Number 4

BULLETIN OF THE NATIONAL SPELEOLOGICAL SOCIETY

n This Issue:

KUBLA KHAN

In Xanadu did Kubla Khan
A stately pleasure-dome decree:
Where Alph, the sacred river, ran,
Through caverns measureless to man,
Down to a sunless sea.

—Samuel Taylor Coleridge

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BULLETIN NO. 4
of the
NATIONAL SPELEOLOGICAL SOCIETY

SPECIAL ARTICLES . . .

THE CAVE

They help tell the story of the earth, upon which man lives and in which he digs.

By J. H. BENN, U. S. National Museum

We earthly beings who place ourselves highest among the known animate creatures because of our mental ability for observation, reasoning and conclusions, look out into the universe and find that our own world is an insignificant unit in a great cosmos of many universes. In looking back to earth, we see her as a comparative universe with many lesser worlds contained therein. All of these lesser worlds, though related, function as complete units of environment for the creatures that exist there. Such a world and such a unit of environment is the cake; a world related to any yet so different from the world to which we are accustomed.

Frequently, this world within a world has but a single passage connecting it with the sky and the air above the earth. Along this passage, there is a rapid change from external to internal conditions, an environment of dimming light through which all creatures must pass to reach the complete black-out within. Then there are other caves which have no openings leading to the outside world and in which no animated movement has ever been known; the only motion being that of earth movement, running water or crystal growth. These two conditions resemble environments of the outside universe in that some planets are capable of supporting life and others are not.

Since the awakening of man's intelligence, caves have been of intense interest to him. They were his first form of semi-permanent home, giving him shelter from the elements and protection from the wild beasts. To acquire and hold this dwelling, early man had to fight the cave lion, the cave bear and many other creatures, with occasional weapons of clubs and stones. Because of his inherent fear of darkness, and having only poor made torches for illuminating the far recesses, it is not likely that the cave-man explored deeply into caverns.

Explorers digging in some caves of the Eastern Hemisphere today find stone implements, along with the bones of animals used for food, buried thirty and forty feet below the present floor. If it were not for these cave deposits, much of man's early history would be lost along with a knowledge of man's prehistoric physical structure.

Neanderthal Man

The Neanderthal Man, skeletal portions of which were discovered in 1856 by workmen clearing a small cave in the Neander Valley not far from Dusseldorf, Germany, is quite familiar to many of us; but not quite so familiar perhaps is the discovery of the Rhodesian-man in 1921. Workmen, while engaged in the Broken Hill Mine, Rhodesia, Africa, cut into a cave containing fossilized remains of animals; among them were found human bones and a skull which is said to have a more modern brain-case than the Neanderthal Man. A still more recent discovery of fossil human remains in case deposits are those of Choukoutian, in the hills east of the Mongolian Plateau, thirty-seven miles south-west of Peking.

The original discovery was made in 1923 and consisted of a single well preserved human left molar tooth; since that time the skulls and bones of twenty-four individuals have been found. The deposits consist of mud, bones and rock-talus cemented together by travertine and forming a breccia which fills a fissure in a hill of Ordovician limestone. From evidence obtained from the fossil fauna, the age of the deposit is considered to be low in the Pleistocene.

In our own Western Hemisphere, human remains found in caves have not been regarded as of great geological antiquity. However, great numbers of both fossil and recent animal remains have been found in natural pitfalls of caves. Such for instance was the Pleistocene cave deposits of Cumberland, Maryland, where the bones of peccary, cave-bear, wild dog, wolverine and many other animals were all found in intricate mass. Likewise, a cave on Charles Island in the Galapagos Archipielago, operated for centuries in capturing the giant land tortoise.

In America the exploration and study of caves has progressed slowly as compared to the work carried on in other parts of the World. Yet right here on our own doorstep we have opportunities for cave work excelled in no other place. What we lack in deposits of early man we possess in every other way, namely: cave fossils, cave life, subterranian lakes and streams, dry caves, wet caves, any number of caves both large and small; and above and beyond this we have the opportunity to study the origin and formation of caves in all stages of development.

The student of geology, whether he be amateur or professional, is greatly interested in the origin of

caves and their various types. These types vary according to the material at hand and the agencies active in their formation. The material may be hard, soft, insoluble or soluble; the agencies may be physical, mechanical, chemical or a combination of all three.

Among the various types of caves there is a vast range of difference extending from the lava caves of many volcanic regions on one hand, to the glacial porting life and others are not.

In the former, the overflowing molten mass cools comparatively quickly at the surface into hard rock and allows the still hot liquid inner portion to run away. The heat retained in the cavernous area thus formed is sufficient to produce long stalactites from the dripping ceiling and to cover the floor with splatter stone. An example of such an origin is that of a lava cave on the slope of Mauna Loa, Hawaii; here twisted columns and stalactitic forms, as well as grotesque shapes of splatter stone, may be seen hardened into basalt rock. This type of cave may be classed as physical—the rock was hot and molten and upon cooling, the cave, such as just described, was formed.

On the other hand, caves and grottos formed beneath glaciers give extreme examples of ice formation. Here beneath the frozen mass, torrents of muddy waters grind and dissolve their way to freedom, carrying with them sand, pebbles and boulders to act as abrasives in making their channels through the ice. These types of caves, though not permanent, serve as an example of both physical and chemical action. Unlike the origin of the lava caves—where liquid turned to solid—the glacial caves are formed by a solid turned to liquid.

Intermediate between the foregoing methods of cave formation are the talus or loose-fall type of cave, extinct hot spring openings, shore line caves and the limestone caves which to many of us are the most familiar.

The alus caves, although not of particular importance for exploration, are of interest because they may be found in many regions where other caves are not present. As their name implies, they are formed at the foot of cliffs or steep talus slopes, composed of jumbled rock fallen from the weathered heights above. They usually are of no greater size and serve only as shelter and breeding places for wild creatures.

Extinct hot springs, although not caves in the general sense, may act as pitfall traps for many animals and are a worthy field for investigation. Their origin is well known owing to the many active examples in our western country. Hydrothermal waters, due to heat and pressure, are forced along crevices and through weak portions of the Earth's crust and are expelled to the surface. In so doing, vents are formed which are enlarged by solution. Upon recession of the waters, deep holes are sometimes left behind particularly plugged with mineral deposits.

The origin of shore-line caves is brought about by the incessant action of the waves and tides wearing away the rock at the base of the cliffs. This action is further enhanced by the abrasive action of boulders hurled and pounded against the coast-line. If, as in the case of the shore-line cave of Nova Scotia, crevices or veins of softer material penetrate the rock, the work of cave formation goes on at an even greater rate. These caves which are worked in horizontally and are never of tremendous length are some of those found in limestone further inland. Where coast-lines have sunken, shore-line caves become marine-caves and serve as shelters for the creatures of the sea.

In discussing the origin of limestone caves, the first consideration to be touched upon is the passage of surface waters to undergound waters. From the surface, water descends through the Earth's crust by gravity, filling all crevices, fissures, and also the pores of solid rocks. The lowest point to which it may descend is determined by the Earth's interior heat. The lowest point of outward discharge is limited to a level not much below that of the ocean's surface. Therefore, cave formation takes place above these limits.

Not only the rains take a downward course through the rocks between their sloping layers and along fissures, but rivers and lakes furnish a permanent water supply as well. These percolating waters from the surface contain carbonic or aumis acid and as they penetrate they eat away the limestone, thus widening crevices, enlarging joint planes and creating a network of connected passages which are sometimes miles in length. At times they are of such breadth and height that streams of considerable magnitude flow through them. In the carboniferous limestone of Kentucky, it has been estimated that the total length of the caverns is somewhere near one hundred thousand miles. In areas as this and in regions of similar extensive cave formations, the country is characterized by numerous sink-holes; enlarged joints or fissures through which surface water enters and begins its excavation between the layers of limestone. Sometimes the underground streams work by abrasion but usually there is little loose material to transport for this purpose, the action being almost wholly chemical.

The life history of a limestone cave may be roughly divided into three stages:

(1) A period of youth and growth during which the cave is gradually enlarging under the solvent action of water,

(2) A refilling or formative period, during which the cave is becoming partially refilled by stalactitic and stalagmitic matter, and

(3) A period of old age in which, owing to the cessation of the flow of water or the depletion of the lime in the overlaying rocks, both the enlarging and refilling processes have come to an end. This period is as a rule followed by the falling in of the root and the gradual disintegration of the cave.

Occasionally a cave may never reach the third stage, its development being arrested by either the lowering or raising of a continental mass. An example of the former was encountered by drillers while working upon the construction of the great aqueduct from the Catskill Mountains to New York City. The drill dropped 28 feet, after penetrating the rock at High Falls to

a depth of over 200 feet, before it again encountered solid material. It was conclude that this soft area was a clay-filled cave, with no further action taking place, and that the occurrence was corroborative of former greater continental elevation when deep stream gorges which are now sunken were being made.

As an example of a case of the cessation of cave formation owing to a rise in land mass and the development of a semi-arid condition, mention is here made of the discovery of a cave in limestone some 300 feet below the surface, by workmen engaged in sinking a shaft at the Maravilla Mine, Naica, Chihuahua, Mexico. The cave proved to be of extensive proportions and the agencies which had been responsible for its formation had long since retired. There is no known natural surface entrance and no plant or animal signs were noted.

Unlike normal caves in limestone, this cave had no stalactitic or stalagmitic growths and was peculiar because of the development of huge selenite crystals from the floor, some of which weighed as much as 45 degrees or more, in beautiful displays of radiated groups; some individual crystals attaining a length of four feet. Evidently at one time the floor of this cave had been super-saturated with calcium sulphate. A reconstructed portion of this cave may be seen on exhibition in the Mineral Hall of the National Museum.

Before ending this paper, a few words should be said concerning the manner in which the familiar stalactites and stalagmites and the less familiar helictites are formed. As has already been stated, surface water filtering down through the overlaying soil contains a small amount of carbonic acid and is thus enabled to dissolve some of the limestone in the cave roof through which it passes. After permeating this rock, the water remains for a time as a drop suspended from the ceiling. As it evaporates, the lime in solution as a bicarbonate is redeposited in a ring about the outer portion of the drop as a carbonate. Where the flow is greater than the process of evaporation, the over-weight drop falls to the floor. As more water filters through and is evaporated in its turn, there is formed a hollow pendant cone which gradually builds downward into a solid mass through deposition from the inside. The lime is thus deposited in successsive layers, forming concentric rings of growth, giving the formation a banded structure. This structure and evidence of the tubular center may be readily studied if a polished cross section of a stalactite is made.

Stalactites have a more slender and delicate form than their coresponding stalagmites, and terminate in finer points. The end of a stalagmite is usually bluntly rounded and more often than not has a small basin-like depression in the top which catches the drop of water as it falls from above. The water spills over and flows down the surface of the stalagmite, thus causing this formation to grow from the outside. A polished cross section of this form shows concentric growth bands but no trace of an internal tube.

Through continuous infiltration of water bringing deposits of calcarious materal, stalactites and stalagmites finally met to form pillars from floor to ceiling. If this action continues long enough, the entire cave may eventually be filled, forming a solid mass of cave limestone. Such limestone is known by various names such as cave onyx, Mexican onyx and cave marble. It is one of the most beautiful stones for ornamental work and where it is found in quantity and of good quality, it is mined for this purpose.

The rate of growth of stalactites and stalagmites is dependent wholly upon the speed of evaporation and the amount of lime held in solution. It may be extremely variable in different localities. The process is obviously a slow one. However, because of the great length of time required for observations along this line, little data is available. In the Hall of Physical Geology of the National Museum, there is exhibited a wine glass which is said to have been exposed to the dripping lime-bearing water of Wyer's Cave Shendun, Virginia, for seven years. It shows a deposit of calcareous mater a scant sixteenth of an inch in thickness.

The composition of stalactites and stalagmites is not always calcite, being wholly or in part aragonite. This mineral has the same chemical formula as calcite but differs in crystalline structure. Varying colors are sometimes given the cave formations due to the impregnation of foreign substances, such as metallic oxides and organic materials.

Helictites are created entirely independently of the stalactites or stalagmites and follow the laws of crystallography. They are formed under those conditions most conductive to crystallization and give rise to radiated needle-like crystal growths upon the walls and ceiling of the cave without regard to the force of gravity. They grow upward, downward, at right or acute angles according to the molecular force exerted within their own bodies. Their formation may be compared with that of ice crystals growing from the ground during cold weather or to the fine needle-like frost crystal which may be seen on windows under certain conditions. When the necessary constituents are present and conditions are favorable, crystallization will occur. Helectites are usually formed of aragonite and occasionally of typsum.

Animal Life Of Caverns

By George F. Jackson*

To the average tourist it always comes as a surprise to hear mention of animal life in a cave and even many naturalists are amazed at the abundance of life to be found in our underground passageways, considering the dark, dreary places in which it exists. Mostly, the life is found where there is moisture, or in spots where food is present.

Wood, organic materials, guano from bats and rats,

***Jackson, author of "Sightseeing Underground", soon to be published by the Society, is now in the Army. The Editor is showing him we like his articles and want more when he comes home.**

and an occasional dead animal furnish some of the chief sources of food, while molds which grow on the wood provided nourishment also. Many of the cave dwellers are scavengers, eating almost anything including their own dead. Animals living in such seclusion are relieved from the competition of seeking to perpetuate themselves where there are enemies more fitted for survival. Those who are adapted to life in the darkness of caves find conditions favorable for their existence. There are no elements against which they must wage a struggle for their lives; no wind, rain, snow, excessive heat or cold; nothing but a need for food which at times may be meager. And so this attractiveness has led representatives of several groups of animals to select these protected retreats for their abode.

Contrary to popular belief snakes are never encountered in caves. Because of the cool temperature (about 54 degrees) and absolute darkness, they are shunned by reptiles whose constitutions require a much warmer temperature. Then, too, snakes are unable to see any better in the total darkness than a man without a light.

Most of the cave dwelling animals are small. Some forms are completely eyeless, the result of living for countless generations in a lightless world; some have good eyes, but continued existence will, in time, result in complete blindness. Most likely to be encountered in the average American cavern are the following forms of life:

Eyeless fish; Amblyopsidae, the cave fish family. There are four different species of these fish, which, existing far down in the pitch blackness of underground streams, have lost all sense of sight and retain only rudimentary specks of eye tissues. This is partly compensated for by numerous touch papillae, or feelers, arranged in ridges along the sides and front of the head. Like all other cave dwellers, they feel their way, but are extremely sensitive to any touch or motion of the water, especially to the front or sides. This acuteness of feeling enables the Amblyopsis to detect and swim instantly to any disturbance of the water. Thus they are enabled to feed upon any form of minute life, or tiny forms of vegetable life which are to be found in the stream.

In size they are small, average in length about five inches. Described as pure white, they actually are a delicate pink, the shade derived from their partly translucent skin through which the blood color shows faintly. They are insenstive to noise, and have a very feeble sense of taste. Many of the characteristics of the eyeless fish appear strange, such as the fact that the anal opening and the oviduct are near the head under the throat. Eggs are deposited in the gill chamber, where they are hatched, and where the young remain for a month or so before they leave the parent to fend for themselves. From eight to twenty young have been recorded in the gill pouches. So accustomed are these fish to darkness that even if reared in the light they will never become a seeing animal, nor will they change their color, as their blindness and bleaching is permanent, the result of long adaption to subterranean waters.

Blind Crayfish: (Cambarus Pellucidus) Possessing a white body the blind crayfish usually stands out with a conspicious sharpness from the darker mud in the pools it frequents. This animal is almost colorless and somewhat translucent. Shaped in similarity to its above-ground bretheren, it can only live in a place where there is a constant water supply. Not only has its sight been lost, but apparently it is as deaf as the eyeless fish. It pays little attention to small disturbances to the water, thus making itself vulnerable to the adriot hands or net of the specimen hunter. When scared it will swim backward, blindly and rapidly toward deeper water, as do the above-ground species, but it does not seem to favor them in hiding under rocks and in crevices.

Little is known of the eating habits of these curious creatures, but they undoubtedly subsist partially on minute animal and vegetable matters in the waters. The writer has observed them taking bread, and raw beef, and once, drops of candle tallow that happened to fall on the surface of a cave pool. They are not at all adverse to eating their own kind if given the opportunity. In captivity they seem to be much more rugged than the eyeless fish, one adult specimen living for months . . . alone, after it developed cannibal tendencies . . . in a gold fish bowl in the writer's home.

CAVE CRICKET (Ceuthophilus stygius). Actually not a cricket at all, but a form of katydid, although differing greatly in appearance from that well known insect. Because it is the most frequently seen, the cave cricket, next to the bat, is the best known (to visitors) of all cave dwelling forms of life. The antennae is always several times as long as the body and the insects are capable of making long leaps, often covering seven or eight feet in a single bound. Their movements are usually quite slow, the long jumps being made only to avoid disturbances.

The eyes are small and black and their vision is apparently very poor, as they are easily caught. Many writers have said that they are found only just within cave entrances, but they have taken them as far as 2,000 and 3,000 feet from the opening in one or two large caves.

No one seems to have discovered much about their eating habits, but the writer is of the opinion they are scavengers.

BATS. Several species of bats are found in almost all caves, the so-called "cave bat" (Least Brown Bat) being the most numerous. They are found underground at all times of the year, but during the winter months of hibernation their number is many times greater than that of summer time. With the exception of an occasional cave mouse, bats are the only cave dwelling mammals, the few other animals frequently encountered underground having gone there either for protection from the elements, or for other sundry temporary motives. That bats have inhabited some caves for more years than can be estimated is indicated by the

enormous amounts of guano in some passageways.

Their resting places are usually the sharp edges of the roof or walls where rocks have been broken off thus giving them something to which they can cling. Or they may be found clutching any ragged or rough spot as they cannot attach themselves to a smooth surface. They hang head downward, so closely congregated together in spots that it is difficult to pull one away from the group. They make a peculiar squealing sound, fly rapidly in the dark, having an acute sense of direction, but this seems to be more of an instinct, since they have been known to fly blindly against a door which had been erected at the rock wall near the entrance of a cave. They spend the night in darkness, going forth in the daytime in search of food. It is needless to mention here that they do not become entangled in the hair of one's head, or that they are carriers of vermin.

They are soft and fuzzy to touch, and will cling tightly to the fingers of a hand, biting with their tiny teeth as hard as they can, but not hard enough to inflict pain, or a wound. (I am speaking of the Least Brown Bat, not the larger varieties, whose teeth can be plenty painful!) They feed on insects such as beetles, flies, moths and others of similar kind. In the fall before going into hibernation it is believed that they fast for a time, but not a great deal is known of the changes or adjustments in the bodies of hibernating animals.

SALAMANDERS: There are several species of cave salamanders, some of which are blind, others which have limited eyesight. By far the most beautiful, and undoubtedly the most handsome form of cave life, is the coral salamandor. The body is a bright orange-yellow color with numerous black spots dotting the entire surface. Specimens as long as seven inches are reported to have been taken, but the average is considerably shorter than this. They are frequently seen just inside a cave entrance, or where there is a stream, or a damp room. They do not seem to favor the remote passageways, preferring to remain nearer the outer world, from which they had not yet lost complete contact.

Regarded by tyros as repulsive the coral salamander is perfectly harmless, and has no weapons of offense or defense except flight and a protective coloring. The skin is so delicate that a careless touch will cause it to break or tear. The food consists of small insects and crustaceans such as are found along the damp ground and the edges of streams. The writer has never succeeded in keeping one in captivity for any length of time.

SPIDERS: Any of several species of cave dwelling spiders may be found from anywhere near the entrance to the furthermost depths. They spin their webs from the rocks and formations living much as do outside varieties. Those living within the distance reaches of a cave show well their adaptation to darkness while those found nearer the entrances are not much different from common out-of-doors species.

BEETLES: Carrion and predacious beetles are found in any cave, sometimes quite conspicuously traveling over damp ground or hiding under stones. Their membranous wings have long been lost from disuse. They have no eyes, the optic nerves and lobes of the brain having disappeared altogether, but their antennae are extremely well developed, and along the head and body are "hairs" serving a sensory purpose. They are somewhat translucent in appearance, although there is a slight suggestion of color. Their size averages around one-eight of an inch to one-forth of an inch in length for the different species. The carrion beetles are more numerous, yet are a darker brown and smaller, thus escaping notice better than the predacious type. Baits of fresh meat attract large numbers.

There are other forms of cave dwelling life, but the foregoing species are the most common and the most likely to be encountered without long and tiresome searching.

GUNPOWDER IN 1812

Not mentioned in any history of the United States is the fact that the War of 1812 would have ended in failure for this country had it not been for the resources so abundently furnished by American caverns.

Our supply of saltpeter, one of the principal ingredients of gunpowder, had been cut off by England's embargo. It was then discovered that nitrous earth in Mammoth Cave, Kentucky and Wyandotte Cave, Ind. could be used to make this much-needed chemical. Thousand of pounds where "mined" in the two now famous caves, and probably in several other smaller ones.

Even today, in Mammoth Cave, may be seen the remains of the wooden pipes and troughs used by the negro slaves who mined this precious material, more than a century ago.

Although this was one of the main factors in our victory over England, the fact seems to have been entirely forgotten by historians.

WONDER BELOW GROUND

Are you considering a "different" vacation this year? Then, why not try a visit to several of America's great caves—and enjoy the breathtaking thrill that comes from seeing nature's lovely, awe-inspiring and wonderful underground chemical workshops.

From the time when they were first used as places of refuge from the elements by primitive man, caves have been associated in the minds of many with evil and fearsome things. As described in song, story and legend, dark unfathomed caverns have always held a weird, romantic and mysterious fascination for most of us. Yet, such fears notwithstanding, most of the so-called commercialized caves are today easy of entrance, not hard to travel through, and some even have electric systems using indirect lighting to guide the tourists through their intricate depths. This modernization has not impaired the original delicacy or im-

mensity of the caverns but has rather enhance it.

The best known and largest cave in the world is Mammoth Cave, now part of Mammoth Cave National Park, in central Kentucky. The section around it is the largest cave area known and contains literally hundreds of caves, varying from mere water-worn channels to beautiful, breath-catching, 'underground labyrinths. Other cave regions are in southern Indiana. Virginia, parts of Tennessee and Alabama and in the southwest, around Carlsbad, New Mexico.

Most of the mysteries of Mammoth Cave are too well known to be gone into here. Suffice to say that they include an eerie stream known as "Echo River", where may be found specimens of the eyeless fish and crayfish, mammoth domes, awesome pits, prehistoric remains, lovely formations, some so fragile that it seems even a hostile breath will destroy them, and many other well-worth-seeing sights.

Wyandotte Cave, in Indiana, long called the "second largest cavern known", was discovered in 1789, and was the first cave in the U. S. to have an account written of it.

During the War of 1812, saltpeter, an important ingredient of gunpowder, was made from the nitrous dirt in both Wyandotte and Mammoth caves. The old wooden pipes, wooden troughs and other paraphernalia of the "miners" may still be seen in Mammoth, perfectly preserved by the cold, dry, even temperature. At the Indiana cave the saltpeter workings are completely gone, having been abandoned nearer the outer air, where the extremes of cold and heat, ice and snow have caused them to decay.

Another noteworthy Indiana cave is Marengo Cave, near the town of Marengo. Although small, as compared to some, it rivals any of them in the number and beauty of its formations. One room, known as "Crystal Palace", has innumerable, glittering formations of every shade of the rainbow hanging from the ceiling and rising from the floor, sometimes joining each other and making pillars of solid, onyx-like stone.

North of Staunton Virginia, is what might be called the "cave country of Virginia." Here, within a few miles are many noted caverns. Among them are Endless Caverns, Luray Caverns, Shenandoah Caverns, Massanutten Caverns, and Grand Caverns. Although the uptilted condition of the Virginia limestones prevents any of the caves from attaining the immense size of some of those of the middle-west and southwest, they rank among the most beautiful in the world.

Carlsbad Caverns National Park, near Carlsbad, New Mexico, is rapidly becoming one of the country's best known belowground show places. Discovered in 1901, this great cave is undoubtedly one of the world's largest and certainly contains some of the greatest formations and largest rooms in any "civilized cavern. Besides highly-colored formations ranging from tiny, flower-like growths to huge, imagination-staggering stalagmites, the visitor is rewarded with many unusual, cavernous characteristics, too numerous to describe here.

All in all you will find that a visit to any of this country's many caves that are open to the public is well worth while. Each is different, has its own peculiar personality. In each you will see the age-old etching of water and chemicals on solid rock. Mighty ledges, carved into fantastic shapes, tunnels, clefts, great rooms with vaulted ceilings, contrast with crystaline columns, gleaming like bejeweled, but unnatural trees, and glittering fringes of sparkling stones on the roofs of some chambers. All of these—and more you will find in our American underground wonderland. Modern highways make them easily accessible and comfortable lodges and hotels are always available nearby. For that different, thrilling vacation, this year, try caves.

MARENGO CAVE

From time immemorial the natural underworld has beckoned yet repelled man. Caves have always been associated in the minds of many with evil, dark deeds and supernatural beings. But, notwithstanding such fears, to old and young alike, there is an absorbing and romantic mystery in traversing these dim underground passageways.

Today there are a number of caverns in the United States where, for a reasonable price, one may spend hours in the company of an experienced guide, exploring these beauties of Nature's chemical workshops. Marengo Cave, located one-third of a mile from Marengo, and 13 miles north of Leavenworth, Indiana, on state roads 64 and 66, is an exceptionally lovely cavern and ranks well up with the most beautiful in the world.

Marengo was discovered in 1883 by some children playing in a sinkhole and was soon explored to about its present known limits—about two miles. Although lacking the lofty vaulted rooms and immense scenic effects of some caves, this one excells most in the number and beauty of its crystalline formations. After the cavern had been fully explored the owners were sensible enough to prevent the breaking of the many stalactites and stalagmites and today the tourists sees them just as they were formed.

Visitors are given their choice of two routes, the time required to see both being about two hours. Many of the rooms, passages and formations have been named after some famous spot or object which they resemble. Noteworthy among these is "Mt. Vesuvius," a large, rounded stalagmite, bearing a striking resemblence to the mountain from which it takes its name. "The Leaning Tower of Pisa" is a tall formation which also resembles the original, as do the "Prison Bars" a series of slender columns about six feet high and eight inches in circumference.

Undoubtedly the most magnificent and wonderful room in the entire cave is "Crystal Palace." From the stand point of sheer beauty, it rivals any cave room the writer has seen in hundreds of caves. Lack of space prevents a complete description of it, but it is indeed a palace fit for King Nature. Hundreds of formations reflect the lights in brilliant colors and fill the

mind of the onlooker with curious sensations of wonder and admiration. On every side are sparkling, fantastic shapes and figures, all constructed through the ages of solid stone and in Cimmerian darkness. One end of the room is mae up of a group of stalactites and stalagmites that look like a giant pipe organ, the glittering ornamentations of which leave the beholder gasping. No merew ords of man can describe it. It is a fairyland in stone.

Marengo has been formed, as are all caves, by that greatest of nature's graving tools—water. It is the result of the slow removal of solid limestone by a stream which started, ages ago, as a tiny seepage along some fault in the rocks.

In case you readers are wondering, those formations which hang from the ceilings of caves are called stalactites, while those rising from the floors are called stalagmites. The former are made by water seeping slowly through limestone rocks and gathering up a quantity of carbonate of lime. When it reaches the ceiling of an underground cavity this water drops slowly down and as it falls leaves a small particle of lime carbonate behind. In time, usually after the passage of thousands of years, a tiny, quill-like formation is left hanging from the roof. Down the sides of this small stalactite other drops of water trickle, each leaving some small bit of its carbonate, and thus the

Meanwhile, the drops that fell to the floor also sides are built out. If the water runs through too fast no deposit is left, the lime being carried away.
contained carbonate of lime and as each struck the same spot, it too, left some deposit and eventually a rounded, cone-shaped mass rises from the floor and is called a stalagmite.

Often stalactites and stalagmites meet forming a column or pillar. There are many of these in Marengo Cave and if the process goes on long enough—Possibly several hundred of thousands of years—it will eventually completely fill the room or passageway.

Caves and Christianity

By Rev. Felix G. Robinson

The Easter Sunrise Service held Sunday April 5 at Trout Rock Cave, Pendleton Co. will likely be reported in another column. This service was held under the auspices of the Society and conducted by the writer as an experiment with an Order of Service derived from ancient texts.

The Institute of Worship and Church Music was founded in Baltimore, Md. the Spring of 1940. Its purpose is to somehow reinterpret Christian Worship thru the discovery of corrected sequences and the utilization of specially created music. Much of our services and music have become so habitually man-centered that objective worship has been almost entirely forgotten. The church needs a new set of men specially educated in the ministry of worship. By her present program she still insists on turning out preachers.

The Easter Sunrise Service in Trout Cave was in the humble opinion of the author, the inspiration for a most amazing idea. What more ideal place of detachment from the world, from institutionalized religion could be found than a roomy cave! It is air-conditioned. No noises of traffic can penetrate its walls—no objects of sight can distract form the inner vision. In other words The Institute in collaboration with the Society is about to embark on a discovery of great spiritual and sociological significance to our present culture. The writer is convinced that a series of services in a suitable cave will not only command the increased interest of members of the Society but will appeal to people from a wide radius of the cave.

Most of the expeditions of the Society are by necessity, scheduled for week-ends. If the Society can announce to its members and the general public that at least in the West Virginia sector it is possible to attend services in a Cave—this will be entertained by those members who are interested in the West Virginia Caves.

The most formative and creative period of the church was the first three centuries. During that long period of 'incubation' most of her life was lived in caves or similar underground places. This was due first to the persecution by the Empire. Inasmuch as Christianity was not legalized by the state—it was just as offensive to be a Christian as it is now to make 'moonshine'. The meetings were necessarily clandestine. It is the old story: Prohibiting people form doing something that they want to do makes them want do it all the more. Perhaps this accounts in part for the unprecedented growth of the church at a time when at least four other religions were very popular and prosperous.

Another reason why Christians worshipped in caves is that the cost of church buildings was unnecessary, and especially in a time when their ideas were being crystallized into forms. And when Christianity became legalized under Constantine 313 A. D. the cavern-motif became the original form of the sanctuary, as was later called the Byzantine art. It was this cavern-feeling for space and time that differentiated the spiritual contribution of this early Christian culture from all others. The East still holds to this, largely as an indestructible tradition. The West lost it by the ninth century by substituting the Gothic sense of space which by the symbolism of the forests, the arches and spires, pointed heavenward. Here in the European West by incorporating a Celestial-feeling in religion, Christianity was trained to forget the heaven that is here, and longed for the transcendental heaven in the far distant future and above the skies.

In behalf of the return of the primitive cavern-feeling which inspired Christianity at its beginning it would seem most fitting in this new era when we are shaking ourselves free of futile shibboleths in science and religion—in days when even the church is crying "let us get back to the primitive church—that our Society, symbolizing an enfranchised science —and our Institute, symbolizing an enfrachised Chris-

tianity should collaborate, and make the adventure of cave-exploring one of spiritual joy. Certainly in these days when civilization is atremble with death-rattles, when language has become bankrupt—and all knowledge has created profound disunities—there might be, God willing, in this unpredictable association of out-door comrades a proper reapproachment brought into existence whereby a new Incident might emerge that would change the whole direction of our culture. No one denies that something radical and fundamental must be effected.

From the chance meeting of members of this Society in 1940 at the Sinks of Gandy I have been impressed by their perspectives—by their healthy instincts—and their valuable objectives. In all my wanderings Walt Whitman-like down the main and up the mountains this group by its wide out-door interests, its discovering the world in miniature thru its cave-explorations, appears to be specially suited to lead many away from the fetid caves, prisons and pens of the city—and by a new spiritual and cultural realism show their limping brothers and cousins 'the sweet roughness' of a new primitivism.

When we have bent the knee, bowed the head, clasped the hand, we then would go forth to what explorations of God's handiwork impress us with an unrestrained curiosity. Still as comrades we spend, therefore, the remainder of the day on the open road, in a closeted crevice or by a cloistered brook. This makes the day redeemed with a hallowness that far transcends the shuttered room, the folded hand and the tedious 'thou shalt nots'. God's Nature beckons with a thousand calls to every moment of sight and sound. This is because we were made of the same stuff.

Notes On Certain Cave Deposits

By Dr. R. J. Holden

Geological Department, Virginia Polytechnic Institute

These notes were prepared originally for the use of the members of the Speleological Society on the occasion of their visit to Luray in January 1940 and incorporated in a letter to President Stephenson. They were intended as a substitute for some of the things which I should have liked telling to the Society on that occasion. They were written primarily for the Luray visit but were later revised to make them of more general application.

Luray is outsanding in its wealth of formations. Stalactites and stalagmites in various forms and shapes are developed on a tremendous scale. Their ubiquity is such that one does not look for more in number but for difference in type. However if one studies Luray critically, there is a varied interest. In 1886 helictites were reported from Luray.

Dolly C. S. On the helictites of Luray Cave, Virginia: Acad. Nat. Sci., Philadelphia Proc. 1886 pp 3ε1-352.

Just what conception of helicties was in the mind of the writer of this article is not entirely certain. Webster's New International Dictionary (1925) says, "A curious twisted form of stalactite". The derivation of the word would lay emphasis on the twisted form but at the time the Luray helictites were first described, an additional idea seemed to be dominant. This was that their long axes were not perpendicular but stood at angles oblique to the vertical. The dripstone character of stalactites and stalagmites was understood and the contrasting attitudes of helictites called for an explaination other than that given for dripstone. Noting spider webs between stalactites and seeing drops of water on the webs, it was but a step in reasoning to the idea that precipitation along the webs accounted for the oblique angles. Just what supporting evidence these authors had, is not known. In light of fuller information, the spider web theory of the origin of helictites seems quite inadequate.

Another explanation of their origin is that they are due to the effect of varying air currents. In no occurrence which I have seen does there seem to be any evidence supporting this theory. I have studied many helictites with this theory in mind. My imagination is not sufficiently vivid to conceive of air currents of a versatility such as to produce these results. Helhand it seems probable that they form chiefly in places where there may be some air movement but they are not forming on any considerable scale. On the other hand it seems probable that they form chiefly in places where the air has little circulation or is quite stagnant. In those extraordinary showings of helictites in the Skyline Caverns near Front Royal, Virginia, it seems quite certain that they were formed in small rooms which were quite closed and in which the air was stagnant and the atmosphere saturated with water vapor. I was present when these helictites were discovered and saw the rooms opened. My first but very limited view of them was through a two inch opening between the rock roof of the cave and the mud floor. This opening appeared to be due to the settling of the mud. The helictites were confined to dome-like cavities in the roof. It seems very probable that these domes were completely sealed below by mud and water and contained stagnant air saturated with water vapor at the time of the formation of the helictites.

Before one can discuss satisfactorily the origin, it is necessary to define the term helictite. I am not yet prepared to give a final definition. My argument therefore loses something of its value. I am inclined to consider a helictite to be a cave deposit of carbonate mineral formed in an atmosphere saturated with water vapor under the force of crystallization and generally in stagnant or quiet air. Like most definitions this one does not set sufficiently exact limits. Under it there must be included structures which mineralogically are composed of aragonite, of dolomite and of calcite. The dolomite helictites which I have seen have been stalactitic in character but definitely twisted. It seems not improbable that the term was originally applied to these dolomite structures. The aragonite helictites on the other hand are branching, with their needle-like and columnar members standing at all ran-

dom angles to the vertical with no direction dominant. They are horizontal. They are inclined obliquely downward. They are pitched obliquely upward. They may even point directly downward or upward or stand at minor angles to the vertical. They may be a network of interpenetrating needles. An outstanding feature is their complete defiance of gravity. It may seem a far cry to include calcite helictites here, but under the suggested definition it is necessary. Calcite does form in caves under the conditions described and produces forms which there may be but little question as to its appropriate inclusion here. A very definite aragonite helictite may become uniformly coated with calcite till the foundation aragonite is completely hidden. The mass has the helictite characteristic but the greater portion of the material is calcite.

There is another structure which has been included under helictites but which under this definition is excluded. No satisfactory name has been suggested. In the absence of anything better the term knob is used. These are common structures in caves. They occur on stalactites and on stalagmites. They are formed as pendants from the roof and as projections from sides and floors. They are knob like or hemispherical or almost globular, the latter being supported by a short thin stalk. Clearly, they are not dripstone. The only characteristic of helictites which they have is that of standing out from their support. They are solid and in this feature are wholly unlike the branching and reticulated forms of helictites. Clearly they are independent of gravity. The explanation seems to be that they result from the action of capillarity in a moist atmosphere spreading lime bicarbonate solutions over surfaces where a gentle circulation of air permits the escape of carbon dioxide and some evaporation.

There is another type of deposit of which I have seen only a trace in the caves of eastern United States. It is the oulopholite, the so-called cave flower. Where strongly developed, they are said to resemble the spreading leaves of certain herbaceous plants. Mineralogically, they are gypsum. They are formed at or just below the surface of the coating of the cave by material which crystallizes and squeezes through a small opening, causing it to be twisted and curved resembling leaves. In the Skyline cavern the gypsum has formed under a coating of crystals of dolomite and disrupted the coating. The following chemistry is suggested. Pyrite is oxidized to ferrous sulphate. This latter reacts with the lime carbonate and water forming gypsum. This gives an increase in volume which finds release through small openings.

These four types of cave deposits may be classified as follows:

	Force	Mineral Composition
Dripstone	Gravity	Calcite (rarely aragonite)
Helictite	Crystallization	Aragonite, dolomite, calcite
Knob	Capillarity	Calcite
Oulophilite	Crystallization	Gypsum

In the developed portions of Luray there are scattered showings of helictites on stalacitites. They may be recognized by their needle shaped habit and their nono-vertical orientation. In a small room below the main exhibition portion of the caverns there are helictites which are particularly interesting. They are branching and interlacing forms whose interior is aragonite but whose exterior is calcite. Quite clearly they were originally regular aragonite helictites which have become thickly coated with calcite. Here then are helictites which have both aragonite and calcite in the same structure.

Various factors determine whether calcite or aragonite will form. In the laboratory a hot solution will precipitate aragonite, while the same solution cold will yield calcite. A strongly alkaline solution of calcium hydroxide will give aragonite to carbon dioxide while a less alkaline solution will throw down calcite. The presence of certain ions is sometimes a determining factor. Temperature, Ph values and ions present and probably other factors are determinants.

At one point in Luray where water is dripping freely, there are a dozen small stalactites, pencil size, hanging close together. Most of these are typical calcite stalactites. Now comes the strange thing. A few of these are tipped with needles of aragonite. There is also one pencil sized stalagmite tipped with needles of aragonite, pointing vertically upward. This seems to show that sometimes the limiting conditions between the formaton of calcite and of aragonite may overlap. It seems to be a pretty well settled mineralogical notion that minerals are stable under the environment in which they are formed. In this Luray occurence it was not determined whether calcite or aragonite or both are now forming. Clearly both are stable under present conditions. It seems not improbable that here under borderline conditions, calcite and aragonite each has the power to precipitate calcium carbonate from solution in its own space lattice.

John Friend's Salt Peter Cave

By William J. Stephenson

The country immediately surrounding this cave gives no indication that caves should be expected to be found in this locality. It is a high and hilly plateau with good surface drainage carrying a thick layer of shaley top soil. No sink nor sinkhole was observed nearby.

The cave itself is entering through a vertical sink hole 15 to 20 feet deep located about half way up the side of a hill in generally open country. The thickness of rock immediately over the cave at the entrance is not more than 12 feet thick. The cave itself appears to be quite young and has a very small (cave visited October 17, 1941 at a time of drought) but active stream running throughout its length.

From the point where the entrance sinkhole breaks into the cave, the cave has a single passage running from roughly northeast to southwest. The northeast branch of the passage ends about 100 feet from the entrance in breakdown which also is somewhat blocked by debris washed in from the entrance.

About 30 feet down the southwest lead, the cave

forms two distinct levels. The upper level lies exactly over the lower, is in places connected and at other points separated by a floor which probably averages less than a foot in thickness. This upper level appears to peter out after about 150 feet.

The lower level has little slope until it reaches a point aproximately below the petering point of the upper level, here it drops at about 150 for 35 or 40 feet and then becomes practically level and continues so throughout the remainder of the cave. It is at this point that the stream flow first reached such a volume as to become noticeable.

The remainder of the cave is merely a generally straight narrow uninteresting passage; at only two points is it necessary to crawl. Both these points are at the spot called the junction, about 300 feet from the cave entrance.

At the junction, the stream and passage swing sharply to the right and an easy crawl is required in the stream for 30 feet, then passage again opens up. To the left at the junction is a small dead end alcove. Straight ahead the cave extends through a very small passage bearing generally to the left. At the end of a 20 foot crawl, there is a series of three rooms which are the largest in the cave. None of the rooms is what can be really called large. The last is the largest, being about 12 feet wide, 20 feet high and 35 feet long, and ends in a mud chock. A spring issues from the side of the second room as the result of the collection of drip from a small chimmey. This spring forms a small stream that flows through the crawlway to join the main stream at the junction.

Past the crawlway at the junction the main cave continues as an unbroken nearly straight passage for about 500 feet whereupon it doubles back on itself in a high "S" curve to the left. From here on, the floor becomes rough and is filled with fallen block and clay. The cave ends after another 200 feet in a mud choke under which the stream disappears.

About 50 feet from the end of the cave is a rock 2 or 3 feet in diameter and half buried in the mud. This rock is called by the natives "the Salt Peter Rock", and has been so hacked or chipped down by souvenir seeker that it has lost its original identity. To the writer, this so-called Salt Peter Rock appeared to be merely the remains of a calcite stalagmite. There was little formation of any kind, outside of this so-called salt peter rock present in the cave.—What little there was—was generally confined to the upper level.

The stream was searched fairly well for fauna, but none was found. Three types of bats were found. Mystis Sodalis, Myotis Sugipicus, and Pipistrellus The latter, in one instance, was so dew covered that one member of the party thought he had found an albino bat. None of the bats of either species were in clusters. In one case, however, copulation was observed.

Felix Robinson pointed out to the party his mother's name which she scratched on the wall when she visited the cave as a girl in 1890. The walls of the cave were wet and so soft that they could be scratched without difficulty. This name appears to be just as fresh as those placed there recently. Above his mother's name, which was less than four feet off the floor, was her initials and the date of October 11, 1890 plastered on the wall with cave mud. This mud appeared as fresh as that found on the floor. Water could still be squeezed out of it by mere pressing down on it with the finger.

From these initials the following facts can be presumed: (1) There has been no flood in this cave since 1890 (fifty years ago); (2) the moisture on the cave walls is practically static; that is, there is not enough of it to produce any noticeable flowing down of water along the walls, otherwise the initials would have either become dissolved or washed out or at least greatly aged or partially obliterated. The mud initials would have immediately been removed if the walls were ever so wet as to actually cause flowing water; (3) the cave humidity conditions have remained practically constant and near the saturation point for fifty years or more. The mud initials would have dried out at least partially were the atmosphere not saturated for the greater majority of the time or had for any period the walls become dry. As before stated no increase in moisture could have ever been present without removing the initials.

Distance and dimensions have been reported approximately in this article for informality. Precise measurement can be obtained from the map of the cave.

PIG CAVE

Darkesville, Berkeley Co., W. Va.

This cave is on the west side of Martinsburg, Winchester Pike, about .5 mile south of a stream which flows across the road (Bridge) in the center of Darkesville.

The cave is about 25' from the road and opens about 10' north of front porch of "Rube" Custer's house. There is a small locust tree about 4' from the opening.

The opening to the cave is straight downward and then slants east in level ground; no rocks protrude through the ground here, although the field behind is full of "breaks." The cave is parallel to the road and consists of (1) a main passage about 150' long, 8' to 18' high and 3' to 8' wide; (2) a shorter smaller passage about 15' east of main passage and lower down, a few small openings even farther east, a yard or so.

The cave is just under the surface of the ground. It appears to be a rather extensive system mostly filled with mud and rocks. Grading for the pike broke through the east passage and it was partly filled with rocks. There are some big wells and a sink hole at Inwood about a mile away and a very small cave at the Inwood Packing House about 100' long.

Rumor has it that a pig was lost in this cave and came out a hole in a man's cellar about a mile to the east, but this seems highly improbable.

G. Flemming, 1882, was carved in the wall of the cave. (explored thoroughly, 6-2-42 by W. Thompson & Frank Silver.

CAVE FAUNA . . .

By J. A. Fowler, Fauna Committee

The previous reports of the Fauna Committee have dealt with additions to the list of fauna collected, in the various caves, visited by members of the Society. While this report likewise represents such additions, it differs from previous lists in that it has been compiled wholly from reports submitted to the Fauna Committee by the members herein included. It is hoped that the preparation of this report of the Fauna Committee from such material sent in by members investigating cave fauna will stimulate other workers so engaged to send in similar reports of their activities. This form of report is much to be desired, particularly under the present war-tme conditions which make most of the investigations being carried on by the Society individual ones rather than projects conducted by the Society as a whole.

The first report, received March 14, 1942 from Bruno Petsch of Morrison Cave State Park, Whitehall, Mont., represents a list of seventeen kinds of insects and their relatives collected December 31, 1940 in Morrison Cave by a party including Mr. Petsch, Dr. Harlow B. Mills, and several others. Dr. Mills, who prepared the list that follows, is associated with the Department of Entomology of Montana State College.

Morrison Cave, Whitehall

12. **Cyptobonus cavicolus** Banks— Cave harvestman.
18. **Pseudosinella** sp.—Springtails.
1. **Onychiurus** sp.—Springtail.
1. **Entomobrya** sp.—Springtail.
1. **Cryptpagus sp.**—Fungus beetle.
3. Rove beetles—fragmentary.
11. Midges Sciaridae)—fragmentary.
1. Blow fly (Metopiidae).
1. Muscoid fly—fragmentary.
1. Parasitic wasp (Ichneumonidae).
1. Plume-winged moth (Pterophoridae).
15. Fleas-probably from pack rats.
2. Flea larvae.
1. True spider.

Mites (sp.)—numerous.

Bat (sp.)—lower jaw.

Of these, the three species of springtails and the cave harvestman are purely cave or soil inhabiting. All of the others are probably accidental or incidental. The fleas are of a group which commonly attacks pack-rats and not humans, and would be expected wherever pack-rats occured.

The cave harvestman are known only from Morrison Cave. They were first found in 1904 by Dr. R. A. Cooley, and the species has previously been known from one probably immature specimen. A dozen specimens have now been collected. According to authorities on cave animals, they are most abundant where there is (1) an abundance of moisture, (2) decayed organic matter, (3) loose stones or other debris where they can find protection.

The following reports were prepared from material forwarded by Martin H. Muma of the Department of Entomology of the University of Maryland. Mr. Muma, who is specializing in spiders and other arachnids, is anxious to receive specimens for identification from other members of the Society. Some of the more difficult groups he will then forward to Dr. Gertsch of the American Museum of Natural History in New York who is working on the cave spiders of North America.

The first list, received March 10, 1942, follows:

Phylum Arthropoda

Class Arachinda

Order Acarina

Family Parasitidae

Three larvae, drip pool, Mt. Etna Cave, Cavetown.

Order Araneida

Superfamily Argiopoidea

Family Theridiidae

Theridion tepidariorum—1 young female, 1 young male, Mock Cave, near Luray, Virginia; 2 males, Goat Cave, Cumberland.

Family Argiopidae

Meta menardii (Cave orbweaver)—1 female, Friend's Cave near Oakland, Maryland; 7 females and males, Mystic Cave, Teterton.

Family Agelenidae

Tegenaria derhami—1 female, Goat Cave, Cumberland.

Family Pisauridae

Dolomedes scriptus—1 female, Twiggtown Cave, Twiggtown.

Family Lycosidae

Pirata sp.—1 young female and 1 young male, Mystic Cave, Teterton.

Of the foregoing all save **Meta menardii**, the Cave Orbweaver, are indicated by Mr. Muma as being of accidental occurence in the caves.

Mr. Muma's second report, received June 25, 1942, is of still further interest. This second report consists of a list of spiders collected by or sent to him since the last report forwarded to the Fauna Committee and which was listed in the foregoing list. This second report is of particular interest since Mr. Muma follows cording to the zone occupied by each in the cave. This system of zonation devised by Dr. Archer appeared in the Journal of the Alabama Academy of Science, Volume 12, Part III, p. 28. According to this system, cave ecology is broken down into three zones:

1. Cave entrances included overhangs of continuous ledges.
2. Zone of partial darkness.
3. Zone of total darkness.

In Mr. Muma's list which follows these zones are indicated by the letters CE, cave entrance; PD, partial darkness; and TD, total darkness.

Phylum Arthropoda

Class Arachnida

Superfamily Argiopoidea

Family Theridiidae

Theridion tepidariorum Koch—Murley's Branch Cave near Rush, 1 female (CE).

Family Linyphiidae

Troglophantes cavernicolus Keyserling—Luray Cav-

erns, Luray, Virginia, several males and females (TD); Mystic Cave, Teterton, West Virginia, several males and females (TD); Needy's Cave, Waynesboro, 1 male (TD).

Phanetta subterranea Emerton—Luray Caverns, Luray, 2 females and 1 male (TD).

Nesticus pallidus Emerton—Luray Caverns, Luray, Virginia, several females and 1 male (PD); Mt. Etna Cave, Cavetown, Maryland, 1 female (TD); Mystic Cave, Teterton, West Virginia, 1 female (PD), 1 female (TD); Ruffner's Cave, Luray, Virginia, 1 female (TD).

Microneta sp.—Mystic Cave, Teterton, 1 female (PD).

Family Argiopidae

Meta menardii Latreille—Blow Hole Cave. Teterton, 1 young female (TD).

Teteragnatha elongata Thorell—Murley's Branch Cave, Rush, 2 females (CE).

Theridiosoma gemmosum Keyserling—Murley's Branch Cave, Rush, 2 males and 1 female (CE).

Family Pisauridae

Dalamedes scriptus Nentz—Murley's Branch Cave, 1 young female (CE).

SPECIAL TRIPS . . .

Society Trip to Wyandotte

REPORT OF AUGUST 1941 TRIP OF THE N.S.S.

By J. S. Petrie

The gathering place was Wyandotte Cave, 35 miles w. of Louisville, Ky. in southeast Indiana. The time was Sunday August 24, the "first day of the week" for speleogical exploration in 1941. George Jackson, son-in-law of one of the owners of Wyandotte Cave a former guide for that cavern, as well as being the author of "Sightseeing Underground" 'sponsored by the N.S.S.' was the first member present recognized by the writer the night before at Wyandotte's entrance, he had dropped off the homeward-bound Dodge in which with a party of four friends he had been traveling to, in and from the Rockies for the past three weeks, and getting in every cave along the way that he could persuade his friends, somewhat less enthusiastic about caves than he. These had comprised Cave of the Mounds at Blue Mounds, Wis.; Niagara Cave, Harmony Minn.; Pool Cave at Banff, Banff National Park in Canada; Morrison Cave, Whitehall, Mont. and Cave of the Winds, Manitou Springs, Colo. Two others of his party, Robert Morgan of Patent Office and Donald Reichard of Public Roads, are also members of the Society,and all cave managers showed the utmost courtesy and friendliness, including presentation of free cave passes, to this little party of the Society. For one reason or another two of the four managers thus met have later joined the Society, which shows its drawing power. A brief report of these five commercial caves visited appeared in the Jan. 1942 Bulletin, so, altho part of the August trip for some members of the Society, will not be discussed further here.

After his strenuous three weeks the writer really welcomed the Sunday rest at beautiful Wyandotte Cave. There was opportunity for a greatly appreciated visit with both Mr. Jackson, (now in the Army), and his father-in-law, Mr. Rothrock, who by the way has a brother in Spokane, Washington, who is one of our members. Reference was made to Clay Perry's S. E. Post article that had recently appeared, and attention was called to one of the photographs showing four or five figures camping in Great Salts Cave. but with only three names in the caption. Mr. Jackson modestly admitted that he was one of the party, and the writer was interested in discovering in the depths of Salts Cave, the following Thursday, a cardboard cylinder on which were inscribed a list of names among them being Mr. Jackson's and others named in the article picture. If Mr. Jackson can write as interestingly as he can talk, not only all our members but many others should not miss his soon-to-be-published new book. He is very fond of Wyandotte Cave, altho no longer employed there and kindly conducted several of us on a short preliminary visit thru a portion of it that Sunday afternoon. Shortly after our return from this trip new arrivals appeared from various directions. Pres. Bill Stephenson, Secretary Al Lewis, Records Committee Chairman Florence Whitley, and John Meenahan came from Washington, as representatives of the D. C. area. Prof. Clyde Malott, of the Geological Department of the University of Indiana, was there among others from Indiana. Harvey Templeton and John Kirby-Smith of Tennessee arrived later during the evening. Ed. Gage and brother, and the Jankowski brothers represented the Pittsburgh area.

Mr. and Mrs. Sam Riely of the management did everything possible to make everybody feel at home. The evening was spent in general discussion led by the president, and in viewing John Meenehan's exquisite Kodachrome slides of caves and their surroundings.

An early start was made the next morning into Wyandotte Cave. As recalled, three trips are now offered to the public, the one of a mile or so into the old cave leading to the left; the short trip of 2 or 3 miles including portions of the intermediate and newly discovered areas; and the long trip of six or seven miles, including the old cave, and most of the newer developed portions. The last of these it is understood has just been opened up the past year. We tried to combine all these trips into a morning's visit.

One of the first places of interest after entering the cave was "The Fillared Palace". Pictures were taken here and also at what was appropriately called "Slippery Hill". The trail wound up and down and finally thru a narrow squeeze into an enormous room, containing a 174' high mountain. A white formation at the top is known as "Lot's Wife". This mountain in a cave was once featured by Ripley in "Believe It or Not". After considerable climbing and picturing the

party ate the sandwiches brought along and were further refreshed with the delicious spring water nearby.

Further journeying, largely thru the most recently opened portions, led thru seemingly endless passages with beautiful helictites and other interesting formations, then back to the fork and into the left branch constituting the old original Wyandotte Cave. Soon the going got rough, with the trail leading up and down nearly as much as ahead. Without actual measurement the distance back to the end of this portion is hard to estimate, but the difficulties in crawling, climbing sliding, wriggling and squirming were abundantly worth the effort, for the passage terminated in what to the present writer is the most thrilling and magnificient scene ever met in a cave, the "Pillar of the Constitution."

This immense formation rests on a broad and high inclined foundation beyond a depression near the end of this old cave passage, and consists of a gleaming white column 72, in circumference and between 25' and 35' feet in height above its inclined base. In the writer's 60-odd caves visited or explored he has never (with one exception, "Mr. Big" in Nickajack later), seen any pillar approaching the "Pillar of the Constitution" in size, and none without any exception whatever approaching it in majestic setting and beauty.

It was long after noon when the party emerged from what in fact was a hasty exploration of Wyandotte Cave, for after all one doesn't see all of what is probably America's third largest cavern in a few hours. We were loath to leave this beautiful spot and its friendly hospitality, but our schedule relentlessly drove us on during mid-afternoon to our next item.

This was Marengo Cave at Marengo, some twenty five miles northwest of Wyandotte. This cave consists of two distinct portions, the first characterized by spacious passages, along a stream bed, with nearly horizontal flat ceilings and frequent shelf-like projections from the walls, reminding the writer frequently of Howe Caverns recently visited in New York. The latter portion contained some of the most beautifully colored formations yet seen, and it will not cease to be a matter of regret that physical weariness from our strenuous morning in Wyandotte robbed us of all appreciation of the beauties of Marengo cave. This cave has many typical interesting geological features. especially of younger caves, and Dr. Maiott's explanations did much toward making the rest of the trip more profitable and enjoyable.

After leaving Marengo, most of the party crossed the Ohio at Louisville and traveled thru Kentucky past Fort Knox and Lincoln's birthplace, reaching the town of Horse Cave in the Mammoth Cave area around midnight. We found Dr. Pohl, manager of three of Kentucky's famous caves, waiting for us, and under his guidance we were soon billeted in cabins at the edge of town.

Tuesday morning, we first visited Mammoth Onyx Cave, about two miles from Dr. Pohl's headquarters in the town of Horse Cave. This cave, tho small, is brilliantly lighted in a way to bring out effectively what might be described as rough and massive rather than delicate formations in all their colors. Among these the rather unusual presence of green stands out in memory, as occuring frequently in the flowstone and other formations. This cave, probably more nearly than any other of the eleven visited during the week, resembled the beautiful Virginia caverns some of us were most familiar with.

Later Tuesday morning we returned to Horse Cave and went thru Hidden River Cave, located under the town. The entrance of this cave is a huge opening in a cliff overlooking a little park at the edge of the business section of the town. We first were conducted along the underground river over a pathway leading shortly to what is probably the country's largest single cave room known east of Carlsbad, Sunset Dome, nearly 200 feet high and between 500 and 600 feet in diameter. Switchbroad connections permit varying lighting effects to be produced in this truly stupendous room, for an experience worth coming many miles to have.

Retracing our steps eight of the party explored a half mile or more of the undeveloped portion of this cave extending upstream. Harry Wilson, legal adviser for these caves, joined us on this trip. He turned out to be quite an enthusiast and has now become a member of the Society.

The passage led over a wide variety of terrain, including slippery muddy stream banks into the stream itself, and narrow zigzag passages with jagged rock walls and downward projecting tongues of rough formations more interesting to look at than to feel with one's head unexpectedly. Several interesting specimens of fauna, attractive to those interested, were observed and collected and at least one picture taken of "non-resident two-legged fauna" in the process of examining an interesting larva. The return to daylight, with ravenous appetites, found a pouring rain in progress.

In the afternoon we were joined by member Leonard Giovannoli, now with the University of Florida, who is the collaborator with Dr. Vernon Bailey (now deceased) in the book "The Animal Life of Mammoth Cave". We journeyed past the road leading to Mammoth Cave thru the wild plateau country comprising the stamping ground of the famous lone caver, Floyd Collins, whose end filled the headlines almost exactly sixteen years earlier. It will be recalled that he accidentally dislodgeed a large mass of rock in a sandhole he was exploring, pinioning his foot, and blocking off rescue parties. Although supplied with food and water and understood to have suffered no injury, he finally succumbed to pneumonia after ten days inprisonment in the dark and cold and shortly before his body was reached thru an artificial shaft sunk thru the living rock. A few years before his death he had explored and was developing personnaly an enormous cave, now known as Floyd Collins Crystal Cave, which we now visited.

The entrance trail in this beautiful cave descends shortly into a colossal and lofty "Grand Canyon" about 100 feet between floor and ceiling, and extending

in a slight curve over 700 feet, with irregular side walls spaced apart varying widths between fifteen and fifty feet as now recalled. In this huge room a casket contains the mortal remains of the great cave explorer. Nearly a mile beyond the end of the Canyon is the small opening like a trapdoor leading to the lower level of the cave, which for lack of time and insufficient guide service, we didn't explore. It is understood that only seven men and no women have ever been into this portion of the cave. Two of these were Messrs. Hall and Gallegher of our membership. Our guide expressed herself as eager to "break the ice" and be the first woman thru this lower level and was as disappointed as some of the rest of us, and undoubtedly more disappointed than some of us due to cumulative weariness that circumstances did not permit the trip. It is understood that a room nearly if not more than a mile in length is eventually reached after a crawl lasting literally for hours, between ten and twenty hours being required for the round trip of the explored portion of this lower level. The extent of this level has not yet been ascertained and numerous leads exist which permit hours of travel before it is realized the wrong one has been taken in the attempt to reach the long room, mentioned above.

While regretfully passing up the opportunity so near and yet so far, we visited what seemed like miles of passageways filled with formations, culminating in a stretch of many feet resembling a huge show window filled with the greatest and most surpassingly beautiful mass of intricate helictites this scribe has ever seen. Another frequent phenomenon was the prevalence of gypsum flowers. For formations of this type, unusual in the Virginia caves, no other cave of the trip approached Floyd Collins Crystal. It is indeed a fitting mausoleum for the one who spent so many hours of backbreaking labor that its beauties might be shared with all mankind possessed of the will and the way.

Wednesday morning, we visited Mammoth cave itself. Our party, now accompanied by Ranger-Naturalist Arthur Lundahl besides Guide Arthur Pine, started on what for most of us was the longest single day's travel in a cave, emerging eight hours later from a different opening four miles away by surface road from the point of entrance. This cave, as every school child knows, is one of the world's famous caves, and on the basis of known mileage of passageways traversed, probably is the largest cave in the world.

Adequate description is beyond the time limits of this article, as well, as of the abilities of the writer. Suffice it to say that it is developed on five different levels, and has two rivers, on one of which, Echo River, the visitor is taken for a long boat ride. The cave is replete with pits and domes of enormous extent, not to mention the miles upon miles of smooth wide passageways, where those of us who had had previous bicycle-exploring experience yearned for their trusty gaspipe cavalry steeds.

Much fauna was seen and many specimens were added to the collection which had been previously started in hidden River Cave. The specimens are now all in the files of the U. S. National Museum at Washington, D. C. Entertainment was furnished by the two Arthurs, one giving us scientific information in the best Ranger-Naturalist interesting manner, and the other pointing out hidden views by flaming oil-soaked missiles thrown with magic dexterity by a mere flick of the wrist with an excellent follow-thru of the cane or wand.

Between morning and afternoon tours we visited the dining room 267' below the surface and had an excellent fried chicken dinner. During the afternoon we left the beaten path and visited some of the lesser known portions of this underground maze. One of the most interesting features was the long rock-lined tortuous passage where excess avoirdupois was distinctly no advantage. The most beautiful formations seen were at the exit where "Frozen Niagara" was truly impressive. A four mile bus ride above ground brought us back to our starting point, for the completion of around 8 miles and the major portion of three of four tours regularly scheduled for what is truly named, Mammoth Cave.

Thursday, we visited nearby Great Salts Cave. On this trip we were joined by members Joe Griffitt and Edwin Trebel, and also Fred Binnewies, Chief Ranger for Mammoth Cave National Park, and others. Fred turned out to be a prince of a fellow and though he had spent 4 years at Mammoth Cave Park since its inauguration as a national park this was his first trip into Great Salts cave.

This is not a commercial cave, but it takes little imagination to visualize its popularity were it closed to any of our great cities. Our progress n this cave was slow, not only on account of the extremely rough terrain but also because the professional photographer for Mammoth Cave National Park who was with us naturally required considerable time to get set for the best possible shots in the various settings encountered. The writer figured in one fearsome picture on a ledge overlooking a chasm that actually wasn't as stupendous as the lighting effect made it appear. However, there were more than a few dangerous spots for experienced explorers in this wild cave. One interesting feature previously referred to was the finding of explorer Neville's and George Jackson's camp and the written evidence of their previous long visit.

One of the highlights of this trip was the finding by Joe Griffitts of a pair of reed sandals left years ago by the prehistoric Indians who visited this cave to get the valuable Epsom salts. The sandals, tho well worn and fragile, were in a perfect state of preservation and were turned over to Mammoth Cave Park Museum as a gift from Joe Griffitt and the N.S.S. We were all excited by this find, such sandals are not rare and many pairs have been found in the various caves in this vicinity. Usually apparently when the Indians discarded their sandals as they wore thru, they hid them neatly under some projecting rock or in some crevice rather than litter up the cave.

Following Joe's finding of the sandals several of the party became interested in searching for other Indian

relics or carrying on other more intensive exploration in the large room rather than pressing on into the cave. Accordingly, Al Lewis, John Meenehan and a few others were left behind in this large room conducting their search, while the rest of the party continued down a small passage which our guide said he had never been in but had always hoped to explore. (The Park Management had decided it best to have a native guide with us for altho Fred Binnewise and Arthur Lundahl were in the party neither they nor any of us were familier with the cave).

The writer was one of several intrigued by the mysterious depths of a sharply descending lead in a particular rocky portion. Down we scrambled, twisting and squirming thru holes scarcely big enough to get thru, and occasionally letting ourselves drop short distances, winding generally down what seemed like a devil's staircase, and reluctant to stop in the absence of any logical stopping place. Finally down a short inclined well we saw the yellowish gray clay indicatiing we had reached the cave floor and the bottom of this crazy rockpile. Nobody can say the writer didn't have his feet on the ground, for here, down to earth at last he was pictured as "Unlost John" grewsome looking to a lesser degree (he hopes) than is "Lost John" referred to later in Mammoth Cave.

One of the party, who had continued on with the guide down the small passage above mentioned tells their experience in the following word:

"After proceeding several hundred feet down this passage a side passage was taken which gradually became filled with sand and clay indicating the presence of an old stream bed. As running water has never been found in this cave and as this side passage led down it was hoped that the stream that must exist on some lower level could be reached thru this new lead. The exploring party was now inching its way forward on their bellies down this wide but closing passage when the wall of the cave began to vibrate as tho an earth quake had occured."

"All stopped to listen and then more blasts followed with a noise like thunder. At this our guide was off like a startled rabbit, his only word being that the entrance had caved in and the roof was falling. The leadership of those remaining now fell on Bill Stephenson and Fred Binnewise. Bill looked at Fred and Fred looked at Bill. Another blast occured but the roof of the passage did not tremble or show any evidence of collapsing. Finally after more silence Bill said to Fred, 'Well, if the entrance has fallen it gives us more time to find out where this passage leads to." The spell was broken.

"Blasts continued to occur, tho with less intensity, and the party continued on its way, inching forward. Though now lively discussion had started as the cause of the mysterious noises, all agreed it best not turn back since if any falls had occurred blocking the entrance we were already beyond help. If the entrance was not blocked, time should be allowed for all falls to finish so that we would not be caught under a fresh fall while making our way out. Most of the party discounted the possiblility of a fall anyway, for as Leonard Giovannoli said, "These caves have been here thousands of years, so why should they collapse today."

Arthur Lundahl pointed out that they know cave collapse occur generally only after heavy floods, earthquakes, or some other actual physical disturbances, no signs of which were present. "Probably blasting in the quarry", he said. "No quarries here," replied Fred. Soon a point in the passage was reached where further progress was impossible and the party started to return, still speculating as to the cause of the mysterious blasts, and what had been the fate of our deserting guide. No one suggested or guessed the right explanation.

"Upon our return to the big room there was our missing guide looking very sheepish, with Al Lewis, John Meenehan and the rest of the party. The cause of the mysterious blasts and noises was merely Al and John pushing a few large rocks off a small ledge to see if any Indian sandals or relics were hidden underneath. None of the rocks had waighed much over 100 pounds, nor had created much disturbance in the main room. Apparently the slope of the passage and solidness of the wall had transparted and magnified the sound to us in the passage more than 500 feet away.

"This incident has been set forth in detail because it illustrates the strange accounts often encountered in cave work. Under other conditions the fall of these rocks might not have been heard fifty feet away. There is also another lesson here. That is, if something new occurs in a cave don't get excited or go off at half cock. Stick with the party and keep with it as did the rest in this instance, even if you are like one member who, after leaving the cave and being complimented on his coolness and presence of mind in not running out behind the guide, said "Shucks, that's nothing. I was so scared I couldn't run, I had to stay with the party!"

This is considered a good place to put in a further word or two about Leonard Giovannoli. He is badly handicapped by the loss of one leg at the knee, and has to do all his caving with the aid of crutches. Yet, never even in the most difficult going did he in any way hold back or retard the progress of the party. It is a geniune pleasure to see him get around, and when the climbing got real tough he would smilingly remark, "Well, I've got it all over you boys, I've one less leg to pull up." His knowledge of cave fauna and formations is extensive. Being with him in the caves was indeed one of the high spots of this trip.

Upon leaving Great Salts Cave we re-entered Mammoth Cave by the Violet City entrance and viewed the mummy of "Lost John", the pre-Columbian Indian whose body was discovered under a huge fallen rock on a ledge nearby the spot in the passageway where it is now encassed in glass. The discovery was made some eight or nine years ago by a CCC boy working in the cave. He first encountered the skull of the unfortunate victim while resting beside the fallen rock mass, and upon investigation found the mummified body had been crushed and almost completely covered. Elaborate hosting apparatus was employed to remove

the rock without further amaging the fragile remains. The victim's reed torch with evidence of its flame having singed his arm was found with the body. How or why the corpse became mummified and escaped consumption by fauna such as cave crickets of the sort now so prevalent, has apparently not been satisfactory explained.

One of these three nights while under the watchful guardianship of Dr. Pohl and his charming wife, a cave-women in her own right, was the occasion of a profitable and highly enjoyable meeting, with beautiful color transparencies of Kentucky caves and their surroundings shown by Dr. Pohl. There the writer first learned of the great Cacahuamilpa cave in Mexico, which for imensity of rooms has "Carlsbad backed off the map," as Dr. Pohl reported. However, altho having seen neither, the writer is willing to hazard the guess that for those who cannot aspire to reach either Carlsbad or Mexico, they can find a very satisfactory substitute in the three caves he has seen and above inadequately described, presided over so graciously by Dr. and Mrs. Pohl.

Thursday night we were joined by member Leo Lambert and Friday morning we left this most profilic cave area of Kentucky if not of the whole country. We stopped briefly on our way toward Tennessee at the site of Lost River Cave, a few miles south of Bowling Green. The immense dance floor in the opening of the cave whose depths we did not see, is apparently the main feature, altho the river itself, said to be 400' deep and 350' long (or vice versa) and the shortest and deepest river in the world, sounded interesting.

By mid-afternoon we had passed thru Nashville and reached Wonder cave on the outskirts of Monteagle, in South central Tennessee. Mgr. Ralston escorted us thru this decorated and fascinating cave, that we were loath to leave as early as the relentless demands of time and schedule made necessary. The large river flowing through indicates the presence of more cave than was seen. It is hoped that this cave may be revisited some time when more time is available for actual exploration.

Before dark we reached Chattanooga and were escorted thru Ruby Falls cave in the heart of Lookout Mountain by Leo Lambert who discovered and developed it. Lookout Mountain cave, over 200 feet lower and not far above the level of the adjacent Tennessee River, had long been known until sealed off by the cutting of a railroad tunnel. In an attempt to reopen this cave by sinking a shaft from above, a new cave, named after Mr. Lambert's wife, was discovered, characterized not only by its beautiful formations in a passageway system, but particularly by its waterfall around 100' in height. Add to this the knowledge that all this beauty was there unknown while the famous "Battle above the Clouds" was fought on the mountaintop over 1000 feet overhead nearly eighty years ago and one indeed has food for thought and his imagination can run riot.

The management granted us the use of the spacious lodge premises for the night, and tired as we were far less comfortable quarters would have been entirely adequate.

Saturday morning, Mr. Lambert conducted us thru Nickajack Cavern. He has ambitious plans to further develop this unique cave, and it is to be hoped that he can carry them thru. It is located at Shellmound, down the river west of Chattanooga, with entrance in Tennessee just north of the junction of Georgia and Alabama. In front of the huge opening in a high cliff. The river in the cave expands into a small lake. Cars can be driven past the lake for some distance over a wide plaza into the cave mouth. Motor boats run by electirc batteries are moored at the landing place near the plaza, into one of which we embarked. The river, probably 25 feet wide at its narrowest, and of unknown depth, widens out frequently as it winds gently during its course of 1½ miles. Presently Mr. Lambert announced calmly, " We are now in Alabama." Beyond another turn "We are now in Georgia." Thus did we play T-A-G in Nickajack Cavern.

At the end of the navigable portion of the river, we scrambled out and had a few hundred feet of rough travel over rocks resembling those previously described in Great Salts Cave. Then the trail marvelously smoothed out into a stretch of nearly 1000 feet like a good highway, on which Mr. Lambert has dreams of laying a track and running small steam trains to conduct visitors. All easy travel has its end, however, and at the end of this highway the ceiling rather suddenly dropped, and we had to crawl. For awhile we found a speedy way was to roll over and over, but before long the height between floor and ceiling was to low even for this, or to keep our bulky gasoline lantern upright, so we had to roll it and inch along ourselves.

In the absence of further excavation many a genial soul who might want to, will never be able to see the wonders beyond this 170' crawl, and with an inch or two less between floor and ceiling none of us could have gotten thru. Finally we emerged into a large room with huge fantastic formations and around a bend met "Mr. Big", as Mr. Lambert calls the largest stalagmite known, so far as we are aware. After careful preparation of lighting supplies at the entrance we had come off without the extra supply of carbide provided, and as our original carbide supply and batteries were running low and the gasoline lantern never did behave other than badly, we had to curtail our study of this phenomenon so deeply hidden in the depths of, I suppose Georgia, an unknown number of feet below any identifiable landmark. The sides of this huge giant were steep and slippery, but not too difficult to ascend for the greater part of the distance toward the top a few feet below the ceiling.

The last few feet were steeper and slipprier and with the aid of the others only one of us managed to reach the summit. Whether the mass is monolithic or consists of stalagmite formation over a series of fallen rocks could not readily be ascertained. At any rate its appearance is that of an ordinary blunt stalagmite enormously multiplied in size. By actual measurement we found it somewhat over 50' across the front and

long diameter, it being roughly eliptical in horizontal cross section.

At least one room lay beyond "Mr. Big", but we understood from Mr. Lambert that we had reached practically the end of the traversable portion of the cave, and our lighting situation did not permit further investigaton. After a picture or two we deflated ourselves into as flat a form as possible and squeezed back with dripping candles replacing now exhausted flashlights and carbide lamps.

Not one of us, I am sure, does not yearn sometime to help re-illuminate for a brief while the inscrutable features of "Mr. Big" as he sits there so tranquilly in the otherwise eternal darkness.

A brief visit to the famous mountain top overhead Ruby Falls Cave, was enjoyed on our way back and a ride by some of the party down the more recently famous cogwheel railway, culminated our scenic views of Sunny Tennessee.

Schoolhouse Cave

REPORT ON TRIP TO SCHOOLHOUSE CAVE, AUGUST 23RD & 24TH

By J. J. Wilson

Since the organization of the Society, a number of trips have been made to Schoolhouse Cave, near Riverton, in Pendleton County, W. Va. It has also become a habit to at least take a look into Schoolhouse whenever working on other caves in this vicinity. A number of our members have been down into the first big room, but because of the peculiar hazards and great vertical distances encountered, many more have been back only as far as the jumping off place. Exploration, however, has been carried on by the rock climbing group of the Appalachian Trail Club, who are better fitted by experience for work of this kind and they have opened up portions of the cave previously unknown or thought inaccessible.

At the invitation of Paul Bradt and in company with Leo Scott, both of whom are responsible for much of the work done in this cave, John Meenehan and I made the trip.

We descended into the entrance at 8:50 a.m., equipped with sufficient carbide, batteries, etc. for at least a twenty-hour trip, and also carrying a few sandwiches, supply of raisins, chocolate, dried beef, canteens of drinking water etc. Our climbing equipment was furnished by Paul and included 120 feet of 7/16" rope for rappelling and about 75 feet of ½" safety rope. Also about 40 feet of ¼" rope and karabiner. At the jumping off place we descended the cedar pole shown on all maps of this cave. There the rappelling rope was made secure and we reached the Grottoe imediately below without difficulty. At this point Paul took time out to demonstrate his method of climbing back to the ledge above without the aid of rope or ladder. This was the first impossible thing we saw done in Schoolhouse.

The rappelling rope was then pulled down into the grottoe and again made secure for the long climb down to the Nick of Time. By keeping to the right as we backed down the rope while facing the wall, and keeping that part of the rope above us close against the rock, we were able to take advantage of small projections and avoid going into the North Well. The rope was then retrieved and the party crossed the balcony to the keyhole with the aid of a safety rope. Paul then made a loop ladder from one of the ropes and we descended to the wet slope that leads down into the Cascade Pit. The climb to the bottom of the Pit is not a hard one but is very slippery and safety ropes were used all the way down.

From the bottom of the Cascade Pit we climbed up to the lower passage, after taking a look into Lowell's Ribfiddle, but not descending into same. We passed the formations known as the Pancakes and climbed up into the Sand Room without difficulty. From here it was an easy trip back to the Dome Room, which is, as far as is known, the end of the lower passage. We stopped to examine some Gypsum flowers in the lower passage and then returned to the Cascade Pit and back to our loop ladder up to the balcony without incident. Next we entered the keyhole that goes through the base of Mr. Hubbard, came out on the plateau and proceeded over it to the Big Bite, where we stopped to rest and eat a little and to change carbide. During this period we threw lighted papers into the Thunder Pit and got a good impression of its depth and size.

Getting under way again, we roped together and crossed the Gargoyle Bridge to where it ends at the Gargoyle Well and Pit. Our lights showed up the bottom of the Pit about seventy feet below, but we could not make out the top of the fell, although we could easily see the Gargoyles about half way up.

As one stands on the Gargoyle Bridge facing the Well, there is a shoulder of rock about eight feet high on the left. By tossing a rope over this one of us was able to delay it from the other side while Paul made a traverse across the inside of the Gargoyle Well to a position of safety near its back wall. John and Jack followed, each being satisfied from both directions by the person who had just crossed and the one who would cross next. Jack then satisfied Leo across, but as he was unsecured from the other direction, the amount of safety he received appeared doubtful.

In the meantime, Paul had climbed directly upward to a window that connects the Gargoyle Well with the Inner Well twelve or fifteen feet above. Most of the belaying stations on the way up the walls would not accommodate more than one person comfortably, although it was necessary for two to occupy them at times because each man had to safety the next one up to where he was before he, himself, could move on. Paul led this climb all the way and was therefore always ahead of and above us, relying entirely upon himself to make all the difficult traverses that are involved. After several laps we reached the Gargoyles, where we could sit, looking down on the Gargoyle

Bridge, the Big Bite, etc. It was with difficulty that we made out the flat roof of the room from this point with our carbide lamps, and the bottoms of the wells were no longer visible. This was partly due to the amount of moisture in the air, but the distances are nevertheless considerable.

Continuing our climb up the Inner Well, we eventually reached a very comfortable balcony where we again changed carbide. There is plenty of room to stand up nad stretch here and the climber can peek off into that part of the cave shown on the maps as "Charley's Groan Box". The second lap above this balcony is one of the most difficult traverses of the whole trip. Paul apparently made it without difficulty and Leo took it in his stride. John and Jack do not know how they got across. Ths traverse brings you to the Upper Window, which I believe is the top outlet from the Gargoyle Well, although the Well itself continues up to the roof of the cave.

Here the climber straddles a few inches of rock, his right leg overhanging the Gargoyle Well, which drops down out of sight, and his leg overhanging the Main Room, as he faces the Angel Roost just in front of him. Orpheus' Snootflute, that expansion bolt driven into the wall by Paul and the other rock climbers on an earlier expedition, and into which Paul's handerchief has been knotted, can be reached and touched from here. Distances to the Big Bite and other landmarks down on th plateau below are rather breathtaking, and even Leo Scott admitted the spot to be somewhat "airy".

The step over to the Angel Roost from the Upper Window is a ticklish one and accounts for the expansion bolt being put there. It is a long upward step onto a ledge that slopes outward at about the angle of repose and we found it wet and slippery. Once on the Angel Roost one has to proceed straight ahead for possibly 35 feet along this outward sloping ledge. There is a crust of dirt along it which tends to dimnish the angle of the slope, but this dirt is loose and provides no protection. The outer edge of the Angel Roost is far enough out so that one walking along the top edge, next to the wall, cannot see over it and down to the plateau more than a hundred feet below.

There is another expansion bolt part way along the Angel Roost so that karabiners may be used to diminish the arc of swing should one slip while being safetied across. The going becomes a little easier as progress is made to a point directly above the Judgment Seat, which is an overhanging ledge of rock at the opposite end of the Main Room from the Jumping off place, and is about twenty feet below the Angel Roost and about thirty feet above the top of the 60 foot mud slope known as Scott's Climb. Here we used Paul's ½" rope to rappell down to the Judgment Seat, using another expansion bolt that had been inserted at this point.

Behind the Judgment Seat is a dirt slope which is fairly easy to climb except at the top where it becomes rather steep. This leads to the very roof of the cave and is approximately fifty feet high. Here a passageway leads to the next room. This passage may be about 100 feet long, but the roof is low and it amounts to an easy crawl. It opens up at the top of the second room, called the Hodag Room in honor of that rare animal whose legs grow longer on one side than on the other by reason of its living on hillsides. The Hodag Room is relatively small and progress is made along the right hand wall, close to the ceiling, over loose dirt into which two or three mud pitons have been driven.

A trough, just wide enough to slide your right knee along while the left leg drags on the side of the wall has been dug. There are a few fairly good hand holds in the rock just above the top of this dirt, but the climber is not always within reach of these. The bottom of the room is about thirty feet below and contains a small pool. The far side of the room contains a good many large fallen rocks, especially back toward the entrance. By bearing to the left as you enter it, you may easily reach the bottom of the room by climbing down through these rocks.

Once across the Hodag Room we entered another passageway along the ceiling of the cave. This passage is about two and one half times as long as the one into the Hodag Room and also requires some easy crawling in places. It fans out at the end at the top of another very large room. I believe this room to be actually bigger in cubic content than the so called "Main Room", but it does not contain as many spectacular features.

We rappelled down about fifteen feet to the top of a large slope of lose dry dirt. The angle was such that we could sit down and slide without getting out of control for about 75 feet, landing on a rock bridge of the same general character as the Gargoyle Bridge. There is danger in the holes between the rocks on this bridge, which may get choked up with dirt at times and present the appearance of firm ground. Judging by stones dropped down these holes, the bottom, which may be in the nature of a well, must be close to eighty feet below.

From the bridge we scrambled to the right for a few feet over broken rocks and then rappelled down for about twenty feet to a good sized alcove which opened out against the right hand wall of the room. Turning to the left we proceeded for a few feet down a corridor to an opening facing outward and downward over the big room, and with a deep well dropping off to the right almost directly below. We were safetied through this hole and across a very difficult step to a point on a wall just above the top rung of a wire ladder, which had been put in place by a previous expedition of the rock climbers.

This point is very uncomfortable because the climber is off balance with little that can be called hand holds, and has to step downward to the top rung of the ladder with his hands. Also, the point from which he is being safetied is not directly above him and a slip would send him swinging out over the well against some very jagged rocks. The ladder is only about twelve feet long, however, and the climber lands on a

small plateau of broken rocks and dirt. Leo Scott was last man down and of course did not have the benefit of any safety rope. By this time, however, we had concluded that the only real purpose a safety rope ever served for either Leo or Paul was in the nature of a moral lesson for others.

The next climb was down a rather steep dirt slope into which mud pitons had been driven. About thirty feet down we landed on a rather gentle slope of dirt and rocks running to the very bottom of the room just a few yards from where a small pool had formed against the back wall of the room. An exposed well runs straight up to the ceiling from here.

Turning to the left, we proceeded first up a gentle dirt slope and then for about fifty feet up a steep dirt and rock climb to an opning in the wall between fallen rocks. Leo led the way and safetied the rest of us up. Crawling straight back through this opening into the wall, and slightly upward, for about fifty feet we followed the passage until it turned directly upward. The climbing was then out through the floor of a corridor up near the roof of the cave. This floor was level and appeared to consist of mud and a considerable portion of sand. The corridor was about 35 feet wide and 30 feet high. One end looked out over the big room directly above the rock and mud slope we had climbed a few minutes before and the floor continued as a ledge part way across the back wall of the room.

As this ledge did not go anywhere and was something like the Angel Roost in the Main Room, we did not go out on it. In the other direction along the corridor the level sand floor gave way to large broken rocks that required some crawling around to get over. On the right is a very deep well, known as the Singing Well because of the musical note that emanates from it as water drips down into it. There is a spring near the top of the well, which for some reason is considered safe while those in other parts of the cave are not. We drank from it and filled our lamps and canteens. The corridor extends for probably 200 feet more after passing the Singing Well, over broken rocks all the way, to a small dome room, at the far end of which is a large cone of apparently fresh mud washing in from the surface above. At present this is considered the end of the cave.

We returned to the part of the corridor covered by sand floor and ate most of what food we had left. and it then being 10:30 p.m. (we had been in the cave for 13½ hours), we decided to lie down and take a nap. Evidently the whole expedition fell asleep for about a half hour. When we awoke we were all stiff and cold despite heavy clothing and the fact we were lying on ropes and miscellaneous pieces of equipment.

We returned as rapidly as possible over the same route we had used coming in, until we reached the Hodag Room. Here John and Jack rappelled down to the bottom of the room on a rope anchored to Paul, crossed the room and climbed out up through the fallen rocks to the passageway at the opposite end. Paul and Leo used the mud wall route and got across quickly.

We came back to the entrance to the Main Room where John and Jack rappelled down the steep part of the dirt slope above the Judgement Seat to a point where it leveled off enough to proceed safely without ropes. Paul and Leo climbed down under their own power as usual.

We stopped on the Judgment Seat long enough to renew carbide and then started down. To the right there is a sort of keyhole going straight down through the Judgment Seat. At the bottom a wire ladder is attached. This ladder is about 40 feet long and swings free, the bottom end touching near the top of Scott's Climb—that 60 foot high wall of mud and dirt. This is one of the "airest" places on the trip. Upon reaching the bottom of the ladder it is possible to climb back up over the upper part of Scott's Climb to an uncomfortable little grottoe about thirty feet below the bottom of the Judgment Seat.

From this point Paul was safetied down Scott's Climb, which contains steps cut into the mud by Leo on a previous trip. Jack followed, being safetied by John and then Leo safetied John down. Leo then tossed the rope down and proceeded to descend without aid. All but Leo had difficulty in locating the steps he had cut in the wall, and it is believed that each of us used different hand and foot holds, missing half of Leo's steps.

Having reached the bottom, Paul took time out to show us the entrance to the South Well, but we were too tired to be immediately interested in further exploration of the Main Room. The trip across the plateau, through the keyhole and back to the Nick of Time was made quickly and without incident. Here we stopped to renew carbide and Leo insisted it was his turn to lead a climb out of the cave.

It must be remembered that all ropes had been brought down into the cave with us, and it was therefore necessary for the leader to climb out entirely unaided. There is a very neat step from the Nick of Time across space to a shoulder of the North Well. A slip to the left would drop the climber into the North Well and one on the right would drop him even farther into the Cascade Pit. There are, however, good hand and foot holds on this shoulder and Leo quickly reached its top about twelve feet up. Now, however, it was necessary for him to climb up a very steep and slippery slope, wet and partly covered with mud. There must be hand holds because he made the climb. Part way up is an expansion bolt, where he snapped his karabiner in place and continued up to the grottoe below the jumping off place. He was dragging the safety rope behind him, with Jack paying it out, and when Leo was ready Jack tied in and started the climb with Leo taking in the slack. A little way past the expansion bolt Jack asked Leo to handle the rope as a fixed rope and stopped climbing the rock and climbed the rope instead, until he reached the grottoe. John followed, climbing in the same manner. Paul followed in quick order and apparently without difficulty, but with the rope as a safety.

From the grottoe, Paul repeated his "upside down" climb to the bottom of the slope below the Cedar Pole.

The packs, canteens and other pieces of equipment were then tied onto the rope that Paul lowered down and hauled up to where he was. Jack followed, being safetied by Paul, and made the upside down climb on a second attempt. One of the requirements at this stage is that the climber hang almost upside down on the underside of a rock over the Cascade Pit. His feet are in reasonably decent holds, but further progress seems to depend on his being able to reach another rock with the back of his head and bridging himself in this positon while he moves his hands up to the next hold. John could just touch this rock with his hair (which is getting too thin for good support) and therefore was unable to get further. He retreated to the grottoe while Paul made a loop ladder out of the safety rope, which ladder was used by John and Leo in climbing out. The party then put their packs back on and climbed up the Cedar Pole to the jumping off place and headed back toward the entrance of the cave.

It was 4:00 a.m. Sunday morning and almost daybreak when we emerged from Schoolhouse. We were quite dirty, and at least two of us were tired. Mr. Scott's wife had accompanied us on the trip, though not into the cave, and we made enough noise coming out to wake her up. It was warm and dry outside and we had little trouble in going to sleep. The sun finally woke us up at about 8:30 and we were able to take our time about eating and getting started home.

As far as the two members of the National Speleological Society are concerned this trip would have been absolutely impossible without the guidance and assistance of Paul Bradt and Leo Scott. We feel certain that Schoolhouse would have continued to hold a great many of its secrets for years to come except for the work done there by Paul and Leo and their friends from the Trail Club. There is still plenty to be done there, but these climbers have established that it can be done.

Caves of the Far West

By Erwin W. Bischoff

What was planned, in the summer of 1941, as a group expediton to explore the lesser known caverns of the Far West, dwindled to a one-man foray as one after another of our party was caught up by demands of national defense. Not to be denied my usual summer fling at subterranean exploration, I determined to go alone with the purpose of looking over the entire regional cave area, running down some "leads", and in general, lay the groundwork for more careful group projects the following year.

What follows is the result of my three-week trip which took me through cave areas of California, Nevada, Utah, Idaho, and Oregon. Bowing, however, to the first rule of cave exploration—never to go alone—

I made actual exploration of only the less difficult caverns.

Moaning Cave—A limestone cavern located 2 miles from Vallecita, California. This is a commercial development, but improvements have been extended only to the entrance chamber. The only known natural entrance was an opening directly above this chamber which is some 210 feet above the floor. Now a 50 foot slanting entrance tunnel 5 x 3 leads to a point a few feet below the natural opening, and here a 200 foot steel spiral staircase takes one down to the bottom. The room was originally about 20 feet deeper but debris sliding from one wall has filled it in. Digging through this "talus" has resulted in the discovery of Indian bones and relics.

This presupposes the former existence of another opening through which the Indians entered, and this is borne out by local legend. Further testimony of Indian occupation is discernible in the smoke-blackened limestone walls. Many excellent formations are in this room which for all its high ceiling is only 20 x 30. There is a steep slanting opening along one wall of the chamber which may lead to the other entrance, but its exploration would require use of ropes. Previous attempts to plumb this passage have been halted by deep water at the bottom. Further exploration should be possible for a well-equipped group.

Lehman Caves—Limestone caverns in the Lehman Caves National Monument, 6 miles from Baker, Nevada. These caverns present the unusual spectacle of a limestone cave in the middle of an arid desert. The water which has hollowed it out originates mainly in melting snows of a mountain above the cave, and partially in infrequent rainfall. This was perhaps the most interesting limestone cavern I have entered, because it displayed every stage of cave formation in active process of growth, and had many peculiar formations that I have never encountered elsewhere. In addition to the usual stalactites,, stalagmites, columns and travertine dams, there were helictites of unusual length and shape.

Huge palette-shaped dripstones have drifted down from the ceiling, a phenomena probably due to the weight and drag of the stalactites on the underside. These stones, resting on the floor, had top surfaces which were perfectly smooth and flat, causing the whole to resemble huge Indian war-drums. The travertine in this cavern is translucent and agate-like, with typical cyclical layers. The Park Service has just completed installation of an electric lighting system, and a 50 foot concrete entrance tunnel. Only about a quarter-mile of the main channel is lighted, and exploration has been extended up to a half-mile. The only existing map of the cave was prepared for electrical installation purposes and is erroneous in many respects.

Many unexplored passages remain, and the length of the main channel remains unknown. The Park Ranger was very cooperative, and volunteered his assistance in any future exploratory work. The local guide, a nearby farmer, is well up on his speleology—has read widely on cave lore— and has evolved some interesting theories on helictite and palette formation. Local geological and hydrological phenomena, as well as the lay-out of the cave tself, point to a vast system

of subterranean passages. This should be a perfect cave for the explorer.

Formation Cave—Small cave 6 miles from Soda Springs, Idaho. This geologically interesting cave occurrs on the border of an undifferentiated basalt and pre-Miocene rock area. It is at the top of a small hill in an area where the ground gives an appearance as though huge bubbles had formed and collapsed, leaving crater-like cavities with overhanging rims. The cave is entered through a small hole in one of these rims.

Average below- surface depth is 25 feet, and the length is about 100 feet. It was probably formed by stream water hollowing out between layers and cracks of the peculiar pumice-like rock. There are no formations, but ground water has formed peculiar globular calcareous deposits on the ceiling, giving the cave roof a bubbly appearance. The cave narrows down in each direction from the entrance to small openings which might be negotiated by persistent wriggling. I did not care to try this while alone. There are possibilities here, but doubtful.

Volcano Hill Cave—A lava tunnel near Grace, Idaho. This appeared to be an old lava tunnel about two-fifths mile in negotiable length. Entrance is effected through a collapsed portion of the roof. Average width is 25 feet, with a 30 foot ceiling. The roof is of stratified igneous rock, and the floor is covered with washed-in silt and mud. There is much evidence of collapse of roof sections, and the consequent debris makes for difficult footing. The far terminus of the tunnel results from a complete filling of the passage by roof debris. Conditions indicate that this tunnel may also have been the course of a stream, post-volcanic, and probably still does carry run-off during the wetter season. No further exploration is possible.

Crystal Falls Cave—Near St. Anthony, Idaho, and **Minnetonka Cave**—Near Paris, Idaho. These I both postponed, as they are of such a nature and interest as to merit separate and careful expeditions. My only object at this time was to locate them to save time in the future. While Minnetonka is easily reached, Crystal Falls Cave required a whole day of search. This latter cavern, from information obtained from natives of the area, and from photographs taken by the Idaho Writers Project, is perhaps the best in the Far West (excepting, of course, Carlsbad and Oregon Caves). Its misfortune, however, is that it lies some 24 miles out on the lava desert over the worst possible road. This particular area north of St. Anthony is a cave-explorer's paradise, there being some 20 limestone caverns and lava tunnels there.

Midway Cave—Near Midway, Idaho. This is an unnamed lava tunnel which I located while checking on rumors current in the area about an "ice cave" near Middle Butte out in the middle of the lava plain. (Every cave is an ice cave to an Idahoan) A half-day search resulted in its location between East and Middle Butte, some ten miles off the road. It approached a half-mile in length, and was a typical lava tunnel of oval shape, 6 ft. average height, 15 ft. average width, with some " rooms" about 30 x 20. It ends as usual with a choking of the tunnel by roof debris. No ice whatever was found. No further exploration here, but there is probability of other lava tunnels in the area.

Craters of the Moon Caves—Lave tunnels situated within the Craters of the Moon National Monument, Idaho. Ed Ericson, the assistant park ranger, became infected with my enthusiasm and together we explored the following "caves": Great Owl, Indian Tunnel, Surprise, Beauty, Boy Scout, Dew Drop, Buffalo, and several unnamed. Great Owl Cavern has the largest entrance room of any lava tunnel I have ever seen, being fully 100 feet high. Surprise Cave contained a "lava dam" some 20 feet high, necessitating use of a rope. These tunnels exist in pahoehoe lava flow area, with interspersed "aa". They are, therefore, very difficult to explore due to the sharply jagged ripples of floor, wall and ceiling. Our hands and legs were soon scratched and bleeding. Lava "stalactites" of good size were soon found here, and even the rarer lava "stalagmite". Many of the tunnels were coated with a whitish "desert salt" which can be broken off in quarter-inch thick crusts.

Shoshone Ice Cave—Located 12 miles north of Shoshone, Idaho, is the only cave I have visited which really deserves the name of "ice cave". It is a large lava tunnel which was formerly completely sealed with ice. Curious natives chopped at the ice wall and discovered it to be a shell which, when broken through, revealed a long tunnel, floored with a frozen "river", and ending at another ice wall of greater thickness. Much of the ice in the cave was melted by the warm drafts coming through the broken wall, and the caretaker here is now attempting to restore its original frozen condition by sealing the entrance with rock. This task, however, was still far from completion. A hole has been chopped over the top of the second ice wall and progress is possible for another 100 feet beyond.

The over-all length of the cavern does not exceed 200 yards. It has an average roof height of 25 feet. The depth of the ice flooring is not known. The floor ice is very clear and unfractured, and rocks several feet down can be seen through the ice. There is a theory that another frozen tunnel lies directly beneath this one, acting as an "ice box" and reservoir for the mid-summer not typical of neighboring caves. Several distinct flows of lava cover the cave, and these may also hold water beyond normal seasons of rainfall and snowfall, and would account for the constant drip of water which does not vary in quantity seasonally.

Pardoxically, the ice in the end wall shows stratified ice layers which indicate seasonal control. A wooden runway has been built along the tunnel to facilitate passage, as several inches of free water stands over the frozen floor. The caretaker stated that a crack in the side of the wall near the middle of the tunnel opened seasonally and drained off this free water. If true, the curious phenomena deserves more scientific observation. There are several other lava tunnels in

the immediate vicinity, and a rummored "chalk" cave nearby.

Arnold Cave—Located 13 miles from Bend, Oregon, is also known locally as an "ice cave" although no ice was present in June. This is an exceptionally long lava-formed tunnel for this area, being nearly a mile in length. It is also exceptionally high roofed (over 80 feet) throughout. Average width is 40 feet. About 200 feet from the entrance there is another opening in the ceiling 6 x 6. The tunnel is rather difficult to traverse due to huge piles of ceiling debris, some piles being over 30 feet high. The walls are smooth, as is the floor where not covered with debris. Near the inner end the floor assumes the more typical rough lava-floor.

While included in my tour, the Oregon Ice Caves, and the caves of the Lava Beds National Monument are not reported on in this paper. I have entered these on previous occasions, and being alone, did not extend investigation beyond former limits.

Conclusion: From explorations made in caves mentioned above, and from information obtained concerning other caverns in the area, I have outlined the important objectives in each state as excellent for future group exploration. California—the lava tunnels of the Modoc Lava Beds, Crystal Cave, Clough Cave, Mitchell's Caverns. Nevada—the Lehman Caves, Northumberland Cave. Utah—the Timpanagoas Cave and caves adjacent thereto. Idaho—Crystal Falls Cave and immediate vicinity, Minnetonka Cave. Oregon—the Oregon Ice Caves.

Should anyone desire more detailed information, sketch maps of caverns, or travel information concerning caves of this area, I will be happy to provide them. (E.W.B.)

Needy's Cave

Needy's Cave is located in the town of Franklin, Pennsylvania, a short distance outside of the town of Waynesboro. It is completely described in Stone's book, **The Caverns of Pennsylvania.** That is, it is described completely as far as information was available at the time of the writing of the book.

To reach this cave, proceed from Waynesboro east on State Route 16 eight-tenths of a mile to a road turning off to the right at Amoco filling station. Follow down this road one-half a mile to point where road forks sharply off to the right and left. Take left-hand fork which is the worst of the two roads. Follow for two- tenths of a mile. Take road sharp to the right. This road crosses a railroad track and stream. Following two-tenths of a mile on this road, take road sharp to the left immediately after crossing stream. One-tenth of a mile on this road brings one to the entrance to Needy's Cave, which can be easily seen not twenty-five feet off the road to the right.

On May 10, 1940, 1941, a party consisting of Stephenson, Black, Mansfield, Chalkley, Allnut, visited this cave, and completed the exploration there-of as far back as the cave extends. On a previous exploration, a party from the society had gone past the well mentioned in Stone's book for a considerable distance, and were stopped by a lake completely blocking the cave about 500' further on. To reach this lake much rock climbing was necessary. The present party started at the well herebefore referred to, and mentioned in Stone's book. From this well one has to climb a cliff by climbing method until they are approximately 20 ft. above the level of the floor. From here the going becomes fairly good for the next 200', the average cave width being 15'. After traversing (3) so-called rooms, another cleft blocks the way. The bottom of the cleft or crevice is water-filled. It is possible to continue further by going around in back of the cleft. This porthole formation is quite interesting. It runs through to the cleft on the right hand side going in.

The wall at this point is sheer vertical for about 25 feet. A partition divides the cave in two. A mud two-thirds of the way up the wall, and it is from this two-thrds of the way up the wall, and it is from this mud-filled passage thru the partition that the above-referred to porthole lies.

After emerging thru the porthole, one finds a footing on the small shelf and, if one is an expert rock-climber, he can climb to the top of the shelf right over the first-mentioned passage and over the cleft carrying the stream.

With the exploring party it was necessary to raise the members at this point by means of rope. Following the shelf for 15' - 20', one goes down a 45 degree slope to the surface of the lake which previously stopped the party. Apparently the surface of this lake had receded by 3 or 4 ft. showing (3) or (4) projecting rocks by which we were able to make our way to the far side.

At this point the cave again divides longitudinally down the center. A cleft existed on the right hand side and on the left. As before it was possible to work one's way up thru the left hand cleft to the top of the cave, and also down across the top of the cave into the cleft on the right. Following the top of the cave back for 15 to 20 ft. the end was approached.

Apparently the top of the cave has collapsed along the left hand side. Broken rock, typical of the collapse of cave ceilings where they approach the surface are found here to exist, and to completely fill the passage. Mud, which had apparently been washed in from the collapse, flowed out over the remainder of the cave so that it petered down, so that further progress was impossible. The cave may continue further, but it is believed that it probably emerges to the surface at approximately this point.

Several interesting readings were taken in the cave. The temperature of the outside air was 50. The temperature of the air in the lake room immediately preceding the well was 55 degrees. The temperature of the room at the far lake at approximately the end of the cave was 53 degrees. The temperature of the water flowing thru the cave was 51 degrees. Apparently the water effected a chilling condition further back in the cave. A reference point for further work on ob-

serving the variations of the stream water level on this cave was established at the well. There is a small projecting shelf upon which the bridge that goes across the well, rests. The tip of this projecting shelf to the level of the water on this day was measured as a distance of 7' 1¼". Apparently the water in the well was 2 to 3 ft. below its normal level. Further readings on the water level of the well at different times of the year will prove most interesting.

The depth of the water in the well at the present was measured and found to be 8' 6½". This great depth is interesting as the stream apparently flows thru the cave along the cave floor. Though the stream apparently flows over the cave floor in times of wet weather, it disappears out along some passage which was thought to lead it into the spring at the farmhouse directly adjacent to the outside of the cave. This may not be the case. It is not understood how the present stream bed could be along the cave floor which is generally six to eight ft. above the bottom of the well for there would be no means to explain how the bottom of the well came to be 6 feet under the present surface of the water. It apparently indicated that the bottom of the well and the far pool were on approximately the same plane.

A complete revised map of this cave will be produced as soon as possible.

Little fauna was collected in the cave on this trip. A few bats found there were all of the pipisquillus family. On the way out several specimens of mosquitoes were collected, and one specimen of cave fly. These were turned over to the fauna committee.

—W. J. Stephenson

Cable Cave

Cable cave is located in the side of the cliffs of the Quarry of Staunton's lime kiln. Only a small man can pass through the several small openings. The quarry is one mile out of Staunton toward Waynesboro on Rt. 2.

The beginning of this cave is small and winding and very dusty. It narrows down to a passage so small that jackets must be removed. From this point the cave is muddy. One must keep to the top passage; the other is too small.

From these, a rope must be used to descend the 40 feet of slick, muddy drop. At the bottom of the pit is a small slit in the wall leading north. This passage opens into a balcony overlooking a large long room. In the wall above one's head, leading east, is a passage which has not been reached to explore.

The walls are covered with peculiar formation resembling barnicles on a ship. They grow or form very thickly on the walls, some being as large as a man's fist. The far end of the room divides into three passages. The left one is too small to explore for. The center one ends in a peculiar formation which resembles a mushroom turned upside down with the stem pulled out leaving a hole in the center.

If you walk near the hole, the thin ledge of rock around it breaks and crumbles. I have never gotten close enough to see how far the drop is.

The right passage is large enough to pass through, but I have never been in it-very far. A few formations are on the roof. This cave takes its name from the fact that there is a steel cable which runs almost the entire length of the cave. No one knows when the cable was put there or why.

—C. Landes

River Caves

By Don Black

On Saturday, April 18, Al Chambers, Chuck Dunning and I took a canoe trip up the Tennessee and French Broad rivers for about fifteen miles upstream from Knoxville. Part way, we slept Saturday night in a cave in same cliffs along the water's edge. We built a fire at the entrance, cooked supper, and went to bed. We'd piled dry leaves on the floor to the depth of 6 inches and spread our blankets on these.

About 15 miles up from Knoxville, we came to Paint Rock Bluffs. They are limestone, I believe, and are colored in streaks by what might be some kind of iron compound. At the base of the bluffs is a small water fall, formed by a stream coming out of a sizeable opening. We explored this for possible 100 feet, but were unable to go further becuse the stream covered the entire floor of the cave. It looks as if the passage might continue on for quite some little distance.

This cave, had an entrance about 20 ft. wide by about 10-12 feet high. The exposure was approximately south. The cave we slept in had an entrance about 10' x 10', and an approximately NNE exposure. Right next to the cave we slept in was another smaller one.

Mock Cave

By Kay Muma

TIME: Annual meeting of the National Speleological Society at Luray, Virginia.

LOCATION: To reach Mock Cave from Washington, drive straight through Luray and make a right turn just outside of town and slightly past the Mimslyn Hotel. The road off to the right turns alongside of a small beer parlor called Dade's Inn. The road is Virginia route 648. Go northwest on this dirt road for .6 of a mile to route 266 which is the left hand turn at a fork in the road. Follow 266 for 1.3 miles, and at an intersection with 654 turn east for .9 of a mile to a field at the end of the road. The cave entrance is about ¼ of a mile from the field on the side of the hill on the left.

On the day of the Annual meeting at Luray most of the party went on a side trip to Mock Cave, just outside of Luray. Many of us went to the cave, all that went saw the inside of the main chamber, but only a few of us, seven to be exact, turned worm for a short time and saw the new part of the cave.

We were led to the cave by an old man who hadn't been there for many years. He was not at all sure of its location or size. After wandering over the hill-

side we finally found the entrance and all lighted our lights and entered. We were sadly disappointed by the size of the one, and only one, room. Most of us returned to the hillside just outside of the cave.

Only a couple of the members of the party stayed in. My husband, Martin Muma, was busy scanning the walls of the one room for spiders and insects. Ellworth Wilson located a small side passage and, not liking to venture alone, came to the entrance of the cave and asked Fishburn to go further with him. On the way back to the side passage they told Muma and Morrison's friend about the new discovery. Thus, the exploring party grew to four men.

Mr. Muma, good husband that he is, came back and stuck his head through the entrance to tell me he was going on through. With that, the rest of us, Morrison Mrs. Wilson and I (the rest of the party had returned to the cars and Luray) decided to go on with the exploring group. The idea of finding something new was toomuch for us. So with Wilson and Morrison's friend in the lead, Muma following them, then Morrison followed by the women, we progressed thrcugh the new passage.

The passage was tortuous. The floor and ceiling came so close together in spots that it was a tight squeeze for most of us, but for Morrison it was almost impossible. He finally, in several spots, took out his pen knife and actually cut away parts of the floor. Of course those of us following him. found life and progress much easier after his excavations. The room at the end of the passage was well worth the squeeze on our stomachs. The path ended abruptly at the brink of a deep hole.

The walls were slippery and muddy and at the bottom were several still, deep pools. Fishburn and Morrison both ventured down on the end of a rope anchore by the rest of us. According to Morrison the pool was full of copepods and isopods. Off to the right of the abrupt ending of the path, just before the drop, was another path which also lead to a drop into the dark, deep water further on into the cave. Having nothing but a ¼" rope, none too new, and since the Luray group was planning supper for us, we decided to give up after Fishburn had attempted to get across the second drop and had given up for lack of rope.

We started back and were soon out on the hillside where dusk was beginning to fall. We hurried back to the cars and, to our surprise, Eno, or what was left of Eno was waiting for us. There wasn't room in any of the first cars for him so he had waited for us.

We want to make a return trip later to see what lies beyond.

P. S. Since the writing of the above story we returned to Mück Cave, but are still not satisfied as to our findings. On the second trip the spring rains had fallen and the stream had risen from eight to ten feet. Thus, the passages were even more dangerous, and Berner Clarke, the copepod and isopod specialist, who went with us was disappointed because all of the pools that had ben inspected by Morrison on the previous trip were now one big, flooded lake. I guess we shall have still one more trip to make to Mück Cave before we are completely satisfied.

Interesting Maryland Cave

By Martin H. Muma

Due to a shortage of rubber and gasoline the author has been limiting his caving trips to caves within a hundred and fifty mile radius of the Washington, D. C. metropolitan area. Fellow speleologists near the district will probably be glad to know that we have in Maryland several very interesting caves, one of which is outstanding. The cave in question is seven miles east of Cumberland at Twiggtown, Maryland on the property of Austin Twigg; the cave is easily located as Twiggtown is a three house settlement, all residents knowing of the cave. Mr. Twigg is more than glad to point out the cave and help in any way.

As for the cave, the dainty speleologist is cautioned to wear his rubbers; it is very wet and quite muddy. The vertical entrance is about twenty feet deep, five to six feet long, and just wide enough to permit entrance. This entrance gives way to a Z shaped shute slanting down on a forty-five degree angle. At the end of the shute one enters an L shaped hallway floored by four inches of the best substitute for glue that the author has even had energy to walk across. The walls in this hallway are glistening with surface water which drains into the lower levels of the cave.

From this main hallway run several short dead end passages. At the end of the hallway and on the left are two passageways, one on the floor and one near the ceiling. The passage near the ceiling the author has left unexplored due to the lack of a ladder or a reasonable facsimile thereof. It leads, according to Mr. Twigg, into the "big room" which contains ornamentation in the form of a "tea table", an "organ", and an "elephant's head".

The passage on the floor leads downward about forty feet and opens into a second level of the cave. This level, like the top level is in the form of a hallway which runs 100 feet in each direction. This room slants downward on about a twenty degree slope, the upper end tapering into a small crawling passageway and finally just ending. Moving down the room, one finds that the much used third foot must be brought into action as the floor slants to the left and drops into many vertical and nearly vertical passages. The lower end of this room has been left unexplored due to several gaps in the floor and the lack of sufficient rope.

Just to the left of the entrance to the second level is a drip hole about three feet in diameter and six feet deep. Descent into this hole proves it to be a chair, a "King's Chair", from which one may step into a third hallway leading downward parallel to the second hallway. From this point on the speleologist must depend on the season for variety of cave exploring.

If the season is dry there is a fourth level to explore, if the season is rainy the stream bed is found

to be on this third level. Exploration during dry weather requires rope, during wet weather the stream bed offers the only avenues to explore. This passage can be traversed in either direction, but care must be taken to test all pools as a fourth, apparently blind, level lies below the stream's surface. From this point on all exploration will be new, and from the cascade roar that reached the author's ears on the last visit, quite interesting.

As a final bit of bait for the curious caver, there is a reputed lake under an adjacent field toward which the stream flows. Could be? Ask Mr. Twigg! A geologist passed the information on to him after studying the geology of the region.

Caves In Cherokee Bluff

Knoxville, Tennessee

The exploration took place on March 21, 1942. The party consisted of Don Black and Chuck Dunning, guided by Al Chambers.

The caves explored on this trip were three in number, located in Cherokee Bluff, across the Tennessee River and south of Knoxville.

A road runs along the base of the bluff, not far from the water's edge. From here it is not very difficult to reach the first two caves.

The first cave encountered, as you procede west on the road, is the larger of the two. It is located in the bluff about 20 to 30 feet above the road. The entrance is about 4 feet wide and 6 to 8 feet high. From here a passage goes back for a short distance to meet another one which runs at right angles to the first. From here on the passages continue in a labrynth of angular passages, some running in a general NE - SW direction. The entire cave is the dryest one the writer has ever been in. Dust to the depth of 3 - 4 inches sometimes covers the floor. The passage of people through this dust creats a most disagreeable condition. (See bottle of dust enclosed). The entire distance from entrance to farthest point may be in the vicinity of 500 to 700 feet, but many side trips were made through various other passages and chimneys, so that the total distance covered may have been in the neighborhood of 1000 feet.

There are numerous chimneys, and one rather deep well, which is about 10 feet in diameter and about 30 feet deep. No formations were observed, but in some places could be seen the stumps of what once might have been columns of considerable dimensions. The writer is at a loss to explain the extreme dryness of the cave. Our guide said that he has never seen it otherwise, and his father went into it often 20 years ago, and said that conditions were the same then.

As with many caves, there is a greatly exagerated tale connected with this cave. It is reported that it is possible to enter this cave, take a certain passage, and come out in Chilhowee Park, 7 or 8 miles away, after having gone under the river. No such passages were observed. The only possible place for such a passage would be from the bottom of the deep well mentioned above. This has been filled in with trash and dust for many years, if it ever existed.

No flora or fauna was observed wthin the cave.

The second cave is farther west along the road. While not as large as the first cave, it has two entrances, one 20 feet higher in the bluff than the other, which is perhaps fifty feet above the road.

This cave is as dry as the first, and the main passages run in the same direction. There were very few noticeable formations here, also.

The entrances are rather small, not over 2 feet in diameter.

In order to reach the third cave, it is necessary to go to the top of the bluff and follow along it for perhaps 2 miles west of the other two caves. This brings one across the river from the University of Tenn. experimental farm.

The cave is rather hard to find without a guide, and is hardly worth the trouble taken to reach it. The entrance is about 2 feet in diameter; this size continues for several feet. Then it narrows down to a circular hole just large enough to get one's shoulders through. After this constriction, the passage floor drops about 2 feet, the roof remaining where it was. From here, the passage continues for perhaps 30 feet, coming to a dead end in light colored clay.

No formations were observed. A small cloud of mosquitoes was observed near the entrance.

Dates as old as 1890 were observed in the large cave. It evidently has had quite a few visitors, because in numerous places the stone has been worn to a smooth polish by the countless number of explorers.

Rope is not needed in these caves, except for the deep well. It is not necessary to descnd into this, because there are no leads extending from it. Unless a guide thoroughly familiar with the rather intricate system of passages is along, it s advisable to take some means of recording one's progress, such as bits of paper, string, chalk, etc.

—Don Black

Moaning Cave

Vallecita, California

By Shelden Davis

(Appeared in Stockton, (Cal.) Record, April 1, 1922)

"It makes the average cave look like a rat hole."

So declared C. T. Mills, the Record's Angels Camp correspondent, in telling us of the newly explored Moaning Cave near Vallecita. He had been down into it the preceding week. We wanted to be shown.

In your dreams did you ever cling to the edge of a cliff, then losing your grip, slide over the edge and drop off into endless space? If so, you know something of the sensation experienced in making the descent into the vast chamber of the famous cave which has long been known to exist but was only explored recently.

The Immense Upper Chamber

For it is a drop of 100 feet from the shelf where the windlass is located to the floor of the first cham-

ber. This shelf or ledge is on the side of the big cavity and from this elevation to the highest point of the ceiling it is 65 feet more, making a total depth of 165 feet. If the Commercial & Saving bank building of Stockton could be set down into this big opening a man on the top of the elevator house would require a pole some 12 or 14 feetl ong to knock the stalactites from the highest point of the ceiling. The bank building is 151 feet high from pavement to the top of the elevator house. You wll not believe these figures on the porportions of the cave. Neither would we until we investigated last Sunday. And the big chamber is only a part of the marvels of the cavern.

Through previous arrangements with the owners of the subterranean wonder, four of us went to Vallecita at the first of the week and made the descent. In the party were Joseph F. Johnson, L. Vinton Peterson, V. Covert Martin, with two cameras and plenty of flash powders, and myself. In Joe Johnson's Gardner car, we left Stockton at 4:45 in the morning, arriving at Angels Camp at 7:25. Here Mills joined the party and after breakfast at Hotel Angels we proceeded on to Vallecita where we met the owners of the cave at Luke Sanguinetti's store. They are Dan Malatesta, Clarence Eltringham and Joe Carley. Mr. Carley's son, Addison, is in fact the third partner but during his absence on construction work in the Pitt river country the father is looking out for his interests. The Solarl brothers, Vic and John, went along to operate the windlass and Master Maynard Malatesta acted as general utility man.

Where It Is

The cave is located two miles from Vallecita on a spur at the right of the Parrott's Ferry road to Columbia and Sonora. It lies between the old Sloan ranch and Balaklava hill which was named by the early French emigrants of the section after the famous Crimean battle. The natural bridges lie three-quarters of a mile away on Coyote creek.

Located in a flat clearing in the chaparral and bull pines are the two entrances to the cave, about 20 feet apart. One of these is the original opening which has been known for 40 or 50 years. The weird moaning sound emitted from this hole gave the cave its name. The other entrance and the one now used was opened up at Christmas time by the new owners. They discovered a crevice and by clearing out some earth and rocks found that there was another passage leading down into the vast chamber which was known to exist below. The old opening allowed the visitors to be lowered by a rope to an abutment (marked A in the accompanying diagram) which afforded a very precarious foothold for one man. The new passage leads to a shaft (B) which was found large enough for the installation of a platform for the windlass and also to allow a half dozen people to look over into the abyss below.

Into the Opening

The brust-covered hills of Calaveras never seemed as fair as they did on that rainy morning when we took one last look around, figuratively kissed ourselv goob-by and stepped into the slimy lips of the ca The warm breath of the inner earth greeted us. Ho ing to a rope suspended from the frame above, went down wet ladders that have been installed. T passage, which requires a tight squeeze in places, fin ly opens out like a cornucopia and brings one to t platform and windlass at the edge of the black g of the main chamber. By the rope it is 135 feet fr the surface to this point.

From the shelf the flash-lights which we all carri made hardly an impression in the dark void. Even t automobile spot-light, with battery attached, which t owners brought in, merely illuminated a small porti of the far wall. By focusing this here and there abo the great chamber, we could gain an idea of the vari formations. But never has any method of lighting be brought into the cave that would show off all the wa at one time and give an adequate conception of t magnitude of this chamber. No pictures had ever be taken in the cave, and when Cove Martin touched o his flash-powders the entire chamber was illuminat for the first time. But of course this was for an i stant only.

Dan Malatesta threw a couple of rocks across t dark chasm so that we could hear how long it took strike the other side. He has pitched for the Ang Camp baseball team, and estimates that the horizon distance from the shelf to the far wall opposite about the same as the stretch from the home plate second base, or in excess of 120 feet.

Some of the Formations

As we clung to the wall and looked over into t void below, one of the boys turned the spot-light on t various formations. Part way down on the opposi wall is the stalagmitic formation which is called t "Capitol Dome," on account of its resemblance to t crowning feature of the national capitol at Washin ton. The surmounting cupola is there, and the lik ness is quite true. No one has ever been up close this protuberance in the cave, but it is probably th the dome is about four or five feet in height.

Farther down is a lovely white orb which resembl an eskimo's house or igloo. The lower portion of th hangs over the wall in folds which simulate curtai and the formation familiar in caves which is known "folded angels' wings." Close to this is a cone with sup-shaped opening in the top, and this has been du bed "the volcano."

On the walls besides and above us were stalactit in all sizes. Bunches of white substance in nodul shape were strongly suggestive of cauliflower. In on place near the shelf was a formation which in col and form bore a striking resemblance to an order beef kidneys from the butcher shop. A little "Siame pagoda" is close to the windlass.

While they were showing us the wonders of th chamber I was taking sidelong glances at that platfor which projected over the inky hole and at the win lass and skip by which we were to be lowered into th

abyss. It is a different proposition from going down into a mining shaft. In the latter instance you know that many others have made the descent before you and come back safely. But last Sunday was the fifth time that anyone had ever gone down to the floor by way of that skip. And you wondered about the strength of the cable and the wooden platform. What if the cliff would give way and the whole works should come tumbling down? And suppose one of those calcium stalactites broke off and playfully tapped you on the head while you were 100-odd feet below!

Into th Depths

The windlass installed is a gear affair with a 6 to 1 purchase and a thousand pound capacity. The half inch steel cable used is capable of handling a working load of six tons. None of us weighed that much, so we decided to take a chance.

The skip is merely a board with four chains from the corners which attach to the cable above. Around the San Francisco waterfront it would be called a boatswain's chair. You straddle the board and then are tied in with a rope "so that in case you get dizzy or faint away nothing will happen,' as Malatesta explained. It is capable of carrying two men at once, but the owners will take no chances.

Eltringham went down first to show how it is done. He took Martin's heavy cameras along with him. We watched his flash light as he slowly descended into the big hole. Mills had been down before and went second. Joe Johnson was waiting for the skip when it came to the top. He was the first one down of our party, then Martin, myself next and finally Peterson. The other two owners staying at the top, leaving Eltringham to be our guide. Johnson waived the right to be tied in. The rest of us were more conservative.

It takes seven minutes for the skip to reach the bottom and meantime you are clinging to the chain in front of you with one hand and gyrating your flash light with the other, viewing the wonderful formations as they are passed. There are great fluted pilasters and heavy curtains of calcareous material which appear like brown velour with their coating of soft mud which has oozed down. There are many of the "folded wings." At one place there is an eliptical formation 10 or 12 feet long which resembles a huge cigar. It is covered with a mud solution which looks like the coating on a chocolate eclair.

As the descent is made, the skip hugs the cliff for part of the way. Then the wall recedes and it seems that the world has dropped away and you are riding through measureless space. At one place about thirty fee down one of the guy ropes has a knot in it and unless the rider pushes it away the thing has a tendency to make the aerial saddle tilt forward and buck you off. This is a real thriller.

Fear is forgotten because of the many things to see every inch of the way. Toward the bottom one passes the so-called "mushroom patch." Then terra firma is reached.

Close to the point where you alight is a little bench and on it is a coyote skull which has become congealed in the limestone formation. Years ago the animal probably fell over the cliff. What became of the rest of his skeleton can only be guessed.

Exploring the Bottom

The floor of the big chamber is composed of loose rock and material which is known among miners as float rock. With a tape measure we found that the distance from the corner shown near the "fountain of Youth" to the opposite corner, shown in the diagram as under the "Mushroom Patch," but in truth on the other side of it, was 75 feet.

The only evidence of life found in the cavern were two small frogs and a spider which seemed perfectly at home in its wet surroundings.

The "Fountain of Youth," as the boys have named it, is a snow white basin of about a foot and a half diameter set in the walls. It is fed by a flow of crystal clear water.

A half pitch slope leads down to this point and the **cave visitors go down** here one by one, as the feet of one's friends have a disconcerting way of loosening the rocks, which come rolling after you.

Human Relics

Squeezing through a passage so small that it forces one to crawl on his stomach and would keep out a real fat man, you emerge into the next chamber, which is known as the bone yard because of the quantities of human bones that have been found here. Samples of these, which without doubt are Indian bones, were brought down to Stockton with us. Edward Hughes, who examined them, states that they are of people who were undersized if anything and, judging from the state of perservation, might have been there for any period from one hundred to three hundred. They were imbedded in soft mud rather than limestone and because of this condition conducive to decay he says that it is more than likely that they have only been there for the shorter period.

How they got there is the question. They are too far down to have been thrown in from the top. It is possible, however, that there were upheavals or landslides in the cave which carried the bones down to their present location. It is also possible that the Indians got into the cavern by other passages lower down on the hillside which have been closed up or remain undiscovered by the whites.

At one point in this second chamber is a group of stalactites which resound like chimes when struck by one of the broken pieces. If a light is held behind them they are as translucent as alabaster.

The Fourth Chamber

A cliff in one part of this room leads down 79 feet to what is known as the fourth chamber. Malatesta is the only person who has ever been down into this one. He was let down by a rope two weeks ago and reports that it has some beautiful formations. Among others there white stalactites three feet long and no bigger around than a lead pencil. A lake of water about twenty feet across and three feet deep prevented him from getting to the shore on the other side. Having just recovered from "flu" he did not care to wade or swim

across. So the far shore which had a bench about 20 feet across remains unexplored and may lead into other passages. He estimates that this room is between 40 and 50 feet long, 20 wide and 20 to the ceiling.

In the Third Chamber

The third room leads down to the mud flat. Two weeks ago today Mills ventured out on the edge of the mud flat and discovered that it would sustain a man's weight. Then Malatesta walked out to the center. His footfalls made a hollow sound similar to a drum and he gingerly tiptoed back.

When we were down there a week ago we climbed the side of the third chamber to the passage marked "unexplored" in the diagram. We ventured in there further than any one had been before, hoisting ourselves up in place and holding our breath in others so that we could work our way through. In one small cubby-hole it appeared as if a quantity of icing for a cake had been poured over the side.

At one place in the third chamber the stalactites and stalagmites had grown together and then been fractured as if by a slipping in the fault.

"Suppose the earth should heave now!" some one remarked.

"Yes, wouldn't it be a shame," Pete commented. "It would smash all the stalactities."

A Quaff at the Fountain

Then we returned to the upper chamber. Peterson was thirsty. He decided to drink at the "Fountain of Youth." The rest of us not being as far along in years as he nor as eager for the object of Ponce de Leon's quest, took no chances.

"Why, its good," Pete exclaimed after a copious draught.

"It ought to be," came back Mills, "I just washed my hands in it after handling all those Indian bones.

There was a tense moment when Martin set off his first flash powder. No, one knew what effect the concussion, however slight, might have on the limestone icicles on the roof of the vault. We thought of trench helmets, and remained breathless, but nothing was disturbed.

In all, five hours was spent in the cave but the time passed so rapidly that no one could have believed it. For the trip back and forth on the windlass it requires seventeen minutes for each person, seven in going down and ten in returning to the shelf.

Upon reaching the surface once more, it was found that the sun had come out. The mocking birds were singing and it was a beautiful world.

When the wet weather came early in the winter the moaning sound stopped and we could not hear it. This gruesome noise, which is said to come intermittently and resemble the gasps of a person dying or in great pain, is attributed to air currents in the narrow passages. It may return in dry weather and it is also possible that by opening up the second entrance to the cave the conditions which made the noise have been disturbed. Any one with a Maeterlinckian fondness for the supernatural will enjoy connecting the fact that the moaning stopped after the owners of the cave first took out a quantity of human bones.

Early Attempts at Exploration

Now for a little history. The Moaning cave has bee for years but never completely explored because of th difficulties in gaining access. Nor did the early visitor have the lighting facilities that are available now.

Thirty odd years ago Clay Hellock, superintende of the Confidence mine, allowed himself to be lowere by a rope through the old entrance. He got as far a the foothold marked A in the diagram. To gain som idea of the size of the cave, he had provided himsel with a barley sack saturated with coal oil. Setting match to this he threw it over the edge. As it lighte up the cavity and fell toward the bottom, Hellock' hair stood on end and he signaled to be pulled up. H never went back after that.

Later Percy Sloan of Vallecita and his brother wen into this chamber. But their lamps were blown ou and as they attributed this to "bad air" further ex plorations were given up.

How They Got It

Last August Addison Carley,Malatesta and Eltring ham went cave hunting. First they were down on th Stanislaus river. Then they returned to the old Moan ing cave. Carley was the first one to go to the botton He went down to the old ledge at the end of a rop and then pushing himself off from this continued o toward the floor. Several times he was lowered int this seemingly bottomless gulf before the bottom wa reached. Discovering the wonders of the cave, the tri started looking around to find who was the owner o the land on which it is located. Strangely enough, i was found to be a 30-acre piece of government land All the surrounding territory had been taken up by private parties years ago. The three explorers locate the tract as a stone and timber claim and filed fina proof on it February 14th. They obtained this bonan za merely for the asking.

At Christmas time they opened up the second en trance and found the ledge which has since served a the means for going down into the depths of the cavity

Plans for Exploiting

The partners hope to put a steel tower 96 feet hig into the main chamber, with a stairway and platform every 16 feet in order to give tourist and visitors a chance to get down into the big hole. A bridge fro the present position of the windlass would lead to th top of the tower. Young Carley, who is general foreman on the high tension line from the Pitt river being pu in by the P. G. & E. has made the model in wood fo the proposed tower. It would have a base 40 feet square and require twelve tons of steel. This would be lowered piece by piece into the hole and then assembled there. Electric welded wire railings would be installed Details of the construction may be altered. It is possible that the stairway will be put inside because of the timidity some might experience if it were on the edge of the structure. Two of the cave owners are steel workers, and with some additional help they can han-

(Continued on Page 40)

PRESIDENT'S COMMENTS

LOCATING CAVES

By William J. Stephenson

The locating of caves is at present probably the biggest and most important task of the Speleologist. In this article the term locating is used in its broadest sense. The termis, therefore, not limited to the finding of caves, but to the actual locating of them so that they may be easily found later by others.

The files of the society have many reports (some of them recent) which merely locate the cave by saying that "X" Cave is on the property of John Q. "X" is 5 miles east of the town of "Y". Such location directions as the above may, off hand, appear all right and a sufficient means of locating the cave. A little reflection, however, shows this not to be the case, for often after two or three years, "X" sells his land and moves away. In later years even the town of "X" may change its name. We have instances on record where even the name of the state has changed since the first location data was written down. In Kercherval's History of the Shenandoah Valley, written in 1832, a great number of caves are listed and located by reference to property of which now there is no trace. In many instances, the county is no longer the same. In some, even the state has changed as above noted.

If the work of our Society is to possess any lasting value, we must develop some means of locating caves so that once they are located they stay located, so to speak.

The only known method of permanently locating any object on the earth's surface is to describe its exact position on the earth's surface; that is to tell its latitude and longitude. If the latitude and longitude of an object is known, its position can again be found, even though all maps which existed at the time it was originally located were to be subsequently destroyed.

The latitude and longitude of any object, of course, may be determined in the field by the use of surveying instruments or with a sexton in accordance with well known principles of navigation. Neither of these methods are usually advisable for the average Speleologist, and further, they normally would not give readings as final as is usually desired. How then can the Speleologist locate cave by latitude and longitude? The answer is easy. The Speleologist has merely to plot the cave on any topographic map and read the latitude and longitude off the map. Where a map is available which is drawn approximately 1" to the mile (compared to the United States Geological Survey Topographic Map of scale 1-62,500, as used on their 15' sheets) one is usually able to locate the cave within a second and a half of latitude and longitude. When maps have smaller scales the accuracy of location is reduced, but even with the 1-125,000 or 30 (minute) map drawn at about ½" to the mile, cave locations can normally be made within 500' or 5" of latitude and longitude. Where large scale maps are available the accuracy increases so that a careful Speleologist should have no trouble locating a cave to within ½ second of latitude or longitude (50 feet) on a map drawn to the scale of 2" to the mile or larger.

The above example of accuracy, easily obtained by the use of a good map are considerably more accurate and precise than those normally obtained as the result of the use of field instruments, and many times easier to obtain. The average Speleologist should, therefore, have no trouble at all making such locations and computing the results in terms of latitude and longitude.

Having located a cave by latitude and longitude, one might guess that they have the cave finally and properly located, and the job finished. This supposition is all wrong. Latitude and longitude locations are all right for permanent work and for records to be passed on to posterity. Though caves may be located in the field relatively easily from latitude and longitude readings with the aid of a map similar to the one on which the location was originally made, it is still desirable to have the usual local directions so that one can, at the present (for at least the next year or so, go directly to the cave without having to lug along a map and make computations and observations en route. To this end, simple directions should be written down with as much detail as possible. These should start at some well known, easily located point such as a definite street intersection in a well known town, or a definite road intersection on some main route (remember that roads are often relocated and realigned; town by-passed, etc., so that road intersections are none to permanent) and proceed in detail as to miles or tenths of miles by speedometer on such a route or street in a souther-north etc. direction. Make note of road forks and whether the turn is to the right or left and how far it is necessary to travel after making the turn. Make directions explicit until finally they reach either Farmer Jones' house or a big tree, etc. where the car is parked. Then compute in feet or paces up path or across field in a particular direction (give degrees if possible) and so on until cave is reached.

These so called popular or road directions are easy to take and can be made by the most unskilled Speleologist. They should be made so clear that anyone can go directly to the cave without the use of a map, making inquires of natives or any other aids other than written directions.

Many caves occur in open country or in the mountains far from the nearest road or farmhouse, etc. Even though, the directions for reaching such caves may be quite specific and accurate. there is opportunity for one following the directions to become lost, confused, or to follow them erroneously. As an example give any three people a series of simple direction such as 100' N. E. then 50 paces at 70 degrees, 500 feet at 45 degrees and 50, etc. and the probabil-

ities are that they will all end up at a different point

As one gets into mountains or open country with few land marks, the probability of one following a set of directions, even when the directions themselves are accurate, and actually ending up at the cave entrance is greatly reduced. Often extensive searching and circulating around the area adjacent to the ending of the directed course is required to find the cave.

For the above reasons it is obviously desirable to use still additional methods of locating the cave. This can be done by way of cross sights. From the mouth of the cave several sights should be taken on both natural and man made objects. (The use of both natural and man made objects is desirable as the man made objects are usually more readily discernible while the natural ones are usually the more permanent. By use of such lines of sight any one getting even close to the cave by the following of a set of direction can easily and quietly line himself up over the cave opening by merely positioning himself on the intersection of the given sight lines. The following is an imaginary example of lines of sight.

Lines of Sight from Mouth of X Cave.

1. Bald Top Mountain 85 degrees.
2. Lone cedar tree in middle of field 120 degrees.
3. Old Red Barn on Horizon 135 degrees.
4. Center line or Red Man's Gap 185 degrees.
5. Gate in fence 150 degrees.
6. Large white rocks on top of hill 260 degrees.

From the above example it should be clear that if one is within 1000 feet of the cave the majority of the land marks should be apparent and when two or more have been line up, one should be right on top of the cave. However, one must get somewhere close to the cave before the use of sights becomes of any real value.

Where the entrance from the cave is relatively shut off from the surrounding country such as by being in the bottom of a small valley or sink, or in a thick woods with no outstanding land mark visible it may be desirable to take the lines of sight from some other point (preferably within sight of the cave) as from the rim of the sink or valley etc., or in the case of woods several lines of sight may have to be taken external of the woods and projected into the woods so as to intersect the cave's entrance.

The above discussion has attempted to show that no single method of cave location is entirely satisfactory. Each method has its advantages and disadvantages, if one is to do a conscientiously good job of cave location. (And every true speleologist does).

SAMPLE SHEET ONLY

CALF.—4 (Nameless)

General Location: Calaveras county, California. In limestone belt of Sierra foothills.

Road Directions: From Angels Camp **north** 6 miles to Murphys, then **northwest** 12.3 miles via posted unimproved road to bridge over Indian Creek, then **east** by trail 200 yards along north bank of stream. Cave is half-way up side of bank.

Map Location: Longitude: 115 50' 10";
Latitude: 48 17' 22".
USGS Map Quadrangle: Tehipite
NE¼ Sec. 14, T 14 S., R. 4E.

Field Location: Natural: 550 feet from top of Brush Hill on magnetic azimuth 53 degrees.
Manmade: 342 yards from north end of Indian Creek bridge on magnetic azimuth 146 degrees.

Map Reading By:_____
Field Location:_____
Date of Magnetic Reading:_____

CAVE FOR ARCHIVES

(This draft of a recent letter requested by Mr. Harris, was prepared by W. J. Stephenson).

Mr. Collas G. Harris, Executive Secretary
Committee on Conservation of Cultural Resources
Room 112, National Archives Building
Washington, D. C.

Dear Mr. Harris:

Following our recent conversation concerning the possibilities of the use of caves for the storage of archives and like material, I hereby submit the following detailed report.

Desirability of Caves as a Repository for Archives

Concerning the desirability of caves as a repository for archives, two main factors are immediately outstanding—one being the complete protection, especially against bombing and other explosives, which they offer; two being their availability.

Protection. The protection which caves offer resides in two outsanding factors. The first is that the majority of caves which are suitable for storage use usually have from fifty to several hundred feet of solid rock above them, and nearby explosions will usually in no way injure the structure of the caves. This factor is borne out from information received concerning blasting which has been done in commercial caves during their process of development and from first hand observations taken in quarries where blasting has been done, showing little if any damage two or three feet in from the face of the quarry. The second is that the location of the cave channels underground are usually utterly unknown. A few commercial caves have had their passages surveyed and their patterns marked out on the surface. However, where the great majority of caves are located under ground is still unknown. It would be impossible, even when it is known that material may be stored in a cave, to either bombard an area or actually drill through the rock with any assurance of reaching the material which is known to be placed within the cave. The passages of caves are very seldom straight—they usually wander in all directions. The opportunity is thereby offered when using caves for storage purposes, to place the material either well back in the caves, a great distance from the entrance in a well-known direction, or closely adjacent to the entrance. A fifth columnist lacking a detailed map of the cave would be unable to locate

the position of the stored material. Wherever excavation is undertaken to provide storage depots the scar on the face of the earth will remain as a tell-tale mark of such storage unless highly camouflaged. Even if camouflage is perfect, the natives in the nearby area or fifth columnists have the opportunity of pointing out the exact location of where the material is stored.

Availability of Caves. The main factor concerning the availability of caves is the fact that they are already there and excavated. Caves are found in widely dispersed areas within the borders of the United States, thus making them generally available to any designated area. The equitable temperature of the cave allows work to continue day and night in all seasons. To use caves as a storage depot should require a minimum of subsequent excavation. Perhaps a minor enlargement of the entrance and the construction of even passage ways for trucking the material into the cave would be necessary. If it is desired to form partitions either of concrete or other material, to install lights, runways, etc., the cost should be no more than that of providing the same facilities in a building erected on the surface, and would surely be less than the cost of the same if the depository had to be actually excavated.

Specific Problems Relating to the Use of Caves

Whenever the use of caves has been previously suggested for this purpose the question of the moisture has immediately arisen. Caves can be divided into two classes—the wet and the dry. In the latter there is no problem of moisture control. In the former the moisture control offers generally the same problems that would be encountered should underground storage be attempted. In normal open country where the storage depot was excavated below ground water level provision must be made to make the walls of the depot water-tight. Obviously, in any underground depot the roof must be made water-tight. Such a water-tight roof could be constructed in any wet cave just the same as it could be constructed elsewhere without the additional cost of the previous excavation. However, dry caves are so numerous that at this time the question of the use of wet caves may well be eliminated. In the storage of certain archives, humidity controlled devices must be used to keep the storage space at the desired relatively humidity. It is probable that no cave presents the optimum relative humidity for the use of archives—they are all probably too dry or too wet. However, if a building or other similar structure were use as a repository, suitable humidity controlling apparatus would have to be installed. There is no reason apparent why such humidity controlling apparatus could not be used in a cave the same way that it would be used within a building. The question of protection from rodents has arisen and it does not seem that any problem is herein presented. Wherever materials are stored provision must be made to protect them properly fewer insects and rodents. There are probably fewer insects and rodents present in caves than in surface buildings or in man-made underground storage spaces. If this question should at anytime offer any particular problem, the membership of the National Speleological Society comprises experts on cave fauna who would be glad to answer any specific questions relating to the control of cave rodents or insects.

As to the specific methods of storing materials it is believed that they can be stored in underground caves the same way as in surface buildings by providing shelves, etc., or in specific containers. Water-proof containers, offhand, appear to offer the most efficient type of storage, providing such containers are available. If enough water-tight containers were used, all questions of humidity control, rodent control and exposure to actual wetting would probably vanish. Attention is called to the fact that paraffin impregnated paper containers can be purchased which should offer ample protection to individual manuscripts. If such containers were additionally stored in water-tight boxes, it is believed that complete protection would be furnished regardless of where the boxes were deposited.

As to the guarding of materials deposited in caves it would be apparent that the problem should be much simpler than guarding materials stored on the surface. The entrances to the caves could be entirely sealed, thereby avoiding any guarding problem whatsoever. In all events, the single or perhaps small number of entrances that a cave possesses should minimize the problem of guarding. Due to the thickness of the rock over the cave, the surrounding area should hardly need guarding to prevent sabotage or breaking in as in a surface building.

Commercial Versus Non-Commercial Caves

Caves of the country may be roughly divided into two classes commercial and developed and non-commercial and undeveloped.

Commercial Caves. Commercial caves have generally been provided with smooth passages throughout. Electric lights, and, in many instances, drainage has been provided. In all cases, good roads usually lead directly to the entrance to the cave. Futhermore, the caves are usually located near some center of population or a well-traveled road, as caves back in the wilderness, so to speak, offer little commercial advantages. Obviously any commercial cave could be commandered should the Government desire to use the same. This act, however, would probably be costly for the Government and would further serve to disrupt the business of the country. It is believed that there may be enough suitable undeveloped caves throughout the country to make commandeering of commercial caves unnecessary. It is pointed out, however, that many commercial caves possess rooms which are not developed, that is, open to the public. Some caves such as Luray Caverns, Luray Virginia, possess rooms which are fully developed and graded but are no longer open for various reasons. Any commercial cave which possesses unno longer open to the public or portions which might developed rooms of easy access or rooms which are be temporarily partitioned off without disrupting the business of the cave, would probably be the most ideal places to store material which is to be used from time

to time and to which easy and rapid acess is desirable. All that would be needed would be the erecting of a suitable light partition or other enclosed space which would be properly protected against moisture. The management of the cave would be responsible for the safe keeping of the material. Non-commercial or undeveloped caves are usually relatively inaccessible in comparison. However, as a permanent place of storage, especially when secrecy is desired this factor is not such a drawback as it would appear. It is believed that there are enough undeveloped caves close to good highways to fulfill all the storage needs of the country. If a non-commercial or undeveloped cave is used, obviously lights must be installed and other light construction work must be done before it is suitable for moving in the material. This, however, should not be too great a drawback since as above pointed out, such facilities must be provided for any storage depot. They are, however, usually already provided in the instance of commercial caves. A list of commercial caves of the country is here attached. It is believed that this list includes every commercial cave of any size or note able that only a few of these caves would be suitable able that only a few of these caves wouldbe suitable under any circumstances for storage. Should it at any time be desired to use such caves the owners or managers can be easily and quickly contacted.

Non-Developed Caves. Non-developed caves are found generally in nearly every state of the Union. Many of these caves were worked for saltpeter during the Civil War. Nearly every cave that was worked for saltpeter is what could be called a dry cave as moisture would naturally tend to dissolve the saltpeter. Also, the saltpeter miners in most caves did excavation work that would minimize the work required to render them suitable for storage depots. There is no known list available of all the caves that were used for saltpeter manufacture during the Civil War. It would be impossible to list them all even if they were known. The work of the National Speleological Society has resulted in a rather large list of non-developed caves in the Virginia and West Virginia areas. Amongst our records are lists compiled by individuals of caves in some few states. Many states which are known to be extremely cavernous appear to have no records concerning their undeveloped caves available either to the National Speleological Society or to any known state or Federal agency. Below is a partial list of the outstanding cave areas of the United States:

1. **Virginia** (particularly the Shenandoah Valley area extending from the northern border practically to the Tennessee border)—several large caves are known to exist, especially in the extreme southern portion of the State.

2. **West Virginia**—the eastern mountains contain hundreds of caves, many of which are dry and form suitable storage spaces. Caves are found in West Virginia practically throughout the mountainous regions. The disadvantages of West Virgnia caves are generally ther lack of accessibility.

3. **Kentucky**—this State has two great cave areas —one in the eastern central and the other in the western central part of the State. The one in the western central part around Mammoth Cave is probably one of the best known areas in the world. This area will be hereinafter dealt with in detail.

4. **Tennessee and Alabama**—both possess their share of caves. There are many large undeveloped caves in Tennessee. However, no catalog is at present available which lists even a portion of the existing caves. The caves of Tennessee generally are found in the middle and western portions of the State.

5. **Northern Alabama and Northwest Georgia** also contain a considerable number of caves. The caves of Alabama have been pretty thoroughly cataloged by the State Geological Survey under the leadership of Dr. Walter Jones. Between 30 and 50 such caves are listed in Dr. Jones' book on "Ground Waters of Northern Alabama."

6. There are few caves of any size in the **New England** area. This area is an exception to the general statement that caves may be found generally throughout the country.

7. East central **New York** has a considerable number of caves but the majority of them are wet, and in all caves in New York which are at present known to the Speleological Society are, for one reason or another, unsuitable for the storage of archives.

8. Caves are found generally throughout the entire State of **Pennsylvania**. The Assistant State Geologist, Dr Ralph W. Stone, has made an intensive study of the caves of this State and has written a book, "Caves of Pennsylvania," which is now in its third edition. Additional caves have been located since the book was last edited.

9. Large caves exist in southern **Indiana** and some in Southern **Ohio**. The caves of Ohio are generally small and not suitable for repositories. The cave of Indiana, however, are both numerous and large and quite similar to the caves of Kentucky. They would probably provide good storage sites.

10. **Florida**—many caves are known to exist in Florida, but most of them are probably wet and unsuited for storage depots, however, they might bear further investigation.

11. Both **Missouri and Arkansas** in the Ozark Mountain region possess a great number of large caves. The caves of both of these States have never been either thoroughly cataloged or explored. It is only known that many big caves exist in this area.

12. In the Black Hill district of **North and South Dakota** is another cave-bearing region. The caves in this area have been partially investigated by the North Dakota Geological Survey.

13. The Rocky Mountain states generally possess few large limestone caves. There are some few exceptions, namely **Montana and Colorado.**

14. In **Western Texas** and **Eastern New Mexico** are found some of the largest caves known to exist in

the world. Carlsbad is one of the outstanding examples of caves of this area. There are reputed to be over a hundred known caves, the majority of which are unexplored, in the Carlsbad National Park alone.

15. There are records of one or two caves in Arizona, but they are not known to be numerous.

16. There are relatively few caves recorded as existing in the states of the West Coast although a diligent search might result in the discovery of some suitable caves in this area.

Lava Caves

In the West Coast area and in the western Rocky Mountains are peculiar formations known as lava caves. Immense lava fields contracted and left a ceiling of lava above the beds of slowly solidifying molten lava. The crust which was left is upheld in most instances by columns of considerable thickness. The lava beds in which these lava caves are found exist in the western states. To effort has been made to catalog and explore these lava caves. They are known to be generally dry and of great area, some of them extending many miles. The main drawback as a storage depot is the thinness of their roofs and the fact that large portions of the roof might cave in under the shock of explosion.

Government-Owned Caves

In the use of caves for storage depots the question of leasing and ownership of course immediately arises. It is earlier ponted out that the Government itself owns many suitable caves. Both of these caves are only a part of a large Government National Park, each comprising hundreds of acres. As before stated, there are hundreds of caves in Carlsbad National Park, the great majority of which would probably be suitable for storage depots. In the Mammoth Cave area some seventy caves are known to exist. Many of these are ex-commercial caves which were bought out, and there would be need for little work if it is decided to use them. Mammoth Cave National Park contains some 40,000 acres and is located near the center of the United States. The area is not only generally safe from immediate action, but it is of uniform access from at least all portions of the United States east of the Rockies. The Government has further eight or nine national parks or monuments centered around a developed cave. For example—Wind Caves and Lava Caves, etc. Complete information pertaining to all Government controlled caves should be obtainable from the National Park Service.

Old Mines

Old mines have been suggested also as storage depots for archives and similar material. Mines present many of the problems as do the caves. However, the majority of mines possess one disadvantage which caves do not possess, that is the danger of caving in. The majority of mines are timbered when worked and these timbers rot, so that the entering or exploring of an old mine is at best a hazardous undertaking. Generally, unless the abandoned portion of the mine has been kept in a state of good repair it would be totally unsuitable for storage space. There are, however, a few exceptions and foremost are the salt mines. These mines are absolutely dry (they would obviously have to be or salt would dissolve) and generally have been worked by steam shovels, therefore having large passages sometimes one hundred feet in diameter. There are miles of such passages reputed to exist under the city of Detroit and also in the mines of upper New York State. These mines being dry, timbering was unnecessary. It is believed that abandoned salt mines, especially of New York State and Michigan could be used for the storage of valuable records to even better advantage than caves. The Bureau of Mines could probably give complete information as to what mines in the country might be suitable for this purpose.

Caves In the Washington Area

To complete this report specific mention is made of two or three caves near the city of Washington which it is believed would be suitable for storage:

1. Luray Caverns, Luray, Virginia—This cave is known to possess two or three rooms already developed but not shown to the public. A limited amount of material to which quick access would be desirable mght be economically stored in this cave.

2. Fountain Cave—This cave is located at Grottos, Virginia, about 1000 feet south of the developed cave of Grand Caverns. It is only a few miles from the railroad and a road suitable for trucks leads right to its entrance. It consists primarily of one large room some 600 feet long and 75 feet wide. It is generally dry and has fifty to one hundred feet of rock over it's entirety. It has but a single entrance and could be easily sealed. It probably is the most accessible permanent storage place near the city of Washington.

3. In West Virginia there are two caves—Trout and Snedekers. Trout is four miles south of the city of Franklin on U. S. Route 220, and not over 300 feet from the road. It is completely dry and has many hundreds of feet of usable passages. Snedekers is a still larger cave located on a back road just west of Dragon Mountain battle fields between Lewisburgh and Marlinton, West Virginia. Trucks could be driven not only to the door, but actually into the cave. The cave was mined for saltpeter during the Civil War. Both Trout and Snedekers Caves have ample rock protection over their roofs.

Suggestions and Recommendations

The following concrete suggestions are offered:

1. That the Government store archives and other valuable and irreplaceable documents and articles in caves wherever possible since it is thought that caves offer the safest form of protection available;

2. That the country be divided into areas and the best and most available caves in those areas be selected as permanent depositories;

3. That foremost amongst these depositories be considered the Mammoth Cave National Park and the Carlsbad National Park. That in the Michigan area the question of the use of salt mines be seriously in-

vestigated and considered;

4. That in addition to the major depot centers a great number of minor depositories be set up primarily for use locally and for the use of material and articles where ready access might be desired. It is suggested that the commercial caves be seriously considered for such depositories, although it is believed that undeveloped caves in the area, if such are known to exist, would probably be superior to commercial caves, except for those articles where easy and quick access is desired;

5. That some means immediately be undertaken to survey properly the country to locate all usable undeveloped caves. It may be a considerable time before a large number of caves would be needed but it would take considerable time even if several parties were placed in the field even to locate partially and survey the major undeveloped caves of the country. It is recommended that this work be immediately started from some available emergency funds;

6. That some permanent Government agency be established to study the caves of the country from all angles. Though the above report has been limited solely to the use of caves for the repositories of archives and of irreplaceable materials, it might be that caves would have even greater use for the storage of bulk material such as gasoline, irreplaceable metals, etc., not to mention other uses that might develop as the study of caves progressed. It is believed that such agency might best be placed under the Geological Survey and that such agency should have the entire jurisdiction and responsibility for the correlating and study of all information concerning caves and should be responsible for the dissemination of this information to such Government agencies that might be interested and for the coordination of any use that such agencies might wish to make of caves; and

7. It is further recommended that any Government agency either, temporary or permanent, work in cooperation with the National Speleological Society and activities of this Society, since the field of cave study is so broad that many years of study and the coordinated efforts of many people will be required to assemble entire information of the nation's caves in any permanent usable form.

Sincerely yours,

(This consisted of a lengthy listing of Commercial caves).

EQUIPMENT COMMITTEE REPORTS

Foot Gear

I have been using a pair of heavy nailed boots for the past year. They are comfortable and very good for climbing over loose rock but are very heavy. For almost any other kind of climbing I would recommend either sneakers or a good grade of work shoes.

That can of whole grease that I sent you is a sample. Try it out. I've found that it is very good for any kind of leather goods. I use it on the uppers of my shoes and linseed oil on the soles. This treatment hardens the soles, softens the uppers and preserves and waterproofs the shoe. Shoes so treated remain dry in any kind of wet going and can easily and safely cleaned of mud and dirt by washing.

Some people prefer to use a special wax in place of the whole grease and claim for it the advantage of not softening the leather so much. This would apply particularly to ski boot. If you are interested I could send you samples of these special waxes.

Candles

Several months ago I sent Bill S. a Standard Oil Co. "Granite Mining Candle No. 302" - 8" long x 13/16 dia. This paraffin candle has the very desirable property of remaining hard at body temperature. Most paraffin candles soften and run unless kept cool. Tallow candles are firm and slow burning but are expensive.

It appears to me that this candle, or one similar to it would fulfill our requirement of an emergency light. If you agree with me, I should like to finance the purchase of a case of candles on the same conditions as the Justrite Lamp deal. Would you be willing to handle the purchase and resales? Unfortunately, I don't know which S. O. Co. makes this particular candle.

Carbide

Carbide is a problem to be worked on. In cans it sells for 2 lbs. for 35c but in drums (25 lbs., 50 lbs., 100 lbs.) it costs only 6c or 7c a pound. What say that we buy a drum for resale to the membership? At say 10c per pound. I would be willing to finance the purchase if you would handle the actual procurement.

Emergency Light

It is my opinion, and I believe many will agree with me, that every speleologist should be required to carry a candle and matches for emergency light.

The procurement of a special candle for this purpose is discussed elsewhere.

A case should be provided for the matches. The 15c brass Justrite match case is recommended.

The question of whether or not the candle should be protected by a case has not yet been determined by practice, or has it?

Have you anything to say on this subject?

Rope Ladders

Rope ladders made by knotting or otherwise adding loops at regular intervals to a single line of rope are occasionally used. For example, on the 1940 Schoolhouse cave trip the PATC climbers used a rope ladder in which the loops were made by doubling back the line on itself and tying a simple overhand knot on the doubled end. Such a ladder is easily made but the loops are clumsily formed and the efficiency of the knot is low. A better way to form the loop is by making a bowline knot. The efficiency is much higher and the loop is better former, being circular in shape, making it easier to insert the foot.

A third type of loop may be made by splicing. By separate enclosure, I'm sending you a sample. The splices are tedious to make but the efficiency is high

and the lack of lumpy knots makes the line easy to handle.

O f the three methods, the bowline knot loops seem to me to be the best.

—J. R. Williams

MEMBERSHIP BREAK-DOWN

By J. S. Petrie

A cursory examination of the 164 names on the active membership roll of the N. S. S. at the end of July, 1942, after a little over 1½ years of the existance of the Society, reveals several interesting facts. Distribution among the several states alphabetically arranged is as follows:

Ala. 2; Ark. 1; Conn. ; Fla. 1; Ill. 1; Kans. 1; Ky. 6; La. 1; Md. 20; Mass. 7; Minn. 1; Mo. 2; Mont. 4; N. H. 1; N. J. 1; N. Y. 3; Ohio 12; Pa. 12; S. D. 1; Tenn. 3; Tex. 1; Va. 23; Wash. 3; W. Va. 9; Wis. 3; D. C. 31; Army 9; Marines 1; C. Zone 1. Total 164.

In as much as the National Speleological Society is the outgrowth of the Speleological Society of the District of Columbia, the fact that more members come from the Washington, D. C. metropolitan area than elsewhere is not to be wondered at. The adjoining states of Maryland and Virginia in their entirety, however, with the District, account for less than half the entire membership. 25 or more than half the states, are represented.

We have on our roll 21 doctors (PH.D. and M. D.). 16 women, 14 cave managers, 14 members west of the Mississippi, 10 in the Armed Forces, and 8 in the Patent Office,—a total of 83, or more than half the entire membership in these six categories.

In our next issue the results of a proposed study of the application blanks of the entire membership, may be given in another article. One difficulty is foreseen, —that the occupations of more and more of our membership are changing under the unprecedented conditions prevailing. Notice of any material changes in data supplied by any member at the time of joining is solicited.. Keep us posted as to changes of address, to the obvious advantage of yourself, the officers, and the Post Office Department. Suggestions of any desired features to be brought out in this proposed article will be especially welcome.

Incidentally, another analysis of our membership shows that these members are all cave managers, as follows:

Baldridge, Tom—Mgr. Sky Line Caverns, Front Royal Virginia.

Burgen, Martin L.—Mgr. Baker Caverns, Williamson, Pennsylvania.

Chaney, C. G.—Bainbridge, Ohio, Mgr., The Seven Caves.

Clymer, Virgil H.—1009 Harrison St., Syracuse, N. Y. Mgr. Howe Caverns, Cobleskill, N. Y.

Cremer, Al—Mgr. Niagara Cave, Harmony, Minn.

Davis, Wesley E.—321 So. 3rd. St., Livingston, Mont. Mgr. Morrison Cave, Whitehall, Mont.

Dunlavy, Myron C.—210 Union St. Hamburg, N. Y. Mgr. Lincoln Caverns, Huntingdon, Pa.

Gillette, Mrs. S. H.—Mgr. Eagle Cave, Muscoda, Wis.

Harnsberger, R.—Mgr. Luray Caverns, Luray, Va.

Lambert, Estyl—Mgr. Seneca Caverns, Riverton, W. Virginia.

Lambert, Leo B.—1032 Volunteer Bldg., Chattanooga, Tenn., Mgr. Nickajack Cavern, Shellmound, Tenn.

Nichols, F. W.—P. O. Box 424, Burnet, Tex., Mgr. Longhorn Cave.

Pohl, Dr. E. R.—Mgr. Hidden River, Mammoth Onyx, and Floyd Collins Crystal Caves, Horse Cave, Ky.

Stover, Holley—803 Stoneleigh Court, Washington, D. C., Mgr. Grand Caverns, Grottoes, Va.

LETTERS . . .

Box 170, Route 5,
Hillsdale Road,
Evansville, Indiana
December 30, 1941

Mr. Wm. J. Stephenson,
Washington, D. C.

Dear Mr. Stephenson:

This is the first chance I've had to answer your letter of November 6th, enclosing the letter from the lady in Iowa. I have answered her letter.

As far as I know there isn't any cave at the spot she mentions. I think it is one of those shallow "wind caves" (as I call them), those depressions that are hollowed in soft rocks by wind, etc., not a true cave at all.

The F. Wallace Rothrock you mention in your letter as having become a member of the N.S.S. is the son of F. M. Rothrock, the principal owner of Wyandotte.

One of the reasons for this letter is to tell you that he an I have recently discovered what we feel absolutely certain is "Indian writing" in Wyandotte. I won't take the space to tell you all about it now, but we first got on the trail of it through a letter written in 1818. It is high on the wall of the first large passage way in Wyandotte, which you probably remember. I am taking some pictures of it soon and will be glad to send you copies if you'd like them. I once prepared a paper on the former possible prehistoric inhabitants of Wyandotte Cave for Indiana University. If the N.S.S. can use it, I'll send a copy along. Interested? It may help to add to the "cave data" you already have.

One of the guides at Wyandotte has also found the name William Henry Harrison back in the Old Cave Route. He was supposed to have visited the cave in 1806, and although plenty of people have looked long and searchingly for his name in the cave, no one has ever found it until now. Will see that you get a picture of it also.

As I may have told you my book on Wyandotte was supposed to have been published sometime this year, or early next. I don't know how the war will affect it, but I also have written a book on all of the principal caves of the United States. Due to the un-

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Florida Caverns State Park

The florida Caverns State Park is in Jackson County about three and a half miles by highway north of the town of Marianna, about twelve miles in an air line south of the Alabama state line. It is gently rolling country with reddish, sandy clay soil underlain by very fossiliferous, soft limestone in which the stratification is not very conspicuous. The Chipola River flows thru the Park passing within a few hundred yards of the entrance of the cave. At this point the river flows underground, sinking and rising again within the park boundaries.

Florida Caverns may be entered thru several openings, three of which have been developed for public use. The main entrance faces west in the side of a low, rocky bluff along a tributary of the Chipola River. Formerly this entrance was low leading thru some large limestone fragments into a wide crawlway. This has been made easier by excavating the floor until there is always at least four foot headroom. Small cave formations are found sparingly thruout this first passageway.

Less than two hundred feet in, the cave was blocked by clay and rock fragments. Directed by surveys made thru another entrance this barrier was penetrated. At this point the cave divides. Here a side trip is taken into three rooms that provide ample headroom and a showy display of stalactites, stalagmites and flowstone, some very delicate, some massive. In the last room there is a roughly circular portion containing a large heap of rock fallen from the domed ceiling. Both the ceiling and the rock heap are covered with formations.

From the beginning of this side trip, the main cave continues thru more narrow passages southeastward for two hundred feet or more to another blocked point now open into a wide room. The main route then swings southward and finally westward. Into a side room on this curve opens an entrance thru the roof, possibly caused by the falling in of the rock cover. This part and the rest of the cave, a series of rooms and narrow, sometimes low, passages, is well supplied, sometimes crowded with unusually colorful cave formations. Several vistas compare well with the best in other caves.

At the end of the westward stretch the second developed entrance is passed. Formerly a well like shaft, it has been completely remade. It is used only in cases of emergency and during periods of flood in the Chipola River when water backs up in several low spots in the cave blocking the main entrance.

From this second entrance the cave runs southeast again to the main exit. Formations, rock falls, etc. force the trail to wind around giving an impression of more than the actual length of the cave. From inside the exit is approached by a series of ramps up an incline to the iron door beyond which about thirty-two steps lead to the surface level This entrance was cut thru at a convenient point to end the trip but it not the end of the cave which appears to extend or around the hill southward. Much further progress in that direction is blocked by formations and rock debris.

While there is some variation in the elevations in the cave there is no distinct separation into different levels. Since the difference in elevation between the lowest floor level and the highest surface over the cave is only a little over fifty feet there is not much room for this. The lowest floor elevation since development is sixty-seven feet while the highest general ceiling elevation except that leading to the entrances is a little under ninety-five feet.

No study has been made yet of the fauna. Spiders camal crickets, salamanders, wood mice and wood rats have been casually noticed but no positive evidence of strictly cave forms has been observed.

At the time of this writing the Florida Caverns are not open to the public but preparations for opening are rapidly nearing completion. The Park is open and contains many interesting features besides the main caverns. There are other caves, pits, natural tunnels, huge springs, streams that seem unable to make up there mind whether to flow above or below ground as well as the so-called natural bridge where the Chipola River runs thru a sort of inverted siphon.*

—Leonard Giovannoli

*A very swell scale drawing of the Florida Caverns sent us by L. G., had to be omitted, regretfully, because of added cost of reproduction.

Mr. Al Lewis
National Speleological Society
510 Star Bldg.,
Washington, D. C.

Dear Al:

After a week's trip to Denver, I have your letter regarding Jefferson's giant cat as he thought.

The late Mr. Andrew Price, Attorney at Marlinton, W. Va., as well as a State historian and brother of Calvin Price, now Editor of the Pocahontas Times at Marlinton, informed me several years ago that he had interested himself in the cave from which the bones described by Jefferson were found. I regret now that I did not also record the information he had at the time but I do remember that he, by tracing the ownership of the lands, concluded to his own satisfaction that it was Organ Cave in Greenbrier County.

I am letting Mr. Calvin Price have a copy of this letter and it is quite possible that he will have further information regarding it.

With kindest regards and good wishes, I am

Sincerely,

Paul H. Price
State Geologist

PHP a
cc: Mr. Calvin Price, Editor
The Pocahontas Times
Marlinton, W. Va.

Letters . . .

(Continued from Page 35)

certain times the publishers won't bother with it now and it occurs to me that possibly the NSS. would be interested in the manuscript. I don't mean to buy it but possibly to use it as a reference book. As far as I know it is the first, **unbiased,** complete account and descri - tion of all the principal caverns of the U. S. with their histories, etc. All I'd want out of it is credit for having compiled the information, but I do not want to send it to the N.S.S. unless I am sure you can use it.

Please keep me informed of any unusual activities of the society and if there is anything else I can do to help it along, just drop me a line.

Hastily, but with best regards,

George F. Jackson

Mr. Wm. J. Stephenson,
R. F. D. #2,
Richmond, Virginia.

Dear Bill:

Your letter of March 29th has been received.

Since Dr. Archer is in the Army, I am sending him a copy of the membership list. I am retaining one copy for the use of Mrs. Jones and myself. Another copy is being filed here in my office. The rest of the copies we are sending back to you for whatever distribution you may wish to make.

Donald Black has written me and I am writing him today.

I wish to acknowledge receipt of four copies of the January Bulletin of the Society. I will make good use of them.

(Recently I managed to get in a little cave work and have run my list of explored Alabama caves to 101. I got some very good pictures and studied some right interesting caves, one of which was the most complex that I have yet seen in Alabama. It had literally dozens of passages, all linked into an elaborate and complicated network. My photographs turned out very well.

One of the caves was leached from limestone, composing a perfect anticline. Unfortunately the picture of the anticline failed to show up. I did not have enough flash bulb capacity to take such a large area. So far as I know it is the only cave to show such geological features.)

With kindest personal regards. I am,

Sincerely

Walter B. Jones

Dear Mr. Stephenson:

Congratulations on the appearance of your Bulletin in real print.

It looks first class, clearly printed and the articles seem to be well composed and free from most typographic mistakes.

Thanks for printing all of my various articles, especially with the statement that you make to the effect that a lot of those that were not considered so important, or something, were not printed.

There are very few places in my papers which I would have changed or corrected, had I been able to correct proof; but there is one larger correction as to content, which I might have made. I have found out the reason for the existence of the flat meadow area called the Glades, mentioned in the article on Devils Den. It is the former floodplain of a river that has shrunken to nothing, one of the numerous tributaries of the New River joining it from the southeast. The headwaters of the New, on this southeast side, have all been cut short during the last few million years of geologic history, by the southeastward-flowing tributaries of the Yadkin River which flows to the Atlantic, which have constantly eroded the Blue Ridge Mountain front, forcing it back toward the northwest, possibly a total distance of 20 miles or more. This is because the streams of the Atlantic drainage are far more active than those going to the Gulf of Mexico. The former have a little over 300 miles to go, and the New River water has to go probably 1000 miles before reaching the Gulf. This results in higher gradient and velocity and carrying power for the Atlantic streams. In another 50 million years I expect that the mountain front will be eroded until the New River is cut back of Galax and its entire headwaters diverted to the Atlantic. All of this heavy physiographic data is too much for a popular article.

If your magazine carries long special articles, later I suggest that you send proof to the authors if you can, for their correction. This is just a suggestion, and does not mean that you are not doing alright just now.

Also, if you could get a few loose pages printed which authors could buy, and thus get copies of their articles, it would be fine. For instance, I don't believe that any of my friends in mineral lines will see these cave articles of mine in your bulletin, but would like to be able to send them separate pages for their files. Many of them are interested: Mr. Gilbert Withers of Atlanta, for example, who has been polishing stalactite sections from Cartersville for some time. I know that The Ladd Lime & Stone Company would appreciate having a copy of the article describing their deposit from our point of view; and Linville Caverns really deserves one for their courtesy to an unknown explorer like me; and they could use it for publicity. But I haven't any to send them, have you?

Did you say once to me, that you had some notes on the lime caves along Route 21 near Speedwell, Va. I would be glad to write a short note of the kind that is intended to indicate the place that should be further explored.

In the book called Geomorphology, (An introduction to the study of landscapes), by Dr. A. K. Lobeck, Professor of Geology, Columbia University (McGraw-Hill Book Company, New York, 1939), on page 148, a theory of formation for the Natural Bridge is put forth. This theory is new to me, and you would, perhaps, like to publish what he says, with credit to him. The statement is as follows; there is also a series of

sketches to illustrate:

"Natural Bridges

Natural bridges may be formed in a great variety of ways. The largest known are formed by the cutting action of streams. But most natural bridges occur in limestone regions and result from solution along joints and bedding planes.

**** At first, there is a stream flowing over a lime stone plateau. Next, at some part of its course the stream loses by seepage a part of its volume, which penetrates cracks and thence follows bedding planes at greater or lesser depth beneath the surface. Finally, the removal of most of the plateau mass be erosion and solution leaves a remnant in the form of a bridge, an arch, or a tunnel.

It is occasionally stated that natural bridges result when a cave collapses and only a small part of the roof remains. Very rarely do caves collapse. In the Mammoth Cave region of Kentucky there is no evidence that any large cave has ever collapsed.

The famous Natural Bridge of Virginia was formed by seepage of water through a joint or fissure athwart the stream hence along a bedding plane until it emerged under a fall or rapid farther downstream. The channel thus formed was gradually enlarged until all the water of the stream was diverted from the stream bed below the point of ingress leaving a bridge.

The height of the arch of a natural bridge above a stream will naturally depend upon the amount of cutting subsequent to the formation of the bridge, and to the weathering of the underside of the arch. Bridges formed in this way can readily be distinguished from the remnants of cavern roofs by the fact that the top of the bridge of the former was plainly at one time the bottom of the valley."

Prof. Lobeck is a very good friend of mine, as we were students together years ago. I wrote to him and expressed interest and some doubt, as I said I had not observed water coming out under waterfalls in limestone regions. I also asked about the origin of the Natural Tunnels in western Virginia, but he has not replied to my criticism. What do you know? The shape of the Natural Bridge is really a little peculiar, seeming narrower at the bottom than at the top.

Yours sincerely,
Alfred C. Hawkins

March 18, 1942
R. F. D. Route 2
Richmond, Va.

Dear Mr. Hawkins,

The government has now got me down in Richmond as you can see from the above letterhead. The society however is going along as well if not better than ever. After I make some brief notes from your letter, I will forward the same to Don Black to get his reactions to your proposals regarding proofs of material in the Bulletin. As our Bulletin gets better established, obviously we will want the authors to have the opportunities to correct their own material and to obtain reprints. I will take care of sending Mr. Withers a copy of the last Bulletin with your compliments if you will send me his full address. The same for the Ladd Stone and Lime Company. If you would rather I will send the Bulletins directly to you for mailing.

I am glad to hear that Lobeck is a friend of yours. I have thought for a long time that he should be a member of the Society. It would be nice if you gave him a little personal encouragement. From time to time we have mailed him some of our materials including at least one of the Bulletins. However we have had no response even though, of course none of the material required any. I cannot agree with Mr. Lobeck as regards to the material which you quote from his last book but who am I to quarrel with a noted authority. In the Kentucky area I have seen at least one direct collapse of a cave. Fr example, the present entrance to Hidden River Cave (commercial). The Virginia area and the West Virginia area have many examples of collapsed caves. C. W. Cook (U. S. Geological Survey) one of our Charter members in his book 'the Scenery of Florida,' June 1940, cites many instances of collapsed caves in Florida. Needless to say I have never heard of an instance of a waterfall with a supplementary stream flowing from the base of the fall though such may be possible. The State of Virginia has issued a lengthy bulletin discussing the theories relating to the origin of Natural Bridges. I think that the bulletin was written by Dr. Frank Reeves. This bulletin is in the society library and could be obtained either from Bob Bray or probably Dr. McGill of the Geological Survey of Virginia will be glad to furnish you with a copy. I am sure that you will find this bulletin most interesting reading and absolutely contradictatory to Dr. Lebecks theory. Maybe we are all wrong. Speleology is a new science and needs many varying and different points of view. I do hope that you can interest Dr. Lobeck in our organization.

Your sincerely,
Wm. J. Stephenson

You were in Morrison Cave in 1911, it was then known as Lewis & Clarke Cavern National Monument.

It is very much different today, because a CCC project was here for five years, they constructed a beautiful road, lodge, trails, picnic area and lights in the cave along with cave trails and stairs, also a new discovery.

I was senior foreman geologist for the National Park Service during that time in charge of cave development, and remained here because I was given the position as head of Morrison Cave State Park. Mr. Petsch and I have lived in so many states, we saw a chance to remain here and maybe "gather some moss" we both like Montana so much.

Last season there were over 12,000 people here may not have so many this year, but we are paying "rent" most every day even this early.

The guides are young college men, who live here on the grounds, one of them is a student from the Montana School of Mines, Butte, he is going to work

on his thesis this summer, there is plenty of geology to unravel within walking distance of the lodge, such as Proterozoic on top of Mississippian, Cambrian on top of Penn. There are 11 faults in the park of 2700 acres.

Very truly your
Bruno Petsch

Mr. Bruno Petsch,
Morrison Cave,
Whitehall, Montana.

Dear Mr. Petsch:

In the Bulletin of the National Speleological Society is an account of a visit last summer by Petrie and other members of the Society to Morrison Cave.

This description suggests to me that it is the cave I visited in August or September 1911 and then called Lewis & Clarke cave, if my memory is right. Anyhow we made an appointment with the owner or caretaker to visit the cave on Sunday morning and arrived by train from wherever we were camped. The party consisted of Mrs. Stone, my Geologic assistant, Bert Kennedy, and myself. We were a U. S. Geological Survey party doing mineral land classification work.

Climbing up the long trail, we could see people at the entrance, evidently waiting for us. Mrs. Stone wore Knickerbockers and so from a distance we looked like three men, rather than two men and a women that were expected. So on arrival we were questioned as to our identity.

Those ahead of us were young men and women from the vicinity. The women were dressed in pretty light summer dresses. The door was unlocked by the guide, we were all given candles, and we proceded to walk through the passages, mostly or all down grade, and crawling or sitting down and sliding in some steep or narrow places. Mrs. Stone was ready for that sort of thing but the other women were not. Their skirts worked up around their waists when they slid, thus exposing legs—a very rare sight in those days. Kennedy happened to have some horse blanket safety pins with him and they were in demand for pinning skirts together between the knees. Then we climbed back up, because there was only one entrance and exit.

We overheard one man say to his companion, "I told you to wear overalls." You can imagine what a bedraggled lot the women were when they emerged to daylight, clothes muddy and spotted with candle drippings.

Now of course conditions are very different; in 1911, the cave was wholly undeveloped but protected by a locked door. But seeing it was worth the hike on foot from the railroad.

Cordially,
R. W. Stone

Notice

If the money for it is forthcoming, the Editor intends to publish a separate edition of 'Letters', before the year is out. This will explain the ommisson of a special "Letters" section in this issue.

45 VISITORS AT LURAY CAVERNS' THIRD ANNUAL OPEN-HOUSE TO THE N. S. S.

February 15, 1942

James Beard, Pittsburgh, Pa.
Mr. and Mrs. Albert Beck, Pittsburgh, Pa.
Mary Brennan, Washington, D. C.
K. Burrell, Washington, D. C.
O. L. Cullers (Guide), Luray, Virginia
Mr. and Mrs. George C. Dare, Steubenville, Ohio.
Anthony Eno, Arlington, Virginia
Mrs. Pauline Eno, Arlington, Virginia
John Fishburn, Washington, D. C.
Edwin Gage, Pittsburgh, Pa.
Catherine Gage, Pittsburgh, Pa.
Margaret Kaufold, Bellevue, Pa.
Lester Kibler, Luray, Virginia
Jimmy Lavelle, Washington, D. C.
Mr. and Mrs. Albert C. Lewis, Chevy Chase, Md.
John Meenahan, Washington, D. C.
Elsie Mintz, Chevy Chase, Md.
Milton A. Mintz, Chevy Chase, Md.
Robert E. Morgan, Richmond, Va.
Nathan L. Mintz, Richmond, Va.
Dorothy Morrison, Falls Church, Va.
Dr. Joe Morrison, Falls Church, Va.
Mr. and Mrs. Martin H. Muma, College Park, Md.
Cleora H. Petrie, Arlington, Va.
John S. Petrie, Richmond, Va.
Dr. Paul Price, West Va., Geological Survey, Morgantown, W. Va.
William Schlichtig, Hyattsville, Md.
Frances Shanker, Washington, D. C.
A. E. Snell, Pittsburgh, Pa.
Frances G. Snell, Pittsburgh, Pa.
Mr. and Mrs. J. Stephenson, Richmond, Va.
Bonnie Sandra Stephenson, Richmond, Va.
Irene Tittle, Washington, D. C.
Florence I. Whitley, Washington, D. C.
Mr. and Mrs. J. J. Wilson, Jr., Washington, D. C.
Mr. and Mrs. L. E. Wilson, Washington, D. C.

VALUED MEMBER DIES

Vernon Orlando Bailey died at his Washington, D. C., home on April 20, at the age of 77. He was born on June 21, 1864, in Manchester, Mich. He had devoted his most strenuous efforts to the advancement of knowledge about natural history, and had carried on field investigations in every state in the Union, Canada, and Mexico—studies that formed the basis for writings that are now listed in a bibliography of 244 titles.

His outstanding publications included two of extreme value and interest to speleologists: "Cave Life of Kentucky", and "Animal Life of the Carlsbad Caverns."

The Skyline Caverns, near Front Royal, W. Va., adjacent to the Shenandoah National Park, has closed for the duration.

Moaning Cave

(Continued from Page 28)

dle the construction of the tower.

With this method of handling the visitors many could be admitted to the big vault at the same time and the crowd scarcely be noticed. The installation of an adequate lighting system is the most urgent necessity. Although it will require quite an investment adequately to equip the cave, it should prove a good money-maker in the end.

Whether or not the steel tower is installed right away, the owners expect to handle visitors during the coming summer. They will at least take them down as far as the ledge on the side of the big chamber.

Already they have brushed out a road over the hills for the hauling of material to the cave. Later they expect to put in an automobile road from the Parrott's Ferry road which will have a very easy grade.

The Natural Bridges

The natural bridges are only three-quarters of a mile away and the cave owners expect to feature the combine attractions in order to induce visitors to come up into the hills. Leaving the cave we followed down the ridge toward the natural bridges. In the Coyote creek canyon to the right the ruins of Gooseberry Town were pointed out to us. This was once a populous French settlement, and it is claimed that half a million in gold was taken from the creek in this vicinity.

We only visited the upper bridge, which is the larger of the two. The arch through which the stream passes is fully three hundred feet long. At its upper end this passageway is about 15 feet wide, and at the lower end it spreads out into a semi-circular chamber about 75 feet across. The limestone has formed stalactites and made a fancy roof which is tinted in shades of green and gray. The alders will be out soon, and this spot makes an attractive picnic ground. It is between 20 and 30 feet to the top of the bridge and on the roof is the remains of the cabin where L. A. Barnes once lived and conducted a little resort. A great mulberry tree, a large oleander and two flowering quinces that were in full bloom are on the top of the bridge. A spring flows down to this point from the hillside nearby.

The road comes within a quarter of a mile of this bridge which is about three miles below Vallecita.

Indian Lore and the Cave

Some of the Indians in the vicinity of Vallecita tell of a race of giants which once lived in that section and Tilly Jeff, a buxom squaw residing at Six Mile creek, links this tribe of big people with the cave. Although the story that these diggers tell may be considered legendary rather than historical, there is a certain uniformity in what they relate.

Tilly says that in her tribe it was handed down from grandfather to grandfather to grandfather that this race existed. They were a cannibalistic people and preyed on the smaller Indians. She tells that once the gaints captured some of the diggers and ran away with them. They were traced as far as what is now known as Murderer's gulch, when they disappeared and were lost track of. This gulch with the gruesome name is near the Moaning cave, and when Tilly heard of the discovery of the bones in the big cavity she linked the two incidents together.

On Deck When Fremont Came

Calaveras Walker, or Chief Indian Walker, as he is sometimes known, is a patriarch living two miles above the Adams ranch who also tells of the race of giants. He confirms the story that they were a man-eating tribe. He says that his grandfather told him that they carried a basket on their backs and a knife as long as a man's arm and that when they had captured their quarry, either beast or man, they would throw it into the basket. The giants, it seems, had a special preference for youths and young girls. When the white man came the giants disappeared, probably into the cave.

Walker, who has a noble cast of feature, is believed to be close to the century mark in point of age. He claims that he was a youthful buck of 20 years when Fremont came over the mountains in the forties. That would make him far over ninety. He only saw Fremont and his men from a distance and the thing which made a lasting impression on him was the uniforms with their bright buttons.

Despite his years, Walker can carry a load of provisions that would stagger a strapping young white man. From Vallecita to his home seven miles away he will pack a sack of flour on his back, other things in his arms—and plenty under his belt.

The patriarch is keenly interested in the Indian land bill. "Mexican took land from Indian and white man took from Mexican," he explains. "You sabe Uncle Sam?" Then he mutters in the language of his tribe and you cannot understand. Probably what he says is not very flattering.

Johnnie Jeff's Story

Johnnie Jeff, another Indian brave of that section goes the other one better. He tells that the giant Indians had a hide so tough that it could not be penetrated by bow and arrow. This is supposed to have been a coat of mail made of deer skin and covered with flat jasper rocks. Johnnie says that as far back as the tribe knows only one of the big people was killed.

This giant, with the basket on his back, had chased some of the diggers up a tree. They threw branches and moss into the basket, then one of them with a flint lighted a bunch of moss and dropped it into the receptacle. The big fellow then had his hands full trying to put out the flames, according to tradition, and while he was thus engaged the small Indians set upon him with tomakauks and killed him. This group of diggers were then honored with pow wows and considered as great heroes by the rest of the tribe.

Two in One

Cave "fans" will be able to get an eye full this coming summer. Moaning Cave will be a new attraction and for the sake of comparison the visitors to the hills will be able to take in Mercer's cave at Murphys on the same trip.

Porter Cave

Bath County, Virginia

By William J. Stephenson

This report is made as the result of a quick cursory visit on April 11, 1942. The party on this trip consisted of Gloria Alling, John Petrie, Frank Ruocco, Wm. J. Stephenson and Tom Watts. Watts having been in this cave on several previous occasions acted as guide.

This cave is just off of State Route 42 between Milboro Springs and Longdale, Va. It is just 8.4 miles south of the junction of State route 39 and 42 at Milboro Springs on the left hand east side of the road. There is a large stone quarry right or west right of the road, .78 miles from Milboro Springs that serves as a land mark to help locate the cave. The cave is, of course, six miles further on down the road.

The road to the location of this cave is following the valley of the Cow Pasture river. The river is on the right and steep banks, almost cliffs, on the left. A path leads from the road to the cave up the hill at the only point in this stretch of road where it is possible to easily scale the bank. At this point there is also a large backwash from the river or spring on the right of the road and next to it. The path to the cave leads straight up the hill for not more than 100 yds. till it comes to a large sink with the cave entrance in the bottom.

The cave is apparently of medium size and located in the Helderburgh limestone. It is quite similar to other caves found in this same limestone in this area. The cave is generally dry but has a small and apparently constant stream in its furtherest part. The course which the flood water, that apparently pours into the sink in time of flood, takes after entering the cave is not exactly understood. There is some evidence that it takes a course which is merely in the opposite direction to that of the stream. This will be more thoroughly discussed later.

The main cave is apparently developed along the strike of the rock and runs in a general direction of 220 degrees. As the direction of the road is about 170 degrees, it is of course obvious that eventually the cave must break through on the road. This appears to be the case. All the main passages of the cave end in a choke of broken rock and mud which come down into the passage from the upper right. At none of such places can the surface or side of the hill be more than a few feet away.

The majority of the passages are quite roomy and easy to traverse. A hundred feet in, the main passage appears to branch. The right hand lead which is practically a continuation soon ends in a choke on the right. The left hand passage is really an offset or part of the main passage about 40 ft. to the left. This passage now becomes what is called the Grand Avenue, a 300-foot passage with fairly level floor 35 ft. wide and 25 ft. high; however, this passage also finally ends in a choke coming in fro mthe upper right.

On the left hand side of this lead opposite the point where the choke develops is a small hole which leads into a small passageway of about 2' in height and 4 to 5' in width. This passage slopes generally down and soon a small running stream is encountered. After about 75 ft. there is a small pool in which a white crawfish was seen but not collected as the water was muddied so from travel through the passage that the crawfish observed was able to effect a safe getaway. Due to lack of time, further progress down the stream was discontinued in order to see the other known main parts of the cave.

In the main passage between the entrance and the branch above referred to are several large pits in the floor. These occur on both the right and left sides of the passages. Some of these holes or wells appear quite dangerous and would require a rope for descent while others are easily scaled. All of them appear to lead to a lower level that is a regular honey-comb.

In general, this lower level is approximately 30 ft. below the main lead and its development appears to lie slightly to the east of the upper level; through numerous small passages cross under the main lead to connect with the pits on the left side. This lower level was paced off for some 300' to a point believed to be well to the northeast of the entrance.

The direction which water takes through this lower level was hard to ascertain. Though it would appear probable that all water which enters the cave should find its way to the stream and pool above referred to, it is not sure that this is the case. There is much evidence of a divide in the lower level and that any water which comes into the entrance works its way back to the north. This theory is further supported by what appears to be a large spring at the base of the hill at the road from where the cars are parked. This point would be about 450 ft. northwest of the entrance to the cave. A line of levels should definitely be run through the lower level of this cave and its passages accurately mapped. There is a distinct possibility that much more cave could be discovered by diligent exploration, especially in the lower levels.

The stream found in the far end of the cave was not located on the surface, but it is quite probable that it comes to the surface as a spring in the valley which cuts into the hill about 500 ft. south of the cave entrance. For this reason, it is improbable that the cave continues much further in the direction of the stream.

This cave is, as can be gathered from the above description, obviously entitled to further work both as to mapping, exploration and fauna studies.

TUCKER COUNTY IN 1854

By Lou Klewer

A Speleologist, ladies and gentlemen, is a person absolutely sane, normal and usually of a high order of intelligence, until he sees, smells, feels or just hears somewhere, somehow, of a hole in the ground. He may hear of it through folklore of the natives, he may find a mention of it in the Tucker County history of 1854 or he may feel a blast of cold air while resting from a bit of strenuous mountain climbing. But once he senses this hole in the ground, all reason leaves him and he becomes the most burrowing animal in all Nature.

Sunday, down in Tucker County, West Virginia, where the mountains are high and some roads are no picnic even for a mountain goat, I was with a gang of these speleologists. Bill Stephenson, president of the National Speleological Society but during his sane moments, chief examiner for the U. S. Board of Patents in Washington, was in charge of this party, in search of a rumored cave somewhere on Limestone Mountain in the Monongahela Forest Preserve.

After driving miles from Davis, W. Va., we finally found the mountain and Earnest Adams, a farmer there, showed us the opening, hidden in a clump of wild grape vines and covered over with old fence wire, tin cans, rubbish and general farm trash.

In a flash, the members of the party were transformed from gentle picnickers and outdoor lovers into wild-eyed fanatics. They became even more so when Adams told us no one had been in the cave for more than 30 years and that to his knowledge, he had lived there all his life, no one had ever been all over the cave.

Cave crawling equipment include flashlights, helmets, ropes, ropeladders, miners carbide lamps, old clothing, gloves, etc., all appeared as if by magic and soon Bill and Jack Preble, the latter from Steubenville and my host, were tearing at the covering of that cave opening.

With the ropes tied in place and the cave opened, Bill descended first with Jack after him. They were followed by George Reeves of Steubenville, then I went down the hole, not knowing what came next and Dr. Paul Price, state geologist for West Virginia, followed.

I swayed, swung and slid down the rope and ladder into a small room cave and discovered that the rest had gone on ahead through a little cubby-hole that went down deeper into the earth. I followed on down through the small opening and down the rope ladder to another room about 20 feet below and there I found several natural tunnels leading off of the room.

None of the tunnels we saw were large but Reeves and I headed down the largest, moving over the wet, muddy limestone on our hands and knees, bumping our heads every time we tried to straighten up. Several times we found where the floor of the tunnel gave way to openings below but none of the openings seemed large enough to do anything but fall into and we kept on with our own tunnel exploration.

It turned out George and I had taken the longest tunnel but it was a comparatively small cave at that. We found a small dome room on about 75 feet and then went on into another tunnel. This was a case of wiggle and crawl on hands and knees or elbows and stomach, in the wet, slippery mud, moving on yard after yard taking time now and then to rest and cool off for even though the cave was at a temperature of about 50 degrees we were sweating freely.

The tunnel wound up into another dome room about 120 yards on and then ended. The dome room was cut into steeple-like formations by the action of the water but there were no stalagtites, stalagmites, flowstone or other formations. Then we crawled back to the second room and found Bill and Dr. Price making a map of the cave. We gave our notes and information and then climbed and pulled ourselves out, looking like a bunch of ditch diggers who had been caught in a cave in.

The 94-degree heat hit us like a blast when we reached the sunshine but all Bill and Preble did was take a deep breath, say "That cave wasn't so hot, Let's take Lou over to Blowhole," and off we flew.

Perry County's Mammoth Cave of Pennsylvania

By Henry W. Shoemaker

The Pennsylvania Cave Men's club enjoyed the rare privilege of being guided to the Mammoth cave of Pennsylvania in Spring township by the leadng geoloist of Perry county, inimitable, rare J. W. "Bill" Sheibley, sage of Ghost Ridge. Bill had been lessee of the cave, which is on the old Woomer farm, for 20 years, and spent many days and nights in the dark labyrinthine depths, building steps and bridges, widening passageways to try to commercialize this stupendous natural wonder. One has to go on hands and knees to enter, and the floor is soft yellow mud, not very good for Sunday best suits, etc. However, most of the Cave Men's club members were suitably attired and little damage was done to raiment.

Guide Sheibley was at his best, with his quaint original sense of humor. Two rooms, georgeously decorated with stalactites and stalagmites, reminiscent of the chandeliers and pillars in the state capitol at Harrisburg, and hanging full with hundreds of sleeping bats. "These two rooms full of bats are called the senate and house," said Bill, dark eastern eyes gleaming, "because they are hanging on, on the state's time." This brought a prolonged laugh from those who remembered the long drawn-out and costly "special session" which recently folded up on Capitol Hill. The largest room in the cave is surely the veritable eighth natural wonder of Pennsylvania. Bill calls it the supreme court, on account of its lofty impressive proportions, and the seven mighty stalagmite columns which Bill calls the "justices of the court." He has them all

named for the present incumbents, the tallest and most majestic one he calls the Patterson column."

"I have several reasons for this, not only because the Honorable Marion D. Patterson is a big and impressive personality, but His Honor comes of good old Perry county ancestry. The early Pattersons helped clean out the surplus Indian population of the county, the sneaking Japs of their day, just as they later cut down the Indian census of what is now Blair county in many a surprise attack and crushing massacre about the site of the old Keller church." The farthest chamber, 900 feet from the entrance is adorned with one huge column in the center.

Bill calls this sanctum sanctorium the "Department of the Interior," and the column "Harold L. Ickes," after Blair county's favorite son, who like the Patterson family, are of Perry county origin. Harold L. Ickes is descended from the Ickes and Loy families of Perry county, both families have towns named for them Loysville and Ickesburg, the pioneer Indian fighters, Michel Loy and Nicholas Ickes. Bill had understood that Harold Ickes middle name was Loy, but Brother Gray, the good old postmaster at Blain says it is Lanfear. Said Bill, "the Huguenots were the "Free fear, but both Loy and Lanfear are grand Huguenot French" of their day, and under Laporte, Cavalier and Ravenel, administered some awful drubbings to the lavals of those times." After emerging from the Mammoth cave, which in one part has three tiers of passageways like an apartment hotel, and could house half of Perry county in an air raid, all agreed with Bill that it dwarfs all other Pennsylvania caves by its scenic majesty, its immensity, and beautiful formations, the mud-stained speleologists were escorted by Mr. Sheibley to the Nine Springs, from which Spring township is named, and also to a cluster of seven springs, in the shape of a natural star, in the same township.

Bill was anxious to accompany the party to the Perry county Warm Springs which register a temperature of 65-70 degrees Fahrenheit, the same as the Warm Springs of Huntingdon county, which they much resemble, but time did not permit this pleasure. Neither was there much time to visit the ancent Gothic Castle of the aristocratic Old Holland Dutch ironmaster, Christian C. C. F. Thudium who conducted Oak Grove Furnace, near the Perry county side of Wagner's gap. "The Wagner's were great Indian fighters in the Revolution, and before," said Bill, "Just as their heroic descendant, Buzz Wagner, of Johnstown, the youngest Lieut. Col. of aviation is mopping-up the present day foes, the Japs, in the World War II. When we decorate the Wagner graves at old St. Michael's in Proutz valley on Memorial day, we'll be prouder than ever of Perry county fighting family No. 1. who knocked off their country's enemies by whole squadrons, and help end war, and bring the four freedoms by their mass annihilation of treacherous foemen."

ALTOONA TRIBUNE

Ruffner's Cave

Virginia

This cave is located about a quarter of a mile due west of Luray Caverns on the opposite side of the hill from the Caverns' entrance. It is now kept closed to the public.

This cave was known long prior to Luray. In fact, its existance led to the discovery of Luray. While it is undoubtedly a part of the Luray Cave system, no connection has ever been found between these two caves. Skyline (commercial) and Allen's also present a similar situation.

Originally, this cave possessed but a single entrance but now it possesses two. The two entrances, in fact, mark the approximate extent of the cave which as measured along the surface is probably less than 300 feet.

The cave itself consists principally of one large main room and a long sinuous lead from said main room to the original opening. This main lead slopes up from the main room at an approximate angle of 150 and averages generally about 5' in height and width. As expected, in places the passage does open up somewhat larger and at other places narrows down. The general impression is that of the passage being not big enough to walk upright nor small enough to require crawling.

Just under the natural entrance, an eight foot shelf is encountered involving a rather tricky rock climb and then from here the passage runs up to the original opening (about 75' at an angle of 30 to 40 degrees.

The main room itself is reported to have been well decorated at the time of the cave's discovery. Now little decorated remains. What decorations were not removed through the years by visitors were later destroyed when it was decided to use this room for the growing of mushrooms. In furtherence of this purpose, the second entrance was broken out directly into this room and the floor filled and leveled. In some places this fill must be at least 20' in depth. It is understood that the raising of the mushrooms was quite successful for a number of years, but was finally discontinued due to bad spores ruining the crop. Later this room was used by the local Shrine for initiation purposes.

Though not measured, the main room cannot exceed over 125' in length and 50' in width. The average ceiling height is approximately 30', both the ceiling and the floor slanting to the made opening on the west wall which is a good 30' drop requiring the use of a ladder.

On each side of the east end of this room, passageways lead down to a lower level which is now closed by fallen rock.

It is believed that the entire part of this cave now accessible is considerably higher than the main parts of Luray Cave and that if any connection between this cave and Luray exists, it must be in the rock-choked lower levels.

This cave proved of considerable interest due to its

history, possible connection with the Luray Cave proper fauna, and opportunities to observe the man-made changes above described. The Society appreciates the fact that the management of Luray's Cave opened the cave for inspection by its members.

—William J. Stephenson

DULANY'S CAVE

The data from this trip was taken on April 20, 1941.

Those in the party were: W. J. Stephenson, Mabel Smith, Lile Mellor, Harry A. Littlecut, Ethel Grand, James Trench, Charles A. Machet, R. W. Stone, Schiller Martin, George Dare, Jack Preble, Mrs. Jack Preble,, Loman Thompson, Ellen Thompson, Pat Miller, Fred Clifton, Florence Whittley, R. M. Spruce, James Fowler, Marie Fowler, Joseph H. Morrison, James Beard, and Bob Houston.

The temperature at the remote portion of the cave was observed at 51. A lower temperature was observed in the entrances, but in no instance was it as low as 40. The temperature of the stream flowing in the cave was observed at 37 at its headwaters, and 44 at the point where it disappeared from the cave. Ice at the entrance of the cave remained from the winter. It appeared to be melting slightly.

Drift was observed on the walls above the stream bed at the lowest point of the cave. This was quite fine. Samples were taken for later identification. Small snail shells were found in the drift. This would indicate that the surface flood carried material down to the remote portions of the cave.

The lowest point of the cave was observed by barometer reading to be 340 ft. below the entrance.

It was observed that a map of this cave published in R. W. Stone's book on Pennsylvania caverns was apparently drawn backwards, that is, the north arrow was back pointing south. Little fauna was observed in the cave. Bats of the pipsiquillus family were observed and five specimens taken. Little other life was observed excepting one specimen of cave cricket. This specimen has not yet been identified. The streams were thoroughly searched by Dr. Morrison and Fowler for signs of life, however none were observed. Dr. Morrison offers for explanation of this fact, that the sands which are washed out of the cave apparently block the entrance to life working their way into the cave in this soil, but yet allow the stream to percolate out further sand without flooding the cave. A good example of cross-bedding was observed at several points in the cave. Where the cross-bedding occurred a dip of the rock was 15 degrees.

Another interesting phenomena was observed in that material on the floor of the cave had apparently been cemented after it had been deposited on the floor, and then the stream had cut down further cemented material. One particular example was observed just off the ballroom on the way to the petit fall. It is noted that the map above referred to contained two or three other errors. Little driftstone was found where indicated on the map. Also no point in the cave was found possessing a hundred foot ceiling as indicated on the map. With this exception the map appears to be quite accurate.

Mitchel's Cave

Milam, West Virginia

Martinsburg party consisting of Will Thompson and Frank Silver arrived at Mr. Trumbo's house just south of Milam about 4:30 P. M., 5-30-41, and renewed acquaintances with members of the N.S.S. who had just finished the Indian caves and were going to Davis to spend the night.

Mr. Trumbo spoke of a very large cave about 2½ miles up the river and as we had not done anything that day, were determined to make a try at finding it, even though he did not think we had a very good chance without a guide. He carefully prepared a map and we set off to look for it.

Follow abandoned railroad (just ties are left) up the bank of the river on the same side as Mr. Trumbo's house for about ½ mile to a ford which the railroad crosses; then up the other bank for about 1½ miles until the mountain on the right moves away from the river slightly, leaving an elevated clearing of fenced in pasture, some old buildings, and a house. Proceed on up the river about ½ mile past the house to a point about 300' beyond the high vertical cliff in the mountain on the opposite side of the river. There are some very large shoulders in the river at this point which enable a good standing broad jumper to cross without getting wet. The cave entrance lies at the base of about a 10' rock ledge about ½ of the way up the mountain on the same side of the river as Mr. Trumbo's house. The opening is small, about 3' wide by 18' high, goes down at about a 20 degree angle and, heads down stream, about parallel with the mountain.

We were lucky enough that in our first attempt we had the cave between us, finding it in about 20 minutes after crossing the river.

After crawling about 50' down the entrance it opens into the main passage in a way that makes it very difficult to find going out; although having been warned and marking it well, we missed it coming out and went on by; however as the cave only goes a short distance past it, there is little danger of not being able to find the way out.

The main passage continues toward Mr. Trumbo's house for about 1800' until stopped by a mud block. Both this main passage and the several other long passages under it seem to lie under the folds of the mountain, having a domed roof from 10' to 50' high and from 30 to 80' wide. The two other passages beneath the main one which we explored seemed only about one-third as long as the main passage, although Mr. Trumbo seemed positive that we should have been able to drop down into one of these lower passages and continue for about a mile and a quarter; from our experience with these other directions we do not feel that he would be taken in by the "cave mile"—so probably there is more exploring to be done. There is a rumor to the effect that years ago a man went so far in the

cave that he was able to see out into Mr. Trumbo's fields and see men working in them, although the opening was too small to permit him to get out. This is not hard to believe as the whole mountain seems to be hollow under its dome.

There are very few formations in the cave although one sheet of crystalline flowstone in one of the lower passages was beautiful.

There is almost no crawling and no rope work necessary in this cave; little water, only some dropping and a few convenient puddles at the entrance for filling carbide lights.

We got back at Mr. Trumbo's house about 11:00 P. M. He seemed delighted that we had found the cave and gave us a fine supper. We then went on to Davis (arrived 3:00 A. M.) and joined the party for the trip the next day to the reservoir cave near Parsons; all crawling and streams of water. On the way home we stopped at the cave at Ridgeville and thoroughly explored it; aside from one fairly big room it was not very large.

—F. Silver

Mystic Cave

Near Mouth of Senaca, W. Va.

Party: Raymond Wolford, Will Thompson, Frank Silver and N.S.S.

Party of three, named above succeeded in finding cave about ten P. M. Saturady Night, November 30, 1941. We entered and found lighted candles in cave going upstream. Caught up with various delayed or returning party members about 600' in cave and then continued with main party to end of 1600' straight stretch. Entered little passage which leads off to right from above large pool in big room at end of main passage (Wolford fell in pool).

Following tortuous passage about 400' through stream of water to a room shaped like a beehive about 12' high, stream flowing down from ceiling. Climbed through ceiling and found one passage going straight and then left for about 100', passage carrying stream went right for 100' (?), but kept getting smaller so finally gave it up. Found pieces of fence rails and walnuts here and suspect that patience and perhaps some digging would let one out into one of the numerous sink holes in the vicinity.

Got back at Hott's cabins about 3:00 A. M. Up about 8:00 or 9:00 next morning. After eating fine breakfast with W. J. Stephenson, returned to cave to explore downstream branch of cave. Entered cave about 10:00 A. M., continued downstream through passage similar to upstream passage, varying from 4' to 20' high for about 800' and met two returning photographers whose flashbulbs we had been finding all along. They said that they had finally reached a point where one had to get wet all over and had turned back.

Went through narrow part of cave which opened out into a window in a fair sized room with a pool in the bottom. Climbed down from ledge with aid of window cord which our friends had left and continued about 200' more until we found the point where one must get wet. After vain search for passages leading around decided that the best plan would be to take our clothes off so that we would have dry clothes to put on when returning. Thompson volunteered to go first and see if lead was worth following and, clad only in a miner's hat, he left us.

In about ten minutes he returned and reported small but passable continuous passage with about 2 feet of water in bottom. Wolford and Silver doffed all clothes but two hats, two pairs of shoes and 1 pair of shorts between them and proceeded also to crawl on their bellies through the water. It didn't seem so cold. Proceeding in this fashion for about 300 very tortuous feet, taking turns going ahead. Finally came to a point where the best passage left the stream.

After about 75' this seemed to get smaller and smaller and appeared about ready to peter out. As Silver had been trailing, he volunteered to go ahead and make sure that passage ended before going back. Wriggled feet first (to make it easy to come back) into passageway which tantalyzingly kept on going.

Tried to turn around to go head first and noticed faint ray of light; couldn't turn around. Ceiling got lower and lower, had taken hat off long ago, now even had to turn head sideways. Had just given up when a voice was heard outside. Called and received encouragement. Finally emerged into warm fall day about 2:00 P. M.

Wilson and Dr. Morrison had been seining in big spring about 100' below opening, and it was their voice that I had heard. Called to Thompson and Wolford, but they couldn't hear me, but in about ten minutes they came out head first. We got some other clothes and went in the main entrance to get the clothes we had left in there.

In all probability, we couldn't have got through the opening with our clothes on, and except for the encouraging voice outside at the crucial moment would probably have given up.

Third Quarry Cave

Third Quarry is the first quarry south of the Charleston Martinsburg Road, near Martinsburg, W. Va., and is right at the Amesite Plant. Cave is in the east cliff of the quarry about 100' from the Charleston Road. The small square entrance is in the brown trap rock overburden, overlying the gray limestone.

Climbing down over the cliff's edge about 8 feet rope not absolutely necessary but recommended) lets one into a 3 foot square tunnel which winds downward at about 30 degrees for about 40 or 50 feet and opens into a room with axis parallel to the cliff face about 10 feet high, 25 feet long and 10 feet wide.

A high narrow opening leads out ot a hole halfway down the cliff's face. A small square on the lower side of the room and in line with the entrance leads down about 15 feet into another room similar to the first but only about half as big. Four or five bats - pigeons in entrance - cave dry.

—Frank Silver

Betsy Bell Cave

This cave is located on a semi-mountain to the southeast of Staunton, Va. It is one of two high round hills well in sight of the city. Betsy Bell is the larger hill, Nelly Gray being the smaller. On the south side of Betsy Bell is located the crater-like opening of this cave. The first drop is perilous, straight down for about 60 feet. Footholds are few and impossible without a stout rope. At the bottom of this drop is room enough to stand on and a small room to the east. A rope is necessary for the entire descent which to the floor of the large room is 165 feet.

Mr. Petrie has claimed that the first drop was the worst he had ever made.

From the first landing the passage goes down at a very steep angle, still calling for the use of rope. Some loose rocks and leaves fill this passage. Boys are continually throwing sticks and stones down the opening which has almost closed it at the bottom of the first drop.

There are several other small drops in this passage, the first about seven feet, the second about three. Near th bottom the passage splits, one going under a shelf of rocks and one going over. Both, however, open into a large room. This drop is about 30 or 35 feet. To the east of where you first touch the floor, a rather large passage leads up. Two of us on this trip climbed to the point marked on the map. It was possible to go on but it was difficult climbing.

The room is quite large, the floor is quite irregular and at places covered with damp mud. There are some small formations on the floor of the room.

Quite a few lizards were found in the cave and several spiders. The bones of a small animal were found in the large room. To descend and ascend the cave, spending quite a long time at the bottom, took about five hours. If the passage that is blocked by mud could be dug out, it might lead on.

The people of Staunton used to tell the story about a dog that entered a cave several miles away in staunton and was found in that cave dead.

—C. Landes

*The Editor has it . . .

BETSY BELL CAVE

Members of Party

Leader—John Petrie—Arlington, Virginia.
Bill Petrie—Arlington, Virginia
Charles Landes—Staunton, Virginia.
Bud Taylor—Staunton, Virginia
Alfonso Seguro—Costa Rica.
Martin Muma—College Park, Maryland.
Kay Muma—College Park, Maryland.

Location of Cave: Staunton, Virginia. ½ mile south of Staunton turn left and drive east up Betsy Bell Mountain. ¼ mile to cave on left side of road.

All of the members of the party gathered at Charley Landes' home about 7:30 p.m. and started out for the cave in two cars. The cave was reached about 7:45 p.m. after a winding trip up Betsy Bell Mountain which overlooks the city. After filling and checking all carbides and flashlights, the party gathered the anticipated lengths of rope and walked down the mountain about 50 feet to the cave.

The entrance to the cave was vertical and was completely enclosed by a rustic fence, which according to Charley had been put there to keep picnickers and animals from falling down the hole. All of the members of the group were soon to learn that the fence served a good purpose.

As Charley, the guide for the party, had estimated the distance to the floor of the cave to be 150 feet, a 200 foot ½" rope was tied to a tree at the entrance and dropped into the cave. Later measurement of the unused rope on the floor of the cave proved the distance to be 160-170 feet, which makes Charley a good judge of depth.

The descent into the cave was then begun with Charley leading and Bill, Bud, Alfonso and John following in order. A safety rope had been tied to Mrs. Muma, Kay, and she was preparing to descend when John called out to send her back to Staunton, unless, of course, she was experienced. Not being experienced she only too willingly returned to Staunton for the night. The writer then inexperienced and all, decided to try it.

After sliding feet first about six feet down the 5 foot entrance I was dismayed to find the passage opening up and falling away vertically 25-30 feet to a pad of leaves and logs that had become jammed across the passage. A ten minute search for foot holds, interspersed with comments and suggestions from the group below, brought me not one foot closer to that inviting resting place on which John and the others stood. Finally, realizing that homicidal glints were appearing in the eyes below, I wrapped my legs around the rope, made a step foot lock, and slid down to the welcome "pad." The party then continued the descent, minus Bill who decided to catch up on sleep rather than continue the climb. As the rest of the descent was made in a passage having an 80 degree slant, no more difficulty, other than that brought about by tender hands, was encountered. Five of the original party of seven finally reached the floor of the cave.

The descending passage varied between 4' and 10' in height and was 3' to 4' wide at all times, with the exception of the first "room' which was about 8' wide, 12' long, 30' high and was floored by the above mentioned "pad." At the bottom of the descent a room 30' wide, 50' long and 25' high was found. Leading from this room were two passages. One running parallel to the entrance passage slanted up toward the surface and according to Charley, Bud and Al contained the only formations to be found in the cave. The other passageway which was horizontal and ran at a right angle to the entrance passage, was found on the left side of the room; it ran about 40' and then petered out.

After a brief rest from the descent, several cave crickets, flies and mosquitoes were found by the author. Al, whose hobby is paleontology, found a complete

skeleton of what he believed to be an oppossum, in the horizontal passage. Several specimens of the dewy bat, z(Pipistrellus s. subflavus) were noted, while John discovered some very interesting saprophytic fungi which had spread out on the walls from some dead flies. In one case the fungus hung like a pendant covering the body of a fly that was held suspended in the air.

When all possible exploration and collecting was completed, the ascent to the surface was begun, the first step being the climb back to the "pad." Charley led off again, followed by Bud, Al, the author, and John in that order. Finally with a few bruised knees and blistered hands the party was reassembled on the pad where Bill waited patiently, from there out, each man with the exception of the first was given the moral support of a safety rope. Charley, the first out, dropped his flashlight, a beautiful 3 cell light, that could be heard bouncing down the shaft to stop with a resounding smack on the floor of the room below. A few terse remarks followed it. That was happily, the only accident of the trip. When all were out John could again breathe freely which he did saying Betsy Bell, was one of the hardest five hours of climbing he had ever done.

All agreed that Betsy Bell Cave was an accomplishment for inexperienced cavers and plenty of exercise for seasoned, experienced men.

—**Martin H. Muma**

Dyer Cave

By E. Anthony Erco

Heavy overcast and intermittent light rain.

Left my home for Wardensville, W. Va. at 7:30 a. m. riding with Bill Stephenson. Uneventful trip. Arriving at rendezvous, White Star Cafe, at 9:45 a.m. Two other cars in party arrived 10:20, twenty minutes late.

Our particular interest for the day centered in so-called Dyer Cave about 7 miles west of Wardensville. While awaiting the remainder of the party Mr. Stephenson became acquainted with Leonard Miller, grandson of the farmer owner of the Dyer Cave who agreed to accompany us as guide (Miller is a pleasant boy, 17 or 18 years old. Proved to be a pretty good hand in a cave after the first hundred feet. Good prospective member).

Started for cave at 11 a.m. losing three of party to the local "Lutheran Branch of the Roman Catholic Church." (Young Miller's definition). Drove west on road to Moorefield, then to second schoolhouse, turned sharp right (almost a complete reversal of direction) up dirt road to third schoolhouse and cave. Narrow road, had to park about 100 leards beyond cave entrance which lies at end of narrow gully running parallel to road. Cave has easy entrance, arch about 16 feet wide by 10 feet high. General direction of cave also parallel to road. Physical aspect of cave is roughly similar to Mohler's and Spring Hill though not nearly so muddy as either.

There used to be a fantastic story told around town about an underground route extending from an entrance somewhere north of Chilhowee Park to Cherokee Bluff south of the Tennessee River.

Boys and young men of an earlier generation were thrilled by the story, but so far as older residents could ascertain no one ever confirmed the story of the cave tours.

Reporters often attempted to locate those who were reported to have made the under ground trip, but usually got their stories second hand. Some one had heard some other person relate the story about the hunning streams of clear water and formations that were reported observed by the explorers.

If any one has definite information about the reported tours through the cavern, Knoxville Journal reporters would be pleased to hear about them. Sent in by Dr. A. H. Maser, Head of the Dept. of Classical Language, University of Tenn. Knoxville, Tenn.

(From Knoxville Journal)

The cave consists of one main passage dropping to five distinct levels, each level having two or more subsidiary passages ending in mud blocks to further progress. Passage height requires more crawling than walking, some sections of considerable ceiling height are so very narrow as to make progress exceedingly difficult. Not much of that, however. The changes from one level to another are uniformly abrupt averaging about twelve or fifteen feet each, some being pretty stiff to maneuver.

A small stream flows through the passable length of the cave (Joe Morrison, note) changing from level to level away from main passage (which averages 16 feet above stream throughout) except at two places. At several points in the main passage break throughs occur, leading down to stream bed. (Stream is not usasable along its entire length). The final level of the cave is in the stream bed itself. From the last dry passage break through to the spot where stream and ceiling meet is a distance of approximately 80 feet of sloppy going.

My opinion is that at the passable end of cave one is about 200 feet below adjacent surface. This does not check with the five levels of about 15 feet each, where it is necessary to stretch along the channel walls. however, even between drops the cave tends generally downward at a perceptibl angle.

Except for rope work this cave gives about every kind of experience to be met with in the Washington area. Therefore, it is recommended as a good "break in" cave for neophytic, it being neither too difficult nor to easy.

Mapping progressed rapidly and the round trip exploration took about 3 hrs. 15 minutes. Return was by same route with a 40 minute stop-over at the White Star Cafe for dinner.

Report of A Biological Reconnaissance of the New Discovery In Mammoth Cave, Kentucy, January 7-11, 1941

January 7-11, 1941

By Kenneth Dearolf, Educational Director
Public Library Museum, Dayton, Ohio*

OBJECTIVES of the RECONNAISSANCE

To obtain information of the animal life in the new portion of the cave as will be necessary in order to decide how to best preserve the cave life and still permit use to visitors of this new discovery.

I. The necessary information of the animal life.

A. What species and how many of them exist in the new portion of the cave?

B. Under what present conditions do these animals live in the cave?

a. Where are the largest populations in the New Discovery located?

b. What are the physical conditions under which these cave animals live?

c. What animals live associated with each other?

d. What is the food source of these cave animals and what food relationship exists between species?

e. To what extent can cave animals adapt themselves to a change in enviromental conditions such as are created by commercialization and admission of visitors?

II. The decision on how best to preserve cave life and still use the Cave commercially.

A. Portions of the cave shown to be ideal for cave life in physical, biological and as a food source should be left undisturbed and only portions which cave life cannot live in or adapt themselves to, be used for the public.

III. After the public has used the cave, check up to see how animal life is surviving.

DEPOSITION of SPECIMENS

All the specimens herein listed have been collected by the author and are deposited in the Public Library Museum until such time as the Mammoth Cave National Park Service may request them.

PROCEDURE

January 7, 1941. Arrived at Mammoth Cave, Ky. and made a thorough inspection of the New Discovery along with 13 other National Park Officials.

January 8, 1941. In the afternoon 5 traps were set along Fossil Ave. Bat bones and a cricket collected.

January 9, 1941. Set 17 more traps down Fossil and Big Aves. to the beginning of Paradise. Collect specimens. Take photographs. Make notes. Take temperature readings.

January 10, 1941. Observe traps. Examine claw scratches on walls in Fossil Ave. Examine bone deposits. Investigate beetle pits. Take photographs. Collect. Take notes.

January 11, 1941. Take up all traps. Collect more bones. Make final notes. Leave for Dayton.

LOCATION OF TRAPS: See location marked on map of New Discovery.

Trap Number **Location**

1.—In course sand at Fossil Ave. Survey Station 26.

2.—In course sand in Fossil Ave. half way between survey stations 21 and 22.

3.—In course sand in Fossil Ave. between survey stations 19 & 20 but nearer 19.

4.—In mud near wall in Fossil Ave. near survey station 15.

5.—In course sand in Fossil Ave. between survey stations 14 & 15 in small passage to right.

6.—In sand in Fossil Ave. between survey stations 10 & 11 at entrance to passage to left.

7.—In sand in Fossil Ave. between survey stations 8 & 9.

8.—In sand in Fossil Ave. at survey station 4.

9.—In sand in Fossil Ave. between survey stations 2 & 3 close to beetle pits to right.

10.—In sand immediately behind the inverted cocktail glass.

11.—In sand in Fossil Ave. between survey stations 1 & 2 near colony of beetle pits beside pathway.

12.—In sand at survey station 0-3 where junction of Fossil Ave. Big Ave. and passage to drill hole and spring meet.

13.—In wet clay under ledge at spring between Drill hole and Big Ave.

14. In sand in Big Ave. between survey stations 3 & 4.

15.—In sand in Big Ave. between survey stations 5 & 6 in offset on right near big crystal coming up from the rocks.

16.—In sand in Big Ave. between survey stations 6 & 7.

17.—In sand in Big Ave. between survey stations 7 & 8.

18.—In sand in Big Ave. between survey stations 9 & 10.

19.—In sand in Onyx Ave. beside beetle pitted sand bank near survey station 6.

20.—In sand in Onyx Ave. close to pool of water.

21.—In sand in Big Ave. between survey stations 11 & 12.

22.—In sand in Big Ave. between survey stations 16 & 17 on top of cliff at end of Big Ave. and at beginning of Paradise.

No trapping or collecting was done in Paradise due to lack of time.

Fungus wood was located halfway between the trav-

*By Permission of the National Park Service
U. S. Department of the Interior

ertime dam and the drill hole. They were four fungus covered boards observed on Jan. 9th then removed.

DATA: RESULTS: OBSERVATIONS.

Specimens trapped

Trap No.	Species
1.	9 small crickets; (1 species; 9 specimens) 1 during 1st day.
2.	83 crickets; (1 species; 83 specimens) 25 during 1st day.
3.	104 small crickets; (1 species; 104 specimens) 30 during 1st day.
4.	105 small crickets; 1 beetle; (2 species; 106 specimens) 40 during 1st day.
5.	7 crickets; (1 species; 7 specimens) 1 during 1st day.
6.	50 crickets; 1 beetle; (2 species; 51 specimens).
7.	62 crickets; 1 beetle; (2 species; 63 specimens).
8.	81 crickets; 10 beetles; (2 species; 91 specimens).
9.	127 crickets; 24 beetles, 3 silphid beetles, 1 bristle-tail; (4 species; 155 specimens).
10.	154 crickets; 62 beetles, 3 silphid beetles, 1 sciara fly; (4 species; 230 specimens).
11.	69 crickets; 17 beetles, 1 silphid beetle, 3 bristle-tails; (4 species; 67 specimens).
12.	60 crickets; 4 beetles, 3 silphid beetles; (3 species; 67 specimens).
13.	58 crickets; 51 beetles, 1 Pseuda. men., 6 silphid beetles, 1 bristle-tail, 2 sciara flies; (6 species; 119 specimens).
14.	19 crickets; 1 beetle; (2 species; 20 specimens).
15.	9 crickets; (1 species; 9 specimens).
16.	3 crickets; 1 beetle; (2 species; 4 specimens).
17.	14 crickets; 7 beetles, 3 bristle-tails; (3 species; 24 specimens).
18.	1 cricket; (1 species; 1 specimen).
19.	2 crickets; 4 beetles, 6 bristle-tails; (3 species; 12 specimens).
20.	15 crickets; 28 beetles, 1 silphid beetle, 5 bristle-tails; (4 species; 49 specimens).
21.	2 crickets; (1 species; 2 specimens).
22.	3 crickets; (1 species; 3 specimens).

Temperatures

The air temperature in the main part of the New Discovery was found to be 56 degrees Fahrenheit. However, from the shaft of the New Discovery (located between Fossil Ave. survey stations 29 & 30) outside temperature and the constant cave temperature. See graph below. The only door was near the middle of the shaft. No air lock had yet been made.

The temperature of the water of the spring near the drill hole was 55 degrees F., while the water pool in Onyx Ave. was 56 degrees F. This difference of 1 degree might be accounted for by the fact that the water at the drill hole was slowing flowing while the pool in Onyx Ave. was, as far as I could see, perfectly still.

Humidity

The humidity of the air in the main portions of the cave was near the saturation point, or close to 100%.

SPECIES of ANIMALS COLLECTED or RECORDED

Mammals

Live Bats. Georgian Bat. **(Pipistrellus subflavus subflavus)** 3 of these bats were seen near Fossil Ave. survey station 25, on the night of Jan. 7, 1941 when the group of 14 National Park officials went on an inspection trip thru the New Discovery. 2 of these bats were collected on Jan. 11, 1941 Near Fossil Ave. survey station 25. One was covered with large drops of condensed moisture which gave it a nearly white appearance. These bats probably entered thru some entrance we do not yet know or thru the Historic Entrance.

Bat Bones. Little Brown Bat. **(Myotis lucifugus).** The skulls, wing and leg bones of this bat were found commonly in the bottom of dried shallow pools along both sides of the path in Fossil Ave. from survey station 15 to 32.

This is a common bat in North America and hibernates in caves often in large colonies. It is my thought that at one time a large colony of these bats were killed by rising water and of course disintegrated and their light bones deposited on the surface of these small pools as the water gradually receded and disappeared. They may have been reflooated many times after their original deposition but the water could not have been flowing very much except as the last part drained off and formed the small dams in which the bones finally settled. These bats must have entered thru an opening we do not know about, or thru a former opening now closed or thru the Historic Entrance.

Other Mammals

Bones of the following mammals were reported by the National Museum from the specimens I collected and sent to them for indentification. More searching will more than likely disclose additional bones.

Raccoon **(Procyon lotor)**
American Marten **(Martes americana)**
Bobcat **(Lynx rufus)**
Allegheny Wood Rat **(Neotoma pennsylvanica)**

Raccoon

It is not surprising to find the remains of this night prowling animal in the cave. This animal is the one I think made the claw scratches in the soft rock of the walls in Fossil Ave. Most of the scratch marks are at the sides of ledges and I believe that the raccoon was attempting to jump to the ledge to search for an exit or for food in the form of crickets or hibernating bats. The scratches which are not on the sides of the ledges may indicate where, in the dark, the raccoon misjudged the ledge location. I do not think these scratches

indicate an animal's attempt to pull itself out of flood waters. They do not impress me as being the type of scratch that would be made in an attempt to climb out of water, besides there are scratches down low near the floor as well.

American Marten

The bones of this animal are interesting as this species is now extinct in this region and now only inhabits the most remote and wildest parts of wooded regions. The fact also that martens retreat from a region at the first evidence of settlement by man, may indicate the age of these bones.

Bobcat

Probably not found in this area today, but must have entered New Discovery thru some now closed opening.

Allegheny Wood Bat

This animal is found in the rocky, wooded regions about Mammoth Cave. Its presence has been recorded from many caves, and it has been known to travel far into them.

Discussion of Mammals

Entrance to New Discovery

1. Thru the Historic Entrance.
2. Thru some former openings now closed.
3. Thru some as yet unknown opening.

Cause of Death

1. Natural causes in cave.
2. Trapped and drowned by flood waters.
3. Bones washed into cave from outside.

Most of the bones were found about Fossil Ave. survey station 32. They were on the surface mixed with small stones and under the surface as much as two inches all mixed with small broken stones. The whole mixture was under water deposited in the series of small spreading dam like pools which are now dry. Here were found the raccoon and marten bones. The large bone which bore marks of rodent teeth which was found by the survey party on the evening of Jan. 7th on the bottom of the shallow dried pool, was the humerus of a raccoon. Bones were also collected in a small group on a 7 ft. ledge at Fossil Ave. survey station 25, that proved to be raccoon bones. Along the trail at Fossil Ave; survey station 14, a small group of bones was found on the ground.

Three | | | scratches were seen on mud cakes at the travertine dam. These might have been made by a mouse.

Crustaceans

Isopods. (Asellus stygia). Large specimens collected by O. B. Taylor in the crawlway past Gypsum Ave. Small specimens found under and about small pebbles in spring near drill hole. I have found this same species on the Historic Mammoth Cave, and it is the common subterranean species over this area.

Amphipod. 1 specimen from among pebbles in spring near the drill hole.

Crawfish. 1 large and 1 small crawfish (Cambarus pelludicus) were seen in the spring near the drill hole. Not collected.

Insects. Cave cricket (Hadenoecus subterraneous)

Trap No.	Number of specimens
1	9
2	83
3	104
4	105
5	5
6	50
7	62
8	62
8	81
9	127
10	164-large and small crickets seen.
11	69
12	60
13	58-large crickets on underside of ledge opposite spring.
14	19
15	9
16	3
17	14
18	1
19	2
20	15-5seen on walls nearby on 10th, 7th, & 11th.
21	2
22	3

1045

1045 crickets trapped
1 captured at trap 3
1 captured at inverted cocktail glass
1 captured at trap 20

Total 1048 crickets collected

From these results it will be seen that these crickets are well distributed throughout the New Discovery. There are, however, peaks of population about the more moist spots in this cave. At traps 3 & 4 there were formerly pools of water which left cracked mud areas when they dried. The moist area about the inverted cocktail glass located the biggest population of crickets. The third peak is the area about the pool on Onyx Ave. Crickets soon cleaned out the bait vials from many traps so these counts here represented would have been higher had I replaced emptied bait vials in the traps. This cricket is the species commonly found in the Kentucky caves. It is a true cave cricket and has not yet been found outside of caves.

Most crickets were very small apparently in their first instar. One was seen eating some trap bait one-half hour after the trap was placed. Nothing recogniz-

sble was found in the stomachs of these crickets.

Insects. Cave beetles **(Neaphaenops tellkampf)**

Trap No.	Number of specimens
1	0
2	0
3	0
4	1
5	0
6	1
7	1
8	10
9	24-Few seen near a pit colony.
10	62-Few seen near a pit colony.
11	17-Few seen near a pit colony.
12	4
13	51-Large pit colony on ledge opposite spring. Few beetles seen.
14	1
15	0
16	1
17	7
18	0
19	4
20	28
21	0
22	0
	212

212 beetles trapped.

3 captured at end of Fossil Ave. running over sand on path (near trap 9). More seen.

1 under fungus board - 3 more seen.

4 - 2 at spring on ledge and 2 in Gypsum Ave. on sand.

220 Total of beetles collected of this species.

It will be noticed that the largest catch of these beetles was made at the most moist locations in the New Discovery, at the spring, at the inverted cocktail glass and at the pool in Onyx Ave.

This is the most common beetle in the cave and is common in the entire Mammoth Cave.

Numerous beetle pit colonies were seen in sandy locations and some were in wet locations where there seems to be a gallery structure beneath the pits. Many pits were dug up but nothing was found. Nothing was found in the stomachs of the beetles examined. Beetle parts were found in the sand at Fossil Ave. survey station 10.

Beetle. **(Pseudanophthalmus menetriesi).**

Trap No.	Number of specimens
13	13

This beetle is the second most common in the Mammoth Cave, but compared to Neaphaenops tellkampf it is rare.

Bettle. **(Adelops hirtus)**

Trap No.	Number of specimens
1 to 8	None
9	3
19	3
11	1
12	3
13	6
14 to 19	None
20	1
21 & 22	None

17 of this species trapped under fungus board. 22 total of this species collected.

This carrion beetle is found in the more moist situations in New Discovery. It is reported as common in all of Mammoth Cave.

Brisdetails. **(Campodea cookei)**

Trap No.	Number of specimens
1 to 8	None
9	1
10	0
11	3
12	0
13	1
14 to 16	None
17	3
18	0
19	6
21 & 22	None

19 bristletails trapped; 1 found at edge of spring on mud floor; 1 on level above spring where lunch is eaten on floor in the open. 21 total of bristletails collected.

This species is most common about the more damp portions of the cave.

Fly **(Sciara sp.)**

Trap No.	Number of specimens
1 to 9	None
10	1
11 & 12	None
13	2
14 to 22	None

3 total flies collected.

This fungus gnat is found at the most moist portions in the cave.

Springtails.

Several minute springtails were seen under bits of discarded paper at Fossil Ave. survey station O, and under wood in three locations.

Pseudoscorpions **(Chthonius parkardii).**

One specimen collected under fungus board.

Worm egg capsule.

I found near worm castings in Gypsum Ave.
Unidentified object found in trap 12.
Bait in Onyx Ave. pool attracted nothing.

SUMMARY OF SPECIES

Invertebrates

Species	Specimens	
Crickets	1048	Many more seen.
Beetles	220	Many more seen.
Adelops hirtus	21	
Bristletail	22	
Sciara	3	
Isopods	6	
Crawfish	2	Seen only.
Springtails	3	Seen only.
Amphipod	1	
Pseudo. menetriesi	1	
Peseudoscorpion	1	
Worm Casting	1	

12 Species; 1329 specimens seen and collected.

Vertebrates

Species	Specimens

Bats, Georgian 3; 1 seen, 2 collected.

Bones

Eastern Pine Marten.

Little Brown Bat.

Alleghany Wood Rat

Raccoon

Bobcat

6 species

18 species total

Discussion

The result expressed in this report must be considered as preliminary in nature. The series of traps has shown the sample of animal life and centers of population. The twelve species recorded, I believe, represent the principal ones present. Trap catch has shown that th greatest population of species both in number and kind centers about the areas in which there is the greatest amount of moisture. There are three such areas, (1) about the inverted cocktail glass, (2) about the spring near the drill hole, (3) about the pool of water in Onyx Ave. These three areas may also be regarded as centers of dispersal. Beetle pits and adult crickets were noticed in greater numbers in these three general areas than elsewhere in New Discovery.

It is suggested that in developing the cave for travel, these three areas be disturbed as little as possible. As I see it, there will be two main disturbing operations. One is disturbance by large scale altering the original cave, by digging the original floor and by dumpng this dirt as fill in these areas. The other is the bringing in of construction equipment, supplies and tools, and the entrance of outside species of animals which are bound to enter with tools, supplies, equipment, etc. With the creation of a dining room, rats and mice are almost sure to be attracted from outside. These eat cave animals and compete with them for food. The population of the animals now in New Discovery is a very desirable height, in spite of the 1331 specimens which I collected. Any great disturbance of this population or its distribution centers by construction work is not to be desired.

Paradise—No trapping, collecting or observing was done.

Areas to Preserve—From Fossil Ave. Survey Station 15 to 32 there exists along the sides and many times under ledges, small dried pools containing bat and other bones. These might be saved under glass for exhibition. The mammal scratches on the soft walls along Fossil Ave. should by all means be covered. Beetle pits wherever they occur, might be preserved. The faint animal tracks in Onyx Ave. should be saved. The fossils eroded from the walls and ceiling in Fossil Ave. should be saved. The very character of the sand in Fossil Ave. being composed of fossil fragments, might be saved from being ground to pieces under foot and some of the more striking examples used to show visitors.

ACKNOWLEDGMENT

I wish to thank Dr. Carl P. Russel, Supervisor of Research and Interpretation for the National Park Service, for the invitation to make this study; Mr. R. Taylor Hoskins, Acting Superintendent of Mammoth Cave National Park for courtesies of transportation, housing, guide service and maps, Mr. O. B. Taylor, Regional Biologist, for assistance in collecting, interpreting and recommending.

HAMILTON CAVE

(Franklin Pendleton County, West Virginia)

This cave is about 250 yards southwest of Trout Cave on the same ridge. It lies at about the same elevation as Trout Cave. Though it cannot be seen from the road, it lies at base of a rift in the cliff which is clearly visible from the road. This is the only large rift apparent from the road in this immediate section of the cliff.

The cliff in which this cave is located is four miles south of Franklin on U. S. 220 (see direction for Trout Cave).

Though this cave has not yet been visited, it is reported to be a regular maze resembling the layout of city blocks. The passages are said to be tall and narrow averaging two to eight feet wide and four to twenty feet high. The cave is probably also quite dry and dead. Cave never thoroughly explored.

This information obtained from Moyers, owner of this and Trout Cave.

—April 6. 1942. W. J. Stephenson

LOG OF THE SOCIETY . . .

This log is a continued summary of information added to the file of the society since the last publisher's bulletin. The society is attempting to establish and maintain a separate file for each cave in the country for which it has any data whatsoever, even if such data is limited to the cave's name only.

The caves reported herein are all caves for which separate files have been established since the issuance of the last bulletin. For a complete list of all caves for which the society has files, references must be made to the preceding bulletins.

The reports listed in this log are summaries only of the information in each cave file. Many caves herein listed are reported in detail elsewhere in this bulletin, while other caves have been previously reported, (see note 2) but only now have files been established for them. While complete files, over 100 on Pennsylvania caves have been set up, are not listed on this report but are witheld to serve as neucleus for the log of the next issue.

The following abbreviations are used throughout this issue:

EWB—Edwin W. Bishchoff; RAA— Robert A. Allen; MMR—M.M. Renalds; JP—John Petrie; and WJS —Wm. J. Stephenson.

Note 1. Cave referred to briefly on pages 380-2 of Dr. Louis Feuchtwanger's treatise on Gems, etc. 1859 (Appleton & Co., New York).

Note 2. Reported in Bulletin No. 3 of National Speleological Society, January 1942. While these caves were referred to in this bulletin, no file for these caves had been established at the time so it is proper to report these caves in this list of new files.

Note 3. The specific latitude and longitude of these caves have been computed and are on record. After the war a list of all caves with their latitude and longitude may be published separately.

"Listed" means: Not yet visited by an N.S.S. member; information from local residents or by hearsay.

ARIZONA

Crystal—Reported in full in N. S. S. Bulletin, January 1942. Note 2.

CALIFORNIA

Clough—Limestone, no detailed information. Listed by EWB.

Crystal—Limestone, much information, alleged to have a mile of explored passages. Some developed by Park Service. EWB.

Deep Creek—Supposedly a commercial development. No specific information available. EWB.

Hawver's—Little formation, many fossils. No other details available. EWB.

Ice—Lava tube with ice. EWB.

Inferno Caverns—Small lava tubes. Indian battle site. Little other information. EWB.

Joaquin Murietta—Small sandstone caves; reputed hiding place of early California bandits. EWB.

Lo Jolla—Marine cave caused by wave erosion. A commercial development constituting 7 caves. Entrance at 1325 Coast Boulevard, La Jolla, California. EWB.

Marble—Near Marble Mountain in Marble Valley. Little other information. EWB.

Mercer—Commercially developed. Although in limestone, is caused by fissure or fault enlarged by subsequent solution. Some formation. EWB.

Mitchell's Cavern—Commercial development, limestone, extensive passages, and good formations. EWB.

Moaning—Complete report furnished the Society by EWB. Cave composed generally of a single large room with some formation. Previous finds of Indian bones make this cave of archeological interest.

Modoc Lava Bed—Several caves in this lava bed formation, all probably small and many unnamed. They vary greatly in size and constitute some of the best examples of lava tubes in this country. All are located in Lava Beds National Monument. The individual names of some three dozen caves for which the Society has records, have been omitted. Report submitted by EWB.

McCleod Ice—A lava tube, with ice, approximately a quarter of a mile long. EWB.

Painted—A commercial development; caves are small and contain Indian paintings on rock. Exact type of cave unknown—probably sandstone. EWB.

Painted Rock—Sandstone with Indian paintings; not known to be a commercial development. EWB.

Paradise—In Sequoia National Park near Clough Cave. Limestone. Little information available. EWB.

Petrified Forest—Little information available; merely the location. EWB.

Pinnacles—In Pinnacles National Monument. Cave caused by collapse of canyon walls; composed of small tunnels. EWB.

Pluto—Large lava tube nearly 1 mile long. EWB.

Potter Creek—Limestone, over 200 species of recent fossils including mastodon and giant sloth reported to have been found here. Should be of particular interest to paleontologists. EWB.

Robber—Marine formation; Legendary pirate cave. EWB.

Samwells—Limestone. Little other information available. EWB.

Split Rock—Indian relics and artifacts. In Joshua Tree National Monument. EWB.

Subway—Lava tube. Nothing unusual reported. EWB.

Travertine—Formed in Travertine; Possess Indian hieroglyphics. EWB.

Trinity Alps—Limestone high on cliff sides. Contain formations. EWB.

Vasquez Rocks—Sandstone; little information available. EWB.

CANADA

Alberta

Banff—Note No. 2

COLORADO

Cave of the Winds—Preliminary report by J. S. Petrie, page 36, N.S.S. Bulletin, January 1942. A commercial development; complete report received recently from the cave management.

Marble Mountain—Report by John Dier on page 33 of N.S.S. Bulletin, January 1942.

CONNECTICUT

West Rock—Note 1.

FLORIDA

Florida Caverns—Preliminary report and map furnished by Florida Forest and Parks Service. Leonard Giovannoli is the assistant director of this park and an N.S.S. member. He will be glad to furnish members with desired information. Further reports are expected.

GEORGIA

Saltpeter—Complete map furnished by Georgia Geological Survey. Full report lacking. Apparently a fairly extensive limestone cave.

ILLINOIS

Devils—Cave reputed to be in state park near Aurora, Ill. Alleged to be developed although not commercially operated. Listed by J. Meenehan.

INDIANA

Corydon—Note 1.

Epsom Salts—Note 1.

IDAHO

Blow Hole—Type unknown. Fissure with alternating wind currents. EWB.

Burley Wind—Lava; periodic winds through small hole produce whistling sound. EWB. and return from Petrie's survey on commercial caves. However, this cave is not confirmed as commercial.

Canyon Basin—Limestone with ice formation. EWB.

Cave Faults—Near Yellowstone National Park. Full detail unknown. EWB.

Clay—Part limestone; floor of sticky clay; some stalactites. Passages average 20 feet in width. EWB.

Craters of the Moon—Constitute Craters of the Moon National Monument. Many have tubes of all sizes. Some with ice. Many individual names in file are not given here. "Surprise Cave" contains lava dam 20 feet high requiring use of rope. Tunnels coated with desert salt. EWB.

Crater Rings—Small lava chamber with ice EWB.

Crystal Falls—Lava with Ice; many passages; massive ice crystals and ice waterfalls. EWB.

Danskin Canyon—Several large caves formerly used by Indians. Type unknown. No other data available, EWB.

Eureka Lava—Little information available. EWB.

Kuna—Sand floor, wind currents. Requires 30 foot ladder to enter. Three known chambers. Cave dry and dusty. EWB. and Petrie's survey.

Ice—Limestone with ice formations; Small; Petrie's survey.

Hot—Limestone; six chambers known; hot water in cave. Entrance now supposed to be caved in. EWB.

Higby—No specific information but report indicates that more than 30 caves exist in this general area. EWB.

Formation—Formed by solution and pre-existing fissure. Full report by EWB. Ceiling studded with white honeycomb formation. Petrie's survey. Not verifed as commercial .

Lava—Assorted smal lava tubes. EWB.

Midway—Usual lava cave. EWB.

Minnetonka—Limestone with many large formations. Reputed commercial and to be the best limestone cave in Idaho. EWB.

Nameless—Small lava cave containing relics, artifacts, and skulls. EWB.

Porcupine—No information other than general location. EWB.

Shoshone Ice—Commercial development. Contains much ice. Typical lava tube. Full report by EWB.

Snake River Gorge—Type unknown; contains Indian petroglyphs.

Swan Lake—Type unknown; reputed to possess some ice. EWB.

Teakettie, Deadhorse, etc.—Assorted small lava tube caves. EWB.

Timmerman Hill—Believed to be lava. No other information. EWB.

Twin Buttes—Lava tube, ¾ mile long, average width 15 feet, height 6 feet. EWB.

Volcano Hill—Lava tube approximately a half mile long, 50 feet wide, 25 feet high. Known locally as "Ice Cave". Indications of intermittent stream in cave. EWB.

Warm Springs—Extinct hot Spring or geyser. Exact size unknown. EWB.

Rock House—Unexplored cave reported by Mrs. E. A. Gill Needs exploration.

Wyandotte—Large commercial cave. Visited by Society in 1941. See reference to recent discoveries in N.S.S. Bulletin No. 3, January 1942, Page 42. (Note 2).

KANSAS

Daly—Note 2. page 24

Hermits—Note 2, page 40.

KENTUCKY

Boons—Note 1.

Crooked Creek— Note 1.

Russells—Note 1.

White's—Note 1.

MARYLAND

Dead Horse—A small cave near Twiggtown. Explored, surveyed for fauna and reported by Martin Muma.

Ditto—Cave yet to be explored. Reported by T. T. Perry. Believed to be a medium sized cave.

Goats—Small cave near Cumberland. Has two levels. Fauna collected and reported by Martin Muma.

Harwell—Note 1.

Hughes—Note 1.

Twiggtown—Large cave; considerable work done by Martin Muma. Fauna collected and considerable exploration. More to be done.

MASSACHUSETTS

Adams—Note 1.
Berkshire—Note 1.
Hudson Brook Natural Bridge—Note 1.
Lanesboro—Note 1.
New Marlborough—Note 1.
Natural Bridge and Cave at Nante—Note 1.
Purgatory—Note 1.
Sunderlaid—Note 1.
West Stockbridge Cave—Note 1.

MINNESOTA

Niagara—Harmony, Minn. Commercially developed. Has large waterfall. Visited by party from the Society in 1934. Note 2, page 15.

MISSISSIPPI

Cooper River—Note 1.
Great Spirit—Note 1. Cave reputed to be abode of Great Spirit of the Northwest Coast.

MISSOURI

Ashley's—Note 1.
Miller's—Reported by Service Club of Fort Leonard Wood. Bulletin by Smithsonian reputed to have been written on this cave and now out of print. Needs further investigation.

MONTANA

Morrison's—Commercially developed, state owned cave. Note 2, 6, 39. Maps and detail report furnished Society by the management. A full report on this cave may be released in some subsequent issue.

NEVADA

Baker Creek—Well explored but not developed. No report as to size and extent. Robert A. Allen, State Geologist of Oregon.
Cave Creek—Limestone, large underground stream; formations. Full extent of cave unknown. EWB. and RAA.
Cave Valley—Also known as Mormon Cave. Partially caved in about 1930. Reputed to be explored for at least a mile RAA. and EWB.
Goshute—Partially explored only. Full data lacking. RAA.
Gypsum—Fully explored and archeological excavations completed. About 300 feet long with 6 rooms. Also known as "Ground Sloth Cave." RAA. and EWB.
Lehman—Constitutes part of National Monument. Good formations including helictites. Developed and electrically lighted. Is operated by National Park Service.
Mineral Hill—Undeveloped but explored as early as 1871 by Capt. G. M. Wheeler. Full report not available. RAA.
Lovelock—Fairly well explored and considerable archeological work done. Limestone cave small in size.
Mormon—See Cave Valley Cave.
Northumberland—Limestone. No other information available, except that it is reputed to be of considerable size. RAA. and EWB.
Ocala—Believed to be limestone formed by ancient wave action. Very small. Contains artifacts and guano. EWB.
Pole Creek—unexplored. No data available. RAA.
Snake Creek—Unexplored. No data available. RAA.
Star Peak—Explored for about 2500 feet. Mineralized encrustations on wall. RAA.
Unnamed—Number one. Partially explored. Discovered in 1883 and reported in "Genoa Weekly Carrier" May 18th of that year. RAA.
Whipple—Developed commercially and abandoned. Supposed to have one large room 100' x 500' with column 10 feet in diameter. Contains guano. RAA. and EWB.

NEW HAMPSHIRE

The Devil's—Note 1.

NEW YORK

Esopus—Note 1.
Knox—Note 1. Now commercially developed. Has been visited by New England Grotto members. Report not yet received. It is understood that the cave will support further exploration.
Monito (Devil's Abode)—Note 1, p. 380.
Niagara—Note 1, p. 380.

NEW MEXICO

Carlsbad—Consitutes main cave in Carlsbad National Park. Some hundred other caves are reputed to exist in this park, many of which have not been thoroughly explored. Society's record on this is not complete. When additional data of interest is furnished the Society, it will be published from time to time.

NEW YORK

Watertown—Note 1.

NORTH CAROLINA

Boone—Note 2, page 18.

OHIO

Cave in Rock—Also called "Natural Building. Note 1. Believed to be developed by State of Ohio and included in its park system. Confirmation is necessary.
Mason's—Note 1.
Old Man's—No information available.

OREGON

Arnoid—Lava cave one mile long, average width 40 feet, height 40 feet in places. Contains ice in winter. EWB.
Catlow—No report on cave except that artifacts have been found. EWB.
Cloudcap—Lava cave. No specific information available. EWB.
Edison—Lava tube with ice, prehistoric relics found beneath the ice. EWB.
Horse—Lava. No other information available. EWB.
Ice—No information available. EWB.
Indian—No information as to type of cave. Hieroglyphics on walls. EWB.
Lava River—Note 2, page 14. Over 1 mile in length. Reported by EWB.
Little Belknap—Lava cave. No other information available. EWB.
Llao Rock—Lava. No other information available.

Malheur—One mile long, last half water-filled. Indian relics. Ice stalagmites in winter. Lava tube. EWB.

Marble Mount—Limestone. No other information available. EWB.

Modoc Lava Bed National Monument—Caves actually in California. See report on California. Post office at Merrill in Oregon, which state therefore claims caves. RAA.

Nash Crater—Lava. No other information available. EWB.

Oregon—Limestone. Developed, electric lights, run by National Park Service. Fairly extensive. Contains formations.

Redman Lava—Lava. No information available. EWB.

Sawyer—Lava formed by bubble in lava crust. EWB.

Sea Lion—Ocean caverns. Main chamber 1500 feet long, commercial development. Has sea lion population in winter. EWB. and RAA.

Skeleton—Lava. No information. EWB.

Skylight—Lava. No information. EWB.

South—No information. EWB.

Surveyor's—Lava. No information. EWB.

RHODE ISLAND

Purgatory—Note 1.

Spouting—Note 1.

SOUTH CAROLINA

Great Flat Rock—Note 1.

Lovers' Leap—Note 1.

TENNESSEE

Arched—Note 1.

Big Bone—Note 1.

Canoe—Reported by Don Black. A shallow river cave in limestone. Eight miles up Tennessee River from Knoxville. Has cave rats.

Cherokee Bluff—Near Knoxville. Full report by DB. to be published.

Nickajack—Large cave extending under Alabama, Georgia, and Tennessee. Entrance near Shellmound, Tennessee. Commercial development being attempted. Cave possesses formations and possibilities for fauna study. Note 1. p 14

Painted Rock Bluff—Limestone cave. Preliminary report by DB. Bats collected and other fauna noted.

VIRGINIA

Border Rock Spring—Small limestone cave near spring. Listed by M. Renalds.

Bathers—Near Lexington, Va. Suposedly an extensive cave. The limestone strata reported to be broken and dangerous. Preliminary report by Dr. Steidtman.

Bean—Near Winchester, Va. Cave only partially explored. No full report available. Listed by WJS.

Betsy Bell—Fairly large cave involving rope work to enter. Reports furnished by George Landis and Martin Muma. Some fauna collected. Rough map available.

Bridgewater Hill—Several openings in hill. Extent of cave unknown. Listed by MMR.

Cabie—Map and report by Charles Landis. Medium sized cave. Note 4.

Cave Hill—Small openings and apparently possesses no great possibilities. Listed by MMR.

Churchville—Supposed to have four large rooms and lake. Not thoroughly explored. MMR.

Montell Coiner—Opening now closed. Would take a day to reopen. Said to be of considerable size and depth; would require rope work for exploration. MMR.

Sam Coiner—Small cave near Waynesboro. Listed by MMR.

Collierstown—A small cave of two rooms. MMR.

Dalesville—Only two rooms known to exist. May support further exploration. MMR.

Gibson hole—Underground lake used as site of local picnics. Large entrance. MMR.

Grand Caverns—Note 3. Commercially operated cave. One of the largest in Virginia. Contains many unique and interesting formations. Several visits by Society. Note 1. Considerable other information in files. Many other caves unnamed, reported in immediate vicinity by MMR.

Greenbrier—Note 1. This cave may be in what is now West Virginia.

Henkel Sisters—Reported to be of considerable size. Opening now closed would require reopening. Last exploration some 40 years ago. Listed by MMR.

Hollins Station—Small cave in farmer's basement. MMR.

Johnson's—Note 1.

Kern—Near Woodstock, Va. Reputedly unexplored. Entrance a vertical hole needing rope ladder. Listed by Richard Wahl.

Lacey Spring—Visited by Porte Crayon. Large cave. Note 2, p. 37.

Madison's—Note 1.

McGuffin—Famous picnic ground. Cave probably has only one large room. MMR.

Caries M[illegible]k—Full report by Kay Muma may be published in bulletin.

Will M[illegible]k—Larger cave than Charles M[illegible]k; Partially explored by Meenehan and Wilson. Further work planned. Complete report not in.

Natural Bridge, Va. Commercial development. May be remains of old Cave. Note 1.

Natural Tunnel, Va.—Cave through mountain. Used by railroad. Note 1.

Pipe—Small cave near Staunton. More in the nature of a well. Entrance lead often filled with water the level of which varies greatly. Report and map by Charles Landis.

Porter's—Partially explored and mapped. Contains several large rooms. Near Clifton Forge, Va. Will support more work. Very small stream. No fauna other than bats reported. Note 3.

Reid's—Cave of unknown size near Hot Springs, Va. Note 1. It is doubtful that the two caves are the same.

Rogers—Note 1.

Ruffner's—Note 1. Cave visited by party from Society. Full report in file. (Note 3).

Saltpeter No. 2—Rockbridge Co. No details available. Reported by MMR.

Turkey Hill—Small cave, fairly complete report by MMR.

Unnamed No. 1—Rockingham Co. Needs rope to effect entrance; can stand further exploration; data incomplete. Report by MMR.

Weyer's (Weier's)—This cave, the oldest known cave in Virginia, now operated commercially as Grand Caverns. All Society's data filed under Grand Caverns.

Wreast's—Note 1.

Zane's—Note 1.

VERMONT

Bennington—Note 1.

Dorset—Note 1.

WEST VIRGINIA

Big Springs—Visited by party from Society, 1940, under Arthur Lembeck. Revisited in 1942 under leadership of Beard. Full report of latter trip. Cave quite extensive, with several leads. Running stream in cave. Room for considerable further exploration.

Blowhole—Sizable cave, running stream, much good formation, full exploration requires ducking-unders. Cave mapped to second duck-under. More exploration to be done, however should await warm weather and dry spell. Not surveyed for fauna. Further exploration and reports by Earl Beardsley. Note 4.

Blowing—Reported by Miles Pillars, not yet visited by Society; may be same as Big Springs Cave. Further check-up required.

Cornwelk—Listed by Walter Amos. No information available.

Devil's Chimney—Very small, vertical opening in cliff. Rich in folklore. Referred to by Kerchival as early as 1832. Report by T. P. Perry.

Devil's Dining Room—Little information available. Listed by JP.

Falling Springs—Little information available. Listed by Miles Pillars.

Hamilton—Not yet visited by Society; Fairly extensive dry cave. Listed by WJS.

Haywood—Reputedly a large cave. Not yet visited by Society. Listed by JP. Note 1, Tucker Co.

Indian—Listed by Pillars; little inforamtion available, supposed to contain Indian relics.

Indian No. 2—Hamilton Co. Visited by Society May 30, 1942. Full report being prepared. No Indian remains observed but considerable fauna collected.

Jordan's—(The Great Cave of Cheat River). Listed by Pillars. Cave subject matter of book "The Great Cave of Cheat River" by Dr. Jordan, published 1855. Not yet visited or found by Society. Appears to be no local agreement as to location.

Limestone Mountain—Near Parsons. Visited by party of Society May 31, 1942. Cave completely explored and full report in records. Generally small and contains no items of particular interest.

McCoy's Mill—Near Franklin. Reported to Society but not yet visited. Listed by Stephenson.

Mitchell's—Near Milan. Visited by party under leadership of Frank Silver, May 30, 1942. Full report in file. Cave possesses two or three levels and is fairly extensive. Is reputed to go on a mile further than found by Silver's party. Little formation now present, cave generally dry.

Moyer's—Near Trout Cave, of same general character but supposedly small. Not yet visited by Society. Listed by WJS.

Mystic—Near Onego. Fairly large cave, good formation, flowing stream. Surveyed for fauna and fairly well mapped. Several reports in files. Note 3.

Pickle Mountain—Near top of Pickle Mt. Reputedly still unexplored. Will probably require tackle to effect entrance. Listed by WJS.

Pine Tree—Near Slaty Fork. Probably a small cave, not yet visited by Society. Listed by JP.

Rains (Luke)—Same as Mystic Cave.

Ridgeville—Visited by party under Frank Silver. Probably now fairly well explored. Preliminary report in file. Not yet surveyed for fauna.

Sharp's Mill—Near Slaty Fork. Probably a small cave, not yet visited by Society. Listed by JP.

Sinnett—Near Franklin. Supposed to require tackle to effect entrance. Not yet visited by Society. Listed by WJS.

Slaty Fork—Small cave not yet visited by Society. Listed by JP.

Teterton—Same as Mystic Cave.

Third Quarry—Near Martinsburg, small cave in quarry wall, requires rope. Bats and pigeons observed. Report recorded by Silver.

Thornbottom—Near Wardensville. Visited in 1941 by party under Dr. Welsh. A small shaft type cave, of no particular interest except for further survey for fauna.

Timber Ridge—This cave same as Mystic Cave.

WISCONSIN

Cave of the Mounds (Brigham's).—Commercial development at Blue Mounds. Visited by party summer of 1941. Report in files. Note 2.

BUTLER CAVE

The Steubenville group were invited on a cave trip by the Pitt boys on Sunday, Oct. 10, 1941. We met in Butler, entered a nice looking pit about 20 feet, then into mud about 6 feet deep and up to 24,630 inches deep of soft mud. We roped a lpine as we plowed through, crossed and recrossed the line several times. We traveled around about half a mile and at no time were we more than 300 yards from the entrance. It contained little formations. After getting out, we all waded into the creek to wash off the mud, and then ate a picnic lunch put up by the Pitt crowd. We also visited Hineman's Cave one mile west of Worthington, Pa., toward Butler, Pa. This cave reported as cave No. 1 in Stone's Book on Caves of Pennsylvania.

These that were on the trip are as follows: Mr. and Mrs. James Beard; Loman Thompson and son, George; Mr. & Mrs. Alden Snell; C. H. Matchett; Ed. "Casey" Schugt; Bill McCauley (Wash., D. C.); Ed. Gaage, mother, brother and sister, Katherine; Miss Lila Miller; Mr. Jankowski; Mr. Gene Young.

COMMERCIAL CAVES . . .

By J. S. Petrie, Ass't Sec.

More or less continuous work has been done since June 1941 in gathering information regarding the commercial caves of the country. The Jan. 1942 bulletin listed on pages 45-47 the name and post office or town of caves which had been reported by the Geological Survey or other authorities in the several states as commercial. From 67 of these, listed in bold type, specific confirmatory information had been received, and since then correspondence has brought the total of such known commercial caves, with data as summarized below, to nearly 100, in 30 states.

One cave, Skyline Caverns, Front Royal, Va., has been reported closed since our country entered the war, and another has reported the probability of such step being taken. In view of the multiplicity of possible reasons necessitating such action involving no fault of management or reflection on the merits of the cave, it seems therefore quite probable that is time goes on others will join the ranks of the temporary "ex-commercial" caves if they have not already done so.

Painstaking effort has been made to assemble, and in most cases drastically condense, into standardized form, information received from various sources as accurately and fairly as possible. Since the writer has personally visited comparatively few of the caves described, and few of the remainder have been reported by Society members or others personally known, the accuracy of the data supplied and interpreted from different caves inevitably varies, and of course portions of it change from time to time as entirely accurate information becomes obsolete.

For those who may not perhaps know already, it is desired to point out that glowing descriptions that sound quite similar do not unfortunately always mean the same thing. Some of the known better caves in their reports and literature appear to the writer modestly to understate the merits of their attractions, while at the other extreme some decidedly minor caves undoubtedly exaggerate their charms. This is not to say of course that some good caves do not occasionally exaggerate, or that some lesser caves do not have more to see than they tell about, and not to say that many in between do not give a fair and complete picture. However, innumerable variations and shades of meaning of a slogan or phrase capable of further epitomization by the unwary as "the world's largest, most beautiful cave", applied to—well, more than one!—undoubtedly require discerning notice in many cases of said variations and shades of meaning to justify the slogan. It may fairly be doubted whether **all** such phrases can be strictly true. However even a resident cave owner or manager is doubtless entitled to sing "there's no place like home!"

For reasons believed obvious, descriptive adjectives have been sparingly used, and the presence of conventional features largely omitted from the description.

Sincere thanks are hereby extended to all those whose efforts, some of no small extent, have made this compilation possible. Correspondence is solicited from any who may be interested, either in correcting mistakes (which must inevitably have occurred in a work of this kind) or in completing the desired data for subsequent report in a later bulletin. Especially is it requested that anyone, knowing of another commercial cave in this country, communicate with the writer at 400 So. Glebe Road, Arlington, Va. giving the name and post office address of the owner or manager.

(*—means "Reported commercial, no confirmation yet"; N. P.—National Park; N. M.—National Monument; S. P.—State Park. Other abbreviations believed obvious.)

ALABAMA

Maysville—Aladdin Cave, 15 mi. from Huntsville. Open daily. Tour 1 hr. Adults 55c, children under 8 free. L. E. St. Clair, R-2, New Market, Ala., Mgr.

Trussville—Crystal Cave (Alabama Caverns, The Great Rock House), at Clay, 18 mi. n.e. of Birmingham. Open daily 9 a.m.-10 p.m. Tour 1 hr. 1000'. Adm. 50c. M. L. Kelley, Pres.

Scottsboro—Great Saltpeter Caverns, 8 mi. s.w. of Scottsboro, 6 mi. w. of Lime Rock. Open daily. Tour 1½ - 2 hrs. 60-100' wide for 1 1-2 to 2mi. Operated for saltpetre as far back as 1812; huge quantity taken out during Civil War. Adults 55c, Children 30c, plus tax. J. L. Matthews, Owner.

Weaver—Lady Cave or Weaver Cave, near Anniston. Each 1 hr. tour, no charge yet, wiring planned. Ed. Hinton, Op.

ARIZONA

Vail—Colossal Cave, S. P., 30 mi. from Tucson, 8 mi. off U. S. 80. Open daily 8 a.m. - 6 p.m. Tour 45 min. 1 mi. Temp 72 dg. Adults $1, children 50c. F. Schmidt, Mgr.

ARKANSAS

Pindall—Big (Hurricane) Cave*

Harrison—Crystal (Mystic, Masion) Cave.*

Jasper—Diamond Cave, on #7 from Harrison or Russelville. Open daily 7 a.m. - 7 p.m. Adm. 55c plus tax.

Eureka Springs—Onyx (Robin's) Cave.*

Bella Vista Wonderland Cave—4 mi. n. of Bentonville on #100, alt. U. S. 71. Open daily 8 a.m.-6 p.m. Tour ¼-½ hr. Mammoth rooms, one including dance floor. Adults 50c, children 25c, and rates. Linebarger Bros. Owners.

CALIFORNIA

Sequoia, N. P.—Crystal Cave, 8½ mi. below Giant Forest, thence 3000' trail into Yucca Creek Canyon Open May 30-Sept. 25. Tour 1 hr. 1/3 mi. Small lakes. Adm. 44c, children under 16 free. F. R. Oberhanhsley, Park Naturalist.

Tulelake—Lava Beds N. M. 294 caves, 45 mi. s. of Klamath Falls, Ore. Closing during short period in winter. Open 8:30 a.m.-3:30 p.m. 2 hrs. for one typical lava tube and one ice cave. Caves range from 100 yds. to over 1 mi. Numerous lava flows, cinder cones, craters and other volcanic features, most recent about 300 years old. 50c park permit. D Fisher, Custodian.

Essex—Mitchell's Cave, on good desert road about 25 mi. n. of Essex on U. S. 66, & 50 mi. s. of Windmill Station on U. S. 91. In Mojave Desert, near New York (Providence) Mts. Open periods & length of tour not stated. Adults $1, children half price. and rates.

Santa Barbara—Painted Cave. Note 1.

La Jolla—La Jolla Caves, accessible from Coast Boulevard. "Sunny Jim" largest of group of seven and only one that can be entered. Washed out by action of the Ocean during ages past.

Vallecito—Moaning Cave, 13 mi. from Sonora. Open all year, 24 hours a day. Tour 45 min. Largest room 165 feet high, explored 400 feet down, bottom not yet reached. Supposed to be largest "well type" cave in the United States. Admission 50c. A. M. Carley, joint owner.

Murphys—Mercer's Cave, 1½ mi. from Murphys on road to "Calaveras Big Trees." Open all hours. 930 feet long; 7 chambers. Mrs. Margaret Mercer, Prop.

Pinnacles—Pinnacles N. M. Always open, lighted 8 hours. tour 1½ hours, ¼ mile. Covered Canyon; volcanic rock; underground stream. 50c per year per car to enter Monument; cave free. W. I. Hawkins, Acting Custodian.

COLORADO

Manitou Springs—Cave of the Winds, 2 mi. N. of Manitou Springs, near head of Williams Canyon at foot of Pike's Peak. Open all year; Nov. 1 to Mar. 1, 8 a.m. - 5 p.m.; Apr. 1 to Oct. 3, 7 a.m. - 8 p.m. Tour 40 min. 1 mile circuit. 19 rooms and passages. children.

CONNECTICUT—None

DELAWARE—None

FLORIDA

Marianna—Florida Caverns S. P., 2 mi. N. of Marianna. To be opened 1942, 24 hrs. daily. Tour 1 hr. ¾ mi. Largest rooms 50' x 100' x 30'. Admission Probably less than $1. Beautiful small formations. Pottery and other artifacts indicate Indians probably used area for camping. Lewis G. Scoggin, Director, State Parks, Tallahassee, Fla.

GEORGIA

Cave Spring—Cave Spring Cave, Floyd Co.*

IDAHO

Arco—Craters of the Moon N. M., 20 mi. from Arco on state #22, cave 1½ mi. from entrance. Open about Apr. 15 to Nov. 30. Tour from a few hours to limit of interest. Lava tubes size up to 30 feet diameter, ¼ mi. long, some with ice. Guy E. McCarty, Custodian.

Shoshone—Shoshone Ice Caves 16 mi. N. of Shoshone on #93, road to Sun Valley. Open summer months, daylight hours. 1 hr. tour, 300' - 400' x 50'. Ice floor and walls. Adm. 50c per car.

Paris—Minnetonka Cave.*

ILLINOIS

Cave-in-Rock—Council Cave in Starved Rock S. P., free to public. A. R. Kugler, Asst. Supt. of Parks, Springfield, Ill.

Marengo—Marengo Cave, 37 mi. w. of Louisville, Ky. #64 and #66. Open all year, daylight hours. Night by appointment. Tour 1¾ hrs., 45 mm. for most beautiful part. 1½ mi. round trip, ½ mi. short trip. "Crystal Palace" 170' x 60' x 30', colored illumination. Adm. $1 plus tax. Marengo Cave Co., Chas. Fitzgerald, Pres.

(Other Indiana caves of interest include: Little Wyandotte, in Crawford County; Saltpeter and Donaldson's in Spring Mill Park; Twin, Hamer's, Bronson, Wind and King's, in Harrison County; Yocum's, in Crawford and Harrison Counties; Danner's, Pitman's, Sheep's Landon, Sikert's Well, Mauck's, Bordens and Squire Boone's, all near Mauckport, Indiana.)

Wyandotte—Wyandotte Cave, #62, 10 mi. W. of Corydon, 35 mi. W. of Louisville, Ky. Open all year. 8 a.m. to 5 p.m. Eight o'clock night trip when desired. 3 trips of from 1½ to 7 hours. "Pillar of the Constitution" 72 ft. circumference. Mountain 175 feet high in room ¼ mi. circumference. Extensive helictite formation in newly discovered portion. Admission $1.50 for #1 route, $2 for #2 or No. 3 route. S. L. Riely, Mgr.

IOWA

Decorah—Wonder Cave, 2½ mi. N. E. of Decorah on Locust Road, Open Apr. 1 to Nov. 30. 8 to 8 daily, June to September, otherwise 8 to 6. Tour ½ hr. ½ mi. Ceilings 5' to 150'. High underground waterfall, disappearing pool. Adults 50c, children 25c. Stanley Scarvie, Mgr.

Dubuque—Crystal Lake Cave, 6 mi. S. of Dubuque on #52. Open Mar. to Nov. 30, 7:30 a.m. to 7:30 p.m. Tour 20-30 min., ¾ mi. Adm. 50c. Bernard Markus, Prop., R. 4.

Monona—Wompi Cave, bet. Monona and McGregor, 5 mi. off #52, 18 and 13. Open May 15 to Oct. 30, 8 a.m. to 6 p.m. Tour 30 min. 800', 250' deep. Under further development. Adults 35c, children 20c.

Edgewood—Bixby, S. P., 3 mi. N. of Edgewood. Free to public.

KANSAS—None

KENTUCKY

Park City—Diamond Cave, 6½ mi. s. of Mammoth Cave on #255, ½ mi. from Park City. Open period & length of tour not stated. $2 per person, and rates. L. Owen, Mgr.

Mammoth Cave—Great Onyx Cave, 12 mi. w. of Cave City, 3 mi. n.e. of Mammoth Cave. Open all hours. Trips 30 min. to 3½ hrs. $2 and $3. Mrs. W. P. Cix, Mgr.

Bowling Green—Lost River Cave, 3 mi. s. of Bowling Green on U. S. 31-W. Open daily 7 a.m. to 9 p.m. Tour 30 min. Opening 150', back 200'. Dance Pavilion 75' underground. "Said to be the shortest and deepest river known 350' long and over 400' deep . . . Empties into a cave and disappears." Adm. 50c W. L. Perkins, Mgr.

Mammoth Cave—Mammoth Cave N. P., 10 mi. w. of Cave City, off U. S. 31-W. and #68. Operated by U. S. N. P. Service. Probably largest cave in the world, as rated on known miles of passageways. Open daily. At present four routes shown, different entrances, time 1-8 hrs. Prices $1.50-$3 with combination trips at reduced rates. Developed on five levels, famous for its extensiveness, its pits and domes, underground rivers, underground dining room. Recent discoveries to be opened in near future.

Horse Cave—Floyd Collins Crystal Cave, 14 mi. n. w. of Cave City on #70, within boundaries of Mammoth Cave; Hidden River Cave, in town of Horse Cave; Mammoth Onyx Cave, 2½ mi. from town of Horse Cave.

Above two caves under management of Dr. E. R. Pohl, with central office at town of Horse Cave on U. S. 31-W and #68. Complete information at this office where arrangements may be made for various single or combine tours. Office open day and night. Six standard routes available for these 3 caves at $2. Tour 1½ hrs. Six Combined routes available ket., 4 and 8 hrs., $3 to $5. Special rates for parties.

Floyd Collins Crystal Cave, characterized by its Grand Canyon and extensive helictite development. offer miles of developed passageways. Developed personally by Floyd Collins, whose casket and body are enshrined in Grand Canyon of this cave.

Hidden River Cave's outstanding feature the Dome Room, 500' x 600', the largest known single cave room in the East. Also famous for its eyeless fish.

Mammoth Onyx Cave characterized primarily by decoration and coloring, comparable with famous Virginia caverns.

LOUISIANA—None

MARYLAND

Post Office

Boonsboro—Crystal Grottoes; on #34 bet. U. S-40 & Antietan Battlefield. Open daily (except Christmas), about 7 a.m.-7 p.m. or later in summer. Tour ½ hr. many white formations. Adults 75c, children 50c and rates. A. R. Sprecher.

Smithburg—Mt. Etna Cave; 1½ mi. n. of Smithkurg, 7 mi. n. of Boonsboro on U. S. 40. Small cave, fully developed, well decorated. Now closed, but hoped to reopen upon expected relocation of U. S. 40 nearer cave.

MASSACHUSETTS

New Ashford—Red Bat Cave.*

MICHIGAN—None

MINNESOTA

Harmony—Niagara Cave; 4 mi. s.w. of Harmony on Iowa-Minn. Line, U. S. #52. Open daily 7 a.m. to 8 p.m. Tour 1½ mi., 1¼ hrs. Has 60' waterfall 100' underground. Adults 65c, children 28c. Al Cremer, Supt.

Spring Valley—Mystery Cave, 8 mi. s. e. of Spring and 30 mi. s.s. of Rochester, on U. S. #63. Open daily 7 a.m. to 8 p.m. Has Turquoise Lake and disappearing river. Adults 55c, children 25c. Tour 1 hr., 1 mi. Al Cremer, V. Pres.

MISSISSIPPI—None

MISSOURI

Cassville—Crystal Caverns, 1 mi. n. of Cassville on State #37. Period open not stated. Tour ¼ mi. Adults 40c, children 25c. P. B. Edison, Mgr.

Springfield—Crystal Cave, 5 mi. n. of U. S. #65 & 66. Open daily, tour 1¼ hr. "Prices Reasonable." Mann Sisters, Owners..

Reeds' Spring—Marvel Cave, ("Shepherd of the Hills"

Sullivan—Fisher's Cave.* Highway #60.

Pineville—Jacob's Cavern.* Highway #88.

Versailles—Jacob's Cave.* Highway #5.

Hannibal—Mark Twain Cave, 2 mi. s. of Hannibal, off U. S. #36 & 61. Open daily 7 a.m. to 7 p.m. ¾ mi. circular tour. Referred to repeatedly in Mark Twain's writings. Adults 50c, children 25c. E. T. Cameron owner.

Reed's Spring—Fairy Cave.* Highway #13.

Cave), 9 mi. from Branson & Lake Taneycomo, on #80, between 13 & 65. Open daily except Jan. & Feb. 8 a.m. to 8 p.m. Tour 1¼ hr. over 1 mi. domes, arches, waterfall, fauna. Admission $1.12. The Misses Lynch, owners.

Stanton—Meramec Caverns, 3 mi. s.e. of Stanton on U. S. #66. Open daily 6 a.m. to 8 p.m. In winter, 5:30 to 11 p.m. in summer. Tour 1 mi., about 1 hr. 4-story cave, with another perhaps to be opened. Adm. 56c. L. B. Dill, Pres.

Leasburg—Missouri Caverns,* Highway #66.

Sullivan—Mushroom Cave,* Highway #60

Leasburg—Onandaga Cave, 6½ mi. off U. S. #66. Open daily 7 a.m. to 5 p.m. Tour 1½ hr. Underwater formations, "submarine room", boat trip 1000' up Lost River. Adults 50c, children 25c plus tax. Mrs. M. C. Bradford, Owner and Mgr.

Noel—Polar Bear Cave, on Highway #71. Closed to public for a number of years. Reported difficult and dangerous. Geo. Hollman, Owner.

Springfield—Sequiota Cave,* Highway #65.

Grove Spring—Smittle Cave,* Highway #5.

Ponce de Leon—Spanish Cave,* Highway #65

Van Beuren—Spring Cave,* Highway #60

Notes: "List of caves (16 of above) . . . by no means complete and does not contain all the commercial caves." Dr. A. C. Burrill, Curator Mo. Resources Museum.

"We do not have a list of the caves that are commercially available or undeveloped in Missouri . . . I do not know how to get a complete list of the caves

of Missouri." Dr. H. A. Buehler, State Geologist.

MONTANA

Whitehall—Morrison Cave, S. P. (only S. P. in Mont.), 1 mi. e. of Jefferson Canyon on U. S. #10-S, about 18 mi. w. of Three Forks, and 18 mi. e. of White Hall. 3.2 mi. scenic road off 10-S, rising 1000 feet to Lodge; ½ mi. walk rising 300 feet to entrance. Open daily 8:30 a.m. to 7:30 p.m. Tour 1½ hr., ½ mi. & 600' of stairs. Has "Empire State" Pillar, among many formations and 530' CCC-excavated tunnel for circular tour. Made part of Lewis & Clarke Cavern National Monument in 1911, and dedicated as Morrison Cave State Park in 1941, after 5 years CCC development Welsley Davis, succeeding Bruno Petsch, Supt. Adults 75c, children 25c, and rates.

Lewistown—New Year Cave, being developed commercially.

NEBRASKA—None

NEVADA

Baker—Lehman Caves, 1 sq. mi. area, near Baker, 70 mi. e. of Ely, in e. central Nevada, near Utah line. Open daily 8 a.m. to 430 p.m. but recommended bet. May and Oct. on account of rigorous weather. Tour ¾ mi. Large rooms, many colorful formations. Adults 40c plus tax. Accom. children under 16, free.

NEW HAMPSHIRE

North Woodstock—Lost River Nature Garden, on the Appalachian Trail, on #112, 6 mi. n. of North Woodstock on U. S. #3, and 15 mi. s. of Franconia; comprises a series of glacial caverns and potholes in granite gorge. Open May 20 to October 31. Adm. 30c C. T. Bodwell, Dir. Soc. for Protection of N. H. Forests, Franconia.

Rummey—Polar Caves, 4 mi. w. of Plymouth, on #25. Open until 11 p.m. Comprises a series of caves. passageways and stairways, of unique boulder formation in granite, felspar, mica, quartz and mica schist, possibly overlying glacial ice. No time or distance or rates quoted. H. E. Flack, Pres.-Gen Mgr.

NEW JERSEY—None

NEW MEXICO

Carlsbad—Carlsbad Cavern, in National Park in s.e. N. Mex., 25 mi. s.w. of Carlsbad, 155 mi. n.e. of El Paso, Tex. on U. S. #62; open daily at 10:30 a.m. (8 a.m. in summer) Tour 5½ hrs., 6 mi.; expected 32 mi., has stupendous rooms and stalagmites, lunchroom 750' below surface seating 1000 diners, operated by U. S. N. P. Service, guide fee $1.50 plus tax per person over 16. Estimated 3,000,000 bats consume per night over 11 tons of night flying insects, outward flight from cave lasting about 3 hrs. from sunset. Thos. Boles, Supt.

NEW YORK

Cobleskill—Howe Caverns, on N. Y. #7, near U. S. 20, 37 mi. w. of Albany; open daily 8 a.m. to 8 p.m. Tour 1 mi. with 20 min extra for 1/8 mi. boat ride on lake 200 ft. below surface; Adults $1.50, children 12-15, 75c, under 12 free; boat trip extra 50c, children 25c. V. H. Clymer, Pres.

Altmont—Knox Cave, on #146, near U. S. #20, 18 mi. w. of Albany. Open May 26 to Oct. 31, 9 a.m. to 8 p.m. Tour 1¼ hr. 6 levels. Adm. Adults $1, children 40c, rates. D. C. Robinson, owner.

Howe's Cave—Secret Caverns, 35 mi. w. of Albany, off #70. Open Apr. 15 to Nov. 15, 8 a.m. to 8 p.m. No time or distance of tour noted. Adults 75c, children 25c.

NORTH CAROLINA

Linville Falls—Linville Caverns, on U. S. 221, 3½ mi. s. of Linville Falls, 18 m. n. of Marion. Open daily at any time. Tour ¾ hr. Adults 65c, children 25c. E. S. Collins Mgr.

NORTH DAKOTA—None

OHIO

Put-in-Bay—Crystal Cave, in crystalline strontia sulphate. These two caves open May 30 to Sept. 10 Mammoth Cave, with lake, tunnel and boulder room, 8 a.m. to 5:30 p.m. Tour ¼ hr. 600'. Adm. 20c. N. V. Heineman, Owner, Mgr.

Jerry Cave, with subterranean connection with Lake Erie; open Mid-May to Sept. 10, 9 a.m. to 5 p.m. 165' x 208'. Arm. 20c. V. Doller Est.

W. Liberty—Ohio Caverns, on State #275, 20 mi. w. of Marysville. Open daily, 8 a.m. to 6 p.m. Tour 1 mi. 1 hr. Snow white formations and all-color backgrounds; Helictites. Adults $1.50, children 75c. M. D. Smith.

Bainbridge—The Seven Caves, on U. S. 50, 5 mi. w. of Bainbridge. Open Mar. to Dec. daylight hours. Tour 1 hr., 2/5 mi. 7 caves, cliff and canyon scenery. Adults 75c, children 25c. C. G. Chaney, Mgr.

Zane Cave.*

OKLAHOMA

Freedom—Alabaster Caverns, 30 mi. n. e. of Woodward in n.w. Okla. Open daily, 8 a.m to 7 p.m. and later. Tour 1½ hrs. 1 mi. Celenite and alabaster formations. Adults 75c, children 35c and rates. J. H. Grass.

OREGON

Oregon Caves—Oregon Caves N. M. on #46, 19 mi. s.e. of Cave Jct. on #199, 50 mi. s.w. of Grants Pass and 75 mi. n. e. of Crescent City, Cal. Open daily 8 a.m. to 5 p.m. (7 p.m. bet. June 15 and Sept. 10). Tour 2 hrs. Referred to by Joaquin Miller as "The Marble Halls of Oregon." Adm. 50c. E. P. Leavitte, Supt.

Bend—Lava Caves.*

Florence—Sea Lion Caves, 12 mi. n. of Florence, on U. S. 101, midway Cal. & Wash. Line. Open daily, daylight hours, Tour ½-1 hr., 1500' "The Green Grotto' of America," 300-sea-lion rookery. Adults 40c, children 20c. J. E. Jacobson.

PENNSYLVANIA

Naginey—Alexander Caverns. Note 1.

Williamson—Baker Caverns, 1 mi. s. of Williamson, & 7 mi. s. of St. Thomas, on U. S. 30. on #16, 7 mi. w. of Greencastle. Open daily, on arrival, Tour 1

hr. 1 mi. Vertical limestone. Adults 55c, children 25c. M. L. Burgen, Mgr.

Kutztown—Crystal Cave, near Kutztown on U. S. 222, bet. Reading and Allentown, 6 mi. s. of Lenhartsville on U. S. 22. Open daily, 7 a.m. to 9 p.m. Tour 45 min. 135 acres, cave grounds. Adults 85c children 40c.

Franklinville—Historic Indian Cave.*

Hummelstown—Indian Echo Cave.*

Huntington—Lincoln Caverns, 3 mi. w. of Huntington on U. S. 22. Open daily May to October, Sundays only otherwise. Tour ½ hr. 40 acres cave grounds. Adjacent undeveloped cave being investigated. Rates not stated. M. C. Dunlavy, Pres.

Hellertown—Lost River Caverns, on #412, 2 mi. s.e. of Bethlehem. Open periods not stated, nor size. Has Lost River and Lake, two levels, 5 chambers. Adults 75c, children 35c. The Gilmans.

Centre Hall—Penn's Cave, 5 mi. e. of Centre Hall on #95, bet. Bellefonte & Lewistown. Open daily and at night by appointment. Tour 40 min. 1 mi. by motorboat. "America's only All-Water Cavern." Many formations. Adults 75c, children 40c. W. P. Campbell, Prop.

Hamburg—Onyx Cave, formerly commercial now closed.

Lewistown—Seawra Cave.*

Manns Choice—Wonderland Coral Cave.*

Bellefonte—Veiled Lady Cave, closed for last two years. G. E. Haupt, owner.

Woodward—Woodward Cave, on #65 bet. Lewisburg and Bellefonte. Open May 1 to October 1. 8 a.m. to 8 p.m. Tour 40 min. ¼ mi. Adults 75c, children 35c. O. M. Hosteman Mgr.

RHODE ISLAND—None

SOUTH CAROLINA

Parler—Cave on s. w. side of Santee River, near Parler, Orangeburg Co. not far from Eutaw Springs. Area being developed as a public park. Stream issues from cave which may be entered several hundred feet. Stephen Taber, State Geologist.

SOUTH DAKOTA

Tilford—Crystal Cave, 5 mi. w. of U. S. 16 & #79 between Piedmont and Tilford, 17 mi. n. of Rapid City. Open day and night. Tour 1 hr. ½ mi. Over 1500 rooms, crystal formations. Adults 62c-$1, under 17, 45c. Loui Storm, Owner.

Sturgis—Davenport Cave.

Galena—Ice Cave.

Custer—Jewel Cave N .M., 14 mi. w. of Custer on U. S 16. Open daily, June-Aug. 8 a.m. to 5 p.m. Other mos. 8 a.m. to 4 p.m. except Fridays. Tour 1 hr ½ mi. Has Milk River & many crystaline formations and fossils. Jasper Cave, not completely explored, within the 1280-acre monument, not open commercially. Adm. 50c excl. tax. H. J. Liek, Supt.

Rapid City—Nameless Caves, 6½ mi. w. of Rapid City. Open May thru Aug. day and night. Tour, thru cave and museum 2 hrs. Bird bath phenomenon, many formations. Adults 75c, children 30c. A. Friedman, Mgr.

Keystone—Rushmore Cave, near #16 and Mt. Rushmore, 6 mi. e. of Keystone. Open daily, 6 a.m. to 11 p.m. Tour 1¼ hr. 1¼ mi. circuit. Many rooms and formations. Adm. 60c, children half price, and rates. F. Eloe, Mgr.

Sitting Bull Crystal Caverns, on #16 n.e. of Keystone. Reported commercial, not yet confirmed.

Piedmont—Stage Barn Caverns, off #14 & 79. Note 1

Hot Springs—Wind Cave N. P., 21 mi. s. of Custer, 10 mi. n. of Hot Springs on U. S. 85-A. Open daily, June 1-Aug. 31, 7:30 a.m.-7 p.m.; Other mos. 8:30-3:00 convenient hrs. Tour 1¼-2 hrs. 1¼ mi. Boxwork formation, wind movement, listing in Encycl. Brit. as one of five wonder caves of world, sponge type cavern. Adults 75c, children 25c and less. Elevator. H. J. Liek, Supt.

Piedmont—Wonderland Cave, off #14 and 79 bet. Rapid City & Sturgis. Open daily, day and night. Tour 1 hr., ½ mi. Owned by U. S. Forest Service, privately operated.

TENNESSEE

Cumberland Gap—Cudjo's Cave Open daily 6 a.m.-10 p.m. Tour 1 hr. 1 mi. Many formations. Adm. 75c and $1.10. W. N. Holbrook.

Clarksville—Dunbar Cave, 3 mi. n.e. of Clarksville on #13. Open May 15-Sept. 15. Hours not stated. Tour 1½ hr. Dance floor in mouth of Cave overlooking lake. Rates not stated. W. W. Dunn, Mgr.

New Market—Indian Cave.*

Dickson—Jewel Cave, n. of Tennessee City on U. S 70, 54 mi. w. of Nashville. Open period and tour length not stated. Admi. $1. R. D. 3.

Shellmound—Nickajack Lacaverns, 6 mi. down river from tollbridge west of Chattanooga and 6 mi. from So. Pittsburg. Open, by appointment. 3 mi. electric boat trip successively in Tennessee, Alabama and Georgia, rates varying with distance and for special parties. "New Discovery" room beyond reached by 170' crawl, with "World's largest Stalagmite" over 50' across. L. B. Lambert, Mgr. R. D. 4, Chattanooga, Tenn.

Lookout Mt. Chattanooga—Lookout Mt. Caves, Historic Twin Caves, 420' level, natural entrance off Tennessee River sealed by railway tunnel in 1923. Elevator shaft being opened, disclosed at 260' level over 100', many formations, 3 mi. from heart of Chattanooga, on Lookout Mt. Highway. Open daily, 7 a.m. to 6 p.m. Tour 1 hr. 1 mi. Adults $1.50, children 75c. J. T. Menefee, Sec. Tre.

Dickson—Ruskin Cave, 10 mi. n. w. of Dickson, 5 mi. off U. S. 70, at Tennessee City. Open June 1 - Sept. 15. Hours not stated. ½ mi. without crawling, expl. much farther. Dance floor for 500, and spring pool 1500' deep. Adm. 10c plus 25c for cave. B. Drinkard. Mgr.

Monteagle—Wonder Cave, on U. S. 41, 3 mi. n. of Monteagle. Open periods and length of tour not stated; 1 hr. Well decorated. Stream. Mr. Ralston. Mgr.

TEXAS

Boerne—Cascade Cavern 4½ mi. s.e. of Boerne on Von Raub road, 23 mi. n.w. of San Antonio on U. S. 290. Open daily, 8 a.m. to 10 p.m. Tour 1 hr. Fossils. Adults $1, children 25c and rates. S. J. Leinweber, Mgr.

Boerne—Cave-Without-a-Name, 11 mi. n. e. of Boerne, on U. S. 87. Open daily, 8 a.m. to 8 p.m. Tour 1½ hrs. 6 rms. dev. 1200'. Underground stream, helictites. Adults $1.10, children 44c and rates. V. L. Cockrell, Mgr.

Cypress Mill—Hammets Cave.*

Burnet—Longhorn Cavern, Texas S. P., entrance, 4 mi. s. of Burnet on U. S. 281, thence 6 mi. scenic drive w. to cave. Open daily 10 a.m. to 5 p. m. Tour 2 hrs. 8 mi. explored. Adults $1, students 50c and rates. H. Galloway, Mgr.

Richland Springs—Richland Springs Cavern, 11 mi. s.w. of Richland Springs, off #190. Open daily, day and night. Tour 1½ hr. 1¼ mi. Adults 50c, children 25c. L. P. Piper, Owner.

San Marcos—Wonder Cave, within city limits. Open daily, day and night. Tour 1 hr. 600' lighted, miles of smaller passages. Adults 70c, children 35c. A. B. Rogers, Owner.

UTAH

American Fork—Timpanogos Cave N. M. in American Fork Canyon, 7 mi. e. of American Fork and Pleasant Grove on U. S. 91 between Salt Lake City and Zion Nat. Park. Open daily, Apr. 1 to Dec. 1, 8 a.m. to 5 p.m. Tour 3 hrs. ½ mi. cavern. Adults 50c, children 25c. L. G. Meredith, Treas-Sec.

VIRGINIA

Strasburg—Battlefield Crystal Caverns, (Hupp's Cave) 1 mi. n. of Strasburg, on U. S. 11, near n. entr. Shenandoah N. P. Open periods, length of tour not stated. Adm. 75c.

Salem—Dixie Caverns, on U. S. 11, 7 mi. w. of Salem Open daily, 7 a.m. to 9 p.m. Tour 50 min. Length not stated. Adm. $1.10.

Endless Caverns—Endless Caverns of New Market, Va. 3 mi. s. of New Market on U. S. 11. Open daily, 24 hrs. Tour 2¼ mi. round trip. Has Diamond Lake Adults $1.50 plus tax, children half price, and rates. E. M. Brown, Pres.

Grottoes—Grand Caverns, (Weyer's Cave), on #12, 15-20 mi. from Elkton, Waynesboro, Staunton, and Harrisonburg, near s. entr. Skyline Drive and Shenandoah N. P. Open daily, 7 a.m. to 9 p.m. Many rooms and beautiful formations. Tour 1½ hrs. Adm. $1 plus tax. Holly Stover, 803 Stoneleigh Ct. Washington, D. C.

Luray—Luray Caverns, 9 mi. from central entr. to Skyline Drive and Shenandoah N. P. New Market, Va. and on State #12. Open daily, 8 a.m. to 9 p.m. on half hour or oftener. Tour 1½ hr. Covers over 40 acres. Figure 8 route with overpass and underpass filled with beautiful formations. Adults $1.65, children half price, and rates. R. C. Harnsberger, Mgr.

Harrisonburg—Massanutten Caverns, 5 mi. e. of Harrisonburg, on U. S. 33. Open daily 24 hrs. Tour 50 min. ½ mi. "The Cave of Jewels." Adm. $1.65 and rates. J. Echard, Mgr.

Harrisonburg—Melrose Caverns, on U. S. 11, 6 mi. n. of Harrisburg. Open daily, night and day. Tour 1 hr. 1 mi. "A Civil War Memorial Underground." Adults $1.10, children half price, and rates. J. B. Sutherland, Mgr.

Shenandoah Caverns—Shenandoah Caverns, on U. S. 11, 4 mi. n. of New Market, 3 mi. s. of Mt. Jackson. Open 24 hrs. daily. Brilliantly illuminated "Symphony in Stone." Elevator and wheel chair service. Rates.

Front Royal—Skyline Caverns, 7/8 mi. s. of n. entr. Skyline Drive, on Va. #12, Front Royal. Open daily 7:30 a.m. to 9 p.m. (until recently announced closing for the duration) Tour 1 hr. 1 mi. Famous helictite display. Adults $1.10, children half price, and rates. Tom Baldridge, Mgr.

VERMONT—None

WASHINGTON—None

WEST VIRGINIA

Charlestown—George Washington Cave, 3 mi. s. e. of Charlestown, off U. S. 340, small cave, formerly commercial, no information, now closed. Geo. Washington supposed to have attended Masonic meetings and written name in cave.

Lewisburg—Organ Cave.*

Riverton—Seneca Caverns, 3½ mi. e. of U. S. #33 at Riverton. Open daily, 6 a.m. to 10 p.m. Tour 1 hr. ¾ mi. Balcony view among many formations. Adults $1 plus tax, children half price.

Petersburg—Smokehole Caverns, 8 mi. w. of Petersburg, on #4 and 28. Open daily May 1 to Nov. 1 or by appointment any time, phone 146-W. Petersburg. 8 a.m. to 6 p.m. Tour 45 min. 875'. "Room of a million Stalactites". Adm. $1 incl. tax.

WISCONSIN

Spring Valley—Crystal, 1 mi. w. of Spring Valley on #29, bet. Menominee and St. Paul, Minn. Opened June 7, 1942. Tour over 1100', can see much farther. 4 levels, river channel on third level. 81' deep, H. A. Friede, Owner.

Muscoda—Eagle Cave, 2 mi. n. of #60, 5 mi. w. of Muscoda, 75 mi. w. of Madison. Open daily, 7 a.m. to 10 p.m. Tour 45 min. Beautiful onyx formations, Multicolored. "Nature's Spacious Underground Palace." Adults 40c, children 25c, plus tax. Mrs. S. H. Gillette, Pres.

Blue Mounds—Cave of the Mounds, on U. S. 18 and #151, 1 mi. e. of Blue Mounds, 4½ mi. w. of Mt. Horeb, 25 mi. w. of Madison. Open Mar. 1 to Oct. 15, 8 p.m. slightly longer in summer. Tour ½ hr. 1000'. Various formations. Adults 40c, children 25c, plus tax, and rates. A. W. Pond, Mgr.

WYOMING

Cody—Shoshone Cavern N. M., "Not now in condition for public use . . . We trust that when, if ever, conditions return to normal, something can be done about this cave."—The Cody Club.

A Society Publication

'SIGHTSEEING UNDERGROUND'

AT LONG LAST!!

AN "ALL-OUT"

BOOK ABOUT

THE CAVES

THE NATIONAL SPELEOLOGICAL SOCIETY is pleased to announce the forthcoming publication of *"Sightseeing Underground"* by George F. and Lotys R. Jackson. The book, an interesting and authentic treatise of the best-known caverns of the United States, will be published under auspices of the Society and undoubtedly will become a "must" possession of every true speleologist.

The first book of its kind, *"Sightseeing Underground"* will contain more than 50,000 words, in full-book-size format. It will be contained in a heavy, attractively-done cover and will be illustrated by more than a score of excellent photographs, printed on heavy glazed paper.

Many of the caves and scenes described in *"Sightseeing Underground"* never before have "appeared in print" and many facts incorporated in the book are unknown to the average speleologist. In addition to covering caves throughout the U. S., the book contains invaluable information on the general formation of caves, animal life of caves, American archaeological finds and a complete glossary of cave terms.

"Sightseeing Underground" will be published in a limited edition and will sell for $1.00 per copy, postpaid to your address. There can be no guarantee of copies for persons other than those who place their orders at this time. So, we shall appreciate it if you will let us know now whether you desire a copy of the book, by filling in and returning the attached postcard today. You will be billed for the dollar after you have received your copy.

THE NATIONAL SPELEOLOGICAL SOCIETY recommends *"Sightseeing Underground"* as a truly worthwhile investment.

To The Members Of The Society

As we read this issue of the Bulletin we have a sense of satisfaction that it contains new discoveries and experiences of members of the Society and valuable information of particular interest and scientific value to all Speleologists. We feel, too, that the Society, in publishing this information is making definite strides in the right direction. It would be natural to wish the publication were better, no matter how pleased we were with the material it contains and the painstaking efforts of the contributors and editors.

There are many who have prepared this informative issue and who have made it possible for all to enjoy its contents. We are appreciative of the thought, time and labor that have gone into it. We are indebted greatly to those who have made and still are making extensive studies in Speleology and relative subjects and who in subsequent issues will tell us of their discoveries. These same persons are accumulating knowledge in Speleology and thereby laying a foundation for the Society which in time should be a vast storehouse invaluable to science.

It so happens that every member cannot be a scientist, a discoverer or help to publish their findings in this or any other paper. We travel with those who do the work and feel that we have the first hand experiences when we learn of their labors and explorations through articles printed by the Society.

The pioneer spirit that prevails in many, makes us thrill at adventures and discoveries of those who take part and we experience the same hopes and joys as if we were there in person. Through the efforts of certain members of the Society, all may have the pleasure of visiting a cave first hand. This first hand experience is most enjoyable as circumstances do not permit all to be the performers. The next best and very vital part of the work of the Society can be played by all, including the "arm chair observers." The second line of "offense" in the Society is with those who make possible the work of the leaders. Without adequate support their earnest and painstaking efforts are of no avail.

What can we do to encourage and support the workers and thereby further the work of the Society? Our purpose should be to enhance the work of all.

Each member is in a most advantageous position to do the utmost for the Society. While we are waiting for gas and tire restrictions to be lifted, or waiting for the next issue of the Bulletin, we can make ourselves useful to the Society. Do you know five persons who like the great outdoors, hikers, naturalists, youth archeology, biology, teachers who lead their students in the fields or just some who are interested in the wonders of the world? Send those five names and addresses to the membership committee. Do you know some one who owns, or lives near a cave? There is a prospective member. Not only will your careful thought bring new members into the fold, strengthen our Society and make its influence and effectiveness felt by all, but you will bring happiness and new experience and greater knowledge to the interested person.

From our particular vantage point, the street on which we live, the town we call home, the office or location of our work or among our own friends or acquaintances we can find persons interested in Speleological work who never have heard of the National Speleological Society. These should be prospective members. Only we, who know of them, can locate and interest them, or if we cannot do the latter we can forward their names and addresses to the membership committee for further cultivation.

This is asking so little of each member, who in turn benefits by a more comprehensive society. If our membership increased five fold, and that should be our minimum for 1943, the Society could produce a Bulletin of which we would be justly proud. The staff has in mind a better magazine which will be forthcoming as soon as additional revenue warrants it. Their promise depends partly on what we can produce in memberships.

There is another source of revenue open to the Society which can be built up by industrious members. People philanthropically inclined are frequently looking for a scientific society such as ours, to sponsor. This sponsoring may be in one of several forms. A bequest, an endowment or an outright gift to the Society are typical. Some of these gifts may be specific and used only for scientific research of one particular cave or for a special study involving all caves or for other noteworthy purposes. We too frequently associate philanthropy with people of considerable means when people of lesser wealth are eager, if interested, in contributing something to scientific research. It would be doing much for the welfare of the Society if members would send the names and addresses of persons known to them who are inclined to philanthropy, to the Finance Committee in care of the Society.

One need not look to cities alone for philanthropy. Many men and women living far from cities who have not the time or physical endurance to partake in exploration would take pleasure in sponsoring such work. Those living near large or interesting caves could be interested in contributing to a society that helped to make their cave or town famous because of some new discovery as the result of scientific research. These are possibilities among individuals about which the Finance Committee would have no knowledge except through cooperation of the members.

There are twelve members who comprise the Finance Committee of our Society. It is their duty to study and promote interest in all matters pertaining to society finances. I feel certain they will perform their work diligently and intelligently with your help.

If this issue of the Bulletin is interesting, will you share the pleasure you derive from membership in the Society with others by submitting five new names to membership and forwarding names of potential contributors to the Finance Committee.

The Bulletin published by the Society will be representative of the Society if we who are scattered far and wide concentrate our inherent speleological efforts for its betterment as it carries out our purposes for which the Society was organized.

Le Roy W. Foote
Temporary Chairman
Finance Committee