CAVES OF NEW JERSEY

by

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BULLETIN 70

STATE OF NEW JERSEY
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with Sections on

CAVE BIOLOGY

by **BROTHER NICHOLAS, F.S.C.**

HISTORY AND LEGENDS OF CAVES

by **A. ROSS ECKLER**

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INTRODUCTION

What is a cave? It can be defined as a natural opening in rock, which is of a size permitting human exploration and which extends into a region of sharply reduced light or total darkness. A rock shelter, on the other hand, can be defined as the area underneath an overhanging rock ledge or talus boulders, if it is large enough for people to enter. Obviously, no sharp distinction can be made between caves and rock shelters; one imperceptibly grades into the other. This report describes both caves and rock shelters in New Jersey, as well as several old mines which have been incorrectly called caves.

Most of the caves and rock shelters in New Jersey are less than fifty feet long. Larger ones are almost always found in either limestone or marble; smaller ones can be found in many different types of rock. Although usually quite small, rock shelters are important archeologically since Indian remains and artifacts are sometimes found in them.

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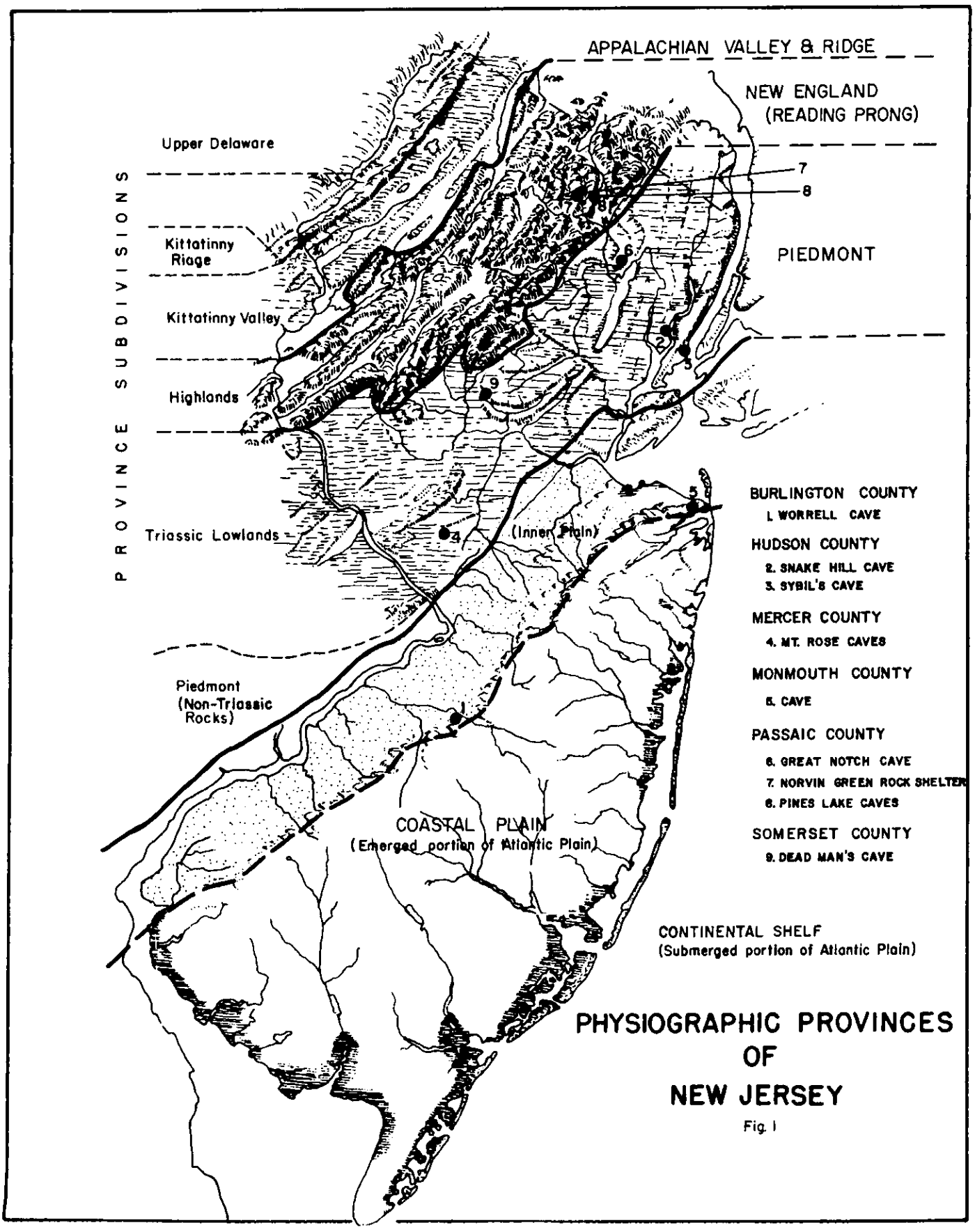

PHYSIOGRAPHIC PROVINCES OF NEW JERSEY

Fig. 1

CAVE GEOLOGY

DISTRIBUTION OF CAVES

New Jersey can be divided into four physiographic provinces (Fig. 1): the (Cretaceous and Tertiary) Coastal Plain Province, the (Triassic) Piedmont Province, the (Precambrian) Highland Province and the (Paleozoic) Valley and Ridge Province. Although caves have been found in all of these provinces, few have been discovered in the Coastal Plain Province, which largely consists of unconsolidated sediments. The only two caves reported from this area were near Sandy Hook and Camden, respectively. Both have since been filled in or destroyed.

The Piedmont Province consists of sandstones, argillites, shales, and conglomerates with basaltic lava flows and diabase intrusions in the upper part of the section. Several fissure caves have been found in the basalt and diabase as well as a solution cave in a limey conglomerate bed.

The Highland Province is an area of complex geology. There are many down-faulted valleys containing Paleozoic limestones and pods of Precambrian marble in a sea of Precambrian granites and gneisses. The granites and gneisses contain several rock shelters, fracture and fissure caves. In the down-faulted limestones, some of the largest and most complex caves in the State can be found.

By far, the greatest number of New Jersey caves and rock shelters are found in the Valley and Ridge Province, which contains a great thickness of carbonate rocks.

STRATIGRAPHY

In New Jersey, caves are found in rocks ranging in age from Precambrian to Cretaceous.[8]* The Precambrian crystallines include granites and gneisses. There are four fissure caves and five rock shelters in these rocks.

Also of Precambrian age is the Franklin Limestone. In this case the term limestone is misleading since these rocks are genetically marbles. The Franklin is not one formation, but several, and in the Franklin-Sterling Hill area it has been divided into three bands up to 1,500' thick separated by gneiss bands up to 1,900' thick.[6] The Franklin Marble is a coarsely crystalline rock consisting mainly of calcite and dolomite with some areas being very siliceous. The Franklin-Sterling Hill area has been mined for zinc and several caves have been intersected during mining. The marble has twenty-six caves with six being over 100' long, and one, 780' long.

*Note: The number in parenthesis denotes the reference number at the end of each section. The references are listed in alphabetical order.

The next oldest rocks are those of Cambrian System[1,2,3,4,8,9]; of these, the Hardyston Formation is the oldest. It is a variable sandstone and contains no caves. The Hardyston grades upward into the Leithsville Formation (Lower Kittatinny).

The Kittatinny Formation is the name that has been applied to the Cambro-Ordovician carbonate rocks in New Jersey.[8] It consists of a thick sequence of dolomites with some minor limestone and shale beds and has an estimated thickness of 2,500 to 3,000'. The name Kittatinny is being phased out and is being subdivided into five formations;[1,2,3,4,9,10] the Leithsville and the Allentown, which are Cambrian, and the Rickenbach, the Epler, and the Ontelaunee, which are Ordovician in age. The Leithsville is a gray to blue gray to dark gray massive bedded dolomite. Within the formation is a section of calcareous to sericitic shale and the total thickness of the formation is about 700'.

The Leithsville Dolomite grades upward into the Allentown Formation. This is a thick sequence of rhythmically bedded light to dark gray dolomite with the beds ranging from a few inches to several feet thick. Chert is found throughout the formation, but is more common in the upper portion. Many beds of cryptozoa and oolites are found in the lower portion. The approximate thickness of this formation is about 1,100'.

The Rickenbach is a massive gray to dark gray, fine to coarsely crystalline dolomite and on a fresh surface the rock will sparkle. The upper part of the section is finer grained and more thinly bedded. There are some local calcareous sandstone beds in this part also. The thickness of the formation is about 500'. Chert is present throughout and the contact with the Epler is just below a massive gray to black chert layer.

The Epler is a light to dark gray very fine to medium grained massive to thin bedded dolomite. Some local limestone and shale beds can be present in the middle portion of the formation. The limestone weathers either smooth or as etched ribbons or irregular bands with thin silty to fine sandy partings. Massive laminated dolomites are found in the upper and lower portions of the formation. Chert is found throughout, but is more abundant near the base. The formation has a thickness of about 700'.

The Ontelaunee is a dark gray to almost black aphanitic to coarse grained massive bedded dolomite, which becomes limey toward the top with some local limestone beds. The lower portion contains a large amount of rugose, colloform, and bedded chert and is much coarser than the upper part. The thickness of this formation depends on the

amount of erosion on the pre-Jacksonburg unconformity. The maximum measured thickness is about 500'. The Rickenbach, Epler, and Ontelaunee Formations are members of the Beekmantown Group.

The Cambro-Ordovician Formations contain seventy-eight caves, ten shelters, and eight major sinking streams and springs. The formations containing the caves have been identified by either plotting them on the newly completed geologic quadrangle maps or by field identification. The number of caves according to formations are as follows: Leithsville, 11; Allentown, 22; Rickenbach, 6; Epler, 37; Ontelaunee, 2. The number of rock shelters according to formations are as follows: Allentown, 2; Epler, 8. Sixteen of the caves are over a hundred feet in length.

The Middle Ordovician Jacksonburg Formation is separated from the Beekmantown Group by an unconformity that can be seen at Sarepta Quarry. The Jacksonburg has been divided into two members in Pennsylvania which can also be recognized in New Jersey. These are the Meyerstown (*cement limestone*) and the Hershey (*cement rock*) Formations.[1,3,4,8,9,11]

The *cement limestone* is a medium to dark gray fine to coarsely crystalline locally high calcium limestone. There are some beds of light to medium gray calcarenites. The total thickness of the unit is about 200 to 300'.[11] One cave is found in the limestone and one is at its contact with the Ontelaunee Formation.

The *cement rock* consists of a dark gray to black argillaceous limestone with a very pronounced cleavage. There are several beds of a coarsely crystalline limestone in this member and the total thickness may reach 600'.[8] No caves have been found in the *cement rock*.

Above the Jacksonburg is a thick sequence of dark gray to black shales and siltstones known as the Martinsburg Formation.[9] The Jutland Member is in the lower part and contains several limestone beds. The limestones vary from a fine grained ribbony to platy limestone to local quartzose calcarenites. The maximum thickness of the limestone units may be in excess of 100'. There are no known caves in these limestones in New Jersey, but several are known to exist in Pennsylvania.

The Silurian System[8] in the lower and middle part is represented by a thick section of quartzites and sandstones; the Shawangunk Conglomerate and the High Falls Formation. Two rock shelters and a large fracture cave are found in the Shawangunk.

Overlying the High Falls is the Poxono Island Formation which is several hundred feet thick. The upper portion ranges from a calcareous to dolomitic shale to a dolomite with some laminated limestone beds. The Poxono Island grades into the Bossardville.

The Bossardville, the lowest of the Upper Silurian Formations,[5,8] is a gray to black massive laminated argillaceous limestone and dolomitic limestone and the upper part grades into a limey shale. The formation has a maximum thickness of about 100'.

Above the Bossardville is the Decker Formation. This is a very variable unit along strike. It changes from a limestone near Port Jervis, New York, to a calcareous sandstone at Walpack Center, New Jersey, and has a maximum thickness of 80'. The Decker also crops out in the Green Pond Mountain area. Immediately above the Decker along the upper Delaware is the Rondout Formation which varies from a sandstone, to limestone, to dolomite, to limestone, to dolomite, and the total thickness is only about 40'.

Overlying the Rondout is the Manlius Limestone which is a blue to black thin bedded flaggy limestone. There are no known caves in either the Poxono Island, Bossardville, Decker, Rondout or Manlius Formations.

The Lower Devonian[5,8] is represented by the Helderberg Group, which in New Jersey consists of five formations. The Coeymans Limestone is a coarsely crystalline limestone containing crinoid stems and chert. The maximum thickness of the formation is about 40'.

Above the Coeymans is the Stormville Sandstone. This is a 10' thick sandstone to calcareous sandstone.

At the Nearpass Quarry in northwestern New Jersey the New Scotland Formation rests directly on the Coeymans, but to the southwest they are separated by the Stormville Sandstone. The New Scotland consists of about 20' of cherty limestone overlain by approximately 160' of calcareous shale.

Overlying the New Scotland is the Becraft (Minisink) Limestone. It is a fossiliferous gray, cherty, limestone about 20' thick.

The Port Ewen Shale, which is poorly exposed, is a calcareous to siliceous shale about 80 to 150' thick.

The only cave known in the Helderberg Group in New Jersey is in the Coeymans Formation. In other areas the Helderberg plays an important part in cave formation.

Above the Port Ewen is the Oriskany Formation. It varies along strike from a siliceous limestone in the Nearpass Quarry area to a siliceous limestone grading upward into a sandstone near Flatbrookville. The formation has a thickness of 170' and contains three caves.

The Oriskany is separated from the next carbonate rock, the Onondaga Limestone, by a thick section of shale known as the Esopus Grit. The Onondaga is a black limestone which contains a large amount of chert in regularly spaced beds. The maximum thickness is close to 250' and there are three caves in this unit.

The rest of the Middle Devonian is represented by a series of noncarbonate rocks in which there are no known caves. After the Devonian no major carbonate

beds are found until the Tertiary.

Some small caves have been found in the Triassic and Cretaceous rocks. Along the Delaware River near Milford are Triassic conglomerates which contain a fair amount of soluble carbonates. In these rocks several fissure caves have been formed.

In the diabase, an igneous rock similar to basalt, but more coarsely crystalline, there are several fissure and talus caves. The basalt contained two caves, one of which may have been a lava tube cave.

There were two caves reported in the Cretaceous rocks; one is in the Navesink Marl and the other in the Red Bank Sand. The Navesink is a greensand (glauconite) mixed with clay and quartz sand. The Red Bank is a fine yellowish quartz sand.

In the Tertiary a major carbonate unit occurs in the Vincentown Formation[8] near Mount Holly. It consists of a locally cemented high calcium carbonate sand. There are no known caves in this formation.

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ORIGIN OF NEW JERSEY CAVES

Caves are found in various rock types, both nonsoluble and soluble. Several caves occur in unconsolidated sediments.

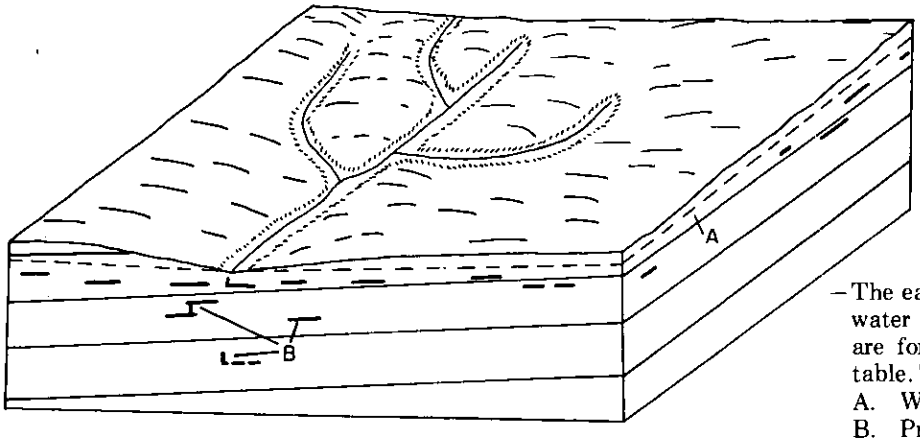
The processes involved in the formation of caves generally depend on the rock type. The nonsoluble rocks include granites, gneisses, basalt, diabase, shales, sandstones, and quartzites.

The caves in these rocks fall into two main groups. The first are those caves which were formed when the rock was molten. Included here are some of the fissure caves and the lava tube caves. The fissures included in this group formed when the molten rock cooled and contracted, leaving behind narrow voids. Lava tubes are formed when the upper surface cools allowing the molten interior to flow out, leaving behind tubes or tunnels. Several caves of this group have been found in the New Jersey Triassic diabase and basalt. The Great Notch Cave, which has been quarried away, was an excellent example of this type of cave.

The second group are those caves which were formed by tectonic or weathering or a combination of these processes. The terms applied to these are fissure or fracture caves and talus caves. Fissure cave can refer to any cave with high narrow passage ways.

Fracture caves are caves which were formed when some geologic process, such as faulting or folding, caused breaks or joints in the rock. If these cracks are wide enough to enter, you have a cave. Sometimes a less resistant rock is weathered away from beneath a more resistant unit. This allows slumpage to occur along joints or fractures, generally parallel to the face of the exposure. Jenny Jump Fracture Cave and Indian House Rocks are examples of these caves. One fracture cave near Lancaster, Pennsylvania, contains about 1400' of passage.

Talus caves are generally very small passageways

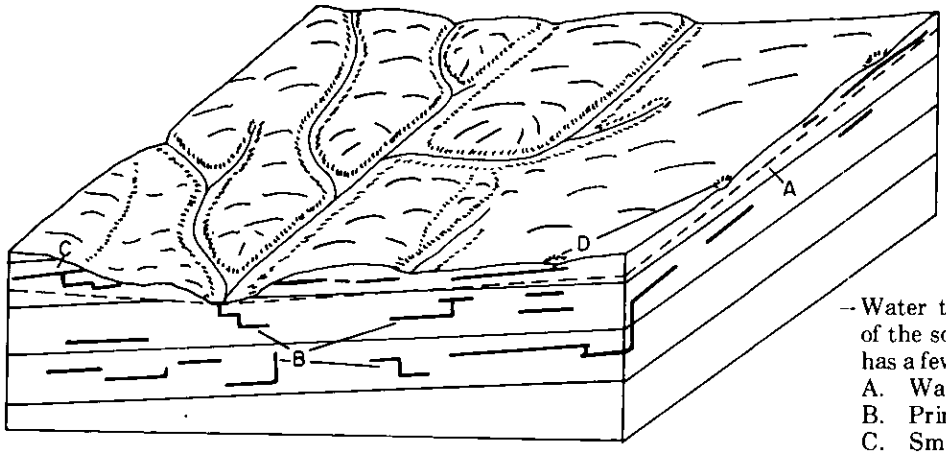


I

Block I

—The early stage of cave development when the water table is high. Primary solution cavities are forming at, above, and below the water table. The land surface does not contain sinks.

A. Water table
B. Primary solution channels forming along joints, fractures, and/or bedding planes in carbonate rocks.

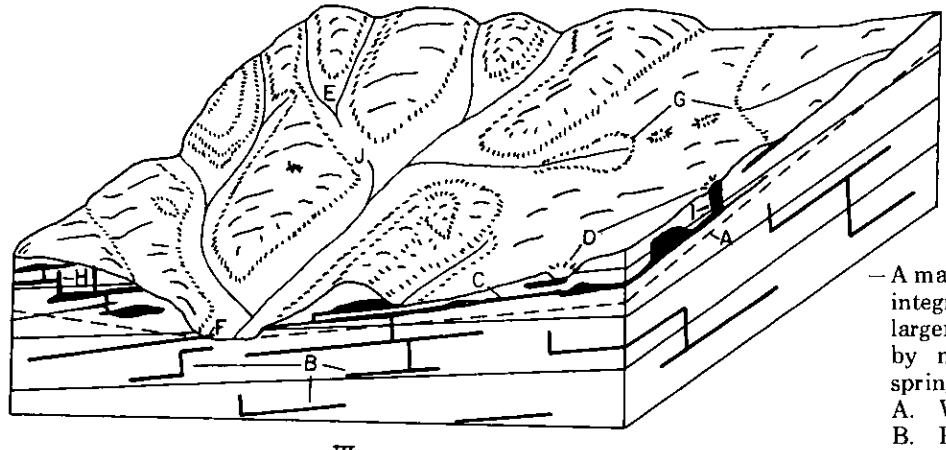


II

Block II

—Water table is being lowered and integration of the solution cavities is starting. The surface has a few sinks.

A. Water table
B. Primary solution channels
C. Small caverns beginning to form
D. Sinkholes beginning to form at the surface



III

Block III

—A marked lowering of the water table, complex integration of the solution channels, and enlargement of caverns. The surface is marked by numerous sinks, sinking streams, and springs.

A. Water table
B. Primary solution channels
C. Cavern
D. Sinkhole
E. Sinking stream
F. Spring
G. Natural bridge
H. Dome pit
I. Pit
J. Rising stream

Figure 2

Block diagrams showing the water table theory of cavern development and associated features.

in the rock rubble at the base of cliffs. Sometimes the random piling of the talus blocks allows the numerous cavities to act like small storage cells for cold air. The temperature of the trapped air may be below freezing and the caves will contain ice most of the year. Van Horn's Ice Cave, near Lake Kathryn, and Cold Cave, at Delaware Water Gap, Pennsylvania, are examples of these caves.

The formation of the two caves in the unconsolidated sediments of the Coastal Plain are interesting geologically. Both of the caves had a caprock roof consisting of a locally cemented sand, and the cave was developed in the underlying unconsolidated material—one in a sand, the other in a clay. Apparently, these caves were formed by runoff water which found its way through small cracks in the caprock and flowed through the unconsolidated layer below to a nearby stream. Slowly, the runoff water removed some of the sand or clay and left a small cave. Caves of this type are unique and have been recently reported from the Gulf Coastal Plain in Eastern Texas and Mississippi.

In soluble rocks, such as limestone, dolomite, and marble, caves are usually formed by solution. This is a process whereby weakly acidic ground water dissolves out channels or passageways in the rock. Solution can take place at, above, or below the water table. Many different theories on the origin of limestone caves have been proposed during the past forty years (see references at the end of this section). However, it now appears that there is no single theory to explain the origin of all caves.

The chemical process by which solution occurs is: meteoric water mixed with carbon dioxide from the atmosphere and from decaying organic matter produces a weak solution of carbonic acid. When the acidic water comes in contact with the carbonate rock it may dissolve sections of the soluble rocks and form underground caverns.

The solution process will create (Fig. 2-I) a series of open channels which will continue to enlarge and integrate as long as the acid-charged water is moving through them (Fig. 2-II). The channel form will, in general, be governed by some fracture, bedding plane, or joint system, where water can flow more readily. These channels (passages) may continue to be modified (Fig. 2-III) in several ways to form a variety of typical cave features. *Vadose* (subterranean) streams may enter a cave passage and enlarge it by erosion. They may also deposit sediments and plug the passage.

Breakdowns are formed when the stresses, built up in the rock of the cave roof, are relieved by the scaling off of rock from the ceiling. In New Jersey caves, many breakdown blocks are as large as ten feet in diameter. *Dome pits* are a relatively late cave feature, formed after the cave has been drained of water. Many speleologists believe that they are formed just below an insoluble layer of rock along

Figure 3

Leigh Cave—Two small pothole-like features which are directly under the intersection of two joints from which water is falling. (Photo courtesy David Conn)

joint or fracture intersections where water can readily flow downward. Many dome pits show vertical grooves which tend to support this hypothesis. Dome pits are found in a few New Jersey caves. Leigh Cave contains dome pits up to forty-five feet high, as well as several small pit-like features directly under joint intersections from which water is falling (Fig. 3).

A cave can also be modified by the addition of new rock in the form of *speleothems,* which include *stalactites, stalagmites, helictites, sodastraws* and *flowstone.* They are caused by the evaporation of water highly charged with calcium bicarbonate, leaving behind small amounts of calcium carbonate. If the water deposits the material on the ceiling, the deposits may be called stalactites and sodastraws (tubular stalactites). Helictites are a special kind of stalactite which can grow in any direction—even horizontally. It is thought that the growth of helictites is controlled by the crystallographic orientation. Stalagmites, on the other hand, grow up from the floor. When stalagmites grow up to join stalactites, columns are formed. If calcium carbonate is deposited in sheets on the walls or floor of the cave, it is called *flowstone, dripstone or travertine.*

PATTERNS

Solution caves can be placed into groups on the form and pattern of the passages. Passages can be grouped into several categories: the *fissure* passage, the *bedding plane* passage, and the *keyhole* passage. A fissure passage is one in which the height is several

times the width and it is controlled by the fractures or joints in the rock (Fig. 38). On the other hand, a bedding plane passage is wider than it is high and is controlled by the bedding in the rock (Fig. 12). A keyhole passage is a fissure which was filled with sediment and then a stream flowed through, carving a new channel on top of the fill; later, the fill was removed by water and a keyhole-shaped passage remained (Fig. 25).

Caves can be classified into patterns depending on whether the passages are single, straight, or branching.

Linear—A cave that has a single straight passage with no branches (Fig. 19)

Rectangular—A cave with one passage that has no branches, but bends (Fig. 32, Fairly Low)

Branchwork—A cave where the passages fork and divide but form no closed loops. In this report, the branchwork pattern includes many of the small caves of New Jersey, where the cave has a room with several passages leading from it (Figs. 29, 35)

Network—A cave with multiple branching passages, some of which join again to form closed loops (Fig. 15)

Maze—Some authors use maze interchangeably with network, but in this report it is defined as a special kind of network pattern. A maze cave contains intersecting sets of parallel passages (Plate 3)

Some caves may contain more than one pattern (Fig. 34). The dominant patterns found in New Jersey caves are the linear, rectangular, and branchwork types. The maze and network caves are typically the longest, while the linear ones are the smallest (Table I).

KARST FEATURES

Karst is the term describing the topography which develops in areas underlain by soluble rocks. It is characterized by sinkholes, underground drainage, bands of exposed bedrock (*karren*) and open joint fissures (*cutters*). In New Jersey, the main karst areas are located in the northwestern part of the state. There are also some karst areas in the downfaulted Paleozoic rocks and in the pods of Precambrian Franklin Marble.

Sinkholes, or sinks, as they are commonly referred to, are depressions in the surface of the ground. They are formed either by solution from above or by the collapse of cave passages from below. New Jersey sinks range in size from a few feet wide and deep to several hundred feet wide and fifty feet deep, such as the ones near Shotwell Cave at Huntsburg. Sometimes sinks contain cave entrances, but ordinarily the drainage passages are too small to enter.

The drainage in karst areas is frequently underground, and there are many dry stream beds or streams which suddenly go underground. New Jersey karst areas are usually in the limestone valleys, with shale or sandstone forming the higher hills.

One of the most interesting New Jersey karst features is the Brau Kettle, located on the Emil Janus farm, west of the intersection of the Old Mine Road with the Hainesville Road, four miles northeast of the Dingmans Ferry Bridge. This is a sinkhole approximately twenty feet in diameter and eight feet deep, grass-covered, except for a small area at the bottom consisting of rocks up to a half-foot in size. After a heavy rain, the Brau Kettle fills with water which rises up through these rocks, sometimes within a half an hour. The water can be seen bubbling up from the bottom, from which the name Brau Kettle (Dutch for brewing or boiling kettle) is derived. A stream passes within a few feet of this sink, but fluorescent dye tests in the Spring of 1963 revealed no connection between the two. It is likely that water flows under pressure through underground crevices in the Onondaga Limestone from the higher land to the southeast.

Karstlike topography need not be confined to limestone areas. Along Punch Bowl Road, connecting Route 24 and Park Avenue midway between Morristown and Madison, one can see numerous sink-like features. The largest of these, called the Devil's Punchbowl, is located next to Route 24 and is several hundred feet in diameter and fifty feet deep. They are known to geologists as glacial *kettle holes,* and were formed in the terminal moraine by melting ice thousands of years ago.

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USE OF CAVES

Caves in Europe, Africa and Asia were used as a place of habitation by many of the early ancestors of man. Some of the most famous caves are those which were inhabited by Cro-Magnon man, such as Lascaux Cave in France. These caves contain many paintings of animals and distorted human figures. The paintings were very seldom accurate portraits of people so we can only guess what the artist looked like.

Human remains found in America are much younger than those of the rest of the world. The most important cave is Sandia Cave in New Mexico. Here are found three cultural levels: the Pueblo Indians, Folsom Man, and Sandia Man. The Pueblo layer is a few hundred years old and is characterized by pottery. The Folsom layer is next and is about ten thousand years old and is characterized by double channeled spear points. The Sandia layer is the oldest and is characterized by a spear point which has only a single channel. This culture has been estimated to be about twenty-five thousand years old.

Corncobs found in Bat Cave, New Mexico, were determined to be over seven thousand years old. However, carbon from fires in the caves of the Mammoth Cave area of Kentucky has been dated at only three thousand years.

The early peoples of America put the caves to use as shrines and sometimes burial places--such as Russell Cave in Alabama and Bone Cave in New Jersey. Indian Cave in West Virginia contains some pictographs.

Some of the most important caves for artifacts in New Jersey are: the Bevans Rock House, Moody's Rock, Owens Cave and Faery Hole. Many of these shelters have yielded rich collections of Indian artifacts.

The Indians made use of caves in another way, by mining certain minerals from them. One of the most famous of these caves is Wyandotte Cave in Indiana where a large stalagmite, *The Pillar of Constitution,* had much of the material removed from its base. In another section of the same cave the Indians mined flint. They also mined epsom salts from the Mammoth Cave and Great Salts Cave in Kentucky.

Other materials have been mined from caves, the most important of which is guano. Guano was mined both as a fertilizer and as a source of saltpeter for gunpowder. Mammoth Cave in Kentucky is probably the best known cave mined for saltpeter. Some of the vats and water pipes may be seen there today. Two other famous saltpeter caves are found in West Virginia. They are: Schoolhouse Cave, which has parts of a tramway left, and Trout Cave, which has some of the hoppers. There was a gunpowder mill on the river below Trout Cave. The mining of cave earth for saltpeter was carried on principally during

the War of 1812 and the Civil War, but the mining of guano for fertilizer has continued until the present. Bat Cave and Guano Cave in Arizona are two such caves. One of the most famous caves mined for fertilizer is Carlsbad Caverns in New Mexico. This was done around the turn of the century, before it became a National Park.

In some cases, caves have been mined and prospected for minerals such as gold, copper, lead, and zinc. Spanish Cave in Colorado is one of the legendary caves mined for gold, whereas a cave in Connecticut was mined for copper. Caves were mined for lead-zinc ores in Missouri and prospected in other areas. It is believed that Kooken Cave, Pennsylvania, was explored with the hope of finding lead-zinc ore. Some caves at the Sterling Hill and Franklin Mines in New Jersey were intersected and mined of rare zinc minerals.

Other caves have been "mined" of something more valuable and less lasting—speleothems (cave formations). Advertisements in various rock and mineral magazines frequently offer them for sale. This deplorable practice is examined in more detail in the section on cave conservation.

Many caves contain water and have been used for domestic and commercial water sources. One of the most enterprising projects of this kind was the Barton Hill Project. In this project, a group of cavers from New York and New Jersey explored an area near Schoharie, New York, with the purpose of determining the extent of a potential underground reservoir. A similar but smaller underground reservoir is Swimming Pool Cave in New Jersey, where a cave stream was dammed to create a domestic water supply. Lake Mohawk Cave was once a water supply and Campbell's Cave was discovered at the base of a dug well. In some areas cave streams were used to operate mills.

One use of caves is very undesirable—as a receptacle for waste matter. In states where there are many caves, homeowners have drilled holes until a cavern was intersected; these were then used as cesspools. This allowed the ground water to become polluted, often at points quite distant from the source of the contamination.

One of the most frequent uses of caves is as show places. There are more than 200 commercial caves in the United States. Some are so small that they can be seen in a few minutes; others are so large that it takes hours to see only a part of the cave. Probably the best-known commercial caves are Mammoth, Carlsbad, and Luray. The nearest commercial caves are located in eastern Pennsylvania: Crystal Cave (opened in 1873), Onyx Cave, and Lost River Caverns. Many commercial caves have special attractions: Penn's Cave, its tour by boat; Mammoth Cave, its legendary length; Carlsbad Caverns, its huge rooms; and Luray Caverns, its great beauty.

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Halliday, William R.; 1959, *Adventure Is Underground;* Harper & Brothers, Publishers, New York, 206 p.

Moore, George W. and Nicholas, Brother G.; 1964, *Speleology, The Study of Caves;* D. C. Heath and Company, Boston, 120 p.

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CAVE EXPLORATION

For the athletically inclined person, cave exploring can be interesting and enjoyable. If certain simple rules are followed, it can also be as safe as any other sport. The basic equipment needed is a hard hat, three independent light sources, and sturdy clothes. These are relatively inexpensive and easy to obtain in surplus or sporting goods stores.

The hard hat is essential for caving. In New Jersey caves, it is more useful as protection against hitting one's head in low passages than against falling rocks. Many hard hats have brackets in which a head lamp can be inserted.

Most cavers use a carbide lamp as their primary light source. Carbide combines with water to form acetylene gas which burns with a yellow flame. An electric head lamp is equally good, but the cost of batteries is considerably greater than the cost of carbide. The second source is usually a two-cell flashlight, and the third source, candles and matches in a waterproof container.

Sturdy old clothes are strongly recommended. Most caves require a certain amount of crawling and squeezing through tight places, and mud or water is sometimes encountered. Most cavers wear one-piece coveralls (of the type used by garage mechanics) over another set of clothes. Boots should be worn rather than shoes or sneakers and a pair of gloves will protect hands against dirt and sharp rocks.

Certain specialized equipment may sometimes be required. In caves containing deep pits, flexible aluminum ladders and 7/16" nylon rope (never clothesline) are needed. This equipment should be well tested before each use, and the caver should practice using his equipment until he can do it in the dark. Many serious accidents have resulted from not testing or knowing how to use the climbing equipment.

If underground lakes or stream passages are encountered, an inflatable boat or a scuba diving wet suit is in order (cave water is cold and can quickly sap the energy of an unprotected caver). Sometimes, scuba tanks are used in exploring completely flooded passages.

A camera is another piece of specialized equipment. Obviously, it is very delicate and must be well protected. A good way to do this is to use an Army surplus steel ammunition case, which can be lined with foam rubber and then waterproofed.

Now you are ready to go caving. Always ask the owner's permission to enter the cave, and respect his property. Never go caving alone; at least two others should accompany you. If the cave is complex, it is advisable to include someone who knows the cave well. If a map is available, study it beforehand. Most important, be careful when exploring any cave. If someone is trapped or injured, it may be several hours until help can get there, and even longer before the victim can be removed from the cave. In March of 1961, the Northern New Jersey and Kittatinny Grottoes held a practice rescue at Leigh Cave. It was assumed that the "victim" (the smallest caver present) had broken his leg in a fall in the Dome Pit Room. Although the distance to the entrance is only 240', it took fifteen cavers several hours to remove the "victim" on a stretcher.

The reader who is seriously interested in the exploration of caves in New Jersey or elsewhere in the United States, should consider joining the National Speleological Society. Founded in Washington, D.C., in 1941, it now consists of both spelunkers (explorers) and speleologists (scientists). Many of these belong to one of the ninety-plus local chapters (called grottoes) scattered throughout the United States. At present, the Northern New Jersey Grotto is the only organization based in this State; however, the Metropolitan Grotto (in New York City) and the Philadelphia Grotto are nearby. To get in touch with any of these organizations, write the National Office of the N.S.S. at No. 1 Cave Street, Huntsville, Alabama, for up to date information.

Excellent books on the sport of caving and the science of speleology are available in many libraries. The following are especially recommended for the reader interested in more information about caves:

Folsom, Franklin; *Exploring American Caves, Their History, Geology, Lore and Location;* Crown Publishers, 1956 (also issued in paperback by Collier Books, 1962)

Halliday, William P.; *Depths of the Earth, Caves and Cavers of the United States;* Harper and Row, 1966

Lawrence, Joseph and Brucker, Roger W.; *The Caves Beyond: The Story of the Floyd Collins' Crystal Cave Expedition;* Funk and Wagnalls, 1955

Mohr, Charles E. and Sloane, Howard N. (Editors); *Celebrated American Caves,* Rutgers University Press, 1955

Moore, George W. and Nicholas, Brother G.; *Speleology: The Study of Caves;* D. C. Heath and Company, 1964 (paperback)

Sloane, Howard N. and Gurnee, Russell H.; *Visiting American Caves;* Crown Publishers, 1966

CAVE CONSERVATION

The largest single problem facing cavers today is conservation. To many people, a cave is just a dark, wet, muddy hole in the ground, but to most people who have enjoyed cave exploration, a cave is a thing of beauty. It is obvious to most people that the relatively few caves containing extensive or interesting fauna (such as blind cave fish) should be preserved in their natural state. It may not, however, be so obvious that *any* cave of reasonable size ought to be similarly protected. In New Jersey there are about 225 square miles of limestone containing 112 known caves. Of these, only 21 caves are over a hundred

feet in length. In other words, there is one large cave for every ten square miles of limestone; thus, caves are a relatively rare geological resource.

Fewer than 10 New Jersey caves have ever had speleothems of any note. The formations in two of these caves were described in newspaper articles in 1954 and 1961; within a month after the article had appeared, the best specimens had been destroyed by vandals. Caves in many other states have experienced similar fates.

Speleothems are only formed after long periods of time and under the right conditions. It has been often stated that one cubic inch of flowstone is deposited in about one hundred years; in reality, this will vary greatly with the amount of carbonate-charged water entering the cave. Nevertheless, in many caves (not in New Jersey) one can see speleothems several cubic feet thick which undoubtedly have taken millenia to reach their present size. If someone breaks off a speleothem (either deliberately, as a souvenir, or accidentally when crawling in a narrow passage), he has destroyed something of great age. If many visitors are acquisitive or careless, the original appearance of the cave will be irreparably altered. The broken stubs of stalactites in many caves are a poignant reminder of past beauties which will never again be seen. A more subtle form of vandalism is the untidy array of smoked (or worse, painted) names and dates found on many cave walls. Although New Jersey has no laws governing the removal of speleothems, several other states have enacted legislation which makes it a crime to take them from a cave.

Biologists are interested in caves because of the unusual and highly specialized forms of life found in them. Molds, fungi and bacteria are able to live in caves because they are parasites and do not require sunlight. Animals, on the other hand, must be highly specialized to live in an environment which has no light and little food available. Most of these creatures are aquatic and feed on vegetable or animal matter washed into the cave. Bats and insects leave the cave at night or at certain seasons of the year to forage for food. Yet other animals live on the droppings of nocturnal creatures such as bats.

Bats (and a few other animals) hibernate in caves. If bats are awakened during their hibernation period, they rapidly use up their stored fat supply and are in danger of starving to death. When not hibernating, bats and other nocturnal food-gatherers can move out of a cave if the environment becomes unsuitable; however, those animals that are totally adapted to caves have no place to go. Cave populations are often in delicate ecological equilibrium, each species depending on others for its survival. If one species is disturbed, the effect may spread through the entire community, possibly resulting in the extinction of another species.

If a carbide lamp is used, remember that the used carbide dissolved in water can be poisonous; be sure to remove it from the cave for disposal. Although other trash (such as batteries, flashlights, candy wrappers, etc.) is not likely to endanger the animal life, it can build up rapidly to unsightly proportions. After a cave has accumulated a large amount of trash, it is a major project to clean it up again. The following motto well summarizes the feelings of conservation-minded cavers: ***Take nothing but pictures . . . leaving nothing but footprints.***

DESCRIPTIONS OF NEW JERSEY CAVES

Table I, which lists all the known caves, includes the name of the cave, the quadrangle where it is located, the length of the cave in feet, the formation or rock it is formed in, the dip of the rock where measured, and remarks which include the patterns of the cave and any other important information.

Cave descriptions list on the first line: the name of the cave, the location to tenths of a minute, the elevation, the quadrangle map, the status of the cave, and the owner, where known.

Abbreviations used to denote status:

C – Closed, no permission given
D – Destroyed
Fl – Flooded
O – Open
PR – Permission required
S – Sealed

Cave Maps, Plates 2 through 7, are included in the pocket at the back of the text.

Legend for all Cave and Surface Maps:


Surveyed passage


Unsurveyed passage


Lower level


Ledge


Sink or pit

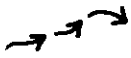

Dome


Natural bridge


Cliff line


Large rocks


Rock fragments


Stream


Pool


Mud


Stalactite


Stalagmite


Column


Slope

Direction and angle of slope

Ceiling height

Depth below entrance

Figure 1, in front of the book, which is a general map of New Jersey, shows the location of the caves outside the limestone areas as indicated on Plate 1.

Plate 1 has the location and geology of all the limestone caves and most of the caves in Northwestern New Jersey.

TABLE I

LIST OF NEW JERSEY CAVES

NAME	QUADRANGLE	LENGTH	FORMATION	DIP	REMARKS
BURLINGTON COUNTY:					
Worrell	Pemberton	25	Navesink	<1°SE	Maze, destroyed
HUDSON COUNTY:					
Snake Hill	Weehawkin	Small	Diabase		Fissure
Sybil's	Jersey City	Small	Serpentine		Artifical
HUNTERDON COUNTY:					
Califon	Califon	40	Leithsville		Linear
Clinton	High Bridge	110	Rickenbach	45°NE	Rectangular
Leigh	Flemington	800	Leithsville	Anticline 45°N-45°S	Network, fault
Milford Caves	Riegelsville	Small	Triassic Conglomerate		Fissures
Muckelman's	Flemington	30	Leithsville		Flowstone
Spruce Run	High Bridge	24	Rickenbach	20°N	Branchwork
MERCER COUNTY:					
Mt. Rose	Princeton	Small	Diabase		Talus
MONMOUTH COUNTY:					
Cave	Sandy Hook	30	Red Bank	<1°SE	
MORRIS COUNTY:					
High Ledge	Stanhope	Small	Granite	Fissures	
Scott Sinkhole	Hackettstown		Leithsville		Sink with room at base
Fissures	Wanaque	Small	Granite		Fissures
PASSAIC COUNTY:					
Great Notch	Orange	120	Basalt		Fissure (lava tube?, Stream)
Pines Lake	Wanaque	60	Triassic Conglomerate		Linear
Norvin Green	Wanaque	Small	Granite		Talus
SOMERSET COUNTY:					
Dead Man's	Bound Brook		Basalt		Copper mine
Peapack Quarry #1	Gladstone	Small	Leithsville	0°?	Destroyed
Peakpack Quarry #2	Gladstone	30	Leithsville	0°?	Rectangular, Destroyed
Peapack Quarry #3	Gladstone	320	Leithsville	0°?	Rectangular, Branchwork
Peapack Commercial	Gladstone	Large	Leithsville	0°?	Branchwork?
SUSSEX COUNTY:					
Andover Pit	Newton East	20+	Allentown		Pit 30' deep
Arch Roof	Hamburg	20	Franklin		
Bevans Indian	Culvers Gap	140	Oriskany		Rectangular
Bevans Rock House	Culvers Gap	85	Oriskany		Rectangular
Bevans Small Cave	Culvers Gap	10	Oriskany		Linear
Big Spring (North Church)	Hamburg		Allentown		Large spring
Big Spring (Springdale)	Newton West		Allentown		Large spring
Bonnie Brook Spring	Flatbrookville		Allentown		Very large spring
Campbell	Newton West	80	Allentown	low NW	Branchwork, well 30' deep
Cranberry Lake #1	Stanhope	85	Franklin		Rectangular?, large low room
Cranberry Lake #2	Stanhope	19	Franklin		Rectangular
Cranberry Lake Fissure	Stanhope	10	Franklin		Linear
Cranberry Lake Fissure Sink	Stanhope	40	Franklin		Branchwork?

LIST OF NEW JERSEY CAVES

NAME	QUADRANGLE	LENGTH	FORMATION	DIP	REMARKS
Crooked Swamp #1	Newton East	200	Allentown	20°NW	Branchwork
Crooked Swamp #2-3-7	Newton East	1250	Allentown	12°NW	Maze
Crooked Swamp #4	Newton East	20	Allentown		Linear
Crooked Swamp #5	Newton East	50	Allentown		Branchwork?
Crooked Swamp #6	Newton East	20	Allentown		Linear
Crooked Swamp #8	Newton East	20	Allentown		Linear
Devil's Hole	Newton West	375	Jacksonburg		Rectangular total depth 85'
Edsall Indian	Hamburg	7	Allentown		Shelter
Emerald	Hamburg	14	Franklin		
Farber's Drowned	Hamburg	17	Leithsville		
Fasolo's	Franklin	780	Franklin		Network
Fishers Cavelets	Newton East	10	Epler		
Ford Dennis	Unionville	16	Epler		Linear?
Ford Dennis Fissure	Unionville		Epler		Linear?
Fox Den, Fasolo	Hamburg	Small	Franklin		
Fox Den Post	Branchville	Small	Epler		
Francisco's	Stanhope	144	Leithsville		Linear
Franklin Mine Cave	Franklin	Small	Franklin		Very massive flowstone
Glenwood	Pine Island	Small	Franklin		Shelter
Glenwood Indian	Wawayanda	493	Franklin		Network
High Point Rock Shelter	Port Jervis So.	Small	Shawangunk		Shelter
Indian	Newton East		Franklin		Mines
Indian House Rocks	Flatbrookville	100	Shawangunk		Fracture
Inslee	Newton West	15	Epler		Rectangular
Kerreganot-Wormscrew System	Hamburg	160	Franklin		Linear, Branchwork
Lake Mohawk	Newton East		Franklin		Linear, network, sealed
Lime Crest #1	Newton East	200	Franklin		Rectangular?
Lime Crest #2	Newton East		Franklin		
Moody's Rock	Newton West		Allentown		Shelter
Mortimer's	Port Jervis So.	170	Coeymans		Linear
Newton Sheep Rock	Newton West		Epler		Shelter
Owens	Unionville	14	Epler		Linear
Papakating	Hamburg	20	Epler		Rectangular?
Paulison's Sinks #1	Hamburg	200	Allentown	30°NW	Maze
Paulison's Sinks #2	Hamburg	70	Allentown	30°NW	Rectangular
Paulison's Sinks #3	Hamburg	350	Allentown	30°NW	Maze
Pipsqueak	Hamburg	20	Franklin		
Post Cave	Branchville	13	Epler	20°N	Linear?
Post Hole	Newton East	40	Allentown		Branchwork
Rocky Ledge	Tranquility	70	Rickenbach	30°NW	Rectangular
Roseville	Newton East	30	Franklin		
Shotwell	Tranquility	60	Rickenbach	30°NW	Rectangular
Sterling Hill Mine #1	Franklin	Small	Franklin		50' level
Sterling Hill Mine #2	Franklin	Small	Franklin		50' level
Sterling Hill Mine #3	Franklin	30	Franklin		400' level
Sterling Hill Mine #4	Franklin	30	Franklin		600' level
Stillwater #1	Newton West	30	Epler		Linear?
Stillwater #2	Newton West	30	Epler		Linear
Stillwater #3	Newton West	Small	Epler		Many small caves
Stillwater #4	Newton West	12	Epler		Linear?
Sussex County #1	Newton West	30	Allentown		Rectangular
Sussex County #2	Newton West	50	Allentown		Rectangular
Swimming Pool	Tranquility	400	Rickenbach	25°NW	Branchwork, Maze
Tanya's	Newton West	10	Allentown		Room
Terry's Pit	Newton West	20	Ontelaunee		40' pit
Todd Rock Shelter #1	Hamburg		Epler		Shelter
Todd Rock Shelter #2	Hamburg		Epler		Shelter
Tom Quick	Culvers Gap	40	Onondaga		Linear?, fissure
Tom Quick Mine	Milford		Onondaga		Mine
Van Syckle's	Unionville	110+	Epler		Maze, Stream
Vulture	Port Jervis So.	380	Onondaga		Maze

LIST OF NEW JERSEY CAVES

NAME	QUADRANGLE	LENGTH	FORMATION	DIP	REMARKS
Warbasse #1	Newton East	10x12	Epler		Shelter
Warbasse #2	Newton East	10	Epler		Shelter (cave like)
Wild Cat Rock	Franklin	15	Franklin		Shelter
Cat Swamp	Stanhope		Granite		Shelters (5)
Van Horn's Ice	Flatbrookville		Shawangunk		Talus, ice
Silver Mist	Flatbrookville				Never located
Cave	Newton West	100+	Epler		Large sinkhole
Sinking Stream (Crooked Swamp)	Branchville		Allentown		Blocked
Sinking Stream (Harmonyvale)	Branchville		Epler		Blocked
Sinking Stream (Huntsburg)	Newton West		Epler		Blocked, several small openings nearby
Sinking Stream (Illiff's Pond)	Newton West		Epler		Blocked
WARREN COUNTY:					
Bear	Blairstown	45	Epler		Linear?
Betsey	Blairstown	8	Epler		
Bone	Portland	Small	Martinsburg		Fissure, Human bones
Carpentersville #1	Easton	20+	Allentown		Branchwork?
Carpentersville #2	Easton	30+	Allentown		Branchwork?
Davidson's	Portland	30	Epler		15' deep excavation
Devil's Kitchen #1	Blairstown	130	Allentown	25°NW	Branchwork
Devil's Kitchen #2	Blairstown	110	Epler		Branchwork
Devil's Wheelright Shop	Blairstown	65	Epler		Linear
Faery Hole	Blairstown	53	Franklin		Rectangular
Fairly Low	Blairstown	112	Franklin		Rectangular
Fairy Tube	Blairstown	25	Franklin		Linear
Foul Rift #1	Belvidere	15	Epler		Linear
Foul Rift #2	Belvidere	15	Epler		Linear
Grouver	Blairstown	Small	Epler		Sinkhole
Hainesburg	Portland	12	Epler		
Hainesburg Rock Shelter #1	Portland		Epler		Shelter
Hainesburg Rock Shelter #2	Portland		Epler		Shelter
Indian Hollow Rock Shelter	Portland	Small	Epler		Shelter and several small caves
Jenny Jump Fracture	Blairstown	Small	Gneiss		Fracture cave
Kalarama Spring	Blairstown		Epler		Large spring
Kennedy's Mill	Bloomsbury	15	Rickenbach		Branchwork
Lake Susquehanna	Portland	20+	Epler		Entrance above a series of springs
Panther Ledge	Tranquility	Small	Granite		Fissure
Pioneer	Flatbrookville	75	Epler		Rectangular
Railroad Cut	Blairstown	60	Epler		Branchwork
Route 80	Tranquility	10	Allentown		Fissure too small to enter
Sarepta Quarry	Belvidere	320	Jacksonburg, Ontelaunee		Rectangular, network
Sarepta Quarry #2	Belvidere	8	Ontelaunee		Linear
Stevens Camp	Blairstown	20+	Allentown		10' drop
Supplee's Mill	High Bridge	95	Leithsville	Low NW	Branchwork
Vail	Portland	60	Allentown		Rectangular
Waterfield	Blairstown	100	Epler		Maze
Yellow Frame #1	Tranquility	210	Epler	20°NW	Branchwork
Yellow Frame #2	Tranquility	30	Epler	0°	
Yellow Frame #3	Tranquility	Small	Epler		
Yellow Frame #4	Tranquility	Small	Epler		
Yellow Frame #5	Tranquility	Small	Epler		
Yellow Frame #6	Tranquility	Small	Epler		
Fox Den	Blairstown	Small	Epler		
Fox Hole	Blairstown				Not found
Cave (Johnsonburg)	Blairstown		Epler		Unexplored
Cave (Shiloh)	Blairstown	40	Allentown		In cliff on side of very large, long sink
Cave (Quaker Church)	Tranquility	Small	Epler		
Cave (Penwell)	Washington	20+	Epler		Several narrow passages interconnected vertically

BURLINGTON COUNTY

Worrell Caves *39°59.4'N;74°44.2'W, Mount Holly Quadrangle, D, Mr. Worrell*

Two caves were discovered during excavation for a cellar. They appeared to be at the contact between the Navesink and Mt. Laurel Formations. The rock material over the larger opening was a fossil zone cemented by limonite. The larger of the two cave entrances measured about two by three feet. The passage trended northwest for about four and one-half feet where it intersected a northeast and southwest passage. At the northeastern end of the latter passage, there was a small room, eight by six by three feet, about 18 feet from the entrance.

The smaller cave entrance was about 14 feet to the southwest. At the base of the entrance were two passages, one heading southwest and the other northwest. The one to the northwest intersected another passage which was parallel to the one at the entrance. These caves have been filled in and their total extent is not known.[16]

Figure 4 *– Worrell Cave Entrance*

HUDSON COUNTY

Snake Hill Cave *40°45.5'N;74°05.1'W, Weehawkin Quadrangle, D, County of Hudson*

The cave consisted of a fissure in the diabase which has since been quarried away.[6]

Sybil's Cave (*Castle Point Mine*) *40°44.7'N;74°01.5'W, 40, Jersey City Quadrangle, PR, Stevens Institute*

Sybil's Cave is in the serpentine at Hoboken, on the property of Stevens Institute of Technology. It is not a true cave, having been excavated about 1835 as part of an amusement park. The entrance, partly blocked by talus, is about three feet wide and one and one-half feet high. Inside, it opens into a room 20 feet long, 17 feet wide and seven feet high, supported by four pillars near the center. There are some places along the walls which show evidence of drilling.[24,26]

See the section on "History and Legends of New Jersey Caves" for a further description of this cave.

HUNTERDON COUNTY

Califon Cave *40°44.1'W;74°50'W, 540, Califon Quadrangle*

Califon Cave is a fissure less than 60 feet long in a quarry one mile north of Califon. It is in the Leithsville Formation.[49]

Clinton Cave (*Spruce Den*) *40°39'N;74°55'W, 200, High Bridge Quadrangle, Fl, State of New Jersey*

The cave is located in a ledge on Spruce Run, about one mile north of Clinton and about 500 yards west of Route 31. The area is now flooded by the Spruce Run Reservoir.

The main entrance is three feet high and two feet wide; about six feet to the west is a narrow fissure which also connects with the cave. Approximately fifty feet from the entrance, the passage is reduced to a crawlway. The cave ends in a room 15 feet high with a pool of water six feet deep.

There is no flowstone, but in one section of the terminal room there are some small nodules on the wall. The cave is in the Rickenbach Dolomite.[42,44,51]

Leigh Cave *40°36.3'N;74°51.4'W, 300, Flemington Quadrangle, O, State of New Jersey*

Leigh Cave (Plate 2) is probably the largest cave in the State (measured in terms of underground volume), and contains more than 800 feet of passages. It is found at the far end of an abandoned limestone quarry (now owned by the State of New Jersey), one hundred yards south of Molasses Hill Road, about a mile east of its intersection with Route 31 near Allerton. The two entrances are located about 50 feet apart on either side of a talus slope. The upper entrance is well up the slope on the right. The lower entrance is at the base of the slope to the left. Leigh Cave is in the Leithsville Formation at the contact with the Precambrian gneiss. This contact is a thrust fault with the gneiss occurring over the limestone. The passages follow not only the bedding and joints, but also the fault surface and many of the fracture zones.

The cave itself has a network pattern complicated by the formation of pits and dome pits. The passages seem to be controlled by the major fractures. The overall trend of the cave dips about 20° to the southwest.

The general plan of the cave indicates that it was formed below the water table. However, it has been greatly modified from the time the water drained out of the cave. In the passage leading from the upper entrance room back to the Dome Pit Room, there are small pits presently forming in the bedrock floor. The largest of these is about one foot deep and directly under the intersection of a set of fractures in the gneiss ceiling. At first glance, this feature appears to be a pothole from stream erosion (Fig. 3). However, smaller depressions nearby are also under sets of fractures which are also water sources, indicating that these pits are being formed by water falling from the ceiling. In many places in the cave, the pits are over 20 feet deep and there is one dome pit 45 feet high. The only flowstone is located in one narrow fissure off the entrance room. The reason for the lack of flowstone is that the roof rock of most of the cave is gneiss.

The side and tops of many pits consist of slippery clay-covered rock. Ropes are advisable when crossing the pits as well as for scaling the far wall of the Dome Pit Room.

The lower entrance leads in a few feet to a 23-foot pit which should be descended with the aid of a ladder or rope. To avoid this descent, the explorer can cross the pit and take either a right-hand passage or one which goes straight ahead. The right-hand passage leads steeply down into a room. The passage straight ahead crosses a pit and then slopes down to another pit which is about eight feet deep; this opens into the same room reached by the right-hand passage.

Two passages leave this room. One leads downward and back toward the entrance through a dome room to the base of the entrance pit. The lowest point in the dome room is 43 feet below the upper entrance. The other passage out of the room leads toward the main part of the cave. It intersects with a high fissure passage at right angles. The floor slopes up under a natural bridge. At the point where the floor starts down again, there is a cross passage. The one to the right is very low and muddy. This is the connection originally excavated (by members of Northern New Jersey and Kittatinny Grottos) to join the lower and the upper caves.

After about two feet, it opens up into a small room with a short passage leading to the left. The route followed is through a low horizontal slit about four feet off the floor. This leads eventually into a large room about 15 feet high. In the left corner of the room is a shallow pit which leads through a low crawlway to the base of another pit in the upper entrance room. Alternatively, the upper entrance room can be reached by way of a low crawlway from the top of the 15-foot high room. On the right, a narrow fissure passage leads to the upper entrance pit.

The upper entrance passage is a wide, low, steeply descending passage which immediately terminates in a pit 25 feet deep, where a hand line is advisable. After crossing this pit, the passage continues down the slope to a second, smaller pit. On the far side is a window which opens into the upper entrance room. Alternatively, from the base of the second pit is a crawlway to the base of the upper entrance room through breakdown.

On the far wall of this room is a stoopway passage leading deeper into the cave. Just past the point where the floor comes up almost to the ceiling, there is a 4-foot wide, 20-foot deep pit which must be crossed. On the far side of the pit, the passage continues straight ahead to a small room, and also slopes down to the right. At the bottom of the slope is an opening about three feet wide and eight inches high which leads to a steeply-downward sloping passage and a horizontal passage up and to the left. The sloping passage leads to the bottom of the Dome Pit Room; the other one leads to a balcony about halfway up the side. On this balcony there is an opening in the ceiling. This leads to a transverse passage which to the left intersects the top of the dome pit and to the right ends in a 25-foot pit with a natural bridge across it.

On the far wall of the Dome Pit Room, about halfway to the ceiling, there is a ledge which leads down to a small room. Off this room is a very low crawl into a cross passage that contains two deep pits and pinches out at both ends. This point is the end of the cave. Isolated bats have been occasionally seen in the cave.[4,29,32,60]

Spruce Run Cave *40°39.1'N;74°55.1'W, 200, High Bridge Quadrangle, Fl, State of New Jersey*

This cave is located across the river and about 350 yards upstream from Clinton Cave in a sink. It is essentially a single room with a short lower level and two fissures blocked by water. The area is now flooded by Spruce Run Reservoir. The cave is in the Rickenbach Dolomite.[42,44]

OTHER CAVES

Muckleman's Cave *Flemington Quadrangle, S*

There is a cave located in Ed Muckleman's limestone quarry, 300 yards southwest of the Leigh Cave. The entrance is too small for a caver to enter, and the cave appears to be only a few feet long. It is in the Leithsville Formation, and contains some flowstone.[69]

Solution Cavities *High Bridge Quadrangle*

In the Spruce Run Reservoir area a large number of solution cavities were encountered in the Kittatinny Limestone during test drilling. These were subsequently filled with grout.

Milford Caves *Riegelsville Quadrangle*

On the Delaware River west of Milford, N.J., there are a series of low cliffs formed of conglomerate of Triassic age, which contain several fissure caves up to 30 feet long.[5]

MERCER COUNTY

Mt. Rose Caves *40°22'N;74°43.5'W, Princeton Quadrangle*

There are several small caves among talus boulders, located 600 yards southeast of the radio relay tower on Mount Rose, midway between Princeton and Hopewell. Similar caves have been reported in the Sourland Mountains to the northwest.[5]

MONMOUTH COUNTY

Cave *Sandy Hook Quadrangle*

The following was published in an 1818 geography book:

> *In Monmouth County, on the side of a branch of Navesink River, is a remarkable cave, in which are three rooms. The cave is about 30 feet long and 15 feet broad. Each of the rooms is arched; the centre of the arch is about five feet from the bottom of the cave; the sides not more than two and a half. The mouth of the cave is small; the bottom is loose sand; and the arch is formed in a soft rock, through the pores of which the moisture is slowly exudated, and falls in drops, on the sand below.*[17]

MORRIS COUNTY

High Ledge Caves *40°53.1'N;74°39.9'W, Stanhope Quadrangle*

These are located three-quarters of a mile northwest of the Route 10-46 traffic circle, and south of Route 46, near the top of a hill crossed by a power line. The caves are a series of fissures in Precambrian rocks.[69]

OTHER CAVES

Fissures *Wanaque Quadrangle*

There are two small fissures in granite on Changewater Mountain, one-half mile south of Route 24 and one mile east of Butler Park.[63]

Scott Sinkhole *Hackettstown Quadrangle*

In the fall of 1959, a fifteen-foot-deep sinkhole suddenly opened in a field on the Scott farm, a mile southwest of the village of Long Valley. There appeared to be passages beyond the rubble at the base of the sinkhole, but the rock was badly fractured and excavation appeared too dangerous. It was subsequently filled in by the farmer. The sinkhole was in the Leithsville Dolomite.[10,60]

PASSAIC COUNTY

Great Notch Cave *40°52.1'N;74°11.8'W, 480, Orange Quadrangle, D, Consolidated Sand & Stone*

Great Notch Cave has been quarried away. It was a fissure 120 feet long in the first Watchung basalt flow.[75]

Pines Lake Cave *40°59.5'N;74°16.5'W, Wanaque Quadrangle*

In 1943 a small cave was reported by State Geologist, Meredith Johnson, on the bank of the outlet from Pines Lake, just about the stream level. This cave is approximately one fourth of a mile downstream from the dam. It is in the east wall of the gorge. The cave consists of a steeply sloping four foot high passage about 60 feet long. The cave occurs in a calcareous bed of the Triassic conglomerate.[19,70]

OTHER CAVES

Norvin Green *Wanaque Quadrangle*

In Norvin Green State Forest, High Point is a bald rocky knob about two miles west of Midvale, N.J. There are a number of small caves formed in the talus boulders just below the summit on the south side of this hill. Several blazed trails lead to the summit.[5]

SOMERSET COUNTY

Dead Man's Cave *40°36.3'N;74°36.7'W, Bound Brook Quadrangle, S*

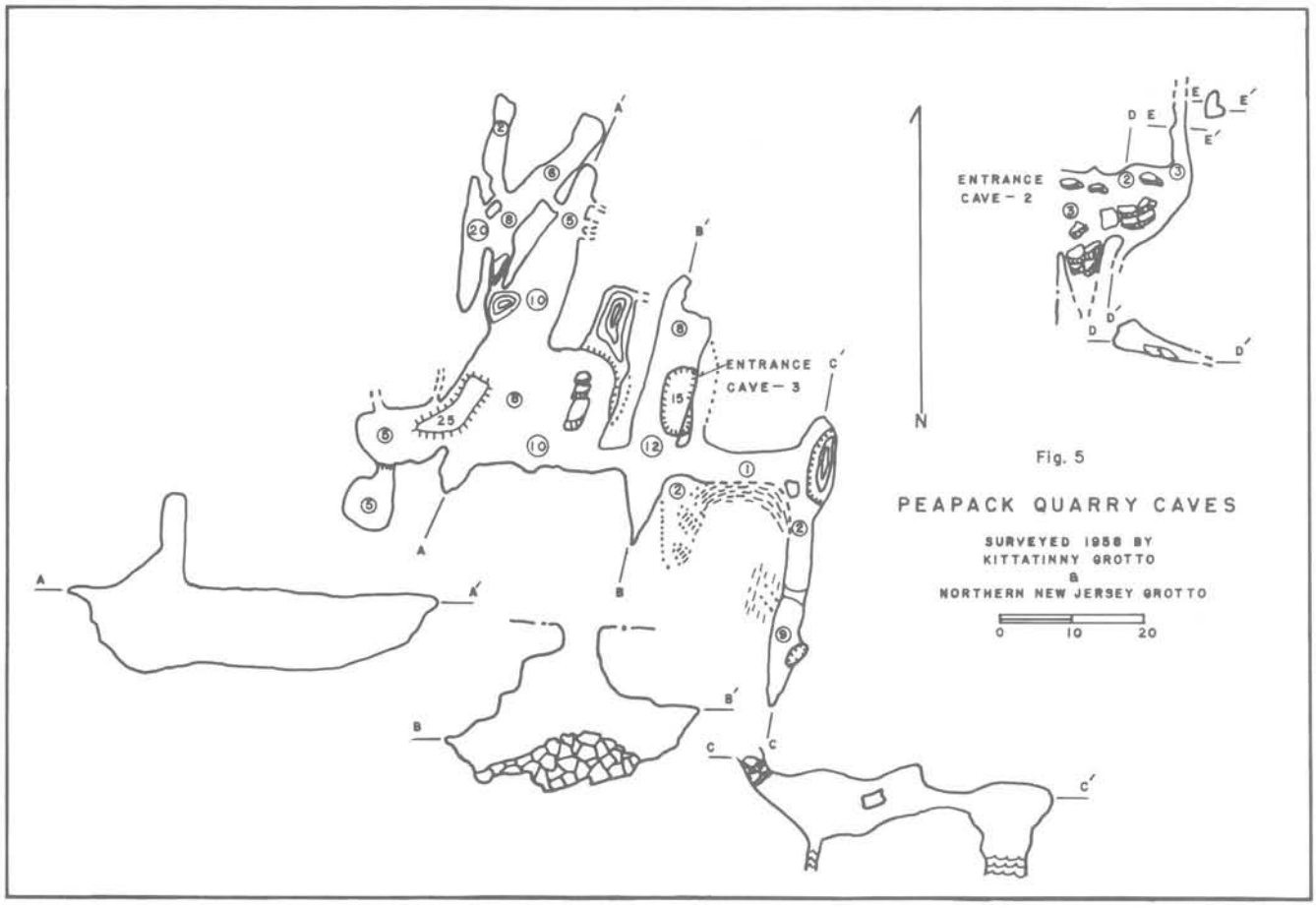
Dead Man's Cave is not a cave, but a copper mine in the First Watchung Mountain.[44]

Peapack Quarry Cave #1 *40°42.8'N;74°39.5'W, 230, Gladstone Quadrangle, D, A. Ferrante & Sons*

This cave (Fig. 5) was reported to be in the northwest wall of the Ferrante limestone quarry in Peapack, N.J., and has since been quarried away. This cave, along with the other three caves in the quarry, was formed in the Leithsville Formation.

Peapack Quarry Cave #2 *40°42.8'N;74°39.5'W, 230, Gladstone Quadrangle, D, A. Ferrante & Sons*

Peapack Quarry Cave #2 was discovered by quarrying operations in July of 1958; it was located about 20 feet up on the east wall. The opening was about six feet wide and three feet high, and was approximately 20 feet long. It contained snow-white flowstone, many stalactites and some reddish-colored draperies, but the cave has since been quarried away.[4,51]



Peapack Quarry Cave #3 *40°42.8'N;74°39.5'W, 230, Gladstone Quadrangle, S, A. Ferrante & Sons*

The cave was discovered at the base of the west wall of the quarry in November of 1958 when some 600 tons of rock disappeared into a hole opened by blasting.

The cave is entered through a small hole about 15 feet deep in the middle section of the cave. This room is about 40 feet long and eight feet wide (Fig. 6). East of the entrance and parallel to the entrance room, a fissure passage connects with a filled sink. There are two pits leading to the water table and a natural bridge in this passage.

To the west of the entrance room is a large room over 50 feet long and 30 feet wide. The floor is very uneven and slippery; behind breakdown in one corner is a deep pool and there is a dome pit in the ceiling. At the northern end of the room a small hole called the "peephole" was enlarged and access was gained to a small rough-walled upper level.

The cave is closed at the present time and no permission to enter it has been given for many years.[4,31,55]

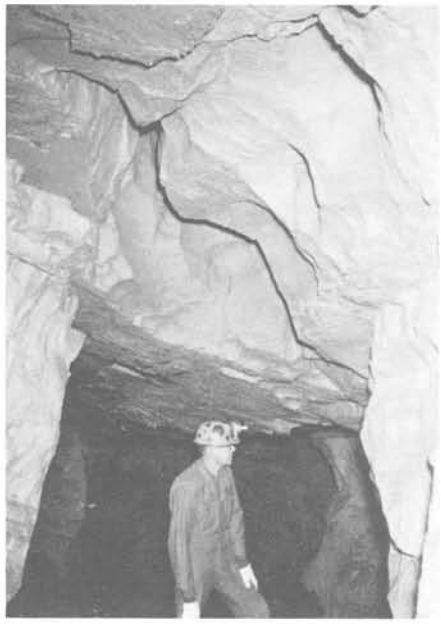


Figure 6
Peapack Quarry Cave #3 – Big Room
(Photo courtesy of Richard Anderson)

Peapack Quarry Commercial Cave

40°42.8'N;74°39.5'W, 230, Gladstone Quadrangle, S, A. Ferrante & Sons

This cave, perhaps the largest one in the State of New Jersey, has been closed since about 1907 and its location in the quarry is now uncertain. The cave was first entered in December of 1901 by workmen of the Todd limestone quarry.[4,72]

See the section entitled "History and Legends of New Jersey Caves" for a complete description of this cave.

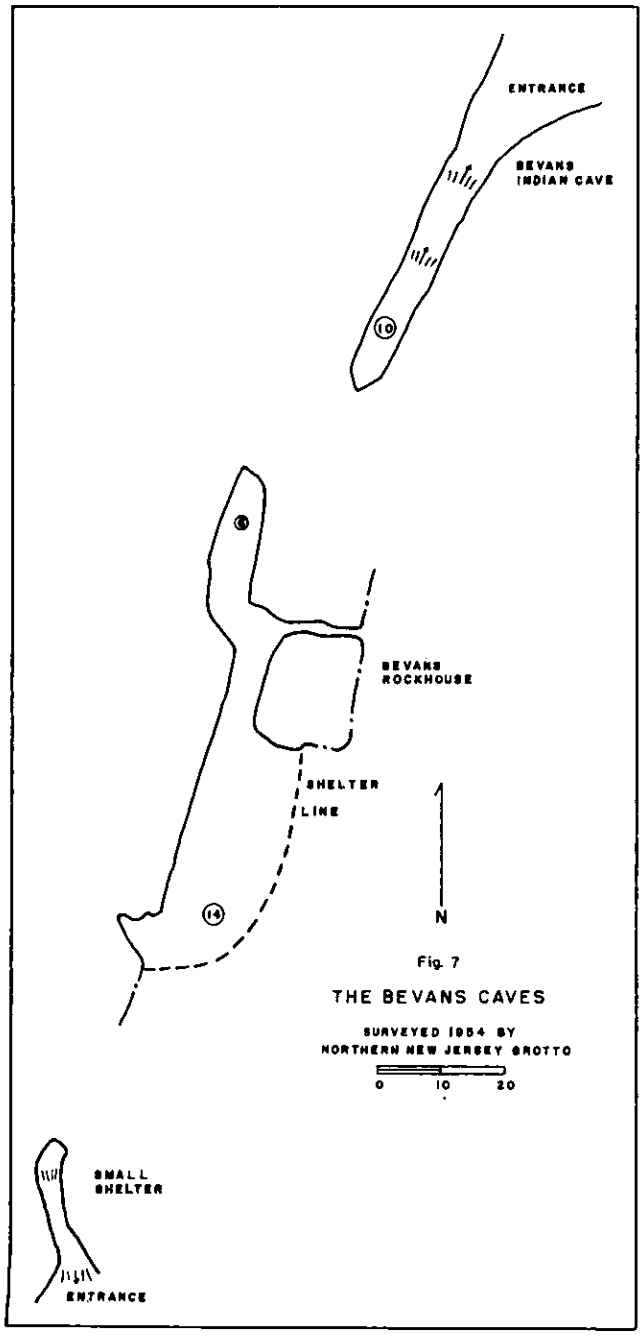


Fig. 7

THE BEVANS CAVES

SURVEYED 1954 BY NORTHERN NEW JERSEY GROTTO

0 10 20

SUSSEX COUNTY

Andover Pit *41°00'N;74°44.8'W, 590, Newton East Quadrangle*

This pit, in the Allentown Formation, is 10 feet wide and 30 feet deep. At the base of the pit, on the northern side of the room, there is an opening in the rubble leading downward. Exploration has not occurred up to this time.

Arch Roof Cave *41°10.8'N;74°32.5'W, 520, Hamburg Quadrangle, C, Playboy Club*

This cave is located high in the wall of the limestone quarry just north of McAfee. It is about 20 feet long and is formed in the Franklin Marble.[40]

Bevans Caves (Fig. 7)

Rock House *41°11.6'N;74°51.7'W, 580, Culvers Gap Quadrangle, O, Mr. Cummington*

Indian Cave *41°11.6'N;74°51.6'W, 580, Culvers Gap Quadrangle, O, Mr. Cummington*

The Rock House is located midway between the Delaware River and Bevans Post Office. Proceed two-thirds of a mile west of Bevans on an asphalt road, two-tenths of a mile south on a gravel road, and about 200 yards east on a woods trail to an eastward-facing rock ledge. There are three rock shelters in this ledge. The trail leads directly to the largest, the so-called Bevans Rock House. One hundred yards north of the Rock House is the shelter known as "The Indian Cave," and 50 yards south of the Rock House is another smaller shelter.

These shelters were much frequented by Indians because of their convenience. They are less than 400 yards from the great Indian trail which later became the Old Mine Road. A tributary of Big Flat Brook runs right in front of the cave, and a fine spring issues near the Indian Cave, so that water is at hand. These rock shelters have yielded rich archaeological remains. A diorama in the State Museum at Trenton depicts an Indian family inhabiting Bevans Rock House.

These three shelters are in the limestone facies of the Oriskany Formation (Glenerie member).[40,74]

Big Spring (North Church) *41°07.8'N;74°37.3'W, 535, Hamburg Quadrangle*

This spring has a one foot opening, from which the water flows at a rate of approximately 700 gallons per minute. The spring is in the Allentown Dolomite.

Big Spring (Springdale) *41°00.6'N;74°47.8'W, 590, Newton West Quadrangle*

There is reported to be a cave entrance near this spring, but it has not been located. The spring has a flow of over 1000 gallons per minute. It is in the Allentown Dolomite.

Bonnie Brook Spring *41°01.7'N;74°53.2'W, 460, Flatbrookville Quadrangle*

This is one of the largest springs in the state with a flow of over 5000 gallons per minute, which issues

from a three foot opening.

Several years ago dye was placed in a pond one mile southwest of the spring. It took just over an hour to appear in the spring.

It is formed in the Allentown Dolomite.

Campbell Cave *41°02.4'N;74°45.5'W, 600, Newton West Quadrangle, PR, Ingersoll Rand Corp.*

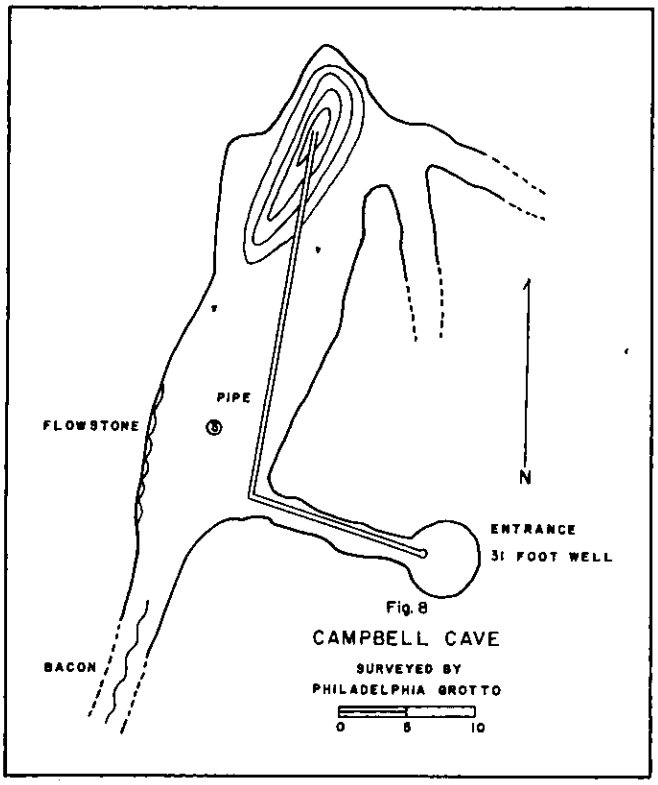


Fig. 8

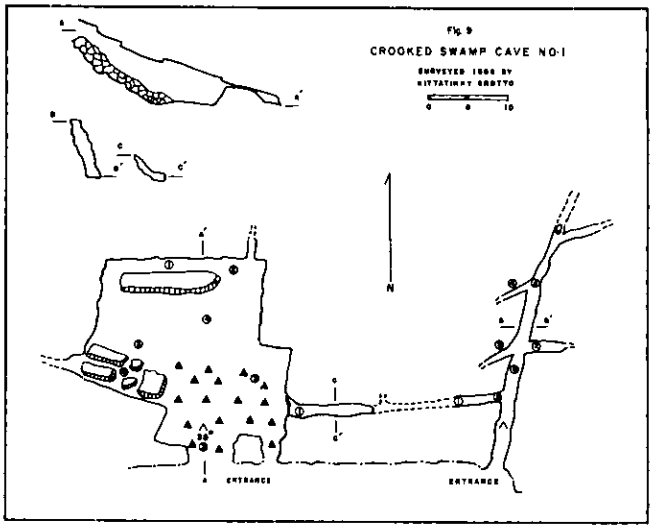
The cave (Fig. 8) is located at the south edge of Newton, just off the land of the Hicks Avenue Plant of the Anken Chemical Company. The entrance is through a well 31 feet deep; a rope or ladder therefore is necessary. At the base of the well, a crawlway ten feet long intersects the main passage of the cave, which is 60 feet long, up to ten feet wide and three feet high. At the lower end, the passage splits into two parts and terminates in a pool. The total length of the cave is about 80 feet. There is some flowstone along with an eight-inch thick stalagmite. A small fault can be observed in the north wall of the room of this cave, which is in the Allentown Dolomite.[20,30,41,42,54,65]

Cranberry Lake Caves *Stanhope Quadrangle, Fl*

On a small island located at the east end of Cranberry Lake are four small caves in the Franklin Marble.[19]

Crooked Swamp Cave #1 *41°07.2'N;74°39.8'W, 560, Newton East Quadrangle, PR, Carl Kadi*

This cave (Fig. 9) is at the bottom of a small cliff at the edge of a field bordering Crooked Swamp. The rock consists of thin seams of limonite interspersed



with the dolomite in the plane of the bedding. In the main room of the cave the development has been along the bedding plane, while in the fissure passage it has been along one main joint and several offshoots. One of these, which is not passable, apparently connects the fissure and the main room. On the ceiling in the back end of the fissure passage there are some soda-straws in an early stage of growth. Cave crickets and spiders have been noted, as well as four dormant honey bees. The cave is in the Allentown Dolomite which has a strike of N.80°E. and a dip of 15°NW.[3,39,40,57]

Crooked Swamp Caves #2-3-7 *(Breathing Cave) 41°07.2'N;74°39.7'W, 560, Newton East Quadrangle, PR, Carl Kadi*

This cave (Plate 3) is the major one of a half dozen caves (Fig. 10) and many sinkholes and other openings in a fairly small area. It might well be thought of as a cave system rather than a single cave, since it was discovered as three separate caves which only later were proved to be connected. The cave is located two miles northwest of Lafayette under a small ridge that borders a swamp through which runs a major fault. It is also known as Breathing Cave due to the frequent changes of direction of air movement in the caves. However, a study of these air currents in October, 1962, (Fig. 11), revealed no strongly resonant "period" as has been observed in Breathing Cave in Virginia. With its many parallel and connecting passages totaling 1250', this is the longest known cave in New Jersey. During winter and spring it is too flooded to permit exploration. Only a few tiny stalactites are found in the system.

From the main entrance of Cave #2, at the southwest end of the ridge, only the passage leading directly back to the five-foot-high room should be attempted except by those who are very thin. The side passages require much squeezing. Caution is advised in the five-foot-high room because of an

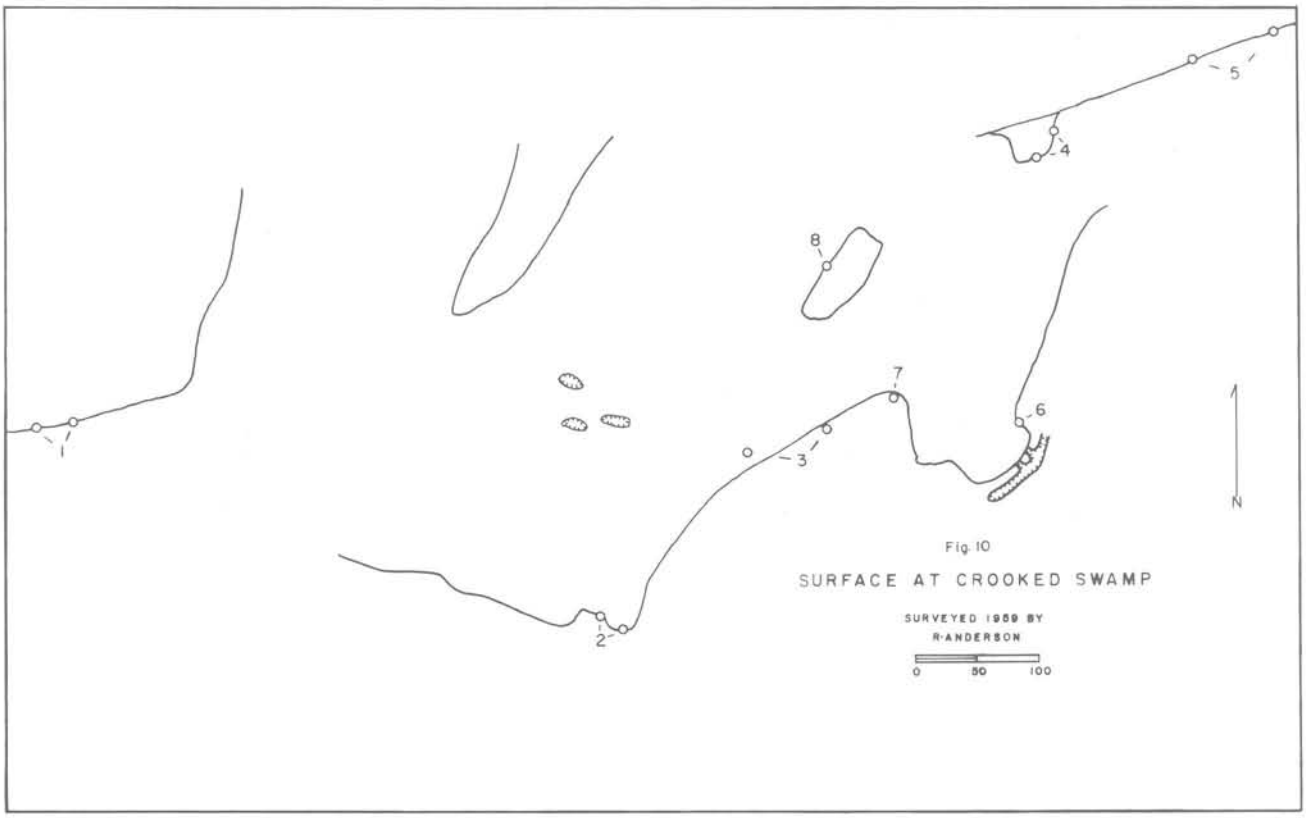


Figure 11
Crooked Swamp Cave #2-3-7
Cave research, measuring the breathing phenomenon
(Photo courtesy of Bell Telephone Laboratories, Inc.)

unstable and potentially dangerous ceiling. Beyond this room it is possible to touch hands with someone coming from the second entrance (Cave #3, 210' northeast of Cave #2), but only very small cavers can get through.

It is possible to enter Cave #3 by either of two entrances, but the larger one on the left is recommended. While the passages in the first section are controlled primarily by joints in the limestone, those in the second section are controlled by the bedding planes (Fig. 12) and are therefore lower and broader. Approximately 30' in, an easily ignored passage leads off to the left, and after about 50' it separates into four passages. The left-hand passage eventually intersects the first section of the cave. Back in the entrance area of the second section, passages straight ahead and to the right lead around an island through a very low area of the cave into an area which is high. From here on, including the very narrow passage on the right to the outside, the section is joint controlled in development. By crawling over large rocks and past an extension of the passage offset below, it is possible to hear voices and to see lights from those in the third section of the cave.

Cave #7 is about 130 feet east of the Cave #3 entrance. Almost immediately after dropping to the bottom of the entrance passage, another passage can be seen leading off to the left, which connects with the second section. A long and rather broad room is then entered by going straight ahead over

Figure 12
Crooked Swamp Cave #2-3-7—Crawlway
(Photo courtesy of Bell Telephone Laboratories, Inc.)

fallen rocks. This room has several side passages. One of them goes around an island while another, to the left, gives a view of a fairly large passage which might considerably extend the size of the cave, but which cannot be entered. The cave also continues beyond the end of the long room, but the passage is obstructed by a large rock. The cave system is in the Allentown Dolomite.[3,33,59,63]

Crooked Swamp Cave #4 (*Wolfe Cave*) *41°07.3'N;74°39.5'W, 560, Newton East Quadrangle, PR, Carl Kadi*

This cave, according to legend, was the home of a family named Wolfe, which would be impossible since the cave is only a one-foot by two-foot by twenty-foot passage in the Allentown Formation.[3,40]

Crooked Swamp Cave #5 *41°07.3'N;74°39.5'W, 560, Newton East Quadrangle, PR, Carl Kadi*

This is a fissure cave about 50 feet long which has three entrances. It is in the Allentown Dolomite.[3,40]

Crooked Swamp Cave #6 *41°07.2'N;74°39.5'W, 560, Newton East Quadrangle, PR, Carl Kadi*

Located between Caves #4 and #5 is a low bedding plane passage at swamp level; and a few feet further to the north is a narrow fissure passage about 20 feet long. Both are in the Allentown Formation.[3,40]

Crooked Swamp Cave #8 *41°07.3'N;74°39.6'W, 560, Newton East Quadrangle, PR, Carl Kadi*

Cave #8 is located above Caves #2-3-7 and it appears to be a remnant of an earlier phase of cave development in the area. It is about four feet high and 20 feet long and is in the Allentown Dolomite.[3,40]

Devil's Hole (*Devil's Den*) *41°02.8'N;74°45.9'W, 680, Newton West Quadrangle, S, PR*

Devil's Hole or *Devil's Den* (Plate 4) located half a mile southwest of Newton is on a farm formerly owned by Mr. Frank Douma. In structure it appears to follow the bedding planes of the rock, but because of extensive breakdown it is difficult to determine the original shape of the passage. Because of much loose rock and the unstable condition of the ceiling, the cave in places is somewhat dangerous. In 1955, a caver was pinned in a crawlway when a breakdown block suddenly shifted its position; it was necessary to use automobile jacks to raise the block and free him. The cave lies at the bottom of a hill where two farm fields converge, and as a result much mud has washed in, filling any side extensions, covering the floor and rendering the entire cave quite slippery. There are a few small stalactites but no other speleothems. However, there usually are a number of bats on the ceiling.

The cave entrance is quite small and is frequently blocked by mud and dirt. It opens at the bottom of a sinkhole and leads down a slide to the left and through a tight spot into the entrance room. Breakdown at the entrance to a room 105 feet long and 40 feet wide, with a ceiling ranging from two to ten feet high, can either be crawled over or ducked under. There are crawlways under shelves on both sides of the room at the far end. A second large room can be entered beyond a constriction. Both rooms have a high ridge of mud-covered debris down the center. On the right side of the second room there is a pool of water under a large rock shelf; at times, water fills the entire rear portion of the cave. Passages over or under the rock shelf lead to two passages that soon become too small for further exploration. At the end of the second room a passage on the left leads off for about twenty feet. A legend about the cave says that it continues for a mile. Like most legends about the size of caves, this one is greatly exaggerated; there are no negotiable passages in any direction from the cave. This is the largest known cave in New Jersey developed in the Jacksonburg Limestone.[4,18,35]

Edsall Indian Cave *41°08.8'N;74°36'W, 580, Hamburg Quadrangle, PR, Carlton Village*

Edsall Indian Cave is located half a mile north of North Church in the top of a small hill. It is a small cave-like rock shelter, seven feet by five feet by five feet. There is a large spring at the base of the hill directly in front of the cave. Both cave and spring are in the Allentown Dolomite.[39,66]

Emerald Cave *41°10.7'N;74°32.1'W, 520, Hamburg Quadrangle, PR, Jos. S. Fredricks*

Emerald Cave is located on the north side of a small bluff, about 150 yards southwest of the McAfee-Vernon Road, a quarter of a mile from McAfee. The cave is very small; the two divided passages can be negotiated in about ten minutes.

It has been rumored that the cave contains a room with a pool of emerald-colored water. The cave is in the Franklin Marble.[18,36]

Farber's Drowned Cave *41°08.3'N;74°34.7'W, 480, Hamburg Quadrangle, Fl, PR, Clyde Farber*

Farber's Cave is a completely flooded cave in a stream bed near Paulison's Sinks. Scuba exploration revealed that the passage is blocked a few feet under water. It is in the Leithsville Formation.[40,41]

Fasolo's Cave *41°06.7'N;74°34.3'W, 680, Franklin Quadrangle, PR, S. Fasolo*

***Figure 13**—Fasolo's Cave—Ceiling Pendant (Photo courtesy of Richard Anderson)*

Fasolo's Cave (Plate 5) is located east of the power line crossing the Fasolo's farm on Route 23 southeast of Franklin. During the winter and spring, water from a nearby marsh, floods the front of the cave, and a very small stream meanders along the floor in the rear of the cave. However, it is obvious from its structure, a maze of passages under the surface of a small hill, that it was not developed by stream erosion. Instead, it appears to have been excavated below the level of an ancient water table, before glaciation and other erosion.

There are at least eight connections with the outside, although only one is large enough to permit access. The walls and floor in the first half of the cave are smooth, polished and white in color and many interesting shapes have been developed by random solution (Fig. 13) such as a "peephole" a few inches in diameter which pierces a thin partition.

Near the entrance of the cave is a "cave within a cave" in the shape of an arch. Another arch, somewhat resembling a modernistic sculpture, can be found further down the main passage on the left hand side. This section of the cave is dimly lighted by a number of connections with the surface. Toward the rear, the passage divides and subdivides and the walls become rougher, and the floor is of sand and dirt instead of bare limestone. At the far end, the passages become increasingly constricted; finally, the passage is blocked by a mining prospect trench on the surface. The cave is formed in the Franklin Marble within a hundred feet of its contact with the Byram gneiss.[4,8,21,22]

Fisher's Cavelets *41°04.6'N;74°40.7'W, Newton East Quadrangle*

There are several small caves located one mile north of Lime Crest Quarry in the Epler Formation.[19]

Ford Dennis Cave *41°15.8'N;74°32.8'W, 440, Unionville Quadrangle, PR, Ford Dennis*

On the property of Ford Dennis at Owens Station a cave was opened at the base of a sinkhole. The entrance is a sixteen-foot deep fissure, at the base of which is a chamber six by eleven feet in size. It is in the Epler Formation.[40,41]

Ford Dennis Fissure *41°15.8'N;74°32.8'W, Unionville Quadrangle, PR, Ford Dennis*

Ford Dennis Fissure, a small fissure passage, is located 300 feet south of Ford Dennis Cave.[43,44]

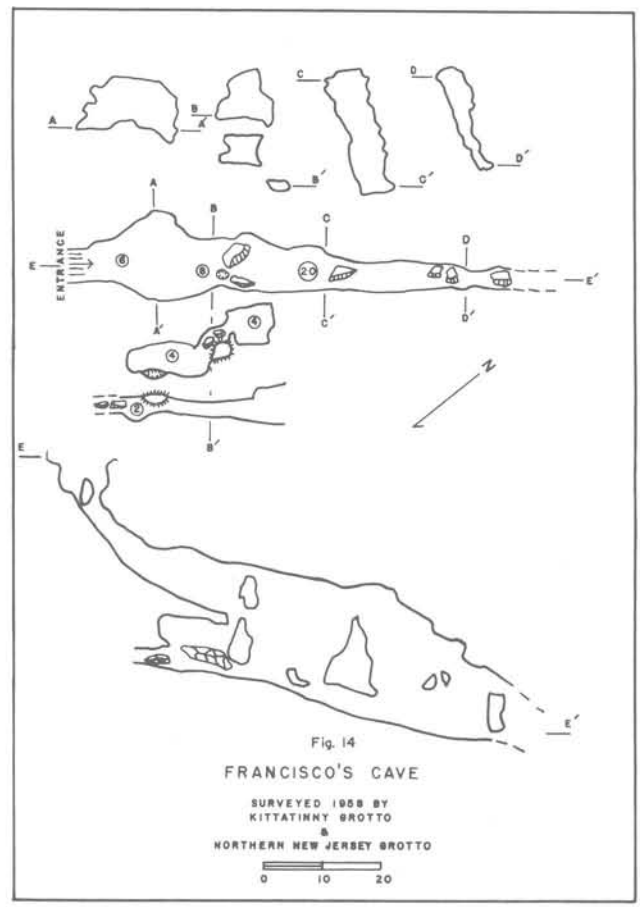
Fox Den-Fasolo *41°06.7'N;74°34.4'W, 670, Franklin Quadrangle, PR, S. Fasolo*

Fox Den is a very small cave a hundred yards west of Fasolo's Cave. It is in the Franklin Marble.[19]

Fox Den-Post *41°08'N;74°39.5'W, Branchville Quadrangle, PR, Mr. Post*

This is a very small cave on the Post farm two and a half miles northeast of Lafayette. It is in the Epler Formation.[40]

Francisco's Cave *40°59.3'N;74°45'W, 660, Stanhope Quadrangle, C, F. Francisco & Sons*



This cave, (Fig. 14) on the property of the Lackawanna Dairy Farm, half a mile west of Andover, is entered through an old sinkhole. The first section of the floor consists of a talus slope which has buried the cave's extension back under the entrance. The cave, for the most part, follows a fracture which cuts across the bedding plane at a sharp angle.

Speleothems are much in evidence; fluted flowstone covers much of the walls above the talus slope. Popcorn is abundant and in a crevice about 40 feet from the entrance, there is a fluted column in the form of an organ pipe cluster. Many of the stalactites and curtains that formerly existed in the cave have been vandalized. The section under the talus slope has several small columns, very attractive curtains and one stubby, but well-formed stalagmite. The cave is in the Leithsville Formation.[39,51]

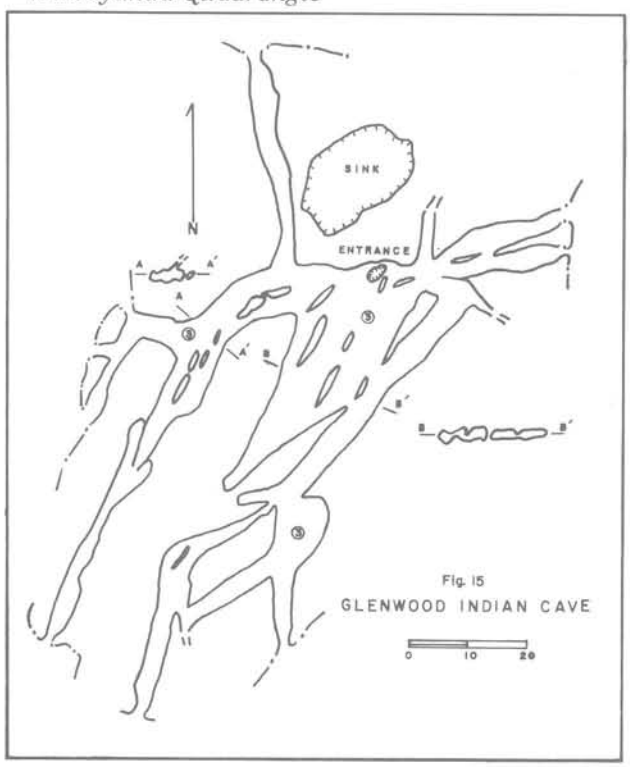
Franklin Mine Cave *Franklin Quadrangle, D*

A small cave discovered during mining operations at the Franklin zinc mine. The cave which contained massive flowstone was in the Franklin Marble.

Glenwood Cave *41°15.1'N;74°28.3'W, 465, Pine Island Quadrangle, S*

Glenwood Cave is a deep shelter cave extending under Route 565 at Glenwood. A small stream flows from a low passage at the rear of the shelter. It is formed in the Franklin Marble.[40,43]

Glenwood Indian Cave *41°14.9'N;74°28.3'W, 390, Wawayanda Quadrangle*



Glenwood Indian Cave (Fig. 15) is in a small hill rising out of a flat, grassy marsh, a quarter of a mile west of Route 517 at Glenwood. The hill is about 150 feet in diameter and 15 feet high.

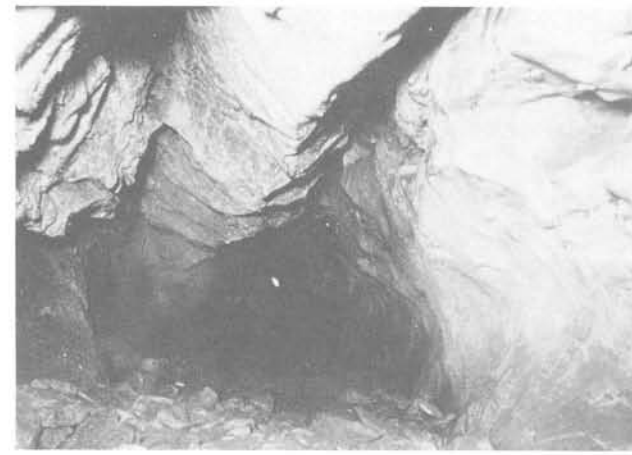


Figure 16—*Glenwood Indian Cave Passage showing breakdown (Photo courtesy of Richard Anderson)*

There are six openings, one on the top of the hill and the rest on its periphery which lead into a maze of crawlways 300 feet long. The walls contain many of the common accessory minerals found in the Franklin Marble.[43,58]

High Point Rock Shelter *41°19'N;74°40'W, Port Jervis South Quadrangle, State of New Jersey*

There is a small rock shelter located just off of the Appalachian Trail at High Point. It is in the Shawangunk Conglomerate.[19]

Indian Caves *41°03.4'N;74°40.8'W, Newton East Quadrangle*

The Indian Caves east of Lime Crest Quarry are mine adits.[39]

Indian House Rocks *41°06.9'N;74°54.4'W, 1300, Flatbrookville Quadrangle*

Indian House Rocks (Fig. 17) is a fracture cave and rock shelter, formed in the Shawangunk Conglomerate. It is located high on the main ridge of Kittatinny Mountain, half a mile west of Harding Lake and three miles from Flatbrookville. The shelter portion of the cave is about 50 feet wide, 20 feet deep, and 10 feet high. A series of fissure passages, about a hundred feet long, lead from the back of the shelter. The fissure passages can also be entered through a small entrance on top of the hill.[40,42]

Inslee Cave *41°01.7'N;74°55.2'W, 620, Newton West Quadrangle, PR, Tom Inslee*

Inslee Cave is located on the Windy Brow farm, two miles southwest of Newton. It is in a ledge ten feet above the ground near one of the Muckshaw Ponds. The entrance is three feet wide and four and one-half feet high, and the cave is about 20 feet long. The cave is formed in the Epler Formation.[47]

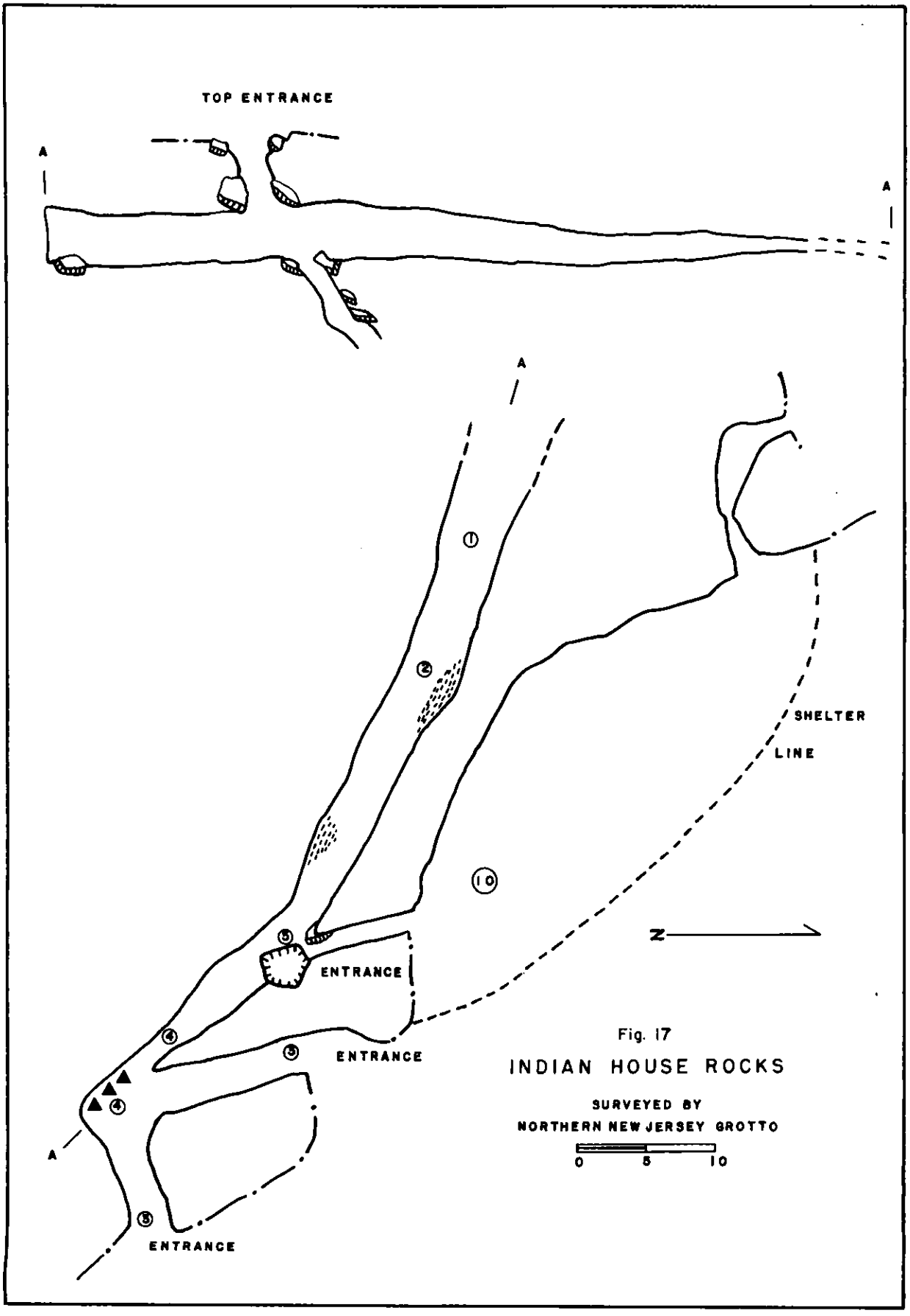


Fig. 17

INDIAN HOUSE ROCKS

SURVEYED BY

NORTHERN NEW JERSEY GROTTO

0 5 10

Kerreganot-Wormscrew Cave System
41°10.8'N;74°32.3'W, 500, Hamburg Quadrangle, C, Playboy Club

These two caves (Fig. 18) are located on the west side of the limestone quarry just north of McAfee. Before quarrying operations, they may have been part of a single large cave extending as far as a small hole (Arch Roof Cave) in the opposite side of the quarry. At present, their entrances are only ten feet apart; a few feet inside, the caves are connected by a crawlway too small to enter. Kerreganot, with its single long passage, was probably once a watercourse; Wormscrew, with its pit, fissures, and offset passages, has had a more complex history.

Kerreganot is a long, almost straight passage that dips at an angle of about forty degrees. Two-thirds of the way down it is necessary to crawl over a large rock that partially blocks the passage. Most of the passage is of walkable height, but it ends abruptly in a plug which was reported to consist of glacial debris. This material is slowly being washed further into the system, exposing extensions of the passage. There are some attractive helictites near the lower end of the passage.

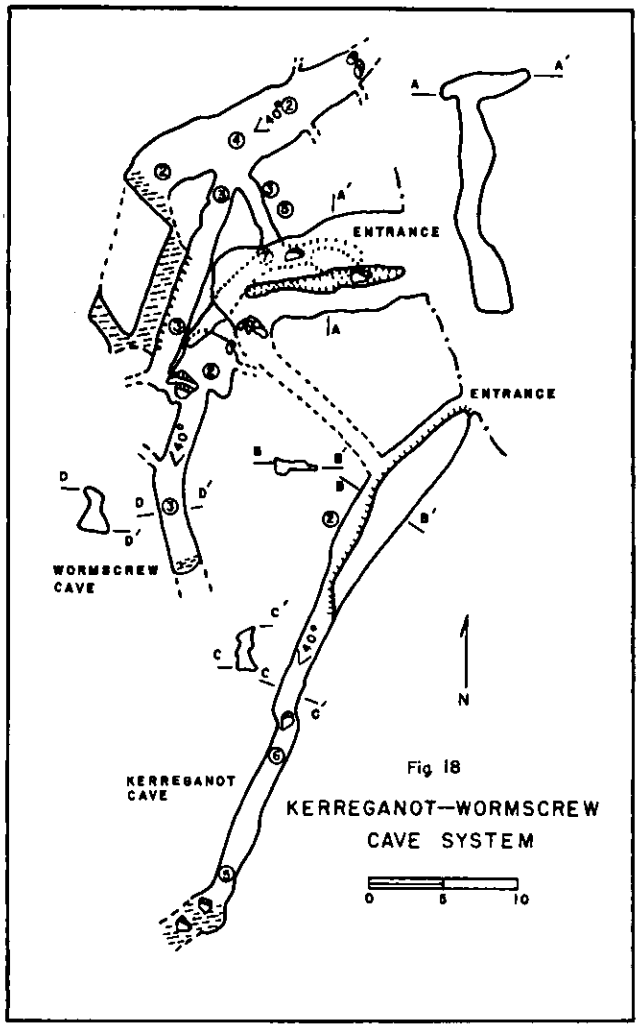


Fig. 18
KERREGANOT—WORMSCREW CAVE SYSTEM

Wormscrew is entered by dropping through a narrow fissure set back in the quarry wall. Rope is advisable to help descend the twenty-foot pit underneath the fissure. At the far end of a short passage, at the bottom of the pit, there are a few small stalactites and some flowstone. From the same passage, the wormscrew crawlway leads off to the right and intersects a room that is blocked by both ends. A side passage to the left leads down twenty-five feet through an offset into a fissure parallel to and at the same angle as Kerreganot. The end of this passage is blocked by similar fill that also is being slowly washed away. The cave system is near a major fault in the Franklin Marble.[36,40,41,44,45]

Lake Mohawk Cave *41°00.4'N;74°41.1'W, 780, Newton East Quadrangle, S, E. Clause*

Lake Mohawk Cave (Plate 6) is located at the southwestern end of Lake Mohawk, about fifty feet west of the road running along the lake shore. It was formerly used as a water supply for nearby cottages. The ten-foot-deep entrance pit is now covered by a cinder block and cement shelter to protect against curious children. However, now the entrance has been blocked with fill.

The cave consists of a single straight passage entered near its midpoint. At the base of the pit is a dam and the remains of the water storage and pumping system. The lake behind the dam is two feet deep, but after sixty feet the floor rises and the passage becomes a muddy crawlway to the far end. This section contains numerous water-filled potholes and other evidence of stream erosion. In some places gleaming white calcite can be seen. Down stream from the dam are a number of dry but quite constricted crawlways which extend about 100 feet. Total length of the cave is about 360 feet. The cave is formed in the Franklin Marble.[42,62,65]

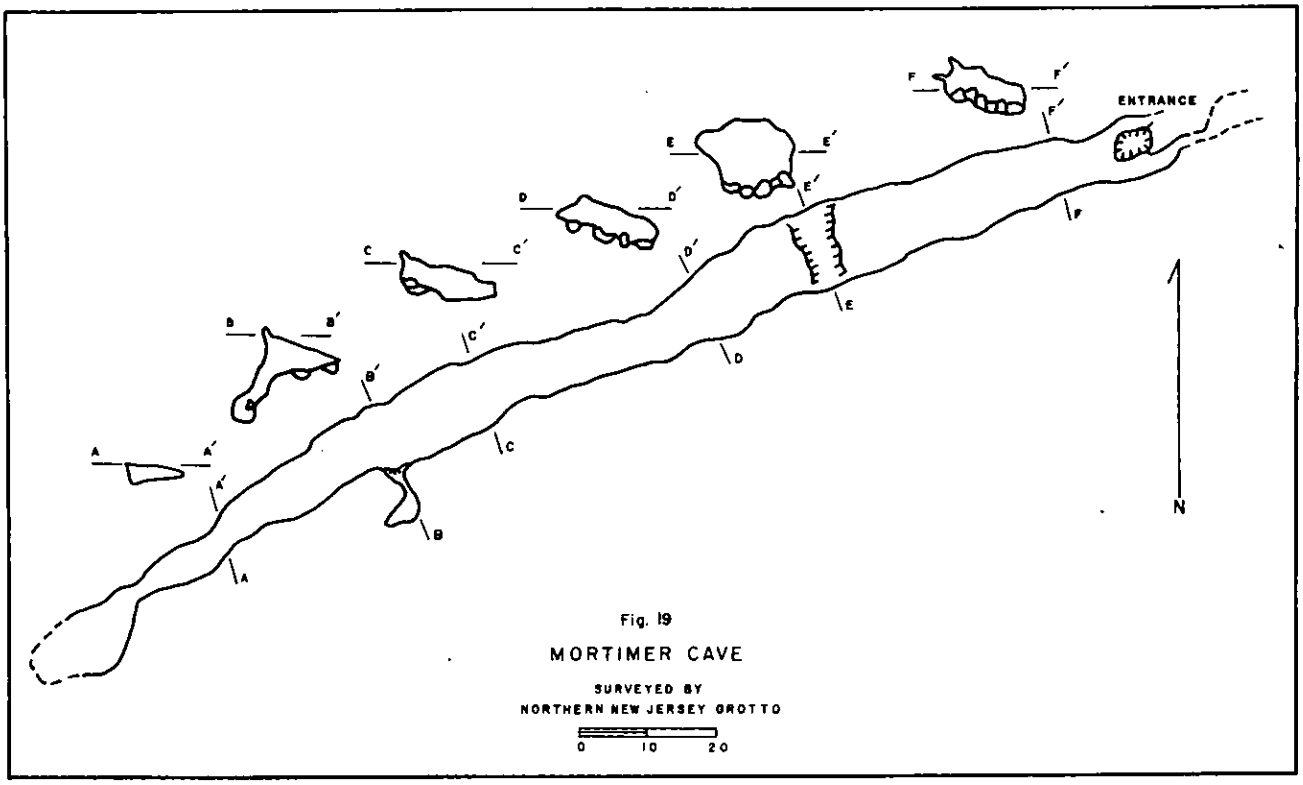
Lime Crest Caves *Newton East Quadrangle, S, D, Lime Crest Quarry*

Two caves were opened up during quarrying at the Lime Crest Quarry. The first cave, about 200 feet long, located at the north end of the quarry, has been quarried away. The second cave was opened and closed in the winter of 1963-64. Both caves were in the Franklin Marble.[69]

Moody's Rock *41°01.5'N;74°46.7'W, 600, Newton West Quadrangle, PR, Tom Inslee*

According to legend, this large rock shelter on the southern edge of one of the Muckshaw Ponds south of Newton once had a passage leading to Devil's Hole (Den) a mile away. The Tory outlaw, James Moody, is said to have used this rock shelter as his headquarters during the Revolutionary War. Many Indian artifacts have been found at this spot, which is an overhanging cliff of Allentown Dolomite.[7,74]

Mortimer's Cave *41°19.7'N;74°43.4'W, 730, Port Jervis South Quadrangle, PR, Mr. Mortimer*



Mortimer's Cave (Fig. 19) is located under a hilltop meadow three miles northeast of Montague, on the Westfall farm owned by Mr. C. Mortimer. It consists of a straight and level crawlway about 170 feet long, only a few feet below the surface of the meadow. About 115 feet from the entrance there is a twenty-foot side passage to the left. The far end of the main crawlway is quite tight. A small amount of flowstone has been deposited on one wall. The cave is in the Coeymans Formation.[37]

Newton Sheep Rock *41°03.2'N;74°45.1'W, Newton West Quadrangle*

This is a small rock shelter located in the Newton Cemetery. It has yielded Indian artifacts. The rock type here is the Epler Dolomite.[74]

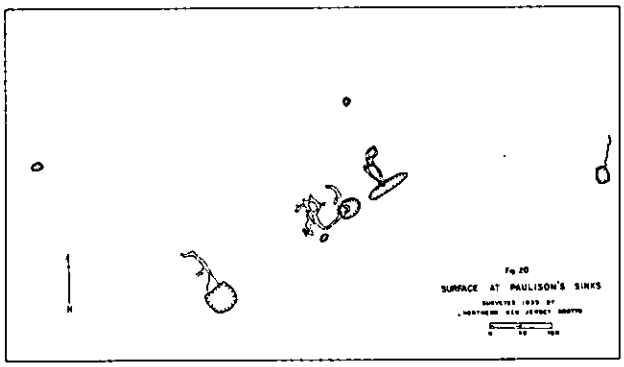
Owens Cave (*Rock Shelter*) *41°15.8'N;74°32.9'W, 410, Unionville Quadrangle, PR, Ford Dennis*

A cave noted for its rich supply of Indian artifacts is located one mile west of Owens. It is a true cave about 14 feet long, in the Epler Dolomite.[43,44,74]

Papakating Cave *41°12'N;74°35.3'W, 460, Hamburg Quadrangle, PR, Joseph Todd*

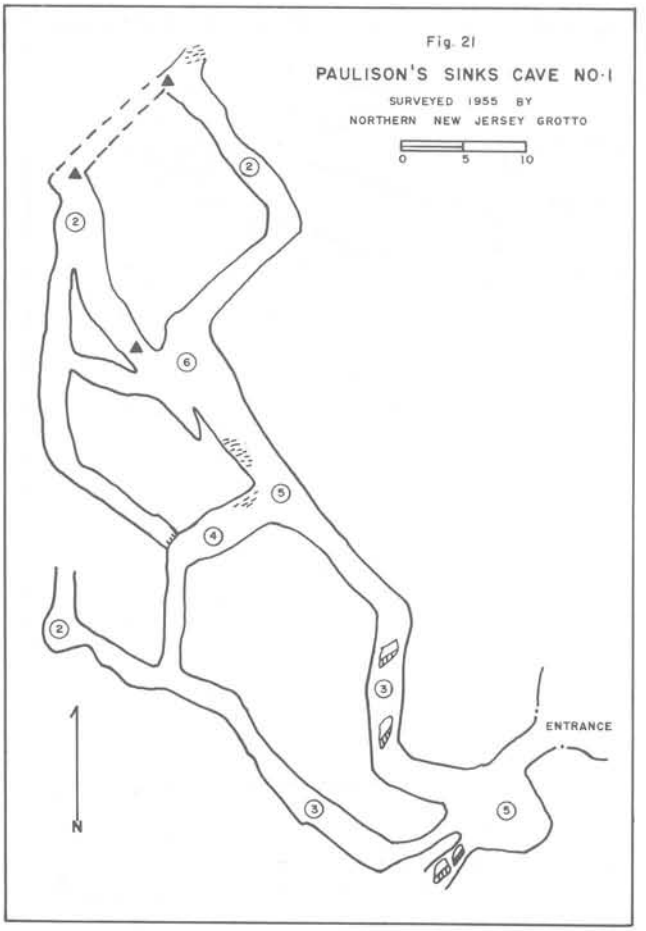
Papakating Cave is a shallow fracture cave located on the northwest side of an eighty-foot hill on the farm of Joseph Todd south of Sussex. The cave is about ten feet long and five feet high; a passage at the back leads to the left for ten feet, but is choked with breakdown. An Indian skeleton was found here. This cave is in the Epler Formation.[13,14,74]

Paulison's Sinks Cave #1 *41°07.8'N;74°35.3'W, 610, Hamburg Quadrangle, PR, Floyd Paulison*



This cave (Figs. 20, 21) is located on the Floyd Paulison farm; half a mile northwest of Franklin off the North Church Road. Many years ago, Mr. Paulison cut down trees in one of his fields; several sinkholes developed after the stumps and roots had decayed. In 1954 excavation at the bottom of the largest sinkhole (15 feet wide and 60 feet long) resulted in the discovery of a cave. (Fig. 22) The entrance had been blocked by glacial drift.

The cave consists of a main passage about 50 feet long; near the far end, a smaller passage branches off to the left for 30 feet. At the end of the main passage, there are a number of constricted crawlways. The cave has a total of over 200 feet of passages. It is in the Allentown Dolomite.[38,39,41,46]



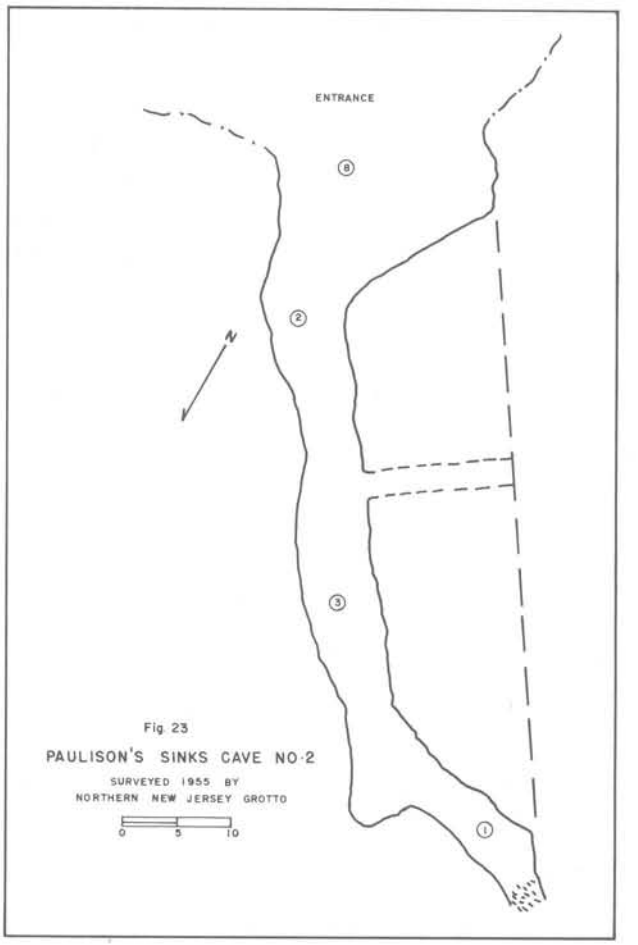


Figure 22
Paulison's Sinks Cave #1—Sinkhole Entrance (Photo courtesy of Richard Anderson)

Paulison's Sinks Cave #2 *41°07.7'N;74°35.3'W, 610, Hamburg Quadrangle, PR, Floyd Paulison*

Cave #2 (Fig. 23) is located in a deep circular sink 325 feet southwest of Paulison's Sinks Cave #1. It was opened in excavation in 1955, and consisted of a wide room nearly filled with glacial drift. Seventy feet of passages were cleared out before the entrance was closed by torrential rains accompanying a hurricane that summer.[41]

Paulison's Sinks Cave #3 (*Key Hole Cave*) *41°07.7'N;74°35.4'W, 610, Hamburg Quadrangle, PR, Floyd Paulison*

Paulison's Sinks Cave #3 (Fig. 24) was discovered in 1955 by removing 18 feet of glacial drift from a circular sinkhole 75 feet southwest of Paulison's Sinks Cave #1. This cave has nearly 500 feet of passages, many of which had to be cleared of sand and stones. Many passages can be seen to continue and their connections with others can be inferred from surveying, but they have not yet been cleared of glacial debris. The cave is a network of intersecting and connecting passages. In the lowest part of the cave, an active stream can be heard on the other side of four passages terminating in debris. The name of the cave derives from the rather distinctive profile of the main passage. The key hole shape (Fig. 25) was formed when glacial debris filled the original passages and the water dissolved new channels on

Fig. 24

PAULISON'S SINKS CAVE NO·3

SURVEYED 1955 BY
NORTHERN NEW JERSEY GROTTO

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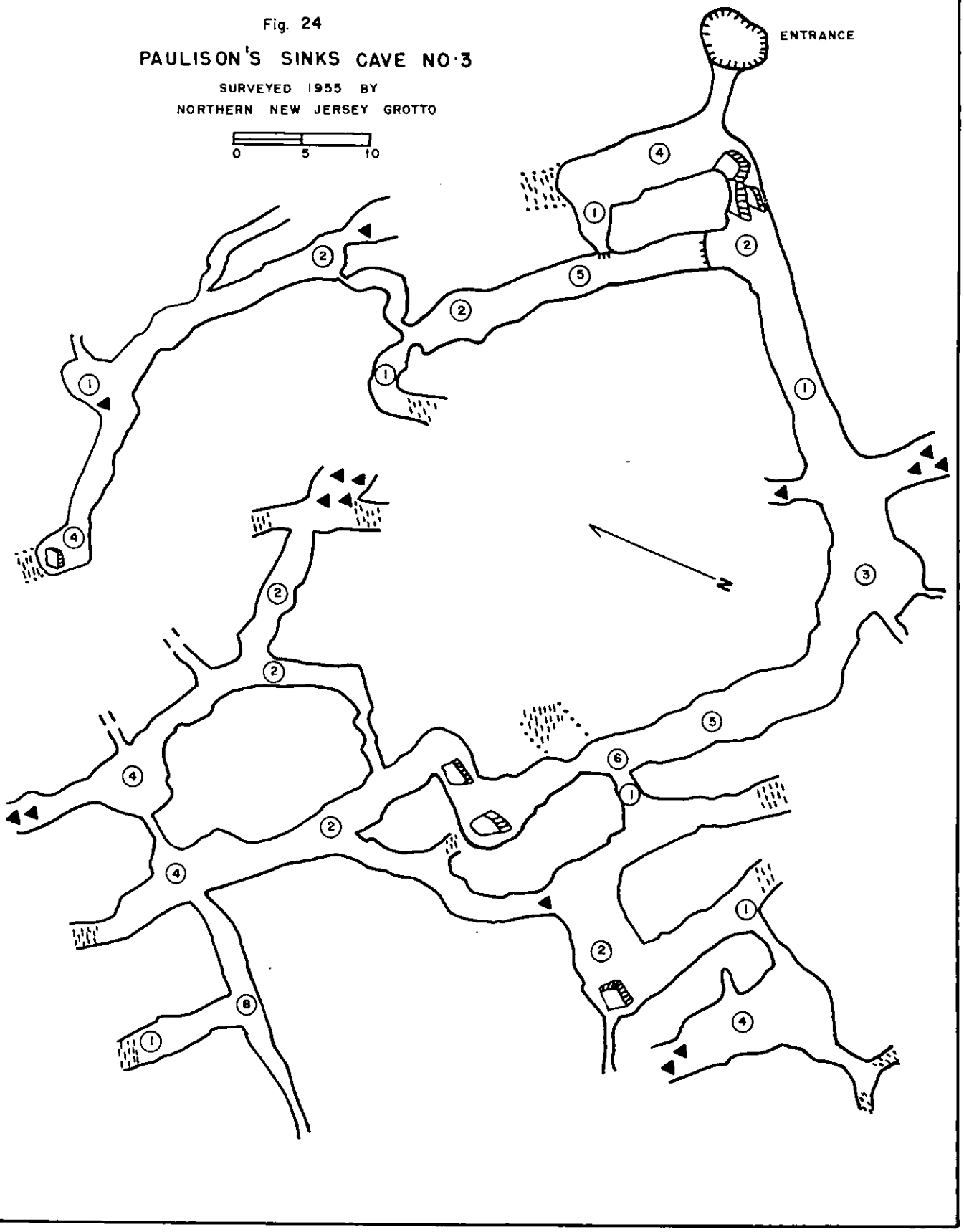


top of the original passages. In addition to the key hole shape, there are many interesting solutional features along the ceiling, but few speleothems are present.

This is a cave in which a map is recommended for the inexperienced. It is quite easy to become confused, particularly in locating the entrance passage. There are only two places where it is possible to stand upright; crawling on hands and knees is necessary in most passages.

A few bats have been seen in the cave, but otherwise there is very little cave life present. Collapse of the sinkhole sides frequently blocked the entrance to the cave. To alleviate this condition, an entrance tube consisting of several oil drums (with the ends removed) welded together was installed in the sinkhole in 1964. The cave is in the Allentown Dolomite; both cave and dolomite dip to the northwest at about 30°.[4,23,41,45,46,67,68,71]

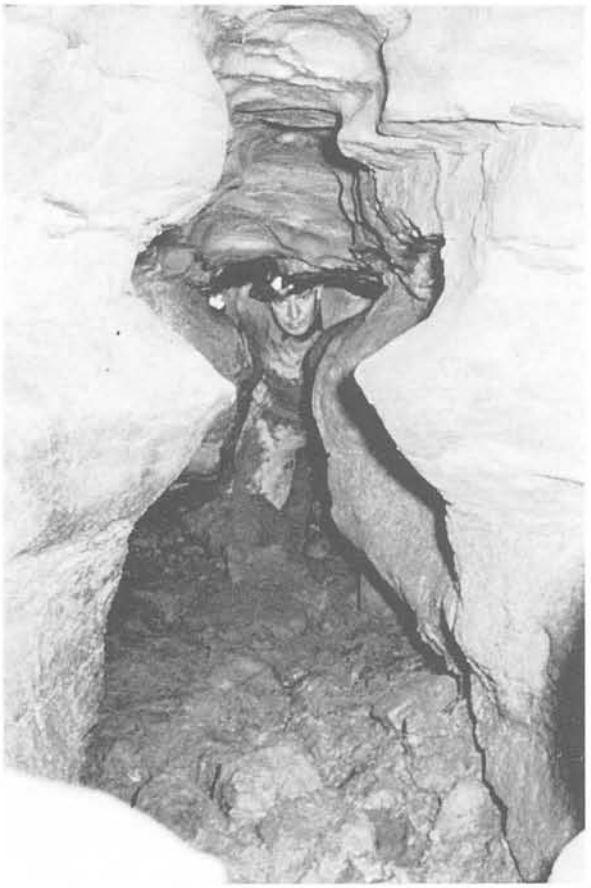


Figure 25
Paulison's Sinks Cave #3—Keyhole Passage
(Photo courtesy of Richard Anderson)

Pipsqueak Cave *41°10.9'N;74°32.3'W, 560, Hamburg Quadrangle, C, Playboy Club*

Pipsqueak Cave is a very small cave in the limestone quarry just north of McAfee, 200 yards north of the Kerreganot-Wormscrew Cave system. It is formed in the Franklin Marble.[2]

Post Cave *41°07.7'N;74°39.7'W, 570, Branchville Quadrangle, PR, Mr. Post*

Post Cave is located in a small hill two miles northeast of Lafayette, on the west side of the road. It has two entrances about 75 feet apart, one on each side of the hill. A stream enters the southeast one. Each entrance is about 30 inches high and 18 inches wide. The northwest entrance is impassable; the southeast one can be penetrated for about ten feet. The cave is formed in the Epler Formation.[3,40]

Post Hole (*Snover's Cave?*) *41°07.5'N;74°39.2'W, 560, Newton East Quadrangle, PR, Mr. Post*

This cave is located a third of a mile northwest of the Crooked Swamp Caves. It has a sloping entrance into a room 25 feet long, 15 feet wide, and up to seven feet high. Several passages leave this room, but are too small to be entered. The cave is formed in the Allentown Formation.[3,39,40]

Rocky Ledge Cave *40°59.3'N;74°44.9'W, 620, Tranquility Quadrangle, PR, R. Shotwell*

Rocky Ledge Cave is on the farm of Ralph Shotwell, half a mile northeast of Swimming Pool Cave. The cave is three to four feet in width and 55 feet in length. Many interesting leads exist on the right side and at the back, but further progress is blocked by a large rock in the middle of the passage. Some flowstone can be found. The cave is a solution channel in the Rickenbach Formation, which follows the dip of the bedding; about 30° to the northwest.[13,27]

Roseville Cave *42°42.2'N;74°58.1'W, Stanhope Quadrangle*

This cave is located a half a mile east of the Roseville Tunnel of the Erie-Lackawanna Railroad; 700 feet north of and 100 feet higher than the tracks. It is a solution channel 30 feet long in the Franklin Marble.[69]

Shotwell Cave *40°59.7'N;74°49.7'W, 620, Tranquility Quadrangle, PR, R. Shotwell*

Shotwell Cave is located 100 yards north of Swimming Pool Cave, at the south end of a fifty-foot deep sinkhole next to the road. The cave, just above the water level of a large pool, is developed for about 40 feet in a fissure, parallel to the cliff face. It is formed in the Rickenbach Formation.[11,27]

Sterling Hill Mine Caves *Franklin Quadrangle, D, New Jersey Zinc Co.*

Several caves have been intersected during mining operations at the Sterling Hill Zinc Mine. Two were found on the fifty-foot level, one on the 450-foot level, and one on the 600-foot level. These cavities were in the Franklin Marble and contained speleothems.[48]

Stillwater Cave #1 (*Dead Man's Cave*) *41°01.5'N;74°52.3'W, 540, Newton West Quadrangle*

Dead Man's Cave is located about 70 yards up the

gulley from Devil's Cave (see below). It is a short crawlway with a small surface opening at the far end. The cave is formed in the Epler Dolomite.[38,74]

Stillwater Cave #2 (*Devil's Cave*)
41°01.6'N;74°52.2'W, 540, Newton West Quadrangle

Devil's Cave is half a mile southeast of Stillwater, about 300 yards from the road up a narrow gulley. The entrance is a slit about six feet high which opens into a large room. The passage continues on the far side, but it is blocked with breakdown. Light penetrates from several openings in the ceiling. This cave is formed in the Epler Dolomite.[38]

Stillwater Cave #3 (*Talus Cave*)
41°01.7'N;74°52.2'W, 540, Newton West Quadrangle

Talus Cave is a series of openings in the next gulley along the road from Devil's Cave. It is formed in the Epler Dolomite.[38]

Stillwater Cave #4 (*Twist Cave*)
41°01.5'N;74°52.3'W, 540, Newton West Quadrangle

Twist Cave is about 70 yards up the gulley from Dead Man's Cave. The entrance is a horizontal slit which curves down and around to a room. It is formed in the Epler Dolomite.[38]

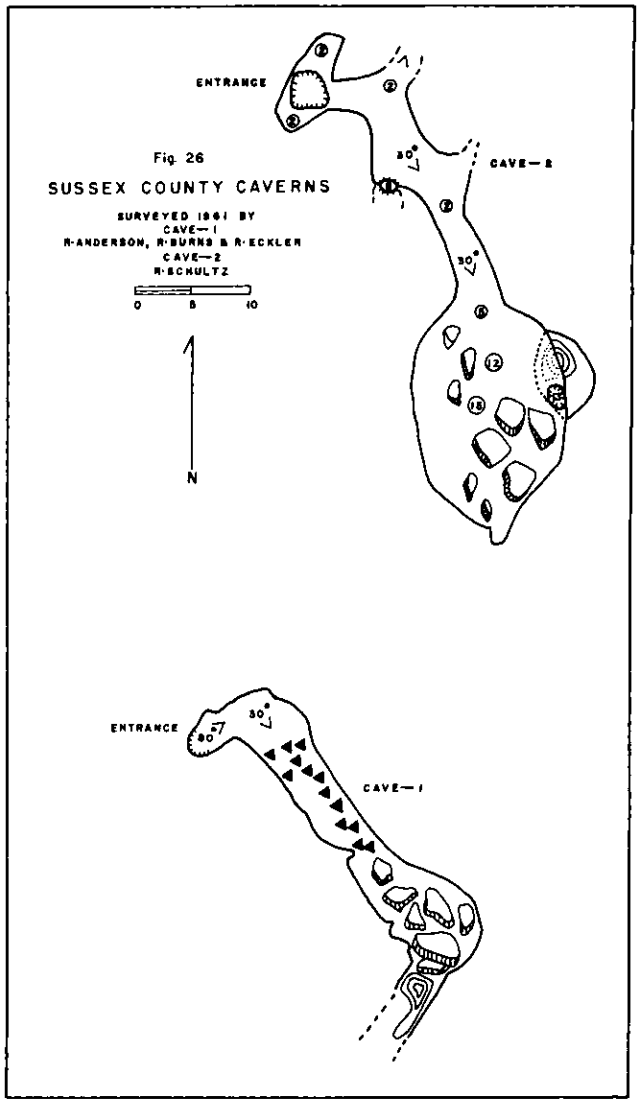
Sussex County Caverns #1 *41°00.6'N;74°45.3'W, 590, Newton West Quadrangle, C, County of Sussex*

Sussex County Caverns #1 (Fig. 26) was opened in July of 1961 when about 25 feet of a limestone cliff was blasted away to make room for a new building at the Sussex County Road Camp on Route 206 a mile north of Andover. The entrance is about three feet in diameter. After a vertical drop of five feet, the cave consists of a rubble-floored passage leading downward for 40 feet to the water table. The cave contained several stalactites, draperies hanging from the ceiling, and one small column. Most of these were vandalized shortly after the *Newark Evening News* described the discovery. Later, a drain from the garage roof was constructed into the cave entrance. The cave is in the Allentown Formation.[4]

Sussex County Caverns #2 *41°00.6'N;74°45.3'W, 590, Newton West Quadrangle, C, County of Sussex*

This cave (Fig. 26) is located about 50 feet north of Sussex County Caverns #1; it was opened by excavation in October of 1961. A constricted vertical entrance pit about seven feet deep leads to a crawlway going down at a 30° angle for about twenty feet. This passage opens into a room twelve feet wide, twenty feet long, and up to fifteen feet high. At one side of the room a thirteen-foot-deep pit was found leading down to a pool.

A number of speleothems were noted on the initial exploration. Many formations had a reddish-brown



color which was slightly fluorescent yellow and blue, and strongly phosphorescent green. Most of the flowstone consisted of toothed curtains adhering to the breakdown of the floor. Later these formations were vandalized. A drain from the garage roof was constructed into this cave, which is also in the Allentown Dolomite.[15]

Swimming Pool Cave *40°59.7'N;74°49.7'W, 600, Tranquility Quadrangle, Fl, PR, Mrs. Collins*

This cave (Plate 7) is located three miles northeast of Johnsonburg near Shotwell Cave. An artificial pond is directly below the entrance; the water completely floods the cave except during periods of exceptional drought (as in late Fall of 1957 and 1963). The cave is both geologically and biologically interesting. Quartz crystals were once found here in considerable numbers and the twilight zone of the cave has an exceptionally rich fauna—several species of salamanders, beetles, water striders, small crustaceans, frogs, spiders, and cave crickets. This cave, which is in the Rickenbach Formation, has 400 feet of passages.[25,27,59,65,67]

Figure 27—Swimming Pool Cave—Ribbon Stalactites
(Photo courtesy of Richard Anderson)

Tanya's Cave *41°01.4'N;74°47.1'W, 610, Newton West Quadrangle, PR, Weddingham Farm*

Tanya's Cave is located in an outcropping on the north side of the road, one mile west of Springdale. It is about two feet high, ten feet wide, and ten feet long and is in the Allentown Formation.[1]

Terry's Pit *41°04'N;74°51.5'W, 690, Newton West Quadrangle*

Terry's Pit is a 40-foot deep pit which was opened up during a MAR weekend in April 1973. The entrance is through glacial boulders which fill the bottom of a large sinkhole.

The top part of the pit is a narrow fissure. About 10 feet below the surface the pit widens out to about 4 feet and is about 20 feet long. There is a boulder choke about 20 feet down that can be bypassed. The pit narrows to a very steeply dipping fissure for the last 10 feet. At the bottom is a small room with a stream. The stream flows down a narrow slot that is heading steeply toward the east.

The cave is formed in the Ontelaunee Formation, which dips toward the east in this area.

Todd Rock Shelter #1 *(Sussex Rock Shelter #1) 41°12.1'N;74°35.4'W, Hamburg Quadrangle, PR, Joseph Todd*

This is the largest of three shelters on the Joseph Todd farm located in the same hill as Papakating Cave. Along the southern slope of the hill are a series of limestone ledges tilting downward from the southwest or south overlooking a swampy pasture. The shelter is eight feet deep and 35 feet long. It is in the Epler Formation.[13]

Todd Rock Shelter #2 *(Sussex Rock Shelter #2) 41°12.1'N;74°35.4'W, Hamburg Quadrangle, PR, Joseph Todd*

The second largest rock shelter on the Joseph Todd farm; this is northwest of Papakating Cave. It is about four feet deep and 20 feet wide and ten feet high. The floor slopes steeply uphill at the southern end. This shelter is also in the Epler Formation.[13]

Tom Quick Cave *41°13.1'N;74°51.3'W, 540, Culvers Gap Quadrangle*

Tom Quick Cave is located above the bridge at Dingman's Ferry. The entrance is about two feet wide and 12 feet high, and the passage is 40 feet long. Legend states that it was once a hideout for Tom Quick, a famous Indian fighter of the 18th century. It is an enlarged joint opening in the Onondaga Limestone.[19]

Tom Quick Mine *41°19.7'N;74°45.6'W, Milford Quadrangle*

Tom Quick Mine is an abandoned mine located about three miles south of Vulture Cave. It is in the Onondaga Limestone.[19]

Van Syckle's Cave *41°06.2'N;74°34.2'W, 550, Unionville Quadrangle, PR, Wantage Township*

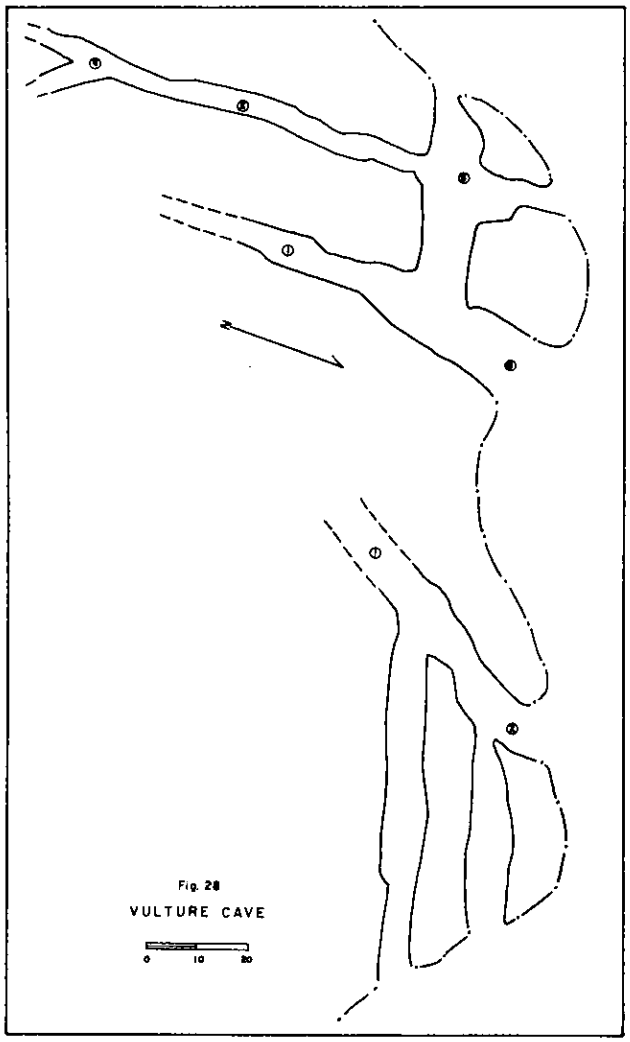
A quarter of a mile south of the farmhouse at Van Syckle's Crossing and a few hundred feet east of the former railroad right-of-way, a small stream flows into a hill. A few feet to the east, the cave begins as a crawlway. The first 25 feet are dry and partly illuminated from a hole in the roof. The next 35 feet consist of a series of crawls offset to the left until the underground stream is reached. Here, the rock walls are especially rough and snag clothing readily. Beyond this point, the floor is covered with at least six inches of water. During dry weather in June of 1957, the cave was explored perhaps fifty feet further and found to consist of a maze of interconnecting crawls and small rooms. A local resident reported that after a narrow squeeze one can stand upright and wade knee-deep to a point where the cave widens out. The stream resurges at a spring a mile away. Presently, leachate from a sanitary land fill flows into this cave, which is in the Epler Formation.[40,44]

Vulture Cave *41°20.3'N;74°44.3'W, 420, Port Jervis South Quadrangle, PR, J. Pantis*

Vulture Cave (Fig. 28) is on the east bank of the Delaware River, opposite Mashipacong Island. It is directly opposite a farmhouse on the Old Mine Road about two miles south of Port Jervis. Near river level, there are three entrances to the cave. In recent years, floods on the Delaware River have filled the cave passages with silt and they are impassable after fifty feet or so. The cave may have been used as a stop on the *Underground Railroad* during the Civil War. It is in the Onondaga Limestone.[37]

Warbasse Cave #1 *41°05.3'N;74°53.6'W, 650, Newton East Quadrangle, PR, J. Price*

Warbasse Cave is a rock shelter three miles northeast of Newton, in a hill on the north side of an old railroad roadbed. It is about 12 feet long, 10 feet deep, and 10 feet wide and has yielded many Indian artifacts. It is in the Epler Formation.[1,74]



Warbasse Cave #2 *41°05.3'N;74°53.6'W, 650, Newton East Quadrangle, PR, J. Price*

This cave is on the east side of the same hill as #1. It is about 10 feet long, 10 feet high, and 10 feet wide, with a mound of rock at the entrance so that the floor is about 5 feet below. It is formed on a small fault in the Epler Formation.

Wild Cat Rock *41°06.1'N;74°35.8'W, Franklin Quadrangle*

This large rock shelter is located one mile south of Franklin. It is about 25 feet long, 15 feet deep, and six feet high. Although its size and location is ideal, few Indian artifacts have been found. This shelter is in the Franklin Marble.[41]

OTHER CAVES

Cave (Swartswood Lake) *41°05'N;74°51'W, 640, Newton West Quadrangle*

About a mile south of Five Points, northwest of Swartswood Lake, there are many sinkholes. One, which is about 100 feet wide and 40 feet deep, has a large stream flowing into it. At times, there is an opening at the point the stream disappears and entrance can be gained into the cave.

This cave has been explored for about 100 feet to a pit. The cave is in the Epler Formation.

Caves *Stanhope Quadrangle*

At Cat Swamp, one and a half miles southeast of Cranberry Lake, there are five large rock shelters in granite.[69]

Cave (Peter Feather)

The following quotation was taken from *Glacieres, or Freezing Caverns,* by Edwin Balch, published by Allen, Lane and Scott (Philadelphia) in 1900:

> *Cave in Sussex County, New Jersey. A clipping from a newspaper, with neither name nor date, says that new ice is found daily on the land of Peter Feather, in the mouth of an unexplored cavern. A small stream of water runs out of the cavern and forms a pool at the opening, and here it is that the ice forms. Enough has been taken in one day to freeze two cans of ice cream. A cold drought of air issues continuously from the cavern.*[2]

A check of Sussex County land records failed to turn up anybody named Feather, nor was there any such name on a late nineteenth century map of the county showing the landowners of that time.[4]

Cave *41°06.2'N;74°53.2'W, 1090, Flatbrookville Quadrangle, PR, Mr. Van Horn*

The October 1951 issue of *New Jersey Recreation Development* mentioned a ravine on the Van Horn farm, a quarter mile north of Lake Kathryn, with holes which emit cold air and caves with ice-covered walls even in midsummer. This is a talus cave in the Shawangunk Conglomerate.[34]

Rock Shelter *Flatbrookville Quadrangle*

Silver Mist Cave is a rock shelter reported on Kittatinny Mountain above Flatbrookville.

Sinking Stream (Crooked Swamp) *Newton East Quadrangle, PR*

North of Post Hole is a stream which sinks under a ledge and flows into the hill. Its resurgence is not known. This area is underlain by the Allentown Formation.[3]

Sinking Stream (Harmonyvale)

41°08.9'N;74°38.4'W, 590, Branchville Quadrangle

About 1,000 feet northwest of Harmonyvale on the east side of a lake is a cave entrance. This entrance is about 10 feet lower than the lake surface and receives the outflow from it.

The resurgence is believed to be in the stream valley just south of Harmonyvale. The entrance to the cave is in the Epler Formation.

Sinking Stream (Huntsburg) *Newton West Quadrangle*

There is a stream on Route 519 which sinks under a ledge. There are several small openings nearby. The rock here is the Epler Formation.

Sinking Stream (Iliff's Pond) *Newton East Quadrangle*

On a dirt road, half a mile west of Iliff's Pond there is a stream which flows into a small hill. The entrance to the cave is blocked by loose rock. It is in the Epler Formation.

WARREN COUNTY

Bear Cave *40°59.3'N;74°59.1'W, 420, Blairstown Quadrangle*

Bear Cave is located on Bear Cave Road, two tenths of a mile north of its intersection with Route 94 west of Blairstown. The entrance to this cave is a tall crack clearly visible in the cliff to the west. A short distance inside, the floor climbs rather steeply to a cross passage at the back. The sharp turn and inadequate space make it impossible to enter this passage. The ceiling and upper walls to the rear of the cave are covered with cave crickets. The cave is in the Epler Formation.[30,39]

Betsey Cave *40°56.4'N;74°53.6'W, 600, Blairstown Quadrangle, PR, Y. Koban*

This is a small cave near Waterfield Cave, a mile south of Johnsonburg. It is in the Epler Formation.[1]

Bone Cave *40°54'N;74°55.2'W, 350, Portland Quadrangle, D*

Three-quarters of a mile north of Delaware, in the railroad right-of-way, a fissure was opened which contained many human bones. They were believed to be Indian remains, but no artifacts were found. The fissure was in the Martinsburg Shale.[74]

Carpentersville Caves *40°39'N;75°11.5'W, 200 and 230, Easton Quadrangle, PR, Houdaille Corp.*

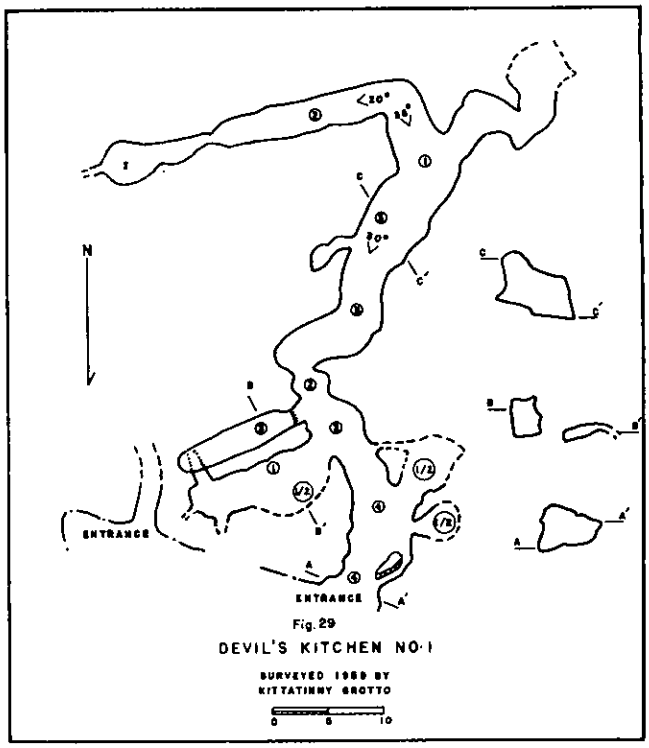
The caves are in an abandoned quarry at the back of the Houdaille sand and gravel pit at Carpentersville. Cave #1 has a small triangular entrance about three feet high, but soon opens up to over six feet high. This passage is about twenty feet long and divides into several low crawlways of unknown length.

The entrance to Cave #2 is 30 feet higher and to the right of Cave #1. The opening is a four foot wide and 15-foot-deep fracture caused by blasting. At the bottom there is a room about ten feet wide and 30 feet long. Two low crawlways of unknown length leave the far end of the room. These caves are in the Allentown Formation.

Davidson's Cave (*Lowell Cave*)
40°58.2'N;75°02.2'W, 360, Portland Quadrangle, PR, George Sappah

A cave on the farm formerly owned by Dallas Davidson, a half mile west of Walnut Valley, received much newspaper publicity when he tried to open it in September, 1954, with a steam shovel and pneumatic air hammer. A hole was excavated to a depth of 15 feet to a vertical fissure; this led down 15 feet to a room about ten feet square. There is a low water course on one side of the room; the passage is blocked by a lens of chert after 20 feet. The cave is in the Epler Formation.[4,42]

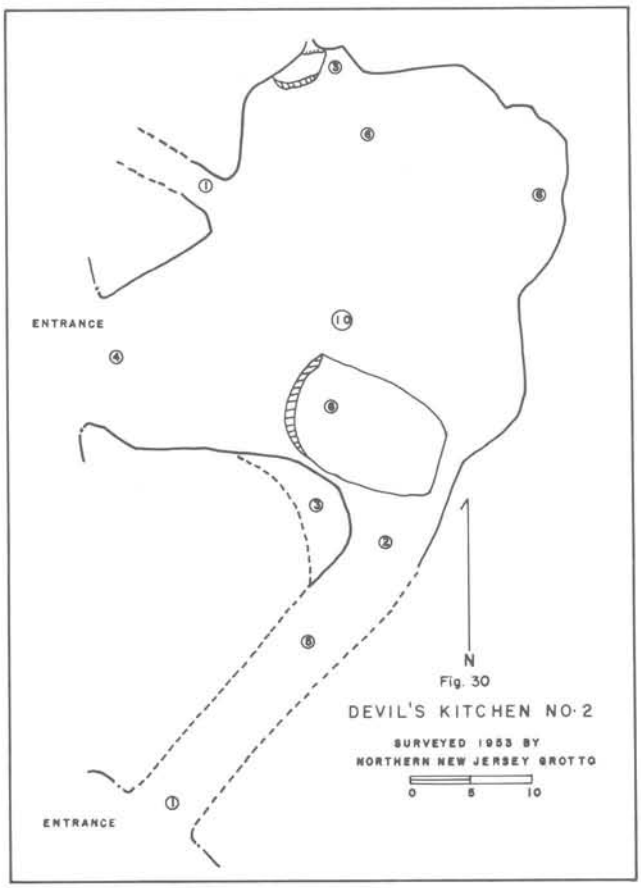
Devil's Kitchen #1 *40°57.8'N;75°55.2'W, 640, Blairstown Quadrangle*



The cave (Fig. 29) is approached by walking several hundred yards east along the Erie Lackawanna Railroad from its underpass at the Marksboro-Silver Lake Road. It can be found on a rocky point several hundred feet across a swampy area on the right. The entrance is about four feet high and five feet wide and there are about 130 feet of branchwork type passages in the cave, although most of it is less than four feet high. It contains cave coral, flowstone on the wall, and a column. Cave life included one small brown bat, a good many spiders and crickets, and a few daddy-long-legs; the cave is intermittently used by larger animals. Silt, containing an abundance of bones, covers all of the floor of the first section. Outside the entrance, many bones and shards and other relics of Indians have been excavated. The cave is formed in the Allentown Formation.[9]

Devil's Kitchen #2 *40°58.5'N;74°52.6'W, 610, Blairstown Quadrangle, PR, Van Horn Pony Farm*

About a half a mile north of the Johnsonburg Station on the Erie-Lackawanna Railroad, west of the road to Yellow Frame is a cave (Fig. 30) consisting of a room 40 feet long, 30 feet wide and five feet high. There is a second entrance which connects to the room by way of a very low crawlway. The walls of the cave contain an interesting example of differential



solution and deposition which outline a paleo-solution breccia. (Fig. 31) The rock here is highly fractured Epler Dolomite.[38]

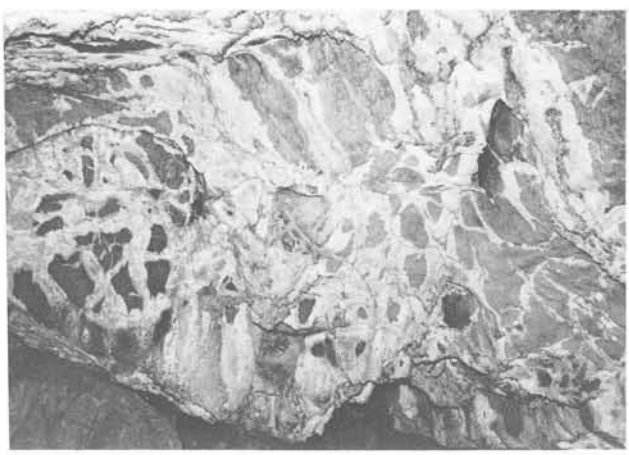


Figure 31
Devil's Kitchen #2
Wall showing deposition of thin flowstone outlining a paleo-solution breccia

Devil's Wheelright Shop *40°58.2'N;74°52.6'W, 580, Blairstown Quadrangle, PR, Erie-Lackawanna Railroad*

Devil's Wheelright Shop is located east of the Johnsonburg Station on the Erie-Lackawanna Railroad. The entrance, partially blocked by a boulder, is south of the tracks. It is a fissure passage about 60 feet long in the Epler Formation.[38]

Faery Hole *40°55.4'N;74°53.7'W, 580, Blairstown Quadrangle, PR, Leon Hull*

Faery Hole (Fig. 32) is reached by following the Shades of Death Road about two miles northeast from its intersection with the Hope-Great Meadows Road. The entrance to the cave is about halfway up a hill on the northeast side of a small lake, to the left of the road. It is about 30 feet long and is formed in the Franklin Marble.

The cave is very important for its yield of Indian artifacts and other material. In 1936, a major excavation was carried out by Dr. Dorothy Cross, of the New Jersey State Museum. More than ten thousand bones and fragments from 23 different species of mammal were recovered. The most important single find was a tooth from an extinct giant beaver never discovered elsewhere in New Jersey. This cave is reported in detail by Schrabisch.[18,30,44,56,74]

Fairly Low *40°55.6'N;74°53.6'W, 620, Blairstown Quadrangle, PR, Leon Hull*

Fairly Low (Fig. 32) is located several hundred yards northeast of Faery Hole, in the back wall of a small cirque. It is a series of low rooms connected by lower crawlways. Flowstone is abundant and the floor is covered with dark brown silt. The total length of this cave, in the Franklin Marble, is 160 feet.[30,44,56]

Fairy Tube *40°55.6'N;74°53.6'W, 620, Blairstown Quadrangle, PR, Leon Hull*

A single passage 20 feet long in the Franklin Marble is near Fairly Low Cave (Fig. 32).[44,56]

Foul Rift Caves *40°47.9'N;75°06.1'W, 300 and 290, Belvidere Quadrangle*

On the hill above the railroad tracks just south of Foul Rift are two small caves. Cave #1 is in the north end of a large dolomite outcropping and is about 15 feet long. Cave #2 is about a hundred yards north and ten feet below Cave #1. It is in the railroad cut; just above the tracks. The entrance is a very tight pit about 10 feet deep at the base of which is a room 15 feet long. These caves are in the Epler Formation.

Grouver Cave *40°57.7'N;75°57.1'W, 500, Blairstown Quadrangle, Mr. Grouver*

There is a cave in a small dump on the Grouver property. It is located three-fourths of a mile northeast of Hope. Take the first turn off of the Hope-Johnsonburg Road; proceed east about a half a mile to a dirt road heading south. The dump is a few hundred yards south of the intersection and a hundred yards east in a sinkhole.[1]

Hainesburg Cave *40°56.9'N;75°03.7'W, Portland Quadrangle*

There is a small rock shelter in a limestone cliff

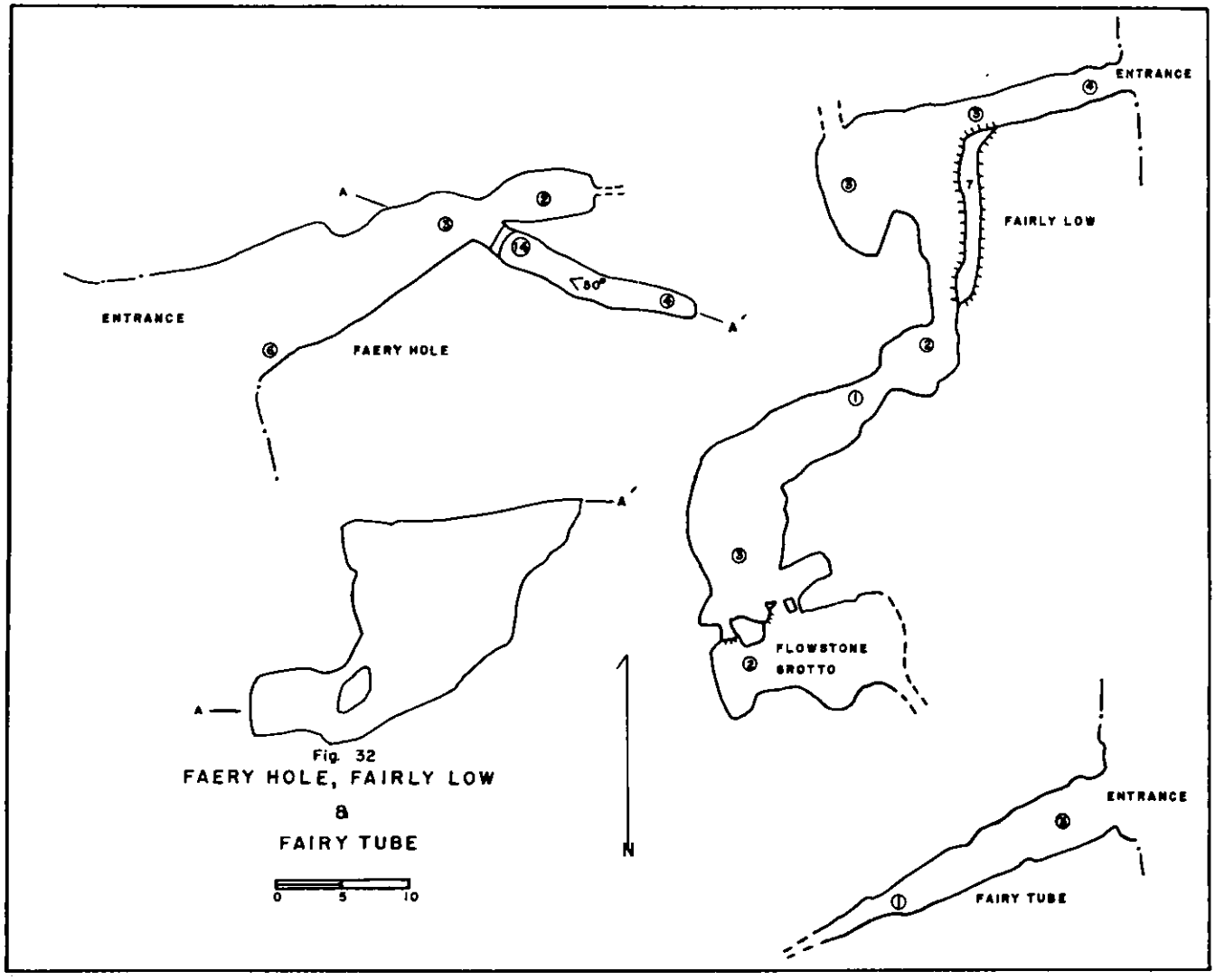


Fig. 32
FAERY HOLE, FAIRLY LOW
&
FAIRY TUBE

west of the mill dam at Hainesburg. It is eight feet wide and 12 feet deep. The entrance is seven feet high but the floor slopes up so the rear is only three feet high. This cave is in the Epler Formation.[74]

Hainesburg Rock Shelter #1
40°58.2'N;75°02.6'W, Portland Quadrangle
Two miles northeast of Hainesburg, near Davidson's Cave, is a rock shelter which is three feet deep and 15 feet long. It is in the Epler Formation.[74]

Hainesburg Rock Shelter #2
40°56.9'N;75°03.6'W, Portland Quadrangle
Located 70 feet above the Paulins Kill at the railroad depot is a small rock shelter in the Epler Formation.[74]

Indian Hollow Rock Shelter *40°57.9'N;74°40.8'W, 620, Blairstown Quadrangle, PR, Mr. Younker*
One-half mile west of Johnsonburg is a rock shelter. It is 10 feet long, 7 feet deep and 8 feet high in the front. From the rear of the shelter are several low passages heading into the hill. About 50 feet to the west of the shelter is a shallow sink with a passage at the base. To the east there is a shallow pit with a passage at the base. To the east there is a shallow pit with a passage leading toward the passages in the rear of the shelter. The area is underlain by the Epler Formation.[74]

Jenny Jump Fracture Cave *40°54.7'N;74°55.2'W, Blairstown Quadrangle, O, State of New Jersey*
The cave is in a cliff near the top of Jenny Jump Mountain, not far from the intersection of Swamp and Laurel Trails, off the East Road in Jenny Jump State Forest. Although small, Jenny Jump Fracture Cave is a good example of a cave formed not by solution, but by massive fracturing of rock and displacement of a portion of it. The entrance way and the first room are the result of a large rectangular block having moved out from the cliff. At the back of this room and against the face of the cliff, there is a relatively small hole that leads into the bottom end of an extended fissure. This fissure can be followed upwards for a short distance. At its end, it is rather close to the surface, although there is no opening. This cave is in the Byram gneiss.[9]

Kalarama Spring *Blairstown Quadrangle, Joseph Brown*

A small cave is reported to be in a ledge 20 feet above the road north of Kalarama near a spring.[1]

Kennedy's Mill Cave *40°40.4'N;75°04.4'W, 260, Bloomsbury Quadrangle, PR, Mr. Horwath*

There is a small cave on the Pohatcong Creek about a hundred yards upstream from the bridge on the Stewartsville-Bloomsbury Road. It is about 10 feet above the creek. There are two entrances which lead into a low room 15 feet in diameter. The cave is in the Rickenbach Dolomite.

Lake Susquehanna Cave *40°58'N;75°0.2'W, Portland Quadrangle*

Several hundred yards below the dam at Lake Susquehanna are a series of springs emerging just above stream level on the east bank. About five feet above the most westerly spring is a small entrance to a water cave. A low crawlway leads in about six feet to a N70°E trending passage. This passage is about three feet high and wide and has a triangular shape.

The cave could have several hundred feet of water passages, as evidenced by the springs. The dip of the formation, which is Epler Dolomite, is into the hill, toward the southeast.

Panther Ledge Cave *40°54.7'N;75°50.3'W, 700, Tranquility Quadrangle*

Near Allamuchy is a small fissure cave in the granite.[74]

Pioneer Cave *41°01.6'N;74°53.9'W, 500, Flatbrookville Quadrangle*

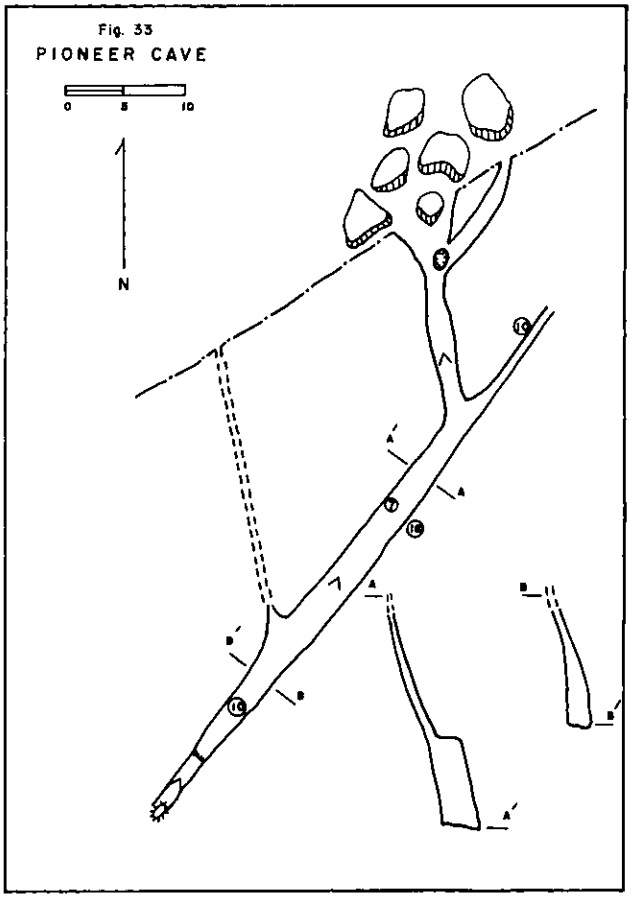
Pioneer Cave (Fig. 33) is located about a mile southwest of Stillwater. It is primarily a fracture cave and runs nearly parallel to the face of the cliff for about 50 feet before it is choked by breakdown. The fracture extends approximately 15 feet to the top of the cliff. The cave is in the Epler Formation and contains numerous spiders.[12,14]

Railroad Cut Cave *40°58.1'N;75°52.6'W, 680, Blairstown Quadrangle, PR, Erie-Lackawanna Railroad*

The cave is located about 400 yards west of the Johnsonburg Station of the Erie-Lackawanna Railroad in a cut on the south side of the tracks. The cave has two entrances but is only about 50 feet long. Originally, this cave contained fine "bacon rind" draperies on the ceiling. However, a 1954 article in the *Newark Sunday News* which pinpointed the cave's location was followed by their destruction. This cave is in the Epler Formation.[4,38]

Sarepta Quarry Cave *40°51.2'N;75°02.2'W, 360, Belvidere Quadrangle, PR*

Sarepta Quarry Cave, (Fig. 34) three miles northeast of Belvidere, just off Route 519, was discovered many years ago in the course of quarrying operations. It is likely that the present cave is less than half its original size. The cave is basically a water course with a still active stream running most of its length.



The entrance is located about twenty feet above the quarry floor. A rope or ladder is recommended, for the rock nearby is wet and slippery at the entrance. In 1960, a caver slipped at the entrance and fell to the quarry floor, breaking a bone in his right heel.

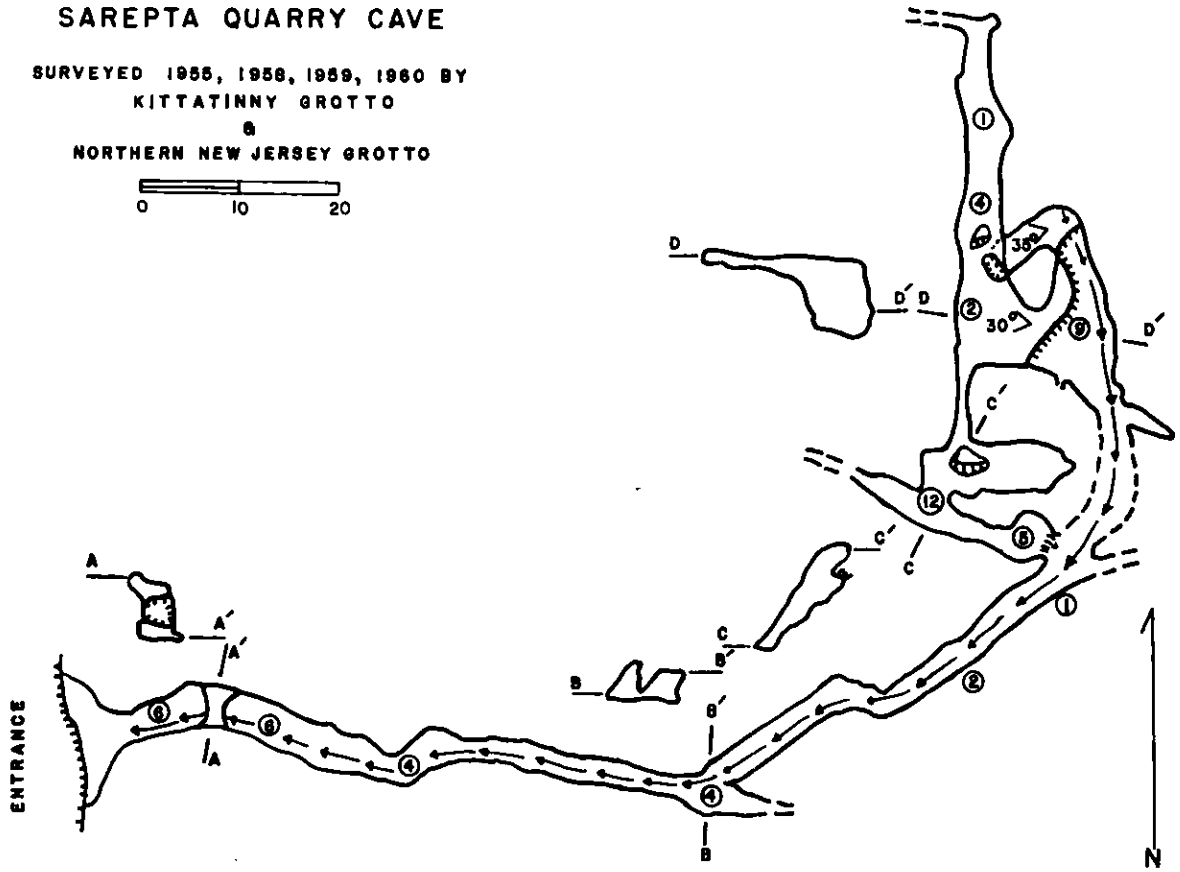
The main passage is 110 feet long and contains the stream. At the far end there is a tight upward squeeze to the left into a side passage. Off of the side passage is a broad slanting fissure in which it is possible to stand. A very thin person can continue through a short, but very tight squeezeway that opens onto the top of a sand bank which occupies half of a fairly large room. The cave stream flows along the far wall of this room and disappears under a six-inch ledge toward the main passage. At the north end of the room, a crawlway leads up through a hole into an extension of the passage that leads into the room. This passage continues until it joins an impassable cross fissure. White flowstone can be found in one of the rooms at the far end of the cave. This cave is developed at the unconformity (the area of junction) between the Ontelaunee Dolomite and the Jacksonburg Limestone, although most of the cave is in the Ontelaunee. The unconformity is clearly visible on the quarry wall.[4,26,28,37,43,49,53]

Fig. 34

SAREPTA QUARRY CAVE

SURVEYED 1955, 1958, 1959, 1960 BY
KITTATINNY GROTTO
&
NORTHERN NEW JERSEY GROTTO

0 10 20



Sarepta Quarry Cave #2 *40°51.2'N;75°02.2'W, 350, Belvidere Quadrangle*

In the northeast wall of the quarry, in the Ontelaunee Dolomite, is a small cave about 8 feet long.

Stevens Camp Cave *40°56.8'N;74°53.8'W, Blairstown Quadrangle*

This cave is located in Stevens Camp, about two miles south of Johnsonburg. The entrance on a ledge 15 feet up a small cliff is in an outcrop of steep westerly dipping Allentown Dolomite. A 10 foot drop leads into a small room.

Supplee's Mill Cave (*Hampton Indian Cave*) *40°42.9'N;74°58'W, 370, High Bridge Quadrangle, PR, Mr. Supplee*

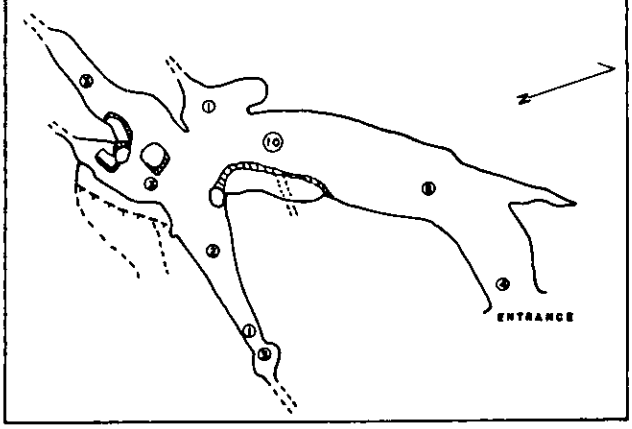
The cave (Fig. 35) is on the west side of the Musconetcong River, about one-third of a mile north of the mill at the Route 31 bridge. On the west bank of the river near an old lime kiln, the cave entrance is two-thirds of the way up the bluff. The entrance room is high enough to stand in, but after about 30 feet the average height is only 2½ feet.

Fig. 35

SUPPLEE'S MILL CAVE

SURVEYED 1964 BY
RUTGERS SPELEOLOGICAL SOCIETY

0 10 20



Several passages lead from the end of the entrance room. The passage on the right leads to a second room; the middle one goes a short distance under a low overhang; the left one heads back toward the entrance and surface. The cave is in the Leithsville Formation.

Abundant argillite chips have been found here, testifying to former Indian occupation.[47,74]

Vail Cave *40°57.9'N;75°01.2'W, Portland Quadrangle*

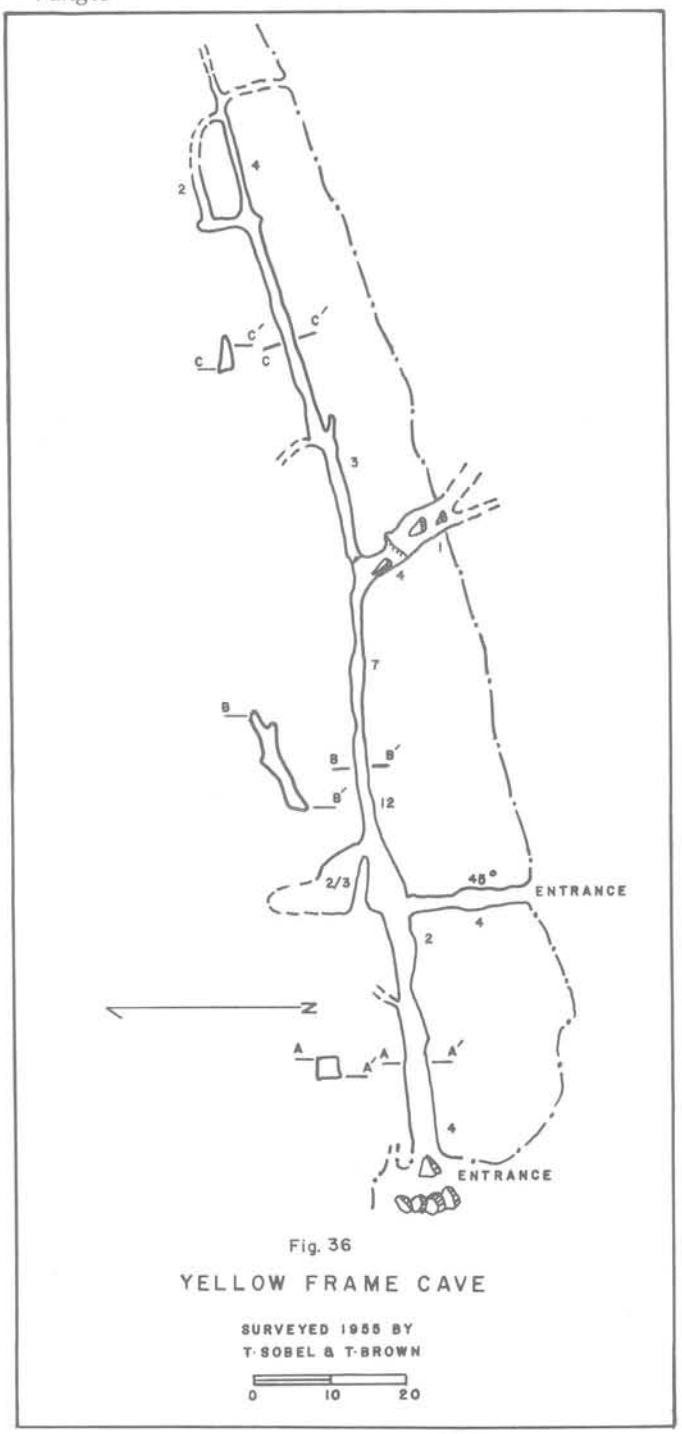


Fig. 36

YELLOW FRAME CAVE

Located on the road from Vail to Hope, near the Vail School, is a low crawlway type passage 60 feet long. It is usually blocked with stone to keep children out. The cave is in the Allentown Formation.[2]

Waterfield Cave (*Wolf Den*) *40°56.4'N;74°53.6'W, 600, Blairstown Quadrangle, PR, Y. Koban*

A quarter of a mile north of Southtown on the Shades of Death Road is a cave. The entrance room is 12 feet long, 6 feet wide and 4 feet high. From the rear of the entrance room is a narrow passage 12 feet long which connects to a passage leading to another entrance. The rear section consists of a very low maze. There are two small rooms and over 100 feet of passage. A small stream flows out the entrance. The cave is in the Epler Formation.[49,69,74]

Yellow Frame Caves *40°59.1'N;74°51.3'W, 730, Tranquility Quadrangle*

Figure 37
Yellow Frame Cave—Crusted Stalactite
(Photo courtesy of Richard Anderson)

Yellow Frame Cave (Fig. 36) is the largest of several caves in the ravines and ledges on top of a ridge that rises very steeply northwest of a marshy pond, less than two miles northeast of Johnsonburg. The cave runs parallel to and on the west side of a large upward fold in the dolomite. The main passage follows a long fracture in the rock; the several side passages reflect the jointed nature of the rock.

The main entrance is located behind a low man-made wall and the passage is almost square in cross section until its junction with the short, steep second entrance to the right passage. Beyond the junction there is a short drop in the floor with a very low bedding plane extension going down to the left. The main passage becomes high and narrow, with stalactites and fluted flowstone (Fig. 37) coming down from the upper part of the fissure. This fissure opens up into a small room. Beyond this room the passage becomes quite long and narrow, (Fig. 38) continuing well past the point where it is impassable.

The five other caves which occur on the ridge are

all very small. All of the caves are in the Epler Formation.[45,50]

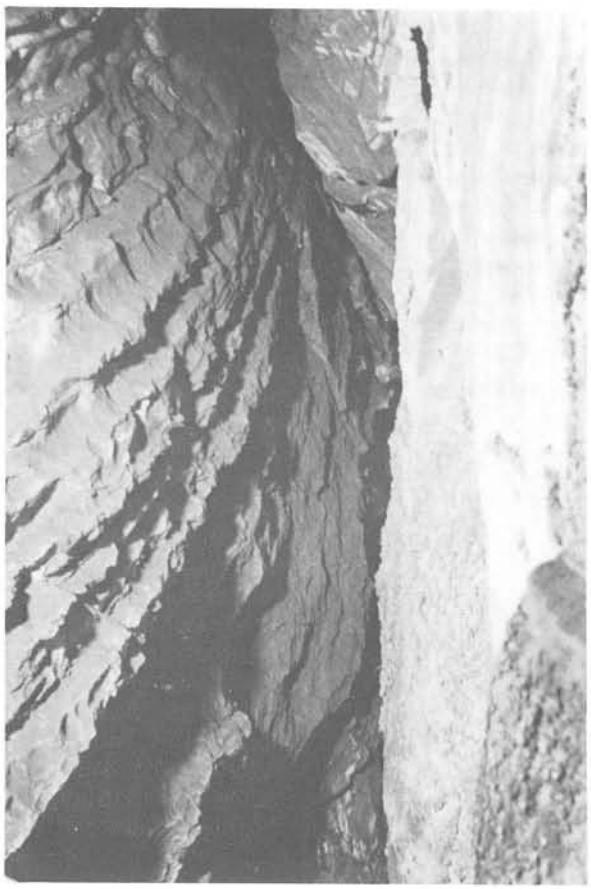


Figure 38
Yellow Frame Cave—Fissure passage with left wall showing differential solution
(Photo courtesy of Richard Anderson)

OTHER CAVES

Fox Den Cave *Blairstown Quadrangle, PR, George Riddle*

A cave is reported to be on the property of George Riddle, three-fourths of a mile northeast of Hope near Grouver Cave.[1]

Fox Hole *Blairstown Quadrangle*

A cave is reported to be at the base of a cliff on the hill above Jacksonburg.[74]

Rt. 80 Cave *Tranquility Quadrangle*

In a new road cut on Rt. 80 near Tranquility just west of an overpass on the north side of the road is a small cave entrance. It is a 4 foot wide 8 inch high slot. The entrance passage intersects a high narrow fissure that parallels the face. This cave is in the Allentown Formation.

Cave (Johnsonburg) *Blairstown Quadrangle*

A small unexplored cave is located in a low ridge 200 yards north of Rt. 519 about a half of a mile west of Johnsonburg. The entrance is in the Epler Formation.

Caves (Penwell) *Washington Quadrangle*

Near Penwell in an old abandoned quarry are several small caves. They are in the Epler Formation.

Cave (Quaker Church) *Tranquility Quadrangle*

Near Quaker Church is a small cave in the Epler Formation.

Cave (Shiloh) *40°56.5'N;75°55.2'W, 560, Blairstown Quadrangle*

This cave is located near the northeast end of a large sinkhole just south of the road about a mile and a half northeast of Shiloh. The entrance is triangular, about 4 feet high and 10 feet wide. The entrance room is about 15 feet long and has a 2 foot wide passage leading from the far end. This passage is about 30 feet long and opens to the surface. The cave is in the Allentown Dolomite.

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CAVE BIOLOGY OF N.J.

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Since the caves of New Jersey are not particularly impressive compared to the caves of other states, it should not be surprising that the cave fauna is extremely meager. This paucity of fauna is due to three factors. First, there are few caves. Second, few of these caves have an extensive dark zone. Third, all of New Jersey's caves were either covered by Pleistocene ice sheets or inundated by torrents of cold rushing water when the glaciers melted. Any life that might have existed in caves before Wisconsin time was exterminated by the effects of recent glaciation.

Because of the lack of possibility of establishment of true cave fauna in New Jersey, few biologists have attempted to study the caves listed in this volume. There is no representative collection extant of the life known to inhabit New Jersey caves. The summary of life listed here is based on scattered personal observations and the field notes of several interested amateur naturalists. The rather pessimistic tone of this introduction is not meant to stifle further biological investigations. It highlights the necessity of a comprehensive biological survey of the caves of New Jersey. In neighboring counties of Pennsylvania there is evidence that certain forms of life are establishing themselves in caves which were subject to Pleistocene glaciation. With the discovery of more caves in New Jersey possessing a significant area of total darkness there is greater possibility of finding cave fauna.

Biologists divide a cave into three general areas when classifying the fauna found there. The *entrance zone* is quite similar to the surrounding environment and animals or plants found here display no adaptation to a cavernicolous existence. Aside from a certain degree of shelter, the entrance of a cave cannot be considered ecologically distinct from the land that surrounds it. The temperature, relative humidity and amount of light are similar to the surface conditions about the cave entrance. Since there is shelter, however, the cave entrance may contain a high population density. In winter these organisms are seeking protection from cold breezes and in summer from the desiccating effect of high temperatures and direct sunlight.

Farther back in the cave the *twilight zone* is encountered. Here some light filters in during the day but the temperature tends to be more moderate and the relative humidity higher. Some green plants, such as ferns or mosses, may be found here. Otherwise, this is the limit of chlorophyll-containing plants. Beyond this only fungus and bacteria represent the plant kingdom within the cave. Animals that normally are to be found under logs or rocks, or in a humid environment, are seen in the twilight zone. These animals may show some slight adaptation to cave life, such as reduced pigmentation, but can readily survive if forced to leave the cave. Many of the animals that live in the twilight zone do leave to forage for food outside the cave. Other sources of food are animal droppings and organic material washed into the cave by stream action.

The third area is the *dark zone* or true cave environment. This is usually at least several hundred feet from the entrance. It is an area of total darkness, has a constant temperature, a relative humidity approaching 100 per cent and is protected from the vicissitudes of the external environment. Animals that live their whole life cycle in the dark zone show extreme adaptation to the cave environment, manifested frequently by loss of eyes, loss of pigment, lower metabolic rate, elongated appendages and hypersensitive organs of touch and smell. No animals have yet been found in caves of New Jersey that remain in the dark zone all year. Few caves in New Jersey have an extensive dark zone. In those localities where animals do survive in the dark zone they are completely dependent on outside sources for food. These sources include bat guano, mud and detritus seeping into the cave, and other organisms within the dark zone. Even in the total darkness of the cave a predator-prey relationship exists among many of the inhabitants.

For convenience, biologists classify the animals found in a cave by their degree of adaptation to the cave environment. *Trogloxenes* are those animals that are surface forms but visit the cave on occasion, either for shelter or seeking food. Bears, bats and even man would be examples of trogloxenes. Practically all of the species found in New Jersey caves are trogloxenes. Animals that show some adaptation to the cave environment are termed *troglophiles.* They exist preferentially in a dark, moist environment but can survive outside the cave. Only one species, a spider, *Phanetta subterranea,* found in New Jersey caves can be considered a troglophile. Those organisms that live their whole life cycle in the dark zone of the cave are termed *troglobites.* A

troglobite cannot survive outside of a cavernicolous environment due to lack of eyes, pigment, etc. No troglobites have been found in New Jersey caves. Possibly troglobitic flatworms (Planaraians) or troglobitic crustaceans such as amphipods or isopods might exist in New Jersey caves.

Earthworms have been found in the entrance zone of New Jersey caves. These are merely surface species that have crawled inside the entrance. Strangely, no crayfish have been reported from caves of New Jersey, although they are common in cave streams of New York and Pennsylvania. Three species of spiders are commonly found, having been seen in Devil's Den, Breathing Emerald, Glenwood Indian and Inslee Caves and Paulison's Sinks. The most prevalent is *Meta menardi* which is found in many caves throughout North America. It is trogloxenic but on occasion is found in the dark zone. The troglophilic *Phanetta subterranea* is small and usually pale. *Nesticus pallidus* is common, both in and outside cave entrances. The spiders feed on the midges, crickets and mosquitoes that are snared in their webs.

Two species of crickets have been collected in New Jersey caves. *Ceuthophilus gracileps* is more common and is distinguished by dark bands on the abdomen. *Hadenoecus puteanus* displays a dull, pale color and has elongated antennae. Both of these crickets normally leave the cave to feed but will reside in the dark zone if sufficient food is available. These two species of crickets are the most easily observed of all the invertebrates found in New Jersey caves. Rare is the cave or rock shelter that does not contain a colony of one or both species.

Various species of flies, fungus gnats (*Sciara sp.*), midges and crane flies may be found in the entrance and twilight zones. If they are at all prevalent they can be seen flying about in the beam of the headlamps or flashlights carried by persons in the cave. Two species of mosquito, *Culex pipiens* and *Anopheles punctipennes,* overwinter in caves and these can be attracted by the heat of a body or lamp. All of these dipterans are trogloxenes.

One moth, *Scoliopteryx libatrix,* is frequently seen in the caves and mines of New Jersey. This is an attractive, reddish colored species, that in the wintertime may seem white from condensation covering its body. Harvestmen, or daddy-long-legs (*Leibunum sp.*) can be found in obscure niches or along the walls in secluded areas. These should not be mistaken for spiders even though they do have eight legs. Rather than spinning webs they move quickly over the walls and floor preying on smaller insects.

Millipedes, *Scoterpes sp.* and *Polydesmus sp.* may be seen in the entrance zone. Two species of snails found in the entrance zone of several caves are *Polygyra hirsuta* (?) and *Zonitoides sp.* Further collecting should expand the list of invertebrates known from New Jersey caves.

Vertebrates, because of their size, are more obvious in caves but except for some of the salamanders, bats, and one species of rodent, they are found only near the entrances of New Jersey caves. There is a report of a blind catfish having been caught in Crooked Swamp Sinking Stream but the specimen seems to have disappeared. This report must be considered doubtful. Frogs and toads are sometimes washed into caves, either as larvae or as adults, so it is not unusual to find them near the entrance (Table II). If sufficient food is present, these amphibians may then continue to live in the cave. Salamanders are commonly found in New Jersey caves, although none of them show any loss of pigment. Among the most abundant cave associated species is *Plethodon glutinosus,* the slimy salamander. This has an elongated body, up to 7½ inches in length, with silvery white markings on a black background. A particularly large aggregation is reported from Paulison's Sinks. *Plethodon cinerus,* the red backed salamander, is not always easily seen since it is small, thin and in one color phase may have a gray or black dorsal surface. A more easily seen color phase is that of a red dorsal surface with black dots. This species has been reported from over a dozen caves, with studies under way at Kerreganot Cave. The most striking of the common cave associated salamanders is *Eurycea longicauda,* the long-tailed salamander. This has an orange-yellow color with a black, herringbone pattern on the dorsal and lateral surfaces. They are occasionally incorrectly referred to as the **cave salamander.** This is another species, *Eurycea lucifuga,* not found in New Jersey. A fourth species, *Ambystoma opacum,* the marbled salamander, is sometimes seen near cave entrances. The other species noted in Table II have been observed at cave entrances only rarely.

Normally snakes and lizards would not be expected to inhabit caves since most of them maintain a dry epidermis, however, cave entrances afford excellent shelter during severe climatic conditions. Some of the best timber rattlesnake (*Crotalus horridus*) dens in the state are at the entrances to certain caves in northern New Jersey. Eleven species of snakes and lizards have been seen at cave entrances (Table II). Even in the case of snakes that live in the entrance zone all leave the cave when feeding. Conceivably, snakes at the entrance could feed on injured or young bats. This has been reported from caves in other states. If a turtle falls into a cave that has a steep, sloping entrance, it is impossible for it to get out. This probably accounts for the records of *Clemmys inscripta,* the wood turtle, and *Terrapene carolina,* the eastern box turtle, at the bottom of pit-like entrances.

Amongst the mammals, bats are the most common dwellers in caves. In New Jersey the caves and mines may be used as sites of hibernation. If the

cave is used for habitation all year, the bats leave at dusk during mild weather and feed by night, returning by dawn to the roost. All bats found in New Jersey are insectivorous. Their guano is an important source of nutrient material for the insects and snails of the cave. The most widely distributed bat in New Jersey caves is *Myotis lucifugus,* the little brown bat. A smaller and rare cave inhabitant is *Pipistrellus subflavus,* the pygmy bat. *Eptesicus fuscus* the big brown bat is found in most caves with a dark zone. *Lasiurus borealis,* the northern red bat has been reported from one cave. *Lasiurus cinerus,* the hoary bat, is another rare inhabitant of caves.

Mephitis mephitis, the eastern skunk, is occasionally found in entrances and even the twilight zone. Perhaps the most appealing to man of all New Jersey cave inhabitants is the Allegheny wood rat, *Neotoma magister.* Unlike the Norway rat, it has a furry tail and white ventral surface. Highly inquisitive, they will peer out of their nests at any visitors to the cave. They normally leave the cave to feed but will take almost anything they can hold in their mouth. In their nests have been found flashbulbs, tin foil, bits of clothing, paper and even photographic film. They are extremely clean animals and follow certain trails on their daily forays. *Neotoma magister* has been seen in Fasolo Cave, Swimming Pool Cave and Paulison's Sinks.

Because of the limited populations of animals in New Jersey caves they should **never** be disturbed or collected except by trained biologists who know how to handle these animals without harm. Much of New Jersey is becoming urbanized. In many instances caves are the last refuge for certain species. It is not beyond the realm of possibility that all cave life in New Jersey could be exterminated within a few years if stringent precautions are not invoked. The caves are readily accessible, small and near large centers of population. All these factors combine to put great exploration pressure on New Jersey caves. Each visitor to caves should be extremely precautious about disturbing any fauna. If an unusual or unknown species is sighted, pictures may be taken for future reference or for obtaining identification by an authority.

TABLE II

CAVE ASSOCIATED VERTEBRATES – NEW JERSEY

SCIENTIFIC NAME	COMMON NAME	COMMENTS
Amphibians		
Bufa terrestris	American toad	Entrance – rare
Hyla crucifer	Northern spring peeper	Entrance – one report
Rana sylvatica	Eastern wood frog	Twilight zone – occasionally
Rana pipiens	Northern leopard frog	Entrance zone
Rana palustris	Pickerel frog	Entrance zone
Rana clamitans	Green frog	Entrance – one report
Pseudotrition ruber	Northern red salamander	Twilight zone – one report
Plethodon glutinosus	Slimy salamander	Common
Plethodon cinerus	Red back salamander	Common
Desmoghathus fuscus	Northern dusky salamander	Entrance zone – one report
Eurycea longicauda	Long tailed salamander	Common
Eurycea bislineata	Northern two lined salamander	Entrance – two reports
Ambystoma opacum	Marbled salamander	Fairly common
Diemitctylus viridescens	Red-spotted newt	Entrance zone
Reptiles		
Thamnophis sirtalis	Eastern garter snake	Entrance zone – fairly common
Opheodrys vernalis	Smooth green snake	Entrance zone – one report
Heterodon platyrhinos	Eastern hognosed snake	Entrance – doubtful report
Diadophis punctatus	Northern ring necked snake	Entrance – two reports
Storeria dekayi	Northern brown snake	Entrance – doubtful report
Elaphae obsoleta	Black rat snake	Entrance – several reports
Coluber constrictor	Northern black racer	Entrance – doubtful report
Lampropeltis dolita	Eastern milk snake	Entrance
Crotalus horridus	Timber rattlesnake	Entrance – fairly common
Eumeces fasciatus	Five lined skink	Entrance – several reports
Sceloporus undulatus hyacinthinus	Northern fence lizard	Entrance – doubtful report
Clemmys inscripta	Wood turtle	Entrance – two reports
Chrysemys picta	Eastern painted turtle	Entrance – one report
Terrapene carolina	Eastern box turtle	Entrance – several reports
Mammals		
Myotis lucifugus	Little brown bat	Dark zone – common
Pipistrellus subflavus	Pygmy bat	Dark zone – rare
Eptesicus fuscus	Big brown bat	Dark zone – common
Lasiurus borealis	Northern red bat	Twilight zone – one report
Lasiurus cinerus	Hoary bat	Rare
Mephitis mephitis	Eastern skunk	Entrance zone – fairly common
Neotoma magister	Allegheny wood rat	Twilight zone – fairly common

HISTORY AND LEGENDS OF N.J. CAVES

A. Ross Eckler
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Today, New Jersey has no commercial caves; a New Yorker who has a yen to visit one must travel eighty miles to Ice Cave Mountain, near Ellenville, New York, or to Lost River Caverns in Hellertown, Pennsylvania. But more than one hundred years ago, one could go across the Hudson River and visit a cave in Hoboken. This cave, known both as Sybil's Cave and Castle Point Mine, was excavated in the prominent bluff of grayish-green serpentine rock between Hoboken and the river. The cave was developed by Mr. W. L. Stevens (of the family who founded Stevens Institute of Technology in 1870) as one of the principal attractions of Elysian Park, apparently a forerunner of present-day amusement parks. An old print of the cave entrance depicts a Gothic arch (in the form of an inverted V) about twelve feet high; the cave itself consisted of a room seventeen feet wide, twenty feet from front to back, and about seven feet high. Four large stone pillars were left standing in the center of the room. About five feet within the entrance and enclosed by these pillars, there was a spring of water, somewhat mineralized by magnesium, which was sold as a "pleasant and healing beverage" to thousands of summer visitors at a penny a glass.

The cave is believed to have been first excavated about 1835. It is not known when the Elysian Park went out of business, but it was certainly long before 1943 when it was visited by the editor of *Rocks and Minerals* magazine. He reported in the September, 1947 issue that the cave was then a small tunnel littered with serpentine fragments, cans, bottles, and other trash. When John Fisher of the Northern New Jersey Grotto visited and mapped the cave in 1952, the entrance was almost completely blocked by a rock fall. The only limestone seen in the vicinity was a carved marble head which was last resting in Lawrence Chapman's rock garden in Franklin, New Jersey.

Anyone who is interested in visiting this historical relic can easily find it at the base of the serpentine outcrop on which Stevens Institute is now located. It is located at the level of a railroad siding between Eighth and Ninth Streets.

* * *

The following article appeared in the columns of the January 13, 1902 *Daily Record*, Morristown, New Jersey.

PEAPACK CAVERNS

An Interesting Description of the Recent Discovery

Reference was made a short time ago to the finding of a large cavern or series of caverns in the limestone hills at Peapack. The caverns have been more fully explored since, having been visited by a large number of curiosity seekers.

Probably the best description of them was given in the January 9, 1902 edition of the *Newark Evening News*, which is as follows:

A walk of an eighth of a mile from the railroad station at Peapack brings one to the foot of Ledyard-Blair Hill, as it is known in the vicinity, and a winding road leads to the lime quarries at its base. The only indication of a cave is a small opening just wide enough for a small man to crawl through, and one enters the main corridor of the cavern.

Before entering the cavern it is necessary to dress in overalls and waterproof garments, and so large has been the demand that the local merchants are entirely sold out and in anticipation of a continued flow of sightseers have ordered large quantities by express. Provided with lanterns, candles, and a guide, a small boy, whose teacher had excused him from school temporarily to reveal the glories of a Peapack mountain, you are pushed and hauled into a narrow passage, the sides of which glisten with the reflected rays of your lantern. After entering the cave you are able to stand upright and walk over broken stone through a tunnel about a hundred yards in length under a vaulted dome.

At the end of the main tunnel a rude ladder has been built from fence rails and after a scramble of twenty feet an upper corridor is reached where two persons can walk abreast for a short distance. Branching off from this tunnel is another, leading about due west, but containing no interesting features. It extends about sixty feet.

At the end of the first upper corridor one finds himself in a circular room large enough to accommodate ten people, and here the cave takes on an arched formation, the roof being nearly 30 feet high. Another improvised ladder and another

scramble leads to what is the third story of the cave. To explore this a steady hand and a sure foot are required, for the difficulties before encountered are slight compared with the ones before you. Crawling like a snake, the highest part of the cave is reached and it comes to an abrupt end. On the right is a large gap leading to a deep well, and a misstep probably would be fatal. You can count twenty slowly from the time a pebble leaves your hand until it strikes the water. How deep the well is no one knows, as no measurements have been taken.

Opposite the well is an opening in the rock not large enough to pass through, but giving a view of a chamber beyond, probably twenty feet square. The roof is circular and hung with stalactites that glisten in the light. This is the largest room so far discovered in the caverns.

The entire cave is Gothic in formation, and no architect ever designed the roof of a building in more graceful lines. The formation of the cavern gives the impression that in past ages the mountain had been rent in twain and fallen together again, leaving a passageway varying in width from two to six feet at its base, a veritable underground Watkins Glen.

Most of the rock on the roof of the tunnels is brown in color and brittle, and the blasting in the lime quarries outside have undoubtedly shattered it and caused it to fall in many places. The formation on the side walls is entirely different and has the appearance of a crystal substance that in past years has dripped and hardened. Veins in the rock stand out blood-red in the light, and the picturesque effect is emphasized by the setting of white crystals.

The appearance of the second upper chamber is weird in the extreme. As you enter with a lantern or miner's lamp, the stalactites flash from the dome as though suspended in air, while the sides of the cavern glow with a mellow-red light. Before you is a formation of reddish crystals, shaped like a pulpit, and above that what looks like a frozen waterfall.

The temperature of the cave is even and the atmosphere fresh. Apparently a current of fresh air circulates toward the opening. The blaze of a match or uncovered flames will always point toward the mouth of the cavern, indicating an opening or crevice yet undiscovered, probably on the other side of the mountain.

This is the earliest known notice of New Jersey's first and only commercial limestone cave, located thirty-five miles due west of New York City in Peapack, New Jersey. Peapack is located in a small belt of Kittatinny Limestone, about seven miles long and usually less than a mile wide, which is bounded to the west by the Martinsburg and Brunswick Shales, and to the east by a thin belt of sandstone and the Byram gneiss. It is one of the closest limestone outcroppings to New York City. Such a favored position ought to have assured the commercial success of the cave, but apparently it was never known more than locally (although groups came to visit it from as far away as South Orange).

Many residents of the Peapack area still remember this cave. Mr. Charles Jerolaman remembers going to visit the cave as a young man, probably soon after its discovery. Elias Guest, one of the workmen in Todd's Quarry had placed an old door across the cave entrance and was charging a quarter admission to all comers. A little later on, the operation of the cave was placed on a more formal basis. Wooden walks were installed, as well as steps leading up to an iron gate at the entrance. Mrs. Henry Cordes, daughter of Phillip Todd, the quarry owner, remembers that the local Peapack-Gladstone Methodist Church put in the walks and collected admission of a quarter per visitor, but church records were unable to confirm this story. Mr. Vernon Tiger, another Peapack resident, remembers that one of the highlights of the old Smith Family reunions was a trip in a carryall (a large wagon with seats along the sides) over to the cave. Apparently the period of commerical operation was not very long—Mr. Tiger thinks that it was a year or so, about 1907.

All of these visitors to the cave are unanimous in describing it as beautiful; they remember that the ceiling of the first room in the cave was covered with stalactites (before they were vandalized). This room, some distance inside the entrance, was fifty feet or more in diameter and had a high ceiling. Beyond this room a narrow passage led slightly downward to a second room with a lake in the center. Mr. Tiger remembers that the lake was at least thirty feet in diameter, and that one could walk around it. Sometimes he and other Peapack boys would steal into the cave at night and burn flares of colored powder. The cave had crawlable passages beyond the lake room, but no one knows where or how far they went. Originally, the cave had a large number of bats, but many of them were driven out by the smoke of fires which the quarry workmen used to build inside the cave entrance on cold winter mornings.

No one remembers why the cave was finally closed. It seems possible that blasting the limestone in the quarry may have made it unsafe. Or, it may be that the operation of the cave interfered with the more profitable quarrying work. The entrance was filled in many years ago, and the quarry is now owned by Mr. Ferrante.

It is probable that most of this cave is still in existence. The entrance was located in the north wall of the quarry, which has not been mined since the time of the cave because of the presence of a village road just beyond. If so, it may well rank as New Jersey's largest cave—but without entrances. Any systematic exploration and mapping lies in the future.

* * *

Perhaps the most fascinating story about a New Jersey cave is the one which tells of pirate gold. Lis-

ten to the following account, originally published in the newspaper column of the *Hunterdon Republican* in 1869-70, which was part of a long narrative entitled *Traditions of Our Ancestors:*

> *About a mile below Bloomsbury in the bed of the Musconetcong is a place about sixty feet deep called Butler's Hole. In a large rock opposite are cut several depressions as though intended for moulds in which to run metal. Tradition says that Spanish Buccaneers and pirates once came here and melted their ill-gotten silver and gold into ingots, and secreted it in this hole. A legend also states that two young adventurers were once fishing in the stream, when their lines became entangled and they drew up a large ingot of silver. A party was organized to make a further search the next day; but they were too late. The young men had re-visited the spot at night and by the light of torches cleaned out the hole, and were never more heard of.*

How much of this legend remains after the passage of a century? On a sweltering summer day in 1960 I went searching for Butler's Hole with Robert Vanderbilt of Asbury, New Jersey, who had fished from Butler's Rock in his youth but had not revisited it in more than twenty years. A short distance north of Warren Glen, we drove a mile along a narrow dirt road owned by the Warren County Beagle Club and parked in a deserted farmyard. A scramble down a steep wooded hill led us to several large boulders jutting into the muddy Musconetcong River. My guide pointed out several depressions in the rock which he was convinced were man-made. Butler's Hole, he added, was located a few feet out in the river; if so, it must have long ago been filled in with silt and other debris, because no trace of it remains.

Skeptics may well ask whether Butler's Hole ever did exist. Butler's rock appears to be Losee gneiss with quartz outcroppings—a very unpromising cave material. However, a short distance upstream the gneiss meets Kittatinny Limestone. A few miles to the east, Leigh Cave, one of the largest known in New Jersey, was formed at the contact between these two types of rock. Could Butler's Hole have been formed in a similar fashion?

* * *

On the edge of the Delaware River, about two or three miles below Port Jervis, there occurs Vulture Cave, a small cave with an interesting local tradition. It was used before and during the Civil War as one of the stops on the *Underground Railroad,* or places to hide fugitive slaves from the law. No written record of this has been found; and it seems unlikely that any will be. However, an examination of the cave certainly suggests that the story is plausible. It is located right at the water's edge, in a secluded spot; islands and swamps conceal the main part of the river. The general trend of the cave is into a bluff, and it is stated that at one time a passage led into the basement of a house located some two hundred feet away on the other side of the bluff. Unfortunately, the cave passages are so near the water level that high water (such as occurred during the great flood in the Fall of 1955) has frequently clogged them with silt and other debris, making them impassable after a few feet.

* * *

In addition to concealing fugitives from the law, caves have served as hideouts for outlaws or rebel bands. James (Bonnel) Moody of Sussex County chose to remain loyal to the Crown during the American Revolution. Abandoning his farm, he became a spy and leader of a Tory band who terrorized North Jersey. Moody's headquarters was a large rock shelter on the southern edge of Muckshaw Pond, about two miles south of the town of Newton. Formed in the Kittatinny Limestone, this retreat today is about fifty feet long, twenty feet deep, and up to twenty feet high; however, there is no sign of any cave leading off from it.

Many legends of Moody's exploits have been handed down by word of mouth. Augustus Schooley, a native of Newton, wrote down eight of these legends of Moody's rock in blank verse. These lines were published in the *Sussex Register* on July 8, 1885 (and reprinted on December 29, 1955):

Listen to the following description of Devil's Den, a cave located south of Newton (Chinkchewunska in the poem):

> *On the farm of Colonel Babbit,*
> *Nigh the town of Chinkchewunska,*
> *You will find a hole, or cavern,*
> *Devil's Hole, the profane call it,*
> *And about it some tough stories*
> *Have been treasured by tradition.*
>
> *Early in the revolution,*
> *While James Moody held possession*
> *Of the rock upon the Muckshaw,*
> *I have learned it from tradition,*
> *That his Tory friends could reach him*
> *Through the 'Devil's Hole' aforesaid.*
>
> *It is known that when the Tories,*
> *Under Moody, robbed the farmer,*
> *Over on the Sparta Mountain,*
> *Robbed him of his bottom dollar,*
> *They were chased by their pursuers,*
> *To this hole, and there they entered.*
> *Five whole days and nights the robbers*
> *Came out not, when 'twas discovered*
> *They were up in Papakating,*
> *Personating Yankee soldiers,*
> *How they got out no one found out,*
> *But there was a dark suspicion*
> *That the 'Devil's Hole' connected*
> *With James Moody's lime-rock fortress.*
>
> *Lately, research by the schoolboy,*
> *Also by the 'Summer boarder,'*

Has resulted in dispelling
Many doubts before existing,
These bold troglodytes discovered,
In their many explorations,
That the 'Devil's Hole' runs southward,
Runs towards the swamp of Muckshaw,
In direction of the boulder,
And, as far as penetrated,
Has no end; thus far confirming
The assertions of tradition.

When again the 'Summer boarder,'
Shall renew the exploration
You shall see the question settled,
And tradition vindicated.

Several of Mr. Schooley's legends describe events taking place at Moody's Rock. In one, he describes a spectre *in the form of a young maiden . . . clad in spotless white apparel . . . eyes cast downward, sad and pensive.* When this spectre is approached, it will *vanish, but will leave behind it, atmosphere of sweetest incense.* Another legend reports that *British gold, no doubt, in plenty, Moody had within the cavern,* and that it is still there. A third legend reports how Moody abducted Kittatinny, the daughter of King Allamuchy of the Pequests, and sought to win her love while holding her captive in the cavern. As she liked to ice skate, Moody built her a roller skating rink in the cave for amusement and exercise. But Kittatinny, depressed at being shut up in a cave night and day (a perfectly normal reaction!),

Lost her love of roller skating!
And one night when Ensign Moody
Came in late he found her body,
From the chandelier suspended,
Lifeless; hanging by a skate-strap;
Hanging o'er the grand piano,
In the middle of the cavern.

One legend describes in minute detail a visit to the cave by a friend of Moody's. Those who think of New Jersey caves in terms of muddy crawlways or clammy rooms decorated with breakdown should find the following account enlightening:

When the rock they had arrived at
Moody gave a long shrill whistle;
Then a small door slowly opened,
Opened in the solid limestone,
And the twain a passage entered,
Leading to the secret cavern.
As the door was closed behind them,
This dark passage was illuminated
As by magic it was lighted,
And revealed the Tory's armor—
Weapons, civilized and savage—
Hanging on the walls and ceiling.
Moody leading, through the passage
Went the pair some little distance,
Now to right, now left, they turning,
Till they came to where it ended.
Here they halted, Moody whistling
As before when forthwith opened,
Swung upon its creaking hinges,
A huge door of massive limestone—
Swung and opened in a chamber
Cut by Nature in the boulder;
Cut in form of a quadrangle;
Cut as if by some hand human,
This they entered, it was lighted
By a chandelier suspended
From the center of the ceiling,
And its brilliancy illuminated
Every nook and every corner
Of this spacious limerock chamber,
On the floor were Turkish carpets;
On its walls were Persian hangings;
All of oriental pattern;
All of colors warm and gorgeous,
Paneled in between the hangings
On all sides were polished mirrors;
Rugs, fauteuils, divans and sofas
Added luxury and splendor,
While an English grand piano
Graced the center of the chamber.
In a corner stood a book-case,
Filled with works of standard authors;
Books which only are collected
By a man of highest culture.
On one side of this cave-chamber,
Where the walls bulged slightly outward,
Was a dais, sort of throne room,
Which in regal style was fitted,
And contained the bust and picture
Of the wicked English monarch,
George the Third, whom Moody worshipped,
In an alcove in this chamber,
Formed by plastic hand of Nature,
Richly draped with silken curtains,
Stood a couch, fit for the Sultan.
Such was Moody's secret cavern,
In the rock upon the Muckshaw . . .

The legened goes on to tell of a pleasant evening spent listening to Moody play the piano and sing, drinking vintage wines, and smoking many fine and fresh Havana cigars. Judging from the above account, Moody's quarters compared favorably with the best in English castles. One wonders what the Chancellor of the Exchequer said when he saw Moody's itemized expense account.

Moody did not have long to enjoy his luxurious cave. He was captured by American troops and imprisoned (some accounts say at Morristown, others at West Point). It is believed that he later escaped and made his way to England. At any rate, the book *Lieutenant James Moody's Narrative of His Exertions and Sufferings in the Cause of the Government since the Year 1776* was published at London in 1783.

GLOSSARY

Adits
Mine entrances.

Bacon rind
A special type of drapery that has an alternation of light and dark bands.

Bedding plane passage
A low wide passage controlled by the bedding.

Branchwork pattern
A cave pattern which consists of a main passage with several subordinate passages.

Breakdown
Rock fragments and blocks of rock which have fallen from the ceiling.

Breathing phenomenon
Where air flows into a cave and then flows out. The cycle has a constant period.

Breccia
A rock that has been fractured and broken apart and then recemented again.

Cave
A natural opening of size permitting human exploration and extending into a region of sharply reduced or no light.

Cave coral
Small knobby clusters of calcium carbonate formed by water seeping out from cracks in the rock or through porous fill in the cave.

Chert
Cryptocrystalline silicon dioxide which forms beds and irregular masses in many limestones and dolomites.

Cirque
A bowl shaped depression on the side of a hill. It is associated with glaciation.

Column
A stalagmite that has grown upward and joined a stalactite.

Curtains
A cave formation that hangs from the ceiling like a stalactite, but is many times wider than thick. Sometimes they may consist of many stalactites grown together.

Cutters
Open joints exposed on the surface.

Dark zone
The area of total darkness. It has a constant temperature and high relative humidity. The life shows extreme adaptation.

Dip
The angle of intersection of a passage or bedding with a horizontal plane, measured in a vertical plane from the horizontal downward.

Dolomite
A mineral composed of calcium magnesium carbonate. The term is also used in place of dolostone, a rock made up largely of dolomite.

Dome pit
An opening extending upward into the ceiling of a cave. Formed by water moving in a vertical plane.

Draperies
See curtains.

Dripstone
See flowstone.

Entrance zone
The area at the entrance. It has an environment and fauna that is similar to the surrounding area.

Fault
A fracture or break in the rock on which noticeable movement has occurred.

Fissure cave
A type of cave that has high narrow passages and may not be due to solution. It can form in any rock type.

Fissure passage
A passage that is many times higher than wide. It can be due to solution along joints or fractures in a soluble rock; voids due to contraction in an igneous rock or open fractures in any rock type.

Flowstone
A secondary calcium carbonate deposit found on the walls and floors of a limestone cave. It is deposited in thin layers. May also be called dripstone or travertine.

Fracture cave
A cave formed by tectonic movements or slumpage of the rock, causing it to break apart leaving open passages. It can be found in any rock type.

Guano
The droppings (dung) from bats in a cave. It has been used as a source of saltpeter and fertilizer.

Helictite
A special type of stalactite where the growth direction is controlled more by the crystallographic axis of the mineral, not gravity.

Joints
Parallel sets of fractures in the rock along which no noticeable movement has occurred.

Karren
Exposed bands of bedrock on the surface as long rows.

Karst
A type of topography formed by solution of the bedrock. Characterized by sinkholes.

Kettle
A depression in glacial outwash and tills formed by the melting of buried ice blocks.

Keyhole passage
A tube type passage with a fissure at the base.

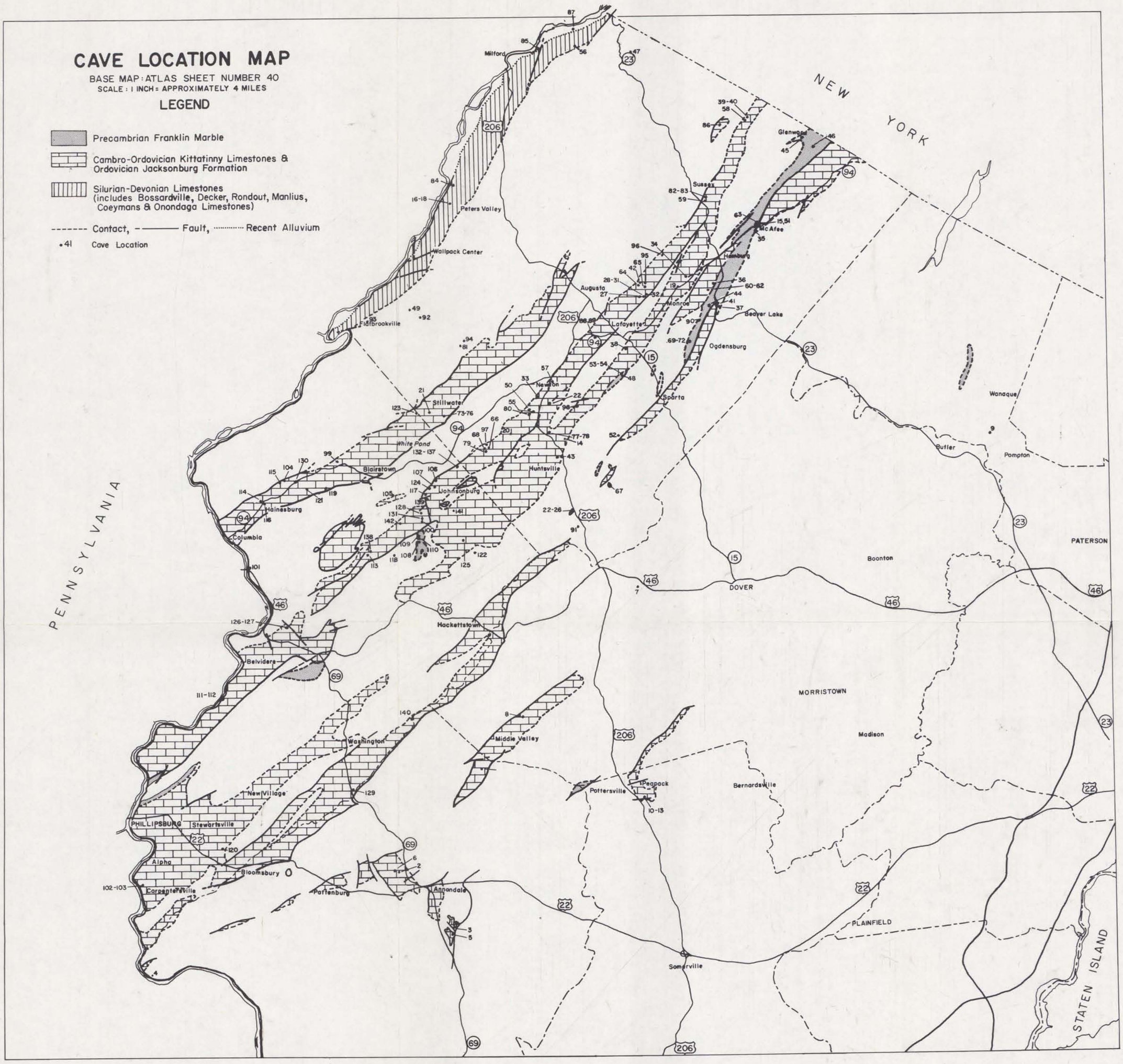
Limestone
A sedimentary rock which is made up mostly of calcite (calcium carbonate).
Linear pattern
A cave that has a single straight passage.
Marble
A carbonate rock that has been recrystallized by some form of metamorphism.
Maze pattern
A special type of network cave where the passages are aligned along sets of joints and they form an interlocking network of parallel sets of passages.
Mine
An artifical opening into the rock for the purpose of extracting an ore. It can be on the surface; a strip mine, or underground; tunnels.
Natural bridge
Applied to two cave related features. In a cave, it is a rock or flowstone span across a passage, open both above and below or it can be a cave which has been breached on both sides by erosion, leaving a small section of cave roof intact.
Network pattern
A cave that has passages which intersect to form closed loops.
Organ pipe formation
A dripstone formation along a wall that consists of a series of half columns and looks like organ pipes.
Pendants
Speleogens formed by solution leaving a mass of bedrock hanging from the ceiling or walls.
Phreatic zone
The region below the water table. The rock in this region is saturated.
Pit
A hole in the floor of a passage formed by water moving in a vertical plane.
Popcorn
A cave deposit which was formed similar to cave coral, but looks like popcorn. It is usually formed on the ceiling.
Pothole
A depression in the rock formed by stream action.
Province
An area or region which has had a similar history or other unifying feature.
Rectangular pattern
A cave with a single passage that has bends.
Resurgence
The point where subsurface waters come to the surface.
Rock shelter
An opening formed by an overhanging ledge, but in many cases it can be a small cave.
Sinkhole
A depression in the bedrock expressed in the soil cover. It can be formed either by solution or collapse.
Soda straw
A long tubular stalactite.
Speleogens
Features formed in a cave due to solution. A natural bridge is a speleogen.
Speleothemes
Features formed in a cave due to the deposition of new rock. A stalactite is a speleotheme.
Spring
A place where subsurface water comes to the surface.
Strike
An imaginary line formed by the intersection of the bedding in the rock with a horizontal plane.
Talus
Rock that has broken away from a cliff and forms a slope in front of the cliff.
Talus cave
A cave-like opening formed under talus blocks.
Travertine
See flowstone.
Troglobites
Animals that are totally adapted to the cave environment.
Troglophites
Animals that show some adaptation, but can live outside the cave environment.
Trogloxenes
Animals that visit a cave on occasion.
Tube passage
A passage that is circular in cross section.
Twilight zone
The area of greatly reduced light. The limit of chlorophyll-containing plants. Animals may show some adaptation. The temperature is moderate and the relative humidity higher than the entrance zone.
Vadose streams
Streams which flow in the vadose zone.
Vadose zone
The region below the surface and above the water table.

CAVE LOCATION MAP

BASE MAP: ATLAS SHEET NUMBER 40
SCALE: 1 INCH = APPROXIMATELY 4 MILES

LEGEND

- Precambrian Franklin Marble
- Cambro-Ordovician Kittatinny Limestones & Ordovician Jacksonburg Formation
- Silurian-Devonian Limestones (includes Bossardville, Decker, Rondout, Manlius, Coeymans & Onondaga Limestones)
- ------- Contact, - - ——— Fault, ····· Recent Alluvium
- •41 Cave Location



Hunterdon County

1. Califon Cave
2. Clinton Cave
3. Leigh Cave
4. Milford Caves
5. Muckleman's Cave
6. Spruce Run Cave

Morris County

7. High Ledge Caves
8. Scott Sinkhole
9. Fissures

Somerset County

10. Peapack Quarry Cave #1
11. Peapack Quarry Cave #2
12. Peapack Quarry Cave #3
13. Peapack Commercial Cave

Sussex County

14. Andover Pit
15. Arch Roof Cave
16. Bevans Indian Cave
17. Bevans Rock House
18. Bevans Small Cave
19. Big Spring (North Church)
20. Big Spring (Springdale)
21. Bonnie Brook Spring
22. Campbell Cave
23. Cranberry Lake #1
24. Cranberry Lake #2
25. Cranberry Lake Fissure
26. Cranberry Lake Fissure Sink
27. Crooked Swamp Cave #1
28. Crooked Swamp Cave #2-3-7
29. Crooked Swamp Cave #4
30. Crooked Swamp Cave #5
31. Crooked Swamp Cave #6
32. Crooked Swamp Cave #8
33. Devil's Hole (Devil's Den)
34. Edsall Indian Cave
35. Emerald Cave
36. Farber's Drowned Cave
37. Fasolo's Cave
38. Fishers Cavelets
39. Ford Dennis Cave
40. Ford Dennis Fissure
41. Fox Den, Fasolo
42. Fox Den, Post
43. Francisco's Cave
44. Franklin Mine Cave
45. Glenwood Cave
46. Glenwood Indian Cave
47. High Point Rock Shelter
48. Indian Caves
49. Indian House Rocks
50. Inslee Cave
51. Kerreganot-Wormscrew Cave System
52. Lake Mohawk Cave
53. Lime Crest Cave #1
54. Lime Crest Cave #2
55. Moody's Rock
56. Mortimer's Cave
57. Newton Sheep Rock
58. Owens Cave
59. Papakating Cave
60. Paulison's Sinks Cave #1
61. Paulison's Sinks Cave #2
62. Paulison's Sinks Cave #3
63. Pipsqueak Cave
64. Post Cave
65. Post Hole (Snovers?)
66. Rocky Ledge Cave
67. Roseville Cave
68. Shotwell Cave
69. Sterling Hill Mine Cave #1
70. Sterling Hill Mine Cave #2
71. Sterling Hill Mine Cave #3
72. Sterling Hill Mine Cave #4
73. Stillwater Cave #1
74. Stillwater Cave #2
75. Stillwater Cave #3
76. Stillwater Cave #4
77. Sussex County Caverns #1
78. Sussex County Caverns #2
79. Swimming Pool Cave
80. Tanya's Cave
81. Terry's Pit
82. Todd Rock Shelter #1
83. Todd Rock Shelter #2
84. Tom Quick Cave
85. Tom Quick Mine
86. Van Syckle's Cave
87. Vulture Cave
88. Warbasse Cave #1
89. Warbasse Cave #2
90. Wild Cat Rock
91. Cat Swamp Rock Shelter
92. Van Horn's Ice Cave
93. Silver Mist Cave
94. Cave (Swartswood Lake)
95. Sinking Stream (Crooked Swamp)
96. Sinking Stream (Harmonyvale)
97. Sinking Stream (Huntsburg)
98. Sinking Stream (Illiff's Pond)

Warren County

99. Bear Cave
100. Betsey Cave
101. Bone Cave
102. Carpentersville Cave #1
103. Carpentersville Cave #2
104. Davidson's Cave
105. Devil's Kitchen #1
106. Devil's Kitchen #2
107. Devil's Wheelright Shop
108. Faery Hole
109. Fairly Low
110. Fairy Tube
111. Foul Rift Cave #1
112. Foul Rift Cave #2
113. Grouver Cave
114. Hainesburg Cave
115. Hainesburg Rock Shelter #1
116. Hainesburg Rock Shelter #2
117. Indian Hollow Rock Shelter
118. Jenny Jump Fracture Cave
119. Kalarama Spring
120. Kennedy's Mill Cave
121. Lake Susquehanna Cave
122. Panther Ledge Cave
123. Pioneer Cave
124. Railroad Cut Cave
125. Route 80 Cave
126. Sarepta Quarry Cave
127. Sarepta Quarry Cave #2
128. Stevens Camp Cave
129. Supplee's Mill Cave
130. Vail Cave
131. Waterfield Cave
132. Yellow Frame Cave #1
133. Yellow Frame Cave #2
134. Yellow Frame Cave #3
135. Yellow Frame Cave #4
136. Yellow Frame Cave #5
137. Yellow Frame Cave #6
138. Fox Den Cave
139. Cave (Johnsonburg)
140. Cave (Penwell)
141. Cave (Quaker Church)
142. Cave (Shiloh)

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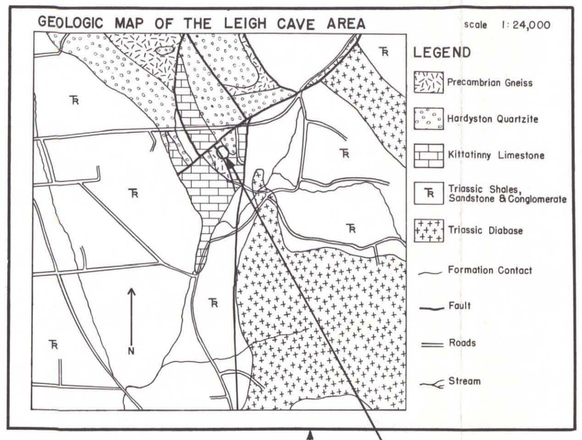
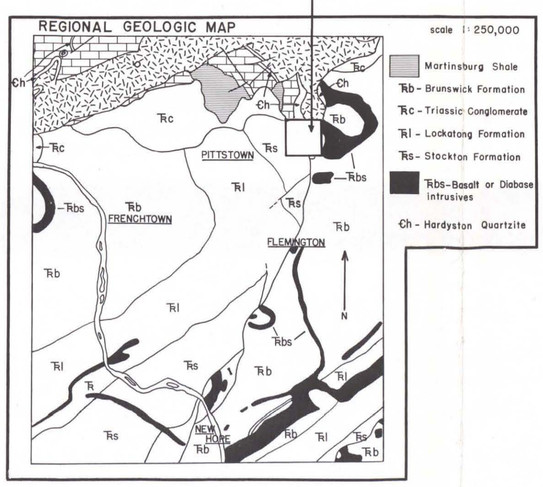


Cave and quarry area



LEIGH CAVE

SURVEYED 1960, BY
KITTATINNY GROTTO
&
NORTHERN NEW JERSEY GROTTO

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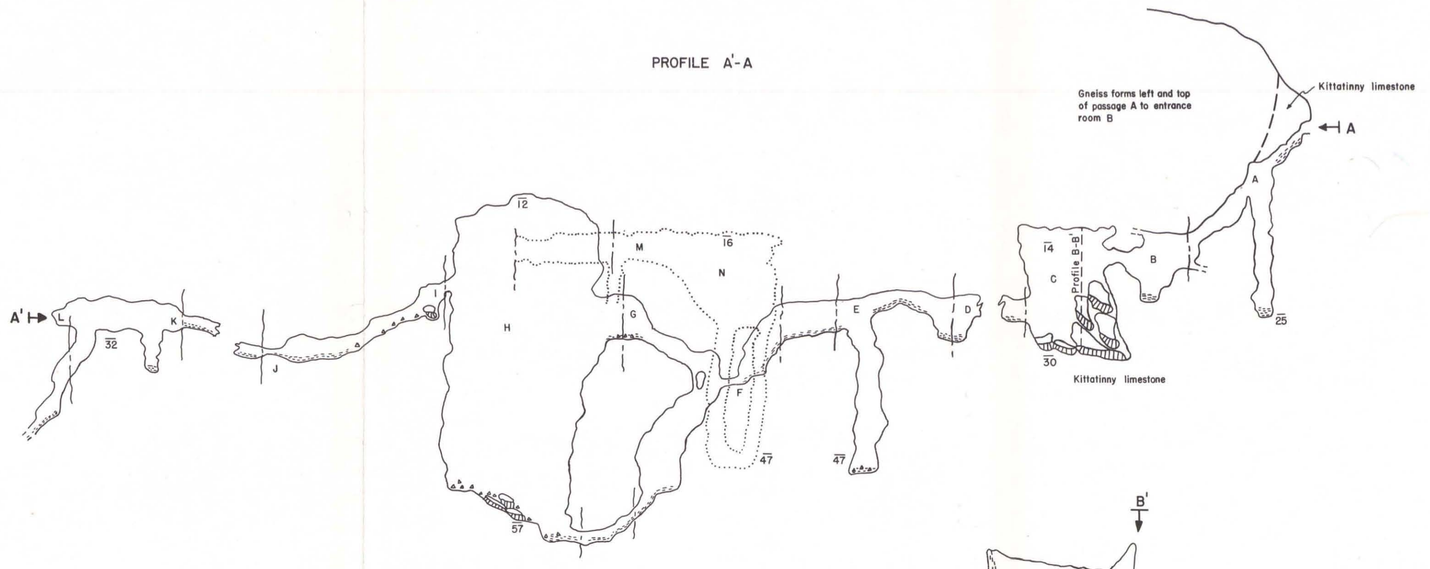
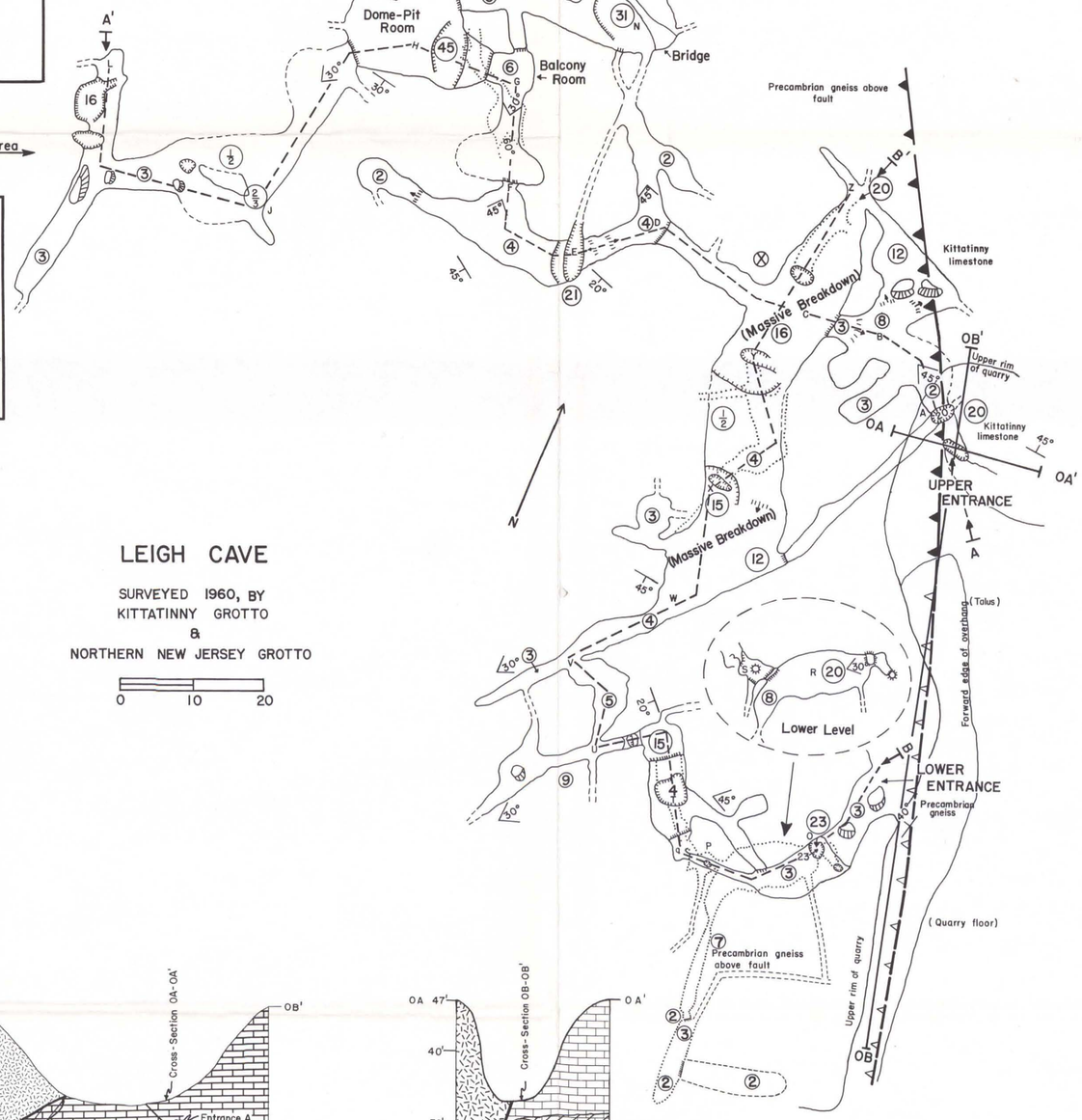
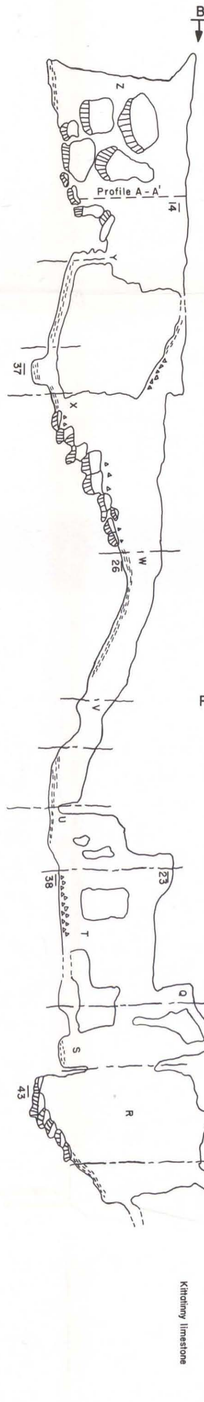
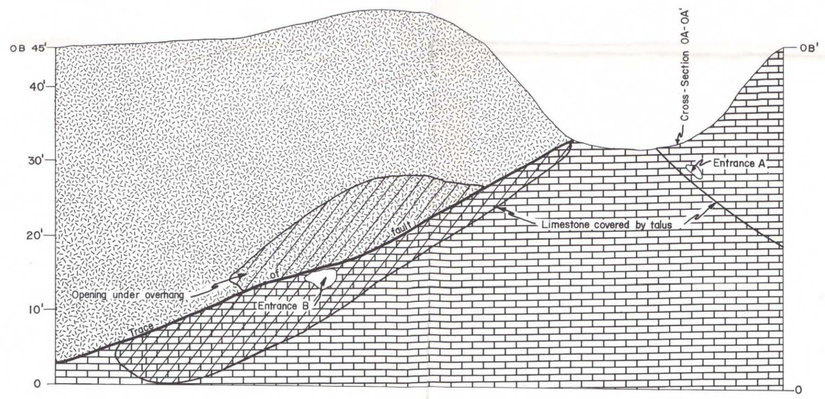
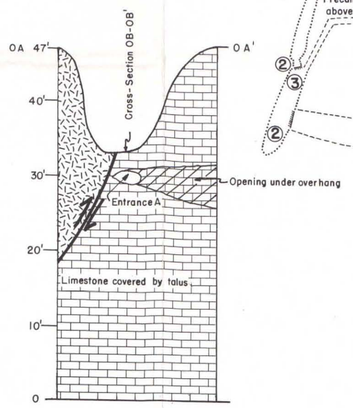
PROFILE A'-A

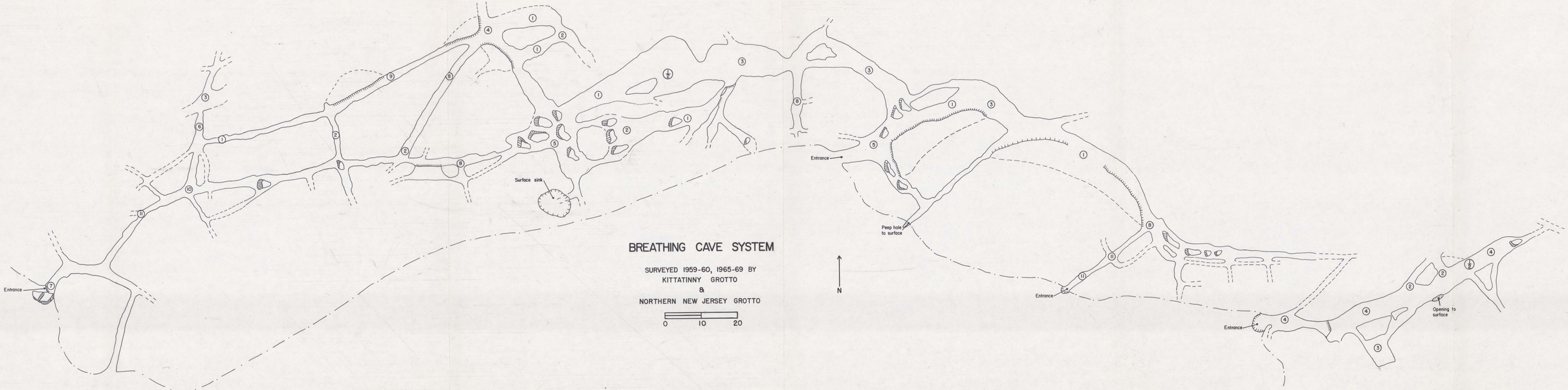












BREATHING CAVE SYSTEM

SURVEYED 1959-60, 1965-69 BY
KITTATINNY GROTTO
&
NORTHERN NEW JERSEY GROTTO

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DEVIL'S DEN

SURVEYED 1960, BY
METROPOLITAN GROTTO

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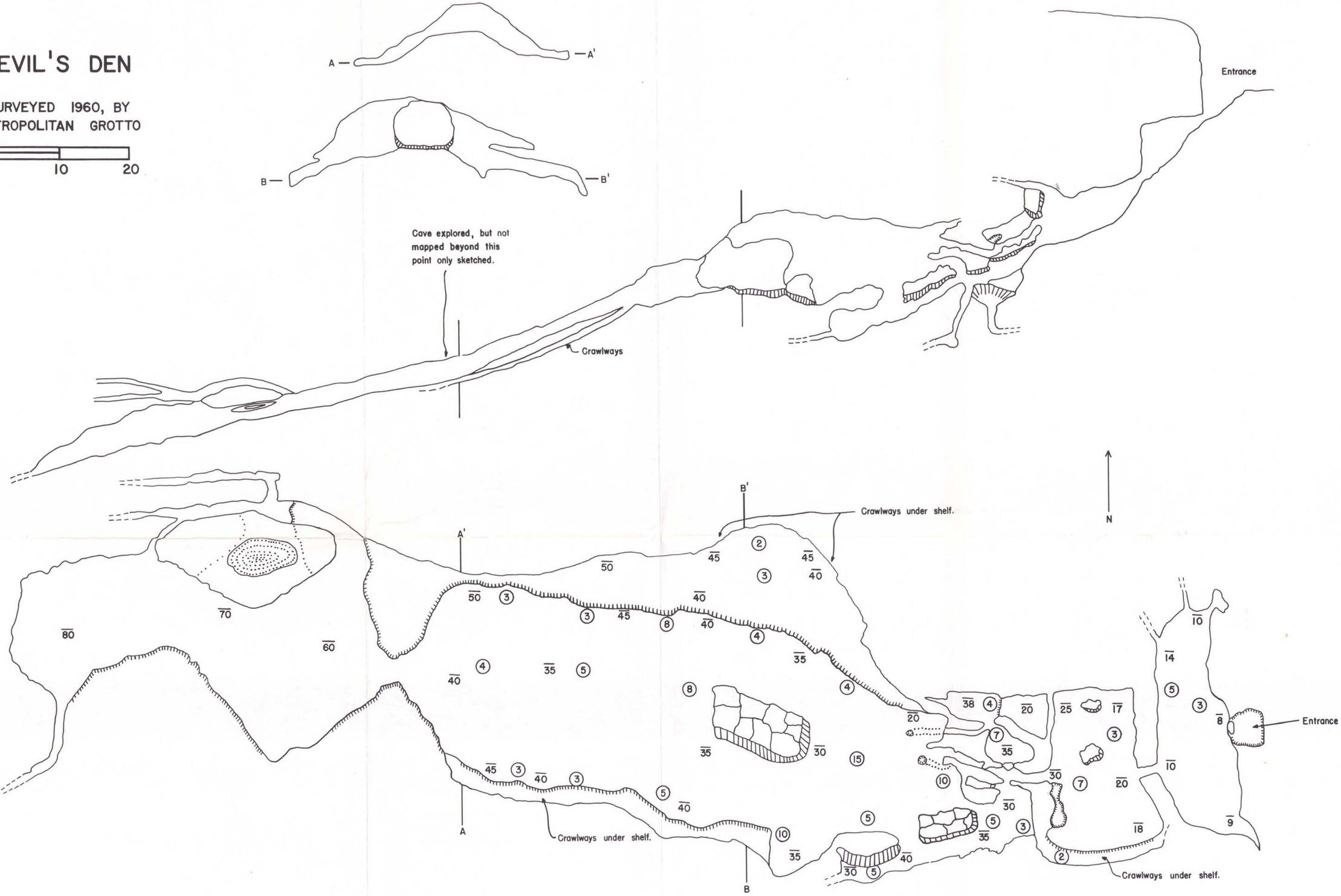

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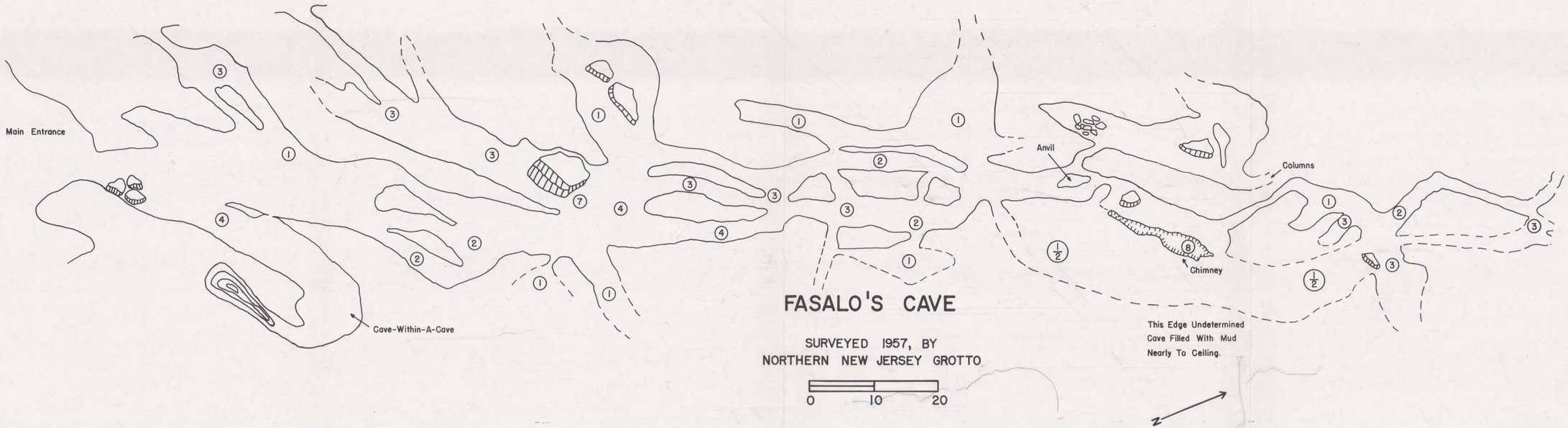

FASALO'S CAVE

SURVEYED 1957, BY
NORTHERN NEW JERSEY GROTTO

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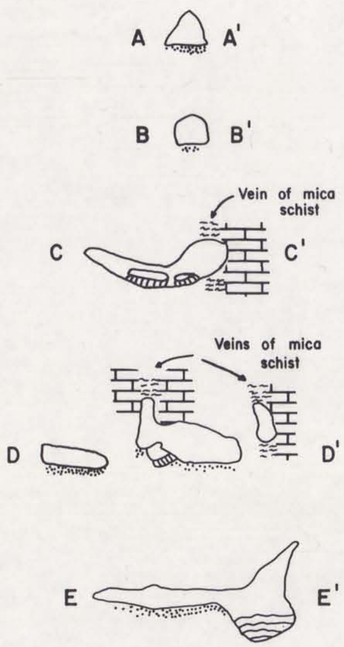
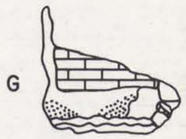
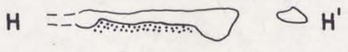
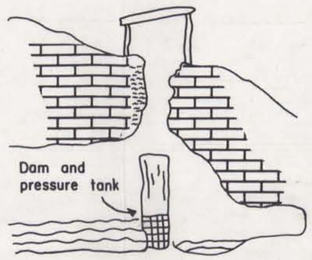
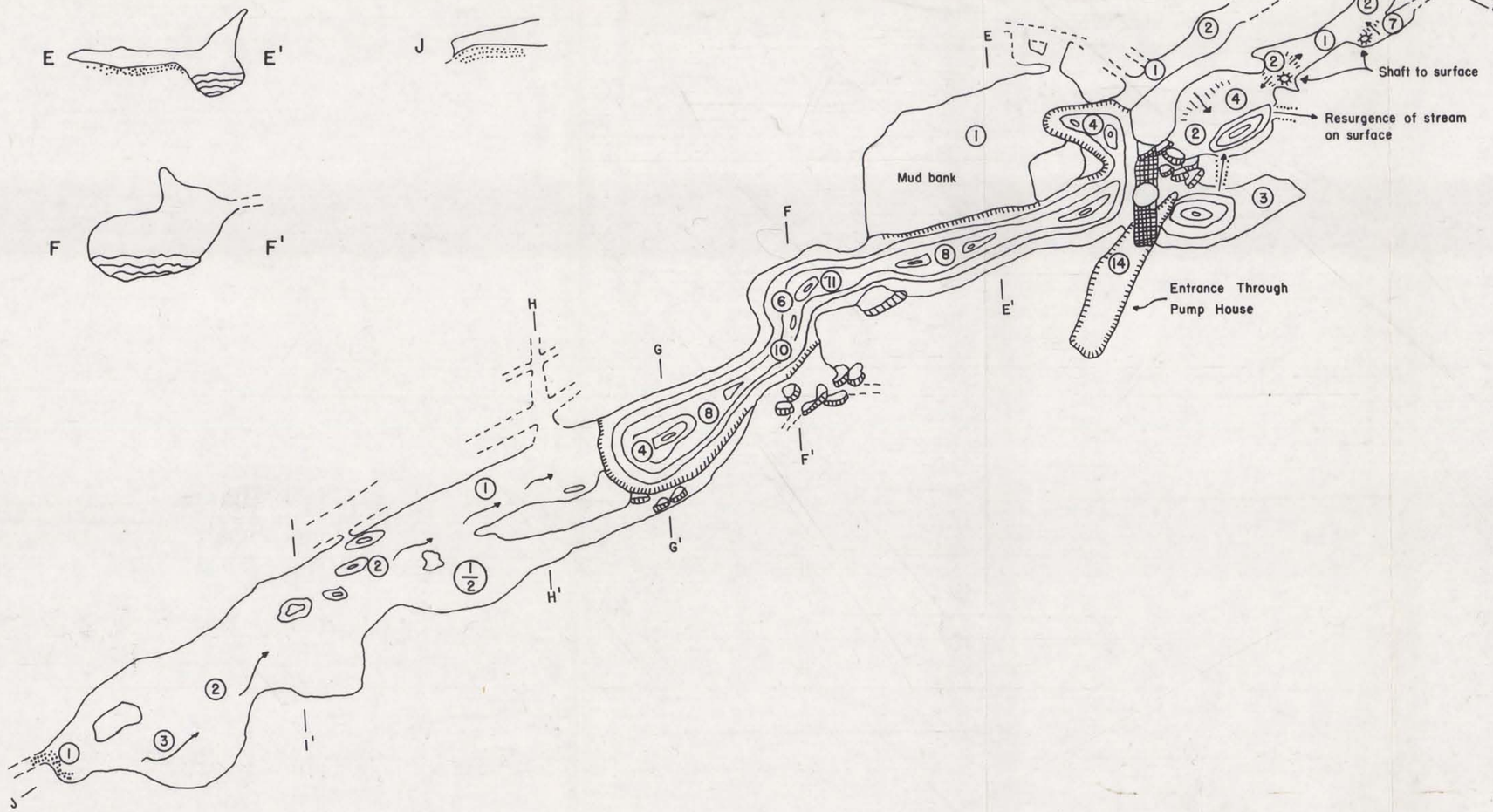






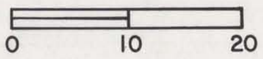


Entrance section, vertical offset



LAKE MOHAWK CAVE

SURVEYED 1960, BY
KITTATINNY GROTTO
&
NORTHERN NEW JERSEY GROTTO



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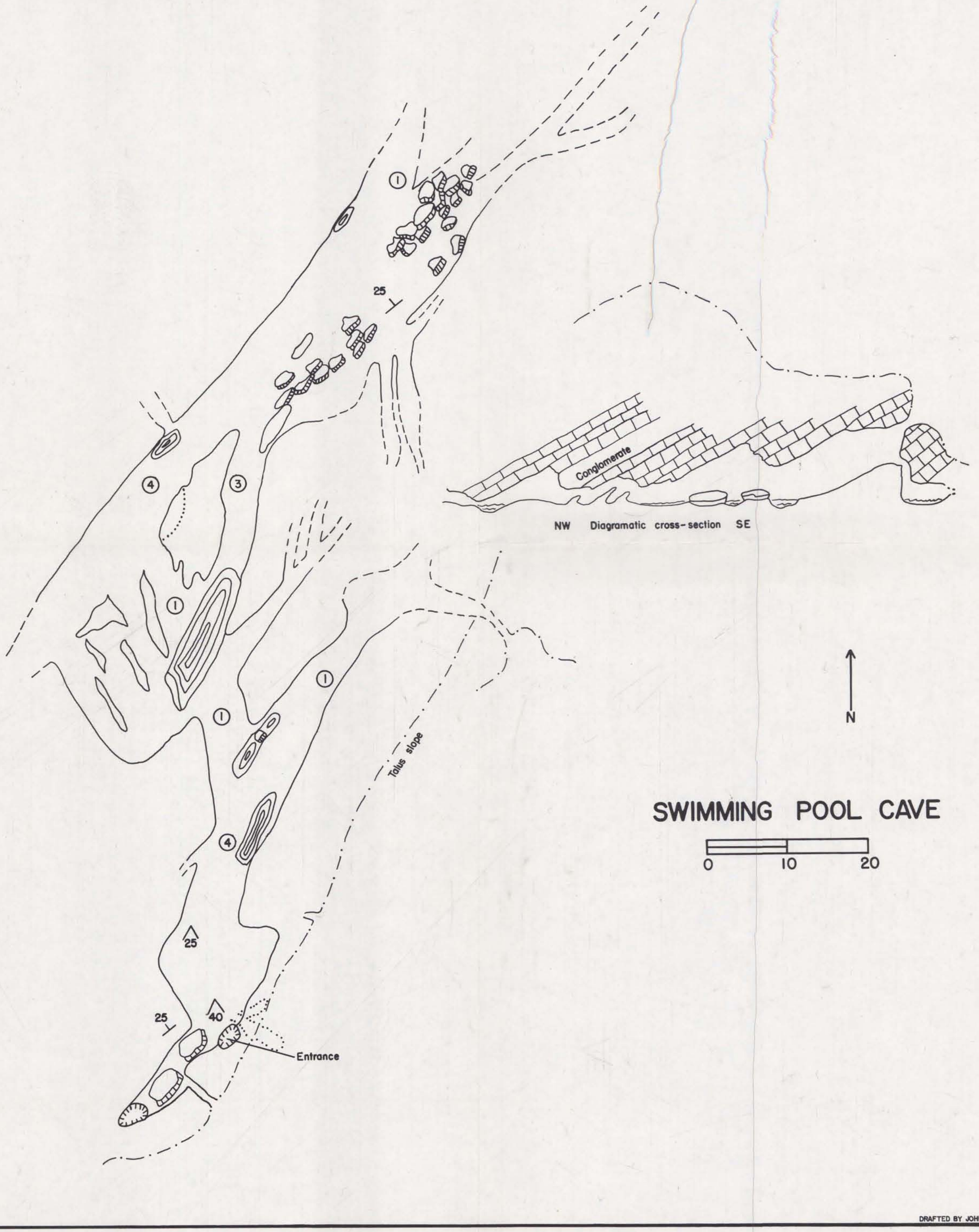

SWIMMING POOL CAVE

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