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SPELUNKING IN VIRGINIA

Jean Lowry

What is Spelunking?

Tourists driving through the Valley of Virginia are frequently puzzled to see groups of muddy, bedraggled people with lights on their miner's hats, emerging from holes in the ground. They do not look like coal miners; just what is going on anyway? The farmers in this section could tell them. They are becoming accustomed to being visited by carloads of eager strangers who ask: "Do you have any caves on your place? . . . Would you give us permission to explore them?" These are the "spelunkers," the happy-go-lucky weekend explorers who are finding Virginia a paradise abounding in caves large and small, many hitherto completely unexplored.

Over 2,000 people in the United States alone have taken up this interesting hobby. Every weekend groups, ranging from informal teams of two or three (see Plate 1) to well-organized expeditions numbering 100 or more specialists, set out to explore caves. Virginia continues to be the Mecca of the eastern cavers. Those fortunate enough to live in our Commonwealth have played host within recent years to visiting spelunkers from France, Britain, Mexico, Montana, Texas, Colorado, Ohio, Georgia, Pennsylvania, New York, and New England, as well as to those from adjacent states, many of whom are frequent visitors. The National Speleological Society, the nationwide organization of spelunkers, has again selected Natural Bridge, Virginia, as the site of its next annual convention.

These people who curiously choose to spend their spare time squirming through small holes and narrow channels, wallowing in sticky mud, crawling through icy streams, and scaling vast underground chasms--all in the Stygian darkness of the depths of the earth where the light of day has never penetrated--come from diverse walks of life. A large expedition recently included college students, housewives, physicians, farmers, U. S. Marines, bookkeepers, nurses, business executives, schoolteachers, engineers, patent examiners, an attorney, a dog trainer, a bricklayer, a dance instructor, a tax analyst, and a stenographer,

Plate 1. Cavers about to enter a cave in Virginia.

among many others. Yet each of these individuals has become a specialist in some phase of cave exploration. There are those whose major interest is in rock climbing, others specialize in cave photography, in cave mapping, in collecting and studying bats and other forms of life which inhabit caves, still others in searching for Indian relics, or in the study of one of the countless other features and aspects of the alluring "underground world." Each has an almost unlimited opportunity to become an authority, if he chooses, in a generally little-known field. Many of them graduate into the classification of the "speleologist," the true scientist of the underground world. The average caver, however, is happy to remain a "spelunker," to whom the lure of the unknown, the thrill of discovery, and the good-fellowship of the campfire are paramount (see Plate 2).

In Virginia, there are active groups of spelunkers located in Alexandria, Arlington, Richmond, Charlottesville, Waynesboro, Lexington, Clifton Forge, Roanoke, Blacksburg, Wytheville, and Big Stone Gap. Their numbers are increasing daily, according to latest information.

Plate 2. Experiencing the thrill of exploring an underground wonderland.

Concerning The Caves Themselves

Many people ask how caves are formed, how extensive they are, and if they are dangerous. Answers given by the uninformed often give the average person a very distorted notion of caves. He may be told that caves are formed by earthquakes, or were carved out by Noah's Flood; that Virginia is underlain by one huge honeycomb of interconnecting underground passages; that the caves are full of poisonous gases, and that they are inhabited by panthers.

How Are The Caves Formed?

What are the facts? Nearly all true caves occur in limestone. Many areas, such as the Appalachian Valley of Virginia, are underlain by extensive beds or bodies of limestone. Limestone is composed mainly of calcium carbonate and is dissolved by pure water but is many times more soluble in water containing carbon dioxide or organic acids. Rain falling on the ground absorbs carbon dioxide from the air and picks up acids from the roots of trees and grass and from decaying leaves and other vegetation. As the acid-bearing water seeps downward through the soil into the ground, it enters cracks and small joint-openings in the underlying limestone bedrock and gradually by solution enlarges them into underground conduits. Numerous trickles or tiny streams may unite to form underground rivers which, with larger volumes of acid-bearing water abetted by the abrasive action of sand and loose rock fragments they carry, just as surface streams do, excavate or carve out larger and larger channels. The partial or complete collapse of the roof of a channel further alters the shape, size and appearance of the resulting underground passage. The jumble of fallen blocks and slabs is known to cave explorers as a "breakdown" (see Plate 3). In the limestone areas of Virginia many surface streams suddenly disappear underground for parts of their courses only to reappear as surface streams several miles distant. Most springs in limestone areas are merely the surface outlets of underground streams.

Below the water table, the circulation of water in crevices and openings is very slow, much slower than above the water table. As the rivers on the surface deepen their valleys and as the land surface is lowered, the water table is also lowered and the cavities formed beneath it are then occupied and enlarged by the underground streams with their loads of mud, sand and rock fragments. In this lowering and deepening process portions of many cavities are completely filled with deposits of clay and gravel brought in by the streams.

As the underground streams seek lower levels and develop new, deeper conduits, the older, high channels become dry abandoned passages or caves. Further enlargement of the passages by solution and stream erosion ceases and deposition of travertine, the many varied kinds and types of "cave formations," begins. The caverns of Virginia are world famous for the color variety and array of the stalactites, stalagmites, columns, draperies and flowstone formations with which they are adorned and which the average person invariably associates with caves. Not all caves contain travertine formations, however. Some caves are barren of any decorative ornamentation.

As above stated the deposition of travertine ornamentation is a late feature in cavern development. Water containing dissolved limestone (calcium carbonate) percolates or seeps through crevices and bedding planes in the limestone and trickles down the walls, or drips from the ceiling of the cavern passages. The circulation of air in the cavern passages and the loss of carbon dioxide from the trickling and dripping water cause it to evaporate. As each drop falls from the roof or ceiling, and as the water slowly trickles down the walls, it leaves behind a thin film or incrustation of calcium carbonate. This is the same thing as the white crust deposited in kettles, pans and cooking utensils by hard water.

As new drops of water form and break away from the same place, a slender, hollow, "soda straw" or "icicle-like" tube begins to grow downward from the roof of the cave. When the end of the tube becomes clogged or filled by some suspended material the water trickles down the side of the tubular stalactite, increasing its thickness and adding variety to its form. A cross section of a stalactite shows a concentric circle development or growth similar to tree rings. A row of stalactites frequently marks a joint or crevice in the ceiling (see Plate 4).

Usually a drop of water falls from the ceiling before it has completely evaporated and a thin film or incrustation of calcium carbonate is deposited on the floor and thus a stalagmite grows upward

Plate 3. Examining a "breakdown" of rock slabs in a cave passage.

beneath the stalactite. Through continued growth a stalactite and stalagmite may unite to form a column like those shown in Plate 4. If the water, instead of dropping from the ceiling trickles down a wall, a sheet-or blanket-like cover of travertine (calcium carbonate) termed "flow-stone" forms on the cave wall. Numerous beautiful, glistening, white or multicolored "frozen cascades" are formed in this manner (see Plate 5).

In places, water dripping from growing stalactites and trickling down the walls and over the floor collects in pools in depressions or low spots on the uneven cavern floor. As the water becomes saturated with calcium carbonate and overflows, a ruffled, corrugated rim of calcium carbonate is formed around the pool. A series of ruffle-rimmed pools may thus be developed at successive heights over the floor. Occasionally pools so formed are deep and large enough for the intreped spelunker to bathe in. Frequently the inner rim of the pool is lined with beautiful, delicate, crystal growths (see Plate 7).

The profusion and varied coloring of the decorative travertine formations found in the caves of Virginia are features of most interest to most visitors. Varied shades of pink, orange, and red are due to small amounts of iron, manganese and other mineral salts in the percolating or trickling water from which the travertine was deposited.

Much has been said about the length of time required to produce a stalactite or stalagmite. The most often quoted figure is one cubic inch of growth every hundred years. No one knows where this figure came from; actual measurements indicate that the rate of growth varies widely from one cave to another, and in different parts of the same cave. The rate of growth depends on many variable factors, including rate of flow and drip of water, degree of saturation, relative humidity of the air, and air currents. In some cases growth may be imperceptible; in other cases growth may be extremely rapid. A case is known of "soda-straw" stalactites several inches long being formed in six months.

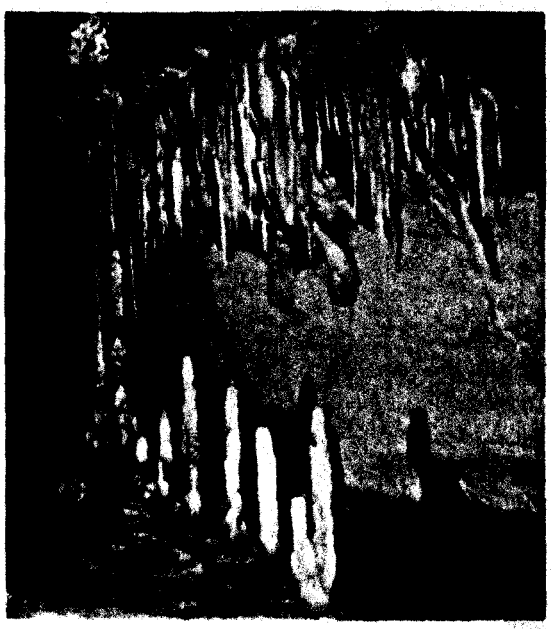

Plate 4. Stalactites (on ceiling), stalagmites (on floor below) and slender graceful columns in a cave passage. Note single slender "soda-straw" stalactites hanging from ceiling.

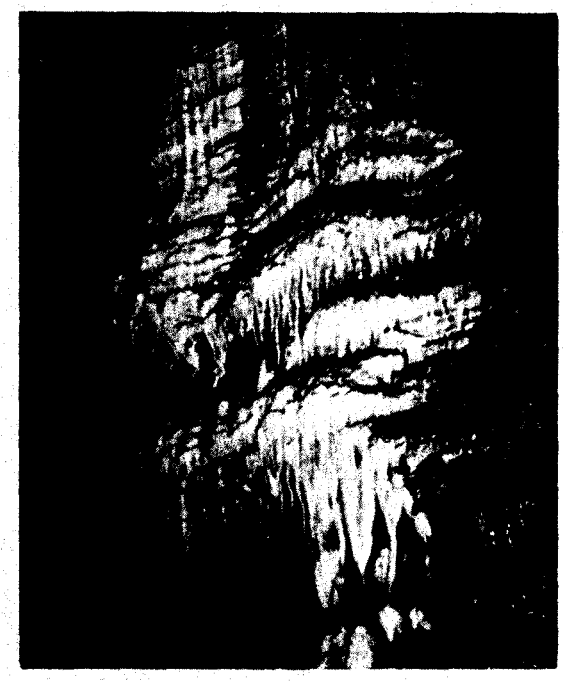

Plate 5. A frozen underground cascade. A typical flowstone formation found in caves in Virginia.

How Extensive Are The Caves?

Nearly everyone is familiar with a story of some cave that "comes out way over on the other side of the mountain." The experienced spelunker is aware that this is usually impossible because the core of the mountain is almost always formed by a layer of hard sandstone which separates the beds of limestone on one side from those on the other. However, caves with more than one entrance are not uncommon. Usually openings may be found on opposite sides of a low hill (not a mountain!) or in a line along one side of a mountain. Reports of caves that "go for miles" are generally greatly exaggerated, although a few such do exist in Virginia. The largest cave mapped to date in our State has a network of passages totaling a little over six miles in length. Although countless small caves are common, the number of caves known to be over a mile in length is not over two dozen. The Cave Club of Virginia Polytechnic Institute at Blacksburg has a standing offer of $5.00 per mile to anyone who reports to it a new cave over a mile in length. So far the club has never had to pay off, although it would be pleased to do so. Fortunately, for the avid spelunker, size or extent is only one of the many features of a cave which interests him.

Depth of a cave is another factor which is almost always exaggerated. Who has not heard of some "bottomless pit"? The deepest known cave in Virginia is about 600 feet deep. Although this may seem insignificant in comparison with the stupendous depths of some caves in the Alps and Pyrenees, it is sufficient to call for considerable skill, experience, and equipment on the part of would-be explorers.

The National Speleological Society is cooperating with the Virginia Division of Geology in a systematic survey of Virginia caves, to discover, record, and measure as many as possible. The accompanying map (Plate 6), shows the region of

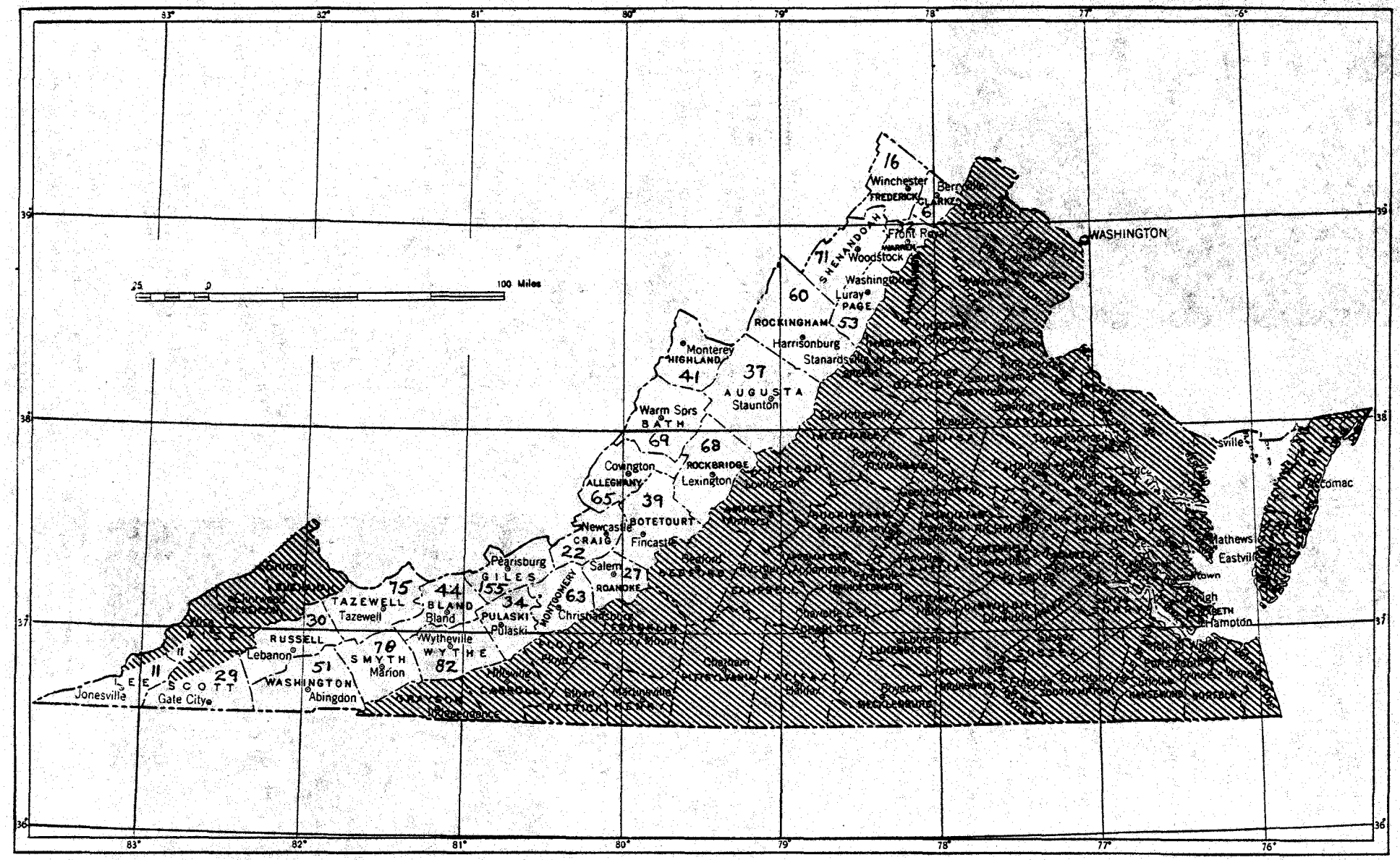

Plate 6. Index map showing the Cave Region of Virginia and the number of known caves in each county.

Plate 7. A spelunker contemplating a dip in an underground pool at the base of a frozen snowbank.

Virginia in which caves occur and the number of caves now known in each county. The present total for the State of over 1,200 caves is undoubtedly but a small part of the eventual total.

Is Cave Exploring Dangerous?

Yes, cave exploring is dangerous. So is crossing a busy street. In each case the exercise of good judgment prevents most accidents. The relative safety of cave exploring compared with other sports may be seen in the fact that there has never been a fatal accident among the nearly 2,000 members of the National Speleological Society, although inexperienced persons have become lost, injured, or even killed in caves.

There are no poisonous gases in caves in Virginia. Two caves have been reported in which candles will not burn. This is due to poor air circulation, and is a danger signal which the wise caver heeds.

Contrary to most people's impression, snakes are seldom found in our caves. The constant year-round temperature in the caves of 50° to 55° F. is too cold for them. Although skunks, foxes, opossums, groundhogs, wood rats, wildcats, and sometimes even bears make their homes in the entrances of caves at times, these generally shy animals are not likely to be encountered by the caver.

Flooding of some caves after a heavy rain is a potential source of danger. The spelunker should look for the highwater mark in a cave and carefully check the weather before entering a cave subject to flooding.

The most frequent cause of accidents in cave exploration is falling. Proper use of safety ropes and sturdy rigging, and reasonable precautionary measures can largely eliminate this hazard.

Although it is a rare occurrence for rocks or slabs to fall from the roof while anyone is in a cave, a hard hat, such as used by miners and other underground workers, is a good protection against the showers of dirt and loose stones dislodged by some venturesome climber.

The insatiable urge to explore which impels the spelunker to climb piles of loose rocks, and even to force his way down through the spaces between them in the hope of finding a passageway through them, has been responsible for many accidents, of which, probably the best known is that of Floyd Collins. Collins was trapped by the shifting of a loose rock while exploring alone in Sand Cave in Kentucky in 1925. The futile attempts to rescue him attracted nationwide attention at the time. The deep impression this made on many people is largely responsible for the belief that cave exploring in this country is perilous.

The experienced spelunker would not think of entering a cave alone, or without notifying someone where he is going and when he expects to return. He is always equipped with a good light, and a spare in case of need. In confusing passages he marks his way as he goes. Such elementary common sense practices convert cave exploration from the realm of a foolhardy exploit into that of a pleasant pastime.

Practical Uses of Caves

Since the days of the cave dwellers, man has found many uses for caves. They have provided shelter not only from the elements and wild animals, but also from enemies and bombs. During this country's early wars, gunpowder was made from the "cave dirt" or saltpeter leached from cave dirt. Many Virginia caves still show evidences of the operations of the saltpeter miners. Today many farmers use near-by caves for rootcellars and storage. Mushrooms grow well in the even temperatures found in a cave. Caves have been used in the past for the storage of documents, and are now being considered for such uses and for oil and gas reservoirs.

The commercially operated caves of Virginia are world famous. Elevators, cement walks, steps, guard rails at dangerous spots, and electric lighting make available to the general public the subterranean wonders of Virginia, which attract spelunkers from all over the country. Skyline Caverns, Battlefield-Crystal Caverns, Melrose Caverns, Endless Caverns, Shenandoah Caverns, Massanutten Caverns, Grand Caverns, Dixie Caverns, and Cudjo's Caverns are among the underground wonderlands of Virginia, which have been developed and opened to the public.

Invitation to Spelunkers

We in Virginia are proud of our caves. The considerate spelunker who asks the cave owner's permission to explore caves, protects his property, and who is careful not to break or deface the decorative formations in the cave will find true Southern hospitality here. We can heartily say, "YOU'RE WELCOME IN VIRGINIA!"

The writer wishes to express her thanks to the following for their kindness in furnishing copies of photographs and granting permission for their use in this article: Earl Thierry of Portsmouth, Virginia, (Plate 1), and S. A. Lloyd of Waynesboro, Virginia

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(Plates, 3, 4, 5, and 7). Plate 2 is from a photograph by the writer.

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RECENT ACTIVITIES OF INTEREST

The Tri-State Zinc Company is constructing, on property in the Timberville district in Rockingham County, a modern mill for the treatment and recovery of zinc ores. It is reported that when completed, the mill will have a capacity of 750 tons of ore per day.

Construction of the new plant of the Appalachian Power Company in Russell County and other new construction projects in progress or contemplated in the southwestern part of the State, have aroused further interest in the possibilities of large-scale production of natural gas in the western and southwestern parts of the Appalachian Ridge and Valley region.

During the past two months three new gas wells were reported completed as producers, one each in Rockingham, Buchanan and Dickenson county. One test in Russell County was abandoned as a dry hole.

The Shell Oil Company has recently established a new district office in South Point, Ohio, not far from Charleston, West Virginia, in order to keep closer in touch with explorations and developments in southwestern Virginia and adjoining parts of West Virginia.

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RECENT FIELD INVESTIGATIONS

During the 1956 Summer Seasonal Studies Program of the Division of Geology, field work was in progress on the following projects:

1. Geology and Mineral Resources of the Broadway quadrangle, Rockingham County, Wilbur T. Harnsberger and Joseph G. Patterson,
2. The Chepultepec Limestone in Shenandoah Valley, Robert W. Wood,
3. Geology and Iron-ore Possibilities in the Purgatory Mountain-Buchanan District, Botetourt County, Lawrence C. Rowan,
4. Magnetometer Survey of the Lynchburg Hematite and Magnetite District, Amherst, Nelson and Appomattox counties, H. Robert Hopkins,
5. Economic Possibilities of Clays and Shales in the Danville Triassic District, Carl T. Meyertons.

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