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CAVES OF MOLTEN STONE
by Stewart Peck

Few Iowa spelunkers have had the chance to see any caves other than those in limestone and dolomite and even fewer realize the immense beauty, rivaling that of the spar caves of Dubuque, which can be found in these other caves. The "different" type of cave I am talking about are those found in lava flows and known primarily as lava tubes.

While traveling to Sequoia National Park in California for my summer job with the National Park Service, I passed through Craters of the Moon National Monument in Arco, Idaho. After talking with the monument Superintendent, and the naturalist of the monument, I expressed my desire to see some of the lava tubes in the monument. Mr. Henderson suggested that his son, Porter K. (Kent) Henderson might like to accompany me into the caves.

The next morning, June 6, I met Kent Henderson and we prepared our spelunking gear and were off for Arco Tunnel, the most expansive known tube in the monument. Because Kent and I were both NPS employees, were granted permission to see this cave, which is closed to the public by a gate 150 feet inside the cave mouth. The cave has been closed to the public because of its outstanding scientific value.

The entrance to the cave, known for many years, is a large collapse in a pahoehoe lava flow. The cave floor is about 30 feet beneath the surface of the flow. This cave was formed as all other lava tubes, when the surface of a molten flow cooled but the lava inside the flow remained in a fluid state. The still molten internal lava continued to flow when the source had ceased. This then left a cave beneath the hardened lava crust, after all the molten interior had gone on its way. The cave is very peculiar in that it is not one tunnel but has many branch tunnels connecting with it that may be entered and has several places where entire loops may be made in the cave passages. With this cave possessing over 4000 feet of mapped passage, it is one of the longest known lava tubes in the country.

After we had gone through the gate, Kent and I came to an area covered and coated with wall and floor ice stalagmites and stalactites. A very fine reticulated pattern was etched into the ice due to the brief periods of freezing and thawing. Numerous fine, vertical striations were present on one 3-foot tall ice stalagmite. These caves have a tendency to store coldness for a considerable period for the cave temperature is about 28-35 degrees F. the year round in this section.

In another 100 feet we came to the apparent end of the cave. It was only a few years back that someone had noticed the low crawl here and entered it to find thousands of feet of virgin lava tube. Beyond this the crawl opened into rooms 30 feet high and 40 feet wide. The floor turned from the smooth pahoehoe lava into rough, sharp lava which was soon to tear the heel

from my caving belt, and in the low crawlways rip (sweatshirt to shreds. Kent showed me places where ledges of lava indicated periods of cooling and flowing the cave's genesis. He showed me how many of the chunks of breakdown were melted into the floor to show that the collapses had occurred while the floor was still hot. Near the end of the cave collapse has permitted a small hole the size of a silver dollar to let light into the cave. A nest of a wood rat was found near this hole.

The back area of the cave is decorated in profusion with lava stalactites. While the wall and ceiling lava were still in a heated and very viscous form, after the cavity had been created, this lava, through the force of gravity, started to flow from the ceiling. These then hardened after some had reached a length of close to 12 inches and after most had obtained a needle sharp point. Some have bulbous ends indicating a second melting period. When the dripping lava fell to the floor before it hardened, the accumulated pile of irregularly rounded lava resembled the shape of copralites (fossil excreta).

In one room Kent showed me a large wall accumulation of a white material cold as snow which did not melt. It possessed a somewhat metallic taste and fused under the heat of a carbide flame. The mineral has been identified by another naturalist in the monument, Peter Sanchez, as being thenardite. The mineral possesses a very high water of crystallization and will rapidly turn into a white powder when it is removed from the cave. When Mr. Sanchez made his determination he had to keep his specimen under refrigeration in 100% humidity to simulate cave conditions so the specimen would not change.

Animal life in the cave was not abundant. Droppings and urination points of wood rats were seen. The cave possesses white spiders and millipeds of which we saw one each.

We then left the cave and Kent showed me some more of the surface features of the lava fields. One of the most interesting of these was a feature called a spatter cone. Spatter cones are formed from accumulations of clots of viscous lava adhering to one another. They are steep sided cones of small height and diameter. I was intrigued by one that was listed on the topo map of the park. It was called Crystal Pit.

Crystal Pit is a spatter cone for which the throat has not been filled with ash and cinders. The entrance is about a three foot diameter hole at the top of the cone. Upon dropping a rock into the hole and not hearing it land, Kent and I decided to explore it the next day. The pit was known to have been entered about 1922 by Bob Limbert and S.A. Paisley about 1925. No one recently has been in it according to the records at the monument.

The next morning, June 7, I showed Kent the methods of rappelling and prussiking and we were on our way to the cone. Our ropes were tied to several large lava blocks at the entrance. I went in first with Kent safetying me and he followed on prussik safety. The throat-like entrance drop went down 60 feet with a gradual enlargement in diameter from 3 to 7 feet. Here it belled out into a large room about 35 feet wide, 35-40 feet high and about 70-80 feet long. Total distance from surface to cave

floor is about 100 feet. Upon reaching the bottom I took a quick preliminary look about and had Kent come down. We saw that the room was the main part of the cave. A small room existed in the SE part of the cave and a tunnel went in a NW direction. Ledges were visible on the walls indicating the presence of shorelines of ancient cooling and subsiding lava pools. One main ledge entirely encircles the main room and can be seen on the map. At least 4 other lava pool levels were present.

The mineral present were truly beautiful and fantastic. Lava stalactites were over 12 inches long and hung in profusion. Most of the walls were encrusted with crystalline gypsum upwards of one inch in crystal length. Some lava stalactites had been covered with gypsum so it looked like they were stalactites of gypsum crystals. Some were so coated it looked like they were stalactites of gypsum. One appeared to be a gypsum stalactite with no lava center. Thenardite was found in abundant profusion. The SE room held a great deal along with the NW end of the big room. These deposits were up to 6 inches thick and covered areas greater than a square yard. Some ~~of~~ showed rounded depressions and irregularities as if it had been water eroded, but was probably due only to solution of the mineral at wet seasons. A yellow wall efflorescence was found in the NW corner of the big room and in the upper levels of the far NW passage. It did not burn so it was not sulfur. A sample was collected and given to the monument museum for later identification. It could possibly be copiapite, a mineral sometimes found in the Dubuque, Iowa area.

Evidence of animal habitation was found in the form of pack rat droppings, a skull, possibly of pack rat, a nest with open top like that of a bird and a skull of a large bird of prey. A piece of fiber composed of woven grass was found that was about $2\frac{1}{2}$ inches long and $\frac{1}{4}$ inch wide. This was most likely made by Indians of the area and brought into the pit by rats.

The floor of the pit is mainly cinder and lava chunks beneath the entrance as shown by the map and the original depth can be seen on the map in the floor levels of the two adjacent rooms. The lava possessed a great deal of iron which had a very noticeable effect on the Brunten compass bearings, but the whole cave extends in a line, that line also being the rift through which all of the lava poured in the several devastating eruptions in the monument. Some of the breakdown on the floor was melted to the floor showing the collapse had occurred when the rock was still fluid.

After Kent and I finished our preliminary investigation of the pit we prussiked out and went to town to get supplies. We again went down and began mapping and completely photographing the cave. Of the \$11.00 spent on photo supplies only 5 pictures were considered worth keeping for my camera was very inconsiderately on the blink. With the assistance of Kent and some pitons I was able to climb up into the upper chambers in the NW passage. The walls of these rooms consist of three inch crusts of lava and under that are red unfused cinders. It is believed that this area underlies the adjacent spatter cone.

After we again came out, we reported our findings to the monument headquarters and deposited the mineral and rock samples we had collected with them for later determination and analysis. Because of the great scientific importance of this pit, permission to enter will be denied to all except qualified scientists when accompanied by an employee of the monument.

I would like to express my appreciation to Monument Superintendent Henderson and his son Kent and the Monument Naturalist David Ochsner for the help and cooperation they gave me during my stay in the monument.

TN ↗



PLAN



KEY



Breakdown



shoreline of
a subsiding
lava pool

G
T
C

Gypsum
Thenardite
Copiapite



Surface of
spatter cone

Talus

G Gypsum
T Thenardite
C Copiapite



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

IN REPLY REFER TO:

GEORGE W. MOORE
U. S. GEOLOGICAL SURVEY
MENLO PARK, CALIFORNIA

August 9, 1961

Mr. Stewart Peck
Box 106, Giant Forest,
Sequoia National Park,
California

Dear Stewart,

The mineral which you brought under refrigeration from Crystal Pit Lava Cave in Craters of the Moon National Monument is mirabilite, $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$. The white powder which forms from the mineral when it dehydrates is thenardite, Na_2SO_4 . This property explains the previous identification of the mineral by the University of Utah as thenardite.

In 1951 I studied some of the white powder which occurs in gypsum cave blisters in Soldiers Cave by optical methods and found gypsum, calcite, and opal. I would like to re-examine this material by x-ray methods if it is possible for you to collect some. Similar material from the larger cave blisters in Palmer Cave would be even better if you should be planning to go there.

Sincerely,

George

George W. Moore

Copy: NPS, San Francisco
Craters of the Moon Monument
William B. White

Craters of the Moon
National Monument

Superintendent

Sup. Park Rangers

Adm. Asst.

Maintenance Men

Naturalist

#1 AL.

Sequoia, California