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THE CRYSTAL ICE CAVES

History

and

Development

of

The Area



North Pleasant Valley Road  
American Falls, Idaho 83211

THE CRYSTAL ICE CAVES  
American Falls, Idaho

The Snake River Lava Plain

The Crystal Ice Caves are located in the central part of the Snake River Lava Plain. This plain, which is 20,000 square miles in area, cuts across the mountain ranges of Southern Idaho in a huge, sweeping arc from Island Park to the Oregon border. The Snake River flows near the southern edge of the plain in most places as it crosses Idaho from east to west. One of the great ground water flows of the earth also moves slowly beneath the plain. Along one forty-mile stretch of the Snake River gorge, in the vicinity of Thousand Springs, which is west of Twin Falls, Idaho, from two to three billion gallons of water a day pours out of the lava rock into the Snake River.

The Plain is composed almost entirely of flows of dark lava called basalt. Some of these basaltic lava flows are of recent origin--that is roughly 10,000 years old or less. These recent flows are interesting because one can walk out on them and see how they looked just after the lava cooled. They are little changed by weathering. A series of these lava flows, which can cover many square miles, is called a lava field. The Crystal Ice Caves Lava Field, one of the smallest on the plain, covers about one and one-half square miles. South and west of this field is the large Wapi Lava Field which is 160 square miles in area. To the north lies the Craters of the Moon Lava Field. The Craters of the Moon National Monument, 80 square miles, covers a small part of this vast field.

A volcanic rift cuts through the center of the Craters of the Moon National Monument. It is called the Great Rift and is actually a zone of huge cracks in the earth, out of which molten lava poured. It was the source of all the surface lavas of the Craters of the Moon National Monument.

The Great Rift, which is the longest volcanic rift in the conterminous United States, extends southward to the north edge of the Wapi Field, a distance of at least forty miles. Here it disappears under the lava flows.

All of the lava of the tiny Crystal Ice Caves Field also came from the Great Rift, which bisects the field. Later, we will discuss the nature of the rift in more detail in the vicinity of the Crystal Ice Caves.

### History and Early Exploration

Long before white men set foot on Idaho soil, Indians roamed the Crystal Ice Caves area, hunting various game including the American Bison. Many Bison skeletons have been found in the Great Rift, especially south of the King's Bowl. The Indians may well have driven some Bison into the shallower sections of the open rift for an easy kill. A few Indian artifacts have been found in the area. The only accessible perennial water supply to be found for many miles in any direction is Crystal Pool, which is 150 feet below the surface at the bottom of the King's Bowl. The Indians must have made at least some use of this water supply.

Some strange, very faint markings have been discovered on the walls, near the entrance of a large cave behind the pool. Scientific investigation of these might well reveal they are Indian writings. However, the interior of the cave remained shrouded in mystery for there is no evidence that the Indians explored the dark depths of the Great Rift.

Long after the early settlers first came to Idaho, sheepherders began traversing the interior of the Snake River Plain tending their flocks. They came across the King's Bowl and eventually the area became fairly well known to the more adventuresome local people. It was at this time that the King's Bowl was named. A large cave (the one containing the strange markings) was discovered leading southward from the bottom of the Bowl, and over the years it was explored by many people.

Other caves were discovered and explored, but still the interior of the Great Rift had not been penetrated and no one really knew what lay beneath the earth near the King's Bowl.

In 1956, two ardent spelunkers decided to find out. Perry Fenstermaker, an Aberdeen school teacher, and David Fortsch, a student at Idaho State University in Pocatello, began to systematically probe the rift, descending to the bottom of every hole they could find.

In September, 1956, on one of their many expeditions to the area, they descended to an ice floor in a particularly deep abyss a thousand feet north of the King's Bowl. The tiny hole in the ice floor did not look promising, and thinking they had reached an apparent dead end, the two men turned back. David Fortsch started toward the surface and dropped his flashlight. It slid toward the tiny ice hole, then disappeared into it. He decided to go after it.

Much to his surprise, the ice hole became spacious after he had gone about ten feet--The Crystal Ice Cave had been discovered!

These young spelunkers chose the name of Liar's Cave for their amazing discovery, for when they told others, no one seemed to believe them.

#### The Crystal Ice Caves Lava Field

This tiny lava field contains a surprising variety of volcanic features, only a few of which will be mentioned here. The map shows the entire field and the nearby edge of the Wapi Lava field. Many of the more interesting and prominent features are named. The Great Rift bisects the field and disappears under the north edge of the Wapi Field. Notice that a secondary system of fissures occurs about 1,700 feet on each side of the main rift. There is no evidence that any lava flowed from these secondary fissures.

A brief study of the Crystal Ice Caves reveals an interesting sequence of volcanic events. The first lavas from the rift flowed over a soil layer. This soil is exposed in the King's Bowl and can be examined close-up at the entrance of the Caves. Here, completely burned blades of grass are conspicuously visible on the bottom of the first flow. Also, roots found in the soil can be radiocarbon dated. This will tell the age of the lava flows and the caves. No other carbon material has ever been discovered under any of the recent lava fields of the Snake River Plain, thus the obvious importance of this find.

After the original outburst of lava took place, a withdrawal followed and the lava surface in the rift receded to a depth of at least several hundred feet. This pattern was repeated over and over again throughout the entire molten phase of the eruption. This fluctuation formed what is known as a composite dike. The dike can be seen by visitors as it is all through the caves. Each vertical layer on one side of the center of the dike has a corresponding layer on the other side. Each one of these sets represents one eruption. Therefore, the number of times the lava fluctuated up and down at any one place can be counted.

The width of the dike at the Crystal Ice Caves is about six feet--the distance between the two walls of the Great Rift.

The way in which the caves were formed is not completely understood. The following brief account sums up the essential events.

When the molten phase of the eruption ended, the lava receded again in the rift to a depth well below the water table, which is almost 800 feet. This left large openings in the rift both above and below the water table. Water is abundant under the Snake River Plain which is one of the world's great squifers. When this water began to encroach upon the cooling rift, great quantities of steam were generated. The flowing back of lava at the surface had partially blocked the top of the rift, and the outrushing steam was greatly restricted.

This resulted in a tremendous build-up of pressure within the rift. Finally, the surface rock gave way and the gigantic explosion which followed scattered rock over a wide area. The King's Bowl was formed by this explosion. It is located at one of the two focal points of the explosion.

The other, Hades, is one and three-fourths miles to the north and consists of a series of deep pits. All of the fine debris from Hades and the King's Bowl areas was deposited on the east side of the rift by what must have been a strong westerly wind. The lavas to the east of the King's Bowl are covered to a depth of four feet. This explosion must have left the caves in approximately the form we see them in today. Most of the changes since then have probably been caused by ice.

The Crystal Ice Caves Area and Its  
Relationship to the Lunar Surface

The two main physiographic divisions of the lunar surface are easily seen with the unaided eye. They are the rugged uplands, which are brighter, and the flat plains, which are distinctly darker.

The plains are called maria (seas), and are thought to be caused by the impact of planetoids. Craters formed by the impact of meteorites cover the entire lunar surface though they are much less numerous on the maria. The Arizona meteorite crater is the best example here on earth. It was formed when a meteorite estimated to weigh 290,000 tons (roughly 175 feet in diameter) collided with the earth at a striking velocity of ten miles per second. The resulting vaporization of the meteorite and explosion left a crater 4,000 feet in diameter and 680 feet deep.

Since the moon lacks the erosional agents of water and air, a meteorite crater will persist almost indefinitely. All sizes are present. The largest is 185 miles in diameter.

One of the most fascinating and puzzling lunar features are the very numerous great rilles. The rilles resemble long, narrow valleys, steep-sided and uniform in width. There is nothing on the earth equivalent to them, but the Finger Lake basins in New York and the Great Rift Valley in Africa do possess similarities.

The maria on the moon are large, depressed areas covered with dark lava flows strikingly similar to the Snake River Plain. Outpourings of lava late in the history of the moon, which is estimated to be 4.5 billion years old, has covered many of the old meteoritic craters. No great volcanoes, such as Fujiyama, are to be found on the moon, and none occur on the Snake River Plain. However, three buttes on the Plain, Big Southern and Twin Buttes, partially buried by the lava flows, are considered to be ancient volcanoes, but not related to the present great rift eruptions. Apparently then, all of the lunar lava flows also erupted from rifts.

The U.S. and Russian lunar orbiters and probes revealed many smaller volcanic features, including rifts heretofore invisible. Deep open rifts, like the Great Rift in the vicinity

of Crystal Ice Caves, will probably be found on the moon.

The withdrawal of molten lava back down the vent is not too uncommon, and evidence of this happening on the moon has already been found. The Great Rift at the Crystal Ice Caves is the deepest open (over 800 feet) known volcanic rift on the earth.

Keep in mind that because of erosion, any open volcanic rift on the earth is a very short-lived feature. On the moon however, open rifts could remain as originally formed for an almost infinitely greater period of time. Also, craters of volcanic origin aligned upon great lunar rifts are known. Even domes with central craters similar to the lava cones, such as Pillar Butte near the Crystal Ice Caves, have been photographed by orbiting satellites. Furthermore, lunar domes are found only on the lava plains.

Some activity has also been observed on the moon. In 1958, the Russian astronomer Kosyrev, investigating the central peak of the crater Alphonsus, observed what was apparently a reddish-colored ash explosion followed by a strong emission of gas for a few hours.

Only lava caves can be expected on the lunar surface. Limestone and other types of caves formed by the solution of rock in water, and so common on the earth, are absent.

Therefore, these lava caves will play a very important part in the exploration of the moon, and much scientific work will be done in the field of lunar vulcanospeleology.

#### Why Ice?

Cold air entering the Crystal Ice Caves through natural openings in the winter chills the air and rock, even in the deepest chambers. Water entering these chambers freezes.

In the summer, the warm, light, outside air tends to float on top of the colder, heavy air in the caves. Mixing of the warmer air with colder air is relatively slight. This is the reason ice caves are referred to as cold air traps.

When slight warming does occur, some of the ice melts, and in so doing absorbs heat. This has the effect of keeping the caves at the freezing point all summer.

The ice and water in the caves are a great stabilizing factor in keeping the temperature near  $0^{\circ}$  C. ( $32^{\circ}$  F.) all year around. They absorb heat all summer, and give off heat all winter.

### Development

Jim Papadakis, developer of the Caverns of Sonora in Texas, began the gigantic project of opening the Crystal Ice Caves in the fall of 1963.

In the Spring of 1964, a trail was blasted out of solid rock down to the bottom of the King's Bowl. Stairs were constructed leading to the bottom of a small cave just north of the King's Bowl. A tunnel was blasted in the narrow partition separating this cave from the entrance of a large ice cave.

After the trail was completed, visitors could proceed to the edge of a large underground pool in the ice cave.

The Crystal Ice Cave was first opened to the public in 1965. The development of this cave is unique as commercial caves go. Visitors descend to a depth of over 150 feet along a trail, and a series of tunnels containing no stairs. This route follows the Great Rift. A tunnel has been excavated through the solid lava alongside of the Crystal Ice Cave and windows allow visitors a view into the illuminated interior.

The development and expansion program of the Crystal Ice Cave will be continued for the interest and enjoyment of visitors touring this unique volcanic area.

