Recent Discovery of secondary Mineral Deposit in an Idaho Lava Tube

David W. Kesner

ABSTRACT

Secondary mineral deposits of gypsum, mirabilite, thenardite, and cristpbolite have iong been known and, in fact, are quite common in the lava tubes of southwest idaho. Until recently, cacium carbonate deposits were only found in a few tubes in very small amounts and were though to be quite rare. The recent 'rediscovery' of Henlen's Hidden Hide -Away lava tube has significantly changed this thinking. The deposits in the lava tube are not only quite extensive but extremely varied in structure. As this ia a very recent discovery, only basic preliminary work will be presented in this paper. It is hoped this will stimulate interest for further and more intensive study of the lava tubes of southwestern idaho.

1. INTRODUCTION

A large number of lava tubes in southwestern idaho contain some extremly impressive secondary mineral deposits. Gypsum and mirabilite can be found coatting entire lava formation and in some cases entire rooms.thenardite and cristobolite can also be found

throughout idaho's lava tubes, although in smaller individual concentrations. To a lesser degree iron and copper-based deposits have been found. On rare occasions and in very small quantities calcium carbonate deposits have been found.

The recent exploration of Helen's Hidden Hide-Away(HHH), has uncovered an extensive deposius of calcium carbonate, never before throught possible in an idaho lava tube. Not only is there an impressive amouts of deposition, but the individual structural variations could rival some limestone caves.

Since the study of HHH began several other lava tubes have been discoverd that may also contain large calcium carbonated deposits. As the work on HHH has not yet begun, this paer will deal with HHH as a truly unique find.

Only very preliminary work has been completed on HHH as there is not a large, knowledgeable, intersted scientific base to draw on. It is hoped that this paper will stir interest in the truly unique lava tubes of southwestern idaho.

2. BACKGROUND

The background of HHh has been hard to uncover and is based mostly on verbal information gathered from locals. The first known accounts of the cave's exploration came in the early 1930's when Helen Lee's. (rof whom the cave is named), future husband took her

to this cave on their first date. While they were in the cave they found some bones and alerted the University in Pocatello, Idaho. They sent the bones to the museum there where identified as prehistoric bear. A team was sent down preliminary studies.(Cmfirmation has not been made and futher information is pending.)

The next account came less than a year ago when Jim Woods from the Herritt in Twin Falls, idaho made a few trips into the cave , presumably to also look for archaeological or paleontological artifacts. (Again confirmation has not been made and further information is pending.)

These are the only known visitations to the cave. It can be assumed, though, that there have probably been many unrecoreded visits by locals. This assumption is verified by the signs left behind of tin can kerosene lanterns and a barbed wire and wood lader.

3. GEOLOGY AND HYDROLOGY

Henlen's Hidden Hide-Away is located in the Central Snake River Plain next to, but not in, the Shoshone Ice Cave Flow. This flow is one of the youngest and least altered flows in the area. It starts at Black Butte Crater and flows generally southeastly, covering almost 210 square kilometers. It was originally thought that HHH was in this flow but subsequent research has shown it to be from a much

older flow driginating in a shield volcano just to the east. The age difference is quite obvious when comparing the bare lava of the Black Butte Crater Flow to the soil covered area around HHH.

Less than sixty kilometers to the northeast is the Lost River Range. These mountains are predominately dolomite and limestione and probably account for a percentage of the soilmake up in the area.

Less than 400 metersto the north of the cave runs the Richifield Canal. It is a raised earthen structure and prone to a fair amount of leakage. This canal takes itis water from he Big Wood River and is the major source of irrigation water for the entore area. The Big Wood River originates in the Lost River Range and has apparently changed it's course many times in the area around the cave. One of the presumed old courses, which is now an intemittent run-off, actually runs over the cave.

4. CAVE MORPHOLOGY

Helen's Hidden Hide-Away is a lava tube that trends ina southwesterly direction for approximately 450 meters. Total vertical depth is 25.8 meters.The vertical depth isattained from a 2.9 meter vertical drop at the entrance; a 5.5 meter vertical drop 25meters in; and a 4.3 and a 3.0 meter sloping drop about half way in. Passage widths average two to three meters and passage heights from four ans one half to less than one half meters with the majority under

onr and a half meters.

The first half the cave is typical for the majority of idaho lava tubes:dry and dusty with the floor covered in small 'klinker' breakdown. A few short areas do have sandy floors through. About half to three quaters of the way in the tube starts exhibiting cavornous weathering features not seen in other idaho lava tubes. These sculpted features look a lot like heavy water erosion in limestone and sandstone.

At about 375 meters in the cave the formations start apearing. At first they look old and dried and are scattered around the walls and ceiling. It is the last 25 to 30 meters of the cave that the formations completely take over and cover the entire ceiling, walls, and most of the floor. Here, the formations are actively growing with water constantly dripping everywhere.

The majority of the formations are a coraloidal structure, but draperies, rimstone, flowstone, conulries, and drip cips can all be found.

The cave appears to end in breakdown in the formation room, but also not been fully exploed due to the tight quarters and fragille nature of the formation.

5. MINERAL ANALYSIS

1) METHODS

Field teting was done using dilnte hydrochloric acid. Laboratory testing was done using energy dispersive x-ray spectroscopy, scanning electron micrsocpy, cross section analysis, and atomic absorption spectrophotomertry.

2) ANALYSIS

All Analysis was dane on formation found on the floor, assumed to befrom natural breakage.

Field tests showd fizzing when dilute hydrochlori acid was applied to the formations. This lead to the assumption that they were calcium carbonate.

Energy dispersive X-ray spectroscopy, (EDX), was done on thtee structurally different samples: a drapery, a coraloid, and a round knob. The drapery showed a make-up of 58.53% calcuim, 38.35% sillica, 1.78% magnesium, and 1.33% chlorine. The coraloid showed a make-up of 65.56% calcuim and 34.44% silica.

The round knob showed a make up of 66.59% calcium, 28.95% silica, and 4.46%magesium. These percentage are not the actual amount of each element present as EDX reports percentage based on total element detected and EDX can only detect the elements sodium through uranium.

Cross section analysis was done to determine if the structures were

helictities.The analysis showed concentric growth rings with no central capillary canal verifying they are coraloidal formations formed from seeping or spashing water.

Scanning electron microscopy was done to analyze crystal structure. This was not successful as the preparation required desiccating the sample which destroyed the surface structure.

A sample of water was taken from the Richfield Canal directly baove the cave, Direct aspiration atomic absorption spectrophotometry was done for five elements. Th results were calcuim 36.0 ppm; magnesium 7.5 ppm; iron 0.01 ppm; sodium 5.7 ppm; and copper< 0.01 ppm.

6. CONCLUSIONS

Preliminary analysis shows these formations to be at least partly calcium carbonate. It is not known if the silica content is bound with the calcuim or is simply inter-dispersed.

The data seems to indicate that elemental make-up may play some part in the different structural formations.

The source for calcuim and magnesium is most likely from the dust deposiyed from the Lost River Range. As this dust is covering a vast majority of idaho's southwest desert, and other java tubes do not have these formation, the water source from the Big Wood River and the Richfield Canal must play a major role in dissolving

and redepositing the minerals.

As research and testing progresses on HHH and exploration and testing begins on other idaho java tubesit is hoped that more accurate and conclusive theories can be made about idaho's 'limstone lava tubes'.

7. ACKNOWLEDGEMENTS

First and foremost I would like to thank Gordon and gloria Sorenson. They are the owners of the cave and have provided free access to the cave throughout the study project. Without their cooperation and support this paper would not have been possible.

I would like to thank Helen Lee for whom the cave is named. She is the one who first showed me where the cave was and provided me with the background information.

I would like to thank the members of the Gem state Grotto and Magic Valley Grotto who provided assistance in exploring, mapping, and data gathering.

I would like to thank Barry Pharaoh at the idaho State Health Laboratory for his AA analysis of the Richfield Canal water.

And Lastly, I am extrmly grateful to Jim Rigg at Boise State University for his analysis work with the energt dispersive X-ray spectroscopy and scanning electron microscopy.

REFERENCES

Greely, Ronald (1982). The Style of Basaltic Volcanics in the Eastern Snake River Plain of Idaho, Idaho Bureau of Mines Bulletin #26. pages 407-421.

Hill, Carol A, and Forti, paolo(1986). Cave Minerals of the world.

Larson, Charles(1990). Persnal communication.

Lee, Helen (1990,1991). Persnal communication.

Maley, Terry(1987). Exploring idaho geology.

Sorenson, Gordon and Gloria(1990, 1991). Personal communication.