



A SHORT HISTORY OF VULCANOSPELEOLOGY

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Introduction

As a subsience, vulcanospeleology began in 1972 and 1975, with the first and second international symposia on this specific subject. Millennia of field observations, and twenty centuries of written documentation - some of it truly illustrious - preceded its formal beginning, however. Prehistoric man investigated and used lava tube caves just as he did those in limestone. We do not know if the walls of presently inaccessible lava tube caves in southern Syria or eastern Turkey carry age-old inscriptions like those of central Turkey's karstic Iskender-i-Birkilin Cave. Otherwise, documentation of lava tube caves of Monte Etna uniquely forms one of two mainstreams of vulcanospeleology, from the dawn years of protohistory.

Today, at the threshold of the 3rd Millennium, vulcanospeleology is the fastest growing branch of all speleology with constant new discoveries crying out for ever-expanding definitive studies. And ever since its dual beginning in 1972 and 1975, the international symposia have served as its forefront.

The development of vulcanospeleology

Like calcareospeleology, vulcanospeleology arose out of an unsystematic array of disparate observations, isolated cave descriptions, and scattered, more or less scientific reports. As in the case of calcareospeleology, its development was strongly influenced by the overall progress of civilization, especially that of European civilization and its American extension. For several reasons, however, the two branches of speleology did not develop precisely in parallel. Early man used caves without consideration of their bedrock. But during most of our literate centuries, limestone dissolution caves have been the type located closest to centers of population, learning, and travel. Further, the characteristics of karstic caves and karstic hydrology long rendered them of disproportionate importance in the lives of individuals, nations, and cultures. Unlike limestone caves, few lava tube caves serve as natural conduits for municipal water supplies, for example. Still further, the origin of lava tube caves long appeared so simple that no special studies seemed needed to determine their origin and development. Today, the paucity of pre-1960 vulcanospeleological literature reflects the distance of world centers of speleological thought from major lava tube cave areas. Even Trevor Shaw's monumental *History of Cave Science* (Shaw, 1992), is strictly limited to karstic caves.

Early Vulcanospeleology in Italy

Only in Italy do we know of lava caves in early areas of literate civilization and learning. Here, Titus Lucretius Carus wrote about "siliceous caves...full of air and wind" which he apparently had observed first-hand, virtually from base to summit of Monte Etna, early in the First Century BC (Cigna, 1993). Albeit rather fancifully, Carus began the Italian mainstream of vulcanospeleology. It continued without parallel for centuries. Many other citations on Monte Etna caves exist in the next 1600 years. In 1591, Filoteo's book *Topographia* mentioned the author's visits to many of them. In 1628, Kircher reported visiting another cave that could shelter 30,000 persons (Licitra, 1993).



Vulcanospeleology and Early European Voyages

Participants in early European voyages encountered Iceland, then other cavernous volcanic island terrains in the Atlantic Ocean. Surtshellir is mentioned in Icelandic sagas perhaps a thousand years old (Hroarsson and Jonsson, 1992). By 1757 it was the site of the first published map of a lava tube cave (van der Pas, 1998); one of the first published maps of caves of any type. (In contrast, the first map known of a lava tube cave in Italy was of Grotta delle Palombe, by Wolfgang Sartorius von Waltershausen, in 1880 [Licitra, 1993]).

During and after the conquest of the Canary Islands in the 1400's, Spanish soldiers, priests and colonizers encountered major lava tube caves on several islands. The original settlers had used many. In 1774 and 1776, major explorations were documented in Cueva de Viento and Cueva de San Marcos, respectively (Lainez Concepcion, 1996; Rosales Martin 1996). In 1896, Puig y Larraz was able to list many caves here. Reports on caves in the Azores and on Madeira began much later, perhaps with Webster in 1821 and Fouque in 1873 for the former (Borges et al, 1992).

Other Voyages and Vulcanospeleology

Early Spanish explorations in the Americas and the Pacific Ocean are not known to have recorded any lava tube caves. In the Indian Ocean, English and French military expeditions and settlements resulted in documentation of lava tube caves in Mauritius in 1773 and 1801, 1812, and 1814 - the last being by Mathew Flinders, first circumnavigator of Australia. Additional accounts appeared in 1859 and 1873, the latter by Nicholas Pike, U.S. consul and an enthusiastic caver. In 1895 and 1898 Haig added a notable scientific account followed by a not-so-notable bit of cave fiction (Middleton, 1997). On Reunion, at least one volcanic cave was reported (by letter) in 1769, with a more detailed consideration by Bory de St. Vincent in 1801 and studies by LaCroix in 1936. In the 1930's and 1940's, the existence of lava tubes on Madagascar and Grand Comoros Islands also became known. (DeCary, 1949). Reunion reports by Velain in 1878 and 1880 dealt with two cavernous hornitos.

In many parts of Oceania, English and American explorers recorded numerous lava tube caves. Charles Darwin was among the first, recording lava tube caves in the Galapagos Islands in 1845. Until 1962, however, there was little follow-up of his work here (Hernandez et al, 1992). At least by 1823 (Ellis, 1823) religious missionaries began to describe and discuss lava tube caves in Hawaii. Later famous for his system of mineralogy, James Dana (1849) was the first American scientist to study them in some detail. His work, however, was somewhat overshadowed by the prolific, precise reports of such missionaries as William Ellis and Titus Coan. Early in the 20th Century, Thomas A. Jaggar (founder of the Hawaiian Volcano Observatory) built on their observations and added new input resulting from his linkage to the mainstream of American geology (Halliday, 1998). With Lorrin Thurston and others, he created the first wave of Hawaii spelology prior to World War I.

Systematic accounts of caves on Easter Island were in 1889, 1919, 1935, 1937 and 1948, followed by Thor Heyerdahl's prolonged investigation in the 1950's (Kiernan, 1993). In New Zealand, lava tube caves at the site of Auckland were visited early. Scientific accounts and maps date to 1869 (Stewart, 1869). In eastern Australia, most of the lava tube caves are so remote that their exploration and study have been 20th Century phenomena. Some of those in Victoria have been known since the mid-1800, however, with especially important reports in 1866 and 1895 (Webb et al, 1993). Elsewhere in the southwest Pacific, lava tube caves in Samoa and other volcanic islands were reported at least as early as 1911, but with little follow-up.



Vulcanospeleology in the United States

The second mainstream of vulcanospeleology arose in the United States, but its onset was slow and fragmented. Most American lava tube caves were remote from centers of population and of academia, and - ultimately - from the burgeoning centers of early American speleology. However, the great American westward expansion brought pioneer explorers and government geologists to remote areas, and the National Geographic Society later funded expeditions into other volcanic regions. Many lava tube caves thus were reported between 1850 and 1915 but few were studied in detail. Local newspapers and various magazines recounted exciting underground ventures, especially where the caves were of special military or economic importance - the latter especially those which contained ice, a precious commodity in hot western summers. Others quickly became popular recreation sites. Henderson (1932) compiled a detailed annotated listing of lava tube caves of the U.S.A., including varied opinions about their origin. Through the mid-1940's, however, the American literature on lava tube caves remained scant and fragmented.

The Flowering of Vulcanospeleology

In many parts of the world, a sudden quickening of vulcanospeleology began independently in the 1960's and 1970's. In the American mainstream, my "*Caves of Washington*" (Halliday, 1963) has been given credit for beginning descriptions of lava tube caves "in earnest" and for introducing a widely used groundwork of terminology (Larson, 1993). However, the roots of this American flowering clearly were several years older. "*Caves of California*" (Halliday, 1992) contained much relevant information, and numerous important reports and articles appeared in newsletters of N.S.S. and Western Speleological Survey units in the 1950's. My "*Adventure Is Underground*" (Halliday, 1959) contained a full chapter on the subject, and Erwin Bishchoff published several important reports in the 1940's which included important examples. Rhodenbaugh also wrote extensively about examples in Idaho (Rhodenbaugh, 1947).


Somewhat similar growth occurred independently in so many other parts of the world that it is not possible to refer to them all here. Ultimately a specific vulcanospeleological society was formed in Japan, with Takanori Ogawa as leader. It has contributed greatly to world vulcanospeleology. Planetary geologists soon discovered the extraterrestrial implications of terrestrial lava tube caves, with still further expansion of the field work led by Ronald Greeley, Don Peterson, Don Swanson and other noted volcanologists. A UIS Commission on Volcanic Caves was chartered in 1993, and a world database on lava tube caves (at Arizona State University) soon followed.

Role of the International Symposia

To date, international symposia of vulcanospeleology have been held in the U.S.A. (Washington state, Oregon, and Hawaii), Italy (twice in Catania), Japan, Spain (Canary Islands) and Kenya. In 1972 and 1975, the first two symposia began to bring together the Italian and the American mainstems of the field, with the English language spelling of the name itself reflecting the notable Italian contributions. The symposia continue to serve as the cutting edge of this expanding field, deliberately soliciting comprehensive reports designed to fill gaps in world knowledge. As we approach the 9th International Symposium on Vulcanospeleology, again in Catania, this 1999 meeting gives promise of being the most productive of all. So be it!



VULCANOLOGICAL SYMPOSIA CHRONOLOGY

- 1° **WHITE SALMON, WA USA, August 1972**. Organized by: Western Speleological Survey (William R. Halliday). Proceedings published (in English) by the organizers in 1976;
- 2° **CATANIA, ITALY, August 1975**. Organized by: Gruppo Grotte Catania of CAI (Giuseppe M. Licitra et al.). Proceedings published (in Italian & English) by the organizers in 1977;
- 3° **BEND, OR USA, Jun/Jul 1982**. Organized by: National Speleological Society (William R. Halliday). Proceedings published (in English) by ABC Publishing Inc, Vancouver WA, in 1993;
- 4° **CATANIA, ITALY, September 1983**. Organized by: Gruppo Grotte Catania of CAI (Orazio Mirabella, Giuseppe M. Licitra et al.) (UIS). Proceedings published (in Italian) by Centro Speleologico Etneo in 1987;
- 5° **IZU-NAGAOKA, JAPAN, November 1986**. Organized by: Japanese Vulcanospeleological Society (Takanori Ogawa). No news about proceedings;
- 6° **HILO, HW USA, August 1991**. Organized by: Hawaiian Speleological Survey (William R. Halliday) (UIS). Proceedings published (in English) by National Speleological Society in 1992;
- 7° **S.TA CRUZ DE LA PALMA, CANARY ISLANDS, SPAIN, November 1994**. Organized by: Fed. Canar. de Espeleologia (Conny Spelbrink, Pedro Oromì) (UIS). Proceedings published (in the official languages of the UIS) by Federacion Española de Espeleologia in 1996;
- 8° **NAIROBI, KENYA, February 1998**. Organized by: Caving & Exploration Group of East Africa (Jim Simons) (UIS). Proceedings published (in English) by Società Speleologica Italiana in International Journal of Speleology (U.I.S.) in 1999.
- 9°  **CATANIA, ITALY, September 1999**. Organized by: Centro Speleologico Etneo (Nicola Barone, Giuseppe M. Licitra et al.) (UIS). Proceedings will be published (in English) by the division of the Istituto Nazionale di Geofisica e Vulcanologia (INGV) in Catania.



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