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Front Cover

Engraving: Exploring the Echo River, Mammoth Cave, Ky. Date unknown.

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RALPH WALDO EMERSON AND THE MAMMOTH CAVE

by Joseph C. Douglas

Historians of Mammoth Cave have long known that Ralph Waldo Emerson (1803 - 1882), transcendentalist and America's premier man of letters in the mid - 19th century, visited Mammoth Cave in the 1850s. Dr. William Halliday briefly mentioned Emerson's trip to the cave in the first, 1966 edition of his classic book *Depths of the Earth*. Dr. Halliday noted, "In 1850 Ralph Waldo Emerson and a party of fifteen journeyed to the cave by river steamer. Subsequently he wove the beauty of the famous Star Chamber thematically into his famous essay on illusion. Yet Emerson's linkage of beauty with illusion seems curiously archaic today."¹

Beyond this entry, cave historians have known little about Emerson and the Mammoth Cave.² Some scholars did turn to the essay Dr. Halliday mentioned, "Illusions," first published in early 1860 in a volume entitled *The Conduct of Life*, for additional details of Emerson's journey to the cave, but that was the extent of the general knowledge. Some of Emerson's 20th century biographers have discussed his visit to the Mammoth Cave, but these treatments have all been brief, cursory, and unread by cave historians. Several of these accounts do, however, refer to other sources of information about Emerson and the cave.³

The purpose of this paper is to delve a little more deeply into this episode in the history of Mammoth Cave, to examine the historical sources, and to reach some additional conclusions about Emerson and the cave. I also want to let Emerson, a gifted writer, describe the cave and his visit there in his own words.

Ralph Waldo Emerson was interested in nature all of his life. Born in Massachusetts, where he lived his entire life, and originally destined for the ministry, Emerson loved to walk, to botanize, and to directly experience the natural world. Emerson enjoyed Walden Pond so much that he eventually bought it, and allowed his young friend Henry David Thoreau to reside there for a while. Thoreau's experiences there led him to write one of the classic environmental works of the 19th century.

Emerson considered himself primarily a poet, but it was his lectures and essays which made him famous and paid the bills. By the late 1840s he was nationally known, controversial, and in demand as a speaker. His visit to Mammoth Cave was an outgrowth of a lecture tour to Cincinnati in late May and early June 1850. In Emerson's essay "Illusions," one of his finest, he used his visit to Mammoth Cave as a starting point, a springboard into a discussion of the nature of reality. I would respectfully disagree with Dr. Halliday on one point, that Emerson's linking of beauty with illusion was archaic. Instead, I would suggest that, while Emerson's language seems archaic, his concept was startlingly modern, at least in his point that the senses mediate between reality and the mind. Emerson noted, "Our conversation with nature is not just what it seems... The senses interfere everywhere and mix their own structure with all they report of."⁴ One of the many students of Emerson's work has called the essay "Illusion" "a poetic description of the psychological experience of illumination."⁵

Because of the purpose of the essay, Emerson summarized his trip to Mammoth Cave and emphasized his impressions of the cave rather than render a detailed account of his journey. Emerson wrote:

Some years ago, in company with an agreeable party, I spent a long summer day in exploring the Mammoth Cave in Kentucky. We traversed, through spacious galleries affording a solid masonry foundation for the town and county overhead, the six or eight black miles from the mouth of the cavern to the innermost recess which tourists visit, - a niche or grotto made by one seamless stalactite, and called, I believe, Serena's Bower. I lost the light of one day. I saw high domes and bottomless pits; heard the voice of unseen waterfalls; paddled three quarters of a mile in the deep Echo River, whose waters are peopled with the blind fish; crossed the streams "Lethe" and "Styx;" plied with music and guns the echoes in these alarming galleries; saw every form of stalagmite and stalactite in the sculptured and fretted chambers; - icicle, orange-flower, acanthus, grapes, and snowball. We shot Bengal lights into the vaults and groins of the sparry cathedrals and examined all the masterpieces which the four combined engineers, water, limestone, gravitation and time could make in the dark.

The mysteries and scenery of the cave had the same dignity that belongs to all natural objects, and which shames the fine things to which we foppishly compare them. I remarked especially the mimetic habit with which Nature, on new instruments, hums her old tunes, making night to mimic day, and chemistry to ape vegetation. But I then took notice and still chiefly remember that the best thing which the cave had to offer was an illusion. On arriving at what is called the "Star-Chamber," our lamps were taken from us by the guide and extinguished or put aside, and, on looking upwards, I saw or seemed to see the night heaven thick with stars glimmering more or less brightly over our heads, and even what seemed a comet flaming among them. All the party were touched with astonishment and pleasure. Our musical friends sung with much feeling a pretty song, "The stars are in the quiet sky," &c., and I sat down on the rocky floor to enjoy the serene picture. Some crystal specks in the black ceiling high overhead, reflecting the light of a half-hid lamp, yielded this magnificent effect.

I own I did not like the cave so well for eking out its sublimities with this theatrical trick. But I have had many experiences like it, before and since; and we must be content to be pleased without too curiously analyzing the occasions.⁶

Emerson's description of the way guides presented the Mammoth Cave to tourists is quite accurate and supported by other 19th century accounts. Yet, because of the purpose of his essay, he did not discuss some of the other pertinent details of his experiences at Mammoth Cave, such as that it may well have been Stephen Bishop, the famous, yet enslaved guide, who so magnificently manipulated the lighting and thus produced such a startling effect. Luckily for us, Emerson also wrote about his journey to Mammoth Cave in other contexts, so we can glean more about his visit than the essay "Illusions" reveals.

Ralph Waldo Emerson was a dedicated journalist. In the scores of notebooks he kept throughout his long life, he recorded much about his readings, daily activities, and experiences. In 1850, prior to his Cincinnati speaking engagement, he began a new manuscript notebook. This was entitled "Journal of the West," because after visiting Ohio and Kentucky he went on to St. Louis and the upper mid-west. In this journal Emerson mentioned his visit to the Mammoth Cave, though he did not include a complete detailed narrative. On June 4, 1850, he noted that he and a "party of ladies and gentlemen"⁷

traveled by boat from Cincinnati to Louisville but were unable to obtain land transportation to the cave. There was, he wrote:

No stage on the morning of the 5th for us to Mammoth Cave, no coaches nor horses for such a party. The regular coach was full and went at 5 AM[,] no other would go till Friday[,] nor then could accommodate us. So we took passage by the "Mammoth Cave" - Boat which goes to Evansville and up the Green River...with many petty delays and breakages but no important misfortune. . .to Cloversport, Ky.⁸

Emerson also recorded the names of those who accompanied him on the journey to the cave. These were E. Shepard, J. R. Wiltsie, F. Donaldson, C. A. Partridge, W. D. Gallagher, J. W. Ward and a lady companion, Mrs. George Donaldson, Miss F. Greene, Miss Smith, Miss Fanny Goodman, Miss Louisa Briggs, J. W. Marshall, G. H. Marshall and Montagu Blackett.⁹ These fifteen persons were described as local cultural leaders by the *Daily Cincinnati Gazette*, which reported that Emerson had gone to visit the Mammoth Cave "with a number of the Literati of our city."¹⁰

Emerson's other notes about the Mammoth Cave in his journal mostly concern the expenses incurred on his trip, though he also wrote a snippet of poetry. His expenses totaled \$16.66, which included transportation from Bowling Green to the cave and lodging costs at the Mammoth Cave Hotel. He paid an additional \$.60 in fees at the cave and \$1.50 at Bell's Tavern for lodging afterward. Emerson also wrote, in pencil rather than his customary ink, these lines: "outside of the cave is the best side/volutes and acanthus or celery formations/We lost a day."¹¹

Ralph Waldo Emerson was not only an accomplished essayist and a dedicated journalist, but also a prolific letter writer. It is in a lengthy letter Emerson wrote to his wife Lidian from St. Louis, a few days after his Mammoth Cave adventure, that he penned the most detailed account of his journey and tour of the cave. This letter is perhaps the most significant source concerning Emerson and the Mammoth Cave yet uncovered. While Emerson owned a copy of Alexander Clark Bullitt's book, *Rambles in the Mammoth Cave*, the description of the cave in his letter to Lidian is his own.¹²

Emerson began this letter by giving his impressions of Ohio and Mississippi rivers and people and sights along the waters, but he then turned his attention to the Mammoth Cave. He wrote first of his decision to visit the cave:

But I have told you nothing of the Cave, which it cost me a week to visit. And Ellen [his daughter], at least, must be duly informed of the great hole in the ground in Kentucky. At Cincinnati, people who had seen it represented it as so wonderful, and at the same time so accessible (for they think it a little matter to run down the river to Louisville 133 miles - (you go on board the boat at noon & arrive about midnight at L.) then you have 90 miles to go by stage which can be done in a summer day, that I suffered myself to be persuaded, & we suddenly made up a party of seventeen gentlemen and ladies, including three Englishmen, & set forth.¹³

The party was unable to get stage transportation in Louisville, as we have already seen, and thus had to resort to other means. Emerson continued his narrative:

Then we bethought ourselves of the Green River & so, though the way was long, namely, 182 miles down the Ohio to Evansville, and 150 up the Green River from Evansville & by Barren River to Bowling Green, yet the

captain of the "Mammoth Cave" steamer promised so well, that we took passage. We sailed on Wednesday afternoon and did not reach Bowling Green & disembark until Saturday morning at 9 o'clock, & the cave, by coaches, 30 miles, at night.¹⁴

Emerson then described the Green River and its features, which made a considerable impression upon him. He noted:

The Green River is narrow and deep, 50 feet deep, until we came to the first locks: 30 feet afterwards; fringed with primitive forest on both sides, and as happens in this country, every tree bearing a water line, say at 12 or 15 feet from the ground, where the waters have remained in the last floods.... In the Green River, we disturbed the ducks all the way before us, who clambered with their young up the banks, & wild turkeys flew before us from tree to tree. Where the river widened occasionally, lay long strata of dried leaves solidly matted together, deserted by the water, and when these are disturbed by thrusting a pole into them carburetted-hydrogen comes out in quantity, &, if lighted, burns over all the river....¹⁵

Emerson next turned his attention to the cave itself, which he visited twice on two consecutive days. He wrote to Lidian:

Early on Sunday morning, our ladies appeared in short dresses and Turkish pantalette & turban indispensable to the adventure. We entered the grand old cavern at 7 1/2 o'clock, a chilly descent into the earth. Every man and woman is provided with a good lamp. We had also bought at Louisville the last bundle of Roman Candles in the city, & Stephen the guide carries Bengal-lights. Two & two, every lady with a gentleman, we marched along the grim subterranean street, stooping at first a little, but the stone ceiling soon rose above our heads to 20, and sometimes to 40 or 50 feet. Water is the engineer who built this tunnel, & of course his work is done evenly & well. Every passage may be trusted to lead quite through to some other; & the floor & the ceiling are finished, & usually smooth. For miles, I think, the ceiling presents the appearance of a whitewashed wall, though dingy & weatherstained, & hundreds & thousands of people have held up their lamps & torches & smoked their names on a surface so inviting to the love of fame. The passage for great lengths will be as regularly arched as a railway tunnel, of which it often reminds me. But the little procession moves on, two & two, every one with his lamp, and the ground changes. Now we come off the rocky floor to damp earth, then to water, & a bridge, over what is called the "Bottomless pit." We lighted a newspaper & let it sink flapping & flaming down till it touched bottom, & was extinguished. We came to the Church and its pulpit rock, a area where some thousands might sit: to the "Coffin Room" where the vault widens & heightens, & in the middle of it lies uplifted on its table a sarcophagus 54 or 58 feet long, - fit, I thought, to be the tomb of Columbus in the heart of his continent. We came to a little river which we crossed, 8 at a time in a little boat, & pretty soon again to another river, Echo River, which was to be crossed again in boat six at a time[.] Here, as each party disappeared under the winding vaults which arched the rivers, our ladies, three of whom were excellent singers and two gentlemen sung well - made a music preternaturally good, - so it seemed to me as I hearkened on the Acherontian shore to the disappearing choir of souls. Some of us, I for one, did not make this navigation this time, nor until our return from the extremity of the cave, but

clambered & crept through a difficult alley of rock called "Fat man's misery," through "Purgatories," &c to the Valley of Relief," where we rejoined our sailors. But I cannot recount all the details of our pilgrimage. Sometimes we came to Rocky Mountains where we needed to climb up & down over mere heaps of broken rock; sometimes down slippery sidling narrow paths with a chasm below us on one side; sometimes to ascend by ladders rather dangerous-looking to nervous ladies. From the mouth of the cave to Serena's Arbour, which was our furthest point, is nine mile, and we returned all the way on our own steps, an 18 miles' walk performed in 14 hours. "Clevelands [sic] Cabinet" is a long passage - where the walls of the cave are profusely decorated with beautiful flowers & rosettes of wonderful elegance, and where I learned one thing plain & clear - that the volutes & foliations of the capitals of columns were not learned from any basket of acanthus, but from the efflorescence of caves. Another fine chamber is called the "Vineyard," because the whole wall is a mass of stony grapes. Another the "Snowball Room." All the roof is snowballs. When we came to great enlargements we lit a Roman Candle & discharged its dazzling fireball into some yawning vault. No height or depth could resist their prying eyes. It was a long and trying tramp certainly for the ladies to make, but the temperature of the cave which is invariable 57 or 58°, winter & summer, permits great & long-continued exercise, and no accident, not a fall or a sprain occurred. When we emerged into the warm night at half past nine o'clock, it was raining fast, and a long & violent thunderstorm had passed over us whereof we nothing knew. We had lost one of the "days of our bright lives."¹⁶

Emerson more briefly described his second, shorter tour in the cave the following day in his letter to Lidian. Although he confused the new and old sections of the cave, he was clearly captivated by several aspects of the unique cave environment, including the twilight zone. Emerson wrote:

People say, the best part of the cave is the outside, and the emerging into daylight is magically fine, as I found the next day, on my second visit. There is a point where you feel the chill of the cave on one cheek, & the warmth of daylight on the other. The next morning we entered again, 7 made a visit of four hours to new parts of the cavern - to the "Gothic Chapel," to the "Star Chamber," and to "Gorin's Dome." The Star Chamber is a broad passage where the lofty ceiling perhaps 50 or 60 feet overhead is a black ground dented with here & there a white spot[.] The guide takes away all your lamps and hides them and you find yourself at once under a starry sky, with a comet, too, easily distinguishable. The illusion is perfect. I lay here on my back on the ground for a quarter of an hour or more whilst our choir sang "The stars are in the quiet sky." And considered that this was the best thing in the cave, & that this was an illusion! But I have spun my story to such an intolerable length that I must end it at once. I walked that afternoon with Mr. Wiltsie to Bell's Tavern, 7 miles, and, in lack again of any stage, carriage, or horse, the next day 14 miles further, when at last we procured a buggy to Bowling Green.¹⁷

In conclusion, Emerson's trip to the Mammoth Cave was a unique and interesting part of his invigorating tour to the west, and the cave, like other natural features fascinated him. As always, he tried to discover truths in nature, including the underground environment. His letter to Lidian and his essay "Illusions" both reveal that the cave passages and

chambers, speleothems, and twilight zone made a significant impression upon him, and these experiences remained with him for years.

Emerson's descriptions of the cave and the tours were both accurate and perceptive. Many of the elements of cave tourism at the Mammoth Cave of interest to historians are revealed in his writings, including lighting techniques, the social aspect of the tours, the role of music, the importance of transportation links, and the whole question of expenses.

The one topic which Emerson does not address but which provokes intense curiosity today is his relationship with and assessment of Stephen Bishop, who guided him on one, if not both, of his days at the cave. If only Emerson had written more about Bishop we might say, but alas, he simply accepted Bishop's skills and abilities as a guide without extensive comment. Emerson probably felt there was no need to enlarge upon Stephen Bishop's fame, which was already considerable, if not quite matching his own. Emerson, already a strong antislavery man, refrained from using Bishop as an example in the anti-slavery cause, unlike many other abolitionists. But no doubt his experiences with Bishop only confirmed Emerson in his opposition to slavery.¹⁸

Ralph Waldo Emerson was a close observer of the natural world, and in his works he often stressed the linked themes of nature, imagination, and the self. These themes can all be seen in his writings concerning the Mammoth Cave. Emerson's essay "Illusions," his journal entries, and his letter to Lidian are important for their information about the cave, Emerson's experiences there, and the impact of those experiences. All of these sources contribute to the already rich historical literature on the Mammoth Cave. And the tale of Ralph Waldo Emerson's journey to the cave is a revealing one, which adds to the larger story, the history of the Mammoth Cave.

NOTES

1. Halliday, William R., *Depths of the Earth: Caves and Cavers of the United States*, Harper and Row, New York, 1966, p. 40.
2. See Shaw, Trevor R., " 'In Mammoth Cave': John Burroughs's Perceptive Essay" *Journal of Spelean History*, Vol. 31, No. 1, (January - March 1997): 7.
3. Rusk, Ralph L., *The Life of Ralph Waldo Emerson*, Columbia University Press, New York, 1949, p. 381; Allen, Gary Wilson, *Waldo Emerson: A Biography*, Viking Press, New York, 1981, p. 537; Richardson, Robert D., *Emerson: The Mind On Fire*, University of California Press, Berkeley, 1995, pp. 479-480. I relied heavily upon Richardson for basic biographical information on Emerson.
4. *The Works of Ralph Waldo Emerson*, Walter J. Black, Inc., New York, p. 416.
5. Carpenter, Frederic Ives, *Emerson Handbook*, Hendricks House, New York, 1953; reprint ed. Hendricks House, New York, 1967, p. 67.
6. *The Works of Ralph Waldo Emerson*, pp. 416, 417.
7. Gilman, William, ed., *The Journals and Miscellaneous Notebooks of Ralph Waldo Emerson*, Volume XI, Belknap Press of Harvard University, Cambridge, 1975, p. 516.

8. Ibid.
9. Ibid., pp. 516, 517.
10. Daily Cincinnati Gazette, June 5, 1850, N. P. Also see Gilman, p.516 for additional information on these persons.
11. Gilman, p. 516. See pages 533 and 577 for Emerson's list of expenses.
12. Rusk, Ralph L., ed., *The Letters of Ralph Waldo Emerson*, Vol. IV, Columbia University Press, New York, 1939, p. 160.
13. Ibid., p. 211.
14. Ibid.
15. Ibid., p. 212.
16. Ibid., pp. 212, 213.
17. Ibid., pp. 213, 214.
18. The full story of Stephen Bishop's place in the pro-slavery/anti-slavery debate in the mid-19th century has yet to be written. Abolitionists used Bishop to argue against the racial theory some Southerners embraced. In response, there was also at least one attempt by a pro-slavery writer to denigrate Bishop, using racial stereotypes.

TREASURER'S REPORT 1999

Year ending 1998

Income \$352.00

Expenses \$338.03

Cash on Hand - about \$3200.00

Year to date 1999 (June 20, 1999)

Income \$262.00

Expenses \$114.21

TRIESTE GROUP PUBLISHES NOTABLE SPELEAN HISTORY VOLUME

by William R. Halliday

Volume XXV of "Atti e Memorie della Commissione Grotte "Eugenio Boegan" has just appeared - somewhat belatedly. On the cover it is variously dated 1997 and 1998. But it is worth the wait. This group owns and operates the great show cave called Grotta Gigante in the Italian portion of The Karst. This volume is dedicated to the 150th anniversary of that cave. The following articles are of special importance in spelean history:

Galli, M. & Pino Guidi, 150 Anni di Esplorazioni e di Turismo nella Grotta Gigante, 1998, pp. 1-17.

Cova, U., Il Club Touristi Triestini e la Grotta Gigante: Testimonianze Archivistiche, 1998, pp. 19-25.

Forti, F. & Pino Guidi, Grotta Gigante: Saggio Bibliographico, 1998, pp. 81-158.

Also included are articles on the cave's archeology and biology. The volume is wonderfully illustrated, and is certain to become a collector's item. Address of the organization is:
via Machiavelli, 17
34132 Trieste, Italy.

THE STEAMER "BAT"

Submitted by William R. Halliday

The BAT and her sisters - OWL, STAG, and DEER - were side-wheelers, long, low, molded steel hulls, schooner-rigged, fore and aft, with two funnels. They had twin, 180-nominal horsepower, vertical, double oscillating Watt engines and capacity for 800 to 850 bales of cotton, plus enough anthracite to return from Nassau, Havana or Bermuda.

Jones, Quiggin & Co. of Liverpool, built the four steamers for Capt. James D. Bulloch, Confederate States Navy (CSN), principal Confederate Navy purchasing agent in Britain. They were Government-owned ships, reporting to the Army Chief of Ordnance, were commanded by CSN captains, carried pilots and as many other CSN regulars as available - but keeping a British master to bring the ship out of the United Kingdom and "front" for them so as not to lose her mercantile register before she reached Confederate waters and until any outstanding liens were paid in full. The OWL class was the first new building program after this pattern and, despite the Army's presence in their management, Navy kept a good share of control: Secretary Mallory speaks of the OWL Class as "under this Department" and of "this Department having to defray the expenses of the vessels sailing under its direction."

BAT, the second ship, reached Halifax on her maiden voyage and ran down to the Cape Fear River, attempting entrance the night of 8 October 1864 with a cargo of shoe machinery and 200 tons of coal; she was turned back by the blockaders EOLUS and EMMA and chased by VICKSBURG. The morning of the 10th, Captain A. Hora, an "old blockade runner," tried again and was hit by USS MONTGOMERY in the forecastle before her speed, double that of the MONTGOMERY could save BAT. The 30-pounder amputated the leg of seaman Match Madick, an Austrian, who had been captain of the forecastle in ALABAMA during her battle with KEARSARGE; Captain Hora surrendered and called MONTGOMERY'S surgeon but Madick died.

Less than a month old, BAT was taken into Beaufort and bought by the Navy from the Boston Prize Court in November for \$150,000. Valuable to the Union the remainder of the war in the North Atlantic Blockading Squadron, USS BAT was sold at public auction in New York, 25 October 1855. One time in March 1866 she had been Admiral Porter's flagship. Renamed TEAZER 1865-72, she next became MIRAMICHI, for the New Brunswick River, and a Canadian institution in the St. Lawrence and Gulf of Newfoundland trade, avoiding the breakers until after 1902.

THE ROOTS OF VULCANOSPELEOLOGY

by William R. Halliday

INTRODUCTION

As a subsience, vulcanospeleology began in 1972 and 1973 with the first and second international symposia on this specific subject. Millennia of field observations and twenty centuries of written documentation preceded this formal onset, however. Prehistoric man investigated and used lava tube caves as he did those in limestone.

THE HISTORICAL DEVELOPMENT OF VULCANOSPELEOLOGY

Like calcareospeleology, vulcanospeleology arose out of a nonsystematic accumulation of fortuitous observations, isolated cave descriptions, and scattered pioneer scientific reports. Also as in the case of calcareospeleology, its development was somewhat related to the overall progress of civilization - - especially that of European civilization and its American extension. A specific investigation of a Japanese lava tube cave was recorded in 1203, and another cave in 1678, but the beginnings of systematic Japanese 20th century follow-up were swept away by World War II (Ueno, 1971).

During most of the literate centuries, karstic caves were the type located close to population centers, centers of learning, and principal routes of travel. Further, certain obvious characteristics of karstic caves and karstic hydrology rendered them especially prone to investigations (for example, lava tube caves - - unlike karstic caves - - rarely serve as conduits for municipal water sources). Lava tube caves thus seemed to be so rare, so unimportant, and so simple in structure that they were mere minor curiosities. Even today, all but the most recent speleological literature reflects the distance of major lava tube areas from traditional centers of speleological thought. Trevor Shaw's monumental *History of Cave Science*, (Shaw, 1992), for example, is strictly limited to karstic dissolutional phenomena. Still lacking are historical accounts of volcanic caves in areas like Manchuria (China), Cheju Island (Korea) and parts of the Pacific Basin.

EARLY VULCANOSPELEOLOGY IN ITALY

Italy was the primary exception to the generalizations above. Here, lava tube caves were located in areas of early literate civilization and learning. In the First century B.C. the noted Latin poet Titus Lucretius Carus wrote (fancifully) about "siliceous caves full of air and wind" on the slopes of Mt. Etna (Cigna, 1993). Apparently he observed some of them first-hand. Numerous citations on Etnean caves formed an Italian mainstream of vulcanospeleology during the next 15 Centuries. In 1591 and 1687, mention in books by Filoteo and Kircher ushered in the modern era (Licitra, 1993).

VULCANOSPELEOLOGY AND EARLY EUROPEAN VOYAGES: ATLANTIC OCEAN

Participants in early European voyages encountered Iceland, then other cavernous volcanic 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 maps of any type of cave. (In contrast, the first known map of a lava tube cave in Italy was in 1880 [Licitra, 1993]).

During and after the conquest of the Canary Islands in the 1400s, Spanish soldiers, priests and settlers encountered major lava tube caves. Many had been used by earlier inhabitants. After pacification, some were used as refuges during pirate attacks - - not always successfully. By 1774 and 1776, major explorations were documented, in Cueva del Viento and Cueva de San Marcos, respectively (Lainez Concetion, 1996; Rosales Martin, 1996). In 1850 Georg Hartung studied and described Cueva de Los Verdes (Hartung, n.d.). Here as in Italy, explorations and studies gradually became increasingly systematic and scientific (Rosales Martin, 1996). In 1896 Puig y Larraz listed many caves in these islands. Reports on volcanic caves in the Azores (and apparently also in Madeira) began much later, perhaps with Webster in 1821 and Fouque in 1873 (Borges et al, 1992).

VULCANOSPELEOLOGY IN THE PACIFIC AND INDIAN OCEANS

Early Spanish explorers in the Americas and in the Pacific Ocean are not known to have recorded any lava tube caves. Scientific knowledge of those in Mexico and Argentina appear to be almost exclusively 20th century.

In the Indian Ocean, English and French military expeditions and settlement resulted in documentation of lava tube caves in Mauritius in 1773, 1801, 1812, and 1814 - - the last by Matthew Flinders, 1st circumnavigator of Australia. Additional accounts appeared in 1859 and 1873; the latter by U.S. Consul Nicholas Pike, an enthusiastic caver. In 1895 and 1898 Haig added a notable scientific account and some not-so-notable cave fiction (Middleton, 1997). Lava tube caves of Reunion were recorded in 1772, with more details by Bory de St.-Vincent in 1801 and theorizations on their origin by 1804 (Decary, 1949). Reports by Velain in 1878 and 1880 dealt with two celebrated cavernous hornitos. This information was appropriately incorporated into mainstream 20th century French volcanology and speleology. In the 1930s and 1940s similar caves were reported on Grand Comoro Island and on Madagascar, but similar follow-up foundered in the wake of decolonization.

On the African mainland, the story of vulcanospeleology is largely the story of the Cave Exploration Group of East Africa in the last half of this century. Only the tuff caves of Mt. Elgon (romanticized by novelist H. Rider Haggard) seem to have received attention in the 1800s.

In the Pacific Ocean, Charles Darwin was among the first vulcanospeleologists, recording lava tube caves on the Galapagos Islands in 1845. Here, however, there was no follow-up until 1962 (Hernandez et al, 1992). At least by 1823, however (Ellis, 1823), broadly educated American and British missionaries such as Wm. Ellis and Titus Coan began to describe and discuss lava tube caves in Hawaii. James Dana (1849) was the first American scientist to discuss them, but his work was overshadowed by that of the missionaries. Early in the 20th century, Thomas A. Jaggar (founder of the Hawaiian Volcano Observatory) began to build on their observations. With Lorrin Thurston and others, he created the first wave of Hawaiian vulcanospeleology prior to World War I.

Other missionaries and scientists probably recorded other lava tube caves in Samoa and elsewhere in Oceania, but their activities remain largely unresearched at this time. Systematic accounts of caves on Easter Island were in 1889, 1919, 1933 and 1948, followed by Thor Heyerdahl's prolonged investigations in the 1950s (Kiernan, 1993). In New Zealand, scientific accounts of lava tube caves in and around Auckland date to 1869 (Stewart, 1869). In eastern Australia, most of the lava tube caves are in areas remote from European settlements and their exploration and study has been mostly 20th century. Some in Victoria, however, were known in the mid-1800s, with some especially important reports in 1866 and 1893 (Webb et al, 1993).

EARLY VULCANOSPELEOLOGY IN THE MAINLAND UNITED STATES

The second principal root of vulcanospeleology arose in the western United States, but its onset was slow and fragmented. Here, lava tube caves typically were remote from centers of population and academia. In the latter half of the 19th century, however, the great westward expansion brought soldiers, settlers, and - ultimately - investigators to many of them. Noted government geologists noted some in passing. Local publications commonly recounted less-than-scientific investigations - especially where the caves had special military or economic importance. Others quickly became popular local recreation sites. Henderson (1932) compiled the first annotated listing of lava tube caves of the United States, and included varied opinions about their speleogenesis. Until after World War II, however, the literature on American lava tube caves remained scant and fragmentary. With the founding of the National Speleological Society, however, Erwin Bischoff almost single-handedly began the first wave of American vulcanospeleology with a series of articles in the N.S.S. Bulletin (Bischoff, 1942, 1943). The caves he reported were quickly incorporated into preliminary lists of American caves in that publication. Rhodenbaugh (1947) added additional information on caves in Idaho, but his book was outside the mainstream and long overlooked.

THE FLOWERING OF VULCANOSPELEOLOGY

In many parts of the world, a sudden quickening of vulcanospeleology became evident in the 1960s and 1970s. The N.S.S.'s Cascade Grotto added lava tube caves of Washington state to earlier knowledge and my *Caves of Washington* (Halliday, 1963) has been given credit for beginning descriptions of lava tube caves "in earnest" and for introducing a groundwork of terminology (Larson, 1993). However, the groundwork of American vulcanospeleology was already prepared. *Caves of California* (Halliday, 1962) systematized much information on lava tube caves from reports and articles in earlier newsletters of western units of the N.S.S. and Western Speleological Survey. *Adventure is Underground* (Halliday, 1959) contained half a chapter on the subject. Simultaneous progress occurred in many other countries.

Planetary geologists soon discovered the extraterrestrial implications of terrestrial lava tube caves, with major contributions by Ronald Greeley (e.g. Greeley, 1971, 1972), Donald Peterson and Donald Swanson (1974) and many others. The International Union of Speleology created its Commission on Volcanic Caves in 1993, and a world data base on lava tube caves (at Arizona State University) soon followed.

ROLE OF THE INTERNATIONAL SYMPOSIA

Beginning in 1972, international symposia on vulcanospeleology have been held in the United States (Washington, Oregon and Hawaii), Italy (three times in Catania), Japan, Spain (Canary Islands) and Kenya. They serve as the cutting edge of vulcanospeleology, deliberately stimulating comprehensive reports which fill recognized gaps in world knowledge.

REFERENCES

- Bischoff, E. W., Caves of the Far West, *National Speleological Society Bulletin* 4, 1942, pp. 20-22.
- Bischoff, E. W., Additional Reports of Previous Trips, *National Speleological Society Bulletin* 5, 1943, pp. 44-46.
- Borges, P. A. V. et al., Caves and Pits from the Azores with Some Comments on Their Geological Origin, Distribution, and Fauna, *Proceedings of the 6th International Symposium on Vulcanospeleology*, August 1991, G. Thomas Rea, Editor, Huntsville, Al., National Speleological Society, 1992.
- Cigna, A. A., Speleology by Titus Lucretius Carus, in *Proceedings of the International Symposium on the Proto-history of Speleology*, 1993, pp. 17-28, Marco Bani, curator, Citta di Castello (Italy), Ediz. Nuova Prhomes.
- Dana, J. D., *Geology*, Vol. V, U.S. Exploring Expedition During the Years 1838, 1839, 1840, 1841 and 1842 under the Command of Charles Wilkes, USN, Philadelphia, Printed by S. Sherman.
- Decary, R., Les Galleries Basaltiques de L'Ile de la Reunion et de Madagascar, *Soc. Geol. de France, Compt. Rendu Sommaire* 9 May, 1949, pp. 166-167.
- Ellis, W., *Journal of William Ellis*, Many editions, many publishers, 1823.
- Greeley, R., *Geology of Selected Lava Tubes in the Bend Area, Oregon*, Bulletin 71, State of Oregon Dept. of Geology and Natural Resources, 1971.
- Greeley, R. and J. H. Hyde, Lava Tubes of the Cave Basalt, Mount St. Helens, Washington, *Geol. Soc. Amer. Bulletin*, 83, 1972, pp. 2397-2418.
- Halliday, W. R., *Adventure is Underground*, Harper and Bros., 1959, 206 pp. Russian edition, Geographic Press, Moscow, 1963, 238 pp.
- Halliday, W. R., *Caves of California*, Western Speleological Survey, Seattle, 1962, 194 pp.
- Halliday, W. R., *Caves of Washington*, Inform. Circ. #40, Wash. State Div. Mines & Geol., 1963, 132pp.
- Henderson, J., Caverns, Ice Caves, Sinkholes, and Natural Bridges, *University of Co. Studies*, Vol. 19, No. 4., Oct., 1932, pp. 359-405.
- Hartung, G., *Die Geologischen Verhältnisse der Inseln Lanzasote und Fuerteventura*, n.p., n.d., 164pp., 9 plates.
- Hernandez, J. J. et al., Contribution to the Vulcanospeleology of the Galapagos Islands, *Proceedings of the 6th International Symposium on Vulcanospeleology*, Aug., 1991, G. Thomas Rea, editor, Huntsville, Al., National Speleological Society, 1992.

Hroarsson, B. & S. S. Jonsson, Lava Caves in the Hallmundarhraun Lava Flow, Western Iceland, Proceedings of the 6th International Symposium on Vulcanospeleology, August 1991, G. Thomas Rea, editor, Huntsville, Al., National Speleological Soc., 1992.

Kiernan, K., Volcanokarst in the Culture and Landscape of Easter Island, Proceedings of the 3rd International Symposium on Vulcanospeleology, July 30 - August 1, 1982, William R. Halliday, editor, Vancouver, Wa., A.B.C. Printing, 1993.

Lainez Concetion, A., Galleria "Hernandez Pacheco" un Nuevo Descubrimiento en el Complejo de la Cueva del Viento-Sobrado, Icod de los Vinos, Tenerife, Proceedings of the 7th International Symposium on Vulcanospeleology, Nov. 1994, Pedro Oromi, editor, Sant Climent de Llobregat (Spain), Forimpres., 1996.

Licitra, G., Volcanism and Caves of Mt. Etna: A Brief Report, Proceedings of the 3rd International Symposium on Vulcanospeleology, July 30 - Aug. 1, 1982, pp. 93-100, W. R. Halliday, editor, Vancouver, Wa., A.B.C. Printing, 1993.

Middleton, G., Early Accounts of Caves in Mauritius, Proceedings of the 2nd Australian Spelean History Symposium, Sydney, July 1994, pp. 5-18, 1997.

Peterson, D. and D. W. Swanson, Observed Formation of Lava Tubes During 1970 - 71 at Kilauea Volcano, Hawaii, Studies in Speleology, Vol. 2, Pt. 6, 1974, pp. 209-222

Rhodenbaugh, E. F., Sketches of Idaho Geology, Caxton Press, Caldwell, Id., 1947.

Rosales Martin, M., Historia de la Espeleologia en Canarias, Proceedings of the 7th International Symposium on Vulcanospeleology, November 1994, Pedro Oromi, editor, Sant Climent de Llobregat (Spain), Forimpres., 1996.

Shaw, Trevor, History of Cave Science, 2nd edition, Sydney, Sydney Speleological Society, 1992, 338 p.

Stewart, J., Description of Lava Caves at the "Three Kings," near Auckland, Proceedings N. Z. Institute, Vol. 2, 1869, pp. 162-163. Reprinted in UIS Groupe de Travail: Grottes Volcaniques Newsletter No. 2, March 22, 1992, p. 4.

Ueno, Shun-Ichi, The Fauna of the Lava Caves Around Mt. Fuji-san, 1. Introductory and Historical Notes, Bulletin National Science Museum, Tokyo, Vol. 14, No. 2, May 31, 1971.

van der Pas, J. P., Is This the Oldest Map of a Lava Cave?, UIS Comm. on Volcanic Caves Newsletter, #21, November 1998, p. 5.

Webb, J. A. et al., Lava Caves of Australia, Proceedings of the 3rd International Symposium on Vulcanospeleology, July 30 - Aug. 1, 1982, pp. 74-85, W. R. Halliday, editor, Vancouver, Wa., A.B.C. Printing, 1993.

LAKE OF PENN'S CAVE 1897

By Tom Metzgar

The *Report of the State Commissioners of Fisheries for the Year 1897* ([Harrisburg], Clarence M. Busch, State Printer of Pennsylvania, 1897) is one of hundreds of obscure state publications found in just a handful of libraries. This report contains a 151 page compilation entitled *The Mountain Lakes of the State*, heavily illustrated by black and white photographs. The author is William E. Meehan, Associate Editor of the *Philadelphia Public Ledger*, author of *Fish, Fishing, and Fisheries of Pennsylvania*, *Fish Culture for Farmers*, *Trout Culture*, and other articles and publications.

Meehan describes dozens of Pennsylvania's natural lakes, large and small, located principally in the Commonwealth's glaciated regions, and especially in the Pocono Mountains. Not surprisingly, sandwiched among these pastoral photographs and detailed descriptions, on pages 351 to 356, are Meehan's impressions of Centre County's Penn's Cave, well-known even a century later for its trout:

LAKE OF PENN'S CAVE

One of the most beautiful of the smaller valleys in Pennsylvania is Penn's valley, lying north of the Tussey, or Seven Mountain range, and entirely enclosed by a succession of smaller mountains, such as the Brush mountain, Nittany mountain, etc. At the extreme western end of the valley is located the State College, now one of the most flourishing educational institutions in the State, while at the extreme eastern end lies snugly ensconced in the forks of the mountains the village of Woodward, at which less than six months ago was enacted the famous Etlinger tragedy, the most heartrending happening since the days of the Indian massacres, on almost the same spot, one hundred and twenty-five years ago.

Penns valley is the native home of the original Pennsylvania Dutch, a race of people as distinct from their fellow men as are the Irish, French, or Germans. They are especially noted for their thrift and handiwork in agricultural pursuits, and the wide scope of beautiful farms, which dot the valley from one end to the other like the squares on a chess board, all under the best possible state of cultivation, and invariably owned by the resident, are in full evidence. Farming constitutes the principal occupation of all in the valley, while in the numerous towns and villages scattered throughout are congregated a few trades-people necessary for the supplies, as well as those who have acquired a competence and retired to a life of quiet that may end their days in peace. Beginning at Lemont, the Lewisburg and Tyrone Railroad traverses the valley through its entire length, passing out through a gap in the mountains at Coburn.

Such is a brief description of a valley which has for an attraction, in addition to the beautiful scope of country and scenery above enumerated, a natural curiosity the like of which is not to be found anywhere else throughout the eastern slope; and not rivaled by any other of the many natural pleasure resorts in the United States. It is in this valley that Penn cave is located, and to any who have ever experienced the pleasure of a trip to and through this cave, 'twould be unnecessary to say anything further, as all would coincide

in the above statement and at once concord in the marvelous picturesqueness of its scenery; but the cave has been so little written about, that it is scarcely known at all outside the boundaries of Centre county. And the further fact that the cave is in the possession of one of the slow-going natives of the county, who either has not the means or the desire to beautify the surroundings and make it the place it ought to be, is one more reason for its being so little known, notwithstanding the fact that its discovery and exploration dates back almost a score of years.

Penn cave is located on an eminence, one of the highest points in the county, aside from the mountains, the altitude being about one thousand feet above sea level, and within three and a half miles of Spring Mills (Rising Springs), the nearest railroad station, on the line of the Lewisburg and Tyrone Railroad, which can be reached from the east by way of the Philadelphia and Erie Railroad, via Montandon, or from the west by way of Bellefonte. However, the great majority of visitors to the cave drive there from Bellefonte, a distance of fourteen miles, the drive being picturesque and delightful, and made mostly over a good road. About twelve years ago a large hotel was erected at the cave by the proprietors, Messrs. Samuel and Jesse Long, and ample accommodations are thus afforded to all visitors; but of this, more will be written later.

Penn cave house is located close to the public highway, and on arrival there the visitor surveys the surrounding landscape in vain to see the cave, or at least some sign of its location. Nothing but broad fields enclosed by high mountain ranges meet the gaze, with the exception that to the west of the hotel stands a large clump of trees, primeval of the original forest, all intertwined with a heavy undergrowth of brush and vines. On expressing a desire to visit the cave, Jesse Long, the man in charge, and who, by the way, is a genius in his own peculiar style, secures a huge can of gasoline, and leading the way, heads direct for the clump of trees above mentioned. On arrival there the first sensation is that of keen disappointment, as the only thing then in view is what seems to be a large sink hole in the ground, all sides completely screened from the gaze by a dense covering of small brush and wild vines, with what seems a mere bridle path leading downward. A descent of ten feet brings one to a pair of steps, down which the way is made to the first landing, where, one turning an angle, the first glimpse of the cave is brought to view, away down at the bottom of another long flight of steps, and all told about sixty feet from the top.

The first sensation that greets the visitor in his descent is the marked change in atmosphere. The temperature may be ninety degrees in the shade at the top, but as one goes down the air becomes cooler and cooler and the atmosphere more bracing until once at the entrance to the cave it seems so cold as to actually make one shiver. The temperature varies from 40 to 45 degrees all the year through, being the warmer in winter time. Once standing on the large platform of planks at the entrance to the cave, one cannot help but be impressed with a longing to enter. The scene is grand beyond description. Seventy-five feet above, up a perpendicular wall of rock on the one side and slanting through a maze of vines on the other, the sun shines in a magnificent splendor, while directly before you is a cavernous opening in the rocks, twenty-five feet high and forty feet in width. In this vast cavern slumbers a lake of sparkling water, invariably as clear as crystal, and reaching as far into the black depths as the eye can see.

While the visitor is taking in all the surroundings, Mr. Long is busying himself in preparing the boat and the light, the latter a double gasoline lamp attached to the prow of the boat, and the former larger enough to accommodate a score or more. At the words, "ready, jump in," the boat is entered and the voyage of sight seeing in the cave begins. From the entrance of the cave to its terminus, three thousand feet under the rocks, the journey is made entirely in the boat, on a lake of water which carries a mean depth of from ten to twelve feet the whole length until near the end, where there is a depth of fifty feet and over. The width of the cave varies from twenty to sixty feet in the clear, with numerous high chambers branching way up in the rocks on either side. In height there is a variation of from twelve to seventy-five feet. If the visitor is impressed with the beauty of the entrance, he cannot help but gaze in awe at the wonders displayed as the boat glides noiselessly along over the placid waters. The light from the gasoline lamps casts a a [sic] perfect maze of fantastic shapes and figures. Long rows and large clusters of stalactites depend from the roof in every imaginable form, while up from the depending rocky sides and rooms have grown just as curious stalagmites. Tracings of fret work, representations of animals, snakes, the arts, and human beings adorn the rock walls on every side.

Penn cave is divided into two chambers, the first extending to a depth of possibly one thousand feet, where there is a narrow channel, scarcely six feet wide, which is followed by the rear chamber. In traversing the course, which is winding throughout, the first thing which attracts the eye of the visitor is a huge stalactite, or rather a group of stalactites, which are a perfect resemblance of bunches of bananas. A little further on stands a beautiful specimen of the "Goddess of Liberty, enlightening the world," the representation being perfect, even to the rays of light from the taper in the uplifted hand. Groups of stalagmites are scattered here and there in exact reproduction of a cluster of Egyptian mummies, and one is led to wonder if at some early day the ancestors of some unknown race were buried by being embalmed and arranged in this cave. Large strings of fish, enormous hauls of eels, the tiger head, elephant tusks, white rabbits, a rhinoceros, the horse, dog, cow, and sheep, and almost every kind of representation in the animal kingdom, are to be seen. Horticultural designs are also displayed in great profusion. A sheaf of wheat, a field of growing grain, tobacco in the plant and hung up to dry, flowers, etc., are all faithfully portrayed.

The arts, too, are not omitted, as the numerous models of various kinds of sculpture are flashed on the gaze. At one side will be the image of a tall building surrounded with innumerable statuesque [sic] arrayed with apparently the most elegant taste. These beauties are scattered everywhere throughout the entire length and breadth of the cave, as if the whole had been designed by a master hand to please and entertain the most fastidious. Truly, must one be impressed on a visit to Penn cave, that the hand of the Creator has fashioned nature more wondrously beautiful than even the most renowned artists or sculptor ever dreamed of. Another marvelous thing must be given mention. It is a cluster of stalactites, very closely resembling the pipe organ, depending from the roof by a single huge stem, and by striking any one of the many distinct pipes a very musical sound is produced not unlike those of the flute; as every branch give forth a different sound, it is highly probable that a master hand could produce some very pleasing music from this natural pipe organ.

The entire wall of rock is exceedingly vibratory. A loud call or "hello" will reverberate from one end of the cave to the other, and so apparently perfect are the acoustic properties that a person at the entrance speaking in a natural tone of voice can be heard the full length of the cave. And although the top of the cave is composed of one solid wall of rock from fifty to seventy-five feet thick, teams passing the road, which runs over the cave, can be heard by a person inside with such startling distinctness as to easily tell whether the vehicle is drawn by one horse or two. On nearing the end of this cavern a constant roar is heard, which grows louder and louder as the end comes nearer, until one almost imagines he is being irresistably drawn into some infernal machine, but this fact is accounted for by the rush of water through the rocks from the cave, a distance of perhaps one hundred and fifty feet, where it emerges to the surface in two large springs and in sufficient quantity to furnish water power for two large saw mills located not a hundred feet from where the water gushes forth. And this is the source of Penn creek, the first stream discovered and named in this county.

The lake is such a wonder that it is hard to view it without picturing some hidden fountain away down in the bowels of the earth from which it draws its constant supply. The water never falls below a certain level, no difference how dry the season, and always maintains the same sparkling cool temperature. Very hard rains, however, will affect it; the water then raising according to the rainfall, and becoming of a murky color. This is supposed to be mostly from the surface drainage. During the flood of 1889 the water rose some three feet. While viewing the wonder of the cave the writer put this question to the guide:

"Are there any fish in this lake?"

"Bless you, yes;" said Mr. Long. "Trout, and the very biggest kind, too. When the water is clear you can see them most any time, and especially out near the opening. I have seen trout in here that I know were fully two feet long, and they are always quite lively and sportive."

On being asked if he ever caught any or allowed fishing in the lake, Mr. Long said the trout would not bite. He had often tried and so had others, but never had the success of one bite, although he knew there were hundreds of trout in the lake. It is more than likely that they come there out of Penn creek, as the hole in the rocks through which the water empties out is amply large enough to admit of their passage, and Penn creek is one of the best stocked trout streams in Centre county. It is just as possible that the trout make this cave their winter abiding place.

Aside from its natural beauties, Penn cave is a remarkable study for any student of nature, as especially the geologist. The rocks which form the boundaries of this vast cavern are composed of what is known as the calcareous limestone, with a slight mixture of silicia [sic]. They are always in a humid condition, the fluid limestone and water dropping from the vaulted roof to the lake all the time, and yet so slowly as to not interfere with the pleasure of going through the cave. As is well known, stalactites are formed by the trickling of water from the roof, in which there is a goodly percent of limestone in the liquid form; and stalagmites are formed in the same way, only the liquid drops to the ground on the floor before it hardens. Knowing

this, and also that only about 1-100 of a drop of this liquid is limestone, or, in other words, will solidify, what a nice problem to compute the age of this cave. To grow all of the stalactites and stalagmites that are in Penn cave, and of the size they are, would require ages and ages - hundreds of thousands of years of time. But whatever the age, Penn cave is a wonder not exceeded by the famous Mammoth cave in Kentucky, and well worth the while of any one to visit.

As stated above, the proprietors are Messrs. Samuel and Jesse Long, with the latter in charge of the cave and hotel. Mr. Jesse Long is one of the old-time residents of the valley, and though not always the owner of the cave, came into possession of it about the time it was discovered, as for many years it had been solely regarded as a sink hole in the ground and had been used as a dumping place for stones and rubbish. He is now living in a humdrum way, and has practically done nothing at all to bring the cave to a point of general prominence, or it might be more universally known what a beauty spot it is. Free advertising and the application of other modern methods would make of Penn cave one of the most popular resorts east of the Mississippi, and at the same time a fortune for the owner. Twenty-five cents is the price he will charge to take one through the cave; no difference if you are in but fifteen minutes or an hour and a half; he will give you boarding at 25 cents a meal, if you eat but one meal or stay a week, and it is the same price for a horse feed or lodging for yourself. In his work he is assisted by a sort of man-of-all-work, who takes care of your horse and will act the waiter at meal time. However, these things do not militate against, or detract one iota from the beauty of the cave, and the illustrations here given, which were taken especially for this work, cannot convey to the reader one-half the grandeur to be seen, or the pleasure experienced by a visit to Penn cave, in Centre county, at one time the original home of the aboriginal Shawanese and Delaware Indians, but now the might-be famed resort of the beautiful valley of Penn.