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Ed Crawford

C O M I N G   E V E N T S

Field Trip Coordinator: Geary Sanders, 763-0361

February 26, Thursday. Mt. St. Helens public meeting, 7:30 PM, University Friends Center, 4001 9th NE, Seattle.
Feb. 28-March 1 or March 7-8.(or possibly some later time) Colville area limestone scouting trip. For date and details, contact Craig Hansen in Cheney, (509) 235-4649.
March 17, Tuesday. Regular meeting is PRECEDED by GALA THIRTIETH ANNIVERSARY PARTY for the Cascade Grotto; 7:30 at the Hallidays', 1117 36th Ave. E., Seattle. Potluck; see back cover. PROGRAM: Bill Halliday will talk on "The Cascade Grotto's First Thirty Years".
March 20-22. International Meeting on Tourist Caves, Borgio Verezzi, Italy.
March 21-22. Tentative Vancouver Island trip. Call Chris Burdge, 775-6724.
April 14-17. Far West Cave Management Symposium, Portland, Oregon. Details two issues ago. Contact Bob Brown, (206) 569-2724, for Western Wash. or Craig Hansen for Eastern Wash.
April 21, Tuesday. Regular monthly meeting, 8:00 PM, same place.
April 24-26. McLoughlin Canyon Cave mapping and exploration trip. 3 day trip to Eastern Washington. Contact Rod Crawford, 543-9853, late afternoon or evening.
July 18-24. NSS Convention and International Congress of Speleology, Bowling Green, Kentucky. One space left; contact Brown.
Sept. 5-7, Labor Day. Regional Meet at Concrete, Washington.

NEW MEMBERS

Tad Riste, R12-81. Box 274, Roslyn WA 98941, (509) 649-2774.
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Craig Hansen and Dave Jones: New mailing address, P O Box 797, Cheney WA 99004
Chas. & Betty Anderson: 13232 NE 133rd, Kirkland WA 98033

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NSS CONVENTION HERE IN 1982? Well, the Region has put in a bid, one of two (the other in Arkansas), and it looks like it's going to happen. But to make up for not having to travel all that way to the convention, we are going to have to provide LOTS OF WARM BODIES to help Ellen Benedict with the work. Come to the meeting prepared to volunteer to do something. You don't have to sign your name in blood; be tentative if you must, but volunteer!

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Mike Templeton, old time Grotto member who helped dig out Dynamited Cave in 1961, is the new director of the Oregon Museum of Science and Industry (Seattle P-I Aug 10)

Our Cover: Filled lava tube exposed in a Hawaiian sea cliff. Drawn by Carlene Allred (on one of those Alaskan winter nights) from photo by Wentworth and MacDonald.

F E A T U R E

A PRIMER ON CAVERNOUS AND RELATED FEATURES IN BASALTIC LAVAS OF THE HAWAIIAN TYPE

based on the writings of
Chester K. Wentworth and Gordon A. Macdonald

[Wentworth and Macdonald's 1953 paper, "Structures and forms of basaltic rocks in Hawaii", is a classic in its field that has never been superseded, but which up to now has not been summarized or abstracted in this publication. Their theories, particularly those relating to speleogenesis, are still accepted by the most progressive young vulcanospeleologists, and will likely survive some of the more outre suggestions made in the intervening years. Newcomers to lava tubes and vulcanospeleology require an explanation of some of the basic terms and processes involved, which is not always found in modern works on the subject. I have therefore assembled the following extracts from Wentworth and Macdonald's crystal clear prose. My occasional comments are placed in square brackets.---R. Crawford.]

INTRODUCTORY

Basaltic lava

The dominant lavas of Hawaii...are the olivine basalts and basalts, and the closely related picrite-basalts and basaltic andesites. [Basalts are distinguished from other types of lava (andesites, trachyites, and rhyolites) by lower silica content, 42% to 51%, greater alkalinity, and greater fluidity.] Generally, the forms developed are those due to great fluidity in the erupting lava. Generally speaking, the features influencing fluidity of lava flows are chemical composition, gas content, and temperature...the temperature of erupting basaltic lava at Hawaiian vents generally ranges from 900° to 1100° C.

Shield volcanoes

The fluid basaltic lavas of the Hawaiian Islands build...shield volcanoes... Typically, Hawaiian shield volcanoes are broad and flat in profile...The slopes of the basaltic shields generally range from about 4° to 10°...Owing to their characteristic mode of construction, by flows erupted from an elongate zone of fissures, the ideal form in plan of the Hawaiian shields is a more or less elongate ellipse. Departures from this ideal form arise principally from interference with the growth of the structure by neighboring mountains.

Rift zones

The Hawaiian shield volcanoes have been built by innumerable fissure eruptions. The fissures are generally concentrated within certain narrow zones, known as rift zones. The rift zones range from a few hundred feet to more than two miles in width, and extend down the flanks from the summit of the mountain to below sea level. Typically, each volcano has two principal rift zones extending outward from the summit of the mountain. Some...have a third minor rift zone, also extending outward from the summit...

At the surface the rift zones are marked by lines of cinder-and-spatter cones and spatter ramparts, pit craters, lava cones, and on the active volcanoes

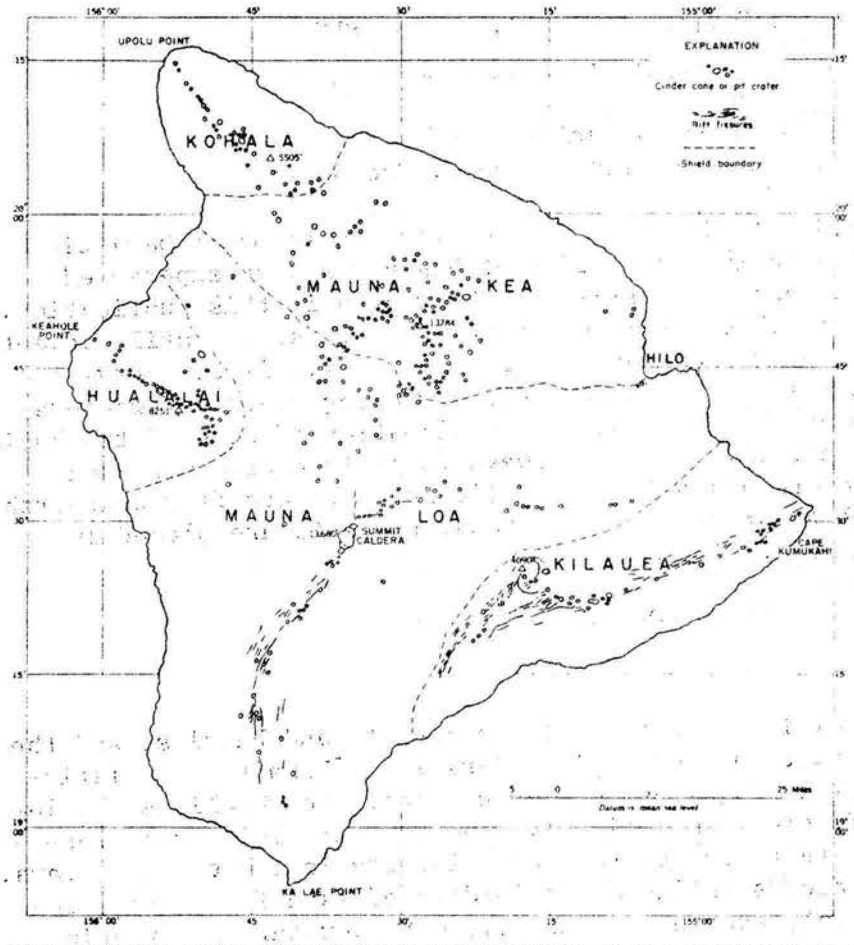

FIGURE 4.—Sketch map of island of Hawaii, showing cracks, vents, cones, and margins of the five component shields.

where erosion has not appreciably modified the surface, by many open fissures. The fissures range in width from a few inches to about 10 feet. They frequently can be sounded, or are visible to a depth of 50 feet, and many probably are open to a much greater depth. [Crystal Ice Cave in Idaho is thought to be the roofed portion of such a rift fissure.]

The origin of rift zones is uncertain. However, evidence indicates that subterranean magma pressure preceding and during eruptions somewhat exceeds the hydrostatic pressure of the overlying rocks....If the pressure in the magma exceeds the weight of the overlying rocks, the upward thrust applied in a relatively small area beneath the summit portion of the volcano may be expected to produce an opening of the overlying structure in the form of three principal radiating fracture zones.... Whatever may be the original cause of the rift zones, the opening of the fissures, allowing magma to rise to the surface, probably results at least partly from the tumescence of the mountain previous to eruptions....

Lava Flows

The Basaltic lava flows of the Hawaiian volcanoes vary greatly in all dimensions. On the flanks of the volcano, where they can spread freely, they range in thickness from a few inches to 40 or 50 feet, averaging about 5 feet near the mountain summit and 20 feet near the shoreline....The increase in thickness on the lower slopes is largely the result of decreasing temperature and gas content, with concomitant increase in viscosity. It is accompanied by a general transformation in the prevalent type of lava flow, from pahoehoe to aa, pahoehoe flows averaging considerably thinner than those of aa...

The lengths of flows also vary greatly. Some flows travel only a few feet. Thus the lava of 1868 along the southwest rift zone of Kilauea volcano in places hardly flowed away from the feeding fissure, and at other places only reached to within a few feet of the surface...Other flows travel many miles from their vents. The 1880 lava flow of Mauna Loa rached a point in the outskirts of the city of Hilo, 30 miles from its source. The breadth of lava flows ranges from a few feet, or at the very upper end of source fissures sometimes even less than a foot, to several miles ...The volume of lava extruded during a single eruption ranges from a few to several hundred million cubic meters. [Lava can flow for less than a day, or, thanks to the insulating character of lava tubes, for several years. One Samoan volcano erupted lava through an 8-mile lava tube and over a sea cliff from 1905 through 1911.]

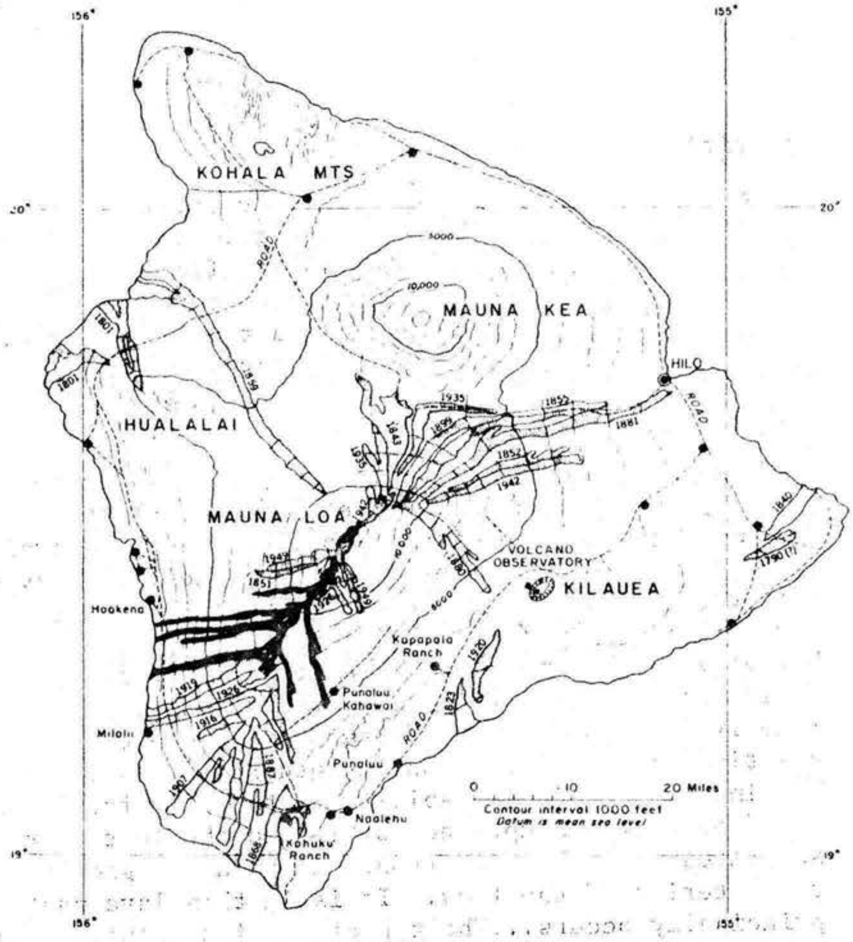

FIGURE 13.—Map of Hawaii showing historic lava flows. The 1950 flows of Mauna Loa are shown in solid black. Older historic flows are stippled.

Flow units

Many lava flows of the Hawaiian volcanoes comprise two or more parts poured one over the other during the course of a single eruption. For these nearly contemporaneous subdivisons of flows Nichols (1936) proposed the name flow units ...Repeated flow units occur in both aa and pahoehoe, but are seen most commonly in pahoehoe. In some sections, scores of pahoehoe units, none more than 2 to 4 inches thick, aggregate 10 or 20 feet in thickness...In prehistoric lavas it is commonly difficult or impossible to ascertain whether successive beds of similar lava, without intervening soil, are merely different flow units of the same major flow, or independent flows extruded during different eruptions. [The term flow unit is often misused for pahoehoe toes.]

Origin of aa and pahoehoe

It is believed that the formation of aa instead of pahoehoe is the result of greater viscosity, resulting from greater loss of dissolved gases in the lava, and greater degree of crystallization. Both loss of gas and crystallization progress as the flow continues downslope, and consequently it is common to find pahoehoe in the portion of the flow near the vents changing into aa farther down the flow. Both loss of gas and crystallization are promoted by stirring, and consequently a flow is likely to change from pahoehoe to aa where it plunges over any steep escarpment. Violent fountaining at the vents also promotes the change of the lava into aa. On the other hand, if the lava erupts quietly, and flows quietly, crusting over and the formation of lava tubes may so retard the loss of gas that the lava remains pahoehoe to great distances from the vents.

AA BASALT

Definition

AA flows are characterised by a central massive phase lying between clinkery fragmental top and bottom layers. The fragments are exceedingly irregular and spinose. Aa vesicles [solidified gas bubbles] are less regular in outline than those of pahoehoe. The central river feeding an aa flow moves through an open channel through most of its course. Spines and accretionary lava balls are common surface features on aa flows.

Mode of flow

An aa lava flow is fed by a main lava river that flows down the mountainside in an open channel. On either side of the main river, and particularly at the advancing toe of the flow, the pasty central layer of the flow pushes outward. Locally and for short distances, the movement may be quite rapid, but generally the most active front portion of the flow advances only a few tens or at most a few hundreds of feet per day. There are many exceptions, but generally aa flows advance much less rapidly than pahoehoe flows...

The black clinkery front of the flow may appear temporarily as a steep, relatively immobile bank...Gradually, however, the front steepens and bulges, sometimes imperceptibly but at other times quite noticeably. Eventually the bulging results in instability of the flow front, and a slab...peels off at the front, breaks up, and tumbles to the foot of the bank...Where the block separates from the flow front it reveals a glowing hot face of pasty lava in the interior of the flow. It is in this lava paste that the flow movement principally occurs...The top of the flow generally moves also, but less rapidly, dragged along by the flow of the pasty material beneath...The flow thus tends to advance over a layer of its own debris, formed by collapse of the repeatedly bulging front.

Aa channels

The lava river that feeds an aa flow moves down the mountainside in an open channel...Commonly, on gentle gradients, the lava river may repeatedly divide and reunite, like a braided stream...The volume of lava fluctuates considerably, and the channel is at times full to overflowing...During times of overflow, blocky material and congealing lava along the banks build up walls, or natural levees, that may confine the stream several feet above the level of the surrounding land surface...At the end of activity, the upper fluid portion of the lava river and part of the lower less fluid portion drain away, leaving an open channel, 10 to 50 feet wide and 2 to 15 feet deep. [Wood reported seeing small lava tubes opening on the walls of aa channels on Mt. Etna, but the main channels in aa do not roof over.]

PAHOEHOE BASALT

Definition

Pahoehoe flows are characterized externally by smooth, hummocky, ropy, or festooned surfaces [see cover illustration], and internally by lava tubes and nearly spherical vesicles. Tumuli, pressure ridges, pressure plateaus, and slump scarps form principally on ponded pahoehoe flows.

Mode of Flow

After the initial burst of lava the top becomes crusted over by congealed rock, and the advancing fluid lava entirely fills the resulting lava tubes. The large tube divides into many smaller ones, each of which feeds a lobe of lava along the advancing flow front. The entire front advances by the protrusion of successive lobate toes, somewhat in the manner of a moving amoeba...Lava may congeal in the tube, the position of the tube being marked only by the concentric arrangement of vesicles; or the fluid lava may drain away, leaving the tube partly or entirely empty... Flows of pahoehoe are commonly a succession of flow units, from a foot to 15 or 20 feet in thickness. Each flow unit represents a separate period of lava spreading, a few hours, days, or weeks apart, during the same eruption.

Pahoehoe channels and tubes

During early stages of the eruption, and sometimes near the vent during later stages, the pahoehoe river flows in an open channel. As it leaves the vent, the surface of the river is largely incandescent, of yellowish orange to red. Thin lead-gray crusts quickly form and are borne along on the moving river, repeatedly fracturing, sometimes turning on edge and sinking, and continually reforming...Occasional overflows build up low levees of congealed lava along the river margins...

A short distance below the vent, the pahoehoe river commonly starts to develop a continuous roof, resulting in a typical lava tube, through which the river moves during most of the duration of the eruption and for most of the length of the flow. The main tube forms a myriad of distributary tubes that feed the active fromt and margins of the flow. Tubes form in two ways: by the chilling of a skin around protruded pahoehoe toes, and by the crusting over of the main lava river. The toes form by the breaking open of the crusted front of the flow, permitting the escape of "a new tongue, which emerges as a rounded bulk encased in a newly formed skin" (Jaggar, 1930)...The crust quickly thickens, forming a rigid shell over the still fluid interior, and repeated outbursts lengthen the toe and develop a small tube.

The main tube is formed by crusting over of the main lava river. The crust is at first thin and unstable, repeatedly breaking up and floating downstream. Eventually, however, floating crusts form a jam across the river, more crusts pile against the jam, and a permanent roof is established that is gradually extended upstream. This process was witnessed during the 1935 eruption of Mauna Loa by H. T. Stears, and again during the 1942 eruption by Macdonald. Once the crust is established, it thickens downward as the lava congeals against its under side.

At the end of an eruption the tubes may remain filled with congealed lava [see drawing on cover of this issue], or the lava may drain away partly or entirely, leaving an open tunnel...Open tubes range in diameter foom less than 1 foot to 50 feet, or more in extreme cases. In Hawaii they seldom exceed 20 feet. The larger tubes may extend for miles, but seldom if ever are they unbroken, even during the eruption. Typically each tube e has a series of openings in its roof, where a permanent roof either failed to form or was broken. Through these openings, during the eruption, the stream of molten lava can be seen below. Drained tubes commonly exhibit a series of shorelines left on their walls as the level of the lava dropped during closing stages of the eruption. The floor is generally the congealed essentially flat surface of the dwindled lava stream, and commonly this very last lava in the tube congealed as aa. The walls and roof of the tube are commonly veneered with spatter and glazed by gas fusion, and hung with stalactites. Larger tubes in old lava formations often have their floors cluttered by piles of blocks fallen from the roof, both floor and roof being convex upward. The walls of most large lava tubes are composed of several thin flow units. These are formed by repeated overflows of the lava river before it crusts over to form the roof of the tube. Several thin flow units commonly are visible in the roof of the tube also, and are formed by repeated small overflows from the openings in the tube roof.

Lava stalactites and stalagmites

Lava stalactites are two different types. One type [called "tapered stalactites" by Halliday and "drip pendants" by Harter] forms simply by the dripping of fluid lava from the roof and walls of a lava tube or open lava river where, for any reason, the level of the fluid in the conduit falls, or in tubes or on the walls of spatter cones where spatter is flung against the roof or walls. Such stalactites generally resemble icicles, although they may be much more irregular. They commonly attain lengths of 6 to 12 inches, and rarely as much as 3 feet. Only seldom are they accompanied by stalagmites, and when stalagmites are present they generally are poorly developed.

The second type of lava stalactite [called "tubular stalactites" by Halliday and "lavacicle stalactites" by Harter] is formed by gas-heating of the roof of a lava tube or the inner walls of a cone...The intense heat, at temperatures up to about 1,200° C., fuses the exposed surfaces to a vitreous glaze that is sufficiently fluid to trickle, forming stalactites. [Harter found that the glaze flows in the form of bubbles, of which the resulting stalactites and stalagmites are both composed.] The latter are typically very slender, attaining lengths as great as 4 feet with a thickness of only 1/4 to 1/2 inch. Some are fairly regular smooth rods, but many resemble slender-elongate bunches of grapes, or contorted worms. Others are icicle-shaped...While they are still glowing hot, they are sufficiently plastic to sway freely in blasts of gas.

In lava tubes, drip from the stalactites to the floor builds up lava stalagmites. The latter are mounds of agglutinated droplets, from 1 or 2 inches, to 1 foot high, and 1 to 4 inches in diameter. Their position directly under the stalactites shows that the drip must have occurred after the lava stream comprising the floor of the tube stopped moving.

Tumuli and pressure ridges

Tumuli are domical upbowings of the flow surface...grading into much elongated structures that are best termed pressure ridges. Tumuli in Hawaii range from 1 or 2 to 10 or 15 feet in height, 10 to 30 feet in width...Extremely large examples...are not found in Hawaii [however, one collapsed example in the Mt. St. Helens area, Washington, like a large crater of rubble, is 41 m in diameter (Greeley and Hyde).] Some...were formed by hydrostatic pressure of the underlying fluid lava lifting the congealed crust...some...by differential collapse of the flow crust owing to the draining away of the underlying fluid portion...Pressure ridges...generally resemble tumuli except in their greater elongation...Some examples are elongate heaps of crust blocks, tilted, jumbled, and overturned...The great majority of pressure ridges apparently were formed by the horizontal thrusting and buckling of the flow crust caused by the pressure of fluid lava.

VERTICAL CAVITIES

Pit craters

Pit craters...are circular or ellipsoidal pits sunk below the gently sloping surface of the volcano and surrounded by no mound of accumulated lava. The pit craters are collapse structures that have never been filled to overflowing with molten lava. They range in size from 30 feet to more than half a mile across; in depth from less than 50 feet to 800 feet. Devil's Throat...when originally described was only 30 feet across at the surface, and 250 feet deep.

Large pit craters are formed by collapse resulting from the withdrawal downward of the surface of underlying magma. Probably in some cases they are formed by the sinking en masse of a cylinder bounded by ring fractures approximately vertical at the surface...Small pit craters may be formed in the same way, or by collapse into lava tubes.

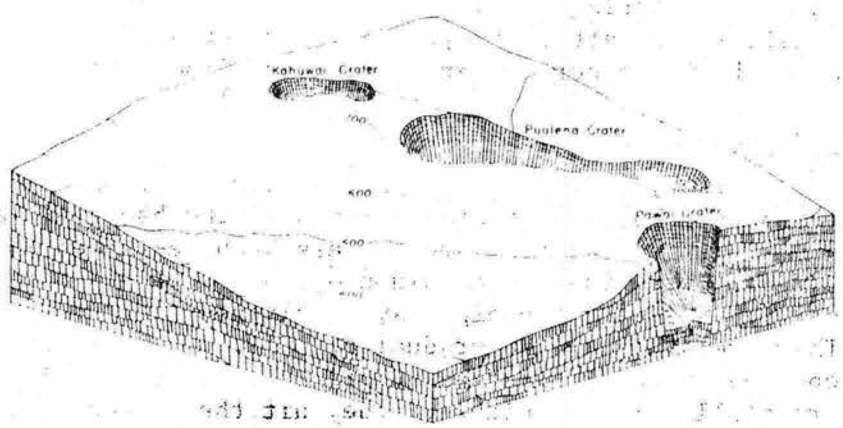

FIGURE 8.—Block diagram showing pit craters along the east rift zone of Kilauea volcano. Contour interval, 50 feet.

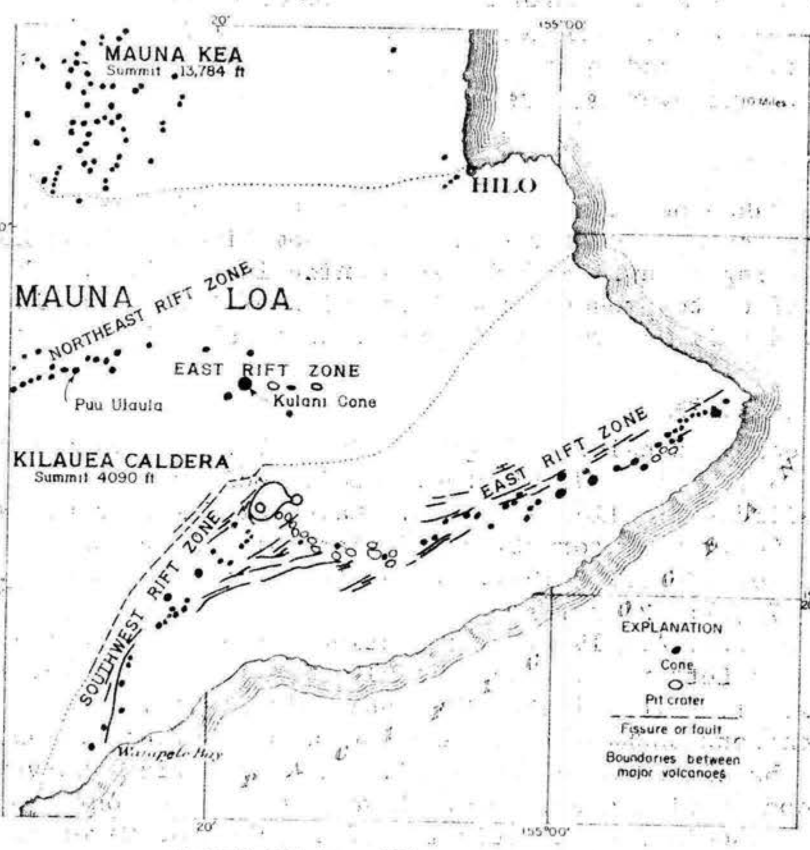

FIGURE 9.—Sketch map of Kilauea and adjacent rift zones.

Rootless vents

The term rootless vent is applied to vents not directly associated with the conduits that brought the magma to the surface from the deep-seated magma reservoir. Three varieties...have been observed in Hawaii. One...includes the hornitos [discussed later]...The second variety occurs on a much larger scale, and produces major outflows of lava at a considerable distance, sometimes several miles, from the true vents of other flows of the same eruption. It apparently results from the lava entering tubes in older pahoehoe, and flowing long distances underground before it breaks through to the surface. In 1935 [on Mauna Loa]...it is believed that the lava flowed underground for 5 miles, through one or more old lava tubes, before it broke through to the surface to form the rootless vent... [It must be emphasized that this phenomenon cannot explain features of existing caves---there is no evidence that old tubes so utilized would remain intact afterwards]. The third type of rootless vent is the littoral cone, [which occurs] where an aa lava flow enters the sea...

Hornitos

Hornitos, also known as driblet cones and driblet spires, are small mounds of spatter built at rootless vents on the backs of lava flows. The typical hornito is a rounded, more or less beehive-shaped mound, whereas the typical driblet spire is a thin column or spine. Both commonly have an open pipe at the center, although the pipe may be clogged or sealed over by the last ejecta. They are built by the gradual accumulation of clots of lava ejected through an opening in the roof of an underlying lava tube. In Hawaii most of the ejecta are still partly fluid when they hit the ground, and the mounds are composed of agglutinate. In other parts of the world some are composed of scoria or ash, and are built by secondary (rootless) fumaroles. In Hawaii...hornitos range from less than 2 feet to about 6 feet in height, and up to about 10 feet in diameter. Driblet spires range from less than 1 foot to about 2 feet in diameter, and up to about 12 feet in height. [Wood found cinder hornitos on Mt. Etna over 30 m tall].

Tree molds

Pahoehoe lava surrounding the trunk of a tree is chilled against it, preserving a mold of the trunk and sometimes of branches. The tree itself burns, leaving an upright tubular opening in the lava. The mold is often sufficiently perfect to preserve the impression of the checks in the charred wood, and rarely details of the bark. [Some tree molds in Washington are of considerable depth.]

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F I E L D   T R I P   R E P O R T S

"But the dauntless Cascade cavers keep sloggin' through the mud;
To get to these small pigpen caves, and wallow in their crud."
---A. Speleothus

Windy Creek Cave
November 21-23, 1980

by Leonard Hargiss

On Friday, 21 November, Andrew Foord and I headed up to Mt. Baker National Forest with the intention of spending the weekend exploring Windy Creek Cave. Several members of the Grotto were to come up for the day on Saturday. We got a late start, arriving at the clearcut about noon. Being unfamiliar with the area, we staggered up and down the 40° clearcut under full packs for three hours, finally giving up and deciding to pitch camp and dayhike up on Saturday.

It snowed and sleeted that night, but we awoke at about 3 AM to a spectacularly clear night with a full moon. I regretted not having a tripod, which would have allowed taking some excellent photographs of Mts. Baker and Shuksan. We went back to sleep much encouraged.

Dayhiking in, we hiked up a clearing straight above the road end and, at the ridge top, followed the ridge spur to the left circa 100 yards, shortly coming upon an excellent route down to the cliffs. Here we intercepted the route previously marked with colored ribbons. After crossing the major stream we promptly headed up the wrong hill, finding ourselves on a 45° slope surrounded by acres of Devils Club. Despite rather specific directions, we took an hour to find the cave.

It was our first trip to the cave, of course, and we were deeply impressed, both with the variety of signs of life in the cave and with the cave itself. Shortly inside the cave, just through the muddy crawlway we bailed out with a hardhat, we were treated to the sound of distant pounding water, which made the cave resonate with a peculiar drone, reminding me of nothing so much as the New York subway system.

There are some gorgeous examples of turd fungus near the rodents' nest about 300 feet into the cave; these delicate feathers are nearly two inches long.

After 2-3 hours of exploring, which wasn't nearly enough, we decided to turn around and head back. Yours truly made the mistake of slipping on an icy rock while crossing the stream in 25° weather just at dark, causing me to sit down in the frigid stream. I doggedly wrung out my socks and continued on, cursing my poor judgement in not bringing insulated boots. We reached the car 2 hours later, but my feet were numb for hours more.

We finished our bar of Hershey's Special Dark for dinner, being too tired to fix anything else. This terrain is much better suited for summertime exploration.

Caving in Trinidad, 1977

by William R. Halliday

On November 4, 1977, Len and I flew to Trinidad on the famous Eastern Airlines $299 special. Our primary goals were (1) visiting at least one guacharo cave; (2) learning about air service to Venezuela for the Cueva del Gucaharo, and (3) studying the Blue Basin Cave, supposedly the source of the Blue Basin Falls depicted on several stamps of Trinidad and Tobago. If time permitted, but it did not.

By the time we got through custons and got a taxi to Port-of-Spain, it was almost midnight. Holiday Inn first said we had no reservation, then that we had not paid in advance (which we had, and still haven't gotten it straightened out despite a receipt on this end), then put us in a room which hadn't been used for at least a few weeks, judging by the rust in the pipes. At $50 per night, we couldn't have done worse. Even the Hilton (which was much nicer) wasn't quite that expensive. Next day we rented a car and ended up in a nice beach hotel/motel about 15 miles west of town, at $13.50 per day, the Chacacabana, which made a good base, then sought out the Blue Basin, a noted attraction of the island: west, then north of Port-of-Spain. Rusting signs lead to the access road but then you're on your own. The Basin actually is a gorge about 1/4 mile long. To find the falls, take the road past the point where it becomes very steep (if you come to a T-junction with the right fork going nowhere, you've gone a little too far), and take the last trail leading into the gorge (right). There is a cave at the falls; it is not the source of the stream as I had been told but is a travertine depositional feature about 10 feet long, to the left of and just above the base of the falls. We were told by locals that the stream arises out of the ground above the falls, not from a cave. However, there is a wide-mouthed limestone cave somewhere in this part of the island; I saw a picture of it in a British geological journal.

At this point, we went into Port-of-Spain to find maps of the island, which was not easy. Also we learned from the Tourist Board that contrary to our previous information, there is a readily accessible guacharo cave on the Asa Wright Nature Center grounds, the old Spring Hill estate about 15 miles east of Port-of-Spain, which I had never heard of before. We headed there next morning and found it fascinating. Room and board are available here, and it would make an excellent headquarters for visiting cavers, although a bit more expensive and more spartan than our beach hotel. Address: P. O. Box 10, Port-of-Spain, Trinidad, W. I. Reservations are essential here. The cave (Dunstan's Cave or Spring Hill Cave) is an odd structure in Schistose rock, which looks partially tectonic and partially corrasional (a stream runs through its 200-foot length). Because of multiple orifices, it probably does not quite reach total darkness, but that doesn't bother the guacharos--amazing, strongly territorial birds that look like a cross between a large Rhode Island Red chicken and a chicken hawk. They sit on flower-pot-like nests and stare back at visitors without the least fear. The guide got his flashlight a little too close to the lowest pair and almost lost a chunk of hand. Our coming and our flash bulbs didn't bother them at all, but when one of the colony (about 30 pair) moves an inch onto somebody else's territory, the language is indescribable. I got so excited about being virtually nose to nose with these rare, bizarre birds that I forgot I had a telephoto lens, but might not have used it anyway. Admission to the Center grounds is $1.00 and the guide merits a good tip too.

After that, Trinidad was all anticlimax. We talked to guides who could take us to other guacharo caves deep in the jungle, got directions to nearby bat caves, went to check out the spur roads to both, ended up sliding off into a ditch at about 5 M.P.H., being bounced out by the local drivers we were blocking, decided the roads were too bad until the dry season, turned around, and checked out Las Cuevas Bay on the north coast highway--found only a couple of little sea caves. On our last day, I tried to find a way around the Blue Basin Falls to verify the source of the water, but eventually came to a place where there were so many banana trees blown down across the steep trail that I gave it up--I didn't have a machete along. One final check with the Tourist

Board, however, yielded the fact that the once-famous Gasparee Cave on one of the islands near our hotel was being readied for reopening as a tourist atraction, probably by now.

There are plenty of other Trinidad caves in the literature, and now we have good rapport with local cavers so that next time we should be able to accomplish a lot more.

And it turned out that there are bi-weekly flights from Port-of-Spain to Maturin, near the great Venezuelan cave. And also that the schedules are in the international schedule book so that our travel agent should have been able to tell us at home.

Littoral Cave Hunting in Northwest Washington
or
Another Rumor Bites the Dust!
April 20, 1980

by Rod Crawford

Several years ago, Grotto rumor-finder Jan Roberts gave me a report from a book entitled "Exploring Puget Sound and British Columbia" by Stephen E. Hilson. One of Hilson's maps shows a "cavern" on the Strait of Juan de Fuca coast east of Port Angeles. I later discovered that the same point is marked "cave" on the USGS Port Angeles quadrangle. So far so good!

So...on a fine Sunday in April with a nice low tide, Frank Haymes and I took a jeep road across some railraod tracks, down a steep canyon, and almost onto the beach. The sea cliffs here are about a hundred feet high, but are not solid rock; they are composed of glacial terrace deposits, clay and sand with large rounded rocks mixed in. A pleasant walk down the bach brought us to the "cave".

It is indeed an impressive sight; an entrance some 50' high at the cliff base with an orange (mineral staining?) stream roaring out. A large passage extends perhaps 150' back to a second, vertical entrance from the land surface above, where the stream enters. No doubt the "cave" was carved by the stream along a previously existing discontinuity in the glacial sediments. It is well lit throughout (we didn't need our lights), and might best be described as a vadose littoral rockshelter.

Next stop was Dabob Bay near the north end of Hood Canal, where W. R. Danner reported two littoral caves in Crescent Formation basalt. Now, we thought, we'll find something dark, for W. R. Danner knew a cave when he saw one. Unfortunately, it turned out that these caves, like those at Deception Pass, can only be reached by boat. After driving around endlessly looking for beach access, we gave up. There are boat ramps in the neighborhood, however: Now who in the Grotto has a boat?...

Micro-Report on the 1980 Regional Meet
Labor Day, 1980

by Rod Crawford

The Regional Meet in Nelson, B.C. was a great success, and the Cascade Grotto had more members there than any other group. Cody Cave was still Cody Cave; I saw a lot more of it this time. After the Labor Day weekend, Bob Brown, I, Geary Sanders, Frank Haymes, and the two ranger-members Craig Hansen and Dale Larson stayed a week at Gardner Cave scouting. Craig and Dale had found several small new caves down by the Pend Oreille River. We climbed 7300-odd foot Abercrombie Mountain for a rumored limestone pit; the mountain turned out to be made of phyllite to the summit. A bear annoyed us at night, and provided Bob with a bear story he can tell for years to come. I helped dig into a small new room in Gardner. Lots of good spiders.

WON'T SOMEBODY PLEASE WRITE A REAL REPORT ON THIS TRIP?!

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REPORTS FROM THE ALASKA TENTACLE

(letters to the editor from Kevin and Carlene Allred)

From Kevin, September 1980:

[Enclosing a vial of biological specimens]: "We collected these in a nice cave [Cave Lake Cave] up here which drains a lake. I couldn't believe my eyes at the shrimp or whatever they are [epigean amphipods, Gammarus lacustris Sars]. Some were attached to a few of the hundreds of tadpoles [Spotted Frog, Rana pretiosa] that were in one lake in the cave. There were also fish that are similar to Arctic Grayling, but we aren't sure yet. There aren't supposed to be grayling in southeast Alaska.

...The shell like things [shell of seed clam, Pisidium sp.] may (at least I think they were) have been connected. We surveyed 300 feet of passage, but need a raft to continue.

Write us and tell us if there are such a thing as these critters. Also, what is happening over there in Washington?"

From Carlene, January 1981:

"Life here has been quite dreary this winter: dark and rainy most of the time. We are really looking forward to Spring. We now understand why many Alaskans fly south for the winter. Today the sky has cleared and the temperature has dropped, so hopefully we will get some colder clearer weather.

We haven't done any caving this winter at all. In the fall Kevin took a hike to our cave and found that the entire basin was totally flooded from fall flooding.

Thanks for the information about the critters from the cave. We really appreciate it. Hopefully some day we will be able to send down some plankton and possibly some white fish (no guarantee on the fish--they have been sighted twice.)

It seems like no one has been in to Windy Creek Cave. Perhaps some day Kevin and I will return for a visit and explore the unexplored tunnel.

How are the grotto members doing and how is the Caving Game coming? We are looking forward to receiving a board at least, because I threw away my original. We would like to hear from you..."

If anyone whould like to relieve the Allreds' isolation a bit by writing to them, their address is General Delivery, Halines, Alaska 99827.

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PARTING SHOT

(a final [?] editorial)

by Rod Crawford

I've enjoyed editing the Cascade Caver. In fact, I still enjoy it, but I no longer have time to get an issue out every month, and that's what the Grotto needs. What's more, I've been railroaded into the Chairmanship this year, and I learned long ago from someone else's experience that you can't do both jobs at once. And, by Gosh, I've been editing this rag since May 1975 and it's time for a rest.

So, Leonard Hargiss will officially take over the editorship with the next issue. There is every reason to expect that Leonard will make a good editor (he helped out with part of this issue, and I defy anyone to tell the difference), and I hope every member will give him their support. I am sorry to have to turn it over when it is still several months behind, but then, that is one of the problems we hope Leonard will be able to solve.

Watch this space in upcoming issues for exhortations from your new chairman!

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LIST OF THE LONGEST VENEZUELAN CAVES IN NON-CARBONATE ROCKS

by Franco Urbani P.
Sociedad Venezolana de Espeleologia
Apartado 6621, Caracas 101

1. Caves in siliceous rocks of the Roraima Group

Quartzites, metalimonites, metaconglomerates, etc.	Length Meters	Depth Meters
Sima de la Lluvia de Sarisarinama, Bolivar	1352	202
Sima Menor de Sarisarinama, Bolivar	989	248
Cueva del Cerro Autana, Amazonas	653	40
Cueva del Tigre, St. Elena de Uarien, Bolivar	485	15
Sima Mayor de Sarisarinama, Bolivar	405	314
Cueva de Urutany 2, Pacaraima, Bolivar	276	18
Cueva de Urutany 1, Pacaraima, Bolivar	228	36
Cueva del Conglomerado, Sta. Elena de Uarien, Bol.	200+	10+
Cueva del Abismo, Boypantepuy, Bolivar	174	21
Cueva de Guaiquinima G1, Bolivar	130	22
Cueva de Guaiquinima G3, Bolivar	105+	35+
Cueva del Salto Eutobarima, rio Caroni, Bolivar	100	30

Not included in the above list are the open crevices which abound in these areas.

2. Caves in Iron Formations (Imataca Formation)

Cueva del Cerro Maria Luisa, Bolivar	1000?	30?
Cueva de Conejero, Guri, Bolivar	190	6

3. Caves in Gneisses

Sima de Hoyo de la Cumbre, P. N. El Avila, D. F.	57	42

4. Caves in Serpentine

Cueva de la Qda. Ocumarito, rio Mamo, D. F.	10	6

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Man Jang Gul Addendum: An overlooked reference [Peterson, Larry, 1972. Caving on Cheju-do, Korea, Cascade Caver 11 (8): 61] adds an estimate of 6.8 km length for the three segments. Downtube Baem Kul (Snake Cave) is separated from Man Jang by collapsed passage and consists of several segments, the longest of which is only 300 meters long.

1981 CASCADE GROTTO OFFICERS

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Vice-Chairman: Chris Erikson
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365-7255 Seattle WA 98155
Pay your dues to him!

Editor: Leonard Hargiss
Ph. 6151 S. 125th St.
772-4346 Seattle WA 98178
Write something for him!

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No
Trace

H E L P
C E L E B R A T E
YOUR GROTTO'S THIRTIETH BIRTHDAY
at the meeting March 17

This special meeting will start ONE HALF HOUR EARLY: 7;30 PM Tues. night,
Place: 1117 36th Ave. E., Seattle (the usual)
Refreshments: Potluck (as a general guide persons with last names beginning with: Bring

A-E	Beverages and/or snacks
F-O	Light main dishes (remember this is a half-hour party)
P-W	Salads or desserts

OLD-TIMERS who don't generally attend meetings ARE PARTICULARLY INVITED!

The meeting following the party will feature:

A talk by Bill Halliday about the Cascade Grotto's first thirty years

The conclusion of the Trip Report Contest

And, of course, The Caving Game.

For further details, arrangements, etc., contact your Chairman, Rod Crawford, at 543-9853 afternoon/evening.

BE SURE AND ATTEND THE GALA THIRTIETH ANNIVERSARY MEETING
TUESDAY MARCH 17 (ST. PATRICK'S DAY!)