

THE SPELEOGRAPH

PUBLISHED BY THE OREGON GROTTO
OF THE
NATIONAL SPELEOLOGICAL SOCIETY

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The **SPELEOGRAPH** is a monthly publication of the **OREGON GROTTTO** (a local chapter) of the **NATIONAL SPELEOLOGICAL SOCIETY**.

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Oregon Grotto general **MEETINGS** are held on the 3rd Friday of every month, at 7:30 P.M., and until further notice, will be held at the Southwest Washington Research Unit, 1918 N.E. 78th St., Vancouver, Washington. (¼ mile east of Interstate-5 on 78th St.)

OREGON GROTTTO OFFICERS

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1983	MARCH	1983	1983	APRIL	1983								
SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31				

Cavers Calendar

1983	MAY	1983	1983	JUNE	1983								
SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31				

March 18: Oregon Grotto General Meeting
7:30 p.m. at the Southwest Washington Research Unit, 1918 N.E. 78th Street, Vancouver, Washington (¼ mile east of Interstate -5 on 78th St.)

April 1: Oregon Grotto Executive Committee meeting at Dennis Glasby's home, 3580 S.W. 104th St. Apt.1, Beaverton, Oregon, 7:30 p.m.

June 27-July 1: Annual NSS Convention in Elkins, West Virginia.

The Trout Rock Conservation Task Force has already raised \$30,120 in cash or pledges and has promises of \$12,800 in bridge loans. Hower, the bridge loans need to be repaid and initial management costs met. We need your generous financial support now. If you have already contributed, you have our sincere thanks. We must settle on the property by March 16, 1983. Please make a contribution to this effort. Send checks, made out to NSS Trout Rock CTF at address below.

NSS TROUT ROCK CTF
c/o Ricketts
6404 Caryhurst Drive
Oxon Hill, Maryland 20744

COVER

The entrance to Bear Cave, Clackamas County, Oregon. (See cave map in *Speleograph* 18:46.)
From an Ektachrome transparency by Mark Perkins.

YOUR HELP NEEDED TO FINANCE PURCHASE OF TROUT ROCK CAVE PROPERTY

The NSS has acquired an option to purchase a historic parcel of land in Pendleton County, West Virginia. The property contains the entrances to three well known caves; Hamilton, Trout and New Trout.

The sale price of the 42 acre tract is \$40,000. Included in the sale price is all of the above mentioned acreage, the three cave entrances and the timber rights surrounding the the caves on the 27 eastern acres. The Moyers family, from whom the property is being purchased, will retain the timber rights to the 20 acre western part of tract for 7 years.

The NSS will hold title; stewardship will be placed with a permanent NSS committee composed of NSS members from nearby regions and grottos.

Money Wrench

- REINSTATED**
Slabic, John & Vada Nieuwenhuis, Luurt & Jeanette
- DUES/SUBSCRIPTIONS DUE JANUARY**
Benedict, Lyle Mixon, Bill
LaLond, Mike Nieland, Jim, Libby
- DUES/SUBSCRIPTIONS DUE FEBRUARY**
Ackley, Lee Schoonover, Keith
La Marche, Clara, Roger
- DUES/SUBSCRIPTIONS DUE MARCH**
Davis, Bob Kenty, Dean Paul
- DUES/SUBSCRIPTIONS DUE APRIL**
Block, Ed, Kathy Nelson, Bob
Chevalier, Roy Nelson, Steve
Dicky, Fred Piccininni, John
Jacoby, Ed, Pat Senger, Clyde
Moser, Michael Stevens, Charles

MEMBERSHIP DUES are: Individual, \$6.00/yr. Family of two, \$7.00/yr. Family of three or more, \$8.00/yr. Please make checks payable to Oregon Grotto and mail or give to Jo Larson, Membership Chairman, 13402 N.E. Clark Road, Vancouver, Washington 98665. If you wish a receipt or membership card mailed to you, please include a stamped, self-addressed envelope.

found contain no ice, and never drop below freezing. Dates of collection suggest that here the "migration" to the surface follows no strict seasonal pattern.

The feeding and reproductive biology of *G. chirurgica* is totally unknown. Presumably, like its congeners, it is a predator and scavenger on dead arthropods. Juveniles have been found in all seasons of the year.

SCIENTIFIC INTEREST AND POTENTIAL VALUE: Grylloblattids have fascinated entomologists since their discovery because of their comparative rarity, supposed primitive phylogenetic position, relictual distribution (5,7), and unusual temperature preference: the better-known, alpine species are most active at temperatures near 0° C (5,6). Few genera of insects have evoked wider interest or more speculation. None of these studies to date has involved *G. chirurgica*, but it would make an excellent subject for study in the future, as its habitat is relatively accessible and specimens may be found at any time of year. The biology and behavior of the species is unknown; its geographic distribution is mysterious; its taxonomic affinities remain obscure; and the temperature of its habitat is significantly higher than predicted temperatures reported for other *Grylloblatta* spp. All these points would be valuable to investigate.

THREATS TO SURVIVAL: Ape Cave, the type locality of *G. chirurgica*, has been developed by the U.S. Forest Service as a tourist cave. Extensive and continuous human visitation since this occurred has resulted in near disappearance of the cave's fauna, including *Grylloblatta*. None have been collected here since 1965 and the Ape Cave population may be extinct. Some of the cave's fauna returned during the period May 1980-March 1982, when the area was closed due to eruptive activity of Mount St. Helens, but no *Grylloblatta* were noted. The largest population of *G. chirurgica* now known is in and around Spider Cave. There is some danger that an alluvial "mudflow" (a slow, water-transported flow of mud and debris caused by recent volcanic activity, and diverted by man-made roads), will engulf the cave (8,9). This would probably cause extinction of the population.

No specimens of *G. chirurgica* have been seen since the eruption of Mount St. Helens in May, 1980 (2,3,10). However, little biological research has been done in the relevant caves during that period. There is no real reason to expect that the population in the lower caves have been or will be effected by present or future volcanic activity. Mount St. Helens has been active almost continuously for thousands of years, and the species has managed to survive until now. However, if human visitation to the other caves increases in the future, their populations could suffer the same fate as Ape Cave's

CONSERVATION MEASURES TAKEN: Most of the caves in which *G. chirurgica* occurs are on lands of the Gifford Pinchot National Forest; at least one is on private land within the National Forest and one is outside the Forest boundary. Prior to the 1980 activity of Mount St. Helens, no specific action was taken for conservation of *G. chirurgica*. When it became clear that the Spider Cave population was threatened with inundation this, and the problem of visitor impact on other cave populations, was

pointed out in comments on the U.S. Forest Service draft land management plan E.I.S. for the area (11), as well as in formal meetings between speleologists and Forest Service personnel (12). The National Forest agreed, both verbally and in its final management plan E.I.S. (13) to "determine the magnitude of threat to the area from flood-washed debris and what, if any, measures to reduce future damage are appropriate," and also to limit public access to caves as appropriate to protect their fauna and features. However, these management directions contain several "escape clauses;" the past performance of this National Forest does not inspire confidence in their willingness to protect environmental features at the expense of other consideration.

CONSERVATION MEASURES PROPOSED: The political action that would most benefit *Grylloblatta chirurgica* is probably the inclusion of its habitat in a Mount St. Helens National Monument [now established]. Legislation to this effect is pending but apparently stands little chance of success. In the absence of this, pressure should be brought to bear on the U.S. Forest Service to fulfill their commitment to protect the Cave Basalt, its features and fauna. A search for possible non-cave populations of this species would also be helpful.

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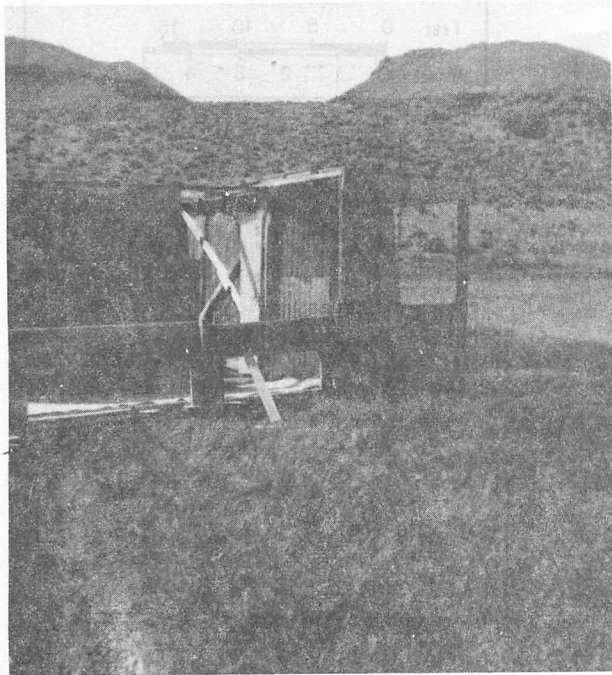
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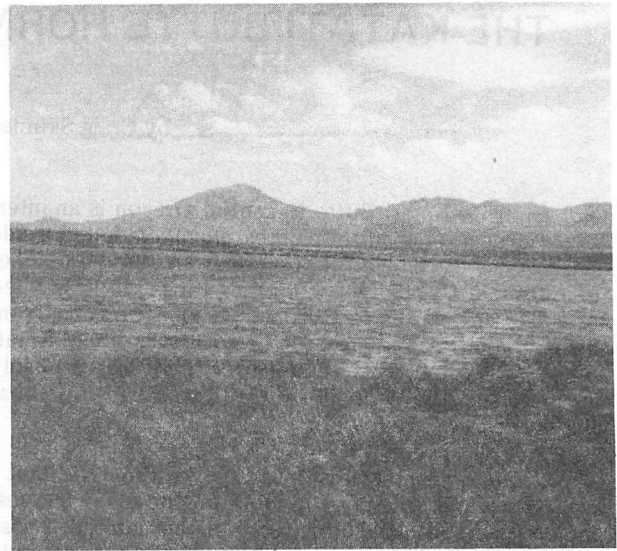
SELECTED HOT SPRINGS IN SOUTHEAST OREGON

by Kathy Block

After a few days of caving and camping in hot, dusty, dry lava country, a hot bath and soak begins to sound pleasant. There are a few hot springs to provide relief. One very primitive spot, with discrete camping, is found about 27 miles southeast of Burns, 5 miles northwest of Crane, off Highway 78. Charlie Larson first showed us this spot. It apparently used to be commercialized. A large concrete enclosure, rusting pipes, and a natural pool of hot water remain. The pool itself is too hot for bathing (122-126°F), but you can soak in little pools in the stream flowing from the main pool. We camped there one evening, sheltered from the highway by a large dirt mound. To locate, watch for a ridge to the north of the highway, and a dirt road going through a gate. You may see the steam, as the pool is less than 1/4 mile from the highway. We've never seen any "Keep Out" signs, and have always been careful to close the gate, etc. We recommend this spot if you need a camping/bathing spot going or returning from Saddle Butte area, which is about 60 miles farther on Hwy. 78. If you have time for the Alvord Desert area, there are several good springs along the all-weather gravel road that goes south from Hwy. 78 near Folly



Bathhouse on Alvord Desert. From a color print by Kathy Block.



Hot Lake or Borax Lake. From a color print by Kathy Block.

Farm to Andrews and Fields, on the east side of the Steens Mountains. The Alvord bathhouse beside the road at the Alvord Desert is well-known. It is about 35 miles south of the junction. Built by early residents of the valley, it features two concrete soaking tubs (one inside, one outside) and a shelter/dressing room. The normal temperature of the water is 120°F; you regulate it with little valves. You can camp about 5 miles farther south at a fresh-water spring just east of the road (watch for dirt tracks and brush).

Closer to Fields, on the extreme south end of the Alvord Desert, is a body of water variously known as Hot Lake or Borax Lake. Site of an abandoned borax works, the lake is filled with 97°F water and some silt. You usually can't drive up to the lake, due to swampy alkali flats. If it's still open (Some rumors have been that the road is now posted with "No Trespassing" signs.), this makes an interesting day-use area. Rusting tanks, and buildings made of borax blocks litter the area. There is also one fresh-water lake. To locate this area, look for a dirt road by a large pull-off with brushy trees to east of highway before you reach Andrews—about 10 miles south of the bathhouse. No real camping can be done here due to the marshy ground; however once, in late August, we were able to drive all the way to the edge of the lake where we slept in our camper.

These are just three of the better-known hot springs in S.E. Oregon. A good reference is *Great Hot Springs of the West* by Bill Kaysing. (Watch for latest edition; our 1974 edition is now outdated, as some springs have changed ownership and are opened or closed to bathers.) Also, the June 1981 issue of *Pacific Northwest* magazine and the October 1978 issue of *Oregon* magazine have good summaries of hot spring areas. The "Preliminary Geothermal Resource Map of Oregon" (1978) in the Oregon Grotto library shows many other sites; however it would be difficult to locate them using this map. I have seen other hot springs guides at Powell's Book Store or West Burnside in Portland.

Here's to happy soaking.

THE KATATI BUTTE HORNITO CAVES: CAVES FOR KIDS

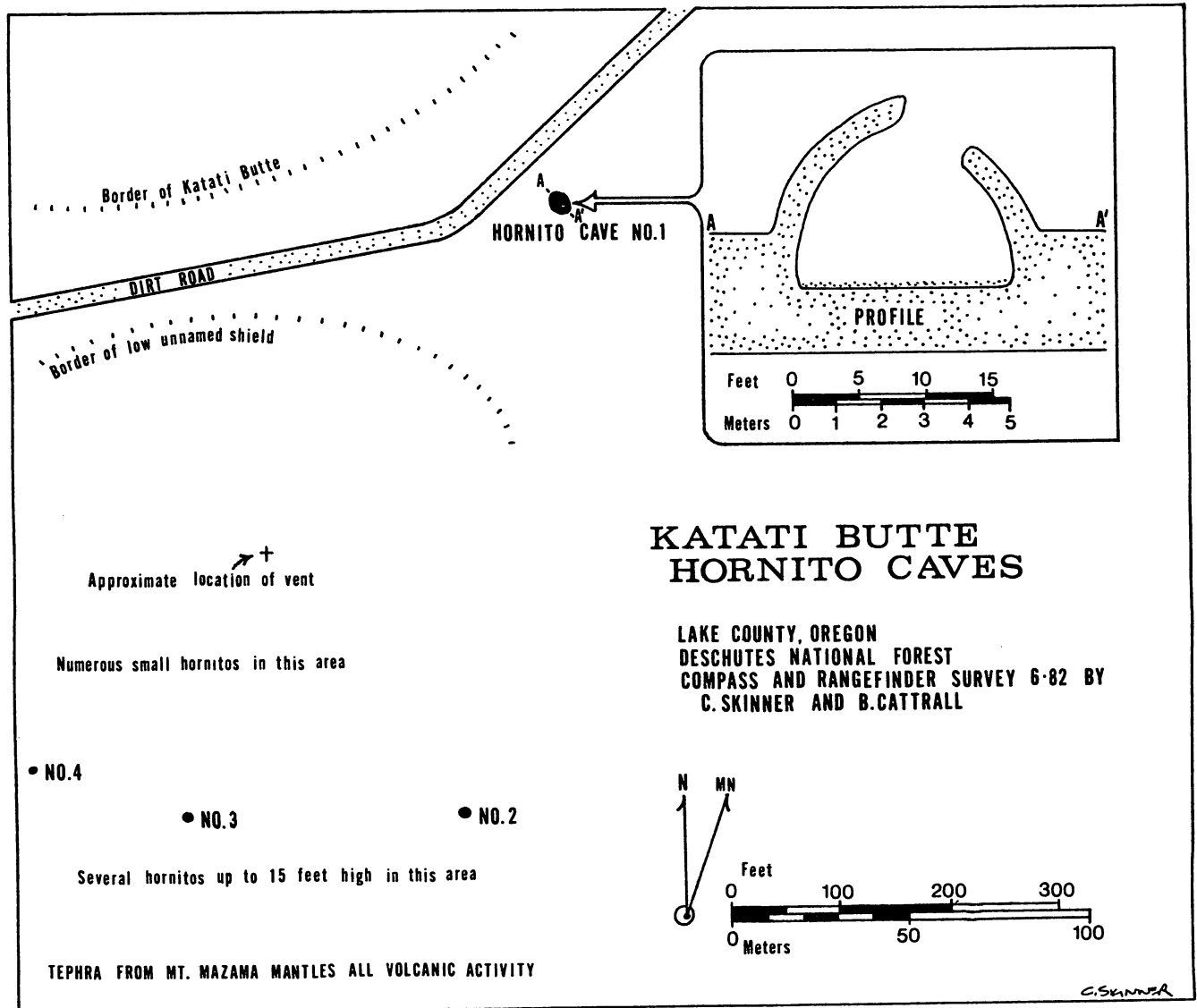
by Craig Skinner

Not far from Katati Butte in central Oregon is an interesting collection of hornito caves, chambers found inside small cones of cemented lava spatter. An unusual number of hornitos, originally fed by lava tubes (all now filled or collapsed) can be found on the flanks of a small, unnamed basaltic cone next to the road that circles Katati Butte. The vent that fed the lava tubes was probably located near the summit of the low shield on whose flanks the caves are found.

The largest and most easily located of the caves that I ran onto is the one marked No.1 on the map. The rest are considerably smaller but can all be entered. I wish that I could find one in my backyard in Eugene-it would make a great playhouse for my three-year old.

Chambers found in spatter cones or hornitos* are only rarely referred to in the literature. The best description of the formation of these caves is by Laurence Kittleman, who wrote in his ph.D. dissertation (Geology of the Owyee Reservoir Area, Oregon, Univ. of Oregon, 1962) when describing similar spatter cone caves at Jordan Craters: "The spatter cones are formed by accretion of lava drops sprayed from an orifice. The writer visualized that as the walls rise, the opening at the top of the cone becomes smaller and may close completely, forming an oven-or igloo-shaped structure... The lava may exert sufficient pressure at the base of the cone to rupture the wall, and a lava rivulet then flows out through a tube..." Similar caves in spatter cones are also found at the Devils Garden lava field at the border of the Fort Rock Basin.

* A spatter cone and a hornito are structurally similar forms created when lava spatter welds together to form a cone. Spatter cones are located at the vent area while hornitos are located away from the vent and are fed by lava from underlying tubes.



KATATI BUTTE HORNITO CAVES

LAKE COUNTY, OREGON
DESCHUTES NATIONAL FOREST
COMPASS AND RANGEFINDER SURVEY 6-82 BY
C. SKINNER AND B. CATTRALL

CAVE HAZARD WEARS THIN AT RISK SYMPOSIUM

by Charlie Larson

The first symposium dedicated to Risk Evaluation and Risk Management in Cave Management will go far toward opening eyes and minds to the true character and scope of hazards inherent to caves. Whether you are a garden variety recreational caver or a black belt caver¹ you would have found this symposium interesting. The entire caving community should be vitally concerned with the perception of cave hazard and the risk of visiting caves that emerged from this symposium. As it progressed it became even more apparent that most state-of-the-art caving hazard is in the eye of the beholder, and that some elements of the caving community have a vested interest in keeping caves hazardous.

Several of the speakers were highly informed and experienced in the field of risk assessment in general. A lot of ethical risk assessment has been taking place, some regarding outdoor activities indistinguishable from caving activities, but nothing regarding caves specifically. There seems no reason why this knowledge and these techniques cannot be applied to caving.

The paper by Chris Newhall and Bruce Rogers was of special interest to "lava lovers" in the northwest. Using data supplied by the audience, Chris tentatively calculated the risk of injury from natural rockfall. If one caved every day of the year (in lava caves) the probability of getting beamed from naturally caused rockfall is very approximately 1,000,000,000:1. (Catching a rock dislodged by another caver is much likelier, but preventable.)

The symposium was remarkably comprehensive for the first of its kind. Nevertheless, one important aspect of caving hazard that escaped attention was the widely accepted, but nevertheless erroneous assumption that reported caving accidents are a measure of the hazard inherent in o caves. This was an unfortunate omission because this belief has effectively forestalled any qualitative or quantitative analysis of hazards belonging exclusively to caves, and it now appears that such an analysis is just what is needed at the present time.

Bill Halliday has written a far more detailed report of the symposium, which I will not attempt to duplicate beyond saying thank you to the participants and especially to Oregon Grottoites Patty and Roger Silver and Mary White for arranging the food and facilities.

1. How I would like to take credit for coining this term, but credit goes to John Eliot Allen who, after hearing a progression of names for those at the "cutting edge" of caving, asked if there was a sort of "black belt" designation.



FEBRUARY 1983 AT MOUNT ST. HELENS

by William R. Halliday M.D.

On February 20, 1983, after the symposium in Vancouver, Ben Tompkins Terry Childress-Landchild (new Oregon Grotto member) and I had a quick look at the situation in the Ape Cave area. A recent snowfall was melting in a warm rain which had been much heavier a few hours earlier. Road 83 was clear of snow all the way to the junction of road 81; a little snow was still present on the latter but tire marks went all the way through it.

Clear water was present in the pond at the west end of the Hopless Cave Mudflow restraining dam and a stream was flowing around the dam. The usual leak was present near its west end. Behind the west end of the dam but not extending all the way to the pond was a large deposit of grey sediment which was new since my last trip as recorded in this journal. Its surface was within a few inches of the top of the dam. The surface of the dam was incised by numerous stream gullies, several times as many as I had ever seen before.

A sizeable clear stream was flowing in the axis of the old pre-eruption stream channel, thence southeast in a new stream channel just east of the Hopless Cave entrance site. Only small amounts of water were flowing in other braided channels at this time. Considerable degradation had occurred in the general vicinity of the Hopeless Cave entrance site, with exposure of much of the dead vegetation which had been buried here. Review of slides taken on the last trip showed that this local degradation had begun prior to my last trip here.

The stream flowing around the west end of the Hopeless Cave Mudflow restraining dam was flowing through the parking lot in approximately the same volume as at the dam. Farther down the Ape Cave road, several clear braided streams were crossing the road and flowing southward on the west side of the Lava Cast Area after becoming confluent. Recent stream deposits in the parking lot and on the Ape Cave road west of the Lava Cast area showed recent higher velocity downslope delivery. The mud tongue on the south side of the Ape Cave road at the Lava Cast turnoff was larger than at last observation and is continuing to spill partially into the roadside sink here.

Underground work was limited to the lower section of Ape Cave and to Lake Cave. Drip was very extensive in Ape Cave, with a trickling stream beginning a few hundred feet below the main entrance. Conditions in Lake Cave were quite similar, with a similar stream in much of the cave and two waterfalls emerging from the Waterfall Passage. While making observations at the lower end of Ape Cave, a visitor identified himself as a former member of the Nittany Grotto and former roommate of Jack Stellmack. We planned to meet later, but missed connections. Hopefully he will contact the Oregon Grotto on his own as he lives in Vancouver now.

A disquieting development at the three key junctions in the cave area is the appearance of three new signs stating

that parking at each is dependent on payment of a \$5.00 snowmobile parking fee which pays for snowplowing. The road 90-83 junction is not in the national monument, but the others are, and this appears to be another clear violation of the intent of Congress in establishing the national monument. The signs carry the name of Washington State Parks. Does anyone have any information on this?

CONSERVATION

FROM IDAHO: CAVE MANAGEMENT PLANS AND A NEW NSS CONSERVATION COMMITTEE CHAIRMAN

Jerry Thornton, a long time northwestern caver of considerable Idaho and Gem State Grotto fame, and known to many Oregon Grotto members, has been appointed Chairman of the NSS Conservation Committee. Jerry is a good choice for the position and we congratulate him, providing of course that he will forgive such congratulations when he discovers how much work he has bought into.

Jerry wrote to say that he has just finished the new management proposal for Papoose Cave and that work continues on on a volunteer agreement at Craters of the Moon National Monument to handle several aspects of a cave management plan there.

1983 NORTHWEST CAVE MANAGEMENT SYMPOSIUM

by William R. Halliday, M.D.

The 1983 Northwest Cave Management Symposium was notable for outstanding speakers and an excellent opportunity for discussion on its theme: Risk Assessment and Risk Management in Cave Management. A total of 38 registered. Mary White and Patricia Silver of the Oregon Grotto handled local arrangements notably, including recording of remarks of speakers and most discussants for subsequent publication of the proceedings. Sponsorship was by the Western Speleological Foundation, the Western Speleological Survey and the Portland State University Department of Geology.

After short introductory and welcoming addresses by myself (for the WSF), Charlie Larson (for the WSS) and Dr. John Eliot Allen for Portland, State University Department of Geology), the symposium was opened by Toni Williams of Tampa, Florida. Originally a member of the Nittany Grotto, Toni is a member of the National Cave Rescue Commission and recently edited the Manual of U.S. Cave Rescue. She presented a statistical analysis by Kathy Williams who was unable to attend, with an update based on very recent data. Aside from cave diving problems, drowning is perhaps the greatest hazard in caves of the U.S. as a whole, with falls, hypothermia, and falling objects perhaps next in order. This suggests that on the average, northwestern caves are safer than in most of the U.S., but perhaps we should be more cautious in the Saddle Butte cave system.

Next came two papers outlining some of the problems leading to selection of the theme for this symposium. Charlie Larson presented problems spilling over into the Northwest Region as a result of adoption of the "New Mexico Cave Management Plan" in California national forests. It is his conclusion that this is a reasonably good cave inventory plan, but a "people management plan" rather than a "cave management plan" and one which perpetuates stereotypes of caves as extremely dangerous places, to the detriment of caves and cavers. The facts are not yet clear, but such thinking may have led to the recent closure of Mammoth Cave near Lava Beds National Monument by a railroad company even though the cave is on Forest Service land. One discussant stated that the Forest Service should demand that the railroad reopen the cave immediately and there seemed to be a broad consensus on this.

My own paper outlined the differences between speleological research in the Red Zone on Mount Baker (Mt. Baker-Snoqualmie National Forest) and the Red Zone on Mount St. Helens (Gifford Pinchot National Forest). It analyzed the well-known problems at the latter in the context of the transcript of a previously semi-secret meeting called by the Gifford Pinchot National Forest on March 23, 1980 where it was decided that risk assessment data would be kept away from the public and everyone would speak with a single voice. This stonewall has survived changes in administration in Washington, D.C. and in Olympia, and the unforeseen outcomes of May 18, 1980. All can learn much from this breach of ethical risk management, but my recommendation is to learn from it, insure that such a situation will never happen again, then forget it and proceed cooperatively in the future, rather than continuing the adversary situation which has existed since March 23, 1980.

Phil Whitfield spoke from the background of being involved in cave management in British Columbia as well as his other roles in speleology such as past chairman of the NSS Cave Management Section. In British Columbia the provincial Parks Branch is much more concerned with risks to caves than to cavers, and while some obvious hazards do need to be managed, he sees no justification for elaborate plans for management of different levels of risk.

Charlie Larson gave a short presentation of the Gifford Pinchot National Forest prescription for cave management, developed at a meeting called by Jim Nieland last summer, as a basis for future cave management in that national forest. It is believed to have been well received by planners of that national forest even though it approaches caves as low risk features. He compared this approach very favorably with the "New Mexico Cave Management Plan" previously discussed.

Chris Newhall a staff person of the U.S. Geological Survey, in Vancouver, presented a paper which he had developed jointly with Bruce Rogers of the San Francisco Bay Grotto of the NSS, on quantifying geological hazards in lava tube caves. The paper pulled together much of what is currently known and what needs to be learned, in terms of periods of volcanic activity and and other times, but the speaker seemed to feel that managers of volcanic cave areas should not permit speleological studies of lava tube caves while they are still hot.

In discussion, it was mentioned that National Park Service cave managers have permitted even the general public to enter lava tube caves while they are still warm. No progress was made toward defining appropriate temperature levels for access for speleological studies.

After lunch, the first paper was by Dr. James A. Wise who teaches a course in risk evaluation and risk acceptance at the University of Washington. He presented an erudite paper on various approaches to risk assessment and how these could be applied to cave risk management. Because of the risk management process at Mount St. Helens, it was not clear whether any of these have actually been used there, but it seems unlikely. The paper will be of broad interest when the proceedings are published.

Dr. John Eliot Allen presented essentially the paper he would have given at the WSU Mount St. Helens symposium on May 18, 1981 had he been in good health on that date. It dealt with his experiences as chairman (and actually the only functioning person) of the Mount St. Helens research permit committee from April 1980 until he resigned in disgust late in 1980. He stressed that this was the first time that the scientific community had ever been precluded from research as a result of the pursuit of safety, and expressed concern about uneven application of Red Zone regulations to different members of the scientific community. It also turned out that he had been a member of the Nittany Grotto of the NSS around 1949-50.

Rick Seifert, of the Pulitzer-winning Longview Daily News, presented a carefully reasoned discussion of balancing the public's right to know with other factors such as protecting caves and accident victims and rescuers etc. He expressed the view that, despite the supposed "single voice" and secrecy of risk management processes at Mount St. Helens, the press had been able to get risk evaluation data from a variety of sources with little or no difficulty. In the discussion period, Toni Williams expressed major concerns about the role of the press during cave rescues, and Rick made various suggestions for better liaison.

Dave Stevens, staff person from the office of the governor, was unable to attend as scheduled. Hopefully his paper will be included in the proceedings, as an addendum.

Chris Newhall presented an important paper on "The U.S. Geological Survey approach to volcanic hazards assessment at Mount St. Helens." Most of this dealt with general principles of long and medium-range hazards assessment and very little with site-specific short-term assessment relevant to access control. In the discussion, Chris indicated that the process was not sufficiently accurate to justify placing the Red Zone boundary a mile one way or another in the cave area.

Jim Zollweg of the University of Washington Department of Geophysics (and formerly chairman of the St. Louis University Grotto of the NSS) presented the final paper, on seismic hazards in volcanic and other cave areas, discussing observations in caves during earthquakes and applying them to theoretical models. He perceives risks at Ape Cave and others as somewhat higher than some

have previously suggested, but still very low in comparison to some other familiar risks commonly accepted.

The final panel discussion included most of the speakers plus a Portland psychologist who has worked in the area of risk assessment in mountaineering. Numerous suggestions were advanced on the topic: where do we go from here?

For a bad cold, with frequent coughing and slowness of thought processes ill-befitting a symposium chairman, I apologize to all concerned. My heartfelt thanks to all participants and to all those who worked so hard to assure the success of this outstanding symposium.

FIND A CAVE

by Charlie Larson

LAKE COUNTY SALT CAVES: In March, 1877, a brief, untitled article appeared in *West Shore*, a long since defunct periodical published in Portland: "All our resources are not known yet, as the recent discoveries in Lake County verify. Two large caves have been found there. One them contains immense deposits of saltpetre, and the other a most excellent article of salt."

This is not as unlikely as it might at first seem, because pluvial Fort Rock Lake afforded the means for concentration of salts in much of Lake County. On page 359 of *The Oregon Desert*, (E. R. Jackman and R.A. Long, 1965) is a copy of an advertisement from an old Paisley newspaper, in which the American Soda and Potash Co. offered 200,000 tons of soda, potash and salt for September delivery. The source of the salts was "Our great vats at Summer and Abert Lakes...."

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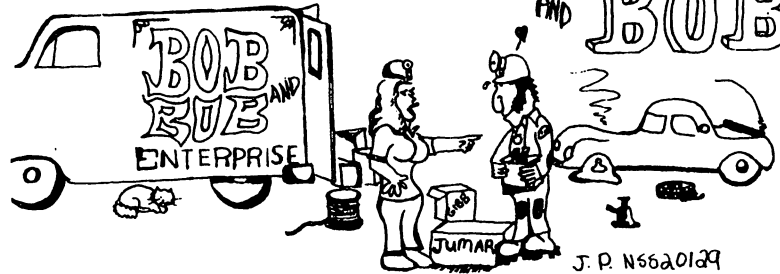
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