THE CASCADE CAVER

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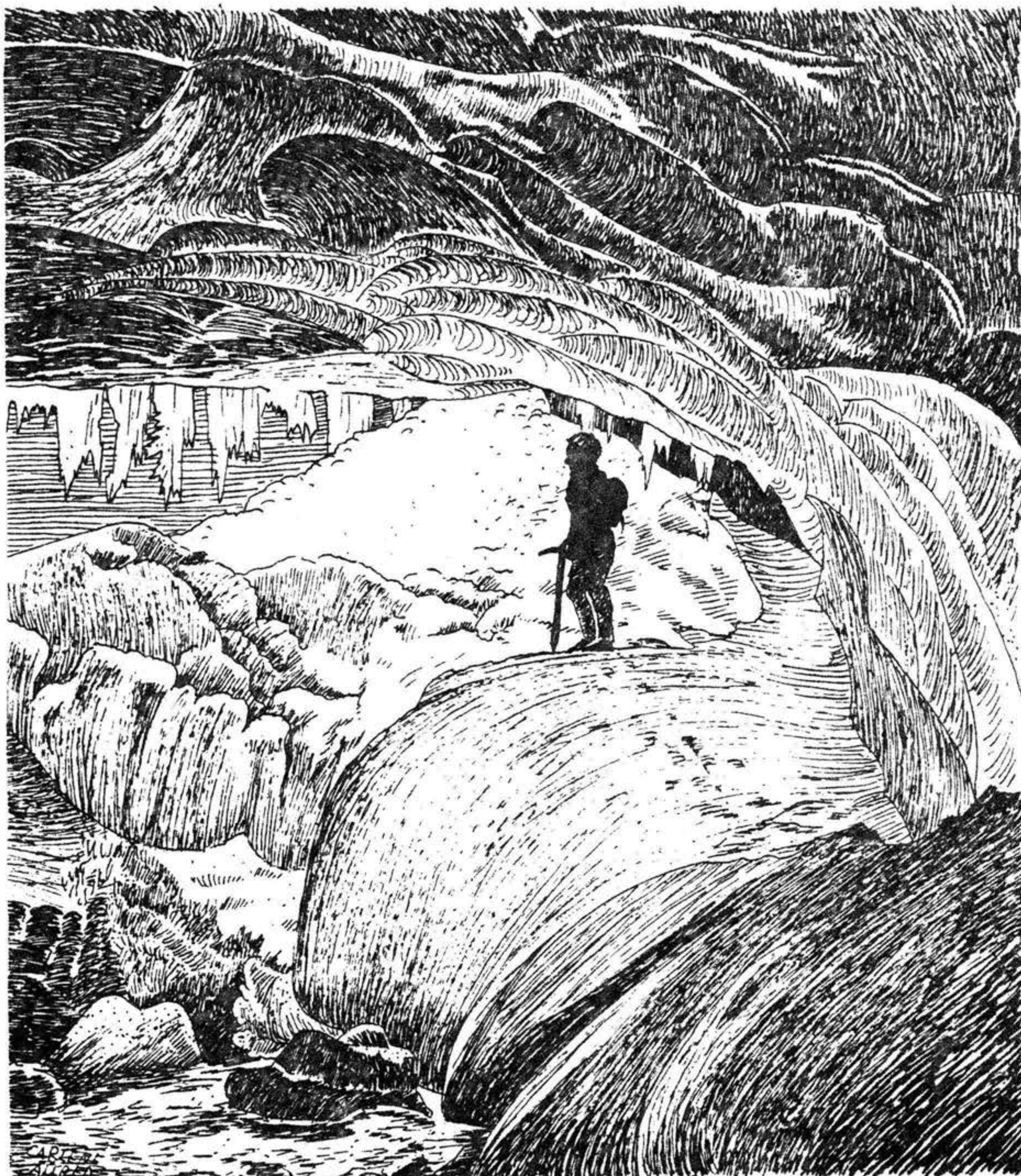
SPECIAL GLACIER CAVE ISSUE



THE CASCADE CAVER is published ten times per year by the Cascade Grotto of the National Speleological Society. Subscription rate is $4.00 for one year's issues. Full Grotto dues are $4.50, and family memberships (not including subscription) 50¢. All payments should be made to Grotto treasurer Craig Hansen, Rt. 3 Box 118, Cheney, WA 99004.

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

For information on rides, etc., on any of the following events you may contact Trip Coordinator Chris Burdge, at 775-6724. And for crying out loud, if you're going somewhere, C A L L   C H R I S ! ! !

October 12-14. As you probably know by now, somebody goofed--Veterns' Day is in November, not in October, and so the planned Papoose Cave trip will occur in November (see below).

Tuesday, October 16. Regular monthly meeting at the Hallidays', 1117 36th Ave, E., Seattle, 8:00 PM. Doors open at 7:55. Please don't arrive early, as the Hallidays eat dinner at this time.

Wednesday, October 17. Northwest Washington Unit meeting, at Wes Gannaway's house, 1604 Brookwood Drive, Ferndale, at 7:00 PM. Slide show: "Caves of Oregon

October 20, Saturday. A preliminary meeting for the seminar in Seattle this coming February, will be held at 6:00 PM at the Allred house, 423 Summit Ave. in Kent.

October 23-27. Cave Management Symposium in Redding, California. If anyone is still interested, there are several sets of literature floating around.

October 27, Saturday. Eastern Washington Unit Meeting, at Dave Jones' house, 106 N. 3rd in Cheney, Wash. at 8 PM. Program: slide show, "Caves of Oregon".

OTHER CAVING TRIPS IN OCTOBER AND AFTER:

Black Mountain Karst. Dates not definitely set; contact Wes Gannaway, (206) 384-4209, for some limestone scouting.

Windy Creek Cave and new caves nearby: Contact Kevin Allred, 852-1058, or Rod Crawford, 543-9853. ← ← ← ← ← Please note this is a new phone number.

Trout Lake Area lava tubes: If anyone still wants to go, contact Rod Crawford.

November (9)-10-11-12, Veterans' Day Weekend. Official trip to Papoose Cave, Idaho, a distant but spectacular limestone cave. If you want to go, YOU MUST CONTACT BOB BROWN AT LEAST TWO WEEKS IN ADVANCE since Bob must file an advance permit form with the Forest Service. Bob's number is (206) 569-2724. If you can leave Friday Nov. 9th, rides are available from Chuck Fair, (206) 832-3651.

Tuesday, Nov. 20th. Regular Grotto meeting, same time and place. Program: film strip, "Exploring the Sacred Mayan Well." NOMINATIONS FOR NEXT YEAR'S GROTTO OFFICERS. If you don't come, beware--remember the Cascade Grotto's fine tradition of nominating someone who isn't there.

November 22-25. Official mapping trip to McLoughlin Canyon Caves, Eastern Washington. Contact Bob Brown.

November 23-25. Mt. St. Helens lava tubes, for bat checking. Contact Clyde Senger, (206) 734-1360.

+ + + NEWS + + +

Dilligent pushing and mapping this year, particularly by the Allreds but with help from many other Grotto members, has made Windy Creek Cave Washington's longest limestone cave, now mapped to 3,057'. That's right, 3,057', and a few leads still going.

OUR COVER: A winter scene at one of the entrances of Paradise Glacier Cave. Drawing by Carlene Allred from a photo by Charlie Anderson.

F E A T U R E S

A Shallow Englacial Cave System in the Mueller Glacier, New Zealand*

by Kevin Kiernan

Large volumes of meltwater frequently complicate exploration of terminal outflow caves in glaciers, particularly in summer. Although exploration of shallow surficial grottoes occuring on the bare ice of some glaciers can be most rewarding on account of their often quite exquisite beauty, these larger subglacial caves have been of most interest to the glaciospeleologist. However, comparatively little interest has been shown in shallower englacial systems. One such was partly explored by the writer some 2 km from the snout of the Mueller Glacier in January, 1979. It was essentially horizontally developed, devoid of the large flows [of water] which complicate subglacial cave exploration, and was actively enlarging its diameter by aerogenic mechanisms but shortening by collapse.

Caves on the upper reaches of glaciers tend to be of restricted size, with larger but much wetter swallets futher downstream. Holes are frequent in the debris covered snouts of many New Zealand glaciers but frequently [are] infilled with rocks and gravel. A number of such holes were examined in the Mueller Glacier prior to location of the cave here described, and subsequently on the Tasman Glacier. Entrances in such situations tend to have to be fairly large and recent to permit entry, and the caves generally appear to be of fairly steep gradient.

Exploration

The morning sun rose reluctantly over Mt. Wakefield and hung unenthusiastically in the morning air as I sweated across the chaotic Mueller debris, dancing from slithering block to stable after having crept down the even more unsound lateral moraine wall behind White Horse Hill. These walls of loose and unconsolidated debris, left unsupported with the downwasting of the glacier, must represent sume of the most hazardous features of this part of the Southern Alps, a few years ago knocking out one would-be glacio-speleologist. The booming avalanches off Mt. Sefton were rekindled by the first touch of the morning sun as I made my way toward a sinkhole complex in a dry valley, spotted the day before from the Sealy Range. The rattling of rocks down ice escarpments on the glacier grew more frequent as the morning warmed and the ice lips began to melt. My new climbing companion had shown the temerity to be less than enthusiastic about my obsession with glacier caves, had crawled out of his pit as I was leaving, and decided on a sightseeing tour elsewhere.

But for the present there was a never ending ocean of giant boulders but no viewpoint from which to check directions. Then suddenly, the first doline, about 40 m wide, flanked to the north by a scarp of hard granular ice 8 m high, capped by rock debris and concealing at its foot a shadowy entrance 5-6 m high. Every few minutes rocks clattered down over the edge, so I paused for a while, wondering at the best spot to dive in between volleys, then charged through beneath where some had just fallen and shouldn't be due again for a while.

After about 7 m, a passage 2 m wide and 1 m high discharged a small tributary stream which sank at the upstream end of the doline, and a blast of cold air, perhaps 2-4 m per second. The air in glacier caves generally stays close to 0° C depending on the geothermal flux and the temperature and

*Reprinted from the Southern Caver, April 1979, pp. 4-8.

volume of any running water. When the outside air is colder than that within, during winter or on very cold nights, the less dense and warmer cave air rises out upper entrances, such as swallets, or in this case, probably crevasses. This phenomenon is known from some limestone caves. In summer, the air within is colder and more dense and flows out the bottom entrances, and for the moment this reverse chimney effect was making life quite unpleasant. After about 30 m of crawling up the icy trickle without much change in passage size, the lure of a more spacious entrance noted earlier on the other side of the doline became irresistable.

There was only one problem: from within the spacious entrance it was not possible to see from just where overhead the next lot of rocks was likely to come. A smaller entrance would have limited indecision. A few photographs filled in the time. Then ten minutes pacing back and forth. The choice came to seem like putting it off much longer, losing my nerve, and waiting for winter to freeze the near continuous stone falls into immobility or the arrival of a rescue party with a sherman tank; or else making a break for it. I picked out the easiest looking path across the boulders and ran like hell.

Breath recovered, I stood before the next entrance, at the foot of a loose 4 m debris barrier built up by entrance rockfall, speculating whether there was sufficient time between volleys to ascend it. There was, but my calculations had forgotten there were two sides to every problem and a clattering behind me had the adrenalin pushing again before I stood at the foot of the pile in a magnificent entrance 6 m in diameter, with beautifully scalloped walls. This large scale (up to 1 m long) scalloping results from air current eddies increasing the rate of heat transfer, and is graphically described as "thumb-print ice" by Charlesworth (1957).

The passage disappeared into darkness: this was more like it. After taking a couple of photographs and cursing a malfunctioning flashgun, I headed in. The passage was floored with mainly small calibre deposits, mostly glacifluvial materials, but also some rock fragments derived from the enclosing ice during aerogenic cave enlargement. After about 50 m the main passage veered slightly north-easterly, but after clambering down over some of the larger rocks covering the floor another 40 m in, my light went out. Almost simultaneously the ice gave a forbidding groan. I suddenly convinced myself I had strong religious views about people, particularly me, being squashed out of recognition, and momentarily panicked, but rapidly tripped over a rock and stoved my head into the wall. After deciding that if the cave hadn't fallen in after the latter it probably wasn't going to, a little blind fiddling with the light in the dark produced the odd perfunctory flash, and this plus a memory in between saw me back to daylight. A few minutes work and the scungy light blazed again, but I had retraced only half my steps when it died utterly. One dayI'll have a companion for these ventures, and with luck he'll be a fanatic about good lights.

Morphology, Spelean deposits and Speleogenesis

Nevertheless, daylight and an uncluttered floor permitted access along a large passage running at right angles for 20 m to an archway at a slightly higher level linking the original sinkhole with the next downstream. This was 5-6 m high, 6-7 m wide, 20 m long, and a truly superb sight. Into one end ran a steep, smooth, ice tube 2 m in diameter, from above the earlier passage. It was smooth walled and free of scalloping, having probably only recently been abandoned by running water. In the archway, thin dirt layers were exposed in the glacier ice, stemming from the dust clouds which are raised periodically from the moraines and ridges by strong winds which spread them on the compacting ice further upstream. There were also fairly frequent interbedded rocks. From outside one massive boulder in the roof near the entrance was also identifiable on the surface: the thin roofs bred a new respect when walking on glaciers. About 3-5 m thickness of ice beneath the bulk of the overlying rock debris seemed fairly typical.

A further passage only marginally smaller was explored for some 30 m, as far as daylight and limited braille permitted, in one corner of the boulder-filled downstream doline. It was developed at the same level as the main passage and was possibly connected to it. Within one wall was part of a discrete body of clear ice partly melted within the opaque white glacier ice. Halliday and Anderson (1972) have suggested similar features in the Paradise Ice Caves, Washington, represent seasonally frozen englacial conduits, and certainly this feature was flowing substantially. It had developed along an inclined minor thrust plane and could perhaps be regarded as analogous to a dip tube in a limestone cave. Presumably there is a seasonal change from a vadose to phreatic state.

Further evidence of probable phreatic activity, noted from a very small passage remnant upglacier, was a narrow degraded ridge of gravel and cobbles 40 cm high which rose 1 m over a convexity in the ice floor, suggesting deposition in the narrow conduit by water under hydrostatic pressure. Typically, however, the floor of the main system was covered by colluvial deposits of varying calibre near the entrances and waterlain cobbles, gravels and silt further inside, blocking some smaller side passages and forming a small terrace in the first part of the main passage. There was no evidence of the river niches so conspicuous in terminal outflows previously examined, suggesting air currents had long sice replaced running water as the main agent of enlargement.

No ice speleothems were present, summer ablation rates presumably being too high for their preservation. The usual spectacular ice blue and green color refractive effects were limited by the thick moraine cover on the ice.

The essentially horizontally developed morphology of the system may stem from its occurrence not far from the point of slowing of the glacier ice. It was developed not far from the point where supra-glacial moraine again becomes abundant beyond the tributary ice and heavily crevassed corner around the end of the Sealy Range. At this point englacial debris may be starting to be returned to the surface by upthrusting behind the slowing ice front. The fairly gently inclined thrust planes evident may possibly have proveded a site for phreatic speleogenesis by englacial water under hydrostatic pressure, with only a limited vertical component in the structural elements. Vadose flow may have been more quicly achieved under the lower confining ice pressures of essentially subhorizontal distribution near the surface, with the conduits subsequently invaded and modified, firstly by supraglacial meltwater and then atmospheric ablation mechanisms.

Alternatively, the shallow depth of the passage beneath the base of the bulk of the supraglacial lode could suggest supraglacial melt adjacent to this darker colored material, which would be differential heated by solar radiation, may have provided both a source of meltwater and a zone of weakness where speleogenesis could have been initiated. Diurnal or seasonal refreezing of the waters nearer the surface might favor downward migration of the developing conduit, as would ablation under the influence of the running water, until more consistent conditions deeper in the ice allowed a more permanent and efficient conduit to develop in equilibrium with both meltwater supply and the pressures within the ice tending to close the void.

Subsequently, enlargement permitted increased meltwater flow, which was active in further enlargement both in its own right and armed with its load of clastic debris from englacial and supraglacial sources, as a precursor to aerogenic mechanisms of enlargement and ultimately destruction.

Bibliography

Charlesworth, J.K., 1957. The Quaternary era with special reference to glaciation. Edward Arnold, London, 2 vols.

Halliday, W. R., and Anderson, C. H., 1972. The Paradise Ice Caves. NSS, 27 pp.

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Reporting a Glacier Cave under the Dinwoody Glacier

Shoshone National Forest, Fremont Co., Wyoming

by Carlene Allred

On August 25, 1977, Carlene Blackham (Allred), Raymond Blackham, and Mark Evans found a cave under the snout of the Dinwoody Glacier, southeast of Gannet Peak. They used the cave as a shelter during a storm.

The glacier is quite long and contains several upper tributaries which flow into the main glacier, creating many medial moraines down the main trunk. The lower mile is nearly entirely covered with large boulders and the upper glaciers are heavily crevassed.

The cave had three entrances and each had many bouders precariously perched on the ice above the entrance, waiting to fall as the ice melted. Inside the cave, boulders were exposed protruding through the ceiling. This made it quite a dangerous storm shelter. The cave walls were horizontally layered with bands of silt, and were textured with large scallops. The passages averaged 25 feet wide and six feet high, and were approximately 200 feet long. Crawlways were not entered. A good sized stream flowed through the cave and out at least one entrance. In one place a stream of water fell from a small hole in the ceiling.

The area has other major glaciers with potential for caves. Two trails lead into this rugged and remote area. The shorter one starts on the Indian reservation and permission is required from the Indians to use it. (Wind River Indian Reservation).

A longer route starts north of the reservation at Torrey Lake, but about three days of walking is required to get to the glaciers via this route.

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GLACIO/VULCANOSPELEOLOGICAL ABSTRACT

Kosa, Attila. 1973. A Tüz ès a viz Barlangjai [Caves of Fire and Ice]. Elet ès Tudomany [Life and Science--Hungarian], 1973 no. 4, p. 176.

Besides such limestone caves as Flint Ridge, Hölloch, and Baradla, other types of caves are interesting. Attila describes his visits to Ape and Lake Caves and the Paradise Ice Caves with the Cascade Grotto some years ago. Included is the Caves of Washington Ape Cave map, and one of this abstracter's photos of Attila in the Red Passage of Lake Cave. Abstr. by W.R. Halliday.

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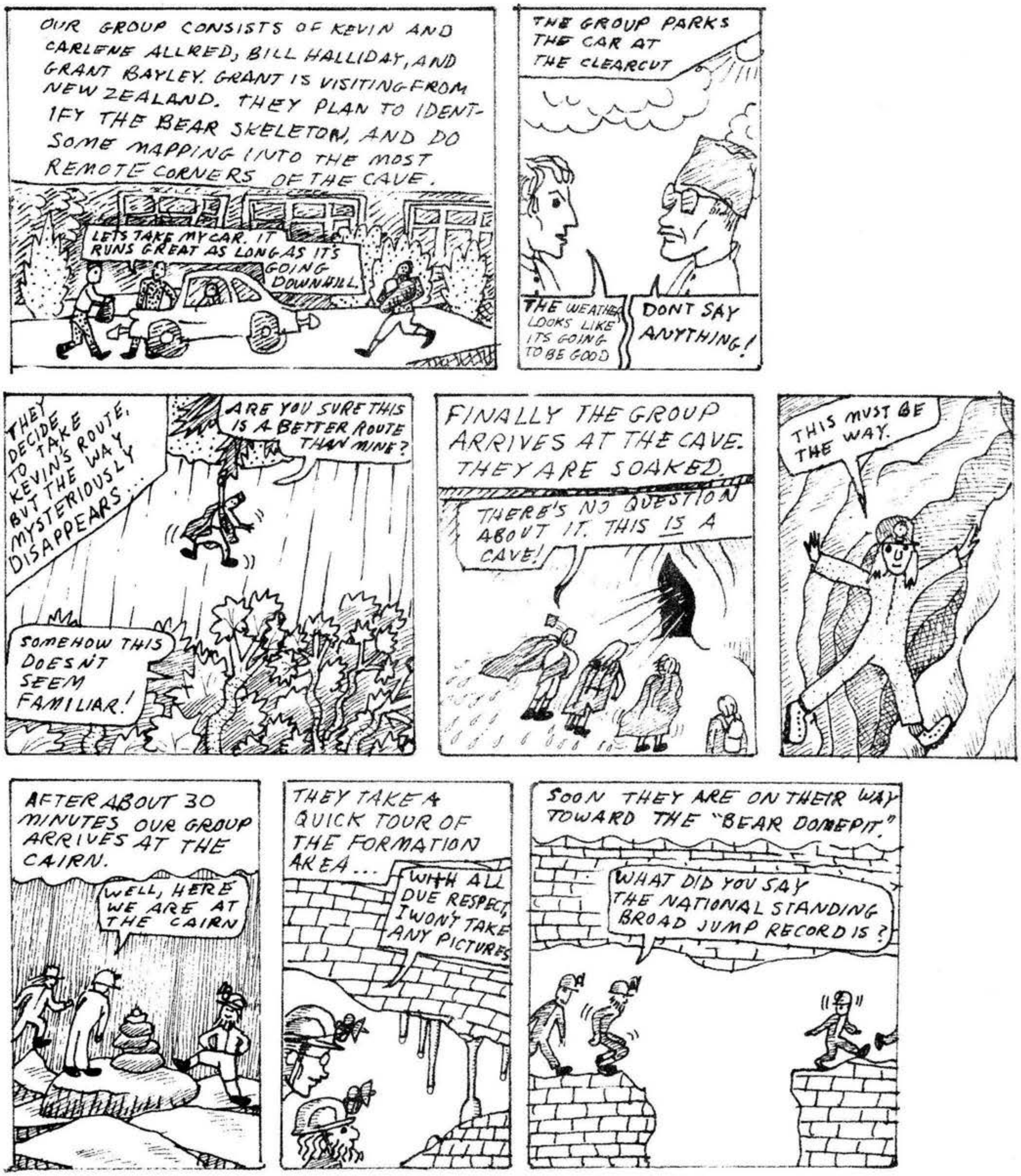
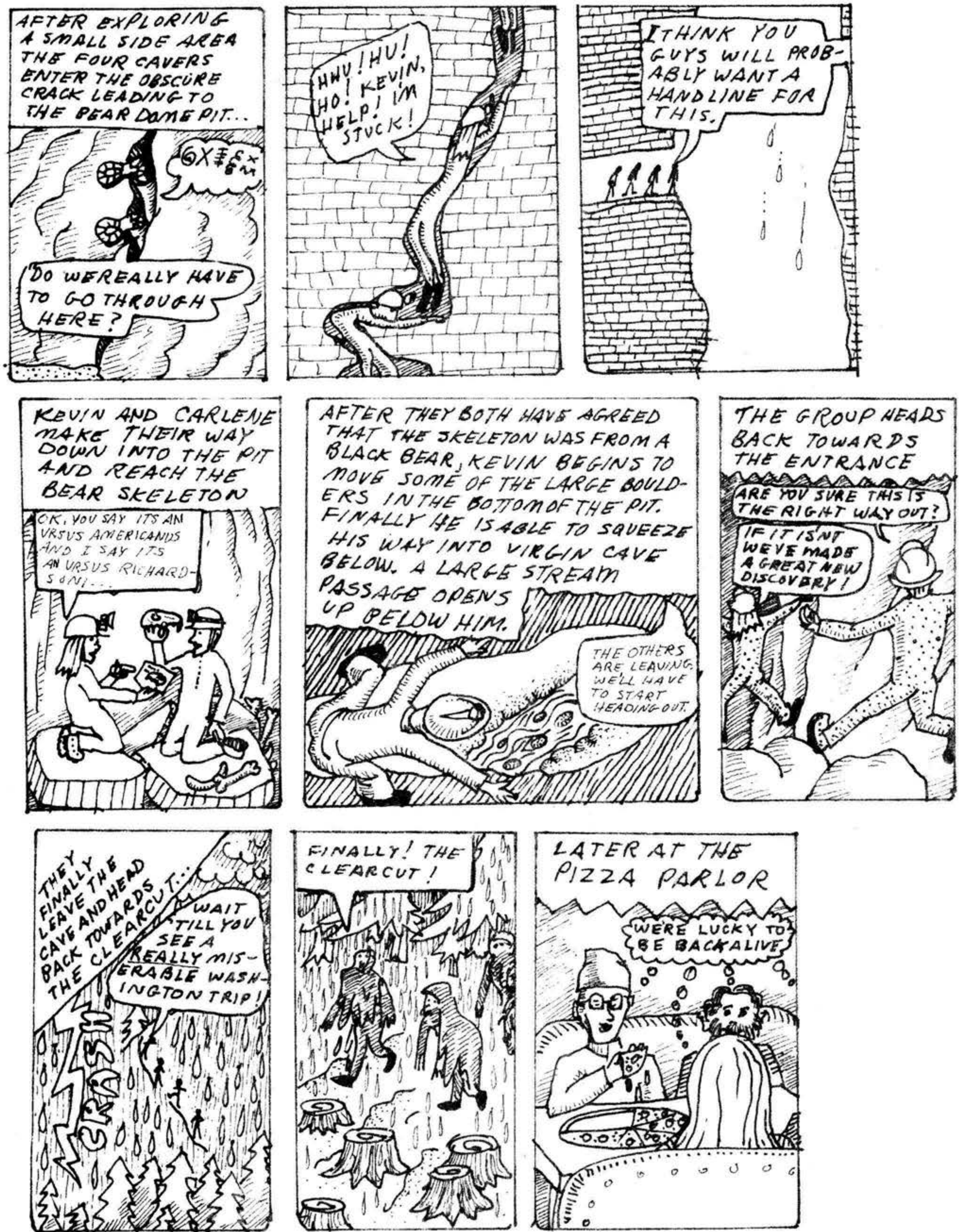
ANOTHER WINDY CREEK CAVE TRIP REPORT

Sept. 1, 1979 by Kevin & Carlene Allred




AFTER EXPLORING A SMALL SIDE AREA THE FOUR CAVERS ENTER THE OBSCURE CRACK LEADING TO THE BEAR DOME PIT...
DO WE REALLY HAVE TO GO THROUGH HERE?
HWU! HU! HO! KEVIN, HELP! I'M STUCK!
I THINK YOU GUYS WILL PROB-ABLY WANT A HANDLINE FOR THIS.
KEVIN AND CARLENE MAKE THEIR WAY DOWN INTO THE PIT AND REACH THE BEAR SKELETON
O.K. YOU SAY ITS AN URSUS AMERICANUS AND I SAY ITS AN URSUS RICHARD-SONI...
AFTER THEY BOTH HAVE AGREED THAT THE SKELETON WAS FROM A BLACK BEAR, KEVIN BEGINS TO MOVE SOME OF THE LARGE BOULD-ERS IN THE BOTTOM OF THE PIT. FINALLY HE IS ABLE TO SQUEEZE HIS WAY INTO VIRGIN CAVE BELOW. A LARGE STREAM PASSAGE OPENS UP BELOW HIM.
THE OTHERS ARE LEAVING. WE'LL HAVE TO START HEADING OUT.
THE GROUP HEADS BACK TOWARDS THE ENTRANCE
ARE YOU SURE THIS IS THE RIGHT WAY OUT?
IF IT ISN'T WE'VE MADE A GREAT NEW DISCOVERY!
THEY FINALLY LEAVE THE CAVE AND HEAD BACK TOWARDS THE CLEARCUT...
WAIT TILL YOU SEE A REALLY MIS-ERABLE WASH-INGTON TRIP!
CRASH
FINALLY! THE CLEARCUT!
LATER AT THE PIZZA PARLOR
WE'RE LUCKY TO BE BACK ALIVE

THE END

Another View of the Same Trip: Windy Creek Cave in the Rain

by Bill Halliday

Beginning September properly, with a quick, easy cave trip Sept. 1, the Allreds and I took Grant Bayly (a visiting New Zealand caver) to Windy Creek Cave, using the northern route Alan Brandeberry and I had tried a couple of years ago and a few others had improved (more or less). This time we used a variant of the lower route the Allreds had recently investigated--below the cliffs that make impossible contouring directly from the top of the clearcut. The rain held off for a while, but unfortunately this route required considerable up-and-down scrambling, and at least yrs truly was damn tired when we got to the cave (about 2:40 from the car in the clearcut). Although Kevin was still in high gear, most of the rest of the energy of the others was used up in checking tight leads in the area of the lead to the Bear Pit; nothing went for more than a short distance, but they will have to be mapped. From the bottom of the Bear Pit itself, Kevin found a downward lead that belled out above a part of the stream passage.

On the way back, we went up and over the knoll on the far side of the main creek; contouring around to the south might have been better. Beyond that, however, we found an excellent game trail along the north edge of the spur, above the spur's cliff, that then angled upward onto the main mountainside to what we later found was Bob Brown's red and blue flagged trail, which was very good until we got close to the crestline above the clearcut. 2:20 back to the car despite ever-increasing rain. The last 20 minutes was the worst: extremely slippery.

But the berries were marvelous.

Big Four Labor Day Trip

by Bill Halliday

On September 2, Charley Anderson took visiting New Zealand caver Grant Bayly to Mt. Rainier for the Paradise Ice Caves, but it was raining so hard at Paradise that they bagged it. So we decided to take him to Big Four next day so that he could at least report to fellow New Zeland cavers what they should look for in their glaciers.

Despite the rain, the parking lot had numerous cars, and we passed many people on the trail to the caves. We visited only the main cave, which had an eastern terminal branch about 200 feet inside, leading down to a snow plug. The lateral levee of the main corridor was breached now at the entrance to this side passage, but the stream level was several feet below the breach, and only a small deltaic distributary stream had utilized the breach.

The waterfall was more beautiful than I had ever seen it before. A small cliffside entrance allowed dim daylight to illuminate it faintly from above and beyond, and it was possible to see that there is a distinct lip maybe 50 feet up, rather than a single cascade in the chimney between the glacier and the rock. I tried some pictures but there was a great deal of spray; no bets on the outcome.

There was a lot of flakefall in and below the Waterfall Room and Grant was less than enthusiastic about glacier caves despite the beautiful big main passage. We told him about their special language and gave him a copy of Kevin Kiernan's recent article (in an Australian newsletter) about one New Zealand glacier cave, so maybe we will learn about others in New Zealand eventually. A visiting Oregon Grotto member then took him away in the general direction of Ape Cave, so he should have had a good picture of the diversity of Northwest caving before flying home.

Senger's Talus Cave
Saturday, July 7, 1979

by Walter Bosshart

Participating: Bob Brown, Rod Crawford, Walter Bosshart, and Cas.

This Saturday was going to be my first visit to a large talus cave. A steep trail through the woods leads up to the spot where gigantic slabs of rock broke loose from the talus cliff and created a cave system. On the way up, led by never tiring Cas, is a lookout spot revealing a fine view of the Sound. On a rock ridge I noticed several marks resembling holes drilled for blasting. In no time we had three plausible explanations at hand. a) holes drilled by man to break off top part of cliff to gain better view; b) marks made by threatened six-million-dollar man digging his fingers into the rock in a last effort to keep from falling; c) glacial scoring left behind by the last glacier. We will let a geologist decide. After one and a half hours we stepped out of the woods at the foot of the high cliff. Making our way over the boulders, we realized that under us was a maze of hollow spaces, some perhaps too small to explore. Naturally a cave of this kind has many entrances. The "main" entrance is a double hole leading down about 3 to 4 m to a large room with a skylight.

Before investigating the innards, there was a cave register to install. Beating like Hell on Bob's rockborer had very little effect on the rock. Utilizing a crack, we were able to penetrate deep enough for a rock bolt, leaving but a stub of drill bit left. Finally, we pushed into the cold dampness. There were some side passages Rod wanted surveyed to complete the existing map. Rod had us going into cracks and crannies dragging a measuring tape and handling a low budget clinometer--protractor with string and plumb bob--to measure angles. Sitting, stooping, kneeling, crawling, lying down. We squeezed through the "tight hole" into the lower level. Amazing what can be under a pile of rocks! At one spot we noticed some orange colored deposit, likely of mineral nature.

Bob and I began to feel cold. We exited from the cave via the lake room. Bob pointed out some interesting reflections in the small lake. With some cursing, I tried taking some pictures in the entrance room. The rim of my skullguard kept hitting the manual release on my flash and thus dumping the charge. All in all, we mapped about 50 m (120 feet), bringing the total length of the cave to 270 m (1010 feet).

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GLACIOSPELEOLOGICAL ABSTRACT

Lokey, William, 1979. Antarctica. Talk presented to Pacific Northwest Chapter, Explorers Club, January 6, Seattle. Abstr. by W. R. Halliday.

The so-called ice caves near the McMurdo Sound base are roofed-over crevasses. Several impressive slides were shown. The speaker later stated that he was unaware of any ablational glacier caves in Antarctica. He has the impression that the McMurdo Sound caves are "large", but he has no idea how extensive.

McKenzie, Garry D., 1978. Classification of Glacier Caves and related features. Geological Society of America, Abstracts, v. 10 no. 7 p. 453.

Author's abstract: "Although glacier caves have long provided access to the subglacial environment for studying glacier deformation, erosion, and deposition, only recently has much effort been expended in studying the morphology, origin, and development of the caves themselves. Glacier caves are openings or cavities that occur within or at the base of all types of glaciers. They vary in length from less than a meter to several kilometers; and water-filled caves beneath the Antarctic ice sheet may cover many square kilometers. They form by: 1) flow of glaciers over and around bedrock or boulder protuberances, 2) deformation of glaciers to form crevasses, 3) ablation of ice due to meltwater, geothermal heat, or circulating air, and 4) a combination of these processes. Some glacier caves are in a state of dynamic equilibrium and maintain relatively constant location, size, and speleothems, particularly in areas where meltwater is not a major factor. Other caves show extensive seasonal and annual changes.

"Glacier caves are part of a large group of caves that are prevalent in cold regions and are developed in ice or snow, or owe their origins to processes at low temperatures. A classification system for these phenomena has been developed to include caves in firn, glacier ice, sea ice, ground ice, ice-filled talus, and bedrock containing ice or glacier ice. The classification matrix is completed with the modes of formation of these features, basically by deformation of the enclosing medium or by changes of state or weathering. This tentative classification system should aid in clarification of the terminology of these features and in research in the developing field of glaciospeleology."

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Klingedrath, Toni, 1978. Paradise Ice Cave. Progressione, Anno 1, #1, pp. 6-7. Abstract by W. R. Halliday.

Toni Klingendrath, of one of Europe's most honored speleological organizations, records his subjective impressions of a quick tour of the Paradise Ice Cave system with members of the Cascade Grotto--in Italian. In short, he was impressed, and ends up considering the glaciers near his home; how come nobody's ever bothered to explore their caves? Good question, and almost 100% accurate. Unfortunately, the accompanying map is a very old one; Toni barely got into the portion shown thereon during his quick visit.

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Kiernan, Kevin, 1979. Glacier caves in New Zealand volcanoes. Southern Caver, v. 10, no. 3, Jan. 1979. Abstr. by W. R. Halliday, M.D.

IGS member Kiernan flew from Tasmania to New Zealand to investigate the spelean potential of several promising glaciered volcanos in the Tongariro area. It appeared that any caves developed on Ngaurohoe are at best very transient features in a very shallow firn bank which fluctuates greatly. At Ruapehu, matters were more encouraging. A crater lake drains into the Whangaehu Glacier, with about 1 cumec of warm water dropping over a 3 m waterfall, then cascading into a cavern entrance 4 m high and 9 m wide. Inside, the water cascades at about 30°, veers easterly, then drops some 6 m into an impressive spray-filled chamber: "Solo exploration needed unavailable gear and a stouter heart." The size of the passage appeared larger than those of other glacier caves of that part of the world, perhaps due either to the high water temperature or to sudden flow surges triggered by volcanism. The resurgence is about 2 km distant; he did not check it. A tributary flows from a 4 by 4 m orifice, drops in a spectacular waterfall for about 40 m and disappears into a moulin 20 m in diameter and of unknown depth. No information on whether the stream flow is less at other times of year.

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Outram, James, 1905. In the Heart of the Canadian Rockies. New York, MacMillan, 466pp., cloth. Abstract by W. R. Halliday.

p. 221: "A fine ice-cave usually marks the source of the Yoho River, just 6000 feet above sea level, but it had recently fallen in and blocks of ice lay strewn around the now low and insignificant exit." (Also on p. 395 is mention of a huge moulin in the Columbia Ice Field).

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Recent Glaciospeleological Investigations in Alaska

(In a letter of July 19, 1979 from Jay Rockwell to W.R.H.): Visiting speleologists from the Kwansei Gakuin University Exploration Club of Osaka reported that the four Byron Glacier caves had collapsed. Lambert's Cave in the Crow Glacier was still snow-covered. They planned to check the Eklutna, Raven, and Matanuska Glaciers the following week.

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Extraterrestrial Glaciospeleology?

by Bill Halliday, NSS 812

NSS member Jim Countney (817 W. Franklin, Appleton, Wisc. 54911) has been studying photos of the great ice cliffs (in solid CO_2) of the north polar cap of Mars, and raises the possibility about certain undercut areas being the entrances to glacier caves. He also is intrigued about the regularity of the spiral pattern of the numerous curving channels incised into the ice mass. Have any of our devoted glaciospeleologist readers any thoughts on these or related matters?

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ANNOUNCEMENT

At the September meeting, Charlie Anderson announced that the Paradise Glacier Cave is now mapped to nine miles and 1000 feet (48,520 feet or 14,789 meters) of real, existing passage. This supersedes the older figures of 14 miles or more which included some collapsed passage, some snow passage, and some survey duplication. But the revised figure is impressive enough.

A copy of the current map of the cave was to have appeared in this special issue, but alas, the promised copy never arrived.

The planned Cascade Grotto trip to this cave on September 29 was poorly attended and without a trip leader, but was still successful. A trip report has been received and will appear in a future issue.

A New Type of Glacier Cave on Mt. Baker

by William R. Halliday, M. D.

During the July 28-29 Mt. Baker crater caves trip, the plan was to pitch a snow camp considerably higher than the previous site at the head of the Railroad Grade. Roger Matthews, Wally Bosshart, and I were casting around for a good place high on the cleaver of the Easton Glacier when we noticed a family tossing rocks into a hole at the edge of the glacier itself. Having reluctantly bypassed other holes farther down the edge, we decided to pitch camp and investigate, especially as we could hear a waterfall but not see it.

The entrance to the cave is a sink due partially to ablation and partially to collapse, sloping down (through fallen flakes) to a steep, muddy hole about 3 feet in diameter at the edge of a vertical drop between a muddy, icy rock wall and the glacier. About 25 feet up-slope, a beautiful little waterfall plunged from a small hole and cascaded steeply to a depth we could never estimate even roughly--far out of sight and sound. We could see it some 25 feet lower, but that appeared to be only a start.

About 10 feet lower a small ledge led south in a narrow space between the glacier and the wall. The wall had a slurry of till in both frozen and unfrozen consistencies, and was alternately brittle and extremely slippery. On belay from Roger, I went in about 50 feet, to a point where light was entering through a smaller entrance due to collapse and ablation within the glacier. Back to the west, the glacier arched a few feet over my head at a point where there was a shelf on the rock wall, forming a low lateral projection of the cave that showed beautiful grooves on the ceiling from flow over rock somewhere up-slope. Similar grooves were present on the side wall of the glacier along which I chimneyed to this point. Small till curls were present on both the ceiling and sides of the cave, and the ledge I used may have been formed by larger till curls--there was too much debris to be sure. The cave continued, onward and downward, but I was losing too much heat and gaining too much mud and retreated. This one is going to need special clothing and a full-scale trip--presuming it is there next year, which cannot be guaranteed.

Small caves of this general type--due to plastic flow of the glacier and/or solifluction of till--are known from the snouts of several glaciers. I have previously reported two in the Boulder Glacier on Mt. Baker, for example. However, I don't know of any previously reported high on the edge of a glacier like this, so that additional effects of a subglacial waterfall may be involved. It is a new type of glacier cave for Mt. Baker, at least.

This and other openings along this side of this glacier are going to be a fascinating opportunity for investigation. However, I urge caution here! Not far down the glacier and adjoining snowfields are several examples of what I have started calling "mini-eskers"--tongues of gravel and other stream deposits forced upward out of subglacial stream channels under hydrostatic pressure. Earlier in the year, this cave clearly carries a tremendous hydrostatic head, and might again do so later each year--after warm rains, for example. So do the other lateral caves farther down the glacier. How deep under the glacier they can be penetrated at lowest water is anybody's guess. This cave is almost 2,000 feet above the main resurgences at the snout.

For the moment, we are calling it the Easton Cleaver Waterfall Cave.

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THE SEPTEMBER MEETING

Nineteen attended and the Grotto voted on the Huntsville Grotto questionnaire about activities at NSS conventions, which generated more controversy than yr editor feels it merited. It was announced that the grotto calendar project has been dropped in favor of a scheme promoting investment in the Grotto Store. We viewed the NSS slide show on Papoose Cave.

ANNOUNCEMENT: The Grotto has acquired a coffeepot and there will be coffee available at future meetings. People are encouraged to bring other goodies (such as cookies, etc.) to supplement the coffee.

IT'S NOT TOO LATE TO ENTER THE TRIP REPORT CONTEST!

You may win $20.00 if your trip report is judged the best published this year. See your Grotto Handbook (or Summer Supplement) for full details.

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AT THE NOVEMBER MEETING, TUES. NOVEMBER 11TH ---- DON'T FORGET IT!