

Cascade Caver

Newsletter of the Cascade Grotto of the National Speleological Society
November-December 1991, Volume 30 No. 11-12

Upcoming Events

Dec 14 — Grotto Party Saturday at Jim Harp's house, 6pm - 10pm. Moved from date discussed at meeting because of schedule conflicts. More details on back of ballot.

Dec 20 — NO GROTTTO MEETING. Take the month off. You shoulda come to the party last week.

Jan 17 — Grotto meeting: Announcement of 1992 officers. Business meeting.

May 1992 — NCA Regional in Idaho. Hosted by Gem State Grotto and Magic Valley Grotto. Great caves near by. Easy drive to Sun Valley Resort and Craters of the Moon National Monument. Memorial Day Weekend. Mark your calendars!

Jul 1992 — NCRI project at Jewel Cave, SD. Gene Smith, coordinator.

Jul, Aug 1992 — POWIE V. (Prince of Wales Island Expedition #5). At least 35 new caves were discovered in Southeast Alaska this year, 14,900 feet of new passage surveyed and lots more to be done. Contact Kevin Allred, PO Box 376, Haines, AK 99827 or locally contact Dave Klinger, Leavenworth, WA.

Aug 1992 — NCRI project in Pryor Mountains of Montana. Ben Tompkins, coordinator.

Aug 1992 — NSS Convention, Salem, Indiana, Aug. 3-7.

1993 — NSS Convention, Pendleton, Oregon

1993 — NCA Regional in Oregon

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Editor's Corner

This issue is a biggie and all of the material came in the last month, honest, I have not been hoarding.

The **Editor's Corner** is a new monthly feature that I just now created as a place to announce that this is my last issue as editor of the *Cascade Caver*. After nine years I am forced to admit that I am married, have kids, and have other caving and non-caving things I'd like to put more time into.

Mark Sherman and I joined the grotto around 1980 and I got involved with the *Caver* soon after Mark became editor in 1982. It is a job where you get to see most of what's happening around the grotto, read all the exchange newsletters, get to know a lot of people. I'm going to miss it.

I'd like to thank all those who provided interesting material over the years without much prodding from me. I think we've done good work with the *Caver*. Now if I could have just found a successor...

As far as I can tell the *Caver* is going off the air until a new editor steps forward. I'm not going away, I'll still be here to turn over materials and help a new crew get started. After nine years of steady production I sincerely regret any lapse in a service that I think is crucial to the health of the Cascade Grotto.

- Ben Tompkins, Editor

Radon Gas in Washington Caves

John P. Buchanan, Ph.D.

The occurrence, concentration and distribution of radon gas in selected caves of Washington state was investigated at Cave Ridge near Snoqualmie Pass, at the lava tube terrain south of Mt. St. Helens, and at a small karst region in northeast Washington west of Metaline Falls. Radon gas concentration was measured twice during a one year period in Cascade Cave, Ape Cave and Gardner Cave located in each of these three regions respectively. Radon was found in the atmosphere of all three caves, where during the summer months the radon gas levels averaged 6.3 picocuries/liter (pCi/l) in Ape Cave, 30.6 pCi/l in Cascade Cave and 46.0 pCi/l in Gardner Cave. Winter averages were 3.7, 27.8 and 40.7 pCi/l of radon in each cave respectively. Despite the occurrence of radon gas in all caves investigated, the presence of this gas does not pose a significant health risk to recreational cavers visiting these caverns. An individual may spend hundreds of hours underground in these caves each year without assuming any health risk associated with the exposure to radon gas.

General Information

Radon is a naturally occurring radioactive gas that is detectable in most regions, and, when it occurs in sufficiently high concentration, is regarded as a significant health threat. Radon is the product of the radioactive decay of uranium and thorium: alpha-particles are emitted when radon decays further, which, if this occurs in the lungs, can damage the living cells that line the lungs. Consequently, radon is the leading cause of lung cancer in non-smokers (Strandon, 1980). Fundamental research into understanding the occurrence and distribution of radon is of primary interest now that the health risks associated with exposure to the gas have been recognized. In fact, the EPA has recently recommended that homeowners nationwide initiate a testing program. Very little effort has been made, however, to characterize radon levels in the natural environment.

The fundamental control on the occurrence of radon is geology, and natural caverns provide an ideal field laboratory in which to measure the level of radon in a given region. In fact, the National Park Service has performed radon sampling in several of its administered caves; for example, Mammoth Cave, KY, Jewel Cave, SD, and Timpanagos Cave, UT to name a few (Yarborough, 1983).

In addition, studies conducted cooperatively with the National Park Service (NPS) and Bureau of Land Management (BLM) in non-commercial wild caves in

karst regions in Montana and Wyoming during the summers of 1988 and 1989 (Buchanan, 1989), showed that radon gas occurs in significantly high concentrations, ranging from 50-700 picocuries/liter (the EPA recommends no more than 4 pCi/l of radon in a dwelling for comparison). While again these caves are not commercially operated, they are heavily utilized by the recreational caving public. The NPS and BLM are now using the baseline data on radon to formulate new management policies for the caves, and to better inform the cavers using this recreational resource of the potential hazards due to radon.

Methods

Three caves were selected in three cave regions in Washington state for investigation. The three regions chosen for this study are 1) Cave Ridge near Snoqualmie Pass, 2) the lava tube terrain southwest of Trout Lake, WA, and, 3) a small karst region in northeastern Washington near Metaline Falls. Cascade Cave, Ape Cave and Gardner Cave were chosen as the study caves in each region respectively.

Charcoal-pack radon detectors were placed at two sites in each of the caves during the summer 1990 for a period of no longer than 24 hours in duration, due to the high humidity of the cave environment. Charcoal detectors consist of tyvex pouches that contain activated charcoal that absorb moisture and gases in the atmosphere. After the detectors were recovered, they were sealed and returned to a national laboratory for analysis where the radon level was determined. These detectors yield instantaneous values of concentration of radon during the short interval of exposure. Mean air temperature and relative humidity of the cavern atmosphere were also recorded at each sampling location.

In addition, two alpha-track detectors were placed in each cave for long-term testing at the same sites used for the charcoal tests during the initial visit. This type of detector uses a track etch technology and reveals a time-integrated or average value of radon gas during the period over which it was exposed to the atmosphere. These detectors were retrieved during the late spring 1991 and returned to the lab for analysis. Thus, radon levels in each cave have been measured during both summer and winter seasons, when the thermal gradient reverses itself between the cave atmosphere and the surface. Radon levels are reported in picocuries/liter (pCi/l).

In order to assess the health risk associated with exposure to radon by cavers, standards adopted by

the U.S. Department of Health and Human Services (1988) for uranium miners are applied. By this method, risk is considered a function of the concentration of radon and the time exposed to the radon.

Table 1. Radon gas levels (in picocuries/liter) measured in the three study caves.

	<u>Charcoal detector</u>	<u>Alpha-track detector</u>
	End date Radon level	End date Radon Level
Ape Cave	07/25/90	05/25/91
lower site	6.2	lost
upper site	6.4	3.7
Cascade Cave	08/03/90	06/15/91
upper site	32.2	47.8
lower site	29.1	7.8
Gardner Cave	07/07/90	05/11/91
lower site	72.4	68.6
upper site	19.6	12.9

Description of Caves

Ape Cave, south of Mount St. Helens near Cougar, Washington, was selected as a representative lava tube cave for investigation during this study and because of its popularity with the public. Ape Cave consists of a single unitary lava tube that extends more than 12,000 feet (the longest in North America), and is developed over a 700 foot range in elevation from its upper end to the lower end. The lava tube was formed about 1900 years ago, and passage dimensions are very large, usually more than several meters wide and high, with lava, sand, ash and pumice comprising the floor of the lava tube. Cave temperatures are cool, about 43°F, and wind velocity in constricted portions of the tube can approach seven miles per hour.

Cascade Cave, high on Cave Ridge above Snoqualmie Pass, Washington is a complex, three-dimensional joint-controlled cavern developed in Permian-age marble and schists belonging to the Denny Formation (Halliday, 1963). The limestone is heavily fractured and appears to dip about 30°S. More than 800 feet of passage has been mapped in this system which are oriented along both dip and strike; passage dimensions are narrow with breakdown and sediment filling the passages.

Average air temperature is 38°F and no air circulation in the cave was observed during this study.

Gardner Cave in Crawford State Park near Metaline Falls, Washington is the third cave investigated during this study. It is the second largest limestone cave in Washington with about 1,700 feet of passage, is formed in the Metaline Limestone, a middle-Cambrian unit (Martin, 1988). Passages are strongly joint-controlled and are well decorated with a variety of speleothems. In fact, this is Washington's only commercial cave with tours operated during the summer months by the State Parks office. Air temperature in the cave averages 41°F.

Results

Radon gas was detected in all three caves investigated during this study and the sampling results are summarized in Table 1. There is some variation between sampling locations within a single cave, attributable to air circulation patterns within the cave or to density stratification of radon at different levels in the cave. Too few data have been gathered to describe statistically what would constitute a significant variation about the mean concentration of radon that occurs in any given cave.

Ape Cave contains the lowest and most uniformly distributed radon levels of the three caves investigated. Radon concentration in Ape Cave averaged 6.3 pCi/l during July 1990, and about half that concentration during the winter months. One alpha-track detector was discovered and removed during this study, despite being carefully placed out-of-sight, and as a result data was lost and average winter levels cannot be reported. Cascade Cave shows an average radon gas concentration of 30.6 pCi/l during August 1990 with a winter average of 27.8 pCi/l. Gardner Cave averaged 46.0 pCi/l during July 1990 with a winter average of 40.7 pCi/l.

The source of radon in the caves investigated during this study is presumed to be the bedrock beneath or surrounding the cavern, with the most likely source of the radon related to nearby granitic rock bodies. The radon levels measured in the caves in three diverse geologic terrains during this study supports this idea. For example, Ape Cave, with the lowest concentration of radon measured in this study, lies in a terrain that is dominated by Cenozoic volcanic and volcanoclastic rocks which are poor producers of radon gas. Nearby, however, are Tertiary-age granitic rocks that underlie and intrude the volcanic units, and these are suspected as the source of the low levels of radon in Ape Cave. Gardner Cave, which was determined to contain the highest levels of radon in the caves studied, lies in

close proximity to Cretaceous (and maybe Archean) granites and granodiorites which have been proven to contain uranium further south near Mt. Spokane. The Snoqualmie batholith, a Tertiary-age granitic intrusion near Snoqualmie Pass, immediately underlies Cascade Cave and provides the source of the radon in caves on Cave Ridge.

Interpretation of Data

A summary of risk assessment studies (USDHHS, 1988) shows that as the cumulative exposure to radon gas decreases, the risk of developing lung cancer also decreases. Accordingly, then, there is an inverse relationship between the level of radon in the atmosphere within a restricted area and the period of time of exposure by a human to such a concentration in that area without endangering that person's health. That is, if radon levels are low, humans can withstand a longer period of exposure without a detrimental effect on their health, whereas if radon levels are very high, then even a short exposure may result in an increased risk of contracting lung cancer.

It is assumed that for purposes of assessing the risk of short term exposure to radon by recreational cavers that the data and recommendations reported by USDHHS (1988) for uranium miners is applicable. This is not a valid assumption, however. These data are formulated for workers exposed to radon gas on a daily basis throughout a significant portion of their working lives, about 170 hours per month for a period of 30 years. Recreational cavers visiting the caves in Washington state are likely to be exposed to the radon gas for a short interval of time, maybe 2 to 5 hours per cave trip, and perhaps only once or twice a year. Therefore, the recommended exposure levels that are formulated for occupational exposures are clearly not designed for application to the recreational caving population.

The U.S. Department of Health and Human Services recommends that the annual cumulative exposure level not exceed 1.0 WLM (working level months) for occupational exposures. A miner's exposure (in WLM) for a given area is calculated as:

$$\text{WLM} = \text{WL} \times \text{T} / 170 \text{ hrs}$$

where

WL = working level (concentration of radon gas)
T = total time in hours spent exposed to radon

and 170 is the number of hours worked per month. The cumulative exposure in WLM is the sum of all exposures for various work areas in which time was spent.

Similarly, the annual cumulative exposure of a caver to radon can be calculated if the radon level in

the cave and the time the person spends visiting the cave each year is known by applying the equation above. For example, if a caver visits Cascade Cave (average radon level of 30.6 pCi/l = 0.31 WL by assumption), and spends 4 hours underground on one visit, and 6 hours underground on a second visit, then the cumulative exposure for that individual during the year is 0.02 WLM. Recall that the USDHHS recommended exposure level for occupational exposures is 1.0 WLM, and if this level is regarded as valid for application to the recreational caving population, then, this individual is well within exposure guidelines formulated for uranium miners.

Therefore, knowing the average concentration of radon within the caves based on the limited sampling that was done by this study, and assuming that the level of radon is constant throughout each cave system, the maximum number of hours a visitor can spend underground each year for each cave is presented in Table 2. Again, keep in mind that the assumption that occupational exposure levels are applicable to the infrequent and short duration visits that are typical of a caving visit is probably not valid.

Table 2. Interpolated limits for time of annual exposure

Cave	Average radon level pCi/l	WL	Max exposure Hours/Year
Ape Cave	6.3	0.06	2,833
Cascade Cave	30.6	0.31	548
Gardner Cave	46.0	0.46	369

Conclusions

Radon gas has been measured in all three caves investigated during this study in levels above those recommended by the Environmental Protection Agency for radon in dwellings (4 pCi/l) and these data are summarized in Table 1. Radon gas levels averaged 6.3 picocuries/liter (pCi/l) in Ape Cave, 30.6 pCi/l in Cascade Cave and 46.0 pCi/l in Gardner Cave during the summer 1990. Seasonal variation in the level of radon has also been documented, with lower concentration of the gas occurring during the winter months in all three caves. Winter averages were 3.7, 27.8 and 40.7 pCi/l of radon in each cave respectively. Risk assessment calculations show that despite the presence of radon in the caves investigated, it does not constitute a significant health threat to recreational cavers visiting these caves.

Acknowledgments

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About the Author

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More at the bottom of Newton Cave

by Chuck Crandell

9/23/91 - To no surprise, Mark Wilson made us get up early on Sunday morning - 7 am. The six of us were: Mark Wilson, Robert DeWolf, Greg Hollenbeck, Mike (from Tacoma), Karl Steinke, and I.

I reached the cave entrance via the up-the-valley route. The surface was dry and the sun beat down on the east side of the ridge. I kidded everyone, saying "I forgot the hangers for the first drop", so we wouldn't be able to do the cave. No one seemed to object because the day was fantastic. After suiting up and checking for the hangers, we climbed into the cave and signed the register at 10:30 am.

Our destination was the Wet Pitch, one of two known deep points in the cave, the other being the Monument Pitch which I did two years earlier. The Bolt Pitch required 3/8" hangers with four nuts and was rigged with a 50-foot rope. No artificial anchors were required below the Bolt Pitch.

The cave was fairly straight forward down to the Water Well where a piece of Gold Line was permanently rigged at an 18-foot drop. Just above the Dry Pitch was a nice little squeeze where it was worth listening to Mark get through. I rigged the Dry Pitch with my 80-foot virgin SSP rope off of a boulder and with a backup through a rock bridge. This drop was about 26 feet or so. The room at the bottom appeared to be orthogonal to the direction of the fault crack that made up the main character of the cave.

Our next rappel, the Wet Pitch, was nasty! Good rigging points were found on the right wall just above

the water puddle. The deeper one went the wetter it got in this cave. The Wet Pitch is named for the trickle of water right at the descent location. Because it was September there was just a trickle where the rope hung, probably about a gallon a minute. The pitch was rigged with Mark's 125-foot rope, an overkill for this 62-foot drop. My 80-footer would have been great here. Rope length is important because of the killer hike to the entrance. There was wind at the top of the Wet Pitch. Not air flow, but WIND.

We reached the bottom and had lunch. I found a lead in a prominent crack. There was good air flow in the crack. On the floor of the crack was gravel with water flowing downward. There was an upward lead in the crack and I was going strong but when the others didn't show much interest I bagged it for another day. Exit time was about 6 hours and 30 minutes after entering.

There are some great leads with strong air at the bottom of Newton Cave.

Even More at the Bottom of Newton

by Chuck Crandell

Cave Ridge, Washington, 10/20/91. Rob Lewis, Mike Lewis, Jon Turnidge, Wendel Pound, Scott Davis, Mike ?, and I met at the Alpentel ski area parking lot at 7:30 a.m. By chance we met Robert DeWolf and a friend of his in the parking lot. They were heading for an alpine hike to Guye and Snoqualmie Peaks. Robert acted as Sherpa and carried my rope up to the entrance of Cascade Cave. The plan was for me to show Jon, Wendel, Scott and Mike the entrance to Cascade. This is a non-technical cave, or at least I thought it was. I was to join Rob and Mike in Newton. The three of us were to drop the Wet Pitch and check out a new pit that Rob had discovered with Larry McTigue a week earlier. Everything went as planned except the 2000-foot elevation gain on the hike to Cave Ridge separated the men from the boys! To make sure everyone made it out OK I instructed John and gang to leave a note saying they had gotten out.

I joined Mike and Rob at Newton's entrance as planned and we were at the register at 10:30 a.m. This was old ground. Within an hour and a half we were down the Wet Pitch. Rob confirmed that the lead I had found last month was also his. It is TIGHT to say the least. Its name is now The Colon Crawl. It is an appropriate name. The pit lies beyond a series of tight zig zag passages starting out in a mud puddle. Knowing Rob was saving this to hear me bitch, I named the passage Rob's Revenge.

Beyond all of this lay the new drop. It is about 60 to 70-foot deep. We have named it Damocles's Drop for the big loose boulder that you have to rappel under. The boulder is named The Sword. (Tom Strong came up with the name) Because of the loose rubble and the Sword, Rob was the only one to drop the pit. Better one person hurt than three.

At the bottom Rob reported many leads to the east, west and of course down. He dropped pebbles down the tight crack at the bottom. He estimates that another 60 or so feet can be bagged.

WARNING. *This area is extremely cold and tight, with tons of loose rock!!!*

If you don't have your cave shit together do not consider this area. This spring we will have to go up and clean the loose rock from Damocles's Drop. We will then be able to survey the new passage. My god, maybe we can make a grotto project of it!

We exited without much mishap. Rob and Mike got turned around just above the Dry Pitch with me getting misplaced just beyond the Cork Screw. We

exited the cave 7.5 hours after entering. A light drizzle was falling from the sky.

It was then that I found the note from the Cascade gang. It read: "Chuck 13:40 - We are on our way back to the car. Had fun except Scott fell 25 feet and is hurt pretty good. All is fine though, don't worry. - Wendel."

What a way to end a trip! The hike down to the parking lot was beautiful for the clouds were layered with the sun poking through.

Accident Report Cascade Cave, WA, 10/20/91 by Chuck Crandell

OVERVIEW

The accident: Jon Turnidge (male, beginner¹, 20), Wendel Pound (male, beginner, 30), Scott Davis (male, beginner, 28), and Mike Pahl (male, novice, 28) entered Cascade Cave on 10/20/91 at roughly 10:30 a.m. PST. Cascade Cave is a non-technical cave situated on Cave Ridge in Washington State and is reached after a one-mile hike with 2120 feet of elevation gain. All four entered the cave. Mike, upon seeing the tight crawls that lay ahead, exited the cave about 5 minutes later. The remaining three continued on. After about 40 minutes of crawling and squeezing they popped out into a standing passage. This was their first time into the cave so they were moving rather cautiously. Upon entering the room Scott went to the right while Jon and Wendel stopped to analyze the pop-out point. They reported that they saw Scott squatting and looking over a ledge behind them. Jon and Wendel were placing a flag to mark the keyhole when they heard a slight brush of clothing against rock. Upon turning around, they could no longer see Scott. Moving over to the general area where he'd been, they found him lying at the bottom of a 25 foot drop, making a cat-like sound.

Scott had been squatting on a sloping surface while looking over a lip at a drop. He was not hanging on to anything with his hands. He then slipped/pivoted off the edge. Scott fell about 10 feet to a ledge where he impacted. To his surprise he kept going. Final impact occurred an additional 15 feet below the initial impact point for a total vertical distance of 25 ft. Scott landed on his back with his helmet behind his head and the chin strap around the front part of his neck. His feet were lodged above his head against the wall. His body was basically straight at about a 35 degree angle on a pile of breakdown rocks about 1 foot in diameter. His right knee pad, a skate-boarder style having a hard

exterior plastic shell with interior foam pad, was demolished. A projectile had punctured the pad scratching the knee.

The rescue: For the first 20 minutes Scott was delirious. He began to shake and shiver due to the damp, sweat-soaked clothing in a cave where the temperature ranges from 35° to 40° F., and possibly to shock as a result of blows to the body. After determining that Scott could be moved, Jon and Wendel changed him into a sweater and put a garbage bag over him. He was then laid on several cave packs to insulate him from the ground. After a 25-minute rest Scott insisted that he was well enough to crawl out of the cave. With Wendel pulling and Jon pushing, Scott self rescued. Exit time was roughly 2 hours.

Upon reaching the surface Scott's spirits picked up immensely. While Wendel and Jon hiked over to Newton Cave to leave a note for me, Scott and Mark started hiking to the car. Jon and Wendel would not catch up to Scott until after the hour-plus hike down to the car. Scott was driven to the hospital for examination. The left wrist was sprained and consequently splinted. The right arm sustained torn muscles and was put in a sling. Several ribs were badly bruised. The right knee had a superficial scratch.

ANALYSIS:

Cause(s): I perceive three contributory factors. First, Scott was the last one up the 2000-foot climb to the entrance. This suggests fatigue as a possible contributor even though Scott had taken a rest before entering the cave. Second, a technique employed while rock climbing should have been used while moving near the lip. Scott did not use this technique. Thirdly, Scott reportedly had a dim light. After the accident he indicated that he should have changed the batteries. I do not see footwear contributing to the accident. Scott was wearing Vibram soled boots that were reportedly in good shape.

Rescue options: Moving Scott without knowing the full extent of his injuries was questionable. The fact that Scott was conscious helped. Partial coherency occurred 15 minutes after the fall. Options were not plentiful. The cave was real cold. Three additional cavers were in a nearby cave but would not exit until 5 hours later. They were unreachable. Two positive options did exist. I had thrown a sleeping bag in the car for the trip. It could have been retrieved in 2 hours maximum. The bag would have bought extra time. Secondly, the garbage bag and extra clothing provided extra insulation against the cold.

Accident prevention: I can think of four suggestions. First, the more physically fit one is the less fatigued one becomes. Second, get some rock

climbing experience. Always try to move or climb with three points of your body attached to a solid surface. Move only one point, out of four, at a time. Use your hands. Third, change your batteries at signs of extreme dimness. Fourth, be more careful!

Equipment: I suggest procuring a helmet with a four-point chin strap. A helmet with this type of strap is less likely to come off the head.

Luck: Finally the luck factor. The fall was broken into two smaller falls reducing momentum and thus impact. The knee pad took most of the blow to the knee allowing the injured person to eventually walk out.

- by Chuck Crandell. Copy to American Caving Accidents, Steve Knutson

Notes:

1. Beginner. I define a beginner as a person who has three sources of light, hard hat, compass. Someone who, in this case, has been caving for a year or less.

Lechuguilla Cave

May 19 - May 23, 91

by Chuck Crandell

Carlsbad National Park, Carlsbad, New Mexico. After the heroic rescue of Emily Mobley last March, project members finally found time to explore and survey. Very little passage was bagged because everyone was exhausted from the rescue. So it was determined to hold a special session to push the North West Passage area and hopefully surpass the length of Wind Cave in South Dakota. I was one of seven to be allowed to participate in the mini-exploration and survey trip.

I flew into Phoenix, Arizona on May 16 and drove to Carlsbad May 17. The drive from Phoenix was really nice because the desert was green from all the extra rain. Everything went all right until I hit a drug check point just north of El Paso, Texas. The well-armed border guards, sporting fully automatic machine guns, took one look at me in my dad's pimp car and said, "over to the side." To complicate matters the power window on the passenger side didn't work. This led them to believe that I was running drugs across the border. So they started pulling at the interior door panel but I convinced them to let me go before they tore the hell out of the car, for which they had a reputation. One of the guards was a search and rescue member and we started talking about Emily. He became convinced that I was cool, so they let me go. FEEW! Drive time was about 8 hours. Have radar detector will travel.

Friday night I crashed at Dave's house. Dave, Carol, and Texas stud Rich Knapp had just finished surveying in Spider Cave. It's still going! That night and early Saturday morning the rest of the gang showed up. The next morning there were bodies all over the place. Donald Davis, Miles Hecker, Gary Petrie, Don Kleuver, Evan ?, and Lyle Moss. That morning we had breakfast and made plans for entering the cave that afternoon. Rick Bridges left instructions for us to pick up a lead list at Bivouac Camp near the Deep Sea Room. Rich, Ann, and a fellow from AZ had entered the cave Friday to go check out a lead off from the Deep Sea Room which was discovered during the rescue. What a fluke. During the rescue someone dropped a water bottle down a hole only to discover booming passage that kept going. This area was to become known as Red Sea Room and so forth. After finishing with the normal BS from parky David Eck we proceeded onto the cave. Shortly thereafter we found our lead list laying on the trail.

Our destination, The Northwest Passage, takes off from the north side of the Western Borehole. This junction is situated about two thirds of the way down the Western Borehole. The hole in the wall was situated some sixty feet off the floor. The first of six or so ropes hung from the hole. I believe Dave Jones performed the heroic first climb. The Northwest Passage is a fault crack, slightly tilted off center and ascends upward. The trek up hill with the ropes and 35 to 50-pound packs was a real bitch. From the first rope in the Western Borehole to the last going lead, which incidentally was a lead that went straight up for roughly 300 - 400 feet, there were leads everywhere! Just before the decent into Hudson Bay I lost my footing and took a two foot tumble to the side. This was the only mishap of the trip.

Hudson Bay is a series of fantastic pools situated in a huge room. A final rope drop into the Bay area is a snotty little 15-foot bastard. Gary sold tickets to watch everyone descended the drop. A nasty lip on the drop caught everyone by surprise. The pure white aragonite is now stained with blood. Even Donald, the old master, got nailed! We set up camp, ate dinner, and plotted our course for the next morning.

Sunday morning I awoke up to discover that Don Kleuver was no longer near my camp. He said I snored so bad that he thought the cave was going to fall in. Lyle, Don, and Evan went off to push the 300 to 400 foot climbing lead that Dave Jones left. The fault crack went so high that Dave ran out of bolts. Lyle, a great rock climber and discoverer of the sizable passage to the Far East, was determined to top out and discover another borehole. Donald, Gary, Miles, and I headed off into Spar City to check a lead

that Donald had found in the initial discovery. At the approach to Spar City there was a bat skeleton on the flow stone. Later Donald would collect the skull for analysis. The skull would later be returned in the interest of preserving the wild cave-type atmosphere.

Spar City is named, as you might guess, for all the Dog Tooth Spar. It very much like Jewel Cave. Some spar was 12 - 15 inches long. Donald's lead, in all its glory, was a small fault crack coated with spar. It was a BITCH to survey. Pushing passage was painful. I wondered what in the hell had I gotten myself into. Donald, an accomplished rock climber, took us up a real nasty climb that would have been certain death if anyone fell. Not from falling 15 feet or so but from landing on the spar. The crack ended with no air flow. Don Kleuver on our way out. He indicated that Lyle and Evan had set to their task of setting bolts. It was slow going. Later that night around camp we all listened to Lyle and Evan bitch about not being allowed to use a power drill to put in the bolts. Eck, the parky, did not allow power drills. Something about impact to the cave. But Lyle debated that the 12-inch diameter by 8 inch deep divot they had to make to put in a good bolt was way more impact than a 3/8 inch bolt. I agree with Lyle. A machine-drilled bolt would be safer all around.

Monday the same team headed back to Spar City to continue poking the small leads. After a couple hours of futile, painful effort we were at a total loss when Gray came back with a big smile on his face. He had crawled/dug through at the bottom of a fault crack. (survey RBC) It was beautiful. We were at the bottom looking straight up. We started surveying. When we hung the survey tape up an air flow took the tape into the direction we were to survey. As Donald, Miles, Gary, and I chimneyed up the crack it became apparent to me that we were getting pretty high up, like some one hundred feet or so. Hum. This concerned me when Donald started to do some hairy moves. So I down-climbed a bit and went off exploring another part of the crack. Within an hour, and with reduced risk, I had climbed above the survey team by about one hundred feet. They had run into trouble because the crack got wider as you went up. I got to the top of the crack and found a breakdown pile leading up. I finally yelled down to them, "Hey fellows, you should see this." They responded, "How did you get up there?" I down-climbed a bit to lead them up to my vantage point. As they reached me I took off for the breakdown pile. I had climbed up another 30 - 40 feet when I broke out into a huge room. Everyone down below dropped what they were doing so they could see the new room. I looked around and followed the room upward. After all I was the search and squeeze man and didn't

mind one bit. Even more when our team found a gigantic room to explore. In the upper part of the room I climbed into some small holes with gorilla grease all over. I continued up and popped into another huge room with holes all over the place. It was mind boggling. Leads everywhere! That afternoon we surveyed some 2000 feet of passage. We named the ascending fault crack The 3 O'Clock Staircase, the first room Ave nida Sombra (Spanish for Dark Avenue, survey RBC13 -RBC27), and the second room Paradox Room (survey RBD) for the strange layers in the domed ceiling. We returned to camp totally exhausted. Lyle and Evan reported that they still haven't reached the top of the bolt lead. They did say that they were close and that they could see breakdown at the top. The fault crack was opening up.

Tuesday we returned to Spar City and Paradox Room. Miles, Don and I did cleanup along the way in the Spar City complex. (survey RB13) We followed an air lead in the floor of Spar City. It led right back into another part of the main passage. Lots of elusive air flow. A little later in the day while Donald and I were checking out leads, Don came running back from the Paradox Room. He said that Miles, Gary and him had just found a large borehole leading northwest. (survey RBF) In actuality they had discovered another fault crack parallel to all the others including the main one off the Western Borehole. Donald and I joined them. It was then that I saw Donald get mad. In their excitement someone had touched the white calcite wall. This had muddied it up. A mushroom type formation was also knocked off the wall. Without placing blame Donald bitched everyone out. He was right.

We continued to survey. To get down a 15-foot drop we used a short piece of rope. What was interesting about the drop was the fact that we had to pass vertical gear on the way out. For the four people there was only two systems. Not too much of a problem for a 15-foot drop until Miles dropped his hand ascender and it stopped just short of going down a 200-foot drop! We returned to camp and discovered that Lyle and Evan had run out of bolts. They were about 70 feet short of what he suspected to be the top of the fault crack.

Wednesday morning we all showed Lyle and Evan our find and cleaned up some short surveys. Lyle pushed the upper climbing lead at the 3 o'clock Staircase. He also pushed a tight little lead in the ceiling of Avenida Sombra Room. Air flow constantly reminded us that there was more but we couldn't find it. It will take some one else with a different perspective. We returned to camp, packed up, grabbed our Lecha Berrito Bags and exited the cave.

Vulcanospeleology Symposium

by William R. Halliday

The sixth International Symposium on Vulcanospeleology was held in Hilo, Hawaii, August 4-6, 1991. Perisymposium events and field excursions were held on the islands of Oahu, Hawaii, and Kauai August 2-3 and 7-10. Co-sponsors were the National Speleological Society, the Western Speleological Survey, the Bishop and Lyman Museums, the University of Hawaii at Hilo, and the Hawaii Volcanoes National Park. Principal host organization was the Hawaii Speleological Survey of the N.S.S. Attendance was a capacity crowd of about 60, including the Mayor of Hawaii County and a few guests from the U. S. Geological Survey's Hawaii Volcano Observatory and the National Park Service. Papers were presented by participants from Australia, Japan, Korea, Iceland, Spain, Portugal, Germany, the Netherlands, and many parts of the USA. Although projected visitors from Bulgaria, Romania, and the USSR did not arrive, only three full registrants failed to attend. One, Korea's Dr. Hong, was represented by the vice-president of that country's speleological society. He received special applause.

The initial event was a reception and a special tour of the Bishop Museum in Honolulu, the state museum of Hawaii. Several unscheduled poster exhibits were added to the program, one depicting a deep vertical volcanic conduit in Iceland which may be the deepest of its type.

Keynote speaker was Ron Greeley of Arizona State University speaking on lava tubes of the solar system, especially Venus, about which he is a leading expert. Session chairmen were Jim Nieland, Tom Rea, Fred Stone, and John Holsinger. Field excursion leaders were Jim Martin, Spike Werner, Darrel Tanaka, and myself. Frank Howarth was the luncheon speaker.

Field excursions were very well attended. The Oahu excursion visited two lava tube caves in basalt 2 million years old, and also studied the peritubal lava of a third from the street below its mouth. The first cave immediately provided the group with first-hand knowledge of the problems of Hawaiian urbanization.

The Hawaii Volcanoes National Park excursion included viewing molten lava entering the ocean. Many of the participants returned after dark, unofficially, for closer views of flowing lava in a different part of the park. Lava has since stopped flowing in the park. The Mauna Loa excursion

encountered blowing rain and sleet at 11,000 feet and had to abandon the hike to the Ice Cave, but participants seemed to enjoy lower elevation caves of that volcano. Further spelean problems of urbanization were demonstrated on the Puna excursion. The Kauai excursion introduced biospeleologists and a few others to the problems of cave conservation in both lava tube and solutional caves on that island.

The Working Group on Volcanic Caves of the International Union of Speleology met and discussed a proposal by Ron Greeley for a world center for documentation of lava tube caves. This will be explored further. A specific proposal for the place and date of the 7th International Symposium was not received but representatives of Iceland, the Canary Islands, and the Azores all expressed interest. An initial Atlantic regional symposium on vulcanospeleology will be held in the Azores in September of 1992 and a decision may be forthcoming at that time.

A trip around Italy

by William R. Halliday, M.D.

An International Conference on Environmental Changes in Karst Areas was held in Padova (Padua), Italy, September 15-19, 1991. Together with the field excursion which extended nearly the entire length of the Adriatic side of Italy, it drew participants from Italy, France, England, Romania, Hungary, Spain, Slovenia, Croatia, Serbia, Poland, Germany, Austria, Czechoslovakia, Israel, Canada, Australia, and the USA. Papers ranged widely from recent biological discoveries in a low-oxygen cave in Romania to the predilection of early Greek colonists for karst areas. The field excursions presented a marvelous selection of varying karstic areas, some impacted by man for perhaps 35,000 years - and also impacted earlier by the temporary drying up of the Mediterranean Sea which temporarily rejuvenated karstic aquifers of its entire basin.

The principal location of the symposium sessions was the Department of Geography of the University of Padova. Other paper sessions and field discussions were held along the routs of the field excursions including Taranto harbor. Principal organizer was Ugo Saura of Padova, well-known to members of the International Association of Hydrogeologists. Other names among the organizers especially familiar names to Americans were Arrigo Cigna (past president of the International Union of Speleology), Paolo Forti (co-author of *Cave Minerals of the World*), and Eipo Burri of the University dell'Aquila. Gianni

Campanella of the *Federazione Speleologica Pugliese* impressed me as especially pleasant and helpful. Among many co-sponsors were the IUS Commission for Physics/Chemistry and Hydrology of Karst, its Study Group on Environmental Changes in Karst Areas, and the IGU Study Group on the same subject.

The language of the conference was English. A couple of papers were presented in other languages but in such basic speech that they were mostly intelligible to anyone with a smattering of any Romance language. Two messages were clear from the onset. One was that planners, ecologists, engineers, and others must not fall into the trap of considering karst areas to be like non-karst areas. The other was that despite dozens of millennia of man's impact on the karst areas of Europe, much still remains to be preserved and studied.

At the beginning of the meeting, an architect/engineer stressed the importance of studying and protecting karst regions on an interdisciplinary basis. Later it became apparent that even the faculty of the main field excursion need to adopt this viewpoint.

The second and fourth days of the event included local excursions in the karsts of the PreAlps northwest of Padova. Of special interest was the enormous Covolo di Camposilvano, a Mammoth Cave-sized corridor that ends immediately. Also of interest was Ponte di Veja, a fine natural bridge high alongside a deep limestone gorge, with an archeological site under it.

The principal field excursion went first to the gypsum karst park at the edge of Bologna. Creation of a natural park here has not resolved all environmental problems inherent in urbanization. This gypsum karst reminded me of eastern Kentucky, with large sloping blind valleys and broad, deep sinkholes. Although small, the park contains more than 150 caves. One of these, the Spipola-Acquafredda system, is over 10km long and 200m deep. We visited about 1/2km of Spipola Cave including one of its areas of calcite speleothems with a large calcite "waterfall". Mud is more impressive than the calcite but the sparkling gypsum crystals are nice. Lunch was in an abandoned quarry which is already starting to collapse due to evasion of regulations. Quarrying was begun here some 2,500 years ago. Gypsum is a better building stone than limestone.

We proceeded south along the Apennines. Most of the group toured the show cave at Frasassi the next day. A few took a wild cave trip, emerging at river level. In the afternoon some of us hiked up the gorge to see the impressive chapels in the nearby Grotta del Santuario.

On Sunday we proceeded further south to the site of the southernmost glacier in Europe, the very scenic Gran Sasso peaks east of Rome. From the bus we observed the entrance of a snow cave in the distance then traversed the depths of Gran Sasso by tunnel and swung back around to tour the parallel underground labs of the National Institute for Nuclear Physics. Then the bus took us to alpine poljes which are the sites of winter sports and beautiful summertime hiking. Then onward south, through the Apennines to sleep in a monastery after visiting Stiffe Cave after dark. This is a newly-developed resurgence cave with several waterfalls and large chambers, little known outside Italy.

The bus was huge, the roads narrow and serpiginous. Often the driver had to back up to get around curves above sheer drops. The going was slow and we missed seeing several karst areas because night fell before we got there. Throughout the trip we were hours late for dinner and bed. Exhaustion and sleep deprivation became real problems.

Monday September 23 was an easy day, however. After viewing 1st-century A.D. polje drainage works, we were welcomed, wined, and dined at the Telespazio Space Communications Center. Then we went south, and south, and south to pretty Mattinata, on the sea at the Gargano (spur on the boot of Italy on the map). The next morning we visited the pock-marked Gargano Plateau itself, passing pits as much as 1000 feet deep. Along the way we visited a cave church at Monte San Angelo, reportedly visited by the Archangel St. Michael himself during the Middle Ages. Then we drove and drove and drove to Otranto where we overnights at a beach resort but never saw the beach. South of Otranto we enjoyed the karstic Adriatic coast, first from the bus, and then on a wonderful boat ride inspecting innumerable cave openings and littoral karst. It took us to Santa Maria de Leuca at the tip of Italy's heel, one of the places I want to return to. In the late afternoon we toured the picturesque but short Grotta de Zinzulusa, one of the oceanside caves, then went on to Grotte Gattula, a thermal spring cave heavily modified as part of the spa complex at Santa Cesarea.

Back at our beachside resort at Otranto we again never saw the beach. We rose early to drive across the heel of Italy's boot to Taranto. Here, through the courtesy of the Italian Navy, we viewed the ingenious new pipe system which harnesses the fresh water of a submarine spring in the Mare Piccolo section of Taranto harbor. The volume of artesian fresh water boiling up out of the pipe is impressive. I immediately thought of the great artesian well at San Mortuus, Texas, famous for its cave biology. I spoke

with several hosts from the University of Bari, which had developed the project. Responses were identical: "I am a geologist. I know nothing about biology." Clearly there was no interdisciplinary approach here and what a pity! It would be so easy to rig a sieve and to look at what now gets eaten by the marine life in Taranto harbor.

At the town of Castellana Grotte we made a late evening trip into that great show cave. It is huge and more colorful than Frasassi and has magnificent crystals, helictites, and multicyclic speleothems in recently-opened back chambers. It badly needs additional cave restoration, however. Castellana was not protected from its first years as was Frasassi.

At this point a half dozen of us pooped out and missed the final day's excursion in the Murge Plateau. We missed Castel del Monte, perhaps the most notable old fort in Italy. We also missed a fine karstic bauxite quarry, the huge doline called Pulo di Altamira, the troglodytic excavations of the Massafra Gorge with its painted church, and a wonderful farewell dinner. But days of exhaustion had done us in. On the train to Catania to meet Sicilian vulcanospeleologists the following day I could still hardly keep my eyes open. The Italians had really knocked themselves out to show us the greatest karst treasures of Apennine and Adriatic Italy. If the opportunity ever arises again, GO!

In Martel's Footsteps

by William R. Halliday

In October 1991 I had a wonderful week in the cave country of southern France seeing some of the world's most famous caves and speleological museums. As a result of the heartwarming help of Jacques Choppy (an outstanding oldtimer of the SpeleoClub de Paris and a director of Grotte de Clamouse) we were able to accomplish about twice as much as we could have done alone. But this report will give an idea of what is possible in a week, in case you are headed that way.

The venture began poorly but did not remain that way long. We travelled by Eurail Pass from Paris to Brive where we picked up a Hertz car. From Brive it was only a short drive to Lascaux II, the artificial replica of the "Sistine Chapel of prehistoric art". It was impressively cavey at first glance but disappointingly small and most of the replicas of the famous paintings seemed dull and lifeless in comparison to published photos of the real things. Rather sadly we walked the short distance to the entrance building of the real Lascaux Cave, thinking about what we had not seen.

Shaking off our somber beginning, we veered through a network of back roads heading generally toward the prehistory center of Les Eyzies. French roads are good and there are signs at every little intersection. But the signs usually only indicate the next village and even for Jacques a good map and constant navigation were necessary everywhere off the main roads.

Soon Jacques pointed us to the Abri de Cap Blanc, which I had never heard of. Abri means grotto or rockshelter, and this was a great one. It was closing time but Jacques was welcomed as a VIP here (and everywhere else we went except Lascaux). We received a special tour to view and admire prehistoric wall sculptures of horses, bison, and deer about 14,000 years old. I had not known that such sculptures existed.

Then on to Les Eyzies itself where new and old buildings cling beneath overhanging cliffs of the Vezere River, home of man for perhaps 35,000 years. In the Abri Pataud we were welcomed in the middle of a lecture on the current excavations and exhibits. Adjacent to the diggings is a little beautifully-done archeological museum. Our hotel was in an old mill nearby, really delightful. There are so many caves, archeological sites, archeological museums, and speleological museums in and around this tiny village that we could have happily spent the entire week here. Make reservations far in advance in tourist season.

The Musee National de Prehistoire the next morning was amazing. I had expected all the portable wonders of Cro-Magnon art to be somewhere in Paris. Instead, world-famous carvings like the Venus of Brassempouy are here where they began for anyone to study and photograph at leisure. I had not realized the Venus, also known as La Dame a la Capuche, was so small but that scarcely lessened its impact. The Grotte (or Abri) Cro-Magnon itself, where Cro-Magnon man was first found, is only a ten-minute walk from the museum. It is only a small rockshelter but for spelean history buffs this short pilgrimage is a must.

In the museum I met a Neanderthal skull for the first time and was shocked. It appeared far less human than I had expected. I could not help wondering if the interbreeding of Cro-Magnons (modern-looking *Homo sapiens*) and Neanderthals vividly described in the *Clan of the Cave Bear* could really have happened.

Our time was limited so we regretfully bypassed the beautiful little Grotte du Grand Roc and nearby speleological museum and drove north to the ruined cliff dwellings of La Roque St. Christophe. Tremendous undercut ledges a half mile long in a cliff 250 feet high had sheltered an entire town. It

was almost invincible before the development of artillery. Long a citadel of Protestant Huguenots, it was totally destroyed in 1588 on the order of King Henri III during the Wars of Religion; a tragic end to perhaps 35,000 years of habitation.



Cave paintings in Rouffignac Cave.

Then on to the Grotte de Rouffignac, notable as a surprisingly lengthy cave in chalk, said to be 6 miles long, and the site of amazing wall paintings and carvings 10,000 to 12,000 years old. First reported in 1575, these gems of prehistoric art were only acknowledged in 1956. Depictions of herds of mammoths and rhinos have the greatest impact but individual ibexes, horses, and bison are magnificent. Thin films of calcite cover some of them. Nearly all the paintings here are in the form of black line drawings. Proportions are exact, careful attention was given to detail, and considerable stylization is obvious. Bear wallows and claw marks are common; speleothems are rare. These features are all widely scattered in several branches of the cave so small electric trains conduct visitors to the most impressive sites.

Although about 1,000 years older than those of Rouffignac, the paintings of the Font-de-Gaume Cave are mostly in color. Here prehistoric art is said to have entered its classical period, with excellent composition and perspective. Body shapes of the depicted animals are in harmony and the perspective gives a sense of realism to the animals. A herd of polychrome bison is especially notable but reindeer, horses, and mammoth are also impressive. The entrance passage is almost choked by flowstone but the inner frescoed regions are dry.

Innumerable cave openings adorned the cliffs as we drove east from Les Eyzies. Jacques spoke of unpublicized painted caves, two of which he had discovered, but noted that all the caves of the region are small. We reached the medieval town of Martel too late to get a room in the delightful country inn

called Hotel les Falaises (cliffs) on the Dordogne River but had no difficulty finding a room in the middle of town. The next morning we were off to Rocamadour, a spectacular, mildly troglodytic town of great fame. Next came Gouffre de Padirac, one of Martel's most famous conquests. From the surface the vertical entrance appeared smaller than I had expected from photos, but it bells out impressively as one descends. A sequence of three delightfully old-fashioned elevators conducts visitors down the 250-foot entrance pitch. Then steps continue down to the underground river 328 feet below the surface. Martel led 9 expeditions here between 1889 and 1900. A half mile of his discoveries is now an enjoyable boat trip leading to a large, vertical, richly decorated chamber. Truly we were in the footsteps of Martel now.

Grotte du Pech-Merle is a few dozen miles farther south near the Lot river. It is notable geologically, archeologically, and scenically. Unlike most of the caves containing Cro-Magnon art, its painted sections contain extensive groups of stalagmites and columns. A spectacular frieze of dappled horses is perhaps its most famous scene but numerous other wall paintings and remains of cave bears are also on display. Red ocher dots and hand outlines are reminiscent of similar cave art in Spain's northern coast. Unique here is a huge oolite shaped like a spinning top, about 2 inches wide and more than an inch high. It is displayed upside down next to its growth cavity.

We overnighted at a motel on the outskirts of Carcassonne. En route were innumerable cave orifices in cliffs along the Lot River. Some of them sheltered cliff dwellings. Just west of Cahors we inspected the artesian Fontaine de Chartreux. Cave divers here have penetrated well below sea level although not nearly as deep as at the Fontaine de Vaucluse which we saw later.

After a quick look at the ancient walled city of Carcassonne and its cisterns, we were off northeast through beautiful Upper Languedoc and into Mediterranean karst briefly rejuvenated when the Mediterranean dried up a while back. probably by coincidence, starting here we met none of the restrictions on photography in caves that hindered my documentation farther north.

First was Grotte de la Deveze, a fine cave in its own right and the new home of the French Museum of Speleology, formerly in Paris. Among the exhibits are the original "singes" ("monkeys") used as rope climbing tools in 1934. They are sort of primitive Gibbs-type ascenders. With this early beginning it is surprising that single-rope techniques never caught on in France until A.C., (After Cuddington). In addition to the work of Martel, pre-Martel Austrian

and Trieste speleological organizations are given credit here.

Monocrystalline speleothems, aragonite clusters, helictites, shields (palettes), and soda straw stalactites are notable in the cave. Some are on dipping schist beds. We accompanied a tour group of elementary school children and it was interesting to hear them being addressed much like adults and responsible cavers-to-be. Education rather than entertainment was the clear intent. We observed this with another school in another cave later and also in a group intently studying road-cut geology. I think we have something to learn from French educators and show cave operators.

We proceeded eastward to Grotto de Clamouse, Jacques' special cave. Here are even more notable helictites, aragonite clusters, soda straws, and vast chambers. I could have shot two full rolls of film here and not taken half of the photos I wanted. We overnighted nearby at Hostel St. Benoit, a delightful country inn well known to the caving community.

Next morning we veered north along the scenic Herault River to Grotte des Demoiselles (Fairies), entered by a funicular. After a series of small passages and rooms, visitors enter a huge, splendidly decorated chamber measuring about 400 by 250 feet and some 150 feet high. The illumination is excellent. Martel was here in 1884, 1889, and 1890.

Still farther north is the Abime de Bramabiau, site of a remarkable underground stream which was the location of some of Martel's most famous explorations, beginning in 1888. The roar of the waterfalls up which he dragged boats is impressive even at low water. Speleothems are few but nodules of barite jut out into the passage like chert. In one unilluminated section of high, narrow passage my flashlight revealed an open barite geode originally about a foot in diameter with classical barite crystals. Besides the show cave, we visited the upstream sink and the first karst window along the course of the underground stream, not open to visitors. Through-trips involve wading in water up to 4½ feet deep. Jacques has done it twice.

Continuing north into the fringes of the Cevennes and the high Causses (great limestone plateaus), we soon came to one of the greatest of all: Aven Armand. En route we had a fine view of Porte Bonheur, a natural bridge that eliminated a long meander of its stream.

The story goes that Martel took one look down the preposterous entrance pit of Aven Armand and delegated the 225-foot ladder descent to its discoverer, Louis Armand. Struggling up the ladder 4 hours later, Armand's remarks were immortalized: "Superb! Magnificent! More beautiful than Dargilan! A true forest of stone..." And so it is.

Martel himself descended two days later with Armand Vire. America's Horace Hovey missed out. He was with the Martel team but was ill and stayed in the village. In any event, below lay a single vast vertical chamber, about half of which is studded with a huge thicket of strange thin stalagmites with flared projections like trimmed cauliflower leaves. This stone forest is one of the truly great spectacles of the entire world of caves. Every caver should experience what Louis Armand first saw.

We spent the night in the surprising La Riche Hotel in the town of Ales, definitely recommended, although parts of the road through the Cevennes seemed below West Virginia standards. Especially at night.

In the morning we continued through the Cevennes to the Aven d'Orgnac. Originally explored by Robert de Joly rather than Martel, Orgnac is almost the equal of Aven Armand in its forest of odd-looking stalagmites up to 75 feet high. Some are flattened and are termed "piles of plates". They occur in a larger chamber than Aven Armand, in a lengthy cave which contains a greater variety of beauties including subaqueous calcite crystals, extra-thin helictites, and much more. This is another must for cave connoisseurs and was a proper climax for a climactic trip.

We still had a lot to see but from here it was all down-hill, figuratively and almost literally. We visited the beautiful limestone natural bridge called Pont d'Arc to check out phreatic cavities in its abutments shown on a 1971 postage stamp of France. Nearby are spectacular limestone gorges. In the Gorge de l'Ardeche we stopped at a newly-commercialized Grottes de St. Marcel, notable for a pre-commercialization cave restoration project. Especially impressive here is a large terrace of big rimstone pools, cleaned out, prettied up, and beautifully illuminated. Then we were off to Pont du

Gard, a famous Roman aqueduct with nearby Grotte Prehistorique de l'Age du Renne de la Salpetriere. Unlike Les Eyzies, we found the latter fenced off every effectively and deserted. I could not learn anything about its saltpeter or manufactory.

Back in civilization now, we spent the night at a roadside hotel near L'Isle sur la Sorgue. The Sorgue is the river that emerges from the famous Fontaine de Vaucluse, but I don't recommend the hotel. We visited the great artesian spring in the morning. It is not very impressive at low water but has been dived by robot to a depth of about 1,015 feet in 1985, far below sea level. Some 400 swallets have been traced to this spring, some as much as 60 miles away. Innumerable other solution features open high in the natural limestone amphitheater above the spring.

Along the walk from the village center to the spring is the Norbert Casteret Speleological Museum, displaying Casteret's equipment in realistic settings. Also on display is his speleothem collection, which should really be out of sight as a study collection, rather than in full view where it might encourage others to collect. Otherwise the museum has a good conservation message and sells notable biospeleological postcards.

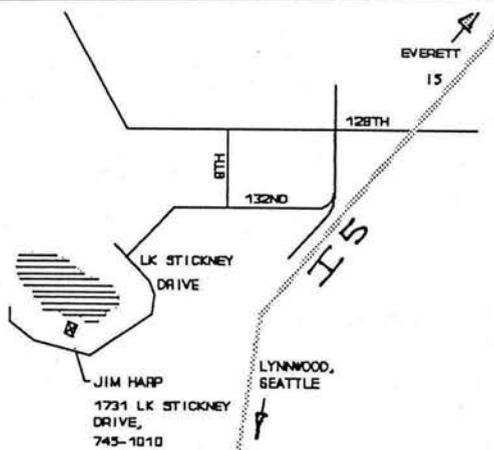
We drove back to Avignon, gave the car back to Hertz, and sped back to Paris in 3½ hours on the TGV train. As we sped north my thoughts turned to what we had not seen: more than a hundred other show caves, some of them almost the equal of the greatest that we had visited. And other great chambers, described to us by Jacques but known only to cavers. We had not even entered the great cave areas of the Alps or the Pyrenees. We will have to return, hopefully for more than a week. But even a week in the company of a Jacques Choppy in the caves of southern France is a truly unforgettable experience.

GROTTO PARTY

DECEMBER 14

COME to the Grotto year-end party December 14 at Jim Harp's house on Lake Stickney, just north of Lynnwood. The party takes the place of the December grotto meeting so get out your December calendars right now, XXX the grotto meeting, and write PARTY on the 14th. Note the change of date from that discussed at the November meeting!

POTLUCK - But not literally - Give Jim a call to coordinate dishes so we don't all show up with a bag of Dunkin Donuts. Jim will fix a ham and a roast so you can plan around that.



TIME: 6pm to 10:30pm. No pre-party vertical seminar as discussed. Who wants to climb trees in the dead of winter anyway?

Other Trips

Mt. McGuire

9/28/91 - Dick Garnick led a trip to the Chilliwack Valley, Canada. Along were Dick Garnick, Mark Garnick, Rob Lewis, Mike Lewis, and Larry McTigue. Entered New Cave which has a 55-foot drop into the first big room. Very wet 12-foot down-climb into next room. Bypassing a big boulder led to a 25-foot pit with reddish-brown flowstone and two possible digs at the bottom. There is another passage about 35 feet up the wall.

Hellhole

10/12/91 - Mark Sherman led a trip to Hellhole Cave on Cave Ridge with Yosh Shimono, Steve Haynes, Mike Compton, Bob Davis, and Steve Sprague also in the party. Rigged both new and old entrances. Went down original entrance and up the dug entrance. Found some small popcorn and soda straws about an inch or so long. Spent 3 to 4 hours in the cave.

Grotto Notes

November Grotto meeting

November 15. The November grotto meeting got off to a gravelly start as Sandy's voice failed to arrive with the rest of her. About 18 people attended.

Business - Ben Tompkins asked if anyone was interested in having a Grotto "Christmas" party. A party was arranged for December 21 at Jim Harp's house on Lake Stickney. No Grotto meeting on December 20.

Jim Harp gave a brief treasury report showing \$1250 in the various accounts. Obligations were not listed.

Sandy Major opened nominations for grotto officers for 1992. Nominations were Steve Sprague and Karl Steinke for chairman, Howard Hoyt and Larry McTigue for vice-chairman, and Greg Hollenbeck and Wendel Pound for secretary/treasurer. Ballots will be distributed in the December *Cascade Caver* and must be returned by December 31 to Jim Harp or mailed to the Grotto mailbox.

Trips - Chuck Crandell described his most recent trip to Newton Cave on cave ridge and the accident in Cascade Cave. Scott Davis helped with accident details.

Larry McTigue and Greg Hollenbeck described a trip to the new Elderberry Cave in the Concrete area.

Jim Harp mentioned that a group was currently on their way to Bighorn Caverns in Montana.

Future Trips - Jim Harp is planning his 3rd (I think) annual cross-country ski trip to Dynamited Cave in late February or early March. Details will be worked out later. Other than that the trip cupboard is bare. There is usually a trip planning meeting in January or February to get a bunch of stuff on the

books again. Plan to attend or submit your ideas at meeting.

Program - Larry McTigue showed slides of Elderberry Cave in the Concrete area and of various expeditions to the Chilliwack Valley in British Columbia. - BLT

Get ready for Spring Caving

Interested in getting started with vertical caving? Want to try climbing systems other than what you have? Do you sorta have it together but not quite? Chuck Crandell is willing to help anyone interested in working on their vertical gear, seeing different systems with their advantages and disadvantages, or who would like help choosing a system and picking equipment. Call Chuck at 772-3271.

Cave Packs

Are you tired of bulging pockets? Is your old gas mask bag about had it? Good News! Chuck Crandell is about to make a batch of cave packs similar to one of the nationally popular cave packs. Call Chuck at 772-3271 for price and other details.

Cover and picture credits

Not this month, silly, last month. I didn't mention last month that the fine cover and inside drawings were done by Linda Heslop, but you suspected, didn't you. But I bet you didn't guess that was me on top of the natural bridge! The prehistoric cave art in this issue was supplied by Dr. Halliday. From literature obtained at the cave concession.

Cascade Caver

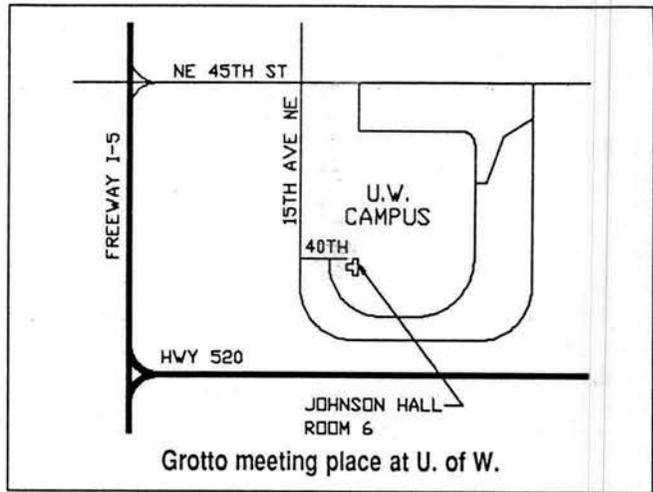
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Subscriptions, renewals, and address changes should be sent to the Grotto Treasurer: Jim Harp, 1731 S. Lake Stickney Drive; Lynnwood, WA 98037.

Exchange publications, material for publication, and other correspondence concerning the *Cascade Caver* should be sent to the Editor, Cascade Caver, c/o Ben Tompkins, 18002 First Avenue NW, Seattle, WA 98177.

Cascade Grotto - Regular grotto meetings are held monthly at 7:00 pm on the third Friday of each month at the University of Washington, Room 6, in the basement of Johnson Hall. Business meetings are held in odd-numbered months immediately following the regular grotto meeting for the month.

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DECEMBER MEETING

Has been cancelled in favor of a year-end party
 Ignore this map until next month.
See party details inside

Cascade Caver

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