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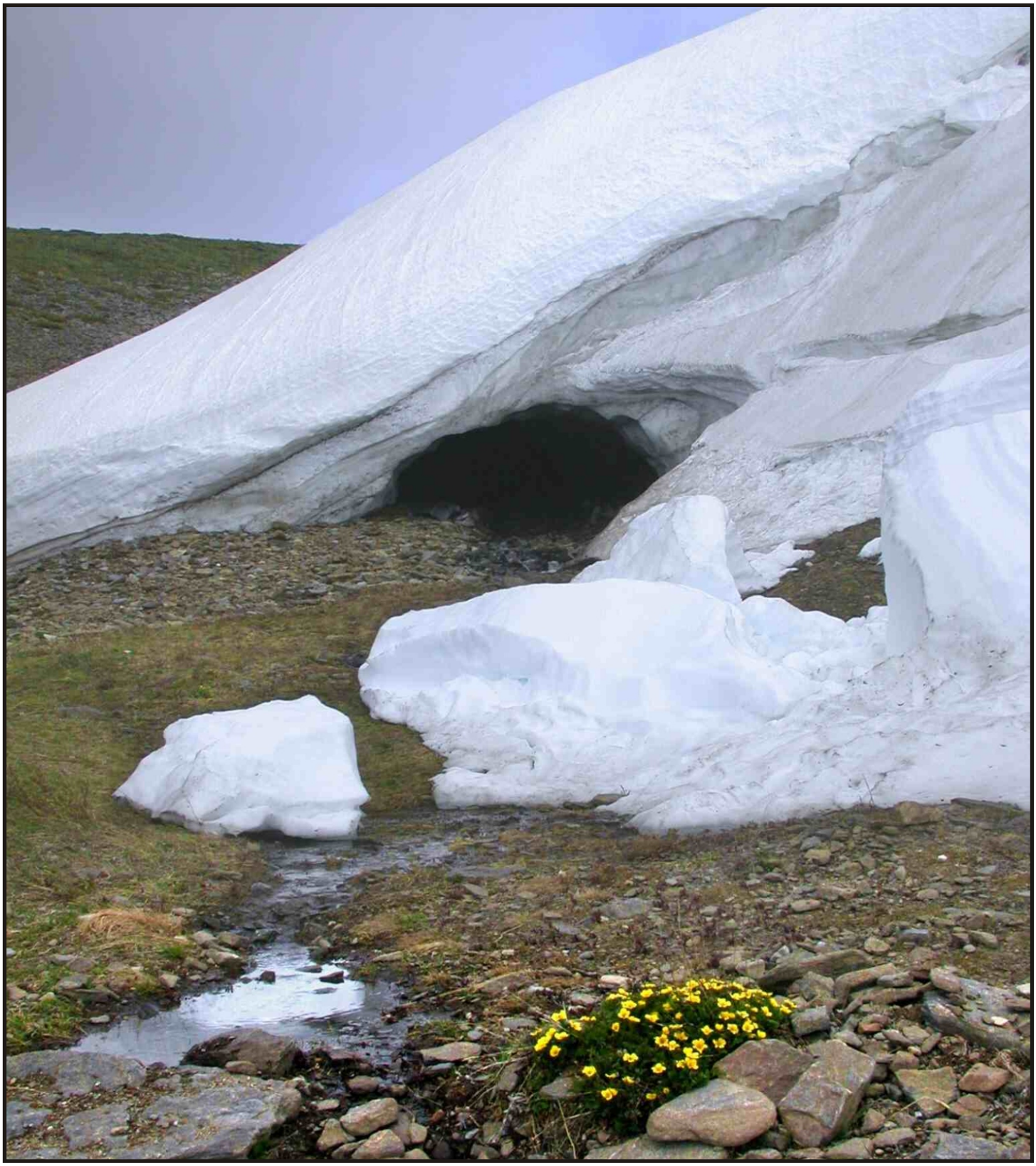
Carlene Allred

THE ALASKAN CAVER



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THE ALASKAN CAVER

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Annual dues are $15 per individual and $20 per family or organization. *The Alaskan Caver* is included in the membership fee. For an additional $8, six *The Alaskan Cavers* will be sent overseas via airmail. Send dues to the treasurer.

TABLE OF CONTENTS

FROM THE EDITOR

Error: In Last month's issue I spelled Josiah Huestis's name wrong throughout the *Hawaii 2008* article. Sorry Josiah.

Thanks to those who submitted trip reports to share with our readership. Keep them coming!

BROKEN MOOSE SNOW CAVE

Article and photos by Mike Van Note

Most Alaskans have traveled along the shores of Kluane Lake during a drive up the Alaskan Highway. Across the lake are the mountains known as the Ruby Range. In late June of 2008 I traveled with my wife Sandy Barclay, and friends Laurie Dadorian, Mark Battaione, and Kristin Hathorne to Haines Junction in the Yukon Territory where we met Yukoners Ken and Libby Anderson, and Bob and Carolyn Hayes for a 6 day trip in the Rubys.

We had been told that it would be an "easy" hike through rolling alpine terrain. We took a turn onto the "Silver City" road a few miles east of the Slims River Bridge. This road is in good shape for the most part though an occasional stream crossing is involved. It was about an hour before we finally came down to the lake at Cultass Bay with a lovely beach and camping spot, however we had another hour of driving up Cultass Creek to Fourth of July Creek where the driving deteriorated (i.e., 4wd high clearance needed). We crossed Fourth of July Creek and slipped our way up the ruts and mudholes for another 45 minutes before turning up Ruby Creek for another 15 minutes of rough road.

The lower part of Ruby Creek shows the effect of active placer mining; however, after shouldering our packs we soon were on a decent pack trail

(continues on next page)

Front cover: Entrance to Broken Moose Snow Cave, photo by Mike Van Note.

Back cover: "Crystal Vortex" is a 2007 painting by Carlene Allred, and depicts a cave that had formed under the Garrison Glacier in 1989, near Haines, Alaska.

BROKEN MOOSE SNOW CAVE, continued from page 2

running along the north side of the drainage in beautiful alpine terrain. The weather had been poor for some days prior and we found ourselves in 5" of snow near the summit of Ruby Pass.

We hurried to get below the snowline before making camp. Here we were visited by the first two of over 300 caribou that we were to see in this area, which seems to abound in wildlife. (We also saw wolverine, dall sheep, wolf, wood bison, and numerous "shorebirds" nesting in the alpine!) To the north of this site was a large gully containing an extensive swath of snowfield. A cave could be seen far up in this field, but it was late and we were tired.

The next day we hiked downhill in a whiteout for the first hour or so before coming to Ruby Lakes where we camped for several days enjoying day hikes and seeing the local wildlife. The weather was unsettled, so on day four I elected to stay in camp and read my book in warm comfort while the others trekked along the chain of lakes.

A short while later the wind picked up and it began to seriously rain. Smugly, I read on…Later in the afternoon the clouds began to part and the sun came out. This was enough to arouse me from my sloth and I packed a few things for a walk to the aforementioned snowfield a couple miles away.

We had noticed a continuous brown streak along the snowfield and thought that it might be an ancient caribou dung deposit. Such deposits were only discovered in the Yukon and nearby N. British Columbia about a decade ago. The oldest have been carbon dated to around 9,000 years ago and have been known to contain remains of other animals and plants which existed immediately after the last ice age. Atlatls and other archaeological material have been uncovered from these deposits as well. It appears that early Americans hunted caribou on the snowfields during the summer, storing the meat in this natural deep freeze for later use.

As I approached the snowfield I could see that the material was not caribou dung but rather a mix of plant material and soil apparently plucked, slumped, washed, or blown along the edge of the main snow mass. The cave was higher than I had realized, around 5,000' elev. It was bigger than it had looked from below. Such caves are not uncommon in snowfields and avalanche deposits, and many, if not most are unsafe to enter in the summer when they are often unstable.

The entrance was 20' wide by perhaps 10 -12 ' high, with a good stream flowing out of it. I could not see the back of the cave, and as it looked reasonably stable, I stepped under the dripping entrance into the main chamber. I hadn't brought a light as I knew we were

(continues on next page)

BROKEN MOOSE SNOW CAVE, continued from page 3

planning on coming this way the following day, but the cave appeared to be over 200' long with mostly walking passage. I took a few photos and left to explore more of the outer portion of the snowfield.

I was curious to see where the stream entered the field. This turned out to be about 150 yards up the ravine. The entrance at this point was a miserable (and certainly unstable looking) belly crawl in the creek. I passed this opportunity up and followed the creek and snowfield another 150 yards where I encountered the carcass of a moose still partially encased in a block of snow which had broken off from the main snowmass. Above this point was a small area where the snow was crevassed as might be found in a true glacier. I surmised that the moose had fallen into one of these earlier in the year, being exposed when a snow "serac" peeled off the face. Amazingly enough, no bears had found it yet…

The next day we all backpacked to the cave on our way to a high wide ridge overlooking Ruby Creek. This time I was able to estimate the cave at over 250' long being up to 30' wide and 12' high in one place.

Like most such caves in snow or glaciers, Broken Moose Cave is destined to be short lived. I would guess perhaps 3 years. The greater part of the passage formation is likely due to the movement of air through the cave once an initial opening is created by the stream melting snow. Warm air moving through the cave readily sublimates the snow in cool weather and melts it when the temperature is above freezing. This sublimation/melting effect created beautiful large scallops on the ceiling not unlike those seen in some large phreatic solution caves. While snow caves are generally quite short , I was delighted to "go caving" in this one, and to know that in the north you can find caves nearly anywhere….

LEPRECHAUN CAVE

Those of you who are NSS members hopefully have read the article in the June 2008 (Pages 10 through 20) issue by Curvin Metzler. This well-written and informative article describes in detail the geographical, geological and historic setting of Leprechaun Cave, situated in the Wrangell Mountains of Alaska. A description of the cave is included, along with a map produced by Jim Nicholls. Numerous black-and-white and color photos by Metzler show the cave's unique features.

According to the article Leprechaun Cave was discovered in July of 2002 by Curvin Metzler and James Larabee, both of Anchorage. They were on a photo-hiking trip when they happened upon the entrance. The two of them explored about a thousand feet inside and discovered that someone else had been in before them. Later they learned that a local had been visiting the cave regularly since 1973.

Cave mapping was begun in September of 2002, and according to Nicholl's map the cave was surveyed by Curvin Metzler, Jim Nicholls, Sam Dunaway, Ben Sainsbury and Jason Ballensky. The map shows a cave length of 5,443.2 feet (1659 meters), making it one of the longer ones in the state. The cave contains a wide assortment of features including a stream, unique speleothems and mineral coatings in colors of blue, green, yellow and orange. Green is especially prevalent.

Nicholls insists that the map is not finished. We look forward to hopefully seeing his completed version in the Alaskan Caver some day.

A copy of this issue of the NSS News can be obtained for $1.50 through the NSS office at 2813 Cave Avenue, Huntsville, AL 35810-4431.

(continues on page 5)

A Visit to Altamira

By Mike Van Note

Last winter Sandy and I found ourselves at the end of several weeks of walking across northern Spain with a few days to kill before heading to Paris to fly home. We decided to bus along the northern coast of Spain on our way back to France. Up until now we had done weeks of travel in France and Spain with a couple of pages hastily copied from a friend's guidebook regarding the Camino de Santiago. We finally broke down and forked over the euros for a decent map of the areas we were headed through and noted that the world famous Altamira Cave was right on our route.

Like Lascaux (and the more recently discovered Chauvet's Cave), the cave at Altamira is famous for its spectacular prehistoric art. Unfortunately, like the other two sites, the cave is no longer open to the general public. Richard Buck of Haines who visited the cave at Altamira in the early 1980s just prior to its closing described it as "the highlight of my trip"…"fantastic". In order that the original cave paintings might be preserved for the future, visitors must now instead see an artificial cave like that constructed at Lascaux in France.

Download from http://museodealtamira.mcu.es/ingles/cueva_altamira.html.com

Though only 25 kilometers from a major industrial city (Torrelavega) and freeway, we found the town of Altamira in a quiet and bucolic setting amidst some serious karstlands. It was obvious that the town is substantially busier during the summer season (think Skagway…), but most of the hotels and pensions were closed for the winter and those that were open seemed to be reasonably priced and happy to have business. As it was only a couple kilometers to the cave, and the weather was pleasant, we opted to walk. The walk took us around a large swallet draining an extensive area of pastureland along gentle limestone hills sloping down to the Atlantic Ocean 10-12 kilometers away.

We soon arrived at the museum where we were to spend the better part of an entire day exploring its various exhibits. The museum is quite modern and most exhibits are multilingual including English. Use of touch screen computers encourages hands-on learning for all ages. Perhaps one of my favorite activities was exploring vicariously the many other cave painting sites of Europe by using maps and photos available on the computers. The museum is certainly about Altamira, and the people who made the paintings some 16,000 years ago, but it is also a museum of all Paleolithic peoples in Europe and of human ancestry in general. On exhibit are prehistoric artifacts and art from throughout Europe.

The most recent findings of modern paleoanthropologists from Africa are discussed in exhibits that start with prehominids and move through the australopithecines, homo erectus, homo habilis, the Neanderthals, and finally the Magdalenian peoples of the late Stone Age. Images from modern indigenous hunter and gatherers are used to emphasize similarities in tool use, art, adornment etc. Modern people with hair styles, clothing jewelry and tattoos are shown to fit right in.

I did find what to me seemed an over emphasis on the "hunting" and less on the gathering part of the "hunting and gathering" economy of indigenous people,

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A VISIT TO ALTAMIRA, continued from pg. 5

something I expect in an older exhibit, but not a modern one. Also the tendency to have "cave men" utter grunt-like communication rather than "talk" (even a made up language) encourages the idea that early people were "primitive", less intelligent and capable. One look at the Paleolithic art on display should put this impression to rest. For example, 20,000 years ago someone made a beautiful ivory carving of a woman, now on display in the museum. We can only guess why this was done, but I would wager that it was not for "posterity", a chapter in a history book, a "heroic monument" or even the ego which drives much of the modern "art" world. I would guess it was done for beauty's sake, for love, perhaps magic of some kind, yet it has lasted, like the bison paintings on the ceiling of Altamira Cave for millennia, a time which trumps all of "modern, civilized" man and his "empires". No doubt these people had their faults, yet through art, their humanity shines in a way that is both humbling and awe inspiring. Oh but for a time machine!

One of the last exhibits is on the discovery of Altamira and the attempts to get the archaeological world to accept that paintings that look like they were made yesterday were indeed thousands of years old(!).

At last it was time to see the artificial "cave". One enters the "cave" directly from the museum via a tunnel which enters the "cave" just inside the "natural" entrance. This triggers a hologram of individuals sitting around a fire at the entrance enjoying a "day in the life…". An exhibition of an archaeological dig is to one side. Beyond is a short loop through a room covered in bison paintings. As one who has seen a lot of caves, including a few artificial ones, I was deeply impressed with the detail in the "cave" structure from the tiniest of solution pit on the wall to the deep solution fissure in the ceiling. Bedding planes, ceiling pendants etc. are all faithfully reproduced in a most realistic manner. The bison are spectacular and were painted faithful to the originals which used ceiling pendants and natural forms in the cave walls and ceiling to give body and a 3-D effect. Deer and other animals are also depicted sometimes in outline or merely scratched into the walls. Since we were not deemed to know enough Spanish to make use of a guide we walked alone spending a good deal of time admiring the reproductions.

When we were through, we stopped to purchase a "cave bison" reproduction by a local artist at the small gift shop attached to the museum before walking back to our pension in town.

Download from www.showcaves.com

The following day we walked out to the coast via a local trail network which took us through the karst pastures and woodland of the area. The wind was up and the Atlantic was pounding the limestone cliffs with powerful blows. It was a wild and chaotic scene! In the distance were the snowy limestone peaks of the Picos de Europa National Park. The coast here is very scenic and worth a visit if you have the extra time. In addition, there are numerous other sites of interest in the nearby region including other caves where one can (for the time being) see original Paleolithic cave art. Unfortunately, we left this intriguing region for the time being as we entered the travelers purgatory of bus, train, shuttle and plane…

For good reason Altamira is recognized as a World Heritage Site by the United Nations. Plan to put it on your list if you should find yourself in northern Spain.

Cave? Hunt

By Carlene Allred

On June 23 Cherry Rice sent me the following email:

"Have you ever looked in that cave by Carlana Lake? Looks very wet. Wonder how deep."

I promptly sent back, "What cave by Carlana Lake?"

I was intrigued... It turned out not to be by that lake at all, but nevertheless, was close to Ketchikan. I knew the area was not limestone, but I was still curious, for it had been a long time since I had done any hole-checking.

Several days later our tour was canceled for the day (we both work as musicians on the Alaska Queen paddlewheeler), so Cherry and I decided to go hole-checking that morning . She picked me up and we drove out the road and parked at a certain place that she knew of. Our path took us along the top of a pipeline that led off into the rainforest. Wet weather had made the pipe slippery, so we had to be careful.

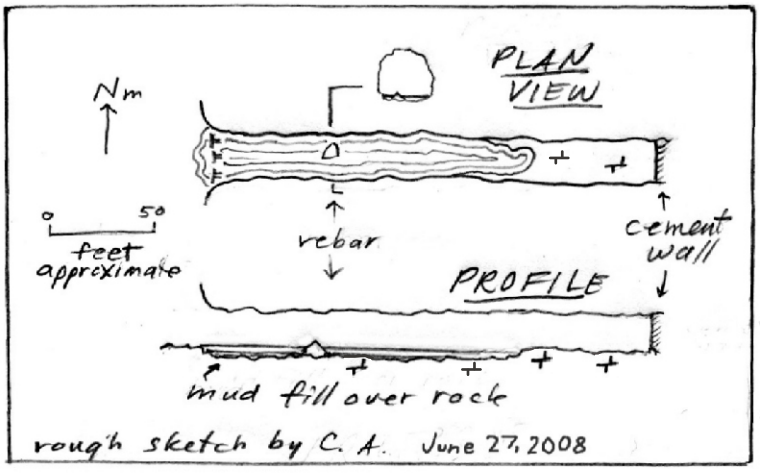
When we arrived at a certain spot along the pipe, Cherry told me to look up. There it was, truly a big, black yawning hole in the hillside! The opening was beautiful and framed in luscious rainforest greenery. After helping each other get down off the pipe we made our way through the dense brush over to the 25-foot diameter entrance. There was a hurricane fence in front but we were able to squeeze past through a hole on one side. We soon discovered that this was a big man-made tunnel that bored straight into the mountain.

Cherry Rice looks out toward the entrance while standing on a dry spot. Photo by C. Allred.

Donning our helmets and headlamps, we were eager to enter. The floor was covered with water that we had to wade through, and it went in over the top of my boots. A ways in we came to a place where there was a small forest of rebar sticking straight up out of the water and rising, twisted, high over our heads. Further on we waded until finally the water ended and a dry bedrock floor continued. The arched tunnel, blasted out of solid rock, is about twenty feet in diameter and runs horizontal and straight.

After penetrating several hundred feet into the mountain we found the spacious passage ended suddenly in an abrupt, imposing cement wall. Thick calcite flowstone and stalactites had formed along the sides of the blockage, sealing it tightly. We wondered if there was water on the other side of the barrier, waiting to rush out upon us were the wall to give way. We did not pound upon it to test its integrity.

On our way out we paused to take a few photos with my telephone camera.



Rope Cutter

Dear Phreada Phreatic,

I was caving with a group of cavers who kept insulting me. They were very crude and called me "#$%&%" and "+&*$@^" and also "%@%"! All I could seem to do is say oh yeah and you are a "%@(%$" yourself. It seems to be normal for cavers to insult each other. What can I do?

Dear oh yeah,

First you need to develop a very thick skin and then you need to educate these backhanded elbows on the gentle art of insulting. There is nothing finer than a grand insult and a great comeback can be remembered for years. The cave can even be forgotten, but someone will remember what so and so said about whatshisface. So, I have a few recommendations for your insulting vocabulary. Like any good vocabulary word it must be practiced until it is always at the tip of your tongue when that great opportunity arises.

There are a number of approaches to insults. As you have already experienced, parts of the body or its functions are always popular. Popular, but boring, unimaginative and lacking in style. I personally favor large words, since that tends to silence people of limited intelligence right away, because even a nohoper loser usually knows better than to admit they couldn't understand what you just said. I have often browsed the dictionary in search of just such words. Some samples of insults follow (and their translations):

1. I can't bear how contumacious you are, you pusillanimous poltroon. (You're always causing problems, you cowardly chicken.)
2. You are slimier than a hyperotreti. (You leave more slime than a hag fish, which is an underwater deep sea snakelike creature that secretes fibrous slimy mucus and eats fish from the inside out after entering an orifice.)
3. I'd rather sit down to dinner with a pilobilus than you. (I rather keep company with the microbe that eats dung. This microbe also creates spores that explode up to 2 meters from the dung it lives on, just to get eaten and pass through on its way to more dung.)
4. Yeah and I've been with diplomonads friendlier than you. (I've had giardia {beaver fever}and sitting on the toilet was more fun than being in your company.)
5. You mutinous bilge rat, I'd rather be keelhauled than keep your scurvy company. (You backstabbing rodent, I'd rather be towed under a boat then to hang around someone who causes me to loose my teeth and waste away to die.)
6. Do you have a doctorate in Toro Scatology? (Scatology is the study of animal droppings- take it from there.)

The important thing is to jump right in and start trying; after all I won't be there to inspire you. With practice it does get easier to trade insults all the time. And the best part is that if you get really good, most of the loser wooses you cave with will either dump you for some other fool to cave with or you will have their undying respect.

Yours Phreada,

PS. Remember to tell your sweetie to get close to some ascofungi. This is not an insult; it is the alpha steroid in truffles that is an aphrodisiac. Studies have shown that men who have been given this steroid even think that fully clothed ugly women look REAL good.

The Hong Megui Cave Exploration Society Kidnaps an Alaskan Caver: Expedition to Wulong Province, China 2008

By Johanna Kovarik

After 15 hours airborne over the Pacific Ocean and one short evening in Shanghai, I, Dan Nolfi, and 300 meters of rope arrived in Chongqing, China the day after Christmas. We crashed in the airport bar to have our inaugural bowl of dog and noodles for lunch while waiting to meet up with long time Hong Meigui (HMG) member and cave-bum Duncan Collis. Another half day's worth of travel via bus and taxi brought us to a nice guesthouse in the village of Huolu in Wulong county, which would be our home for the next week and a half. Upon arriving we firmly ensconced ourselves in down jackets, gloves, and a few pairs of socks– while pleasant in Chongqing, Huolu was quite a bit cooler. There we met up with the rest of the down-and-fleece-layered group, consisting of expedition leader Erin Lynch, Brits and HMG veterans Matt Ryan and Rob Garrett, Americans Jean Krejca, Charley Savvas, Matt Oliphant, Nancy Pistole, and Andrea Croskrey. One invaluable Chinese caver, Rick Yan also joined the group and for a short period we were graced by the presence of the British Consul-General in Chongqing, Nick Whittingham.

Cavers head off on the backs of motor-bikes through the streets of Huolu to look for caves. Photo by Charley Savvas.

The Hong Megui Cave Exploration Society has done quite a bit of work in Wulong county since its inception in 2001. Within Wulong, the Houping area is known internationally for its many beautiful tiankeng (literally, "sky pit") and makes up a portion of the newly inscribed South China Karst UNESCO World Natural Heritage Site. Houping consists of over 40 square kilometers of karst that has thus far yielded more than 60 kilometers of surveyed passage. There have been 10 HMG expeditions to the Houping area since 2001. The first two were collaborations with the Institute of Karst Geology, Guilin as part of a project to study the karst resources of Wulong county in its successful bid for Chinese National Geological Park status. Huolu is located to the southwest of Houping. HMG had not previously explored this part of Wulong county for its cave potential.

Our expedition traveled around the Chinese countryside via foot and motorbike, with local guides from the villages leading us to caves through terraced farm fields. Erin Lynch, Duncan Collis, Rob Garrett and Matt Ryan have lived in China long enough to speak fairly decent "putonghua" or the common language (Mandarin) of China. This greatly assisted in our ability to find caves! In the Huolu area, we mapped approximately 15 caves– not all were virgin passage, but none had previously been mapped. Gan Dong, or "Dry Cave" was arguably the best new find in the Huolu area. Large dry passage gave way to a flowing stream and approximately two kilometers were mapped through large borehole before the cave ended in a sump.

The author sketches in river passage in Gan Dong. Photo by Jean Krejca

We spent a week and a half in Huolu before moving the expedition to the small farm village of Er Wang Dong, located to the west of Huolu. To date, most HMG expeditions to the Houping area have concentrated on entrances near Er Wang Dong village, most notably San Wang Dong (28.8 kilometers of mapped passage) and Er Wang Dong (25 kilometers of mapped passage). Although these two caves represent a small fraction of the total karst area in Houping, they are some of the longest mapped caves in China. San Wang is the most westerly and larger of the two caves, comprised primarily of upper-level extremely large paleo-phreatic passages, including features such as the 34,052 square meter Dancing Elephant Troupe chamber, and the 10,220 square meter Old Department Store chamber. In contrast, Er Wang is relatively modestly sized with most of the passage comprised of mid-level phreatic and lower-level vadose development.

(continues on next page)

... CHINA 2008, continued from page 9

A type of loach never before located in San Wang Dong was discovered on this expedition. Photo by Jean Krejca

The second half of the expedition involved multiple attacks at San Wang Dong and Er Wang Dong, with the ultimate goal of connecting the two caves. There were three main areas of survey in San Wang Dong, the "Shattered Stream" survey, Shi Wang Tiankeng, and the most exciting lead entitled "Inconclusive" which had a fairly strong draught. Three teams went out everyday into the two caves, and the leads kept multiplying. Shattered stream eventually connected with another bit of passage in San Wang Dong, and the tiankeng leads kept multiplying beyond the abilities of the expedition to hunt down a resolution for each one. These leads, however, are not heading into blank space on the map-- nor are they headed towards passage in Er Wang Dong like the inconclusive lead! Duncan Collis led a team into Inconclusive almost every day, cumulating in an overnight trip bagging 1,741 meters of survey still following a very strong bit of air.

The first expedition for 2008 got the year off to a great start for the Hong Meigui Cave Expedition Society. Fifteen new caves were mapped and one promising new cave was located and will be mapped in the future. While the connection between San Wang Dong and Er Wang Dong was not made on this expedition, 4,750 meters of new cave passage was mapped in both caves with an exciting lead pushed 2,195 meters by Duncan Collis and his teams. A total of 9,149 meters of cave was mapped during the entire expedition, and several interesting specimens were sent off to the Kunming Institute of Zoology for analysis. A stiff breeze still awaits cavers in massive passageways of Er Wang Dong and San Wang Dong, with the promise of connecting two of the longest caves in China!

Thanks go especially to Erin Lynch and Duncan Collis, as well as to Dan Nolfi, Andrea Croskrey, Jean Krejca, Charley Savvas, Nancy Pistole, Rick Yan, Matt Ryan, Rob Garrett, Nick Whittingham, and Matt Oliphant for their time in editing this piece, the photos, and the fun! Our special thanks to the National Speleological Society for providing a portion of the funding for this expedition through the International Exploration Grant, and to the following for their kind support: the Ghar Parau Foundation, the China Caves Project, Andy Eavis, the Institute of Karst Geology, Guilin, the People's Government of Wulong, the Wulong Administration of Scenic and Historic Interest, the friendly people of Wulong, and of course the ever-hospitable Wang family. For more information about the Hong Meigui Cave Exploration Society, please check out our website http://www.hongmeigui.net/.

Large leads loom in the bottom of Shi Wang Tiankeng. Nancy Oliphant visible in background, right. Photo by Jean Krejca

Cave Madness And Karst Landscapes

By Louis Hoock and Karen Michael
GEOL301

Abstract

Cave Song
By Louis Hoock

Archeology… Formation… Exploration!

"The difference between a scientific expedition and an adventure,
is the amount of information brought back."
Bill Stone, Caving in Mexico

Caves are cool… hey hey, hey hey
They are the place to go… to escape the world
No one can see you, in the cave
You can't even see horror around you
Spikes from the ceiling!
Pudgy sticks in the pits!
Guano on the ground!
There are stalactites and stalagmites,
No rescue, so be careful,
And if you are,
You can sleep all day,
No need to go out and play,
There is no rain,
But it drips all day… hey hey
High pH, so good to drink
Wipe off your moon milk mustache,
And beat a cave pearl,
Or play a soda straw
You could find a beetle, bat, or bear
Blindly bumble, beneath the bottom
No need to bundle, for there is no temperature change
That's good for brewing beer
Watch out for the bear!
Beneath the world, under the ground
It's so quiet,
I make all the sound!

Introduction

Karst is an important geologic land coverage. It supports some of Earth's most rich and dynamic ecosystems. Caves often form, although very slowly, in karst terrain. They have many ancient features and spectacular formations. Additionally, cave systems can house a wide range of inhabitants, including: bears, bats, insects, bacteria and much, much more. Research is even being conducted in southeast Alaska on a certain cave bacteria that may hold the key to cancer (Baichtal 2007)! Caves can also hold clues to early human migration; even occasionally housing preserved bones of ancient mega-fauna. This helps scientists in determining historic ecosystems or imagining what past climates may have been like. Since caves are generally very stable systems, they change very little in thousands of years. It is in this way that caves of the world and the karst where they develop are especially sensitive, and must be protected from any extreme human impact.

Karst landscapes are shaped by the dissolution of soluble rock including: limestone (CaCO3), dolomite (Ca,Mg(CO3)2), gypsum (CaSO42H2O), rock salt (NaCl), sandstone, and marble. Karst can dissolve into many different formations above and below the ground. Above ground features include: dolines, cockpits, springs, sinks, sink ponds, poljes, grikes, towers, pinnacles, cones and assorted kluftkarren (Ford and Williams 1989, White 1988). Caves and their interior elements dominate those features found below the surface and their location is influenced by several variables. Although many caves form in karst landscapes, there are also some that form through various other processes in various other mediums.

The subsurface voids and internal cavities have many magical features and spectacular formations created by underground geologic and hydrologic processes. These features include: stalactites, stalagmites, soda straws, flowstones, curtains, draperies, moon milk, helictites, cave pearls, cave popcorn, rimstone dams, dogtooth spars, and columns or pillars (Ford and Williams 1989, Waltham 1976). Due to their role as huge sediment traps (Ford and Williams 1989), various other source materials have been found to create incredible decorations seen in caves such as fluvial sediments and bat guano. Some

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may even consider the weird and astonishing trogs, or cave dwelling biota, a fascinating feature in cave systems as well.

Many people are enticed by the mystery and variety of caves and karst landscapes. Their exploration is an exiting field involving: satellite imaging, dye tracing, hiking, climbing, mapping, and for the cavers, rappelling into Earth's underworld abyss. Exploration of karst is an important way to further our understanding of this amazing geologic land type, the diversity of its inhabitants and the existence and uses of ancient artifacts. Entering the bowels or mouths of Earth is a task, which is extraordinarily dangerous to the adventurer and possibly destructive to the fragile environment. Therefore, an immense amount of safety, thought, and consideration must be done before embarking on any cave exploration.

Exploration can provide an inventory of locations and features of karst and caves. This helps significantly in managing the resources provided by them. Effective protection of cave systems is important to preserve their extraordinary formation, biologic diversity, hydrologic and archeological importance as well as the lives of inexperienced cave explorers (Streveler and Brakel 1993).

Productivity

Karst systems are important as productive ecosystems. They can be a geologic medium for beneficial hydrologic functions. Karst landforms composed of calcite or dolomite generally increase acidic precipitation (generally pH of 5.6) to an average pH range of 6.5 to 8.9 (Ford and Williams 1989). As water moves through the karst landscape, dissolution of the minerals also increase nutrient content, providing rich water for organisms that depend on it (White 1988). In a presentation given by Jim Baichtal (2007), a southeast Alaskan geologist, he reported plants growing on karst were found to be larger and healthier due to the increased nutrient content of the water. He went on to say that animals generally prefer lowland karst plants to any other food available. Additionally, the diversity of such plants is found to be very high, attracting a great diversity amongst the many herbivores, carnivores, bacteria, and insects that utilize this food source. For those organisms, living within the mineral rich waters, most are found to be robust, and karst-fed waters support some of the most prolific salmon fisheries in the world. Timber growth is also productive, markedly in the lowland areas, resulting in large, old-growth forests. Although alpine and sub-alpine carbonate areas exhibit relatively poor production as opposed to the lowlands, both are luxuriant ecosystems with high commercial and habitat value (Streveler and Brakel 1993).

Formation

Karst landscapes possess a vast range of formations, and are commonly caused by the dissolution of limestone, gypsum or other soluble rock. Dolines or sinkholes are common to see in karst areas. Poljes are depressions surrounded by steep limestone mountains. They're usually larger than other sinks and contain a flat, sometimes alluviated bottom (Ford and Williams 1989, White 1988). Another interesting effect of dissolvable bedrock is the formation of pinnacle, tower or cone karst. All three form by differences in rock solubility relative to other rocks in the vicinity, but are divided by the shape of the resulting relief (Gunn 2004, White 1988). One of the most interesting formations in karst topography lay below ground and provide openings to Earth's strange and mysterious underworld.

The locations of these karst features are influenced by multiple variables. Areas with greater dissolution rates will generally be sites of cave development. Muskegs can influence the rate of rock dissolution by providing acidic percolation (Allred 2004, Streveler and Brakel 1993). Organic soils have also been found to increase dissolution rates due to the formation of carbonic acid in soil organic matter (Allred 2004). Tectonics plays a role in the location of caves too. Areas with faults provide fractures for water to flow through more easily causing a direct route for cave development. Once developed, the uplift by relief of massive pressure exerted by ice, known as isostatic rebound, allows the water table to drop, expanding the cave. Isostatic rebound can also influence size and locations of caves not of dissolution origin, which are many.

The development of caves can occur in multiple ways besides that of dissolution. Caves that form within glaciers are often composed entirely of ice. When water flushes down a moulin or sink point, into channelized flow, the water weathers new passages, and a glacier cave is born (Gunn 2004). They often form along ice crevices or where the ice meets bedrock, but often times their existence is brief. Another type of cave formed by weathering processes is termed littoral caves, better known as sea caves. Pure force for extended periods of time on rocks with weaknesses such as a: fault, dyke, variable hardness layer or bedding-plane parting (Gunn 2004), can produce caves in coastal areas by wave action. Once fractures are made within sea cliffs,

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CAVE MADNESS AND KARST... Cont. from page 12

the mechanical erosion force increases due to the compression of the air within the cavity and by the same force being applied to a smaller area (Gunn 2004). Some of the largest caves in existence are ones formed from molten rock. In Hawaii, the Kazumura Cave is 32km from end to end, ranges to 1100m vertically and is composed entirely of lava (Gunn 2004)! The process by which volcanic caves, or commonly called lava tubes, form is very interesting. Typically, low viscosity pahoehoe basalt begins to and eventually completely cools to form a ceiling on a lava conduit, allowing more lava to continue flowing through the bottom portion of the channel. The resulting caves usually include evidence of the molten liquid movement by striations on their sides.

Features

Most of the spectacular decorations within dissolution caves are formed from the precipitation of calcite in solution as it flows on, through, or around the perimeter of the cave. Aragonite and gypsum are the second and third most common mineral precipitate in cave decorations, respectively, and all deposits are termed speleothems (Ford and Williams 1989). The most notorious formations, stalactites, actually start out as thin little tubes termed soda straws. As drips fall off the ceiling they leave behind minerals to produce the sides of the tube allowing water to continue to flow through (Ford and Williams 1989). The drips can then begin to develop the stalactite's column-building partner, the stalagmite. Depending on the slope they may run off instead, forming general floor or wall coverings called flowstone (Ford and Williams 1989). It is not entirely uncommon to see a soda straw on the ceiling above a huge stalagmite formation beneath it, like in England's Easegill Caverns (Waltham 1976). Often times the soda straw flow will become partially or completely blocked with organic material. This then causes the water to drip along the sides of the straw, forming the larger, more dominant ceiling feature we all know and love. The shape of either of these dripstones is directly related to the amount of mineral in solution. Once equilibrium is met the precipitation ceases (Waltham 1976).

Helictites are another interesting feature in the cave. Explorers and researchers in the past have thought that this gravity-defying, organically shaped formation was an odd cave plant. It was eventually determined to be just another awesome speleothem. Even today, the formation process associated with helictites baffles scientists. It is now hypothesized that due to the tiny tube in which the depositional water flows, they are shaped by capillary action moving the water by the "whims of hydraulics" (Waltham 1976); further influenced by wind patterns and earth tremors. Cave popcorn and pearls are cool features that form in saturated pools of water on cave floors. The popcorn precipitates out along the edges, and grows like a fungus on anything available. Some rooms within the Carlsbad Caverns are covered entirely with this decoration (Waltham 1976). Cave pearls form by a granule of sand or small rock becoming the nuclei for mineral deposition. As the nucleus circles in the pool, calcite will form evenly around it until buoyancy is lost and the pearl falls to the bottom of the pond. They are often perfectly spherical (Ford and Williams 1989) due to incessant drips constantly moving them (Waltham 1976). It is noted that cave pearls aren't of value outside the cave environment. They will dry out and crumble into a pile of calcite dust.

Biology

Cave biology, also known as biospeleology, is the study of "troglos"; cave dwelling organisms, that is (Gunn 2004). There are three main types of trogs: troglobites, troglophiles, and trogloxenes. Taxonomy identifies the aquatic variations of each with the prefix "stygo"; their classification is generally similar (Gunn 2004). Troglobites are organisms that remain in the cave their entire lives; with the absence of light they are generally blind and acquire no pigmentation, leaving them pure white in color (Waltham 1976). This amazing type of organism, once introduced to a cave, never leaves. It exists only in that particular cave, and though there are many biologically similar troglobites between caves, they are all diverse. Each troglobite evolves differently to their unique surroundings, developing their own distinctive adaptations (Gunn 2004, Streveler and Brakel 1993). An advanced cave salamander, Proteus, sits atop the cave food chain and has evolved to give birth to live young when the temperature is above 15 degrees Celsius and lay eggs when it's colder (Waltham 1976).

The second type of trog is the troglophiles. These organisms also live in complete darkness, but may exist both in and out of the cave. This class of beings includes fungi and burrowing insects called hypogeanic organisms, or soil dwellers. It's been found that much like the distinct adaptations of the troglobites, troglophilic anthropods have longer antennae and legs as opposed to their above ground counterparts (Gunn 2004). It's also been discovered that the legs of many

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troglophiles are less waxy than other epigean creatures to facilitate the removal of water, since caves are typically of high humidity (Gunn 2004).

Finally, trogloxenes are organisms that enter and exit the cave, primarily using it for shelter. In southeast Alaska, Jim Baichtal comments that some solution caves and littoral caves have been used as dens for both wolves and river otters (Streveler and Brakel 1993). Additionally, at least one cave on Admiralty Island is used for a resting spot by hibernating bears (Streveler and Brakel 1993). One biologically important trogloxene, in the provision of biogenic substances or guano, is the bat. Many of the before mentioned trogs depend on mineralized bat guano for food and nutrients (Waltham 1976). Without this vital resource, the independent cave food chain would not be able to develop. In a video interview about the integral cave creature, John O.Whitaker PhD, attests that the bat is the only mammal that can fly. He goes on to say that most hibernating creatures wake up very slowly, but bats wake up easily and quickly. It has been theorized that the reason they hang upside down is so that they may quickly drop if awakened, almost instantly, giving them a high enough speed to elude any predator. They too have adapted to cave conditions and use sonar or echo location to navigate and find their own food. Bats are generally termed habitual trogloxenes, whereas bears and even humans are called accidental trogloxenes.

Archeology

Humans have been stumbling about caves since the first half of the 19th century. It was the systematic excavation of caves that dawned the field of archeology and developed the notion of "human antiquity" (Gunn 2004). Caves are ideal environments for preservation. They typically have minimal internal temperature changes and artifacts become buried by debris, hidden from all disturbances, even light, until a spelunker or archeologist befalls it (Waltham 1976). The discovery of such artifacts has provided clues to early human characteristics and activities. In the Dead Sea area of Judea, people of the 3rd century considered documents to be sacred treasures and thus hid them in wilderness caves of Khirbet Qumran. Over a thousand years later, in 1947, they were found perfectly preserved, and called the dead Sea Scrolls (Waltham 1976).

Besides human history, caves can bring insight into the history of climate and biology. Since many caves form at different time scales, it is common for radio carbon dating to be done on select cave features to provide an estimate of a cave's age. Understanding the rates of cave formation helps scientists to understand geology and climatology of the area. For example, Dan Monteith discovered preserved brown bear remains in a cave on Prince of Wales Island. After radio carbon dating the bones to over 10,000 years old, scientists were able to conclude that the ecosystem was much more diverse and productive than previously thought; since it was apparently able to support such mega-fauna.

Exploration

Cave exploration is a methodical process requiring technique, gear, skill, and experience. Psychologically, cavers must be calm, cool, and collected. They must keep in mind the extreme potential for serious injury, but not let it get to them. Because cave exploration is associated with many dangers, a large safety net must be constructed. It is absolutely imperative that several members of the group be medically trained with a bare minimum of EMT Level 1 or Wilderness First Responder. Ideally, everyone should possess some level of emergency medical training. Simply the ability of a cave team to function well as a group may mean life or death for one or all the members.

In addition to adequate safety response and group confidence, traveling underground often requires many advanced rope skills. Every caving expedition should have at least one rope expert. However, that is not enough. All members must know the fundamental techniques, like: rappelling and ascending a rope, building anchors, and tying of the basic set of climbers' knots. These knots include the figure eight, clove hitch, prussic, water knot, tension releasing combination knot (TRD), double butterfly and double fisherman. Everyone in the caving party should be proficient with pulley systems and understand when and why to build each kind.

The gear required for caving strictly depends on the cave and the group. In general, caving is a gear intensive activity. For individual spelunkers, everyone must have their own: harness, belay device or rappel device, lights, carabineers, and helmet. Group gear includes: a substantial amount of rope, anchor material, pulleys and tubular webbing, Plus, depending on the mission of the expedition various scientific devices, notebooks or cameras. Any caving group must also bring the required gear to perform a self-rescue.

Most importantly, in the world of the

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CAVE MADNESS AND KARST... Cont. from page 14

underground, it is you, and you alone, as your own rescue party. Groups like Juneau Mountain Rescue, SEADOGS and local fire fighters exist, but it is unlikely that they will have the adequate training, maps, or equipment to perform any rescue in a timely fashion. Plus, the response could be days. If a rescue team is in the cave searching for you, the individual rescuer has already prioritized their life as number one; their team members' lives as number two, and your life as the least important, no matter who you are. That is in their training! For this reason, it is reiterated, team safety in the caves is critical to survival. Before beginning the expedition, all members must be briefed on emergency response, establish an order of command and ask all questions they may have. This all sounds deadly serious, and it is, but that is not why cavers cave. Really, they cave for fun and knowledge...

Conservation

Increased knowledge of karst and their caves results in greater management or conservation of the area. Map making and careful inventory of cave locations becomes an important tool in avoiding irreversible damage (Streveler and Brakel 1993). Delicate cave features or biology dwelling within the cave should be prevented from contact with humans. If already exposed, efforts should be made to decrease negative impacts and focus on protecting those areas still pristine. All scientists and explorers should be aware of techniques to reduce the human ecological footprint (like developing a Tyrolean traverse). This is when a horizontal rope system is set so that no foot actually touches the cave at all. Some tourist caves in Europe have set up a permanent Tyrolean traverse to continue the features from increased damage.

Due to the increased productivity of karst landscapes, many areas are already in peril or are targeted for future logging. Timbering and the resulting road inputs have proven detrimental to karst ecosystems (Streveler and Brakel 1993). It is in this way that the Tongass National Forest in southeast Alaska adopted the Federal Cave Protection Act of 1988. As written in the Forest Service Manual, implemented policy is to "manage caves as a nonrenewable resource to maintain their geological, scenic, educational, cultural, biological, hydrological, palentological and recreational values" (Streveler and Brakel 1993). Many are still fighting for increased protection of the land, since logging projects are still approved in many karst areas .

Conclusion

In conclusion, continued cave conservation is important to the preservation of these spectacular karst features. Furthering our understanding of the productive qualities and resulting flora and fauna can help provide insight to important nutrient cycling and vegetation succession. Many types of caves and features exist making them a unique addition to our environment and an enticing area to explore, carefully. The biology that depend on them can prove beneficial to our own well being, like the possible cancer curing bacteria, so every effort should be put forth in their protection.

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