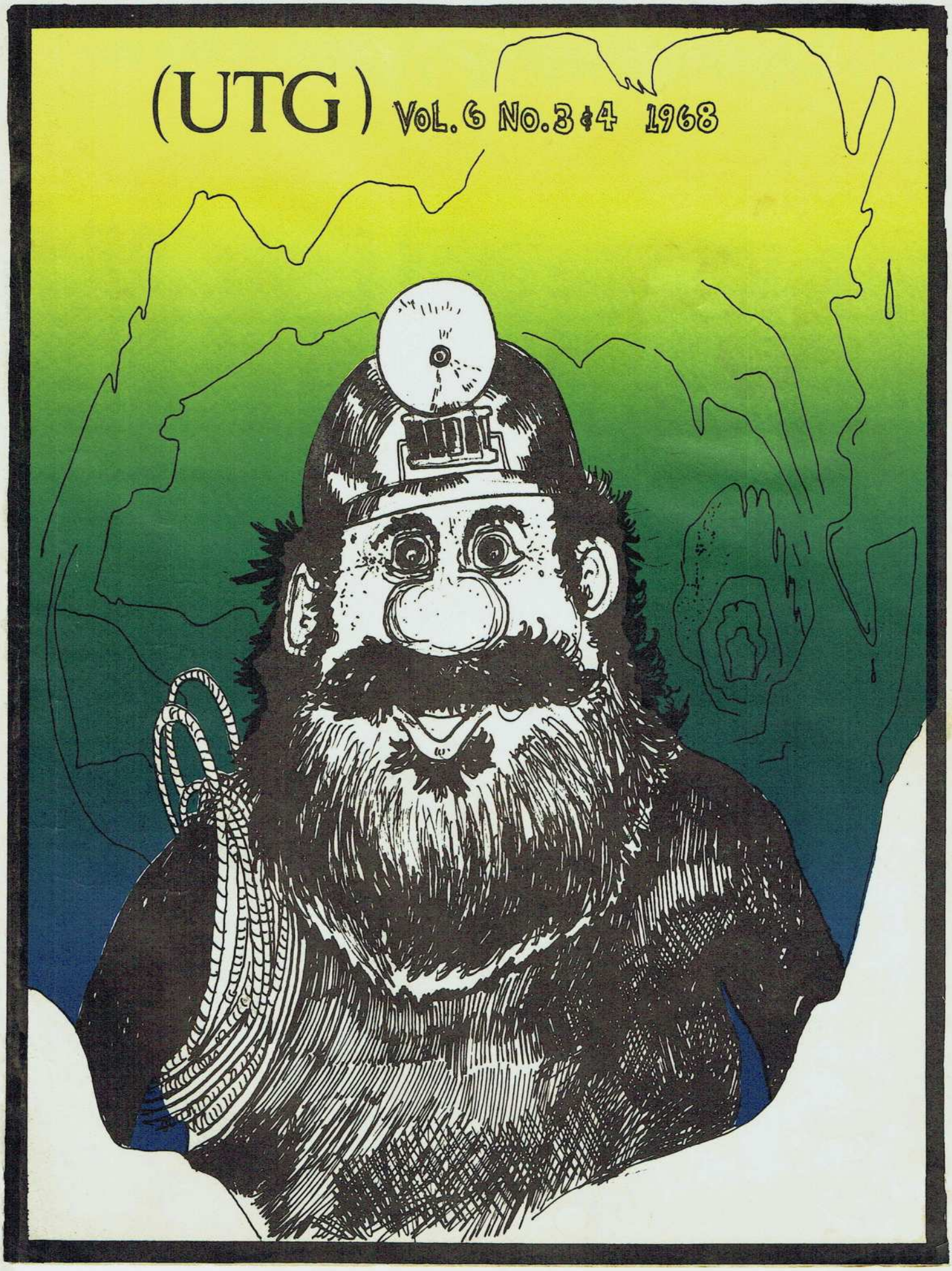
(UTG) Vol. 6 No. 3 & 4 1968



Recent meetings have provided very interesting talks to members of the club. Last meeting, prior to the Spring Vacation: Dr. E. Mott Davis lectured to the members on archaeology and caving. The old adage that we leave nothing but footprints and take nothing but pictures applies here also. When in your travels you come upon some ancient relics or artifacts, chronicle their location and what they are but leave the digging and collectlng to those who know how. Who knows they may be able to find, another Piltdown man or maybe a Wonder Cave man, a missing link in that chain of history.

****

The UTG Newsletter is published once in awhile by the members of the Univ, of Texas Grotto. This name has been changed because the board of REGENTS is unable to. . . . (well anyway). . . . . Anything here in can be used by anybody that wants to and if they don't we don't care. Address all mail to UTG office of the EDITORIAL RESEARCH BOARD STAFF. ATTN? Editor or Editorial Ass. 706 Upson, AUSTIN, TEXAS Z I P C 0 D E

****

The TSA convention will be held soon in Kerrville, Texas, plan to attend. We haven't made a good showing since the one in San Angelo when the TSA board wanted to kick us all out of the region and censure our members for evil deeds. . . . Yall come its fun to fight with the EAGLES. . . . .

****

Scan and OCR, January 2022, by William R. Elliott

SOME THOUGHTS ON SAFETY

First, let me state that I oonsider myself very well qualified to write this article, not having commited any crimes against cave safety in well over a year.

Cave safety practices consist, in the main, of familialrity with your equipment and its use, knowledge of your own capabilities and limits, and practical application of your common sense, if available. Also, since it is unwise to cave alone, a large measure of consideration for those caving with you is strongly recomended.

In view of the fact that caving is, by nature, far too varied a subject to enable every possible situation to be covered, I shall attempt only a review of the standard rules which have application in all caves.

1. Never cave alone. (Look what happened to Moishe Dayan.)
2. Always have the following; equipment:
   a. one artiole of protective headgear per head.
   b. three Independent sources of light per pair of eyes.

   Beyond this, the individual cave will dictate what additional equipment will be necessary. (Examples would be: climbing gear, protective clothing, inflatable rafts... and the list gets wilder and wilder.)
3. Don't get lost. This has been thought of as one of the major dangers of caving since lod "Injun Joe" got lost in that cave that I can't remember the name of. Several methods have been devised to help the caver retain his bearlngs.
   a. Arrows - generally frowned upon by conservationists.
   b. String - experienced cavers usually shy away from this method. Aside from its more obvious drawbacks, it looks silly.
   c. Bread crumbs - watch out for voracious cave crickets.
   d. Compass - generally the handiest, providing the cavers is familiar with local geological factors, such as the existance of oertain types of mineral deposits.
   e. Dead reckoning - the name always bothered me.
4. Don't get hurt. This, in essence, is what cave safety is all about.

By way of an afterthought, perhaps some of you are ourlous about the secret of my success. Well, I don't go in oaves anymore. It's far too risky a businass.

EDITOR'S B.S. (BIG SENTENCE)

In the past six months since the last Newsletter a lot has happened in the club. Recently there was the election of new officers. The election was as usual. Elected President: William Russell.

Bill is a life member of the UTG. Bill is well qualified as was twice President Orion Knox. Orlon was recently married (this info for those who didn't know). Bill is a member of Balcones Grotto and N.S.S. He just finished editing with T. Raines the AMCS Newsletter. Bill's wife Carol was elected research chairman and will take over the job vacated by M. Turner who has passed into oblivion.

Assistant Chairman is J. Davis. J. Davis hasn't done anything too noteworthy; in fact, neither has William. J. has done lots of digging holes, looking for bone things and pots.

Other officers elected...Strickland and Juan Pescado. A new caver has broken the oligarchy ice. Karen Mitchell had been delegated secretary by acclamation and Jerry Broadus is now treasury officer..

Then, too, there is the office of club speller...T. D. Plemons. Still club Chingashgook — Richard Smith. He is the super duper hero who recently tied the knot of bondage with Reva Ba... Buy... Bie... Bee... Biyer... Byer... Baye... B....*%

William Davin Bell's and C. Loving and Fiat Lux now have Land Rovers.

A note on the three. At this moment things don't look as glum as they did. We may all rejoice soon.

And now there's the last trip I took. I believe it was the greatest tea drinking trip in the history of the club, even though a certain Mead snuck in some Madero Cino Equis Brandy.

Persons — J. Mead, B. Mead, R. Smith, R. Ralph, K. Mitchell,C. Loving, K. Mithcell, Fiat Lux, and crew, two Mead helpers, the Berghershers, P. Winsborough, P. Price, S. Price, T.D. Plemons, and G. Green. All these folk went to Carlzal or Karryczal. In Mexico. All this was a good trip. Lots of fun and grins. Not much in the way of caving done

We did. the Mead & Berghershers found that the syphon was cleared out by the rain and much passage is there. We neglected to follow up the lead due to great problems of having too much to drink. We finally drahk it all up and went home.

Be sure to give help to Juan on the TSA convention site. He will need help, I am sure. The convention will be held in Kerrville, Texas. This will be a real gas, I'm sure? I'm sure there are caves around Kerrville.

Attention Cave Photogs. There are places for you in the TSA salon and in the NSS thing. Enter early.

Love, Old Man Wisdom

Editorial No. 2

Baltazar Rascoe and I were talking the other night about the direction caving was taking. In view of recent events it seemed that the future was rather dim. The hard sell spelunker ecruiting of a year ago had vanished and we were back down to a hard core of fanatics. These fanatics were completely out of it.

We got the idea that if you eat in the Chuckwagon long enough you would either die of food poisoning or at least from boredom. It is impossible to talk about nothing but caving 365 days a year; but evidently the hard core are quite capable of this.When the Chuckwagon closes they talk about caving on the phone—long distance even.Like old hens they rant and rave. Why not talk about sex or something interesting like that.

Sex... "Did you know that the male albino cave cricket is sterile?"

"Huh?"

"Yes, and all the female albino cave crickets are emasculately concepted.""

"Huh?"

"Yes, and the same is true of the albino red-finned fish; which reminds me of a story.. We—-John Bass, Louie Red Dill, Zeke Smith— were down in Tangre over Thanksgiving, back in 1943..."

"Moan."

Where are they Now?

Fred Sawin: The fellow that fought sco-pro for twenty-seven years and then by some fluke got his PhD.. Sawin--caver extra-ordinary. Was able to drink more beer in less time than most ordinary cavers. In the spring of 1946 Fred went caving for the first time in Comal county. After falling 56 feet into a deep pool. Fred decided to retire to beer drinking and female chasing- In the latter he failed and was caught. Thusly ends our story. Fred is now a cop, a PhD cop in Dallas. He will soon be issued a real gun with real bullets.

Bud Frank: Now living in Australia, going to the U.of Australia. He was a fanatic cave biologist,. One of those persons who was unable to talk in the morning until 11:46. One who owned an old finky pickup. Life member of the club, Bud was able to talk about caving for hours and hours and thusly joined the ranks of the order of the Great Golden Wizard of Balderdash in Chuckwagonology.

The Great Golden Wizard of Balderdash In Chuckwagonology.

1. A. R. Smith
2. John Fish
3. James Reddell
4. Bud Frank
5. Bill Russell

The order of Not do.

1. T. D. Plemons
2. W. D. Bell III

Caver Killed In Breathing Cave, Va..

On Sunday, May 28 [1967], Joseph L. Chiara (age 15) of Harrisburg, Pa., fell to his death on a routine trip through Breathing Cave, Virginia. Joseph was not a member of the NSS but had been caving for about one year with the York Grotto and had gained much caving experience during that period. He was accompanied on this particular trip by five members of York Grotto.

The group was taking the upper route through the cave which leads along a high-level ledge above the Cathedral Passage. It is a standard route and a safety is not generally used unless inexperienced people are along or it is requested. In fact, the accident occurred before the more difficult portion of the route had been reached. No one actually witnessed the fall, but it is thought that the boy's foot slipped off the rock ledge he was standing on while he was possibly changing position from facing inward to facing outward.

The accident occurred at 2:00 p.m. and just beyond the Lemon Squeezer. Joseph fell approximately 50 feet to the floor of the main passage, roughly 1300 feet from the entrance. He landed on smooth flowstone. Injuries sustained during the fall included: fractured skull, broken neck, fractured wrist, dislocated left leg, and possibly a broken rib. Internal injuries were also indicated by bleeding at the mouth and both ears. He died approximately two hours after the fall and never fully regained consciousness. The actual cause of his death was not determined.

Joseph was wearing a hard hat and chin strap. His hat stayed on during the fall but became pushed forward, allowing an unprotected blow to the back of his head, The hat also acquired a crack on one side, all indicating multiple blows to his head during his descent.

While some of the party remained with Joseph, others left the cave to obtain help. The first call made was to the Field House since it was known that Jerry Nettles and other cavers were present there. The second call was to Jerry Frederick in Vienna, Va., who obtained medical aid and additional assistance by use of the Virginia-West Virginia Cave Rescue Communication Network. The third

call was to the Virginia State Police who were very cooperative and kept publicity to a minimum.

Dr. Warren Brown (NS3 7773) of Charlottesville, Va., arrived at the body by 7:00 p.m. Removal of the body started at 7:30 p. m. and was completed at 11:30 pm. It was taken to the McLaughlin Funeral Home, Hot Springs, Va. and hence to Harrisburg.

Joseph was a sophomore at the Central Dauphin East High School. He was the only son of his parents who,while bereaved at his death, accepted it as philosophically as possible under the circumstances» They told the members of York Grotto that he always enjoyed caving and that was what he wanted to do. It is a pity that the sport has lost this young caver so early in his life.

NSS NEWS
August, 1967
Vol. 25, No.8

Val Verde Co.: Thanksgiving Break

Karen Mitchell, Susie Loving, John Holstrum, Will Cowan, Rick Remington

All of us entered Will's Chevy with a lot of gear for swimming the Rio Grande and hiking along the other side to look at pictographs, at dusk. After many hours we arrived in Del RIO, Gateway to West Texas, and the house on Lake Walk. Since we slept on cold concrete amidst the scurrying of many small feet the dawn in color was nice, especially for Susie, who slept on the top step of a stairway that ended abruptly in the lake. For breakfast, coffee, we went to Mack's Cafe in Comstock. Next stop: Langtry.

After much discussion our packs were finally ready and we began to walk toward a crossing of the Rio Grande at the mouth of Mile Canyon. Part way to the river Guy Skiles told us that during deer season we were not welcome. Upstream to another place without our packs. We five looked at the Boundary and Water Commission's cable across the river and discussed the feasabillty of melting the lock which secured it with thermite or another hot thing. It was decided against so we scrambled to the bank and thought about the river's bigness, wetness and coldness. Upstream again and across on a rope fixed by Will.

The other side (Mexico),is an area of limestone cliffs with many small and a few large shelter caves in which we hoped to find pictographs. Climbing among the rocks at the base of the cliffs we picked up a few dart points on the surface and finallv found a large shelter with an important new site painted during Archaic times by a hunting and gathering people. The pictographs are polychrome red, black, yellow and intermediate hues in anthropomorphic designs. This type of painting is called Pecos River Style. As the sky darkened we again went down to the river and thought about it, but swam across sooner than the previous time. It was dark by the

time we reached the car so we went to Del Rio. After a Thanks-giving dinner of tuna fish sandwiches we visited Sally Cave, four miles west of Del Rio on Highway 90. This Isa large, mostly unmapped maze cave. We descended *a* long chimney and watched several blind salamanders with semi-transparent bodies and spindly legs swimming in a pool. Pipistrellus and Myotis, two common Texas cave bats were flying around in the upper levels of the system. *We* slept comfortably in the Esquire Motel until leaving for Terrell Co., and some bat caves we had heard of near Dryden. It was deer season there also so we weren't able to see any caves; though a fine Golden Eagle sailed around us for what seemed a long while. Also some ring middens, a few, verv vague pictographs, a sunset and a fox.

From Dryden to Langtry to the Pecos crossing north of Langtry, or rather an island in the middle of the river where we spent the night. In the morning we visited pictograph site 41VV241, which is downstream from the crossing at the base of a high cliff. The paintings there were probably done during Neo-American times, around the time of Christ. Upstream to another site and then to Fort Lancaster, near Sheffield, Pecos Co. The fort was built about 1850 and occupied for the early part of the Civil War. Foundations of many buildings and some broken artifacts lie about. Here, as with many archeological sites in Texas, pot-hunting has been a scourge.

To the Caverns of Sonora where Karen went through the cave while the rest of us watched the effect of dusk upon the many caged animals next to the parking lot. Without any money we left for Austin and food.

El Sotano Del Tigre, etc. — lies and distortions by Mike Collins

Over the Thanksgiving holidays, four intrepid spelunkers set forth from this cozy bastion of education towards the amoeba- infested jungles of Méjico. The aim of the expedition was, in connection with AMCS Project #1, the exploration and mapping of as many caves as possible around Ciudad Valles, S.L.P.

The group consisted of Juan Pescado (alias, John Fish), Marsha Meredith (secretly the illegitimate daughter of Meredith Wilson, cleverly disguised as Mild-Mannered-Marsha, your visiting folk- lorist (equals scandalmonger)), T.R. Evans (alias the spider, wanted by the police of Sarawak for smuggling of Peace Corps tee-shirts), and myself (alias, the author).

We were thrust onward at a constantly decreasing velocidad by the carro pescado, that is, as soon as we got it cured of diarrhea of the brakes and could get out of town. We carried enough rope to strangle a herd of giraffes, but since James Reddell had cap- tured Mexico's only troglobytlc giraffe the summer before in La Cueva de las Mentiras de los Gringos Caidos, we weren't very worried.

Altho the Jefe de Inmigración in Reynosa was skeptical of two bearded gringos accompanied by two non-bearded (Marsha shaves clean, T.R. hides his) gringos, we were actually in Mexico and pointed south before 4 a.m. We reached Valles that afternoon and went out to some caves near the Hotel Taninuil (Taninjuil; Tan— jujual??). While interesting, these caves are sort of Texas-sized. Cueva de Taninul (I checked) No. 4, however, is well-worth visiting. Located about halfway between El Abra and Hotel Taninul, it is about 2/3 up the northern wall of a 200', plus or minus, deep canon. There are Nine (nueve, nuef, etc.) entrances, most of them shallow, broad sinks from the ridge above. These form spectacular skylights and make it possible to visit the cave without a carbide lamp. (See pp 80, 83, AMC3 Bull.#1. A photographer (sound like bat wings as the five ears of Mills Tandy and Carl Kunath perk up) could go ape about two p.m., as each sink has inclined shafts of light falling on stalagmites below. We waited about ten minutes, staring at these, but neither Christ nor Buddha came floating down, we went to the back of the cave where several locals had dug a 50' shaft, looking for phosphatic earth or El Tesoro de Pancho Villa. Three men stood at the top of the shaft, raising, emptying and lowering large buckets of dirt and rock while several others sweated at the bottom of the ready-to-collapse-any-second shaft.

We went thru Valles again, heading north towards Los Sabinos and the Infamous Cueva del Tigre. AMCS members and hangers on had visited the pit twice before, but had copped out each time. No one had gone any deeper than the entrance drop.

We bargined with the Jefe at Los Sabinos to guide us to the entrance. The next morning the five of us set out into the jungle.

El Jefe led the way to the pit with T.R. and Marsha following, Juan and I at the rear with a braided 300′ length of goldllne over our combined shoulders. One of the kids in the village made some remark about a python. We ignored him. Ten-year old Mexicans are tough!

On our treck (four or five miles equaled 1 hour) to the entrance we met thousands of the locals. We soon became quite attached to them and they to us. We were able to get rid of them with para- thion powder provided by El Jefe.

The entrance to Tigre, like most in the area, is in an arroyo. However, the arroyo is only about 1/2 or 1/3 as deep as those of Cueva del Arroyo and Tinaja. This is, however, the only one with a spectacular pit-entrance. The first drop is about 170' then there is a slight offset to another 120' drop.

Because of recent, heavy rainfall in the area, a pool had formed at the bottom of the first drop fed by a waterfall from the overhang above. By carefully stopping Just above the pool, swing- ing back and forth and then jumping under the waterfall, one could get to the 2nd drop without getting too wet. Marsha didn′t. She went for a swim before continuing.

The room at the bottom is large, with two passages leading out, one to an unchecked drop, the other to the route we followed. This leads down a walking passage about 15' x 20', to a short

(35′ of rope) drop. Several scramble down drops come next, leading into slightlv larger passage.

About 300' from the drop, the passage splits, the larger passage going to the right, and two passages continuing more or less straight ahead. The left-hand passage is unexplored, but leads to a fissure which penetrates the passage above the 35′ drop. The right-hand of these smaller passages drops into a complex of joint-controlled walking size passages with a stream. We followed this passage for about 1500', in ankle to waist-deep water. It was still going when we quit.

We went back to the junction and followed the larger right-hand passage. This leads to a scramble down into a small pit formed as a plunge-pool for water from a passage which comes out at the ceiling, far above. This is probably the smaller passage off the entrance room. A fantastic volume of water must come in, as four to ten inch cobbles have been rounded and polished by it. It's like dropping onto a pile of black bowling balls.

Beyond this, another 30' drop leads to water passage. We stopped that first day at the top of this drop.

Marsha hadn't been too certain she could prussik much more than the entrance drop, so she had left us before the second drop. I was the first one up the short drop. When I returned to the entrance room, I found a comatose Marsha, sitting alone in the dark. She had returned to the entrance room and decided to rest a while before going out. Her lamp had quit, and since she had neither carbide nor water, she simply had to sit and wait the four hours the rest of us were gone. Her hallucinations were only mild at the time I found her.

After jumaing out, we stumbled thru the wet jungles, back to Los Sabinos and the car. We got back about 11 p.m., cooked *a* meal and died.

I awoke in time to throw up, much to the amusement of a herd of the local ninos. While the rest went to a cave near Xilitla, I lay in the carro, awaiting the end of the day.

Juan, T.R., Terry Plemons and Super Bounce went back to Tigre the next day. Marsha had joined me in death by Jungle Rot, so she and I stayed with the car and watched Karl Kunath take a trip to the bushes every ten minutes.

Bevond the drop, Tigre goes and goes and goes. The "Rice and Noodles" and upstream passages were each mapped for about 500' apiece, and explored for 1000' apiece. No end was found to anything, so start thinking about a trip.

Tigre reminds me of a Tennessee or Kentucky cave, rather than a Mexican cave. The connecting, multiple levels, apparently inde pendent stream passages, etc., all are more similar to a Mammoth Cave-tvpe of system than anything else. On a smaller scale, of course, Tigre has a lot of potential and will need many more mapping expeditions.

The next morning, all of us started back towards good ole U.T. at various rates of speed. Terry Raines crept along, followed by Dick Smith, as his transmission disintegrated. We got the Pescado-mobile within 60 miles of Reynosa before it suddenly became feverish. With the help of a truckfull of cactus-choppers and a friendly

bar ditch we soothed its brow, but noticed a slight knock in the engine. The knock became progressively worse as we crossed the border about 6 p.m. By nine that night, it became obvious that se serious things were about to happen.

If you've ever tried to find a garage in the middle of a Sunday night in a small valley town, forget it. We couldn't. After trying emergency repairs which didn't work, we called good ole, de dependable Richard Smith about 11 p.m. He drove all the way from Austin and picked us up about 4 a.m. I was back just in time for my nine a.m. class.

May El Gran Carro Pescado R.I.P.

Who: Barbara Scott, Mike Anderson, Frank Dupre, Bill Craddock, Mike McCaskell, Kirby McDaniel, Paul Zeisset, Gary Smith, Richard Cone, Butch Broadus, L.J. Eck, Ralph A. "Chip" Carney.
When: Nov. 3 to Nov. 5, 1967
Where: Attempted to get to Bustamante, Mex. Made it to McCarty Cave, San Marcos, Hays County
Reported By: Ralph A. "Chip" Carney

With the monster truck loaded with cavers, caving gear, the club carbide, a store's litter, misc. groad, a song and a prayer we left Austin at 6:30 Friday night. All went smooth until 15 miles north of Pearsall. Thunk! Grind, grind, grind. It was an unholy racket from within the bowels of the machinery. Investigation found the drive shaft carrier bearing bushing dangling a good foot from the bearing mount where it was suposed to live. We got out and got under. Mechanic motions persuaded the bushing to retun home. Onward all of a half of a mile. Thunk! Grind, grind,grind. Damn! Again we got out and sure enough.To hell with it. We slept. That is Eck, Broadus, and I slept. Judging from the noise the rest of the mob milled around in the back of the truck all night.

In the dawn's early light we rebuilt the offending carrier assembly with bailing wire, on to Mexico. On to Mexican injustice. It was some national holiday. Immigration was all but closed.

Trucks over one ton need a special form and that office was closed. "Come back Monday!" We couldn't seem to find the proper palm to cross. Neither could the U.S. Consul. As a matter of record the U.S. consul in Nuevo Laredo is Harvey Cash. His home phone (trouble always comes on holidays) is 2-26-20. That was that! We returned to Laredo and again rebuilt the carrier bearing—this time with new parts. The mob wandered about Nuevo Laredo. After a feast at the Alma Latina we headed horth to camp at the first roadside park. The area around Laredo is totally devoid of trees, firewood must be imported.

Waking to a fine morning rain we poured ourselves into the truck and slogged for home. We visited the owner's of Bracken Bat Cave but due to deer season we were politely refused permission to enter.

In desperation we went to San Marcos and McCarty Cave. Since we didn't know the owner we had no trouble entering the cave. Thus in the nick of time our trip became an honest cave trip. Everyone agreed that it was an interesting wav to travel.

Help! Have large two ton truck with a nice weatherproof van (box) on the back. We can haul up to 4,000 pounds per trip (more if sneakv enough). We need loads to haul to earn the payments. No job too small to consider, few too large. Call Carney at 1800 Rio Grande, phone 477-6219 after 6 p.m. Be the first to throw a moble partv. Surprise your professor by moving his house while he is away for the weekend. Moving possibilities are unlimited!

Why Go Caving?

Caving is not unlike the motive of the moron who banged his head against the wall because it felt so good when he stopped.

Every caver knows that a cave is never so much fun as it is in retrospect. He'll vow to himself as he lies shamelessly in a slimy pool of mud that he'll never—no never—succumb to such lunacy again. Back home, however, warm, dry and rested, he'll remember how great it was! That delightful long crawl through icy water, those moments of low ebb, when it seemed he was pruslkking into eternity—exhilarating! Superbly miserable!. What fun he'd had! Fun as he dodged the rocks falling from above, clawed at the rockface for a foot-hold, and fought to get his prusik knots over the overhang! He hadn’t minded at all missing lunch and supper; being cold, and tired. The mud on his candy bar and water sloshing in his boots hadn't really mattered; and his wet coveralls, well, they were a actually rather comfortable after the first hour or so underground!

The question is,"Why?" When he's there, underground, marveling at nature’s wonders—and the mud; surrounded by beautiful formations— and the mud; awed by the depths of the pit—and the mud; he wonders why... why doesn't everyone flock to caves? Why is it that he seldom finds anyone else there? And he stops to ponder, as he lies there. . .in the mud.

NSS NEWS
June,1967
Vol. 25, No. 6

Inner Space

People: M. Abernathy, B. Elliott, B. Miller, B. Peterson, W. Russell, C. Russell.

On the night of Feb. 15 [1968] we left for Inner Space, George- town, and were pleased to have with us Brian ("Bird") Peterson and Bill Miller, both of SWTSC caving club. Our purpose: check out a crawlway near the Chapel having a lot of wind and promising to lead on from the Mud Room to parts unknown south of Bone Sink. We wanted to see if it were possible to chip or shoot through the grovely thing later.

However, Progress was stopped just past Turner's Turnaround by high water — loads of it. Since the 6-8 inch rains last month this part of Inner Space has slowly filled with clear, standing water, which soon met the ceiling, or nearly. Turning around, we examined the lower left jaw of a Pleistocene peccary found by Bird on a previous trip. The bone is flaky but the teeth are hard and pearly white. Other peccary fragments seen before nearby were under a foot of water.

When the waters subside we intend to check out this part of the cave thoroughly — parts of it are no more than 200-300 feet from a surface gravity-meter survey which has indicated unexplored walking passages going south. We also want to map these parts where the water is so it can be seen how they trend alongside the sink.Much remains to be done at Inner Space.

- Bill Elliott
V. Ch., Inner Space Society

eeeeeeeeeeeeeeeeeeeeeeeeeeeeeee LETTERS TO THE EDITOR eeeeeeeeeeeeeeeeeeeeeeeeeeeeeee

Editor,
Upon returning from Denver, I found that I had been re-elected to an office in the U.T.S.S. and that subsequently the name had been changed to U.S.S. I appreciate the honor, and will do my best to serve the new United States Steel.

Jim Strickland

To the Editor:
Back in the good ole days I was a member of the U.T.S.S. — University of Texas Speleological Society. I have recently been informed that the U.T.S.S. has decided to call itself the U.S.S. — the university Sucking Sows, I presume.

T. R. Evans

Dear Sir:
I consider the following names to be more appropriate and more colorful than the present name, University Speleological Society (USS).

1) Acme Speleological Society (ASS)
2) Speleological Society (S3)
3) Society (S)
4) The Great Society (TGS)
5) No Name Society (NNS)
6) No Such Society (NSS)
7) Blah Speleological Society (BSS)
8) Hero Speleological Society (HSS)
9) State Speleological Society (SSS)
10) Caving Club (CC)

T. D. Plemons

From the Desk of Old Man Wisdom University of Saudi Arabia
Saudi, Arabia

Dear Editor,
Upon hearing that you have changed your name, I am apalled. — U.S.S. How can you almost use the initials of the Union of Soviet Socialist Republics? COMMUNISTS!

O.M.W.

Dear Editor:
Bill Russell is now king. What happened to democracy in the University of Texas Grotto? What is going on? Why was the total membership not consulted? What is this? If we are going to have a monarchy, it should be a Constitutional monarchy. More and more... (Portions of this letter had to be censored.)

George, Taco, Nurdoo, Blitz,
Omodoodoo, Murphy's Momy, Muffin,
Piltdown Hoax.

TRIP REPORT
Date: April 4-13, 1968
Persons: Joe Cepeda, Mlles Abernathy, Bill Calvert, Dennis Fortas-sain, Russell Hannon, Donna Lovelace, Jerry Broadus
Place: state of Guerrero, Mexico
Reported by: Jerry Broadus

One blow-out, busted muffler, cracked exhaust pipe, broken tie—rod, blown brake cylinder, short-circuited distributor, hole in gas tank, clogged fuel line, fire in engine compartment due to over- worked automatic transmission spraying fluid out all over the place..

That was most of our trip to Mexico. I thought I'd get that part over with first. We did get to do a little caving, though. We were going to Guerrero to try to find Grutas de Acuitlapán, reported to be the largest cave in Mexico, or so said the National Exploration Club, anyway.

At Acuitlapán one has no trouble finding a guide, but it is next to impossible to find one for a reasonable price—they're very used to cavers (from various Mexican clubs) in that town and know a lot of tricks to get your money. Anyway, Grutas de Acuitlapán is a sort of nice cave, but it isn't very big at all--about 3000 feet at the most. It's a little dry solution cave with a lot of nice formations—a lot like Palmito in Bustamante. It's also full of bats, bugs, and confetti. The confetti is nice and colorful, but it really doesn't help the looks of the cave too much.

We were making a location map when we found out we were near an upper entrance to one of Dos Bocas, a couple of real nice water caves. We were planning to take a trip through this one when Bill found a couple of guys from Exploraciones who told us that the cave we were after in the first place was known as Las Granadas, and they told us more or less how to find out about it, location and all. We were back on the trail of the largest cave in Mexico, etc.

Las Granadas was easy enough to find, and is a beautiful place. Water coming out of the entrance goes over several nice travertine dams and forms a beautiful 80 foot waterfall, with lots of nice travertine pools for a long ways down the canyon. It was a gorgeous place to camp and swim. The cave is pretty big although it doesn't look like it could get quite as big as either of Dos Bocas. When it floods, it does let out a fantastic amount of water. We got only back about 500 feet when we came to a big, very deep, pool of water at the bottom of a 15 foot drop. Miles swam the pool, and continued on in a 30 foot wide river passage until it got too deep again. Flotation gear will be necessary to explore the cave. In the passage we entered, the ceiling height varied from five to about thirty feet. It could, potentially, be quite a cave.

Well, we spent the rest of the time fixing cars, playing (and fixing cars) in Acapulco, and Taxco, and wandering around in Cacahuamilpa and the entrances to the Bocas.

POEM TO CHARLES I. LOVING PROM A SECRET ADMIRER

("Hail to thee, Blythe O.M.W.,
Bird thou never wert—")

I think that I shall never crave
A poem lovely as a cave

A cave whose hungry mouth is open
For countless cavers who come gropin',

A cave that looks at God all day
And sometimes looks the other way

A cave that may in Summer wear
a nest of batling in her hair
(so to speak)

Upon whose "bosom guano's lain,
Who indirectly lives with rain.

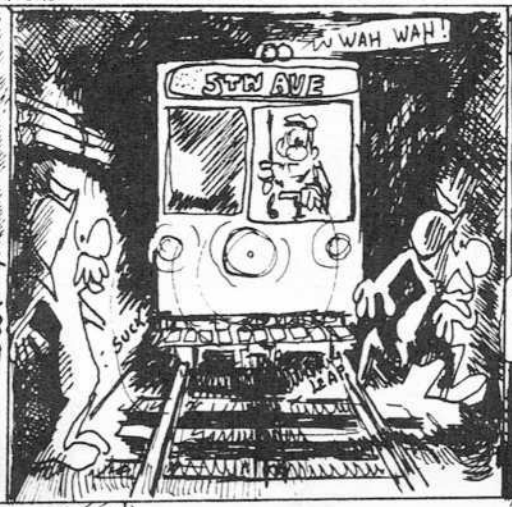
Poems are made by fools like me
But only God can make a cave.

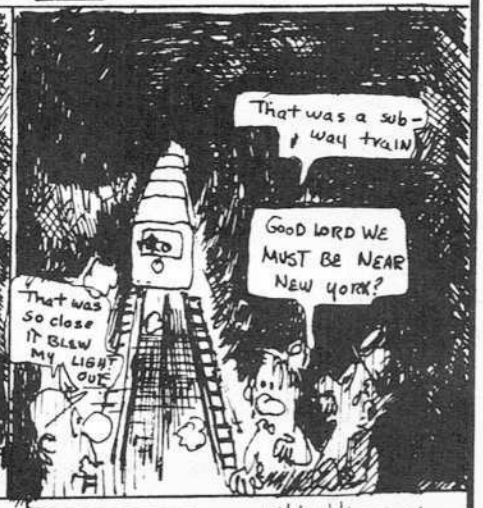
—E.P. Passionflower

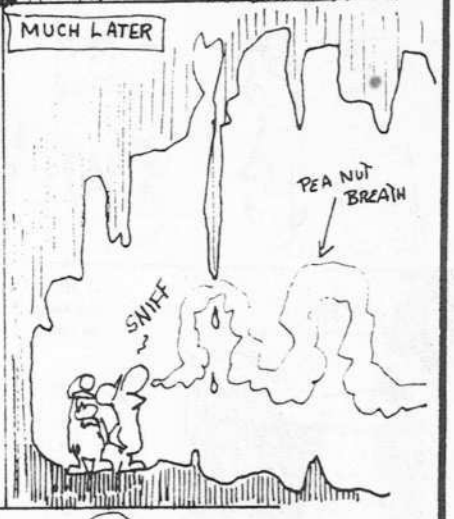
P.S. I think that I shall never envision
A Poem as lovely as Old Man Wisdom

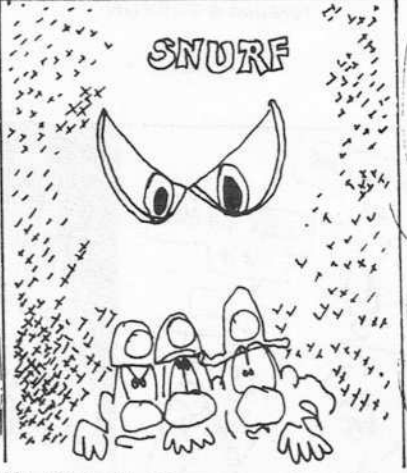
OLD MAN WISDOM

When we last left O.M.W. (if you can remember back that far) he, Nurdoo + Zephlin were having problems. They are still in search of the Holy CARBIDE LIGHT, AND they had just met a blinding light, AND said "GASP!" So now to continue this adventure and to introduce the arch villian- THAT NASTY ONE.....







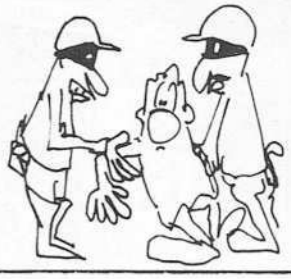


* E. MOTT BEING SOMEWHAT EQUAL TO CAVE CARSON OR ZEUS OR IS IT ZUES

MEANWHILE →

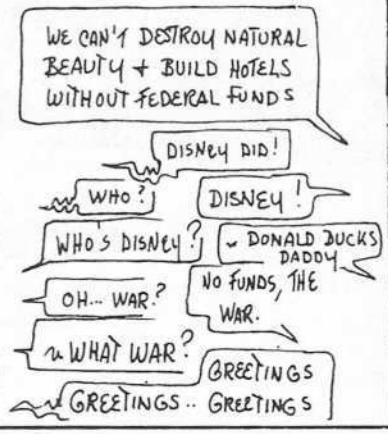
AND SO SUPER POLOGIST IS TAKEN TO THE VAL VERDE CO. JAIL..

MEANWHILE UNDERGROUND NURDOO AND ZEPHLIN ARE IN THE HANDS OF THE E.O. ORG.

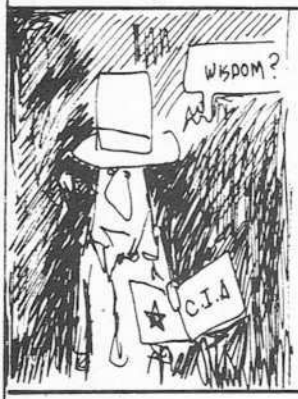


IF THIS DOESN'T SEEM TO MAKE ANY SENSE, TRY WRITING IT, thats EVEN MORE SENSELESS

MEANWHILE IN THE EVIL ONES PLACE ....



OLD MAN WISDOM OVERHEARS ALL THIS

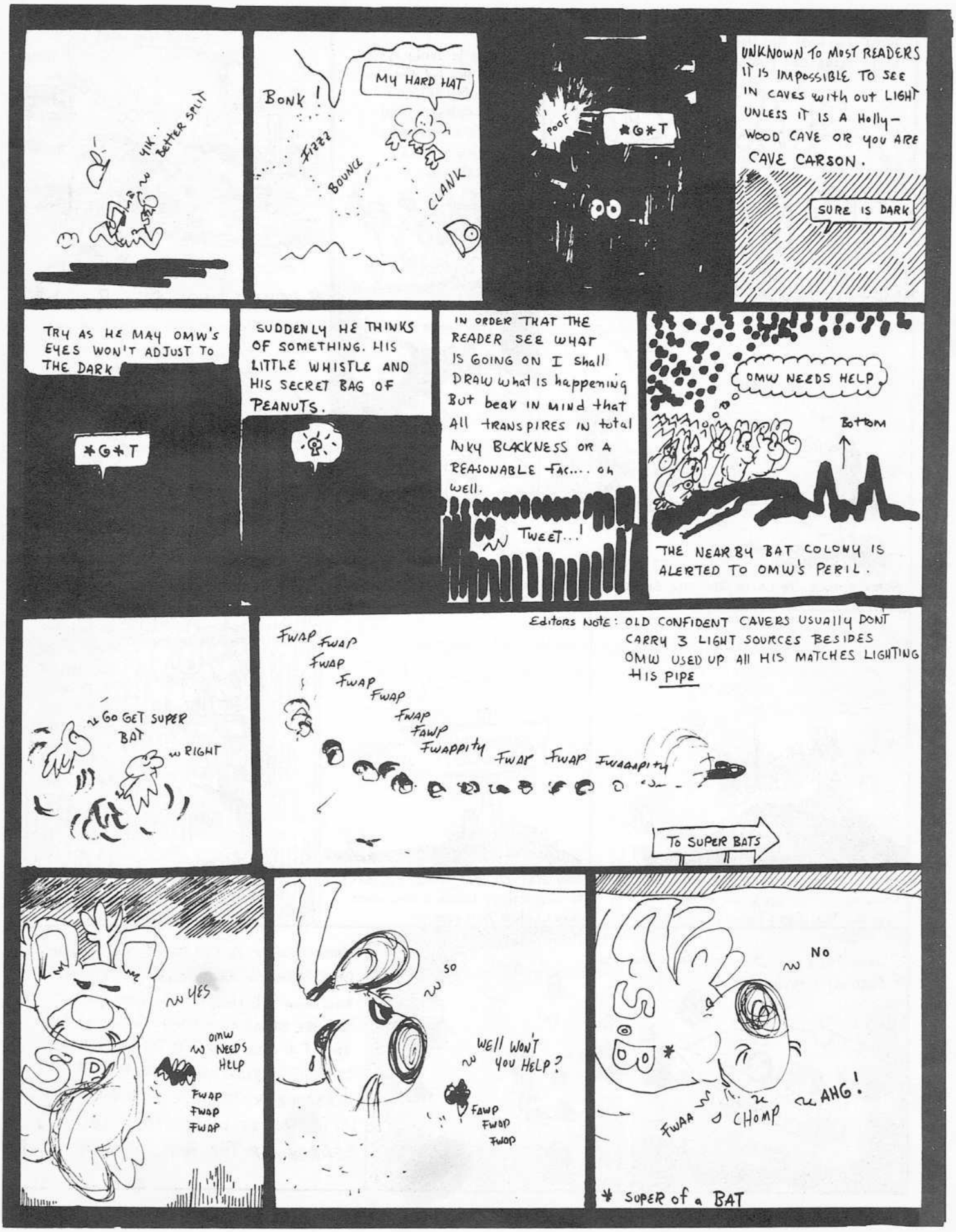


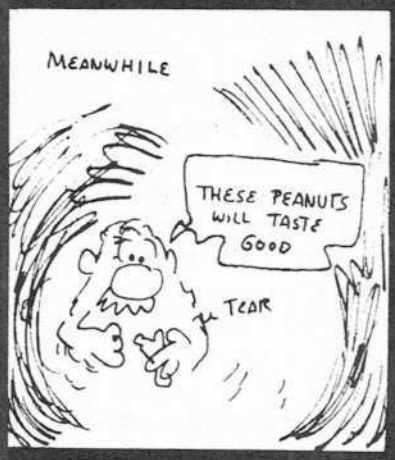
FANTASTIC AS IT SEEMS TO THE READER WE HAVE ENDED SUBPLOT FOUR OR ONE LIKE THAT, BUT WE NOW HAVE ANOTHER PROBLEM. I HAVE O.M.W. IN TWO PLACES AT ONCE. BUT WE WON'T LET THAT WORRY US. LET US DELVE INTO THE PAST AND GO BACK TO THE CAVE AND SEE IF THE CAVE ELEPHANTS ARE DOING EVIL THINGS TO OMW AND NURDOO + ZEPHLIN.

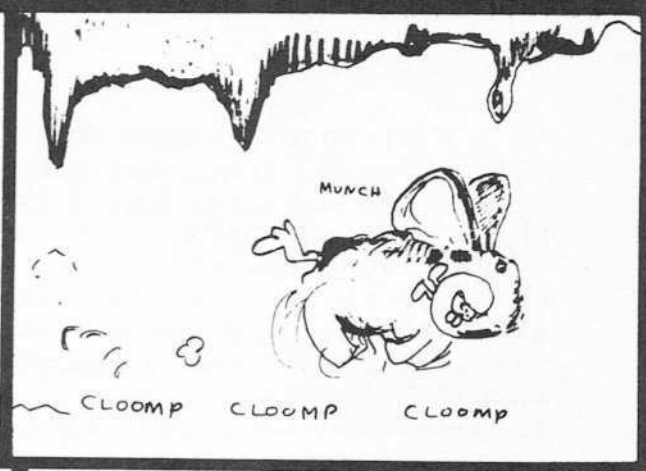
· PAUSE ·

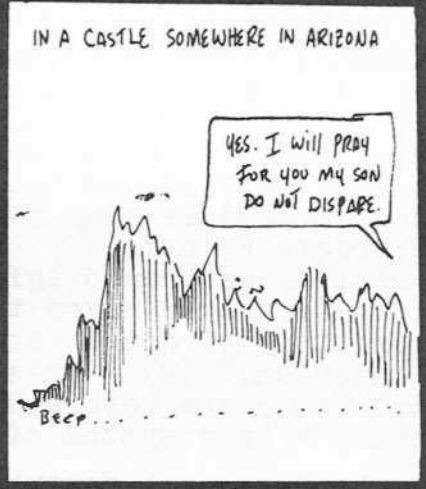
SO NOW WHERE ARE WE.

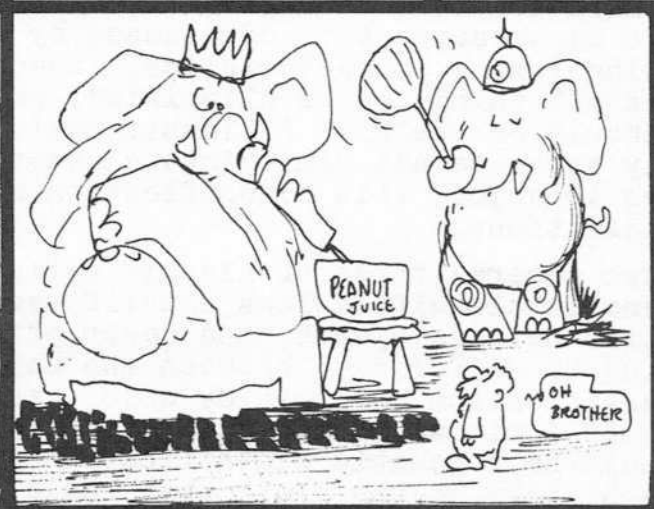
THOSE WHO HAVE THE HOLY CARBIDE LIGHT MAKE EVIL PLANS
OK MEN
WE GO TO LUDLOW'S SINK AND fill the CAVE ENTRANCE WITH CEMENT. THEN ON TO ALL THE CAVES IN THE WORLD.. OK LETS GO
WE GOT SOME INSIDE
CEMEN
AT LUDLOW'S RANCH
YOU CAN'T DO THET
SPANISH
CEMENT
SUPER BOUNCE TRIES TO STOP THE EVIL ONES BY YELLING
! NO FAIR OR IS IT FARE?
POW
POW
POW
THE EVIL ONES TRY TO STOP SUPER BOUNCE WITH BULLETS
No fare? No Fair? Huh.... OKEY GO CATCH HER...
RUN RUN RUN
So of go the EVIL ONE IN hot persuit of SUPER BOUNCE. To catch her or not to catch her. RUN RUN SUPER BOUNCE.
STORY
NOW THAT ALL THAT IS SETTLED, BACK TO OUR STORY. WHICH IS NOW MORE COMPLICATED THEN EVER.
Ah hah. For those of you Who AREN'T up to date AND SCIENCE fiction NUTS WE NOW HAVE A BURNING SPACE SHIP
Idiot I told you not to try to come to Earth on a Caving trip.
Putt
Goof
Putt
Putt
AND SO ENTER Δ and ∝ ꝟR two INTREPID CAVERS from the third MOON of SATURN. Now how will they fit into our story? Will the SPACE SHIP CRASH IN LUDLOW'S RANCH? IN NEW YORK? AT THE CHUCKWAGON? OR WILL IT BLOW UP AND DESTROY ALL OF ALABAMA AND THE NICE GUYS BACK HOME? LET US SEE AS WE CONTINUE ON THE SEARCH FOR THE Holly CARBIDE LIGHT.


YIK. BETTER SPLIT
BONK!
MY HARD HAT
FIZZZ
BOUNCE
CLANK
POOF
*G*T
UNKNOWN TO MOST READERS IT IS IMPOSSIBLE TO SEE IN CAVES with out LIGHT UNLESS IT IS A Holly-WOOD CAVE OR YOU ARE CAVE CARSON.
SURE IS DARK
TRY AS HE MAY OMW'S EYES WON'T ADJUST TO THE DARK
*G*T
SUDDENLY HE THINKS OF SOMETHING. HIS LITTLE WHISTLE AND HIS SECRET BAG OF PEANUTS.
IN ORDER THAT THE READER SEE WHAT IS GOING ON I shall DRAW what is happening But bear IN MIND that All transpires IN total INKY BLACKNESS OR A REASONABLE FAC.... oh well.
TWEET...!
OMW NEEDS HELP
Bottom
THE NEARBY BAT COLONY IS ALERTED TO OMW'S PERIL.
GO GET SUPER BAT
RIGHT
Editors Note: OLD CONFIDENT CAVERS USUALLY DONT CARRY 3 LIGHT SOURCES BESIDES OMW USED UP All HIS MATCHES LIGHTING HIS PIPE
FWAP FWAP FWAP FWAP FWAP FWAP FWAP FWAPPITY FWAP FWAP FWAAAPITY
TO SUPER BATS
YES
OMW NEEDS HELP
FWAP FWAP FWAP
SO
WELL WON'T YOU HELP?
FWAP FWAP FWAP
NO
FWAA CHOMP
AHG!
* SUPER of a BAT









AND SO ENDS ANOTHER INSTALLMENT OF OMW. BE SURE TO JOIN US AGAIN IN THE NEXT EDITION OF UTG OR WILL IT BE USG OR NSG OR PSG OR BSG OR what? BUT return with us next time to those days of yesteryear when we hear that fateful cry..... "ROCK!"

compiled and edited by the staff of UTG and may not be reproduced unless permission is asked ©

CAVE CLASSIFICATION THROUGH THE AGES

by Bill Russell

Most people think about caves, if they think about them at all, as dark, damp, and dangerous places under the ground. But every cave explorer knows that caves are more varied than this—while, most are dark, some damp, and a few dangerous, they can al- so be big, deep, wet, cold, muddy, miserable, and fun. But none of these characteristics are very useful to classify caves, as they tend to be somewhat subjunctive, and they give little insight into the origin and development of a cave. A good classification should both aid the understanding of a subject, and give useful information about the items classified. For while initially no classification is better than the ideas upon which it is based, the attempt to classify frequently leads to modification of the theory and increased understanding. For example, Linnaeus, in 1758, when he proposed the binomial system of nomenclature, thought: "There are as many species as there were originally created di- verse forms." (1) But in his attempts to classify plants, he dis- covered many hybrids, and by 1744 he believed "...that He in the beginning of the plant kingdom created as many plants as there were natural orders. These plant orders He himself, therefore produc- ing, mixed among themselves until from them originated those plants which today exist as genera. Nature then mixed these plant genera among themselves through generations of double origin and multi- plied them into the existing species." (2) This early idea of evolution was developed almost 100 years before Darwin and could not have been formulated without a good system of classification.

All good classifications have several features in common. First they give a clear separation of classes by uniform applica- tion of the distinguishing characteristics. Secondly, the classi- fication includes all things to be classified, and finally the classification should be useful. A classification of fruit by co- lor might clearly separate all fruit into classes, but even dis- regarding changes in color, this classification would not be use- ful for most applications.

There are two general types of classifications: genetic and descriptive. Genetic classifications classify according to the method of formation or development, and descriptive classifications classify according to differences between the objects to be clas- sified. The classification of fruit by color was a descriptive classification. If fruit were to be classified as root, vine, bush or tree, this would be a genetic classification and might require knowledge of the history of the fruit that could not be determined directly from observation. Both types of classification would be used to classify caves. There would not necessarily be the same number of classes in each system, as caves formed in several dif- ferent ways might fall into the same descriptive class, and caves formed through the same process, but perhaps in different types of rock, might be in separate groups in a strictly descriptive system.

Ever since caves have been seriously studied, attempts have been made to classify them. Alexander von Humboldt, the 18th cen- tury scientist and naturalist, classified caves according to two models, one based on the type of rock in which the caves occurred

and the other based on the structure of the cave. In 1805 Humboldt wrote "...that the form of grottos depends partly on the nature of the rocks in which they are found, but this form, modified by exterior agents, often varies, even in the same formation. The configuration of caverns, like the outline of mountains, the sinuosity of valleys, and so many other phenomena, present at first sight only irregularity and confusion. The appearance of order is resumed when we can extend our observations over a vast space of ground...From what I have seen in the moun- tains of Europe and the Cordilleras of America, caverns may be di- vided, according to their interior structure, into three classes. Some have the form of large clefts or crevices, like veins not filled with ore; such as the cavern of Rosenmuller, in Franconia, Elden—hole in the peak of Derbyshire, and the Sumideros of Chama— casapa in Mexico. Other caverns are open to the light at both ends. These are rocks really pierced; natural galleries, which run through a solitary mountain: such are the Hohleberg of the Muggendorf and the famous cavern called Dantoe by the Ottomite Indians, and Bridge of the Mother of God by the Mexican Spaniards. It is difficult to decide respecting the origin of these channels, which sometimes serve as beds of subterranean rivers. Are these pierced rocks hollowed out by the impulse of a current? Or should we admit that one of the openings of the cavern is owing to a falling down of the earth subsequent to its original formation... A third form of cavern and the most common of the whole, exhibits a succession of cavities, placed nearly on the same level, running in the same direction, and communicating with each other by passages of greater or less breadth." (5)

Humboldt's classification of caves into fissure caves, natural bridges and horizontal galleries is a purely descriptive clas- sification. He realizes that not all caves fit into this classification, but he is impressed with the number of nearly horizontal passages, even in areas of high mountains and steeply dipping rocks. Humboldt observes: "To these differences of general form are added other circumstances not less remarkable. It often happens that grottos of little space have extremely wide openings; whilst we have to creep under very low vaults in order to penetrate into the deepest and most spacious caverns. The passages which unite partial grottos are generally horizontal. I have seen some, however, which resemble funnels or wells and which may be attributed to the escape of some elastic fluid through a mass before being hardened. When rivers issue from grottos they form only a single, horizontal continuous channel, the dilations of which are almost imperceptible, as in Cueva del Guacharho...and in the Cavern of San Felipe near Thuilotepec in the western Cordilleras of Mexico. This sudden disappearance (in the night of the 16th of April, 1802) of the river which took its rise from this last cavern, has impoverished a district in which farmers and miners equally require water for refreshing the soil and for working hydraulic machinery." (4)

Any classification, even a purely descriptive classification, tends to lead to a discussion of origin. Humboldt felt that:

"Considering the variety of structure exhibited by grottos in both hemispheres, we cannot but refer their formation to causes

totally different. When we speak of the origin of caverns we must choose between two systems of natural philosophy: one of these systems attributes everything to instantaneous and violent commotions (for example to the elastic force of vapors, and to the heavings occasioned by volcanoes); while the other rests on the operations of small powers which produce effects almost insensibly by progressive action. Those who love to Indulge in geological hypothesis must not, however, forget the horizontality , so often remarked amidst gypseous and calcareous mountains, in the position of grottos communicating with each other by pas-sages . This almost perfect horlzontality, this gentle and uni-form slope, appears to be the result of a long abode of the wa-ters which enlarges by erosion clefts already existing, and car-ry off the softer parts the most easily..." (5)

Though there was speleological progress in Europe, for many years little attention was paid to the caverns of North America. Probably the first serious study of caves in North America was undertaken in 1930, over 100 years after Humboldt, by America's most distinguished student of landforms and eroslonal processes, William Morris Davis, the geomorphollgist who Introduced the concept of the geomorphic cycle. Davis began his study of caves when he was more than 80 years old, well past the age when un- derground exploration was advisable, by gathering all available information on American caves, and then working out a theoreti- cal scheme to explain the observed features. Before Davis' study the ideas regarding the origin of caves had been only vaguely formulated, but caves were generally regarded as having been formed by water flowing through cracks and pores, dissolving and washing away the rock, much as a river would operate on the sur- face.

Before examining Davis' theory in detail it is necessary to understand several geologic terms relating to groundwater, J. Harlan Bretz, a geologist familiar with caves, gives the following Introduction to groundwater: "Rainfall is disposed of in three major ways: by evaporation, by runoff down the land slopes, and by infiltration into the ground. This last way is the source for all the groundwater with which we as students of caves are concerned. Gravity pulls this water down through any opening it can use, and the deeper openings in the rock which are not ef- fectively sealed off from the surface become saturated. It is to this saturated zone that water wells must penetrate for a re - liable supply.

"The upper limit of this saturated zone—above which the rock interstices contain air as well as water—is visualized as a definite surface, and is referred to as the water table." (6) The zone above the water table in which the rocks contain air as well as water on the way down to the water table is the vadose zone. The saturated zone below the water table is the phreatic zone. Bretz goes on to observe that "...In wet seasons, ground-water rises higher in the rock, in droughts it drops lower. Its lowest levels are rarely below the valley bottoms of nearby per— rennlal streams. Under divides between such stream valleys, the upper limit of the saturated zone is higher, consequently there

is a slope to the water table comparable in direction to, but less than, the slopes of the land surface above. The greatest seasonal fluctuation of the water table is under the hills—the slope becomes flatter during droughts. If no rain should fall in many months the "hill" of saturation would completely flat- ten out.

"This lowering of the upper surface of the zone of saturation is due to lateral migration of groundwater down its slope toward and into the adjacent valleys, where springs and seepages constitute its escape to the surface.

"Thus we know that rainwater entering the ground in the up-lands goes downward as directly as possible until it reaches the top of the saturated zoen, and in the upper few feet of the zone the direction of movement becomes much more lateral, thou there is still a dowards flow." (7)

Bretz then notes that for a long time prior to Davis' article geologists "...have held that this downward movement of the groundwater in search of the water table is responsible for cave making, and that caves are made in this upper zone (the vadose region)or are developed within the horizon of fluctuating water table levels. This view considers that both air and water are in the cave from time to time while the cave is being dissolved out, and that caves with a stream are growing under present conditions.

"While many caves are or have been enlarged either by solu— tional attack of such descending water or by cave streams flow- ing on the bottom and some may have been made entirely by such mechanics and are still growing—most caves have features which cannot be thus explained. To understand the conditions and the times when most caves took origin, these features must be exam- ined critically and with an open mind. The conclusion reached will be that cave making starts and progresses far in the saturated zone (the phreatic zone) below the water table." (8)

The idea that caves can form deep below the water table was first introduced into American literature by William M. Davis, and he called this idea the Two Cycle theory. This theory is summarized by Bretz as follows: "His (Davis') paper "The Origin of Limestone Caverns" (9) is a masterly deductive study. In it he argues 1) that cave patterns, cave features, and cave rela- tions to the overlying topography all point to an origin in the phreatic zone 2) that surface streams entrenched themselves and subsequently drained them 5) that vadose water dripping into them or flowing along their floors does more to destroy them than to enlarge them. He termed this scheme two-cycle; the cave being formed deep below the land surface during the first cycle, and then being drained and exposed in the later cycle." (10) Accor- ding to this view there were two epochs in the history of the cave: the first consisting of solutional excavation and the se- cond of depositional replenishment by dripstone and other secondary limestone deposits. Bretz then adds that "In addition, a third epoch had been overlooked by previous observers and its place in the theoretical scheme had not been realized by Davis.

This is the epoch of cave filling with very fine textured red clay. It is recorded in the majority of the late histories of Ozark caves and occurred after the original, phreatic, solutional cave making was complete, but before the later vadose alterations were begun. Indeed, much of this later effect of water has been simply to remove the red clay, to reopen large portions of earlier caves, and to cause the first air filling they have exhibited.

"Any erosional, old land surface developed under a humid climate on limestone or dolomite must carry a deep mantle of insoluble residue of weathered material such as chert, gravel, sand and clay, which the aged and low gradient streams are unable to carry away. A decrease of ground water circulation coincides with the decreased vigor of the surface water movement, the common cause being the low relief and very gentle slops of the land surface. Very fine textured clay will remain suspended in water indefinitely with only a minimum of current or turbulence. Therefore the clay fraction of a residual soil may be expected to migrate downward along Joint planes and cracks almost as part of the descending rain and surface water. It should be able to go almost anywhere in the saturated rock that water can go, thus reaching the deep caves formed by earlier and more vigorous phreatic circulation and finding them filled with almost motionless water, this clay should slowly settle. Given time enough after the old land is developed, these caves should become filled with a smooth unctuous tallow—like claw, the deep red color of which is no surprise because clay soils developed under a forest cover in a warm humid climate (pedalfer soils) are characteristically a strong red in color." (11)

The two-cycle theory proposed by Davis and its modification into a three—cycle theory by Bretz has had rather wide acceptance. Bretz has developed a list of features of solutional origin that, to him, indicate phreatic development of the cave. His main characteristics are:

1) Sponge work or honeycomb—areas where much of the rock has been removed, leaving a three-dimensional network of passages. It is difficult to see how this could be produced by mechanical erosion.

2) Wall and ceiling pockets—holes in the wall or ceiling surrounded by relatively unaffected rock.

5) Bedding and Joint plane anastomoses—small curving tube-like cavities lying in a plain and making an intricate system.

4) Joint—determined wall and ceiling cavities—cavities formed by solution outward from a passage along a Joint.

5) Continuous rock spans across cave chambers.

6) Network patterns. Some cave passages form complex interconnecting patterns and it is difficult to see how these could have been formed by stream erosion.

After the cavern had been drained, the free surface cave streams that later modified the cave formed other features, the main ones being:

1) Incised meanders in cave walls—places where a meandering cave stream has cut into the cave wall, sometimes above the present floor.

2) Horizontal grooves in cave walls—formed at the edge of an active stream.

3) Dome pits—vertical shafts with fluted walls formed by descending water.

4) Ceiling channels—caused by the cave stream cutting up- ward on top of accumulating cave fill.

Unfortunately once a classification of this type is set up, it tends to be self-perpetuating. The assumption is made that all caves developed under the water table and then were to a greater or lesser extent modified by vadose water. And as almost all caves appear to show signs of a phreatic origin with vadose modi- fication, there was little incentive to examine a cave carefully to see if there were features that could not be explained by the two (or three) cycle theory. One feature that did give Bretz and Davis cause for concern was multiple levels in caves. Bretz deals with the problem as follows: "Many caves have two or more imperfectly developed and imperfectly separated stories or levels. An interpretation of two—story caves—one which Davis believed was erroneous—was that they record different successive devel- opments , the highest being oldest, and the lowest being youngest, and still growing if conditions are favorable. The author (Bretz) is convinced that Davis was right in his skepticism, and that the entire system in three dimensions is developed simul- taneously below the water table of its time. He allows for a succession only during the third epoch when the vadose water is discovering phreatic passages, and modifying them in its own ways. Then as valley deepening progresses, these "levels" might be successively encountered, occupied and then abandoned. (12) The idea of several horizontal levels developing at the same time well beneath the water table might be feasible in areas where the dip of the limestone is low and there are numerous nearly—hori- zontal Joints and bedding planes that could serve to initiate and control the development of the different levels. Humboldt had long ago observed the horizontality of caverns, even in mountain- ous areas and as more data was collected from caverns in various geologic areas, it was discovered that many caves, even in steep- ly dipping limestones, where there were neither horizontal bed- ding planes nor Joints, also had horizontal or very nearly so le- vels, often one above the other. And as accurate profiles of caves in areas of nearly horizontal limestone were made, it was discovered that many cave passages in these areas did not follow the individual beds of limestone, but cut across them at a low angle. These cave passages were not horizontal, but usually sloped rather uniformly, with a gradient of a few feet or tens of feet per mile. To have a nearly horizontal cavern level in dipping limestone requires some control of the development of the cave. Apparently these passages develop in close association with the water table, most likely Just below the surface of the saturated zone. The slope of the water table in most well-deve- loped karst areas is a few tens of feet per mile, about that of the nearly horizontal cave passages. And as different superim- posed cavern levels are in many cases within 10—15 feet of each other, the cavern celling is probably formed within a foot or so of the surface of the water table. This would help to explain

cave passages whose ceiling is flat to within an inch when crossing beds of different solubility. To have large passages developed so near the surface of the water table would require a con - stant elevation of the water table for a relatively long time, and thus the development of cavern levels could be correlated with geologic events. The most common geologic indication of a period of relative stability is the development of wide river valleys, as the rivers swing laterally across their valleys, which are only slowly being lowered. This wide valley is then left behind as a river terrace after conditions have changed, causing the river to downcut and drain the cave . In several places a correlation between cave levels and terraces has been found. (15, 14)

Thus there are three distinct groundwater zones, a vadose zone, a shallow phreatic zone, and the deep phreatic zone. The vadose zone is the zone just below the surface where the water is moving downward toward the water table. The shallow phreatic zone is characterized by nearly horizontal flow just below the surface of the water table. This concentration of flow near the surface of the water table develops with time, as the path along the surface is the shortest distance to the outlet. Initially, water may circulate to lower depths, but as cave passages become larger and more Integrated, those passages that provide the most direct route to the outlet will be enlarged much more than other passages. Below the shallow phreatic zone is the deep phreatic zone, where there is only relatively slow circulation. As might be expected, horizontal cave passages are best developed near the outlet or spill-over point where the groundwater emerges, as here the surface of the water table is more nearly constant, being controlled directly by the level of the outlet. Further fromthe outlet there is more variation in the altitude of the watertable and cave levels are generally not as well defined.

With this more detailed concept of groundwater zones, a new classification system for cavern development is needed. This new classification should indicate in what groundwater zone a cave developed, as well as not being limited to any particular number of "cycles", as many caves have very complex histories. The first term in the new classification describes the origin of the initial openings; these may be either phreatic or vadose. In general they would be phreatic, only in a few special cases, as near the surface where solution has enlarged Joints or bedding planes, could a cave be said to be vadosely initiated. Usually after the initial openings have formed and some permeability established, the cave begins to be enlarged. This enlargement may be either vadose, shallow phreatic or deep phreatic. Vadose enlargement occurs when the limestone has been drained of water before caves have had time to develop. Vadose development is characterized by dome pits, graded stream passages leading from sinkholes to exits, recessional canyons below waterfalls, and other features of surface streams. Shallow phreatic enlargement is developed along the surface of the water table, especially during times of stability. It is characterized by passages of relatively uniform size, with low gradient that is not related

to the dip of the rock. The cave plan typically exhibits large trunk passages with a more complex network of much smaller side passages. Deep phreatic enlargement is typified by large irregular rooms (frequently connected by passages not related to the formation of the room), by solution along favorable zones, and by complex passage networks. Deep phreatic solution is a slowprocess and tends to be very selective.

After a cave has been enlarged, it can be filled, and thisfill can usually be related to one of the groundwater zones.
Deep phreatic fill is usually very fine clay without bedding, sometimes mixed with large solutlonally modified breakdown. Shallow phreatic fill is usually fine and will almost alwayshave some sorting of sediment with regard to grain size, and may be varved or show some cross—bedding. Vadose fill is frequently composed of rounded cobbles or chert or other resistant rock, reworked lumps of clay, surface gravel and other debris from outside the cave. There may be several cycles of enlargement and fill in a cave. Commonly a deep phreatically enlarged cave willhave a deep phreatic fill, then the cave will undergo furtherenlargement in the shallow phreatic zone, with reworking of much of the phreatic fill, and deposition of shallow phreatic fill.
Caves can undergo any number of cycles of fill and enlargement.

The classification system contains the following terms:

Initiated: Vadose
Phreatic

Filled: Vadose
Shallow Phreatic
Deep Phreatic

Reexcavated: Vadose
Shallow Phreatic
Deep Phreatic

Enlarged: Vadose
Shallow Phreatic
Deep Phreatic

Any of these terms, except initiated, can be repeated as often as necessary. As the vast majority of caves are phreatically initiated, this term can be omitted unless the cave was vadosely initiated.

In addition to these terms, it is necessary to specify when the enlargement is controlled by the stratigraphy, as when the solution follows an especially soluble bed, or when a cavern is formed at the base of the soluble rock. For example, a cave of this type might be classified as: phreatically initiated, deep phreatically enlarged with stratigraphic control. Talus and other nonsolutional caves, as well as caves that have moved upward from their original position by collapse are not included in this classification. This system is not intended to give a single word or phrase that will describe a cave. This was one of the appealing features of Bretz' and Davis' two and three—cycle classifications, but this new classification emphasizes the point that the history of most caves is complex and difficult to describe with a few words, though if a cave were predominantly formed in the shallow phreatic zone and exhibited numerous shallow phreatic features, it would be proper to summarize the classification by calling the cave a shallow phreatic cave. Keeping in mind that different parts of the same cavern may have an entirely different history, this classification is intended as an

improved framework for observations to formulate a detailed history of the cave.

Examples

Examples of this system applied to some well-known caves:

Natural Bridge Caverns: Phreatically initiated, deep phreatic enlargement, shallow phreatic enlargement, minor shallow phreatic fill.

Inner Space: Phreatically initiated, deep phreatically enlarged with stratigraphic control, shallow phreatically enlarged, minor shallow phreatic and vadose fill.

Steam Cave: Deep phreatically enlarged with stratigraphic control.

Indian Creek Cave: Shallow phreatically enlarged with stra- tigraphic control, minor shallow phreatic and vadose enlargement.

Pothooks Cave (in gypsum): Phreatically initiated, vadosely enlarging cave. (To emphasize tht the process is continuing the classification can end with —ing)

Carlsbad Caverns: Deep Phreatic enlargement, shallow phreatic enlargement, very minor vadose fill and enlargement.

Mammoth Cave: Some deep phreatic enlargement, major shal- low phreatic enlargement, minor vadose modification.

Langtry Lead Cave: Deep phreatically enlarged with strati- graphic control, shallow phreatically enlarged, shallow phreati— cally filled, vadosely reexcavated, vadosely filled, vadosely reexcavated.

REFERENCES

(1) Linnaeus, Carl, 1758, Classes Plantarum; quoted in Taxonomy of Flowering Plants by Cedric L. Porter, 1959; San Francisco, W.H. Freeman Co., p.62.

(2) _____, 1774, Systema Vegetabilium; quoted in Taxonomy of Flowering Plants by Cedric L.Porter, 1959; San Francisco, W.H. Freeman Co., pp.62—65.

(5) Humboldt, Alexander and Bonpland, Aime, 1806, Personal Narrative of Travels to the Equinoctial Regions of America during the years 1799—1804, trans, and ed. by Thomasina Ross, London, George Bell and Sons, 1907, 5 vols., vol. I pp.265—266.

(4) Ibid. vol. I p.266.

(5) Ibid. pp.266-267.

(6) Bretz, J Harlen, 1956, Caves of Missouri; Missouri Geological and Ground Water Division, Rolla, Miss., p.6.

(7) Ibid. p.7.

(8) Ibid. p.8.

(9) Davis, W.M., 1950, The Origin of Limestone Caverns: Geological Society of America Bull., vol. 41 pp.475—628.

(10) Bretz op.cit. p. 7•

(11) Ibid. pp.11-12.

(12) Ibid. p.15.