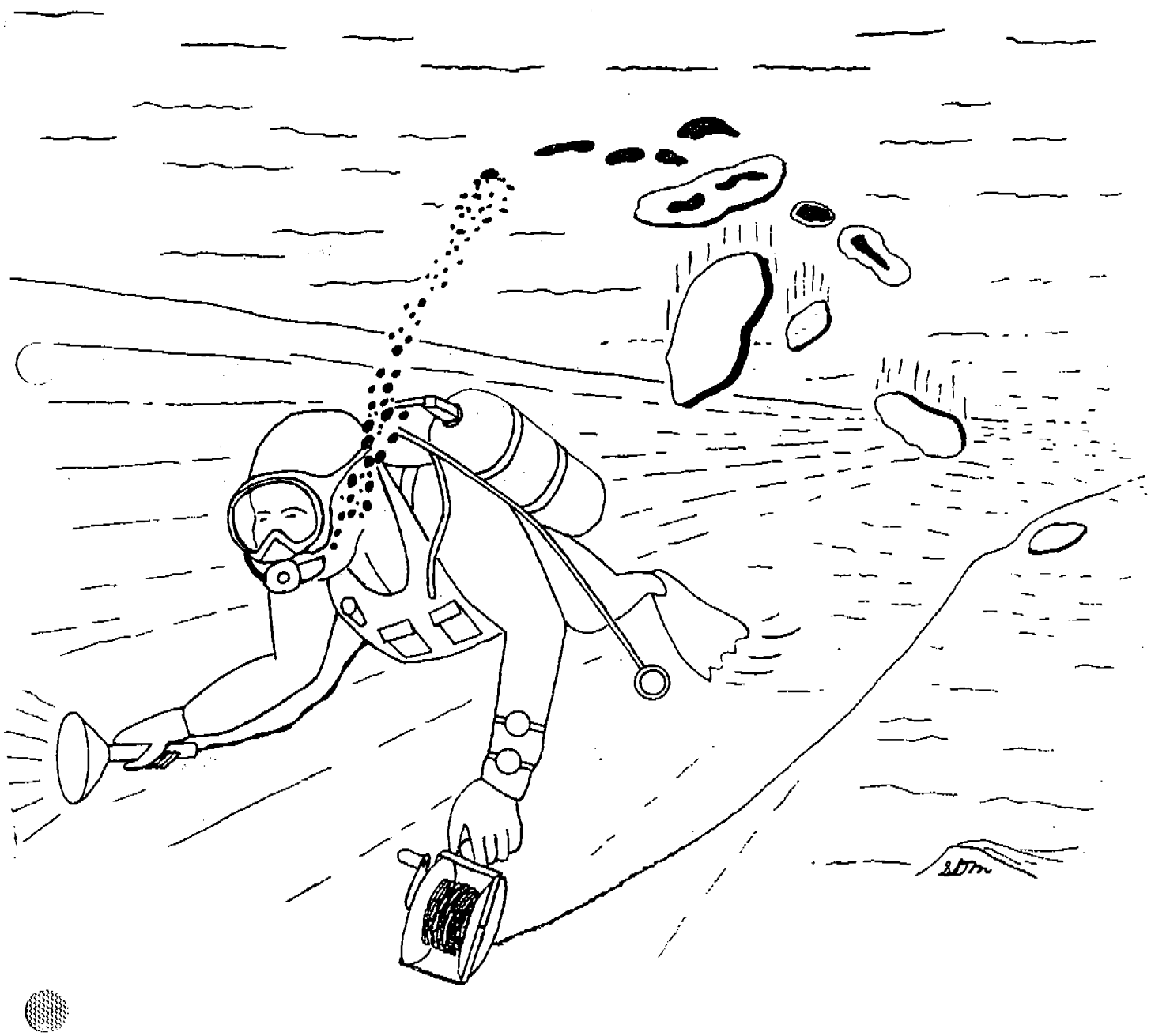
UNDERWATER SPELEOLOGY

OFFICIAL NEWSLETTER OF THE CAVE DIVING SECTION OF THE NATIONAL SPELEOLOGICAL SOCIETY

Vol. 2, No. 5- Fall 75



Divers encountered unstable ceiling in the passages of the Lost Sea (page 46).

UNDERWATER SPELEOLOGY

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The National Speleological Society

Deadline is the second Friday of the proceeding month. Send articles and correspondence to the Editor:

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NEW SUBSCRIBER

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FAIRGROUND SPRING, INDIANA

Fairground Spring is a brick lined grotto in Corydon, Indiana. Surveryers hoped that a short cave dive would connect the spring with a terminal sump in Binkley Cave. Binkley Cave has over 17 miles of mapped passage and only two known entrances. Robert Sdanler made a dive in the spring basin on Oct. 1, 1975 and found an air passage beyond the 30 foot entrance trap.

On Oct. 5, he again dove into the spring carrying radio locating equipment. He had planned to meet up with cave explorers who were making the long trip through Binkley Cave to a terminal sump near the spring. Sdanler explored 100 feet of passage with 4 inches of air space before being stopped by breakdown during the 45 minute dive. He did not make contact with the Binkley Cave explorers. The radio locating equipment was not needed, fortunately, as the equipment flooded during the dive.

The cave diving report, including a rough sketch map, was printed in the Louisville Grotto newsletter, The Karst Window, Vol. 5, # 7.

DIVING LIGHT EXPLOSION

Glenn Thompson reported that the bulb assembly of his diving light exploded when it was turned on. Fortunately, the accident did not happen during a cave dive and no one was injured. The force of the explosion was so violent that the threads were sheared on the plastic bulb retainer ring. The 3-inch diameter sealed beam bulb was not found nor were any glass bulb fragments. The bulb was apparently thrown a considerable distance by the explosion yet the bulb case and battery case were not damaged.

The conditions that caused the explosion may be as follows: The metal case housing the nicad battery pack was sealed up soon after charging of the batteries. The batteries were accidently turned upside down. Hydrogen and oxygen, generated at the battery plates, were under sufficient pressure to force electrolyte out of the batteries and into the stainless steel battery case. Electrolysis of water in the spilled electrolyte probably occurred on the exposed electrical wiring. The explosive gases generated in the battery case passed through the electrical cable into the hand lamp. A loose connection or arcing switch in the hand lamp set off the explosion.

Preventive measures which might avoid such a recurance include:
1) mark batteries and case clearly so they will not be turned upside down,
2) periodically check for loose electrical connections,
3) use a none sparking, sealed switch,
4) seal the ends of insulated wire with rubber cement to make them gas tight.

SUMMER TRIP REPORTS

by Sheck Exley

NSS 13146

The hospitality of some veteran cavers hepled Court Smith, Lewis Holtzendorff, Karan Exley and I put together some really great cave diving trips this summer.

ALABAMA... Acting on an unreasonably short notice, Bill Torode graciously provided us with some directions for a trip to the Huntsville area over the 4th of July. A dive through a 68-foot-deep sump approximately 350 feet long added a new lake room to Belgreen Underground Lake, AL 11. The room is about 150 feet long by 25 feet wide at the water surface with the ceiling about 5 feet above the water. There appeared to be a "dry" lead running out of the left wall, but a raft or innertube would be needed to reach it. The passage continues underwater beyond the room but is only about 2 feet high, 15 feet deep, and very silty.

Next stop was Hughes Spring, where a dive through a 100-foot-long sump 8 feet deep led to a nice streamway with about 300 feet of air-filled passage. A short crawl beyond this point was blocked with breakdown, leaving only the virgin second sump for future investigation. We did a tape and compass survey, then left.

VIRGINIA... Two divers from Virginia Beach and enthusiasic members of the Butler Cave Conservation Society provided us with our Labor Day trip. A marathon 16-hour drive led to more marathon caving and diving. The water is lot's colder than either 'Bama or the Ozarks (about 50° F.), so our dry suits came in handy. I volunteered as a "coolie" at Lockridge's Aqua Cave, but found to my surprise that I was able, without tanks, to follow the two cave divers as far as they went because of the unusually low water level. Best of all, my lack of tanks made it possible for me to investigate an interesting breakdown room beyond French Lake.

Last Hope Syphon in Butler Cave should be renamed Lost Hope Syphon, for by the time I got there I was completely out of the stuff. Like an idiot, I wore my dry suit and almost died of heat prostration during the 8½-hour, 4-mile trip. Fortunately, Rick Rigg had previously undergone the ordeal and his report provided us with a good description of the sump. A 500-foot dive in the shallow (8 to 11 feet deep) sump was not very productive though it did add a tiny segment of new passage to this enormous cave. I took a few azimuths on the way out.

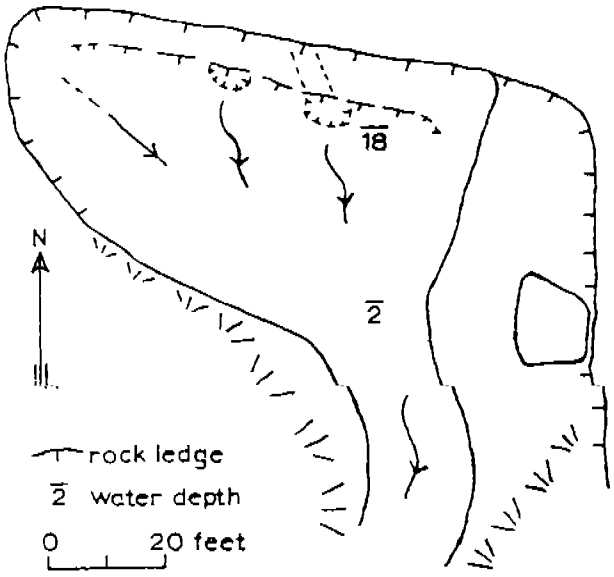
MISSOURI... Our Ozark trip was something of a disaster. Despite driving all over MO and Arkansas we could not find an area where it had not rained or was not raining a lot. Diving visibility was far less than expected, and a week-long trip was good for only three dives. The best part of the trip was chatting with Ozark cave diver Don Rimbach, visiting with AACS director Mike Warshauer, seeing the Blanchard Springs presentation by Glenn Thompson, and having supper with Bill Torode on the way back. Speaking of the way back, guess what it was doing when we got home to Florida? Right. Raining!!! Oh, Well, wait 'til next time....

ORANGEVILLE RISE, INDIANA

by Stephen D. Maegerlein

NSS 8240

A picturesque spring alcove in the little town of Orangeville, Indiana contains the basin of the Orangeville Rise. The spring is about one mile north of the Rise of Lost River and drains the northern most part of the Lost River drainage system. Water resurging at the rise has been traced with fluorescein dye from Show Farm Cave, three miles to the north, and from swallow holes 5½ miles to the west near the town of Orleans as reported by Murdock and Powell (1968). The flow rate varies from a minimum of 6.3 c.f.s. as measured by Powell (1961) to a maximum of 180 c.f.s. as estimated by Bassett (1974). Like most Indiana springs, the rise is not suitable for drinking water. The coliform content, an indication of pollution, was measured at 9300 most probable number per 100 milliliters (Powell, 1961, page 52).



ORANGEVILLE RISE

The spring basin has been explored by Clarence Dillon, Jim Fishback and the writer. Mud and rocks form an alluvial choak that leads down into the basin. The water emerges from under a 50-foot wide dolomite ledge 15 feet below the surface of the basin. The submerged cave opening is blocked by rock blocks and gravel which prevent a diver penetrating any appreciable distance into the passage. The passage was possibly blocked several years ago when rocks were pushed into the spring during a landscaping project. No attempt has been made to move the blockage. The submerged system may lead to Ragesdale Gulf, ¼ mile away. It would be interesting to compare the passage level at the Orangeville Rise with the passage found in the Rise of Lost River which reaches a water depth of 160 feet.

References

Powell, R. L., 1961, *A Geography of the Springs of Indiana*, unpublished M. A. thesis, Indiana University, 74 p., 25 fig., 5 tab.

Murdock, S. H. and Powell, R. L., 1968, *Subterranean Drainage Routes of Lost River*, Proc. of the Ind. Acad. of Sci., Vol. 77, pages 250 -256.

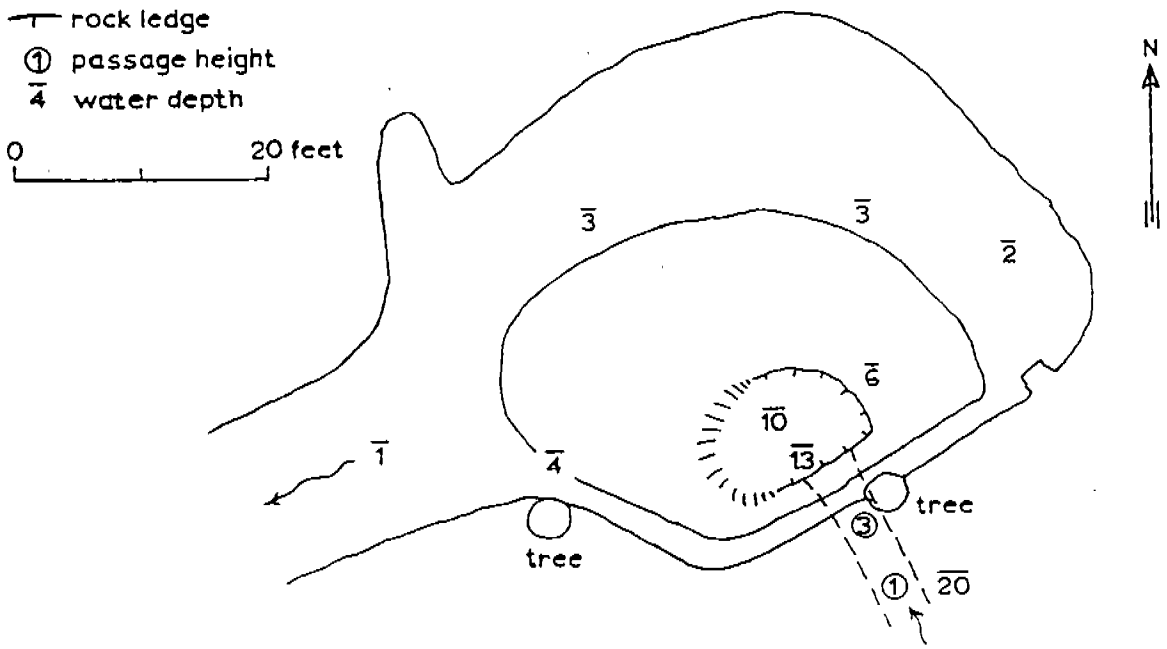
Bassett, J. L., 1974, *Hydrology and Geochemistry of Karst Terrain, Upper Lost River Drainage Basin, Indiana*, unpublished M. A. thesis, Indiana University, 102 p., 30 fig., 6 tab.

HALF MOON SPRING, INDIANA

by Stephen D. Maegerlein

I had heard stories of diving at Half Moon Spring and had read a description of the spring by C. A. Mallot. Jim Fishback, Clarence Dillon, Richard Powell and I drove to the spring about 3 miles southeast of Paoli, Orange County. Mr. Philip Bosley, the owner of the spring, was not at home when we arrived. We decided to drive along a country road and spot the spring location on our map and come back later to find the owner. Fortunately, we accidently found Mr. Bosley out inspectiong his corn crop near the spring. At first he was reluctant to let us dive in the spring. He thought we might be associated with the Lost River impoundment project. He was very upset that his farmland might be condemned for a lake site. Once we had assured him that we were only interested in exploring the spring, he was very hospitable.

Mr. Bosley told us about the history of the spring. Dol Brackston, many years ago, owned a livery stable near by. He would take wagons down to the spring and back them into the water deep enough to cover the wheels so the wood could swell and tighten up the rims. The wagon tongue was tied to an oak tree to keep the wagon from rolling into the deeper portion of the spring basin. Boys would climb out on a partially submerged wagon and throw their fishing lines into the spring depths. Boys being what they are, a wagon was once cut loose from its mooring by one mischievous boy while another lad was out on the old wagon fishing. To the surprise of both boys, the wagon rolled out into the spring and sank in the basin, leaving only the tongue sticking out of the water. Since there was no easy way to lift the old wagon out of the hole, it was considered not worth salvaging. The tongue stuck out of the water for many years before disappearing into the basin.



HALF MOON SPRING

Back in the earily 1960's a couple of local scuba divers, the Brunner boys, went diving in the spring and brought out pieces of the old wagon. The Brunners did not have wet suits so their diving was limited in the 56^{0} F. water. Their diving stirred local interest and an account of the exploration was published in central Indiana newspapers. Some how a rumor got started that there was money and other treasure at the bottom of the basin. Perhaps the rumor brought two divers from Louisville, Ky. to explore the basin. These men found an opening in the bottom of the basin and managed to work their way down a sloping passage clogged with sand. The passage was so low that they had to use poney tanks in part of the passage and pull their large air tanks beside them. They fully extended their 165-foot safety line. Visibility was too poor to see anything.

Two of their diving buddies had died while cave diving in Florida, thus when they returned later to do more diving, they decided it was too dangerous after getting suited up and into the water.

Mr. Bosley keeps cattle in the pasture surrounding the spring. The alluviated spring basin is at the lower edge of a gently sloping pasture. A sycamore tree grows out over the south side of the basin; its root ret work supporting the bank. A limestone outcrop is visible on the east side of the tree where a dry, shallow ravine comes into the basin. A beach of coarse sand and pea gravel has been washed up on the edge of the basin opposite the tree. Another dry ravine comes into the basin from the northwest. The shallow spring run flows off to the southwest. The rotting trunk of a tree stands above the south side of the spring run.

The water in the basin was very muddy on August 31, the day we investigated the spring. A little rain had fallen in the area within the last few days but the spring flow was only a few cubic feet per second. Mr. Bosley assured us that in dryer weather the spring is very clear. We decided to go ahead an explore the spring basin to determine if a long duration dive would be possible. Jim took the end of a fiberglass tape measure and helt it on the bottom of the basin in many locations. I floated over him on the surface holding the reel out of the water and reading the water depths. Richard and Clarence took compass sightings and recorded the soundings. In a short time we had a map of the basin with bottom contours. Jim found a cave opening in the bottom of the basin during the exploration by feeling along a rock ledge. He could see only a few inches in the muddy water. We decided to make a short penetration into the cave to determine if the passage was large enough for a long exploration dive. Jim entered feet first through the 3-foot high opening. I followed him head first. I found the passage was wide enough to turn around in. The ceiling and floor sloped downward. By the time I had caught up with Jim, he was 20 feet into the passage at a water depth of about 20 feet. Visibility was only 6 inches and I could just barily see Jim's hand signal to terminate the dive. The sand floor was sliding down into the passage and beginning to bury Jim, so we made a quick exit. Jim said he could not feel an opening large enough to continue deeper into the cave. We came to the conclusion that the divers from Louisville were correct; Half Moon Spring is too dangerous for cave diving.

J A W S . . . FLORIDA STYLE

by Sheck Exley

Viewers of the big cinema hit "Jaws" should be appreciative of the dangerous marine life that a cave diver might encounter while diving a sea cave or a marine Blue Hole. However, fresh water cave divers in Florida have their problems with ferocious "jaws," also - alligator jaws.

Officials of the Florida Game and Fresh Water Fish Commission have recorded an astounding total of seven confirmed 'gator attacks on humans through September of this year - up from the previous high of four attacks in 1972 and 1973. Part of the cause of the problem is certainly the fact that the population of alligators, protected by its placement on the endangered species list since 1960, has risen from less than 250,000 to 500,000 in Florida in the same period. Another factor is that many of these protected 'gators have, as Dr. O. E. Frye, Director of the Commission, stated it, "lost their fear of man through constant exposure to humans. Feeding alligators ... can cause the problem."

This last point was well-demonstrated to us during a trip in February of this year to Knights Sink near Tarpon Springs, Florida. The steep banks of the sink were heavily overgrown with dense subtropical foliage, making access to the water possible only via a ravine on one side. While eagerly scampering down this ravine we duly noted, not without some trepidation, that an unusually fine specimen of *Alli. Mississipiensis*, at least 8 feet long, was sun-bathing on the far bank.

"What the hell do we do now?" says Lewis.

I looked from the 'gator to the beautiful clear blue water, then back to the 'gator and swiftly calculated the odds. "well, there's four divers...", says I.

Yeah, but 'four to one' doesn't mean much when the 'one' is a quarter-ton, hungry-looking reptile," says Lewis.

"Then look at it this way," says I, "the 'gator can't possibly eat us all at once, so the chance you'll be 'dinner' is only 25%." Actually the chances were "even" less than that, our unfortunate guide, Bill Bonds, did not have on a wet suit, so undoubtedly would be selected as the tenderest morsel, right?

No cave diver can argue with logic like that, so we quickly slipped into the depths, pausing briefly to push some small white objects that looked like mushy ping-pong balls out of the way. We completed an exhilarating 20-minute exploration of 400 feet of huge virgin cave, then returned to decompress.

Despite the popular rumor that crocodillians seldom dive very deep because of the pressure, our 10-foot deep decompression stop was unusually deep. It was also longer than usual. Arranged back-to-back in a four-man phalanx like an underwater version of "Custer's last stand," each

of us waited patiently for one of the other cowards to finish his decompression and make a break for the surface and "'gatorland." Not having the luxury of a wet suit, Bill finally had to make the choice between the possibility of a 'gator fest and the probability of hypothermia. When Bill "made his move," the rest of us brave souls promptly exited elsewhere so as not to confuse the 'gator.

Moments later all four of us were standing safe and sound in shallow water near the ravine, idly chatting with two old ladies who had watched us submerge at the start of the dive. The 'gator was nowhere to be seen.

One of the ladies called down the bank. "We were worried about you boys. As soon as y'all went underwater, our alligator went in, too."

We quickly moved to even shallower water, Suddenly I noticed that one of the ladies was holding a bag of those strange ping-pong ball things that I had seen in the water earlier.

"What's that in your hand, maam?" I called back up the bank.

"Oh, this is just some marshmellers. We always feed 'Ollie' this time of day," she answered.

You can bet your alligator shoes that it didn't take us long to get back up that ravine!

* * * * * *

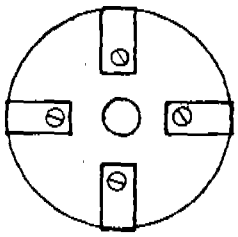
CONSTRUCTION OF A BATTERY CASE FOR A DIVING LIGHT

by Clarence Dillon

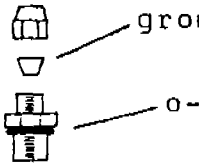
The case described below is one that I found easy to construct, economical and very durable. Ease of construction is shown by the fact that the only tools needed were a scroll saw, rasp, electric drill and drill bits. Time to construct, minus setting time for adhesives, was 2 hours at most. Durability has been proven by use on many cave dives to depths of over 150 feet. The cost of materials will vary, so they will not be listed here, but look around construction sites for polyvinyl chloride (PVC) pipe scraps. Plexiglas can be purchased by the pound at wholesale plastic outlets. Materials listed below cost me less than $5.00.

Quantity	Description
4	16½-inch long stainless steel pipe clamps - for 4-inch dia. pipe
2	12½-inch long stainless steel pipe clamps - for 3-inch dia. pipe
8	# 8-24 brass screws, 3/8-inch long
2	¼-inch thick Plexiglas, 3½-inches dia.
2	¼-inch thick Plexiglas, 3-inches dia.
1	waterproof outlet port for ¼-inch dia. cord
1	length of 16-2 or 18-2 wire, ¼-inch outside dia. electric cord
1	12-inch length of heavy wall PVC pipe 3-inches inside dia.
1	3-inches by 1/8-inch o-ring.

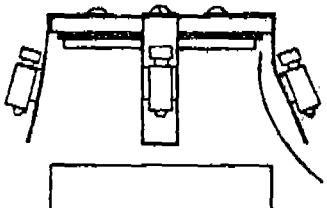
BATTERY CASE

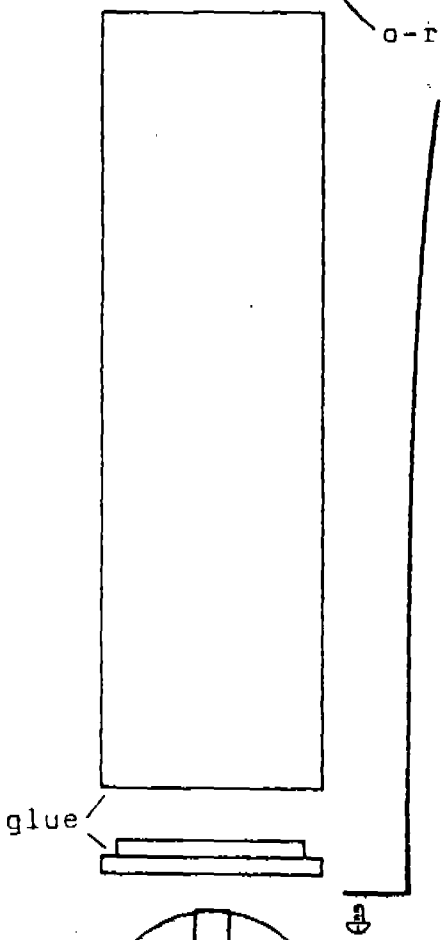


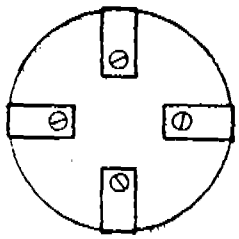
TOP VIEW



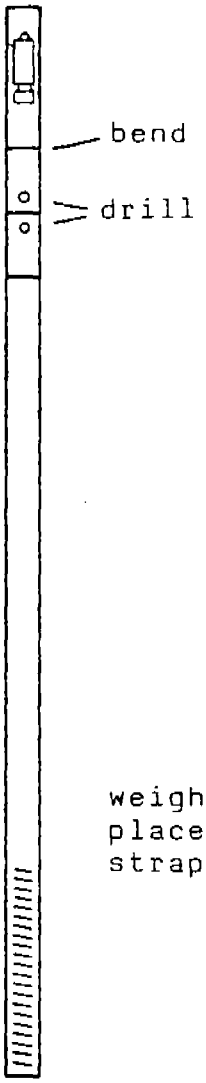
SIDE VIEW





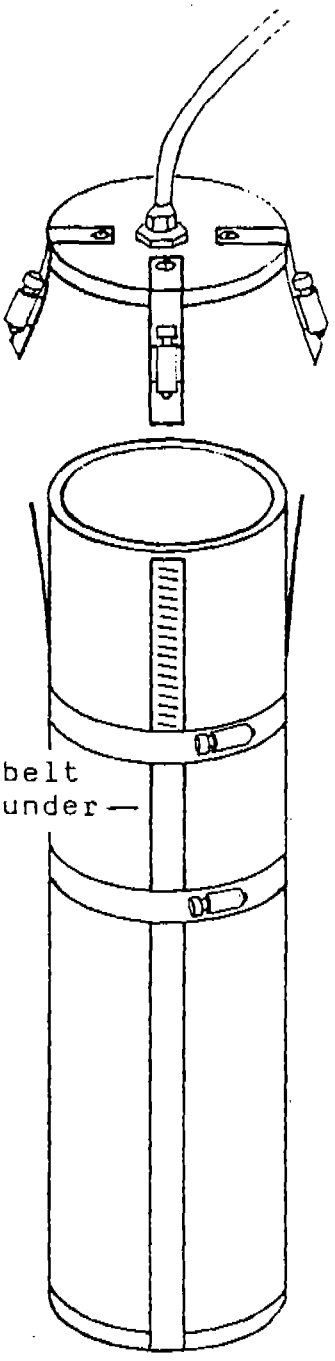


BOTTOM VIEW



worm gear
hose clamp
IDEAL CORP.
HY GEAR # 72

scale in inches



SDM

The diagram shows the general construction of the case and the following suggestions will help in construction.

1. Drill Plexiglas slowly to avoid grabbing and breakage.
2. Tap # 8-24 holes only 3/8 inch into the Plexiglas to avoid leakage.
3. Measure and place holes carefully.
4. Use enough adhesive on the end caps to get uniform lamination.
5. Allow the glue to cure a day or two before using the case.

I have used the Panaloid 355-H batteries in this three-inch case but the design can be used for larger or smaller pipe and many different types of batteries. The length of the case is determined by the batteries used.

Editor's note: The Panaloid battery, from Panasonic, is a sealed, 6-volt, lead-sulfuric acid battery with gel electrolyte. The battery is normally used in portable television sets.

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NEWSLETTER SUBSCRIPTION RENEWAL TIME

This newsletter issue is the next to the last issue of the volume. Thus, it is time to subscribe for volume 3. The size of the newsletter has been expanded during this year. Inflation, however, has hit the newsletter and it is necessary to increase the subscription rate to cover the increased cost of printing and the postal increase. The membership dues, including newsletter subscription is $3.00 for NSS members. For those not belonging to the NSS, the subscription rate is $5.00.

* * * * * *

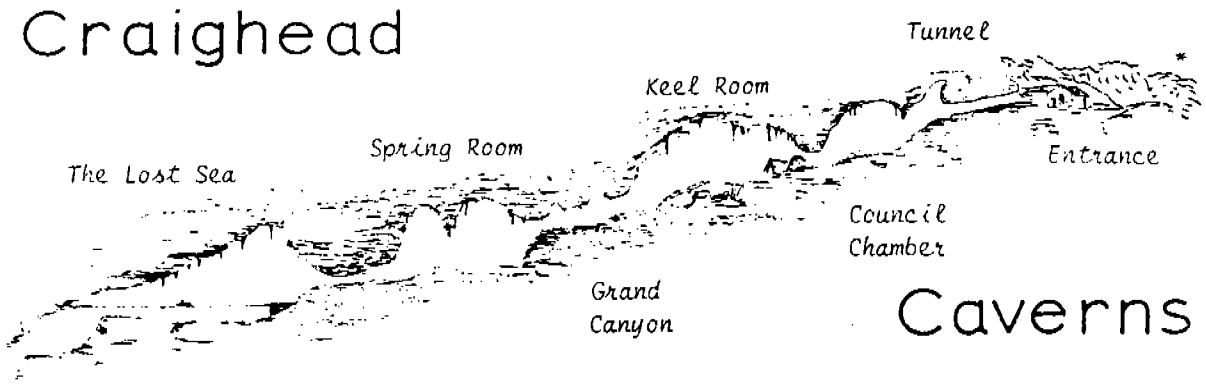
ELECTION TIME ! ! !

The executive committee of the cave diving section is holding an election for 1976 officers by mail. To nominate a candidate for office, simply write the nominee's name and desired office on a post card and mail it to Sheck Exley, NSS Cave Diving Section, 1591 S. Lane Ave., # 118C, Jacksonville, Florida 32210. They must be received by no later than February 1, 1976. All nominations will be slated.

Please check with your candidate and make sure that he is willing to work in the office for the coming year. Don't hesitate to nominate yourself if you are interested in working. We recieved no nominations last year! The present officers are:

CHAIRMAN - vacant
VICE CHAIRMAN - Sheck Exley
SECRETARY - TREASURER - Stephen Maegerlein
UIS CAVE DIVING COMMISSION REPRESENTATIVE - vacant

Ballots will be mailed out on February 2, 1976. All officers must be NSS members, and you must be an NSS member to vote (membership list on page 52).



THE LOST SEA EXPEDITION

by Stephen D. Maegerlein

INTRODUCTION

Craighead Caverns is located on Tennessee Highway 68 midway between Madisonville and Sweetwater. The cave has developed in the Holston Formation and seems to follow the dip of the limestone strata. Mud fills in the cave indicate the subterranean stream origin of the system. The Keel Room, shown on the map, was named for the layers of clay, locally called *keel*, found in the room.

The cave is named for Chief Craighead who was given title to the cave by land grant. The Cherokee Indians penetrated deep into the cave as evidenced by artifacts found in the Council Room area. Earily settlers used the cave to store food. Saltpeter, for gun powder, was mined in the cave during the Civil War. Many visitors wrote their names and visiting dates on the cave walls from 1865 to 1890.

Ben F. Sands discovered the Lost Sea area, later to become the commercial name of the cave, in 1905 after crawling down a small, muddy passage leading from the Spring Room.

George Kyle acquired the property in 1915 and attempted to commercially develop the cave. The Big Room was floored for dancing and cock fights. Deeper in the cave, moonshiners were operating the first of several whiskey stills that were to be set up in the cave.

Mr. Kyle and W. E. Michael formed Craighead Caverns, Inc. in 1927 and continued commercial development by opening a larger entrance down the hill from the natural one. They had the first electric lights installed in the cave. The two men discovered the New Room area which contains the most extensive occurrence of anthodite clusters found anywhere in the cave. Anthodites consist of slender, tubular spines of calcite which radiate outward from a common center. The spines vary in length from less than one inch to over 6 inches. Some of the smaller clusters are white. The larger clusters are generally coated with a brick-red film of iron oxide.

Dr. B. C. Moneymaker, a geologist for the Tennessee Valley Authority, made a plane table map of the large passages of the cave in 1929. The map was published by Simpson in 1941.

The cave corporation failed during the depression of the earily 1930's. Mr. Michael retained ownership of the cave. A mushroom farm was operated in the Big Room around 1940 but the farm was abandoned when horse manure fertilizer was no longer available from nearby Fort Oglethorpe.

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* adapted from a drawing by E. Yarbrough

Children discovered some bones in the cave in 1940 and Mr. Michael sent the bones to the American Museum of Natural History. Dr. Gaylord Simpson, a paleontologist, spent several weeks investigating the bones and foot prints. The tracks and bones were identified as Pleistocene Jaguar. Additional paleo material was discovered in lower levels of the cave but it has not been investigated. The lower levels are entered through complex joint controlled passage on the east and west sides of the Ball Room and also from the bottom of the 90-foot pit.

The cave was leased for operation of the "Cavern Tavern" in 1947. The tavern was not much of a success. Patrons found it difficult to climb the stairs out of the cave when intoxicated. Often the constable would be waiting outside to fine or jail drunkards that managed to climb the stairs. One customer, who probably wondered off into the darkness to relieve himself, fell 40 feet and broke his ankle near the Saltpeter Mine.

The cave was partially surveyed by Guy Crawford in 1955. The map was published in the Caves of Tennessee, 1961.

The Craighead Caverns Company was formed in December of 1964 by Mr. Micheal's son, Van. A tunnel was cut into the Council Chamber area and entrance buildings were constructed in front of the tunnel. Ed Yarbrough assisted Roy Davis, the manager, in installing concealed electric lighting for guided trips. A tunnel was cut around the crawlway of the Spring Room to the Lost Sea. A gravel beach was built adjacent to the tunnel and a metal pier was erected for docking electric tour boats. Pumps were installed in the lake to stabilize the water level by pumping the water 225 feet straight up to the surface. Without pumping the lake fluctuates as much as 13 feet during the year, filling up in the winter and slowly dropping during the summer.

A worker was killed in the cave during construction of the tourist facilites. He was hauling gravel down a steep trail and lost control of the tractor. The tractor crashed through a guardrail and plunged over a ledge. The man was crushed to death under the gravel loaded wagon.

Dr. Robert Lash, from Knoxville, headed scuba diving explorations in the earily 1960's which disclosed that there were submerged passages leading off the lake room.

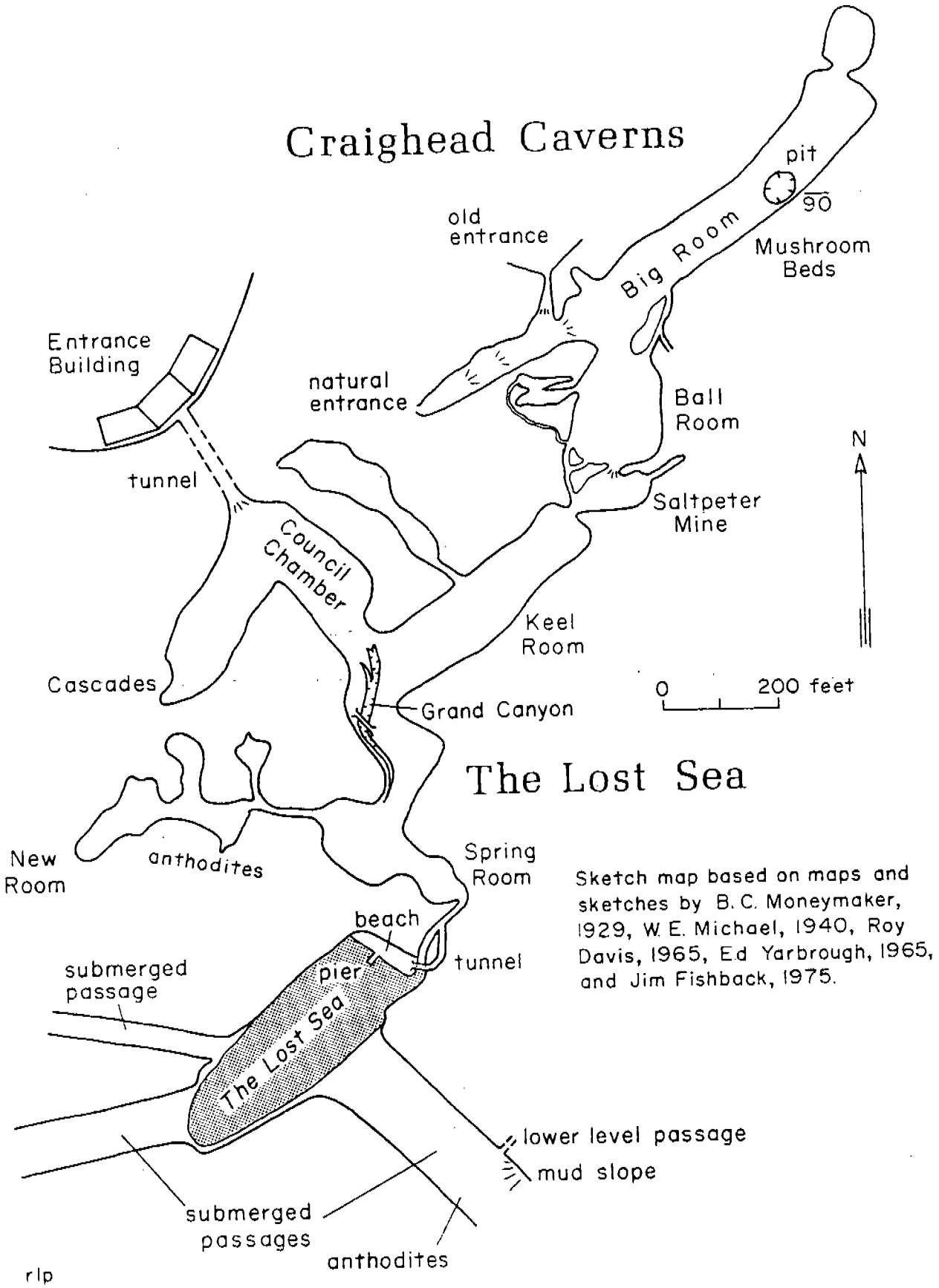
The following account is based on an interview with Jim Fishback, a member of the Lost Sea Expedition.

THE LOST SEA EXPEDITION

Bill Schenck, a National Association for Cave Diving (NACD) diving instructor, conceived the idea of a Lost Sea Expedition in 1972 after visiting the Lost Sea. He submitted several proposals for cave divers to explore the lake but was turned down for 3 years by the owners of the company. Finally an agreement was worked out where by the owners would pay the expenses of the expedition members and would control the publicity. The expedition team members were approved by the company board of directors. All divers were certified by the NACD.

A survey of the perimeter of the Lost Sea lake surface was conducted prior to the cave diving expedition. Bill Schenck, Victor Sparks, Jim Fishback, Dave Smith and his wife made up the survey team. A transite was set up on the pier to obtain accurate fixes on locations along the lake walls. Trying it set the transit to magnetic north using the sensitive transit compass was impossible. The "I" beams in the pier and the operating electric tour boats caused the compass needle to swing eratically. The diver's compass was not sensitive enough to be affected by stray magnetic fields and was used for north alignment.

Unfortunately, Bill Schenck was unable to participate in the cave diving expedition.



Sketch map based on maps and sketches by B. C. Moneymaker, 1929, W. E. Michael, 1940, Roy Davis, 1965, Ed Yarbrough, 1965, and Jim Fishback, 1975.

Tom Mount, leader of the expedition, is a diving officer for the Rosensteil School of Marine and Atmospheric Sciences, University of Miami. Besides being an NACD cave diving instructor, he has written several books on cave diving.

Victor Sparks is the chairman of the local cave diving committee and is also an NACD instructor. He works in the laboratory at Olin Chemical Corp. in Charleston, Tennessee.

Sharee Pepper is a marine biologist and is a civil service employee of the Air Force in Montgomery, Alabama at the Maxwell Air Force Base. She is a cold water specialist and is interested in studying the effects of the 56° F. lake water on the cave divers' performance.

Jim Fishback is a hydrological technician with the U.S. Geological Survey, and is familiar with the problems of lake mapping and surveying. He lives in Muncie, Indiana.

Jimmy Wyatt, an NACD instructor, and Jeffery Davis, both from Ringold, and Mac Fair from Dalton, Georgia took part in the diving.

First Day (September 17, 1975)

Dr. Lash, who had explored the lake, gave the expedition members a tour of the lake. The lake is 150 feet wide and 450 to 500 feet long. The ceiling is more than 50 feet above the water at its highest point. Dr. Lash pointed out some of the most promising places to dive. The rest of the day was spent organizing the expedition. The diving equipment was transported down to the lake by the Lost Sea personnel on a wagon pulled by a garden tractor. Divers sat on top of the equipment to give the vehicle more traction on the steep underground trail, but there was yet almost a wreck when the electric wheel breaks failed on the wagon and the tractor narrowly missed a guardrail.

Second Day

Tom and Victor changed into dry suits in a room near the lake which had heat and light. They wore double tanks and used quartz-halogen hand lights during the exploration dive. Initially the visibility underwater was estimated to be 50 feet as they explored the northwest side of the lake beside the beach. They discovered a unique problem with this cave which would plague the expedition during the six days of diving. The ceiling of the submerged cave was composed of loose shale layers. When divers entered the submerged passages, their exhaust bubbles dislodged clay and shale and large pieces of material would drop from the ceiling. The rocks were generally 2 to 3 inches across but at times sections as large as 9 feet by 4 feet by several inches thick would break loose. The divers normally swam single file but it was necessary to swim side by side in as much as a tailing diver might be hit by falling shale slabs. The divers found they could not retrace their course on leaving a passage since the ceiling material continued to fall long after the divers had passed. The air bubbles worked upward into the shale layers dislodging more material. The unstable material was estimated to be three feet thick. Fortunately the passages were wide and the divers could move over 30 feet to the side and come out of the cave without swimming under the falling material.

There is no unstable ceiling material in the dry sections of the cave.

During the afternoon, a reporter and photographer from the Madisonville newspaper came to the Lost Sea and interviewed the divers.

Sharee and Jim made the second dive exploring along the southeast wall. They encountered the same unstable ceiling conditions that Tom and Victor had found. The lefthand wall of a submerged cave was explored back 100 feet. The floor of the cave was covered with clay which sloped up to the ceiling with no distinct walls in much of the area explored. There were no projections in the passage on which to anchor the safety line. The absence of line tie points and the instability of the ceiling were problems which forced a change in the exploration plans for deep penetrations into the submerged system.

The clay in the cave was also an annoyance to the divers. It would stain clothing so deeply that it would not wash out. In fact, the clay has been mixed with buttermilk and used as paint. Some buildings in the vinicity of the cave still have a red coating of *buttermilk paint.*

Only two dives were made due to the fact that the air compressor had not arrived yet and there was not sufficient air to continue exploration. That evening Jimmy Wyatt, Jeffery Davis and Mac Fair arrived to help support the expedition.

Third Day

Jimmy and Jim drove over to where the compressor was stored and worked on it all day. They finally got the machine working that evening and brought it over to the Lost Sea.

Tom and Victor explored further along the left wall of the passage that Sharee and Jim had entered the day before. Back about 300 feet into the passage they found a mud slope which went up and the ceiling also rose above it. The slope looked unstable so no attempt was made to swim up it for exploration because of the possibility of a mud slide. Near the slope was a 7-foot wide passage in the wall that went deeper than the section the divers were in. This passage was not explored because it was close to the the mud slope.

Sharee observed the effect of cold water on the performances of the divers.

The divers saw many trout in the lake which has been stocked with 8-inch trout by Craighead Caverns Company. Food is thrown into the water during the tourist boat rides which is the only apparent source of food for the fish. They are agressive feeders and provide quite a show for the tourists, Some of the trout have grown to 2½ feet long. No other animal life was observed in the lake.

Fourth Day

Jim and Victor planned to explore along the lefthand wall of the passage but their dive was cut short because of material falling from the ceiling. Tom and Jimmy explored along the righthand wall of the same cave passage and at a penetration of approximately 300 feet they swam out of the cloudy water and visibility increased to 60 - 80 feet. They observed cave flowers (anthodites) all over the ceiling in fist size and larger clumps.

The ceiling sloped down from a 40-foot high entrance to a 10-foot high passage along the walls. The floor was 15 feet lower in the center of the passage, sloping gently up toward the walls. Beyond the entrance, the floor was at a water depth of 70 feet and the passage was uniformily 120 feet wide. This was the last exploration into the passage because over half the lake wall had yet to be explored.

Fifth Day

Divers continued to explore the lake wall to the right and encountered another large cave passage at the end of the lake. The water depth to the passage floor was 25 - 30 feet and the passage was about 10 - 15 feet high. The passage seemed to lead straight back away from the lake and was 90 feet wide. The visibility was only 30 feet in the 300 feet of passage explored. The ceiling also fell in the wake of the divers exhaust bubbles. There were no rock projections to tie a permanent safety line to.

The divers estimated that when a permanent line is evenually installed, the ceiling should be cleared after 3 or 4 trips as the air bubbles bring down all the loose rock. Scrap iron, discarded in the lake during construction of the tourist facilities, might serve as safety line anchors in the mud lined passages.

Toward the end of the day the divers started making lake cross section surveys. The lake has underwater lights positioned about every 30 feet along both sides. The cross sections were ran between left and right sets of lights by stringing a marked line for measuring depth and compass bearings to obtain a map of the bottom contours of the lake.

Sixth Day

The lake cross section surveys were continued during the day. Several teams of divers also explored along the northwest wall and apparently found a third cave passage. The direction of this passage was uncertain because of conflicting compass readings.

Sharee, Jeffery and Mac had to leave the expedition and return home.

Seventh Day

On the morning of the last day of the expedition Jim and Tom varified some questionable compass bearings and wall references in the third passage. The cave was estimated to be 40 feet wide and 12 feet high with a maximum water depth to the floor of 25 feet. There appeared to be a slight outward water flow from the passage because silt stirred up at the entrance of the cave moved to the other side of the lake. In this passage there was a circular cave opening in the wall, 3 feet in diameter. Divers looked into the opening being careful not to disturb clay walls and ceiling. A short distance inside the small tunnel made a 90-degree turn and went straight down. The diving lights did not reach the bottom of the hole. Back in the main passage, the divers penetrated about 300 feet before turning around.

With the survey data an accurate map of the lake and submerged passages could be drafted. Tom Mount is in charge of preparation of the data.

There was a press conference in the afternoon at which the discoveries of the expedition were described and explained to the Lost Sea representives and to the newspaper reporters. The personnel of the Lost Sea were praised for their assistance in making the expedition successful.

That evening Jimmy and Jim made the final dive of the expedition. They checked some of the cross section measurements. That night employees at the Lost Sea hauled out the diving equipment. The remaining expedition members packed up their equipment and departed for home.

NOVEMBER EXPEDITION

In the latter part of November, a team of divers placed 300 feet of permanent safety line in the southeast passage. The line was anchored to 5-foot long pieces of reinforcement rod with a large metal washer welded on one end. The rods were pushed into the mud floor and the safety line was tied to the washers.

FUTURE EXPEDITIONS

Victor Sparks and Bill Schenck plan future exploration which will include installation of more permanent safety line and mapping deeper into the three submerged cave passages. Other phases of study are planned. Dye tracing will be attempted to determine the sources and resurgences of water flowing through the lake.

The dry sections of the cave have never been completely mapped. The plane table map by Dr. Moneymaker in 1929 and the survey by Guy Crawford in 1955 show only the large passages in the cave. Other studies in the cave could include geology, paleontology and archaeology.

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DIVING LIGHT ELECTRICAL SHORT

Jim Fishback reported that an electrical short occurred in the lamp assembly of his quartz-halogen light. Before he could get the light shut off, the insulation burned and the copper wire melted which connected the battery case to the hand lamp. The light was not being used for cave diving at the time of the accident. Neither the battery case nor the light assembly sustained any damage. The electrical cable had pulled loose from its terminals in the light which allowed the two conductors to touch causing the short. The short might be prevented by installing cable anchors in the lamp assembly and in the battery case to take the stress off the electrical terminals.

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