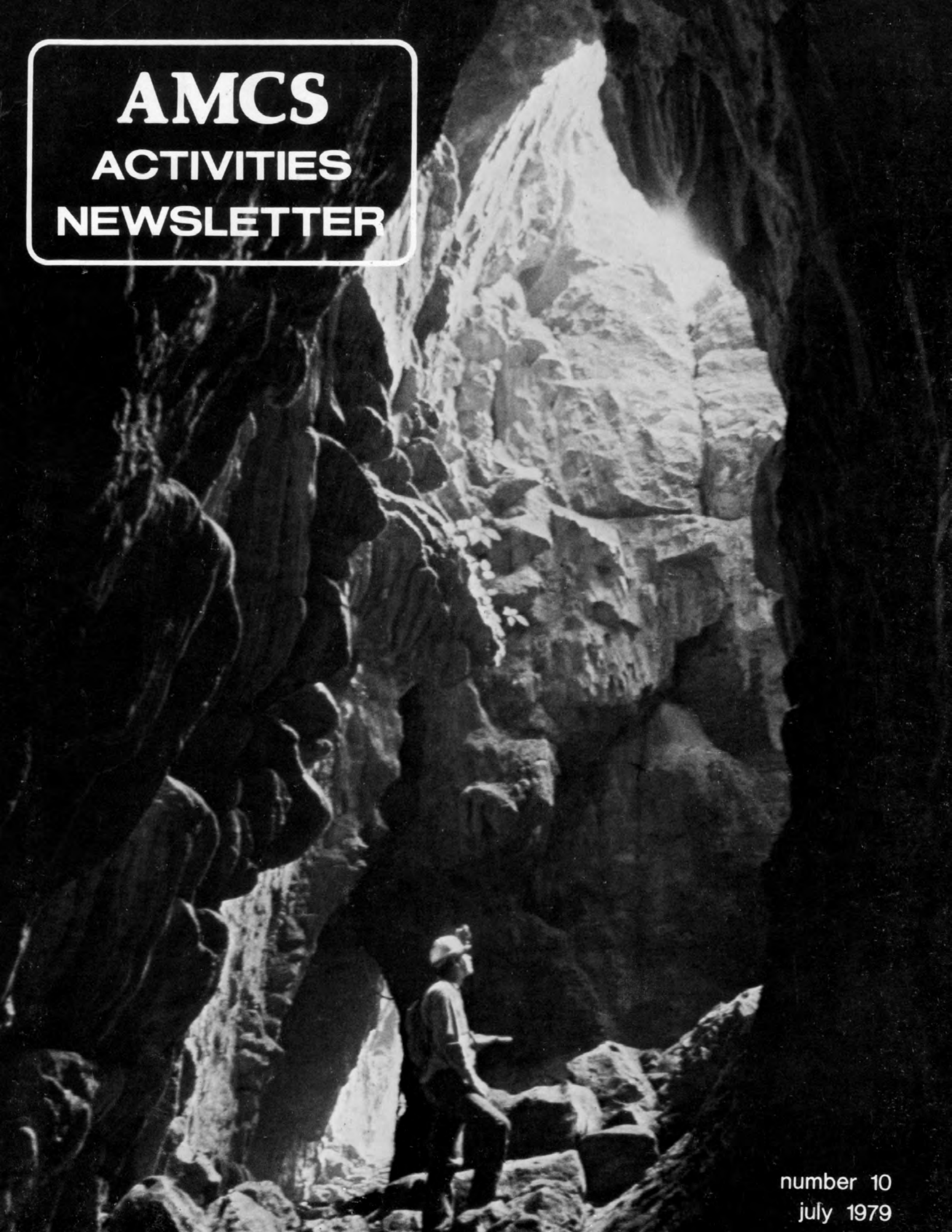
AMCS ACTIVITIES NEWSLETTER



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front cover: Cueva de Ojo de Agua de Manantiales (William Elliott)
inside front cover: Helictites in Sumidero de Jonotla (Ernesto Garza)

AMCS Activities Newsletter

Number 10 July 1979

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The AMCS Activities Newsletter is published at regular intervals by the Association for Mexican Cave Studies, a non-profit group dedicated to the conservation and study of the caves of México. Articles, maps, and photographs on caving and speleology in México are solicited. A list of publications and prices is available on request.

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Editorial

With this issue the Activities Newsletter reaches its tenth volume. What began as an informal seven page summary of trip reports has evolved into the journal you now hold in your hands. While this has been the result of the efforts of a dedicated and enthusiastic staff of AMCS cavers, the real reason is the increase in significant caving activities in México and the resulting demand for published information. Yet even though this issue contains a dozen times more information than the first did, there is much that is still going unreported. Those of you who have things that should be published (and you know who you are), write it up and send it in. And don't be daunted by the grandiose articles on supersystems—even the smallest cave occupies a place in Mexican speleology.

In this issue we are introducing two new departments. A Letters to the Editor section we hope will serve as an effective means of response to the Newsletter's contents, as well as a general forum on Mexican speleology. The Book Reviews column will provide an overview of recent publications of interest to AMCS cavers. Reviews from readers are welcome.

The focus of AMCS caving in the last three years has been on major ongoing projects that have resulted in México's rise to a truly world class status in terms of long and deep caves. One of these is the Cuetzalan area in northern Puebla. Our last two issues, as well as this present one, have featured reports on Cuetzalan in an attempt to disseminate as much information as possible. This has turned out to be an important function for several reasons. Several independent groups from the U.S. and México have been active in the area, and often these published reports are the only way that results of field work are getting exchanged. A glance at the area map of Cuetzalan in this issue will show that the many caves in the area will most likely be joined one day in an enormous system. This will require an organized survey coordination in order to minimize resurveying and inadvertent duplication of effort. A high quality cave system (as Cuetzalan most certainly is) deserves a high quality survey . . . organize!

Peter S. Sprouse

México News

compiled by Peter S. Sprouse

French cavers from the Speleo-Club de Paris report that they have surveyed a side passage off of the river in Gruta del Río Chontalcoatlán, bringing the length up to 5827 meters. This enormous river cave is the sister cave to Gruta del Río San Jerónimo, both of which resurge in the two massive entrances of Dos Bocas below Gruta Cacahuamilpa. Don Coons and crew have also done more surveying in Chontalcoatlán and he hopes to publish an updated version of his map soon.

(Sources: Claude Chabert, Don Coons)

Claude Chabert and members of the Speleo Club de Paris have explored several caves in the Zongolica, Veracruz area, including a major sumidero. Sumidero de Atlaquia, elevation 1245 meters, takes a large stream and the French cavers were stopped by lack of equipment to handle the heavy volume of water. The river is believed to resurge a kilometer away at El Precipicio, 395 meters lower.

(Source: Grottes et Gouffres No. 68)

In April 1979, Mike Schulte led a group of kayakers on the first successful boat trip through the canyons of the Río Santa María between Ayutla and Puente de Díos south of Cd. Valles. The six day trip took them through four major canyons involving many portages, some requiring technical climbing. Cave entrances could be seen high in the canyon walls and several resurgences were located on the north side of the river. Five hundred meters up river from the spectacular Cascada Tamul is a spring flowing an estimated 2 m^3/sec. Two to three kilometers downstream from the cascada, the large entrance to the Nacimiento de Agua Clara carries a 3 m^3/sec stream which soon sumps. It is believed that this is the resurgence for the Río Galena.

(Source: Mike Schulte)

Cavers all across México were amazed at the severe cold front that blew in on New Year's Day 1979. Snow fell in such diverse places as the Purificación area, the Sierra de Guatemala, Sótano de las Golondrinas, and Sótano del Buque. In tropical Cuetzalan, the freeze threatened the coffee crop which is the lifeline of the local Indian population.

Winter caving in Cuetzalan. (Bill Liebman)

A group of Kentucky cavers led by Don Coons and Sheri Engler has finished the survey of Boca del Río Apetlanca, Guerrero at 2750 meters. After they first discovered the sumidero entrance several years ago, another entrance was found over 150 meters lower where the river resurg-

México News

ed. Pushing up this, they were eventually stopped by waterfall climbs. The sumidero entrance was subsequently pushed down waterfall cascades and slides to a sump. The cavers probed the sump but could not find a way on. Returning to the resumidero entrance, they scaled the waterfall climbs upstream to the sump and popped right through it in a short duck off to one side.

(Source: Don Coons)

The federal government is studying the possibility of establishing a 3500 hectare forest reserve near Rancho del Cielo, Tamaulipas. This is a unique area of "cloud forest" located on a shelf in the eastern Sierra de Guatemala at 1200 meters elevation. There are several caves in the area of biological importance. Land use in the El Cielo region was an issue in the mid-1960's, when Frank Harrison of Rancho del Cielo opposed a group of lowland agronomists who wished to develop the land for agriculture. Harrison maintained the land was unfit for farming activities which would damage the ecology - a position which eventually cost him his life. The cloud forest is now on the verge of receiving the protection he desired. The Secretaria Forestal y de la Fauna plans to establish a research station in the reserve - a "micro-region unlike any in the country, with four different climates."

(Source: El Diario de Cd. Victoria)

A ceremony honoring Andrés Ortega, guardian of the federally operated show cave Grutas de Juxtlahuaca, was held recently with nearly 100 persons in attendance at the event. Sponsored by Jorge Ibarra Soto of the Asociación Méxicana de Espeleología, representatives of Mexican caving clubs as well as officials of the state of Guerrero and the Secretaria de Turismo presented Sr. Ortega with a certificate of appreciation for his work in preserving the cave. Juxtlahuaca is known as one of the most beautifully decorated caves in México and also contains many Olmec burials. Andrés has become known amongst cavers as a knowledgeable guide who delights in taking the adventurous wading through guano pools into the far reaches of the cave. A plaque was also placed inside the cave during the ceremony.

(Source: Jorge Ibarra S.)

When Mike Boon left his old caving car with Jerry Atkinson in Austin, he certainly couldn't have anticipated the chain of events which followed. Dubbed the "Boonmobile", Jerry used it to drive to Huautla, Oaxaca for the spring expedition. Once there he realized it needed a new set of tires to get it back to the U.S. That would cost more than it was worth, he reasoned, so he left it with anthropology researchers Cindy Perlman and Cathy Rountree to sell, if they could. They couldn't find a buyer, but managed to trade it for a burro - the "Boonsburro"! The burro didn't last too long however, as it received a broken leg when kicked by a drunken Indian at a town festival and had to be "put to sleep." The family of the borracho offered reparation in the form of a goat as a replacement! And the next incarnation in the chain of events? ¿Quien sabe?!!

International News

compiled by Peter S. Sprouse

AUSTRIA

European cavers are continuing to make pushes in the upper reaches of the amazing Lamprechtsofen. A Polish expedition has reached three different points higher than 1000 meters: +1004, +1005 and +1014 meters. Work in these upper portions required a three week bivouac. Including the 10 meters below the entrance, this makes the system 1024 meters deep.

(Source: Paul Courbon)

FRANCE

A major river has been discovered in Gouffre des Vallon des Soufirs above the famous Fontaine de Vaucluse near Forcalquier. The Vaucluse Spring itself has been the focus of speleological interest for some time, having first been dived in 1898 to -23 meters. The most recent dive was in 1967, when a robot diver, the "Telenaute", stopped in a narrow passage at -106 meters, still going down. The spring has an average flow of 29 m^3/sec.

In the Vallon des Soufirs, blasting in a fissure at -30 meters led to the discovery of a 700 meter meander with a 10 l/s stream. At -150 meters the stream tumbles down a 103 meter shaft, followed by other shafts dropping to the 600 meter level. Here a large river, "Le Collecteur", swells the flow to 100-200 l/s. This river sumps out, but several unexplored pits may provide a bypass. If so, French cavers may be able to drop the 220 meters to the Vaucluse Spring.

A diving attempt in the Gouffre Berger in September 1978 succeeded in increasing the depth from -1141 to -1148 meters.

(Source; Paul Courbon)

USA

Wyoming's Fossil Mountain Ice Cave has been the scene of recent significant breakthroughs. Cavers have surveyed 2530 meters of passage with a vertical extent of over 122 meters. Good leads blowing air continue upward, toward a plateau 250 meters higher. In early June 1979, Chris Albers and Warren Anderson entered the cave but were halted by an ice blockage in a small crawlway following the second drop. Undoubtedly significant discoveries will be made later in the season.

(Sources: Warren Anderson
NSS NEWS)

The length of West Virginia's Organ Cave has finally been settled, after years of speculation. Often referred to as the Incredible Shrinking Cave, the D.C. Grotto spent 1-1/2 years computerizing the survey data to produce a surveyed length of 57,376 meters. This makes it third longest in the U.S. and eighth in the world.

(Source: D.C. Speleograph)

International News

Mapping efforts in the same area of West Virginia have also sent several caves climbing up the charts. The Hole, in a remapping project by WVACS and Pittsburgh cavers, topped 33.6 kilometers in March, with a lot of passage remaining. Culverson Creek Cave, also being resurveyed by WVACS, now stands at 22.7 kilometers. In McClung's Cave, a new entrance has stimulated mapping activities, bringing the length up to around 24 kilometers. The Friar's Hole System survey coordinated by Dug Medville stood at 45.8 kilometers in early July. Current projects include excavating new entrances.

(Sources: Bill Falvour, Dug Medville, NSS NEWS

Jewel Cave, the South Dakota maze cave explored primarily by Jan and Herb Conn, recently passed 100 kilometers in length. Thus there are now five caves in the world over 100 kilometers long.

(Source: NSS NEWS)

In California, the Bigfoot Cave survey totaled up to 11,651 meters at the end of the 1978 season. This pushed it past Lilburn's Cave, for many years California's longest.

(Source: NSS NEWS)

The World's 1000 meter systems

1.	Complexe de la Pierre Sainte-Martin, France	1332
2.	Systeme Jean Bernard, France	1298
3.	Gouffre Berger, France	1148
4.	Schneeloch, Austria	1086
5.	Sima GESM, Spain	1074
6.	Lamprechtsofen, Austria	1024

Note: The depth of Austria's Hochlecken-Grosshohle, previously listed as being 1022 meters, has now been adjusted to 890 meters.

(Source: Paul Courbon)

Long Caves of México

Peter S. Sprouse

1.	Sistema Purificación, Tamaulipas	27,962
2.	Sistema Cuetzalan, Puebla	17,200
3.	Sótano de San Agustín, Oaxaca	12,364
4.	La Grieta, Oaxaca	8,913
5.	Sótano del Arroyo, San Luis Potosí	7,200
6.	Actún Kaua, Yucatán	6,700
7.	Gruta del Río Chontalcoatlán, Guerrero	5,827
8.	Gruta del Río San Jerónimo, Guerrero	5,600
9.	Grutas de Juxtlahuaca, Guerrero	5,098
10.	Sumidero de Atepolihuit, Puebla	5,000
11.	Cueva del Nacimiento del Río San Antonio, Oaxaca	4,570
12.	Cueva de la Tinaja, San Luis Potosí	4,502
13.	Sótano de Japonés, San Luis Potosí	4,500
14.	Sumidero de Jonotla, Puebla	4,500
15.	Sótano del Río Iglesia, Oaxaca	3,800
16.	Sótano de Agua de Carrizo, Oaxaca	3,732
17.	Cueva del Río Jalpan, Querétaro	3,440
18.	Actún Xpukil, Yucatán	3,353
19.	Cueva de la Laguna Verde, Oaxaca	3,350
20.	Sumidero Yochib, Chiapas	3,316
21.	Cueva de El Chorreadero, Chiapas	3,280
22.	Sistema de Montecillos, San Luis Potosí	3,022
23.	Sótano de Huitzmolotitla, San Luis Potosí	3,002
24.	Sótano del Tigre, San Luis Potosí	3,000
25.	Boca del Río Apetlanca, Guerrero	2,750
26.	Actún Loltun, Yucatañ	2,682
27.	Sima Esteban, Puebla	2,500
28.	Gruta de La Joya, Guerrero	2,500
29.	Cueva de Juan Sanchez, Oaxaca-Veracruz	2,493
30.	Grutas de San Cristobal (Rancho Nuevo), Chiapas	2,250
31.	Xocomanetlán, Guerrero	2,223
32.	Grutas de Estrella, México	2,100
33.	Sótano de Yerbaniz, San Luis Potosí	1,980
34.	Grutas de Tenextepec, Puebla	1,920
35.	Cueva de La Mantilla, Michoacán	1,900
36.	Cueva de la Puente, San Luis Potosí	1,830
37.	Cueva Tecolo, Puebla	1,830
38.	Cueva San Francisco, Chiapas	1,750
39.	Sótano de Matapalma, San Luis Potosí	1,722
40.	Grutas de Balankanche, Yucatán	1,600
41.	Cueva de Los Sabinos, San Luis Potosí	1,500
42.	Zacatecolotla, Guerrero	1,500
43.	Cueva de Tasalolpan, Puebla	1,400
44.	Agua Carlota, Oaxaca	1,400
45.	Sumidero de Tenejapa, Chiapas	1,400
46.	Gruta Cacahuamilpa, Guerrero	1,380
47.	K'ocho', Chiapas	1,360
48.	Sumidero Chicja, Chiapas	1,270
49.	Sótano de Sauz, Chihuahua	1,230
50.	Sumidero de Cohuatichan, Puebla	1,200
51.	Cueva de La Peña, San Luis Potosí	1,200
52.	Sótano del Buque, Querétaro	1,149
53.	Gruta del Precipicio, Nuevo León	1,090
54.	Sumidero de Oyamel, Tamaulipas	1,040
55.	Cueva del Porvenir, Coahuila	1,000

Deep Caves of México

Peter S. Sprouse

1.	Sistema Purificación, Tamaulipas	893
2.	Sótano de San Agustín, Oaxaca	861
3.	Sótano de Agua de Carrizo, Oaxaca	848
4.	La Grieta, Oaxaca	760
5.	Cueva de Diamante, Tamaulipas	621
6.	Sótano de Trinidad, San Luis Potosí	559
7.	Sótano del Río Iglesia, Oaxaca	535
8.	Sistema Cuetzalan, Puebla	530
9.	Sótano de Nogal, Querétaro,	529
10.	Sótano de las Golondrinas, San Luis Potosí	512
11.	Hoya de las Conchas, Querétaro	508
12.	Sótano del Buque, Querétaro	506
13.	Hoya de las Guaguas, San Luis Potosí	478
14.	Cueva de San Agustín, Oaxaca	458
15.	Sótano del Barro, Querétaro	455
16.	Sótano Itamo, Veracruz	454
17.	Sótano de Tlamaya, San Luis Potosí	454
18.	Cueva de La Peña, San Luis Potosí	448
19.	Sumidero de Atepolihuit, Puebla	443
20.	Sótano de La Joya de Salas, Tamaulipas	376
21.	Cueva de El Chorreadero, Chiapas	345
22.	Cueva de Xocotlat, Puebla	339
23.	Grutas de San Cristobal, Chiapas	330
24.	Sotanito de Ahuacatlán, Querétaro	320
25.	Hoya de Zimapan, San Luis Potosí	320
26.	Cueva de Santa Cruz, Oaxaca	314
27.	Sótano de Javalín, Querétaro	308
28.	Sótano de los Monos, San Luis Potosí	291
29.	Sótano de Soyate, San Luis Potosí	287
30.	Cueva del Rancho de Agua Amarga, San Luis Potosí	283
31.	Sótano de Vasquez, Tamaulipas	275
32.	Sótano de Huitzmolotitla, San Luis Potosí	245
33.	Sótano del Macho Rey, Querétaro	244
34.	Sótano de Otates, Tamaulipas	244
35.	Pozo Melendez, Guerrero	229
36.	Sótano de Ojo de Agua, Querétaro	228
37.	El Sotanito, Querétaro	225
38.	Sótano de Sendero, Tamaulipas	223
39.	Sótano de Sauz, Chihuahua	220
40.	Sótano de Coatimundi, San Luis Potosí	219
41.	Sótano de la Cuesta, San Luis Potosí	217
42.	Sótano de San Francisco, San Luis Potosí	217
43.	Sótano del Arbol Sangre, Tamaulipas	216
44.	Sumidero Yochib, Chiapas	213
45.	Sumidero de Tenejapa	209

all units in meters

Yucatán . . . by bicycle !

Jim Pisarowicz

Through a strange set of circumstances (involving anthropologists, Vietnamese war refugees, and psychologists), I found myself getting off an AeroMéxico flight in Mérida, the capital of the Yucatán, on March 29, 1978. My trip had been a long one, leaving Denver at 4:00 AM and involving an eleven hour layover in Houston. The flight from Houston arrived Mérida at 10:00 PM. Rushing down to customs I saw a bewildered official looking at my luggage--two small, and one LARGE box. He motioned that I should open the large one, which I did. "¿Una bicicleta?", he asked. "Si," I replied. He was confused, but I was not, as my means of transportation for this bizarre caving trip was to be a bicycle.

To experience an area like the Yucatán a bicycle is an ideal conveyance. My goal was to see many of the Mayan ruins and to locate and explore any caves that I should find in the process. Since most of the Yucatán is just one flat, or at times rolling, karst plain, a bicycle provides an inexpensive, enjoyable means of transportation. By combining this slow means of transportation with an almost complete immersion in the environment, the areas that I traveled along could be checked, quite thoroughly, for caves or any other interesting karst features.

From Mérida I traveled south toward the major ruins of Uxmal and Kabah. From a geological point of view, this was a spectacular ride. From Mérida to Muna one travels across a vast, flat karst plain. Here the soil is only a few centimeters thick and no surface water is seen. Dolines can be seen immediately to the side of the road and off in the distance. Small cave entrances dotted the roadsides and I stopped to check several of these. Most were small, crawling type caves that pinched down to nothing within 10 or 15 meters. Along the route to Muna I stopped at my first cenote -- Cenote de la Culebra for a quick visit.

Actún de Henequen

Although I was finding many small caves, nothing of any significance was found early that morning of the first day. But then, while stopping to take a landscape photo (which I never did take) I saw a large iguana run across the road. Thinking that I could perhaps get a good picture of it I followed him off the road and into the thickets. About 100 meters from the road I lost the creature (or rather it lost me) but there I found a small sink-

hole with a 3 meter cave entrance. I immediately crawled in as far as the sunlight went and it obviously continued further. I literally ran back to by bike to get my carbide lamp.

Chaining my bicycle to a small tree in the thickets I rushed back to the newly found cave. There I fired up my lamp and proceded into the darkness, now lit by the warm, familiar glow of the acetylene flame. The passage was straight forward and I crawled and walked down it about 100 meters when suddenly I was confronted by a half buried wall built out of limestone blocks. To the right the passage continued so I followed that trend until it was getting tight (perhaps 50 meters beyond the wall). Being alone, I did not want to push my luck and I returned to the now mysterious wall.

Since walls are usually built for a reason, and it was apparent that I was the first person in the for some time, I attempted to get through the wall by kicking it down. Unfortunately, I was only wearing tennis shoes and with such excavation tools as these I initially made no headway. Just as I was about to give up this venture, the right side of the wall fell in. I quickly enlarged the hole and squirmed my way through. The cave continued on in the direction of the entrance trend. With excitement running high, I decided to exit the cave to get my Suuntos and my surveying chain (actually a 10 meter tape only marked every half meter), for here was surely a cave worth mapping.

I almost could not find my bicycle and had to return to the road to get my bearings. Finally I was back at the cave entrance, survey equipment in hand. Using my bicycle leg light for the point of the survey station, I crawled back and forth setting stations and sketching the passage as I went. Since I had never solo surveyed before, I did not know what would constitute a good pace, but I thought that I was making good time. After surveying the entrance and the right hand lead, I started through the wall. My pace now seemed almost frantic as I shuffled forward and backward setting stations and taking readings. About 100 meters past the wall, following an ever downward trend, I entered a large chamber. This chamber was about 20 meters in diameter, and there I immediately confronted a large lake. This lake I christened the "Grande Chen" (chen means "well" in Mayan)--and a Grande Chen it was. It was nearly as wide as my survey tape and it looked deep. Here was perhaps another entry into the famous subterranean lake system of the Yucatán.

Skirting the lake and surveying the large chamber that I was in, I became even more excited when I discovered a series of pictographs and carvings on the far right hand wall of this chamber. The excitement of these finds were intense and I had to sit down for a few minutes. "If I had only brought the flash for my camera," kept going through my mind.

Spurred on by these discoveries, I continued my survey through a wide passage, perhaps 5 meters in width. For over 200 meters this corridor continued in an almost straight line. Finally this major trend pinched but it was apparent that the terminal spot was near the surface. Digging with my hands confirmed this notion as the soil began to fall into the passage from above. Minutes later I was pulling myself to the surface and found myself in the middle of a henequen field. Overjoyed at the prospect of a truly significant find I buried the henequen field entrance and trotted back to my bicycle. When I returned to Mérida (in a week), I reported my find at the museum of archeology there.

Returning to my bicycle, I packed my carbide and changed into my cycling shorts. With the energy that comes from a sense of great excitement, I bowled my way on to Muna.

Uxmal, Actún Treinta y Seis, Actún de Abeja Picadura

At Muna the flat coastal plain rises abruptly into the Puuc Hills and the countryside changes to a rolling karst plain that gains altitude as you proceed further south. This area was a pleasure to cycle as the rolling expanse provides for a variety of gear pushing and a change of scenery. Twenty kilometers later I was pedaling up a rise and there in the distance I could see the outline of the Piramide del Adirino (Pyramid of the Magician), the prominent ruin of Uxmal. Minutes later I was walking up to the top of this ancient structure to again experience the mysticism of the ancient Mayans.

From Uxmal my travels continued south for I was heading for the village of Bolonchén (Mayan: "Bolon = nine and "Chen" = wells) to visit the famous caves: the Grutas de Xtacumbilxunam. Fortunately this road not only took me to Bolonchén, but also by several interesting caves.

My cave count had by now reached 35 when I chanced to see what looked like several interesting cave entrances in a round hill only half a kilometer away. Again hiding and chaining my bike off the road, I put my carbide lamp, my bikelight, and survey gear into my pack and started off through the jungle, chopping my way through with my machete. Half an hour later, I found myself confronted by no less than three cave entrances.

Since this was my 36th cave of the trip, I dubbed this cave system Actún Treinta y Seis. When I entered I was surprised to find that all three entrances led into one large, low ceilinged room. This chamber was fully 100 meters wide. Situated between two of the entrances in this large room was a short column (seemingly holding up the ceiling).

Piramide del Adirino at Uxmal. (Edward Ranney, Stonework of the Maya)

Interestingly enough, the major passage of the cave split into three sections here, all trending down. I chose to follow the middle corridor. Within 30 meters this dead ended. My hopes of finding another truly long cave were momentarily shattered. I headed back to the junction.

This time I headed right. Here the passage was relatively large (5 meters wide) and I could nearly walk as the ceiling at times approached 2 meters. Again I went into my now familiar shuffle routine with Suuntos, tape, and bicycle light. One hundred fifty some meters were thus surveyed in the right hand passage until both going leads at the end of this trend got tight. Solo caving, far out into the jungles of the Yucatán, are no time for heroics.

Satisfied with my progress I again returned to the junction. It was now time to follow the left trend. For 75 meters the surveying was like a breeze. The passage was wide (5 meters) and nearly high enough to stand in. Then I encountered a relatively large breakdown room. This room had a higher ceiling (5-7 meters) and was approximately 20 meters in diameter. Almost deciding to turn back at this point, I instead continued on through the breakdown and again found a similar passage as the one I had been following. This continued on for another 70 meters until it again got tight (but still going). I decided to call it a day.

Just before I crossed the border between the Yucatán and Campeche, another cave entrance caught my eye. Tearing out my caving gear once again, I parked my bicycle in the cave entrance and started in. With bicycle light glowing red, I shot a series of compass bearings back to the two ends of this small cave (total survey 107 meters) and started out. Unfortunately I decided to exit through the second entrance and ran into a series of bee hives there. Running quickly back into the darkness of the cave did not stop me from getting stung several times and thus the name of this cave, Abeja Picadura.

(Jim Pisarowicz)

La Gruta de Xtacumbilxunam is relatively easy to find since it is just south of Bolonchén and there is a sign pointing down a dirt road to this cave. Bicycling down this road was not too pleasant but luckily the cave is only one kilometer off the main road.

This cave is relatively famous in this area of Campeche since in ancient times when all the wells in this area would dry up people would have to enter the cave to get water. Extensive series of ladders were built in the cave to get down to the water level.

Arriving at the entrance to Xtacumbilxunam I was greeted by a young Mayan boy who quickly pulled out his flashlight and asked, "¿Gruta?" My reply was a simple, "Si." He then motioned that I would need a flashlight and I replied by pulling out my carbide lamp. The boy was clearly confused until I fired up the lamp. We both then proceeded down a series of steps built in the large arroyo in which the cave is located.

This was truly a tropical cave as banana trees almost blocked the large cave entrance. Down more stairs built into the cave, past some relatively poor displays of stalactites and stalagmites, and finally into a large chamber, I followed this young Mayan.

The chamber of Xtacumbilxunam is actually quite impressive. Two skylights illuminate the chamber, drawing light from the surface 60 to 70 meters above. To venture further into the cave you need to rappel down a short drop of only 12 meters or so. I did not have any rope with me but there was an old wooden ladder leading down into the depths. I was so game to go caving that I decided to try the ladder. My Mayan friend was too frightened to follow (perhaps he knew something I did not).

That ladder climb was one of the all time frightening cave experiences in my life and I would not recommend it to anyone. But the ladder held. From the bottom of this chamber a path led down. This passage continued and another ladder was encountered (oh well, I did the first one didn't I), and another and finally down to the water. I figured the vertical relief of the cave to the water to be about 125 meters and around 400 meters of cave to traverse to get to this point. Large stalactites can be seen once you are in the cave and this cave deserves serious consideration if you are in the area.

Climbing out of the cave proved to be a bit of a problem, but soon I rejoined my Mayan comrade and we proceeded together out of the cave. Although the boy did not want to be paid for his guide service, (to my surprise), I gave him a 5 peso coin and he appeared happy.

While bicycling through Campeche I found one other cave that I surveyed. This cave was about 2/3 kilometer off the road and I happened to see it while searching the hills for likely cave entrances. Grabbing my machete, it was a short chop and a jump to this cave's entrance.

Though this cave had three entrances like Actun Trienta y Seis, it was not nearly as extensive. Again all three entrances led into a large low entrance chamber. This room was about 50 meters wide and 75 meters long. Two leads go off the back of this room. Both were tight where I gave up surveying.

I called this cave Cueva de Pech since when I got back to my bicycle I found that I was covered by small ticks (Pech = tick in Mayan). I quickly dusted off my pants and then

proceeded to find 78 ticks on my body. Twenty-three were attached and I had to use my carbide lamp to give them an "assist" in exiting my body. I actually got quite good at this toward the last and hardly singed my body hair.

Author eating lunch at a roadside cave in Campeche. (Jim Pisarowicz)

Cenotes

From a speleological viewpoint, the most interesting "caves" in the Yucatán were the cenotes (Spanish corruption of the Mayan "Tzonot"). These features appear to be ponds of water on the surface, but these ponds are actually very deep and are essentially open entrances into the Yucatán's subterranean water system.

The most interesting cenote I saw was Xlacah, located at the ruins of Dzibichaltun just 20 kilometers north of Mérida. This cenote is about 20 meters wide and 40 meters long. The long axis is oriented east-west with the east end being swampy and shallow while the west end is deep (40-50 meters). Thus within a relatively short distance this "cave" drops down 45 meters. What is fascinating about this cenote is that the water is so clear that you can see the bottom at the deep end.

Swimming in this cenote is something of an experience. I dove into the deep side and started to swim down as far as I could go. Looking off to the west, underwater, was a gaping borehole type passage dipping down. I could only wish that I would be around when the Yucatán peninsula gets drained. What a magnificent cave system it would yield.

Cenote Sagrado at Chichen Itza.
(Jim Pisarowicz)

The other major surface cenote I visited was at Chichen-Itza, which was used for sacrificial purposes. It was believed that the god of rain lived here and human sacrifices were often made. Contrary to the stories you may have heard, young virgins were not the subjects in these sacrifices.

Unluckily, the Grutas de Balankanche were not open the day I spent at Chichen-Itza, but it was a great speleotour of the Yucatán.

Cenote Xlacah at Dzibilcaltun.
(Jim Pisarowicz)

The Sierra de Guatemala mountain range of southwestern Tamaulipas was among the first major karst areas in México to be investigated by the AMCS. Yet it still remains largely unexplored for caves and has tremendous potential, particularly for deep cave systems. William Elliott and James Redell are currently in the process of compiling information on the known caves of this important area, for future publication as a Bulletin. Recent issues of the Activities Newsletter contain accounts of exploration in the Sierra de Guatemala. Issue No. 8 describes a May 1978 trip to Sótano de La Joya de Salas, and the first diving attempt in the Nacimiento del Río Sabinas, a major karst spring at the base of the range. Issue No. 9 recounts the second dive in the Río Sabinas, and this issue contains Sheck Exley's article on the diving of the same spring to a phenomenal depth of 95 meters, as well as an investigation of the Nacimiento del Río Frío, another resurgence for the Sierra de Guatemala. (Ed.)

Sierra de Guatemala

William R. Elliott

On the evening of 28 December 1978 David McKenzie, Frank Endres and I arrived at a favorite caver camping spot along the Río Frío near Gomez Farías. In the morning we unsuccessfully attempted to locate Cueva del Río Sabinas which is reportedly west of El Encino near the Nacimiento del Río Sabinas. So, that afternoon we decided to get a local guide. We met Mario de Leon Castillo who lives on a rancho north of La Libertad and knows of several caves in the area, one of which he described as having pictographs in it. He and some hunting companions agreed to help us and so began our journey downstream from the nacimiento. After a 45 minute hike involving two river crossings we arrived at Cueva de El Charco de la Cabeza, which by legend was where the skull of a murdured man was found many years ago. The cave lies on the north side of the río about 20 meters above a pool. This wasn't the cave we wanted, but it looked good. The entrance, about 3 meters in diameter, is barely visible through the trees from the río and is at the base of a prominent white bluff. All eight of us entered, and about one hour of biological collecting, photography and exploration ensued. The cave was notable for its many large moths and Ctenus

Opposite: Second lake in Cueva de Ojo de Agua de Manantiales. (William Elliot)

spiders on the walls, and a blind gryllid cricket was taken as well as other fauna typical of the area. A schizomid was seen but it escaped. David sketched the cave, which inclines upward at about 35° for a distance of about 175 meters. The passage is generally 5 meters wide, 2 to 5 meters high, and is floored with flowstone and some breakdown. About 50 meters inside is a skylight. At the end, a short climb up leads to a tight squeeze to the left that even small Frank had difficulty pushing. He went for about 10 meters to where it was too tight to go on.

Cueva de Ojo de Agua de Manantiales

The next phase of our trip took us to Ejido Manantiales, Municipio de Ocampo to re-visit Cueva de Tres Manantiales. This is a cave which has been visited many times in the past by cavers but never mapped or fully explored. We learned from a vigorous 57 year old local, Antonio Barragan, that the cave is actually named Cueva de Ojo de Agua de Manantiales. It is the only source of water for the ejido for miles around. A trail leads about 50 meters into the cave, past an 8 meter high skylight entrance, to a narrow fissure sloping down 9 meters into a large lake. Over the fissure is a wooden platform and a system for drawing water buckets along a standing wire which inclines down to the lake.

We spent 4 days here making biological collections, photographing, exploring and mapping in the cave. The cave entrance lies at the southwest and lowest end of a large cultivated dolina. It is a picturesque, 6 meter diameter arch surrounded by ferns and elephant ears. After photographing the entrances we began the survey. We mapped down the water fetching trail to the fissure above the lake. We found a 10 to 15 meter rope sufficient for descending the drop into the lake. The lake can be crossed by crouching under a ceiling drop to the right and creeping around the right perimeter while trying to keep from sliding along the mucky bottom and off into deep water. A better strategy is to use an inner tube and paddle straight across for 16 meters. The lake is about 4 meters wide and quite chilly. The cave strikes to the SE for 84 meters by way of a vadose-modified, mud-banked fissure to an intersection. Straight on is a scoured flowstone and cemented breccia-lined crawlway which turns left (NE) after 73 meters and becomes a 0.3 meter high, muddy water crawl. We could see for 10 meters into this but did not explore it. Back at the intersection, the main route becomes a cobble-floored, joint-controlled subway which generally bears NE. Extremely strong jointing is evidenced by the high, zig-zagging fissures and striking intersections. The ceiling is about 12 meters high here. At most joint intersections, where the route usually turns, one can look up and see a deeply incised "X" in the ceiling. About 95 meters past the intersection we came to a 2 meter climbdown over clean flowstone to the edge of a deep, clear water passage. We tubed across the 19 meter long, 3 meter deep pool, and were once again in cobble-floored fissure. A major intersection lies 13 meters on and the route takes a left to the NW. We stopped after 50 meters at the top of a sloping drop, ending the day's survey with 422 meters mapped.

The next day we photographed the area near the clear lake, and continued the survey at the drop. The fissure descends steeply and we rigged a rope around a 1 meter diameter cobble which is wedged and cemented at a constriction. A 15

meter long, 9 meter deep, sloping drop then follows, and a 20 meter handline can be used here, although we found a Texas prusik to be helpful on the way back out. After some more zig-zags the cave heads NE again and 25 meters past the handline it gets into 30+ meter high fissure. Another 25 meters later we rigged to a small loophole in the left wall for a 6 meter drop. An easy 80 meter stroll led us into La Sala Grande, a major joint and passage intersection. This room is only about 10 by 15 meters, but from a vantage point at the top of a high mud bank, the 25 to 30 meter ceiling looked impressive. We followed the main route into a 290 meter long section of meanders with mud and cobble banks -- easy mapping. At our last station the ceiling dropped to less than 1 meter and we were 790 meters from the entrance and 44 meters below it. Frank crawled on for about 30 meters and could see another 12 meters or so as the passage meandered back to the left with an undulating mud floor. We left a smoked "X" for our last station on the face of the ceiling drop. Figuring that the cave could continue for hundreds of meters like this, we returned to La Sala Grande and surveyed 30 meters up and over a mud bank to the head of a stream passage which struck off to the SE for about 30 meters to where it turned left. It looked like tubes were in order and ours were two pitches back at the last lake. Tired, hungry and chilled we decided to end our survey here. We had mapped 468 meters, bringing the cave length to 890 meters. It was agreed that wet suits were definitely in order for this cave. In fact, a record cold front had blown in and the lack of wet suits convinced us to abandon the survey this trip and move on to another area for our last two days in Mexico.

Cueva de Ojo de Agua de Manantiales had been collected in before,

David McKenzie in Manantiales. (William Elliot)

but I found two species of pseudoscorpion, an Exochodrilus cricket, and perhaps a few other things not taken before.

Rancho Manzillas

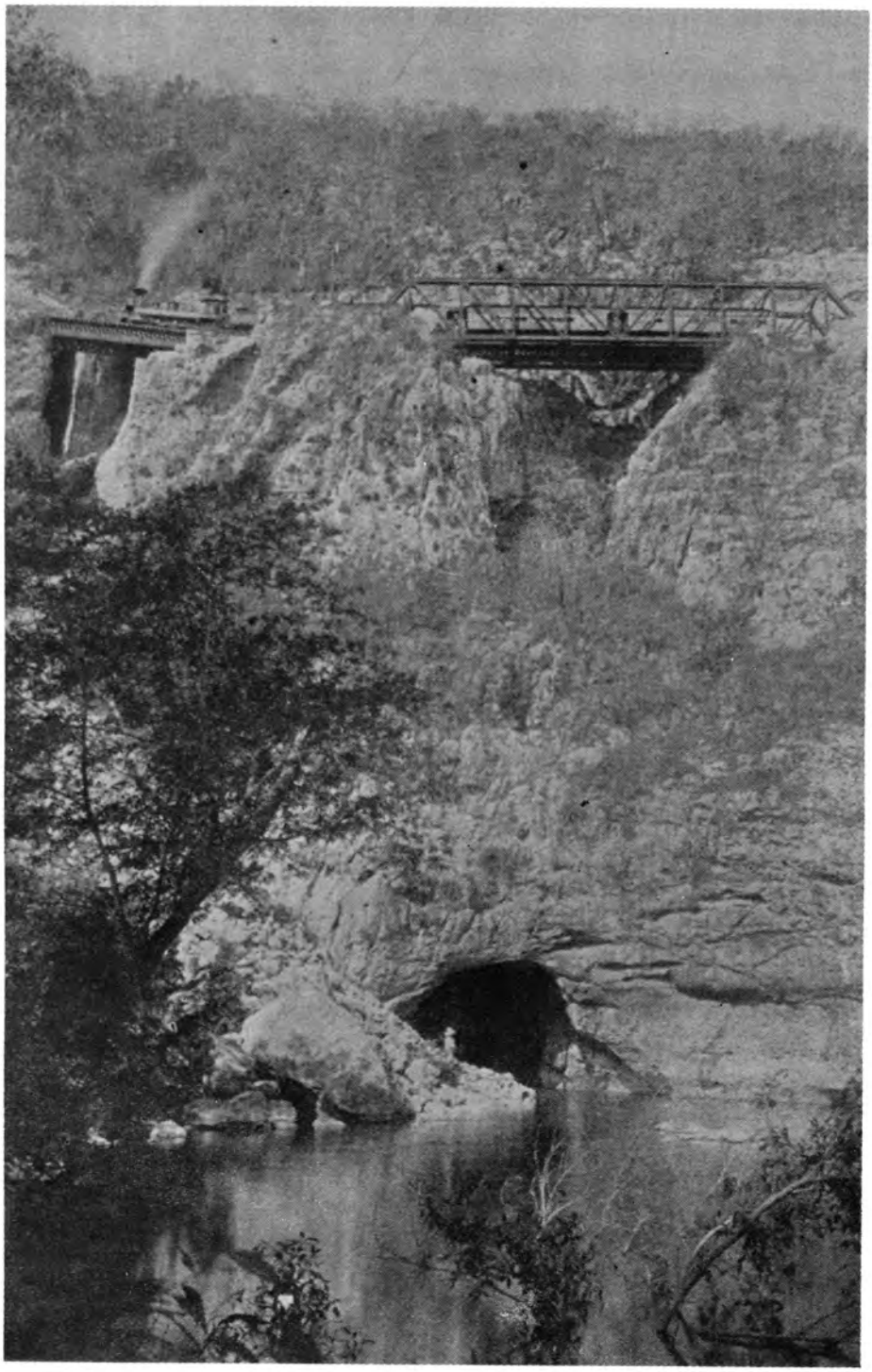
We decided to check a sótano lead at Rancho Manzillas, which is located in the northernmost Sierra de El Abra at the base of the escarpment. A vaquero led us 20 meters up to Sótano de Rancho Manzillas, which David and I spent a couple of hours checking. It is actually two sinks connected by a window-like slit through a wall between them. The first sink is 20 by 30 meters, with a 5 meter pit at the SE end. David

rappelled down and walked through a 10 by 14 meter room and then out through a lower entrance in the bottom of the sink, about 10 meters below the upper entrance. A couple of shelters in the walls led nowhere. The second sink, just up the hill to the NW, is 15 by 40 meters and is 10 to 20 meters deep. I climbed 10 meters down the east side on some large roots to the floor. Halfway down there is a 2 meter diameter entrance to a side passage. This goes 3 meters to an unexplored 6 meter drop with a visible passage at the bottom paralleling the NW-SE axis of the sink. About 2 meters in from the entrance there is a room on the left, about 2 meters in diameter and 3 meters high with a small tunnel sloping down to the east. This was not entered as a loud hissing noise, rather like a mad Boa, precipitated my retreat. At the floor of the sink I saw a large, gray iguana perched on a root. At the NW end of the sink I climbed up into a fissure which soon split in two, the left branch soon pinching off and the right continuing steeply up over flowstone to a skylight. On the west side I entered an 8 meter diameter, 6 meter high room which led nowhere. The SE end led into a fissure which dropped 6 meters to the floor of a 10 meter diameter, 10 meter high room. I entered this by taking a 10 meter long, floor-level crawlway on the west side, but I exited by climbing up flowstone and between some columns. I saw an owl hiding among rocks on the west side of the room, having left its 2 eggs and 2 chicks in their nest on the floor of the east side. The window opens high in the SE wall of the room, onto the previous sink (I assumed). We sketched the place upon returning to the truck and returned to the Río Frío for our last night in Mexico. In the morning we crossed the río on the hand trolley and visited the nacimiento. That afternoon we were back in Harlingen, Texas.

Continued field work in the Sierra de Guatemala

We hope to return to Manantiales and finish the map this summer. There are a number of other known caves and pits in the lowland Sierra de Guatemala which are unmapped or incompletely explored. Cavers interested in assisting in our work in the area should contact me, William Elliot, Ttsum Pesticide Lab, 152 E. Stenger, San Benito, Texas 78586.

Author's Note: "Manantiales" on the Loma Alta topo sheet is actually a place called "Corrales" (for the stone corrals there), and the real village of Manantiales is in the large dolina 5 kilometers by road to the NW of Corrales. We learned from locals that the best way to come from Chamal is via Coahuila, then north to Corrales.



¡ Nacimientos !

Diving the big springs of the Sierra Madre

Sheck Exley

Our 5-vehicle caravan crossed the border at Matamoros on Sunday, 18 March, 1979. While it wasn't planned that way, most of the top deep cave divers in the U.S. were along. This turned out to be a very good thing since most of the nacimientos that we visited were quite deep. Our team included Terry More from Michigan, Dan Lenihan from New Mexico, Frank Fogarty from Kentucky, Paul DeLoach and Ken Fulghum from Georgia, and Dale Sweet, Steve Forman, Jamie Stone, Carol Vilece and myself from Florida.

Aside from a small mordida, the border crossing wasn't much of a hassle, though the sudden appearance of 87 scuba tanks did cause some consternation among the Federales. The following is a summary of our investigations in the underwater caves of northeastern Mexico, during which 32 scuba dives were made. The term "depth" refers to vertical distance below the water surface unless specified otherwise, and the term "penetration" refers to the one-way swimming distance from the underwater cave mouth.

Nacimiento del Río Sabinas

We selected this spring for our first dive not only because it was the northernmost, but also because we had an excellent description of it from accounts of previous dives by Bill Stone and Norm Pace. Anticipating depths in excess of 55 meters, we dived twin 100 cu. ft. steel tanks filled to 3000 psig (giving each diver approximately 227 cu. ft. of air, enough for 7-1/2 hours at the surface but only 70 minutes at 55 meters) and put a couple of cylinders of pure oxygen in shallow water for decompression. Oxygen is much more efficient than compressed air when decompressing to prevent the "bends", and we were very mindful of the fact that the nearest recompression chamber for treatment was in San Antonio, Texas.

On the first dive Dan, Jamie, Carol, Paul and I quickly followed the large, sloping conduit of the spring to the 55 meter level, where the slope steepened somewhat (as Bill Stone had described in AMCS Activities Newsletter #9). Unfortunately, at this point the passage was less than 1/2 meter high - too low for us with twin 100's on our backs -

Opposite: 1893 photo of Nacimiento del Río Choy showing original railroad bridge.

so Paul and I started digging at the cobble floor, releasing vast clouds of silt in the process. After several minutes of this we seemed to be making little progress, so I grabbed the spool and tried over near the left wall, which seemed to be a little higher. Sure enough, I managed to plow on through and the five of us swam on into a sloping passage 10 meters wide by 4 meters high, tying off on the floor at a depth of 85 meters.

As soon as I finished the knots at 85 meters there was a loud blast accompanied by a sharp concussion as one of my two sealed beam primary lights imploded. This is a fairly common occurrence, as the slightest scratch or imperfection will generally cause a sealed beam bulb to implode below a depth of about 60 meters, but was nonetheless distressing since it thoroughly trashed the light and I had to spend a couple of extra minutes gathering up the pieces (we don't like trashing up underwater caves any more than we do air-filled ones).

Our exit was marred by a bottleneck of divers at the 55 meter constriction, where zero visibility (as opposed to the 15 meter visibility we had enjoyed coming in) made finding the best route out difficult, even with the aid of the well-belayed guideline. Since the water was warmer than we had anticipated (about 19°C) and I was trying out my new dry suit, the two hours of decompression stops we required before surfacing weren't too bad.

On our third dive Dale, Steve and Ken extended the line another 18 meters to a depth of 95 meters (a total penetration of 175 meters) reporting another low area just ahead, beyond which the slope appeared to steepen again. We named the impressive area before the 55 meter constriction Sala de Piedra , and the large area beyond it the Pacesetter's Passage in honor of the two original explorers of the cave.

Nacimiento del Río Mante

Since there is some above-water cave at the entrance and plenty of mountain behind it, we were hopeful of finding some big streamway past a short, shallow dive at the Río Mante. However, on dive number 4 (the first dive at Mante), Frank and Terry pulled their way along a 5-8 meter wide by 5 meter high conduit 60 meters to a depth of 13 meters, at which point the bottom dropped out! The only route continued down a long, narrow pit 30-50 meters by 2-4 meters, from which all of the considerable water flow was gushing at a rapid rate. They halted their vertical descent down the pit at a depth of 85 meters. Decompression in the warm (27°C) water was made interesting by the calcite crystal walls and a small troglobitic isopod, which was sighted near the entrance at a depth of 6 meters.

On dive #6, Paul and I ran a branch line horizontally at a depth of 55 meters, then descended diagonally to a depth of 85 meters. On dive #8, Frank and Terry descended to the same point, where they sighted several more of the isopods (preparing to dine on our line?).

On dive #9, Paul and I extended our branch line 18 meters to a depth of 101 meters, at which point (168 meters penetration) we could see the near-vertical pit continuing to

Aerial view of Nacimiento del Río Mante, Tamaulipas. (William Russell)

plunge downward at least 9 meters deeper, making the vertical extent of the pit itself on the order of 102 meters as measured from the roof above it at a depth of 8 meters.* We dubbed it Macho Pit, thinking it ironic that, in this land of dry pits more than 4 times as deep, this relatively (as far as we know, since we never saw bottom) shallow pit may be the most difficult to bottom! Perhaps Frank, who has done some mixed gas cave diving in the Ozarks, will return someday and do the trick.

Nacimiento Media Luna

Even though we were trying to rotate the first dives at each site to different people to keep everyone happy, no one seemed to be interested in diving the night we arrived at Media Luna, so Dan, Paul and I found ourselves making dive #10 here. The water temperature was quite comfortable, 28°C at the surface and 30°C below at a depth of 30 meters, and visibility approached 30 meters of open water at the largest of the 6 spring vents located therein. Unfortunately, the only cave located - the main spring - was small and short, extending to a depth of 48 meters before the strong

*Ed. Note: Interestingly, this total depth of 110 meters puts it 20 meters below sea level, as the elevation of the surface of the spring is 90 meters asl.

current made it impossible to continue. The cave was, however, loaded with pottery, small figurines and bones, which greatly excited Dan, our expedition archaeologist. The high altitude made our decompression interesting since the standard U.S. Navy decompression tables and corresponding stop depths had to be modified considerably.

Nacimiento del Río Verde

While the others logged dives in Media Luna the next day, Paul and I amused ourselves free diving in the spring basin until I surfaced unusually dizzy after a dive to 21 meters and decided that there may be something about holding one's breath at altitude that isn't healthy. Accordingly, we spent the rest of the day looking for this small spring, which definitely wasn't worth it. Any cave at this small, shallow nacimiento will definitely require extensive excavation.

Nacimiento Verde

On the way from Valles to Río Verde we had crossed an unusually clear stream, so we stopped on the way back and repeated for the umpteenth time the only Spanish we knew, "¿Donde está el nacimiento?" - ("Where is the spring?"). To our delight we learned that the spring was less than 0.5 kilometer from the highway, at the base of a nice hill. Accordingly, while the rest of us went off to the Río Huichihuayan, Ken, Frank and Terry made dive #18 here, penetrating 262 meters to a depth of 47 meters. On dive #21 the next day they extended exploration 27 meters further, ascending to a depth of 27 meters. Even though the visibility here was only 3-5 meters and the temperature 23°C, this locale is very interesting in that it is one of the few sites investigated that shows some promise of coming up into air within the range of cave divers.

Nacimiento del Río Huichihuayan

Jamie and Carol did the honors here with single tanks, attempting on dives #16 and 17 to find a route through the cave wreckage at the head of this picturesque river. Unfortunately, they were unable to procede further than 30 meters underwater or deeper than 9 meters, though Jamie did report that at one point he might have been able to continue further if he had removed his tank. This spot also had the coolest water that we dived in the whole trip, 18°C, which struck us as odd because it was also the southernmost site visited.

Nacimiento del Rio Coy

On Monday, 26 March, we got permission to visit this spring, and Jamie, Carol and Dan checked the spring basin, (finding no route through the rubble there), while Paul and I hiked a short distance up the adjacent hill to check out a cave that went down to water level a short distance to a nice submerged pit, which we bottomed at a depth of 58 meters some 79 meters from the point at which the cave went underwater. This excited the other three, who tediously hauled twin 100's and full regalia into the cave, only to find their path halted on dive #20 by excessively strong current a scant 18 meters past where Paul and I had stopped.

Dan located some pottery here on the slope above the pit during decompressions. Besides a scatter of sherds, there was what appeared to be an intact ceramic vessel with the bottom knocked out. It would have been necessary to disturb the context of the material to be sure but it is possible that this item represented a ritually "killed" pot. All ceramics found here and in other springs on the trip seemed to be non-glazed utility ware. It is interesting to note that the dry portion of the cave leading to this water filled fracture is apparently serving as a shrine of some sort at the present time. Many of the limestone projections were covered with freshly laid green leaves and modern Mexican money. There was considerable smoke staining of the ceiling over these areas indicating that candles had been frequently burnt near the apparent offerings. We disturbed nothing and exited with due haste upon realizing the possible sacred significance of the cave we were in.

Ojo de Agua

One of many "eyes of water" in the area, this small intermittent spring a short distance southwest of Cd. Valles was checked while we were looking for Puente de Dios (which we later found out was not a spring but a short natural bridge over the Río Santa Maria). While the water in the 4 meter diameter pool looked a nice clear blue, it was also the source of drinking water for the nearby village. Since we weren't too sure how the locals would react to our muddying up their water, we decided to skip the dive and split.

Nacimiento Taninul

This is one of three springs adjacent to the beautiful Hotel Taninul, none of which looked very promising. There appeared to be a cave at a depth of 7 meters here, but it is choked with debris.

Nacimiento de Moises

Another of the springs at the Hotel, this one is completely enclosed by a picturesque spring house. Although the water was quite clear, it was all coming from a crack only 30 centimeters wide with a maximum depth of 2-1/2 meters.

Nacimiento de Gargaleote

The zero visibility in this hot sulphur spring enclosed by a swimming pool at the Hotel Taninul discouraged any diving investigations on our part. The manager of the hotel, Sr. Medelas, and also the owner, Gaston Santos, related that the spring clears up considerably during the summer rainy season, when most of the other springs get muddy. Later Sr. Santos, reputedly Mexico's premier bullfighter of the Portuguese (on horseback) style, invited us to a very pleasant dinner at his huge ranch when he learned of our investigations at Nacimiento del Río Choy.

Nacimiento del Río Choy

In an earlier AMCS publication I had read where this spring was described as one of the premier swimming holes of the western hemisphere, and after visiting it I most wholeheartedly agree. Fortunately, we avoided the 55 meter rappel from the railroad tracks over the spring by obtaining permission to use the hotel's private road to the spring. On a quick recon dive, Terry and Ken ran a line from a depth of 15 meters some 30 meters to a depth of 38 meters, suggesting that this was just another deep Mexican spring and our attempts to find a nice horizontal system, hopefully with air, would once more be thwarted. However, on dive #25, Jamie and Carol installed approximately 183 meters of line along the bottom of a high canyon passage, finding nothing deeper than 40 meters.

Even though visibility was only 4-6 meters, this was exciting news, so Dan, Paul and I quickly suited up and entered the water. Diving with only partially filled twin tanks, we were nearing our turnaround point on air, (for safety we always allow at least twice as much air to come out on as we use going in), with no sign of the end of Jamie and Carol's line. Because of this and the fact that I was curious about the unseen ceiling above us, I elected to start a branch line and swam up diagonally from a depth of 28 meters at a penetration of 187 meters. After another 50 meters we were at a depth of 5 meters and the telltale quicksilver glimmer of an air space was above us! After 10 minutes of jubilant decompression at 3 meters it was safe to surface, and we found ourselves in a shoreless lake room more than 20

Entrance chamber, Nacimiento del Río Choy. (Bill Stone)

meters long by 5 meters wide with a constant 6 meters or so of air above us. No air-filled leads were visible, so we tied off at 267 meters penetration and headed out.

The following day the three of us decided to run a new line along the top of the canyon, both to conserve air and to check for any more air spaces that might be located along the way. Things got off to a bad start when Dan, wearing twin 100's (which weigh over 100 lbs.), took a tumble while climbing the 2-3 meter falls in the run below the headpool, slightly injuring one arm. Fortunately, he felt good enough to dive after a brief rest.

Despite our intention to stay shallow, we had to descend to a depth of 24 meters near the entrance to find a route large enough to comfortably swim through, but thereafter never had to descend below a depth of 12 meters. Meanwhile, we found five more large air spaces on the way to the one we had discovered the previous day. We also found that the previously discovered sixth air space was much larger than we had previously supposed, most of its 90 meter length hidden by an offset just past where we had stopped the day before. At the end of the air space we dropped all the way to 40 meters before finding a way on, though on the ascent from that depth it appeared that a shallower route might exist along the left wall. The tieoff at 379 meters represented the maximum penetration that was attained on the trip.

Even though it cost us a great deal of added decompression time, we elected to take a deep route out

from the sixth air space to avoid the silt we had riled up along the shallow route going in. We discovered another isopod on the way out, and spent much of decompression in the spring basin examining the remains of a former railroad bridge that according to Sr. Santos was dynamited during the revolution. I also discovered to my surprise that I could not hear the waterfall while underwater above the falls, even though it is very audible above the surface. We had previously supposed that we would be forewarned as to the existence of waterfalls beyond downstream sumps from the noise underwater, but now it appears that this may not be true. Sump divers beware!

On dive #32 Jamie, Carol and Frank extended the deep line another 45 meters to a depth of 43 meters and a penetration of 254 meters. Most of the participants feel that the Choy definitely warrants further investigation and may soon come up into significant air-filled passage.

Nacimiento del Río Frío

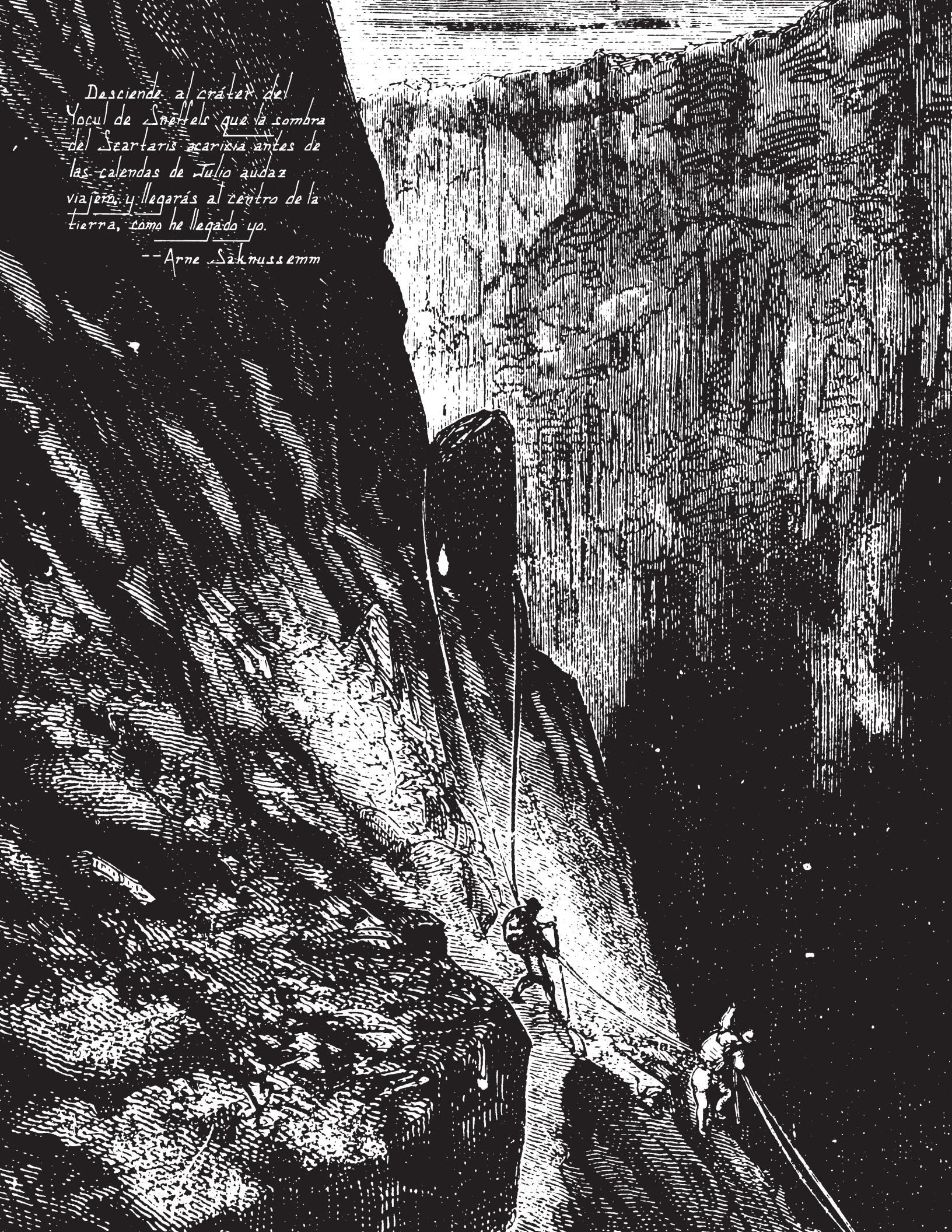
We checked the headsprings and snorkeled the lower spring, but never found any cave here despite the considerable volume of water in the river.

Mapping techniques and Expedition notes

Naturally, underwater surveying does not produce the degree of accuracy common to most AMCS maps. Nevertheless, the compass and "knotted line" method we employ is probably more accurate than most cavers would suppose. One reason for this is that significant errors in linear measurement can be detected easily. Each length of the line is measured against a surveying tape and knotted at precise 10 foot intervals, and the resulting total supply of line is of a known length. Thus, if a 600 foot length of line was laid in the cave, the survey shots should total 600 feet if no errors are made. A compact Suunto diver's compass graduated in increments of 5 degrees at intervals wide enough to estimate the nearest 2-1/2 degrees is used for direction. Ascertaining the depth of each station so we can convert our distances to "true horizontal" is an easy, clinometer-less task, thanks to our depth guages. Getting accurate survey shots between stations in poor water visibility is no problem because we can line up the edge of the compass against the guideline to obtain the proper azimuth.

We discovered a source of compressed air at Infra on 704 Avenida Ejercito Nacional in Tampico, but two of the five sets of twin tanks we had filled there smelled like eau de Greyhound bus and gave Paul a bad headache on a dive at the Choy. It should also be added that cave diving to depths in excess of 40 meters, as described in this report, is a very complicated activity requiring years of experience and highly specialized procedures. It is only because the AMCS Activities Newsletter is not casually available to sport diving enthusiasts and the fact that the information is of speleological value that we have included the depths of the deepest dives in this report.

The Central Sea. (Riou, from Journey to the Center of the Earth)


Desciende al cráter del
Yocul de Snæfels que la sombra
del Scartaris acaricia antes de
las calendas de Julio audaz
viajero, y llegarás al centro de la
tierra, como he llegado yo.
--Arne Saknussemm

By 1979 there seemed only two ways to go deeper in Huautla: Dive or Climb

The 1979 San Agustin Expedition

by Bill Stone

When the Sótano de Agua de Carrizo expedition returned to the States in June 1978 it left many of us wondering just how we had missed hitting it big in the depths of Huautla. We had, since 1976, explored three cave systems down a long series of drops to where each was sitting in the environs of 900 meters deep and tens of kilometers long.

Steve Zeman rappels into the Sala Grande enroute to Camp III (overleaf opposite). (Bill Stone)

Hal Lloyd tackles a typical pitch in the Grand Cascade at -700m (overleaf). (Bill Stone)

The proximity of the three to each other suggested the possibility of a link. As they were perched on an ascending plateau, a considerable difference in elevation existed between the highest known entrances and those down at the bottom of the dolines. A triple connection from Sótano de San Agustín to La Grieta to Agua de Carrizo would yield a system approaching the PSM in depth. There was also a general feeling that passages existed both above and below the known extremities. The question then was where to direct the next attack. As each possible target was going to require a major expedition and thousands of man hours underground, we pondered the question considerably. Guided by what we knew of the hydrology and the computerized map of the survey data we slowly began to piece the puzzle together. As the 1979 season drew near, the objectives crystalized. The target was Sótano de San Agustín, the massive sumidero which barrelled down forty three shafts to a depth of 859 meters. Exploration had been halted there in 1977 when the lead team encountered a sump. The lure was that this was the lowest known point in the system and there was still 500 meters of vertical potential down to where the water burst from the mountain in a giant turquoise spring. Diving the 859 sump, however, was no easy proposition. To get down there with full scuba gear would require a succession of underground camps. Just as high altitude mountaineers progress in stages to the summit, we would have to progress in stages to the sump. The final stage, Camp III, would be one of the deepest underground camps ever set. The dive would be the world's second deepest. We expected to be underground for as much as three weeks during the first push. In addition to this, we planned to optimize the effort by bringing enough rock climbing gear to begin an upward seige toward the high systems should the dive be unsuccessful.

Frame on axle, the first truck left Austin on February 19 to begin the four day journey to Huautla. Tommy Shifflett, Hal Lloyd, Steve Zeman, Dino Lowerey and I were the live cargo -- the advance rigging and diplomatic team for the expedition. Our task was to handle public relations, rent a fieldhouse to be used as a surface base camp, rig to Camp II at -536 meters and establish an equipment depot. This would be the staging platform for Camp III. The main assault would then begin when the second team arrived in early March.

Despite all this planning the expedition got off to a rather inauspicious start. A day and a half out of Austin, well into México, we experienced our first mishap. We had just passed San Luis Potosí and were on the road to Querétaro. It was not the best engineered bit of pavement so Steve, who was at the wheel, and I had recently fastened our seatbelts. A few kilometers further on I was engrossed in a magazine when my attention was abruptly snapped to the left. "That butt's going to run us off the road," Steve shouted. Things happened fast. A semi was trying to pass us on a knoll. We were side by side when an oncoming semi appeared at close range. The passing truck veered right. In a flash we were forced off the road, narrowly missing a deep arroyo. We arched back onto the pavement, sliding sideways. Then there was a jolt and suddenly we were hanging by those seatbelts, sliding down the road upside down. I remember distinctly watching the pavement going by only

Minor delay in San Luis Potosí. (Dino Lowrey)

inches away. Strangely amusing. But then Dino was shouting, "Everybody out quick! There's gas coming in!"

I rolled down the cab window and Steve and I crawled out. All our plans and preparations. All that anxiety while packing. All to end here, wheels in the air, our carefully planned expedition laying in the road. It seemed the truck was not destined to explode in flames. We took a head count. Miraculously no one had been hurt, so we went about pulling everything possible from the wreckage while trying to keep an eye on the large crowd of locals that had shown up. A couple of tow trucks arrived about an hour later, rolled the truck upright, and towed us to the Policia Federal de Caminos detainment yard in San Luis. Even though we had not caused the accident our "vehicle" was being impounded until all damages were reconciled.

To our surprise this included a healthy sum to be paid for "road damages." Fortunately our Mexican auto insurance came through and after a mere four days of negotiations we were permitted to drive our heap to the nearest mechanic for repairs. The equipment was now stacked in a great wall in the detainment yard and required constant vigilence, less from the locals than from the rats! In the space of a long day of welding, burning and bolting we resurrected the phoenix from ashes to the point where it looked like we could reload and carry on. A call was made to Austin for the second team to bring down replacements for the essential equipment that had been destroyed. The rest of the journey was without incident.

Tuesday morning the 27th we met with the secretary to the presidente of Huautla. Permission proved to be

no problem and we were soon four wheeling up the last nine kilometers to San Agustin. Pablo and Feliberto Escudero, old friends, greeted us when we arrived. They were in the process of building a new house for Feliberto as he needed more space with the two "gringas" living in his old house. The "gringas" were Cindy Perlman and Cathy Rountree, Americans who had been living there since November doing anthropological studies on a Fulbright scholarship. Upon inquiring about renting a house in town Pablo immediately volunteered his fieldstone and thatch dwelling. It was perched on the ridge overlooking both the Río Iglesia and San Agustín dolines and offered a magnificent view. We accepted, spending the rest of the day moving in.

The next few days were to be spent organizing the house and repairing equipment. As we would be running a skeleton crew for the first couple of weeks we spared no measure in the replacement of worn slings. There would be no margin for error down deep this time.

CAMP II

Finally, on March third, we got into it. Twenty ropes, totalling 700 meters, had been meticulously measured out and labeled for the known drops to Camp II. Those for which we did not have the exact length were cut from new 200 meter spools that had been hung in the loft on broom handles. Lloyd and I arrived at the entrance early in the afternoon and began stringing lines. As there was going to be a continual flow of traffic along this route in the coming months we were taking considerable care with the rigging. Besides padding the sharp places a route had to be picked out to avoid awkward maneuvers for anyone carrying a load. For the most part we were able to accomplish this using natural anchors, but eight rather wicked spots required bolts for optimum positioning. I was taking care of this chore and so was overtaken soon by the others. Steve moved out ahead taking charge. Down the marble corridor our train descended, rappelling with 70 pound coils of rope, pads and bolt gear. We hit the water at -250 meters and donned the wetsuit tops we'd been carrying up till then. The bottoms were always necessary, if only for padding when you fell on a slick boulder. From here on we rappelled pitch after pitch down a massive fissure, building our nylon highway. By the time we reached the -350 meter level everyone was becoming fatigued -- we had been under for eleven hours already and this was only to have been an acclimatization trip. A short strategy session on a spray lashed ledge concluded with Tommy, Dino and Steve beginning the ascent. Hal and I decided to continue rigging for a while, possibly to Camp II, so as to avoid a bottleneck on the ropes above. We managed to descend another 120 meters before reaching a sixty meter shaft requiring an aid traverse to rig. During the 1977 expedition the team exiting from Camp II had found the rope nearly cut in two by sharp rocks here before a problem was discovered. With due intent to avoid a recreation of that incident we began a bolt traverse out along the left wall to a point where the line would hang free. Our progress was stopped short when the bit clogged and froze up on the driver. By that time we were a bit punchy from lack of sleep and decided to leave it for the next push. Six hours and 17 pitches later we staggered up the mist filled doline at dawn.

The following morning we began preparing rope and provisions for the depot trip to Camp II. We had made

an extensive switch to compressed freeze dried food this time in an effort to cut down on the ungainly weight of the canned provisions we'd been using in previous years. The advantage gained was immediately apparent when it was all bagged up -- one and one half duffels held all the food for five people for a two week stay at Camp III. A shorter push from Camp II in La Grieta in 1977 had demanded four 70 pound duffels be dragged down 23 pitches and three kilometers of very tight passage. That had not gone over too well with the sherpas.

The afternoon of March 6 found Hal and I back at the entrance again with the food, forty pounds of carbide and anticipating a slow trip down. In all we figured we were carrying around 140 pounds of equipment on each of us -- bolt kit, Nicad batteries, standard kit, all on an ammo belt, plus vertical gear, wetsuit, helmet, lights, and then a 70-80 pound duffel. Coming down the far end of the entrance corridor at -140 meters I hit a slick rock and did a full forward sommersault, landing on the pack a few meters down the slope. Needless to say our agility was somewhat hampered by the load. Once we reached the fissure things picked up for we could suspend the duffel off the rappel rack.

By the time we had completed the bolt traverse at our previous stopping point Steve, Tommy and Dino came cheerily sliding down the big shaft and plunked six hundred meters of rope at our feet. Four hundred meters were cut and labelled for known drops to the -859 meter sump. The remainder was for the push should the dive be successful. Two pitches and 80 meters below we finally intersected the marbleized canyon leading down to Camp II. The walls were most striking for everything was polished by the spray. The colors in the rock itself were quite varied ranging

Stone setting bolts below Camp I (Steve Zeman)

from jet black to orange and cream white. We dumped everything in a great heap at Camp II and relaxed a bit, pleased that we were now poised for a long stay underground. "Objectives met," Steve's voice echoed across the chamber.

During the next three days we prepared as for no other trip. We had still received no word from the second team, which was nearly two weeks overdue, and decided to go ahead with the dive at -859 meters. In planning for this we had amassed some unusual gear. The scuba tanks, special lightweight 15 cubic foot capacity, were equipped with quick release harnesses that mounted on the

Schreiber negotiating the tension traverse at -450m. (Bill Stone)

diver's hips. Besides being above to quickly stop a free flow, this also allowed for ease of transportation to the sump. Two of these were to be used equipped with dual regulators so that a 100% back up system was maintained. For weights we planned to fill a hip pack full of stream cobbles when we got there, for we surely had plenty of weight already to be dragging lead down that far. And for lights we planned to use two Nicad powered Wheat Lamps with dual filament bulbs, mounted on the hard hat. In short, we were cutting the weight to the absolute minimum while trying to retain a high safety factor for the diver. As for technical climbing equipment we had enough gear down there to do Half Dome in the dark under a waterfall. This was in the event that the dive panned out and we had to start scaling incoming shafts to follow upstream routes. Each person carried a minimum of five ascenders and some six. That was our basic gear.

Our last day on the surface was spent loading camp packs. Steve astounded us by compressing all his wool camp clothes, a fiberfill sleeping bag and one of the tanks into one stuff sack. This space saving was to no avail as he soon topped out the duff with stoves, pots, medical supplies and the like. By 2:00 PM March 11 all was ready and we stacked everything along the front wall of the house for a last minute checkout. We said goodbye to Pablo and Bernardo, his father, assuring them we would be back soon. Feliberto had come by as well and began asking questions about the computer profile we had out on the drafting table. We had placed two pins in the map, bearing the slogans, "We are here," and, "Welcome, you are here," each at the proper location on the plot. Feliberto looked at one, then the other, then the scale. "And how long are you going for Guillermo?" he asked. "Two weeks." He walked off, head shaking, saying, "Well, if you say so, OK."

CAMP III

The rain had returned and there was a heavy fog in the doline, so there was little reticence in leaving this wretched weather behind for the serenity of Camp II. One by one we crawled through the tunnel and into the verdant void of the entrance shaft. Despite all the rain, the waterfall which usually cascaded down the far wall had mysteriously dried up. This was a good indicator that the water would be down for quite some time throughout the system, a windfall that was to make exploration

magnitudes easier in the lower parts. Things went swiftly from there. We regrouped at Camp I (-250 meters) to pick up wetsuit tops, leave dry shirts and generally trim up for the wet stuff ahead. "Three and a half hours to Camp II. We're hustling this time," Steve declared when we reached the equipment depot. A brief discussion ensued concerning whether or not we should push on for the end of the walking passage beyond camp with the ropes. "Go for it," seemed the unanimous decision. Route '68, discovered at the end of the Canadian-American expedition of 1968, was something unexpected for the original explorers. After crashing down a long series of shafts they had come upon this gallery which, at a depth of well over 500 meters, was going horizontal instead of down from Camp I. They had mapped over a kilometer beyond Camp II before being stopped by a formidible climb. This eventually became the primary route which we were soon to follow to Camp III. However, at the end of the 1977 expedition the derigging team had pulled out all tackle, including the standing line at the climb. So we had to re-climb the obstacle to continue. When we arrived at the cornice, Tommy and I went about sizing it up, looking for a possible free ascent route. He took to the right wall and I the left. Before long I glanced around and Hal called out, "He's got it!", and to my amazement Tommy had gained a stance a good six meters off the floor with one move to the top. After cleaning off a ledge he bridged over to it, then went back for the other wall. His right hand suddenly slipped, and in a voice of desperation he shouted, "whoa...WHOA!" I know all four of us below sucked in a load of air as the adrenalin rushed. "Please no, not an accident here," I thought. But during the moment I closed my eyes awaiting the impact he had repositioned his right hand, catching the fall. He carefully finished the climb and tied off the rope I tossed up to him. After pulling the ropes up to the platform we returned to camp.

Schifflett at -520m on the second rigging trip to Camp II. (Steve Zeman)

Once out of the clammy wetsuits things took on a far more benevolent atmosphere. In the comfort of dry woolens we surveyed what was to be our home for the next few days. Camp II was perched on a flat mesa some 6 meters above a narrow stream channel along Route '68. The wind, driven by the barometric differential, seemed channeled by the unusual geometry of the passage so that one person's camping spot would be perfectly calm, yet the next person over would constantly complain of a draft. As the direction of the wind changed twice a day we were able to

keep an accurate fix on whether it was day or night on the surface. This wind cycle was to act as an unusual chronometer by which we could compare our gradually dilating work-sleep cycle over the next few weeks. At dinner Steve philosophized on Tommy's hair raising climb. "In 1968 they got there and decided it was not climbable. In 1976 they came back, decided it was still unclimbable and found a way down through the breakdown. In 1977 they put an aid route up it. And in 1979 some crazy bastard free climbs it. Caving has changed."

The following morning saw us polish off 10 quarts of oatmeal in an unparalleled display of gluttony. We were going to need every calorie. The food for Camp III was divided into three duffels for Steve, Tommy and I. Hal and Dino brought carbide and other gear that would not be needed at Camp II. We shuffled this to the end of Route '68 and picked up the ropes. The overhead continuation followed along a large canyon, dropping down sharply just thirty meters from the climb. While the others worked their way along to that point I shuffled the ropes over to a plate of breakdown perched on the edge of the next pitch. On the surface, Tommy had carefully labeled each of the ropes to Camp III in sequence, so that when we got to drop #16 say, then all we would have to do was find rope #16 and rig on. Unfortunately, in handling and transit to that point all the numbers had been wiped off. I had also forgotten to bring the list of rope lengths needed, so everything from there on would have to be improvised.

As it was difficult to judge the exact depth of the drops in some instances we would invariably throw down a long rope we knew would surely reach. Then Steve, bringing up the rear, whacked off the excess and brought it along. The only drawback to this plan was that sooner or later we would come to the pitch where all those sawed off pieces had to be tied together. We continued down a long rubble slope, broken at the end by two twenty meter shafts. The last of these dumped us precipitously into a large lake at the -648 meter level. As the duffels had been packed air tight in preparation for this, they floated quite well. Barge style, we pushed them across the lake to a sandy beach twenty meters distant. A long series of canals followed until the main passage was abruptly closed off by a massive ceiling collapse. The 1976 expedition had, on their final push, managed to find a route through this boulder pile which had led on to a spectacular stream canyon -- the "gorge." In order to get the equipment through, we strung out in a chain and passed the duffels hand to hand. Five cycles brought us to the head of the gorge. Following each cycle I scouted on ahead making sure of the route. During this time I stumbled upon an unexpected find -- a large upstream gallery which we followed for a hundred meters before running into another collapse. We left it for a future push.

Back at the gorge we zipped up for some heavy water. A ten meter climb down the sculptured polished wall brought us to the wet stuff. The river thundered as it shot out of a sluice above us and crashed, turbulent and foaming, into the first plunge pool. Thus we proceeded, from basin to basin of azure tinted water, tossing our packs in and hastily following before they were swept over the next falls. We soon came to a narrow gut where the water funneled down and shot out over a twenty meter cascade -- the first pitch in this series. As a direct descent would have been foolhardy, we traversed the right wall along a series of solution carved potholes

Zeman crawls through a low spot in Route '68. (Bill Stone)

to a dryer rig point. In the process of shuffling the gear across the traverse a hundred meter coil of rope was inadvertantly knocked off the pile. Upon hitting the water it was immediately swept into the chaos below. Realizing the importance of every meter of rope at that point, Hal and Tommy strung a line down the wall into the plunge pool to attempt a retrieval. While Hal was getting buffeted against the wall by the waves, Tommy dove down pushing off with his boots and managed to hook the coil with his foot, four meters below the surface. Things proceeded smoothly till the "Grand Cascade." Here, by some quirk, the water had punched a hole in the bottom of a thin rock dike which held back a large pool at the head of the shaft. The effect was striking. Driven by the hydrostatic head the water was forced out into a horizontal plume which roared into the 25 meter void below. The walls resonated, seemingly tuned to the din. Again, a traverse out along the wall was necessary, except that this time it was blank -- smooth, and vertical. I put a bolt in at the head of it, rappelled down to where the water started slapping the duffel, then pendulumed around the corner. Here, by pivoting on an etrier, I was able to drive a solid bolt well out on the face. This served as the far end anchor for the tension traverse. The rappel then continued diagonally down to where the stream washed us under a large boulder and into a spray lashed pool. Quite invigorating. Six more drops and a forty meter swim found us at -760 meters and quite fatigued. However, we decided to push on for Camp III as

we had finished the last of the rope-work for a while and could ditch vertical gear and wetsuit tops for the final stretch. At this point our cascade canyon junctioned with a large trunk passage dubbed the Metro. The river quietly ran along the floor, giving a momentary respite from the thunder above. A brisk hike downstream brought us to another junction, this one dwarfing the first, where a great talus pile fifty meters wide shot up into the blackness. Camp III was somewhere up there. None of us who had been there before had really scoped it out thoroughly so a campsite had to be found. We dumped the supplies on an eroded flowstone bank halfway to the summit, then went for it. To our surprise the top was fairly flat and floored with silty sand. Space proved to be no problem as the nearest wall was forty meters away. The cascading of the distant river filled the chamber with a soft rumbling sound. Camp III.

Back at the gear we took a nap, waking an hour or so later shivering in our wetsuits. With due intent to warm up we split for Camp II. After fifteen pitches and 19 hours on the go, we stumbled into our woolens, made some chow and crashed.

It seemed an eternity. I could sleep no longer and opened my eyes. Nothing. Then there was a dull popping of a carbide lamp being ignited in the distance. Tommy was up, writing in his journal. Dino fired one up as well. I called out, "Steve, what time do you have?" "Nine!" "Is that day or night?" I queried. "Nine," he replied somewhat amused. I backtracked my log, knowing full well we hadn't slept only nine hours after that trip of yesterday. The wind was blowing the wrong direction as well. We had been asleep for 21 hours. Twenty-one hours!

We slowly packed up camp. Everything had to be meticulously quadruple wrapped in plastic trash bags to make it through the gorge intact. We left a note for the second team should they arrive in our absence and a one day supply of provisions for the retreat. With that we bid adieu to Camp II for the next twelve days. Despite the load, the trip down was one of the best we'd had to that point. Within eight hours we were hiking up the slope to Camp III. We stopped at the equipment depot to exchange wetsuit tops and vertical gear for food and carbide, then made our way up the final stretch. Upon cresting the summit everyone dumped their loads and scouted out a likely spot to sack out. The place was so spacious that Hal established his own sub-camp some fifty meters from the rest of us. Steve, Dino and Tommy took the "hilltop" area while I dug out a furrow near the kitchen. As the floor was covered with a thick layer of silty sand we were able to travel a considerable distance from camp in bare feet.

It was difficult at that point to really think about, or worry about, the cave above. We had been traveling for four days underground now and finally, nearly a month after we had left the States, we were within striking distance of our two primary objectives. We gathered around for a bull session while dinner cooked. Conversation centered on the high lead which loomed above us at the end of the camp chamber. Was it just a dead end, or the main trunk passage which formed the chamber we were camped in? We broke out a Wheat lamp and focused the beam. It looked pretty awesome -- a good sixty meters above us with the final forty meters going up a sheer wall of mud covered breakdown. It was going to be a sporting climb to get up there.

Following breakfast the next day Tommy and I climbed down the rubble

pile to the depot to pick up bolts, rope and vertical gear for the climb up the wall. We stopped briefly in camp to pick up our standard kits and were off. We had a forty-five meter Goldline with us as well as a good variety of pins, mudtons -- 60 cm aluminum angle spikes -- bolts and slings; plenty for any good solid wall. But everything seemed to be held together with mud. We located a narrow chute along the left wall and keyed this out as our route. Tommy found a tie off for the rope, clipped in and fed the line through his belay plate.

ANTHODITE HALL

Two solid pins and twenty meters later our auspicious "chute route" hit a bad overhang and I was forced out onto the face. This was considerably more exposed and I used up all my protection in gaining a stance that was still ten meters from the top. I called out for ten meters of slack. "Not enough rope," echoed the reply from below. "How about untying the line?" "I'm doing that now, don't move," was the reply. By the time I had yanked up ten meters of line -- the friction was bad between the runners -- Tommy called out that it was off the floor and up the chute. He tried climbing to it but slipped, banging his elbow. Cursing softly he called out, "We need another rope. Hey, could somebody down in camp bring us a longer rope?" No reply. Again. Hal seemed to be walking down to get one. In the interim I had grown restless waiting. The summit was only a short, but exposed, scramble away. I went for it. After pulling the line up through the protection and coiling it, I moved back on top of the chute and tied it off. Tommy prusiked up with all the gear and we made tracks upward following a change

Lloyd on the Grand Cascade Traverse. (Bill Stone)

of carbide. The ceiling was festooned with crystal white helictites. It was very dry here, very quiet. The passage led steeply upward, getting smaller as we went. I was just about to say, "Well, this looks like it," when my Wheat lamp picked out a blackness ahead through a low arch. We had been moving fast already, but for the next five minutes it was a mad dash for the top of this talus pile into an incredibly immense room. Blackness everywhere. Echoes just went and went. I started up a thirty meter high ridge of talus which bore to the left. Tommy descended right, to a flat paleo lake bed which stretched out of sight. Great plates of dried cracked clay paved the floor. At the widest point Tommy was but a speck of light 140 meters in the dis-

tance. This continued for some 280 meters to where the two routes curved around and joined. We backtracked, looking for an exit. No luck. We were returning via the high route when, quite unexpectedly, we were confronted with the most dazzling display of Anthodite crystals either of us had ever seen or read about. Absolutely pure white, and some were nearly a meter long and 60 cm in diameter. A breathtaking chamber, but unfortunately it was not the relict "down" route we had been hoping for to bypass the 859 meter sump. In fact the survey was later to show we had climbed 134 meters vertically above Camp III at the top of the room. We christened the find Anthodite Hall and returned to camp to deliver the news.

"What's for dinner?" I called out from the rope. "What did you find?" came the reply. Stalemate. We climbed down the talus leaving the static line rigged. Over the roar of the stove, much louder than the river down the hill, we related the scoop. Survey and recheck the edges seemed to be the consensus. This was duly done the following day, yielding the same prognosis: No go. The high point of the venture occurred when Hal managed to detonate Steve's spent carbide bottle while attempting to burn a loose string from his pack. Steve was nearly knocked down by the blow, and with a bear like growl set off after Hal down the talus for retaliation. The boot found its mark.

DIVING THE 859 SUMP

With the upper lead finished we turned our attention to the main objective -- the 859 meter sump. It took us quite a while to break camp. There was a two course chow down that lasted three hours. We were entertaining thoughts of running out of rope beyond the dive, just as we had done two years previous in La Grieta, and were packing down the calories for a thirty hour push. The wetsuits went on amid the usual expletives. Looking like some rag-tag militia we descended, bearing left toward a large waterfall. Directly beneath the cascade, soaked from the impact spray, we filed through the boulders and into a narrow corridor. The walls were carved from jet black marble, webbed with white streaks where the fractures had filled with recrystallized calcite. Tan colored flowstone deposits made a fleeting attempt at covering the floor, but were so dissolved by the high pressure monsoon torrents so that only occasional remnants remained. This was no place to be in the summer. We continued to a ledge overlooking a striking shaft. The water split, roared out and ricocheted off the far wall with fire hydrant force. There was no avoiding it. "The washing machine," Hal called out with a grimace. Then he disappeared into the maelstrom. The familiar four blasts from his whistle soon penetrated the din. Off rope. We regrouped below, clinging to the side of immense potholes bored into the floor. Steve was ahead, scouting the route along the grease slick wall. "This way," he called out. We were screaming to communicate. The roar from the shaft above was minor compared to the river that soon smashed in from the right. The entire passage shook. We were dealing with thrice the water of the upper gorge in a passage a third as large. It eroded our confidence. The passage beyond was the most difficult in the cave. Heavy water pounding. Plunge pools where all you could see was foam. And the climbs avoiding them nearly as bad -- glass smooth rock belling out toward the water. We were stringing lines all the way. In one place we rigged a free hanging diagonal rope out over three particularly bad falls.

Chow down at Camp III. (Bill Stone)

Hal had considerable difficulty descending with a Jumar safety. Steve yelled, "Check this out," and proceeded to slide down the line fireman style on a harness carabiner. Ahead the cascades stopped and we were swimming, side by side, down a long canal. The roar of the waterfall faded to a distant throbbing. The canal got wider, deeper. The sump. We were 859 meters below the entrance.

Perched in a small side passage we organized our equipment. Steve and I unwrapped the valve protectors from the tanks and checked the pressure. 2800 in both. I buckled the twin Nicad packs around my waist and snapped the headpieces to the helmet. Steve and Tommy were to feed out the line from the side passage. Hal would belay at the sump. We rehearsed our signals -- Smooth steady pull; keep feeding out the line. One jerk; stop. Two or more; no go, pull me out. Hal and I swam to where the ceiling met the water. There was a good ledge for him to sit without treading water. "Ready on the line," I called. "Go for it," he grinned, and I kicked through to a small bell chamber. This had to have been where Jim Smith stopped on his free dive attempt in 1977. The ceiling dropped down again. Six meters later the light reflected off a mirrored surface and I popped up into another air bell. This only lasted a short while and I was now under for good, regularly checking the pressure gauge. Pinned to the ceiling by the positive buoyancy of the suit I was able to kick my way long at a good clip. The floor, which I never really did see at the beginning due to some silt we had stirred up, was still out of sight. As the

Talus summit at the beginning of Anthodite Hall. The main chamber is to the left. (Bill Stone)

water was very clear at this point I could see a good twenty meters down and still no bottom. Thirty-five meters in I rechecked the pressure gauge. Below 2000 and dropping. Enough to go maybe another ten meters safely. I hung motionless, playing the twin beams of the electric across the vista. The ceiling was dropping rapidly and there was no indication that the trend was soon to change. I was far beyond anything we could safely free dive, which would have been the requisite for any serious push on our part. I took one last look at the bottom of San Agustín, then turned and gave three yanks on the line. There was a momentary pause and the line went slack. A tinge of fear shot through my mind. The way out was murked up. Did they get the signal? But then the line suddenly snapped straight. I relaxed for the ride out.

Back at the side passage we were preparing to coil the rope when Steve cast over his shoulder, "There's a sump up this passage you may want to look at before undoing your kit." Hal and I swam to the end and sure enough a black opening led off below the surface of the pool. I turned the air on and dropped under, this time crawling along the ceiling upside down. Eight meters later I caught a reflection and headed up. Upstream passage! Returning I gave a tank to Hal and we both went through. Together we saw a good hundred meters of watery passage before it swung to the left and dived back into the main sump level. With all the "down" leads exhausted it seemed our climbing gear was about to get a work out.

THE UPSTREAM CAMPAIGN

The following day saw us back at the waterfall marking the head of the 859 passage. The stream came from a black gallery twenty meters above and we were prepared to aid up the wall if need be. This proved unnecessary as I managed to put in a free route up the right face. The others were up the static line in a flash and we pushed on. Though the passage carried a strong breeze, it soon got very wet forcing a retreat. We had done the climb in camp clothes and opted for a return with wetsuits, and survey gear.

Our next foray into this section saw Hal and I out in front clanging away, heavily laden with rope and climbing gear. The others were shooting the survey in on our heels. Shortly the gallery split. The climbers went right, the surveyors left. Two twenty meter climbs and 300 meters of swimming brought an end to the right hand branch -- upstream sump. The left continued as a tall canyon. A considerable amount of man made debris clung to the walls. "This looks like the town dump from San Andres," Steve said wryly. Later we stumbled across an off color basketball laying on the floor. The passage thusly gained the appellation, "Red Ball Canyon!" Inevitably we ran out of rope after scaling two more shafts and had to leave it for the next push. On returning to the junction we had a short conference. Steve and crew volunteered to survey the right hand branch provided Hal and I derigged the 859 passage. As more rope was needed for the upstream push the pact was agreed upon and the deeds done. A tally with the calculator back in camp showed we had bombed out nearly a kilometer into a blank spot on the map. The trip had sapped us though - eighteen hours from camp. We drifted off.

Anthodite clusters along the North wall. (Bill Stone)

Again my back was aching and I knew we'd been laying there for one hell of a long time. Steve consulted his watch. It was March 22 and we'd been sleeping for 26 hours. Plan for the day was a photographic trip around the big chambers. We packed off with a trash bag full of press 25 bulbs intending to turn the lights on. Every bulb Steve set off brought a round of applause from the rest of us. No one bulb would have phased the room, so we mounted the camera on a tripod and locked the shutter open. Then for the next half hour Steve would waltz back and forth painting in the vista. Following dinner Tommy, Hal and I took a fast paced recce up the Metro to its

source, a kilometer and a half upstream. We were eventually halted at the base of a smooth fifteen meter shaft. The water dropped in from above.

At breakfast we held a strategy session. We had but three meals left and much to do before exiting. The final plan agreed upon was to go for the end of Red Ball Canyon with everything we had, until we came to an impassable obstacle. In essence we had to do that, for once we pulled out for Camp II the lead was beyond the endurance radius. And there is nothing worse than not being sure about a passage that remote. It might make the connection to La Grieta or Agua de Carrizo. If the push was short we would attempt to take all extra hardware and tackle up to Camp II the same day. We ate heartily.

Back in Red Ball Canyon, Hal and I advanced to the lead again. High above the waterfall which had halted the previous push we climbed up a bulbous flowstone facade. A narrow fissure loomed in the distance across the gulf. With Hal belaying, I set a route out along the wall, gaining the fissure without complication. We dropped a fixed line and the others were up shortly. All this was to no avail as we encountered another sump 200 meters further on. Lacking diving gear we commenced a series of pull downs to Camp III. At the depot we loaded ropes, tanks, regulators and trash into our duffles and packed off for Camp III, arriving eight hours later. Famished from the run we cannibalized a sack of granola from the food stores. Our appetites still unabated, I went to open the bag for a second time when I noticed something odd about the camp. It was as if someone had thrown 3" diameter cotton balls all over the place. "By god, it's the attack of the fungus," someone chuckled over my shoulder. Each bit of food we had spilled ten days ago had yielded a fine crop of fuzz. We cast aside all notions that caves are sterile environments. The wind was now blowing in pretty stiff; morning topside. As we had ditched our wetsuit tops at the -648 lake, we began getting cold and beat a retreat to Camp III. Another 19 hour trip. Another 21 hours sleep. We were really out of sync with those upstairs now. Over fourteen days had passed on the surface. Yet our group had only seen it as ten. Michel Siffre's predictions on free time cycles were being borne out.

EXIT TO BOREHOLE

With most of the heavy equipment now at Camp II, and the food gone, our packs were down to a reasonable weight for one. But by the time we had ascended the final pitch in the gorge we were ready for a breather, and decided to spend a half hour poking around in the breakdown to see if there was an overhead continuation. Tommy had previously seen a black hole in the ceiling, lending credence to this theory. As well, Richard Schreiber had remarked once that in pushing the breakdown in 1976 they had heard long echoes above them, but were unable to reach whatever was up there.

At first we tried to climb up through the hole in the roof. I gave Tommy a boost to where he could definitely see that there was something very big up there but that the hole was too tight. He climbed back down and retreated toward the duffels hoping to find an alternate route. Steve meanwhile set about trying to hammer his way up through the hole Tommy had tried, using a large rock as his weapon. He had scarcely begun when we heard an echoing, "Damn. This is the biggest passage I've seen in this cave!" And we knew

Tommy had made it through. He came over to the hole Zeman was working on and pulled out the key boulder blocking progress. Steve and Hal slithered through. Dino and I grabbed the packs that had been left and followed Tommy's route. By the time we had crawled through into the big stuff- 20 by 30 meter trunk - Steve and Hal were off in the distance hooting and hollering. Borehole! No other name would fit. We seemed to have popped up at some sort of junction for there were three massive passages leading off. One apparently connected directly out over the gorge, for we could distinctly hear the river roaring below. With the wind at our backs we ran down a good 800 meters of passage that afternoon, stopping only for lack of rope. We still had a long trip left to Camp II and so returned to our packs. One thing was certain, our short diversion had changed the course of the expedition.

The following morning we began our 16th day in the hole and it was high time to leave. With the advent of the new discovery, Camp II was left intact for the return push. We packed out the final 20 pitches carrying garbage, spent Nicad packs and worn out equipment.

Shifflett and Lloyd at -760m in the Metro , heading for Camp II. (Bill Stone)

I slowly picked out the tumblers on the lock to the house with the dim glow of Hal's carbide. Hal made a dash for the food stores. Before I got to the canned peaches I'd been dreaming of for the past six hours, I noticed an assortment of letters posted to the drafting table. Fresh words to savor! I must have read them four times before Hal called it to my attention that I was still in my wetsuit and might be getting cold. In our absence we had been visited by Ernie Garza and Blane Colton. Besides telling of a new 175 meter shaft near San Miguel they had checked out the message ended on a grim note. Bill Steele had broken his ankle while running the day before he was scheduled to leave the States, and would not be out of the cast till late April. This was a blow.

The happenings of the next few days were quite diverse. The long awaited reinforcements from Georgia - Jim Smith, Jill Dorman and Richard Schreiber - arrived on the 29th of March. Some friends from Mexico City, Gerardo Fernandez and Gonzalo Herrera, had also come up for a visit. An acclimatization trip was in order for the newcomers, so Richard, Tommy and the Mexicans took a trip to Camp II. Jill, Jim, Hal and I went on a gymnastics excursion to the 464 meter deep Cueva de San Agustín. We often used the cave as a warm-up, for it

consisted of a dusty dry corridor bombing down 19 drops into a massive terminal room. In T-shirts we moved fast. Some of the others had expressed a desire to do it the following day so the ropes were left in place.

April first saw Tommy and the Mexicans pack up and drive off for D.F. Tommy had to return to tend to personal matters and we were to miss him greatly. During the rest of the morning people straggled off toward the Cueva for the derigging. Well into the afternoon I pored over the survey notes with a calculator trying to figure out just where we had been down there. Pablo stepped in, asking where the others had gone. "Over to the Cueva," I told him, not elaborating. "La Cueva de San Agustín. Sí. Sí. Sí." he replied in acknowledgement. Which reminded me that I had best be on my way to help with the derig. I descended to the 300 meter level and sacked out in the sand. Shortly I saw a light flicker in the distance and heard Richard's voice. After thinking about it a while, I could no longer resist playing a practical joke. I pulled up the rope without further hesitation and scuttled back around the corner, watching as the light drew near. "What the hell?" He paced back into the other corner looking somewhat stunned, then returned convinced of his memory. "It has to be here. Damn, Where's the rope? It was here when I came in. Oh, you've got to be kidding." Pause. "Wait a minute...Guillermo. GUILLERMO!" I clicked on my electric. "April Fool, Richard."

The following day was chaotic. There was gear scattered from end to end in the house with people running about in a frenzy of activity. The menu was planned for a ten day stay at Camp II. With the food packed I made a list of coordinates from the master printout on the system of various stations in the neighboring caves which we might be likely to connect with. There was a general air that we were finally onto something big.

RETURN TO CAMP II

The afternoon of April third found us once again on that familiar sand pile at -536 meters. Schreiber waxed eloquent on the virtues of the various underground camps he'd been in. Some had waterfalls roaring in the distance. Some had horrible smells from the latrine. Camp III below us had a long run to the waterhole. At Camp II in La Grieta you could fall out of your hammock into the waterhole. Indeed the camps were as varied as the caves themselves.

Our first foray into the new gallery netted a rather unexpected connection. At the junction chamber we split into two parties: Hal, Steve and Jim to the south; Richard, Jill and I to the north. The northern trunk, never less than 20 by 30 meters, shot up a steep talus pile for 300 meters to where it appeared to "T." To the left Richard pointed out a fault where the passage terminated. High and to the right a waterfall was audible. Upon climbing the hill toward the falls, we found ourselves confronted not with an unclimbable dome but a gaping pit with water fluted walls. We tossed a rock in and counted while it hissed into the blackness. Four seconds later the impact echoed from below. I'd say we better tie these ropes together," Richard said with a grin. We had around sixty meters when that was done, but a good bit was used up in the rigging. He put a figure eight knot in the end,

Route '68, main passage to all levels below Camp II. (Bill Stone)

should it be too short, and tossed it in. As expected, I found myself swinging at the knot, lacking some twenty meters to the floor. With the electric I searched the area below. It looked vaguely like passage we'd seen before -- the canyon beyond the end of Route '68. Not quite sure of this I thought about dropping a glove to mark it, but opted in favor of a yellow plastic bag I happened to have in my pack. Scraping some spattered mud from the wall to weight it, I let it fly.

As expected, we found the bag at the base of a large dome on our return to camp. This now opened the possibility for a swift new route to the southern section as well as the lower levels. The perplexing question was why the passage had ended so quickly to the north. There was a kilometer wide blank spot between there and the northern systems and intuitively we reckoned there had to be something big in that void.

Despite 26 hours in the sack we were not quite up to facing the wetsuits again. They were indeed very foul odored and had to be scrubbed with soap after each trip. We were however, fired up for doing something in our camp clothes. Having had a notable success in the upstream Red Ball Canyon, we decided to have a go at pushing the Camp II waterhole source. With some luck and formation lassoing we were able to scale five pitches, seeing 300 meters of new passage. Eventually we came to a 50 meter dome which required wetsuits and aid climbing equipment and left it at that.

There was much speculation about the next trip. We planned to put the entire group out in the southern branch as nearly 800 meters of passage had been seen down this route and several leads remained, all of which were poised for possible connections to nearby Sótano del Río Iglesia. Jim, Jill and Steve took a sling of climbing gear, a dynamic rope and went high. Richard, Hal and I took eight coils of static rope and went down a narrow stream canyon. Below, things soon got tight and we found ourselves inching along, religiously shooting the survey as we went. We shortly began descending a series of steep chutes with the stream disappearing and reappearing through slots in the floor. I stopped at one point, bridging over some deep fluted potholes to change carbide. Richard was timing his burns to mine and paused a short ways ahead to change as well. In doing so he managed to drop the gasket into a small plunge pool. Ninety-nine percent of the time a pool that size would not have been but a quarter of a meter deep, but this one seemed bottomless. I went about closing up my pack, assuming he would just dig out a spare and carry on. Through the corner of my eye I watched with disbelief as he took a deep breath and dove in head long. Soon Hal and I were both staring at two boots and little more sticking out of this tiny pool. Thirty long seconds later he popped back out, beaming and holding the cantankerous gasket. A short way beyond Hal cried out, "Rope drop, all right!" All along we had entertained the thought that this might be the bypass to the 859 sump, but to do that we had to start dropping rapidly. This drop appeared to be the sign we were looking for. Richard and Hal rappelled in and were waiting on a ledge below. As soon as I racked something struck me oddly about this place. The feeling grew as I descended until finally I was sure. "Connection," I called out. "Where?" Richard fired back. "Upstream Metro." This was the furthest point of penetration reached by Tommy, Hal and I on our recce from Camp III. We tied in the survey.

Back at the rope in the main trunk we found a note:

> "Mapped roughly 175m in 22 stations into the breakdown. Climb up the wall successful. No passage on top."

I passed this along to Hal and clipped on my ascenders. The rope was grossly muddy and it was the case of the old two steps forward and one step backward as the cams failed to catch. I envisioned sliding all the way to the floor more than once. Up top I was confronted with yet another note. "Off rope," I called out and looked at the paper.

> "Amigos: Estamos rigos ropos on dropos con boing-line. So avoidos lagos."

Meaning apparently that they were going to try and rig Yellow Bag Dome with their dynamic rope and use this shorter route back to camp. Much to our surprise there was no rope in the shaft when we arrived. "Short roped again!" I thought, knowing what must have happened. Again we tied everything together and tossed it in. This time it reached, although it was a bumpy descent with three knots. I climbed up the breakdown a way to get out of the blast zone and wait for the others. About this time I glanced to the right and noticed a fissure which had previously caught my eye. Curious I thought, as everything going in that direction mysteriously stopped at all levels. Richard had by now negotiated the final knot and bounded the remaining twenty meters to the floor. He undid his rack and stumbled up the slope towards me.

"Richard," I called, "What's the story on this passage?" "Goes in a ways, twenty or thirty meters at any rate. Then gets tight. You should go check it though, to satisfy yourself." Then he continued up the slope. I began poking around. There were a few holes in the breakdown at the beginning but it quickly narrowed to a popcorn encrusted rift slicing northward straight as an arrow for sixty meters. There the thing was plugged right to the ceiling with rounded boulders. The crawl Richard mentioned continued along the floor, and it was unquestionably impassable. Bridging between the narrow walls I forced my way upward. There appeared to be some sort of hole at roof level. I paused, watching my breath stream to the side. Good breeze here. There was a passage along the roof but I was only able to manage three meters before it became hopelessly tight. Pushing my helmet through the tiny hole which led on I yelled to see if it got any larger. Very faintly I could hear an echo carrying off in what surely was something very big. Getting through was going to require more than human force though.

Dorman and Schreiber swimming the 648m lake. (Bill Stone)

I caught up with Richard in Route '68. Along a low section where the wind threatened to extinguish our flames, I queried him about something I had long wondered about. "You must have known this passage continued in 1968, Richard," I said. "Sure," he replied, "but it was a long trip then too. Remember we surveyed from the bottom of the hundred meter shaft to here the same day. We had all agreed to stop whenever we came to a rope drop. The climb at the end needed a rope." "Why didn't you come back the same trip?" I continued. "British weren't into upclimbs. The 612 meter sump was the lowest point and that was as far as the consensus went. Shoot, we had broken 600 meters, not to mention the depth record. We were content to leave it at that . . . for 1968 anyway. And you know how the local situation deteriorated for the next eight years," he finished. I nodded. Back in Camp I, I discussed my feeling about the crawl with Hal. He seemed agreeable to the plan I had in mind.

UP KINEPAK KANYON

The following morning Hal and I packed off to the surface for an explosives kit and some additional provisions we had run short of. Upon re-

turning to Camp II we found Richard and Jim staring at us groggily. Richard related that they had returned only a few hours ago from a long survey trip to wrap up the crawls off the big passage. It seemed everything in the way of open leads was finished. We were down to desperation strategy. While the others went back to sleep Hal and I continued on down Route '68. At the end of the fissure I primed two sticks and strung out the wire. It seemed like an altogether sinister activity. Hal looked at me, I at him. "Don't drop it," he chuckled. His grin faded when I laid it in his hand and said, "When I get to the top, pass it up to me. Carefully!" I chimneyed up to the head of the crawl, got the charge from Hal, and ever so carefully inched it along in front of me toward the rocks we had to move. With everything in place I retreated, unravelling the yellow and orange lead wires. Upon connecting this to the long wire we scampered out to its end and pressed ourselves into a small recess in the wall. "Ready?" Hal nodded. I opened my Nicad pack and untwisted the wires. "OK," I said, "five, four, three, two, one." BAROOM! Like a cannon, rock dust flew down the fissure. The walls shook and the echo crashed off down Route '68. Smoke soon engulfed us, driven by the wind. We hardly noticed for both of us were uncontrollably laughing releasing all our pent up tension. To our surprise not as much of the obstacle had been removed as we expected, but it proved enough to get through. A six meter climb followed and suddenly we were there. Twenty by twenty meter trunk, and wind. By Jove, the wind was roaring down this passage.

I could hear a powerful rumbling in the distance. A river too. We stopped shortly to recarbide. The rock was dark colored and we just couldn't keep a long enough flame. Moving fast we traversed 800 meters of breakdown gallery until it jogged to the right and intersected a narrow stream canyon. The place was thick with akinoliths -- razor sharp rock flutes peculiar to tropical caves. Thus our going was slowed as we had to test each precarious hold lest it crumble underfoot dropping us onto the blades. After nearly 120 meters of ups and downs in the canyon we came to a large, crystal green lake. "Up for a swim?" I queried. "You try it first," came the reply. By clinging to finger holds on the wall we traversed forty meters around the corner to a sandy shore, managing to at least keep our shirts dry in the process. The big stuff picked up again and this time really took off. We ran for well over an hour before coming to a large collapse chamber. The wind whistled through the breakdown. We had seen enough for one day.

Our derigging plans were subsequently aborted and the new passage surveyed. Armed with this data and a hand calulator we were able to pin point our location at the head of the breakdown. We were stunned when we found the furthest point of penetration to be only ten meters from the end of La Grieta and thirty from Agua de Carrizo. All the caves seemed to enter the same collapse complex. We were on top of the grand junction: a triple connection that would form the third deepest cave in the world!

The following day we returned to the breakdown to attempt a connection. After six hours of wetsuit ripping crawling among the boulders, Jim, Steve and Hal pronounced the pile impassable and returned to camp leaving Richard and I to ponder the problem. Richard recounted his impressions of the high maze at the end of La Grieta; everything trending down was plugged in breakdown. But up high the air went through a series

Typical dimensions in Kinepak Kanyon. (Bill Stone)

of domes. Before he left, Jim had indicated that there appeared to be something near the roof level on the east wall. In context with what Richard had just said we hypothesized that if we couldn't cross over to La Grieta down low in the breakdown we might be able to do it over the top through the domes. Indeed, there were quite a number of incoming shafts on this side. We focused our electrics on the east wall and sure enough there was something black up there, though we were denied a clear view due to a thick mist which hung near the ceiling. Richard readied the belay while I racked my climbing gear. Despite being well equipped there were few suitable protection points. No cracks. No projections. Rotten rock. I finally managed to get a bolt in 25 meters off the floor. Then the electric cord pulled from the battery and the carbide died. We were finding subterranean climbing to be full of new twists. I eventually topped out at 35 meters to find the blackness was but a deception projected by a wide ledge. This was not the way.

Our second attempt was further down the passage up a towering shaft we had of late been calling BB Dome. This one was by far more promising and within a short time we had rapped out forty meters up the fluted wall. Things abruptly ground to a halt when the route gave out at a six meter overhang. No free route over this one. Still, in our stupor from 21 hours on the go, we knew it was the lead we were looking for. I anchored the rope to a series of wafer pins slammed into the roof and we rappelled off, vowing to return with aid gear.

We had barely slept three hours when a flurry of activity erupted over the camp. The other four were packing up for a journey to the surface. And with good reason. Our food had already been stretched four days longer than intended. When Schreiber and I exited to the thunder of a violent tropical storm a day later two weeks had passed since our entry. It was the night of April 16.

A CLIMB AT BB DOME

During the next few days the team was in a state of transition. Steve and Dino returned to the States. Jerry Atkinson joined us, having just spent a month caving in northern México. Then, while returning from town on a resupply trip April 17, mishap number three struck. Jim Smith fell from the roof, breaking his ankle, when the truck came to a rough stop. This reduced our lead team to four and there was serious speculation that we might not be able to pull everything out before the rainy season hit.

The afternoon of April 21 saw Richard, Hal, Jerry and I again dropping toward Camp II. We intended to break the derigging operation up into three phases -- Camp III to Camp II, Camp II to Camp 1/2, Camp 1/2 to the surface. It took us a long day to bring all the tackle out from Camp III to Camp II. But after that we were convinced that we would have the drive to get it out the rest of the way and thus focused our attention back to the climb at BB Dome.

Perspiring from the three hour run I racked my climbing gear, then clipped in and jumared up to where the line was anchored. Richard arrived shortly with his antiquated three knot prusik system and tied himself into the wall. With the belay ready he gave a nod and I moved up to the roof. To the right was an overhanging flowstone face that looked like a feasible route around the slab above me. Using a healthy number of slings looped through short columns I was able to aid across it until it gave out in a forty meter free drop to the floor. In vain I bolted up three meters to where I could see that this route led to nothing. The wall went straight into the ceiling. Reluctantly I resigned myself to tackling the main roof direct.

Schreiber called up in an impatient voice, "Are you in a stable spot?" "Yes," I replied after clipping an etrier into the pins in the ceiling. "OK. I'm going to change carbide." This done he searched the overhang looking for a weak point. "Can you traverse out that buttress overhead? It looks good from here." The look required a bolt and a four point aid traverse but it was well worth it. We had surmounted the overhang. Six meters later I climbed over the head of the buttress. The triumph was short lived for instead of a booming passage we were left staring up another 50 meter shaft. And so it went. Finally, at a point 120 meters vertically above where we had begun we intersected a low crawl and the climbs ceased. A hundred meters further on we crossed the base of an immense dome -- at least as high as what we had climbed already -- and suddenly the wind reversed direction. It had been at our backs through the crawl, urging us on. Yet now, descending the opposing corridor, it was in our face. "Crossing the drainage divide," Richard said quietly. We felt a surge of connection fever coming on. Our forward drive was stopped short by a fifteen meter pit just around the corner. We had no more rope.

Lloyd de-rigging above Camp I. (Bill Stone)

Two days later saw Hal, Richard and I back with 150 meters of line determined to make the connection. Seven drops later we ran out of rope and began slogging along a low passage with knee deep mud. Steamy and tired we hoped it would sump out soon so we could finish the survey and get out. Most of us were on our last burn and anticipated returning to camp on what dubious charge remained in our Nicad packs. Twenty-two hours had passed. There seemed no end to the mud. Suddenly, Hal called back, "Hey, something big up ahead. I hear a large stream. Really!" It was a big twenty-five by twenty-five meter borehole. Just like the one in . . . a cold wave of perspiration swept over me. Just like the one in San Agustín. It was the one in San Agustín. Stunned silence. We had looped around. We sat down on a rock to console ourselves. What a lousy quirk of fate. And worse, it wasn't over yet. We were now down to a half charge of carbide each and a swift retreat to Camp II was of paramount importance meaning we would have to come back once more to pull the ropes out lest they be blown to shreds when the rainy season hit.

Jerry and Hal left for the surface the following day with tightly stuffed duffels. Richard and I procrastinated for several hours, finally overcoming our lassitude. Once more we slid into those wretched neoprene skins and for the sixth time headed for that remote dome complex. Fifteen hours later the dour deed was done and following a relatively short sleep we began cleaning camp up. All well and good I thought. We'd spent 39 days at or below Camp II now and discovered nearly seven kilometers of new passage. To remain any longer would be asking for a flood. The ever elusive connection was going to have to wait again, until next year.

Despite three sixty pound duffel bags of equipment between us, we managed to derig everything to the 400 meter level that day. The effort left us quite winded and we found ourselves crawling meter by meter, up the last drops to the Sala Grande. Had it been night, I would have bivouacked right there on the trail we'd worn into the hill from countless supply runs. Instead we were greeted with a blazing sunrise and the brilliant onslaught of colors was nearly too much for our dark adapted eyes. We climbed up the verdant slope toward the ochre sky. It was good to be back.

POST EXPEDITION NOTES

Bill Steele and Jim Smith have returned to their feet and the rest of us to our jobs. During the three month ordeal we learned something of the art of perseverance. It was to lend us those few fleeting glimpses of the puzzle which had so captured our imagination. Fifteen years after its discovery, we were finally given one of the links which was to clarify the hydrology of the cave of the Huautla Plateau. That link was the northwest passage leading from Route '68 in San Agustín to within ten meters of the end of La Grieta. It was the passage that had to be there. And was. The water it carries is the confluence of both La Grieta and Agua de Carrizo, the primary drainage nets of the high area to the north of San Agustín. These caves, as well as all the major systems in the region appear to be developed along an immense, tilted syncline trough which drops toward the probable resurgence southeast of San Miguel. For this theory to be true, the caves to the southeast will necessarily have to go deeper to hit the main drain. The 859 sump in San Agustín doubtless leads to this corridor below but does not appear to be humanly traversable. The bypass, if indeed it does exist, will likely come in the form of Sótano del Río Iglésia. Despite a depth of 535 meters and claim to some of the largest known passage on the plateau it has received less than one week of attention to exploration and mapping throughout its twelve year history. It was felt until this year that the water entering Río Iglésia, by far the largest surface stream in the area, came into the deeper San Agustín as one of its lower tributaries. This now appears to be invalid as all of the water sources in San Agustín have been explored towards the caves to the north. So in Río Iglésia, to the south, may lie the key passage to the underground water conduit draining the 100 square kilometer plateau to the coastal plains, 1600 meters lower.

The 1979 expedition received the backing of numerous sponsors, both private and commercial. Thanks are particularly due to The Explorers Club of New York, Nikon Corporation, PMI, Speleoshoppe, Bob and Bob, CMI, Oregon Freeze Dry Foods and the host of NSS members and grottos who made it all possible.

Expedition Personnel:

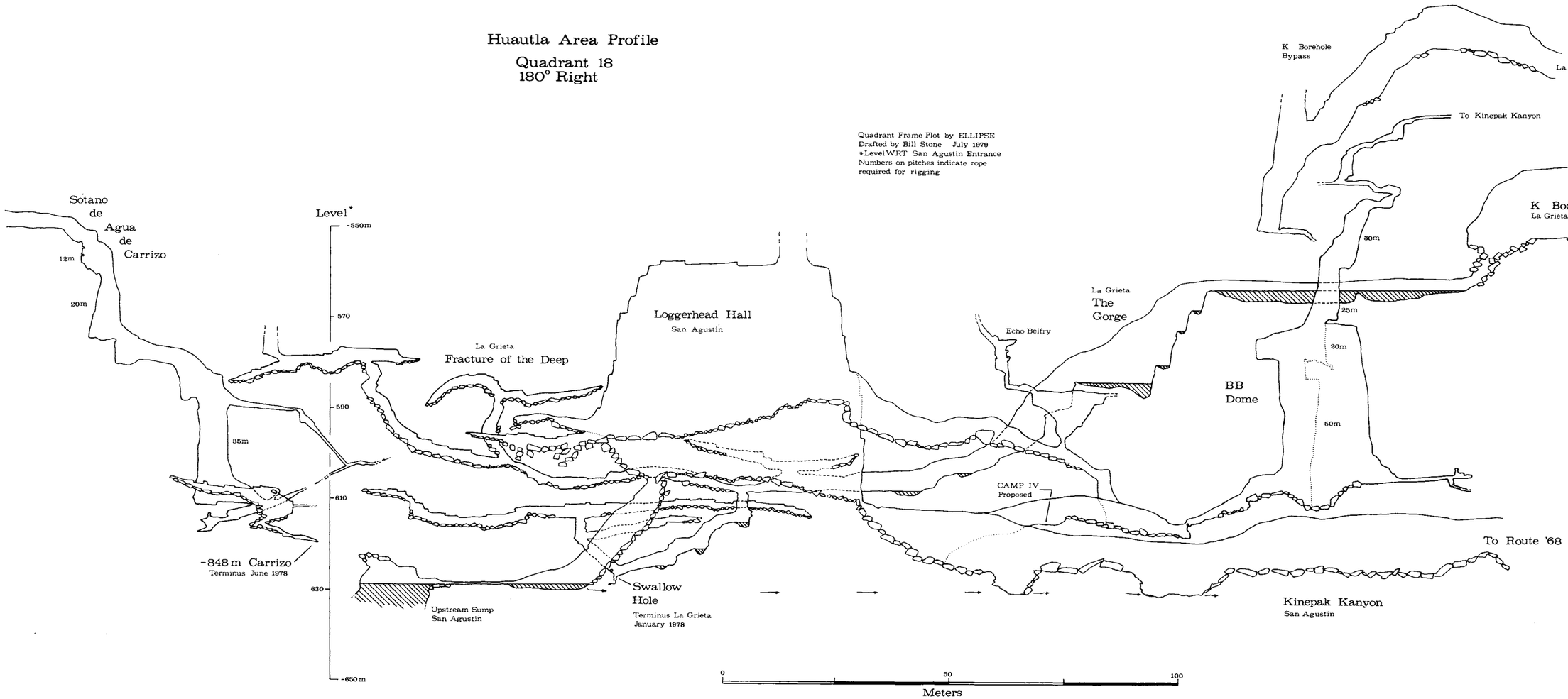
Jerry Atkinson
Jill Dorman
Dino Lowrey
Hal Lloyd
Richard Schreiber
Tommy Schifflett
Jim Smith
Bill Steele
Bill Stone
Steve Zeman

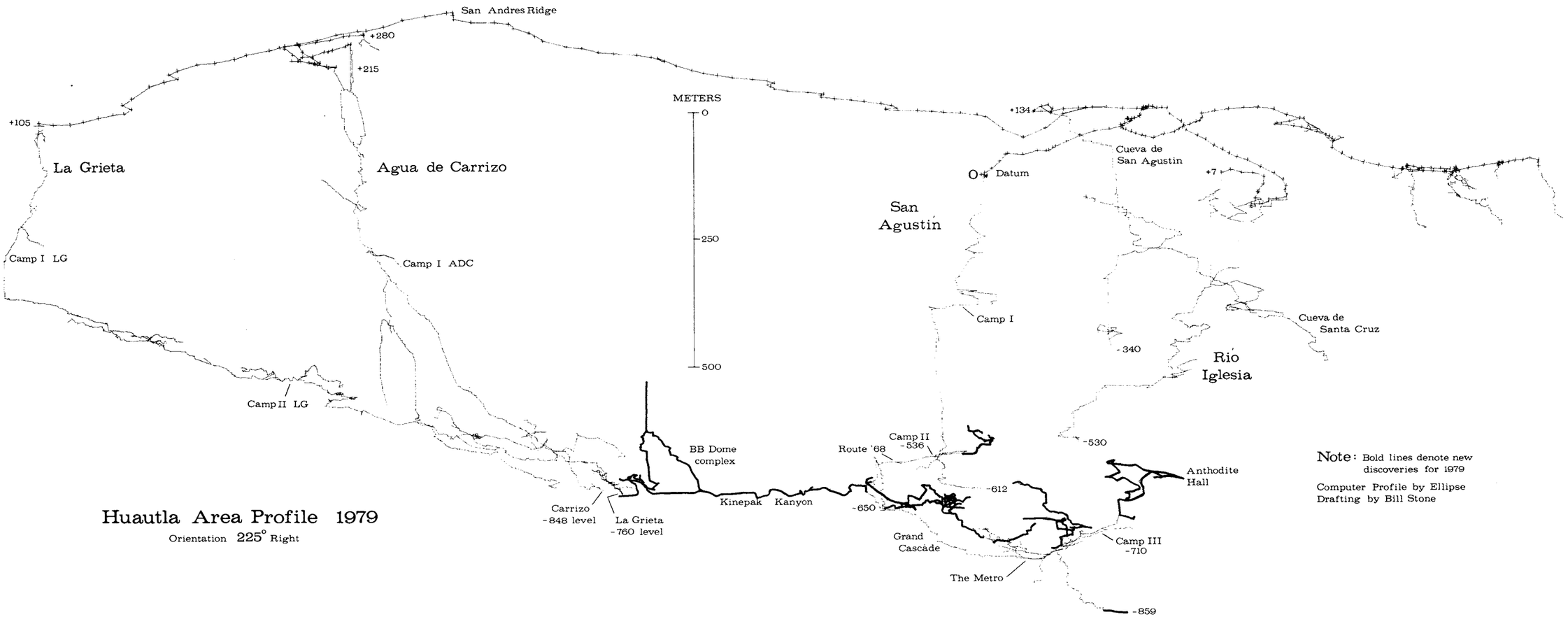
Editor's Note: Following the addition of the new data to the survey, the depth of San Agustín has been adjusted to 861 meters.

Huautla Area Profile

Quadrant 18
180° Right

Quadrant Frame Plot by ELLIPSE
Drafted by Bill Stone July 1979
*Level WRT San Agustin Entrance
Numbers on pitches indicate rope required for rigging





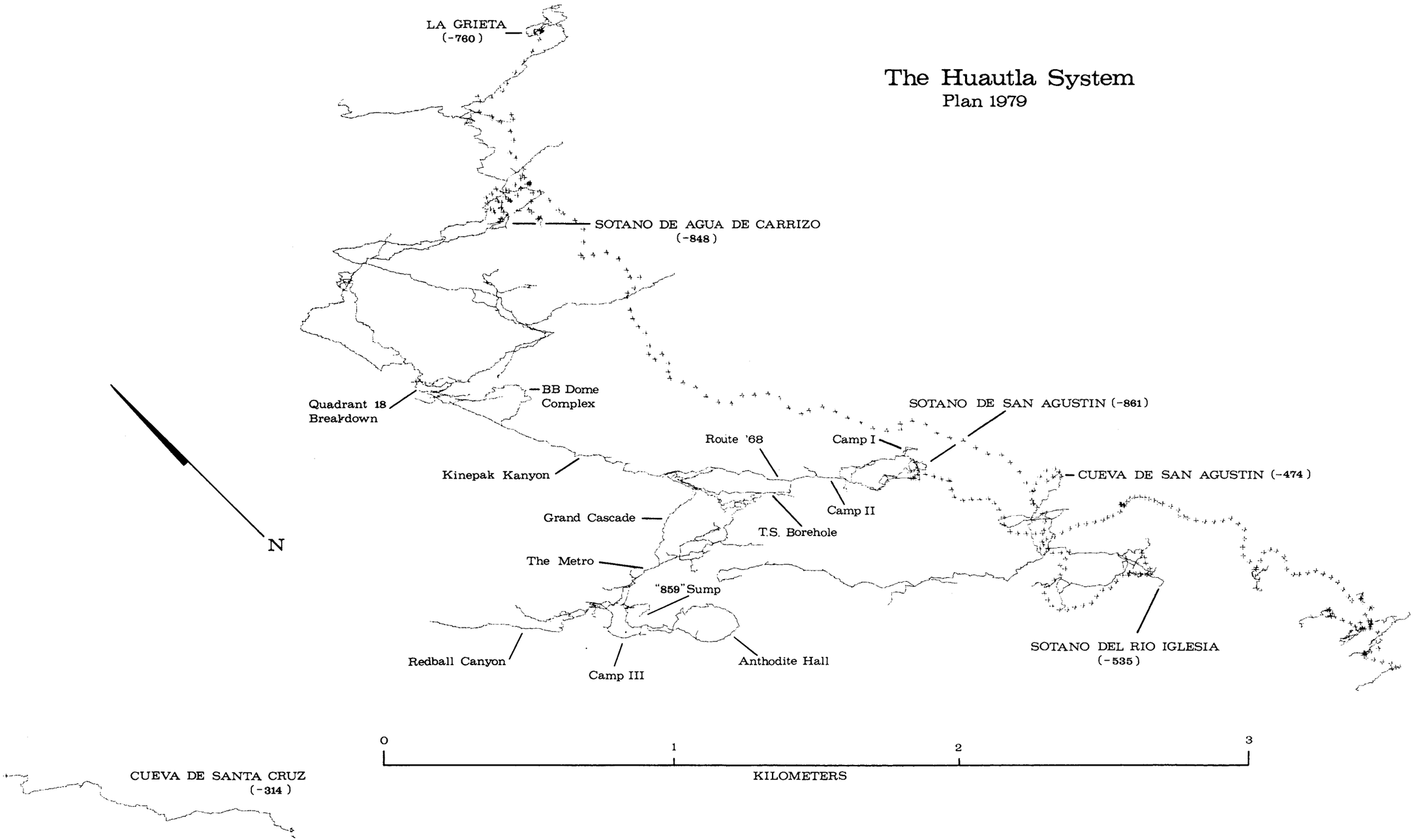
Huautla Area Profile 1979

Orientation 225° Right

Note: Bold lines denote new discoveries for 1979

Computer Profile by Ellipse
Drafting by Bill Stone

The Huautla System
Plan 1979



translated from the Mazatec

by Cathy Rountree

Song, tune lost

Vibram prints upon the path.
The cavers are in town.
Bleached out bodies at the bath.
The cavers are in town.
Do they come for buried jewels?
Is there oil in hidden pools?
Are they mad, or only fools?
The cavers are in town.

Where have all our children gone?
The cavers are in town.
Whose were those footsteps just at dawn?
The cavers are in town.
New waves arriving every day;
How long do you suppose they'll stay?
I heard the tide goes out in May.
The cavers are in town.

Stores and gossips overstocked.
The cavers are in town.
Taverns rumble with tough talk.
The cavers are in town.
Did you see the battered truck?
Ragged sacks of flattened stuff?
Who'd they piss off to earn such luck?
The cavers are in town.

They come each year, like summer's rains.
The cavers are in town.
Like clouds of locusts o'er the plains.
The cavers are in town.
We tried to frighten them away.
Cut ropes, wrote laws, but still they stay.
At least we've learned to make it pay.
When cavers are in town.

DISCOVERY

IN CUETZALAN

Peter Sprouse

Whilst on a caving pilgrimage across Mexico in December 1976, Terri Treacy and I stopped in at Peter and Sue Lord's house in México, D.F. to check on their caving progress in the Cuetzalan, Puebla area. I had suggested the area to them a year before as a promising cave area within easy driving distance. They waxed enthusiastic over the place, finding going cave everywhere they looked. They invited us to join them that weekend in checking a new pit that Mike Boon had found and had assured them was at least 400 feet deep.

On December 17, we drove eastward past the volcanos of Ixtaccíhuatl and Malinche, and northward until reaching the village of Zacapoaxtla, on the southern boundary of the caving area. Here I was amazed to spot Austin caver David McKenzie walking down the street. He had just driven down from Texas with James Reddell, Carmen Soileau and Andy Grubbs. We agreed to join forces in our explorations in the area. We parked the vehicles at Itzacamel and set off walking along the aqueduct that leads towards the tremendous Sumidero de Cohuatichan. The new pit lay to the left of the aqueduct. It had a circular entrance about 6 meters in diameter, which we immediately rigged. Peter descended first, then Sue, Terri, Carmen and myself. The drop turned out to be only 35 meters. At the bottom was a large passage trending SW-NE with a small side passage heading off NW. Terri, Carmen and I began the survey while Peter and Sue explored. The NE section continued 100 meters in large passage before closing down to a narrow tube. This went on 30 meters to a dead end. The SW extension of the same passage climbs 20 meters up a slope to a pinch. The small NW passage of the bottom of the pit proved to be the interesting one. We surveyed 10 meters to a tight squeeze taking air, through which the sound of a waterfall could be heard. Peter squeezed ahead and I followed. We broke into a dome with a waterfall coming from above. The stream route pinched out downstream but Peter found a climb over it. Beyond was another squeeze which he didn't push.

This pit is known to the local people as Sima de los Bueyes, for some oxen reputed to have fallen into it. After exiting the cave we continued on down to to Sumidero de Cohuatichan (interpreted by a local as meaning "snake-water") to take a quick look at a lower level off to the left that Peter had discovered.

Ateschalla Norte y Sur

The following day we split into two teams. David, James and Carmen set off for Sumidero de Atepolihuit, where they were thwarted by the absence of the log that had formerly been used to get down the entrance drop. They discovered a new cave nearby and slightly higher. Peter, Sue, Andy, Terri and I set off with a guide who knew of several unexplored sumideros. He showed us two pits in the karst hills over Cohuatichan, then brought us to a higher stream swallet. This entrance, later called Ateschalla Sur, takes a merry little stream. Peter and I followed it downdip in a stoopway to where wetsuits would be required for serious exploration. After exiting I ran downhill and discovered another stream entrance, Ateschalla Norte. I dropped into it and crawled across wet stream gravels to another entrance close by, where I found Andy looking for crayfish.

Waterfall cascade in Chichicasapan (Norm Pace)

Chichicasapan

We regrouped and continued north along a major stream. We followed this quite a way, past a shelter cave, and on until I doubted that it would actually sink. Andy, Terri and I lagged behind looking for crayfish in the stream and when we caught up with the Lords they told us that the stream did indeed sink 100 meters further along into a cave. We filed past Indian women washing clothes in the stream who turned the water a milky hue with their soap. A large head wall appeared around a corner and the stream rushed underneath it. We fired up our lamps and entered Sumidero de Chichicasapan. The stream ran across a gently dipping bedrock floor in pleasant walking size passage. We stopped about 100 meters in where the stream tumbled over a short climb down. Peter had explored further and the stream continued. Our guide led us back to the fieldhouse by way of another entrance he knew of, Cueva del Arbol de Resistol. This was a large pit in a sinkhole which we didn't have time to adequately check. The major entrances we'd seen that day later turned out to be integral parts of the huge Sistema Cuetzalan.

Cueva de Tasalolpan

While Peter, Sue, Terri and I unfortunately had to depart for Ciudad Valles, David, James, Andy and Carmen stayed on to do more work in the area. They began the survey of the new cave above Sumidero de Atepolehuit, which a man in the village of San Miguel told them was called Cueva de Tasalolpan. They mapped 1.4 kilometers in mostly large, dry passages, with many leads left to explore. An active stream goes to a low air duck and a sump, but was not pushed. The cave lies above and runs parallel to Sumidero de Atepolehuit and may drop into it. It is also not far from the main Sistema Cuetzalan.

Cuetzalan Area

Puebla, México

Adapted from P. Lord (1978) and N. Davis (1974).

Additional information from S. Knutson, P. Sprouse, D. McKenzie, and aerial photographs.

Compiled and drawn by P. Sprouse July, 1979.

Piloztoc - Zoquiapan connection not shown.

Locations approximate.

N m

RESURGENCE CAVE

to Tetecilla

ferry

Tuzamapan

Zempoala

Río

Jonotla

Río Toxan

GRUTAS DE JONOTLA

GRUTAS DE CUEXALOCSTOC

CUEVA TECOLO

SUMIDERO DE JONOTLA

to Río Apulco

SUMIDERO DE ATEPOLIHUIT

CUEVA DE TASALOLPAN

GRUTAS DE ATEPOLIHUIT

CUEVA DE LA PROVIDENCIA

SIMA ZOQUIAPAN

CUEVA ZOQUIAPAN

CUEVA PILOZTOC

Cuetzalan

SIMA DE LA CRUZ VERDE

SUMIDERO DE CHICHICASAPAN

SIMA DE LOS BUEYES

CUEVA DEL ARBOL DE RESISTOL

SUMIDERO DE COHUATICHAN

CUEVA SIN NOMBRE

ATISCHALLA NORTE

ATISCHALLA SUR

to Río Apulco

SYMBOLS

- entrance
- passage
- stream
- road

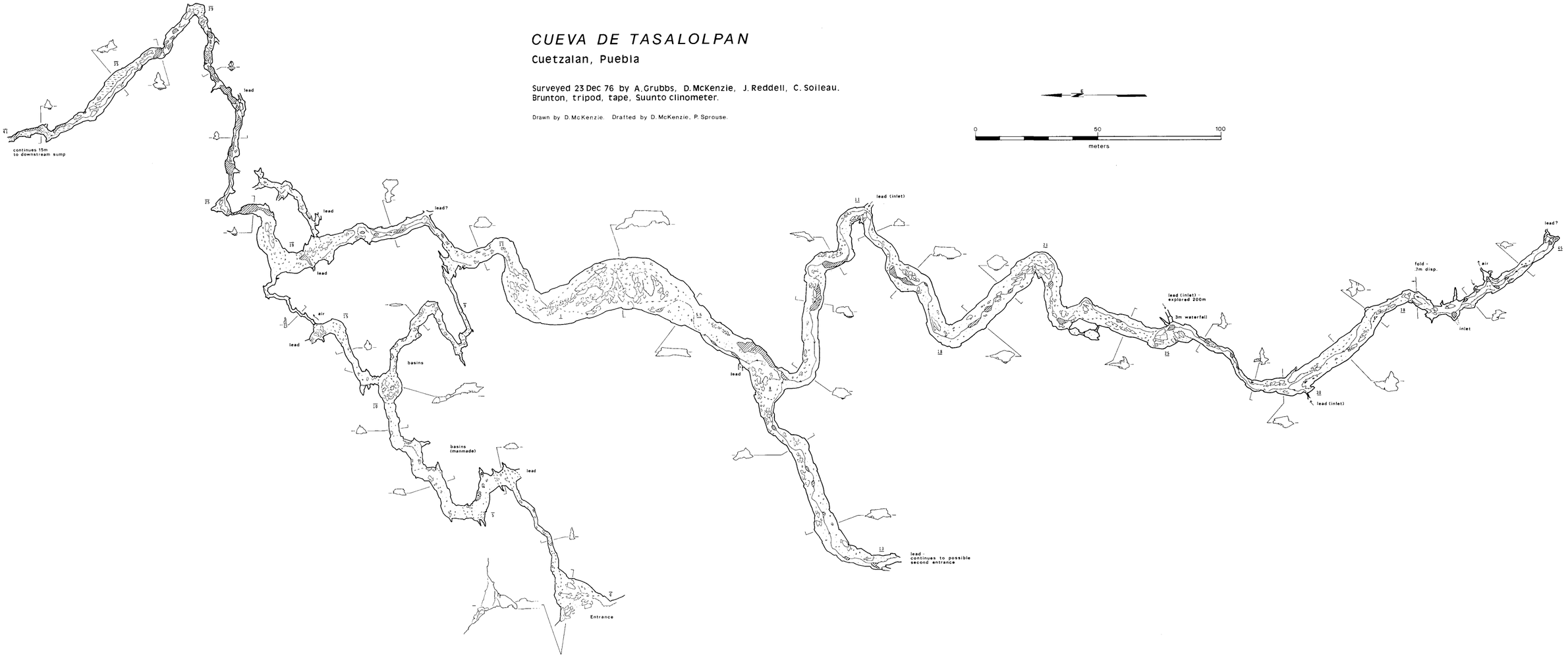
1 KM

CUEVA DE TASALOLPAN

Cuetzalan, Puebla

Surveyed 23 Dec 76 by A. Grubbs, D. McKenzie, J. Reddell, C. Soileau.
Brunton, tripod, tape, Suunto clinometer.

Drawn by D. McKenzie. Drafted by D. McKenzie, P. Sprouse.

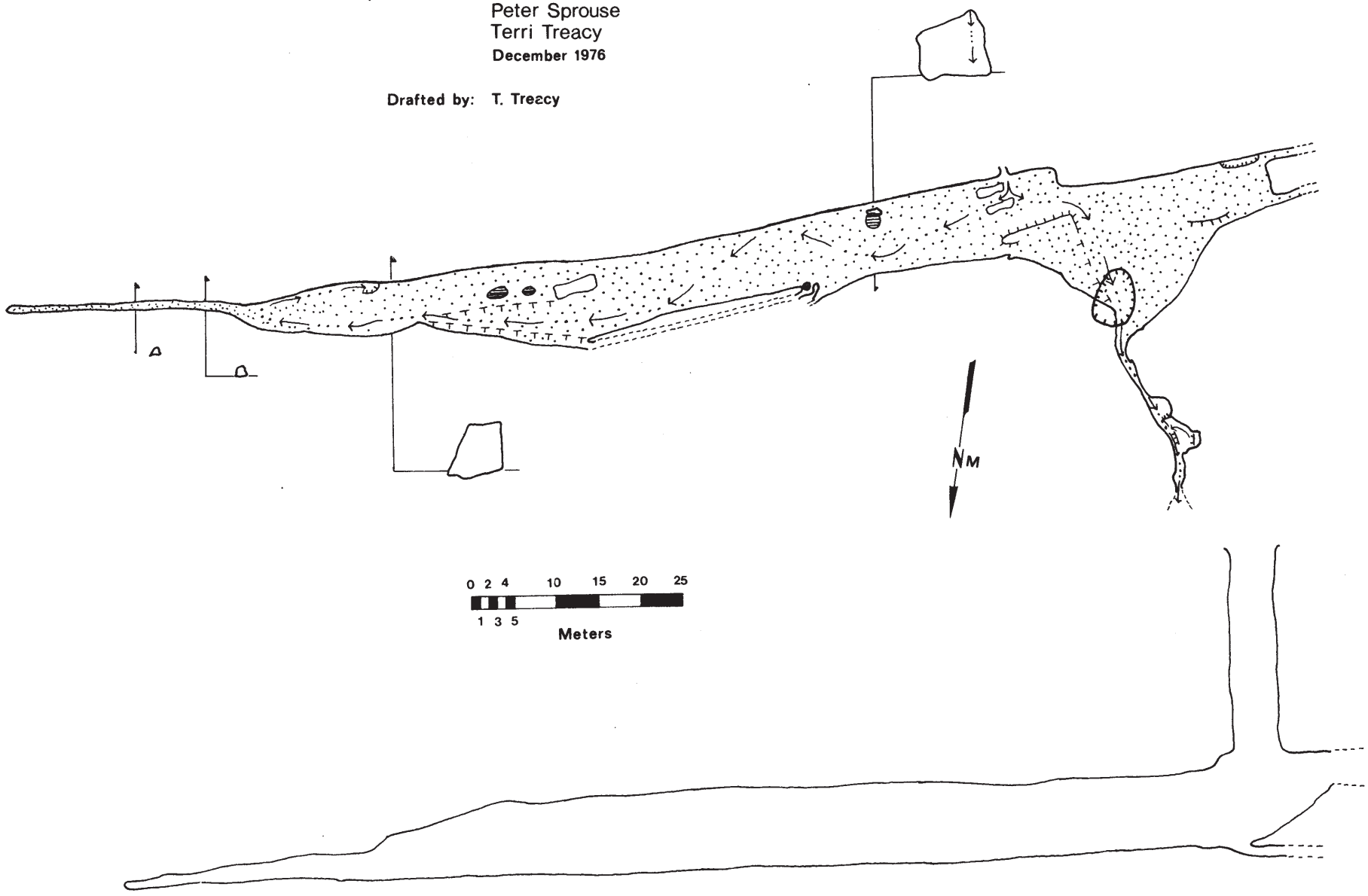


Sima de los Bueyes

Cuetzalan, Puebla, México

S.unto & Tape Survey by: Carmen Soileau
Peter Sprouse
Terri Treacy
December 1976

Drafted by: T. Treacy



Steve Knutson

Cuetzalan

Spring 1979

Massive entrance to Sumidero de Jonotla. (Steve Knutson)

At various times in late March 1979 a group of Western cavers arrived at the caver house, Casa Carmen, about a mile up the road from Cuetzalan, for a couple weeks of caving. This included Chris Albers, Bill Bockstiegle, and Bob Benedict in Chris' Power Wagon; Dick LaForge, Warren Anderson, and myself in my Carryall; and Bill Liebman, Joe Lieberz, Ernie Garza, Allejandro Villagomez, David Johnson, and Norm Pace by plane and bus.

Cuetzalan is on a karst upland, which in general, slopes to the east where it merges with a plain of low elevation ($\pm$ 100 meters) which continues to the Gulf of Mexico. The area is isolated from similar terrain

to the north by the Río Zempoala (Tecuantepec on one map) and to the south by the Río Apulco. The dip of the bedrock is somewhat varied but is generally to the north, and the caves trend in that direction. Pits are not common as most entrances are of the sumidero type. Sistema Cuetzalan (and several closely related caves) lie beneath the town of Cuetzalan and vicinity. The highest entrance to this is at about 1300 meters and the lowest point is the bottom of a separate cave, Atepolehuit (which is the local Indian word for Sumidero) at about 500 meters. This gives a depth potential for the system of about 800 meters.

Joe Lieberz has taken over the coordination of cave surveys for the area and this is now being computerized. This spring, however, the work of locating stations in the caves from the field notes of prior surveys had not been done so there seemed to be little point in expanding Sistema Cuetzalan with new surveys that could-not be linked to the old. Thus we worked on a few other caves in the area and entered Sistema Cuetzalan only to do some photography and poke around.

Sumidero de Jonotla

Sumidero de Jonotla, located about 4 to 5 kilometers east of Sistema Cuetzalan near the town of Jonotla, had been known for several years and partially mapped. It has a huge main passage. A few hundred meters along this a large side lead takes off on a higher level. We pushed and mapped both the side lead and main passage. The latter involved a number of swims and some vertical work, and a group finally came to a sump with a high level by-pass. This dropped back into the main passage but rope for this drop was lacking. The considerable airflow and the general NW trend of Jonotla leads us to believe that this is the back of the cave which Nevin Davis reported in '73, called Cuexalocstoc. This opens on the canyon of the Río Zempoala (Tecuantepec) north of the town of Zoquiapan and its passage is reportedly huge such that 350 meters in one still doesn't need a light. At this point 500 meters from the entrance a sump pool was encountered with an unreachable higher level from which air was issuing. Thus, a Jonotla thru-trip seems almost a reality.

A stream cave about 3 kilometers further up the Cañon Zempoala from Jonotla, called Xiliapa-Ceccla by locals, was mapped for 800 meters to a drop which required rope. This seems to trend directly toward the side lead area of Jonotla, which also contains a stream. About 1.5 kilometers separates the two caves.

Thirty meter pitch into canal section, Jonotla. (Norm Pace)

Cueva Tecolo

While observing the plant life in a field below Sumidero de Jonotla, cavers were taken by a youth to a cave entrance into which a stream was flowing and which was called Cueva Tecolo. This was pushed on an initial trip to a short, overhanging falls, then to a 50 meter borehole, and finally, on the third trip, cavers emerged from a modest opening into the humid night and lush growth on the side of Cañon Zempoala. Cueva Tecolo was mapped (including one major side passage) to a length of 1830 meters. There are still a few leads.

Opposite: Pushing upstream in Cueva Tecolo. (Warren Anderson)

Stream passage in Cueva Tecolo. (Ernie Garza)

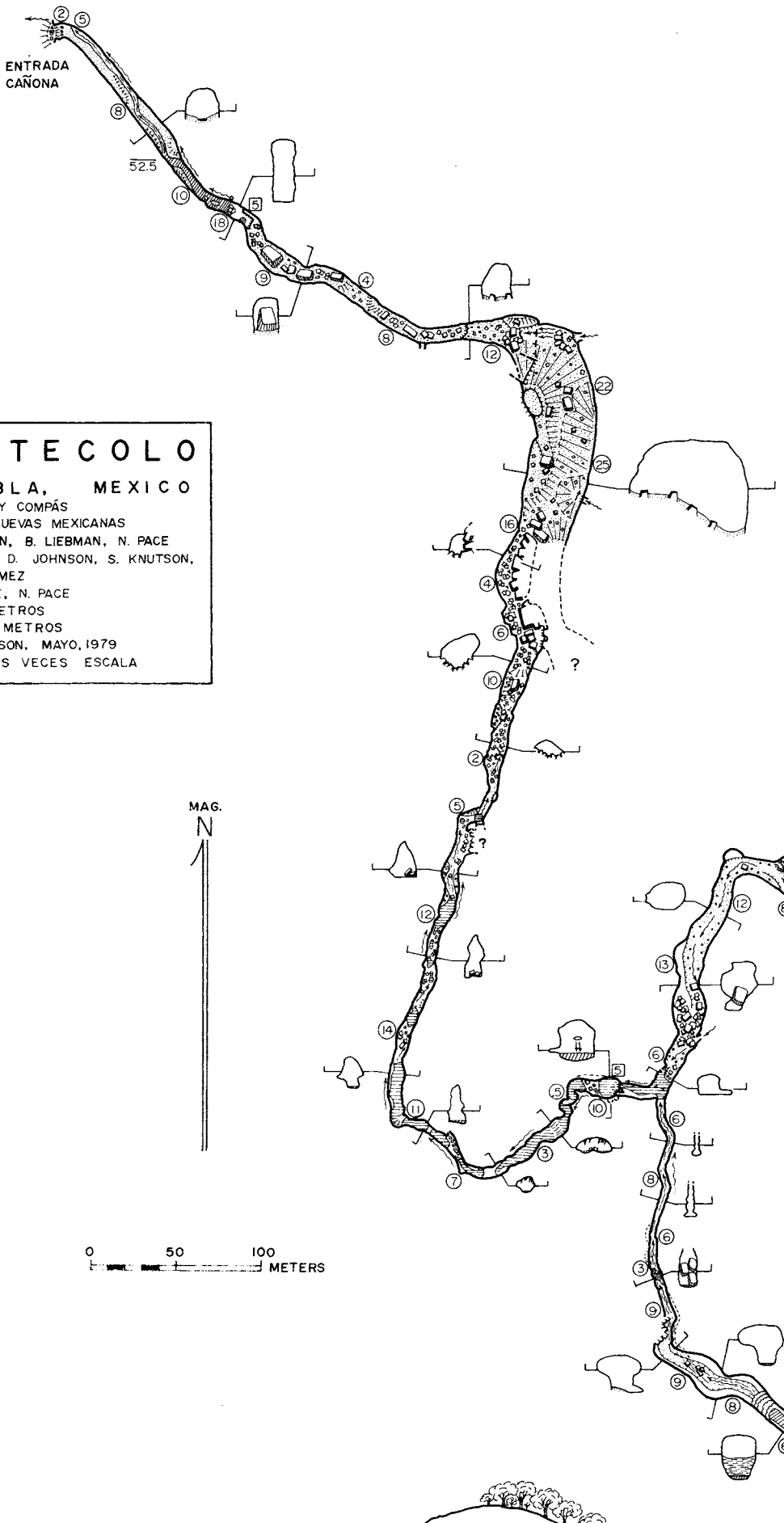
Sistema Cuetzalan: the resurgence?

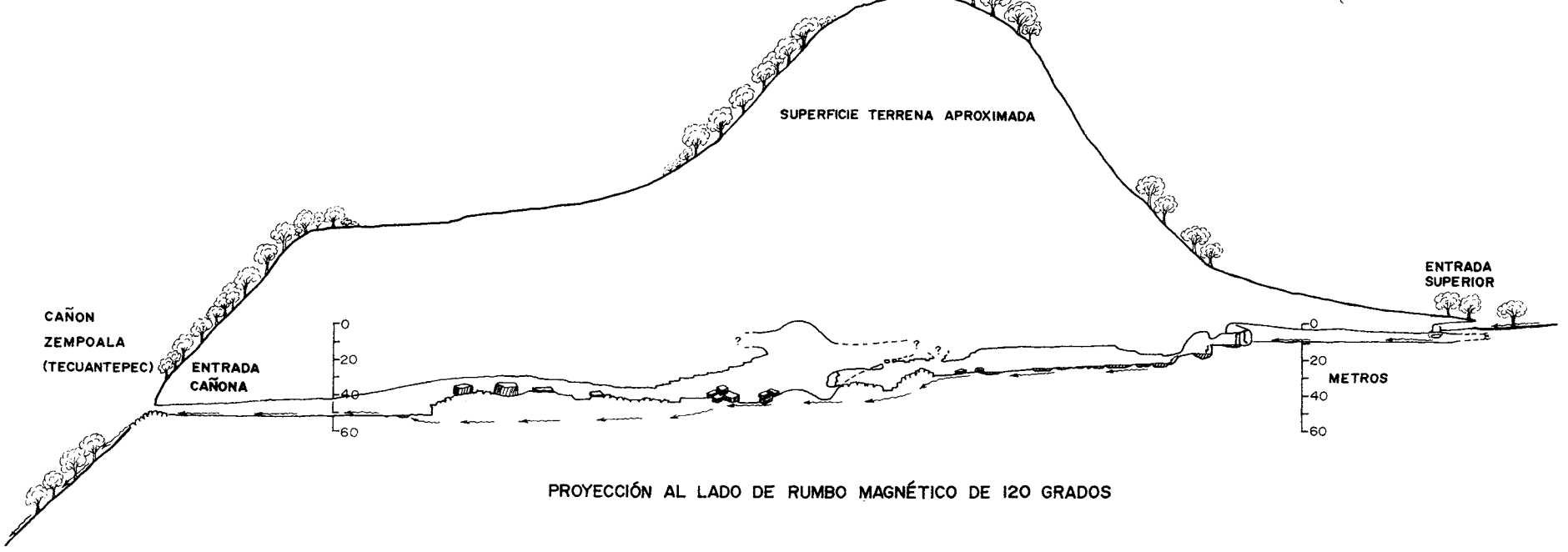
A trip into Chichicasapan to do some photography was very enjoyable. A look at the boulder choke at the bottom of the Resistol Stream Passage seemed to reveal that this is not just a simple stopping. As far up as one can climb into the breakdown it is covered with silt, which seems to be coming from above. One might conclude that there is a higher level crossing as this point, and, if it could be entered, it might lead back to the stream and onward and down. It should be noted that dry upper levels seem to be common and are found at least in Jonotla, Tecolo, and Chichicasapan. Where these can be seen to have collapsed to form an unusually large chamber in the lower stream level, one finds

CUEVA TECOLO

ESTADA DE PUEBLA, MEXICO

PLANO POR CINTA PARA MEDIR Y COMPÁS
ASOCIACIÓN PARA ESTUDIOS DE CUEVAS MEXICANAS
4-2-79 W. ANDERSON, D. JOHNSON, B. LIEBMAN, N. PACE
4-4-79 W. ANDERSON, E. GARZA, D. JOHNSON, S. KNUTSON, B. LIEBMAN, A. VILLAGOMEZ
4-6-79 S. KNUTSON, D. LAFORGE, N. PACE
TOTAL DE LARGO ES 1830 METROS
TOTAL DE HONDURA ES 52.5 METROS
DELINEACIÓN POR STEVE KNUTSON, MAYO, 1979
SECCIÓN TRANSVERSAL ES DOS VECES ESCALA





PROYECCIÓN AL LADO DE RUMBO MAGNÉTICO DE 120 GRADOS

boulders mixed with silt.

Chichicasapan apparently drains into Atepolihuit and this, at its bottom, continues in a terrible canyon taking a "Yochib-like" quantity of water. Where does this resurge, and at what elevation? The rumor was that it continued to the north to Cañon Zempoala which reportedly is so wild and difficult of access that even local Indians questioned knew nothing of its bottom. What a challenge! Accordingly, one rest day I drove down to the ferry northwest of Tetcilla (above Reyes de Vallarta) at the mouth of the canyon, at an elevation of about 100 meters. The river was low, at a guess about 10 CFS or less; perhaps enough to be described as Yochib-like if confined in a cave passage. The canyon was not cliffs down to the waters edge, so I made my way upstream with little difficulty, crossing almost at will and never getting more than crotch deep. About 800-1000 meters upstream there was obvious water entering from the south and poking around I found a cave entrance of walk-in size with cold air flowing out. My flashlight refused to work so I didn't go far in, but it seemed to go. The water flow out didn't seem more than 1-2 CFS. About 2 kilometers upstream from where I started I came to another ferry crossing (these ferrys are just boats for foot travelers poled back and forth at a quiet place in the river). The second ferry is a trail crossing below Tuzamapan, a town on the road I had driven down. Here I turned back after examining a collapsed spring opening on the north side of the river right at the crossing. About 2-3 CFS was the flow. At no time was I out of sight of a person or corn field on the way upstream. So much for the terrible canyon.

The trend of Sistema Cuetzalan (and Atepolihuit) makes it seem unlikely that its resurgence would be further upstream. If it were, most of the river's flow would have to be the flow described for Atepolihuit. Another possibility is that the system resurges in a lesser canyon of the Río Toxan just to the south. According to the maps we had, this was too high in the area where the caves should cross, but after that it loses elevation and enters the Zempoala below Reyes de Vallarta.

So another day, LaForge and I drove down the road below Cuetzalan that skirts the south rim of the Río Toxan canyon. I dropped Dick off about 3 kilometers down - he took a trail into the canyon at a point above where the cave system should cross. I continued on to where the road was blocked by a slide. There I continued on, hiking along the road and checked the Toxan and another canyon coming in from the south. I came to where these two joined, above their confluence with the Río Zempoala. Both were quite dry. Interesting since Dick found the Toxan to have several CFS of flow higher up. I continued on, out onto the coastal plain which presented a strange appearance. As far as you could see was a landscape of rolling, steep-sided hillocks 20 to 30 meters high, covered with green grass and occasional trees and cows. Between the hills were no stream channels - it was karst. But where the road I was following cut into these hills, they were shown to be sand. Apparently the ocean once lapped against the base of the mountains.

So we still don't know where the resurgence is, but my guess would be either the Río Zempoala near Reyes de Vallarta or the edge of the dune karst somewhere. If so, the depth potential of the system is something like 1200 meters. If the resurgence is further up the Zempoala than the crossing below Tuzamapan, then the potential is 1000 to 1100 meters.

Sótano del Buque

Robert Jefferys

Sótano del Buque was discovered as part of an AMCS project in the summer of 1972, in a region located north of Ahuacatlán near La Ciénega. Buque was the most significant cave mapped while systematically recording the speleological features of the area. The total depth was measured at 502 meters, making Buque the fourth deepest system in México at the time. Subsequently, the survey notes were lost and a map of this large cave was never published.

Thursday, December 29, 1978 my Chevy van, dust covered from two thousand miles of travel, hit the town of Ahuacatlán, Querétaro and turned north on a one lane shelf road. On board were Vi and Dave Allured, (CO), John Evans (MA), Gerry McCollum (MA), and myself (CT). Armed with a ton of tackle and information from Kirkwood cavers our group planned resurveying, photographing and pushing the terminal sump in Sótano del Buque.

Many kilometers later, we found that the road did not go to Santa Aguida as had been thought. Not this year anyway. On questioning the construction crew building the road, we learned that Santa Aguida was 6 kilometers farther. This meant the truck could not be two kilometers from the cave as originally planned. Therefore, we arranged with Juan Flores, of El Pino, to hire a man and burros.

We spent the night in the hut of one of the locals and were on the trail shortly after the sun rose. All of us found the burro driver's brisk pace tiring under the weight of our heavy packs. Gerry, who is totally blind, soon found the rock strewn trail more than he had bargained for. A man was hired to carry his pack. Gerry endured his bumps and knocks with his usual good spirits.

On reaching El Pino, we prepared to spend the night in the municipal building at the insistence of the jefe Feliciano Espinoza. Then, for the next few hours his English speaking nephew, Jimmy, plied us with cervezas while we compared cultural notes.

By midday Sunday, we had finally reached Buque. Above the dry entrance arroyo, we began to set up camp in the same shelter caves used by the original expedition.

Opposite: Arroyo entrance to Sótano del Buque. (John Evans)

On our initial investigation of the cave, we were impressed by the entrance passage. Also, the view from the top of the first 15 meter pitch into the next enormous room, the Iceberg Room, was spectacular. The well lit entrance passage contains scattered stagnant pools that supply the locals with drinking water. This would be our water supply too, but we used coffee filters to strain out the silt and bugs, then added iodine. The Iceberg Room connects with the upper vertical entrance shaft. The sun beaming in at noon was truly a sight.

The next two days were spent rigging and mapping to the 200 meter level. The passage after the Iceberg Room was high fissure type, averaging 5 meters wide with short dry pitches close together. This leads to the biggest interior room, the Dry Room. At the end of this chamber, a well decorated archway led to Delta Drop. Past this point the cave was wet; all pitches had water, and walls showed signs of seasonal flooding. The trips were kept short and non-taxing in anticipation of necessary long, harder ones later.

Rigging

On Tuesday, we awoke to a drastic drop in temperature. There was a coating of ice and snow blanketing everything. This unusual climatic change caught us unprepared clothing-wise. Nature also seemed unprepared. It was sad to watch many of the tall, majestic prickly pear cactus breaking off under the burden of the ice. Our optimistic goal for the day was to finish rigging and bottom the cave. The sooner we saw the whole cave the easier it would be to schedule the work for our remaining days. Slowly, one by one, the crew members dragged themselves out of their warm sleeping bags and entered the cave. We all gathered in the Dry Room and donned our wet suits. Then, we switched rope lengths on Delta Drop for the third time.

Much of the temporary confusion on Delta and subsequent drops was due to my misreading of a profile view of the original traverse run in 1972. Someone who apparently had never been to Buque had numbered the drops: drop one, drop two, etc. through drop ten. We soon discovered Buque has fourteen distinct drops.

The next several hours were spent placing a multitude of bolts. Two 1/4 inch bolts were poorly set and our homemade 1/2 inch driver became stuck halfway through a placement. It was not a sight of engineering beauty, but reinforced by Goldline slung over a passage size chockstone wedged 5 meters off the canyon floor, it was secure. We found that in most cases our canvas and carpet pads were superfluous. The overabundance of smooth flowstone kept rope abrasion low. On the other hand, the 5/8 inch rubber garden hose left unsplit and slipped on the end of the ropes was invaluable for protecting rope from wear at rough tie-off points. From this "Christmas Tree" arrangement of bolts we rigged the next three pitches in a single shot with one rope. Because of its tendency to spiral to the right, this section was quickly dubbed The Corkscrew.

A short, tricky traverse skirting a pool brought us to an enormous dome pit, The 337. Since I had misread the profile, the pit was thought to be The 200, so we lowered a 300 foot (90 meter) Bluewater rope. John slung a 150 (45 meter) Bluewater over his shoulder, racked in and entered the dome. After an unsuccessful attempt to communicate over the thunder of a large volume of water sheeting down the pit, two whistle blasts rang out. I proceeded down

the rope. What John had been trying to tell us became obvious. He had reached a small ledge and judging the main line as being too short, he tied on the 150 foot (45 meter) Bluewater. After he got off rope on the bottom, the rope apparently shifted making it impossible for me to get anything but my toes on the ledge. I had a brief conversation with John, and we decided to try again tomorrow. I switched over to ascend. We all made our way back to the cold surface air.

The sump

After a much needed day off, we finally bottomed Buque on Thursday. We started by switching all our misplaced ropes. A few paces from the bottom of The 337 we encountered a 5 meter flowstone climbdown. We found it safest to perform one precarious friction move in the middle of the climb with assistance from a partner. Just beyond the climbdown, we encountered another large dome pit, The 200.

After setting a 3/8 inch bolt near the lip, we backed up a 300 foot (90 meter) Bluewater to a solution hole. Dave rapelled. At the bottom, confronted with a deep plunge pool, he clawed his way along the wall and squeezed through a narrow crack. Dave used the excess rope to pull the rest of us in. Then, tied off, we used the same rope to drop two 5 meter sloping flowstone pitches. Shortly after, we found two overhung cascade drops. To speed things up, only John and I continued. The horizontal section, Main Street, that followed proved to be a real energy drainer. The dynamic wet canyon contained many short climbdowns and a multitude of potholes and canals.

On reaching the final pitch, we luckily found a tie-off point near the lip. Barring cutting or a long walk back to the truck, this was our last rope and had to be long enough. John began his descent. Moments later, two whistle blasts echoed indicating that both John and the rope made it to the bottom. I racked in, then rappelled down the rope. Soon, I reached walking passage, with a plunge pool below me. I got off rope and wandered 100 meters down a large muddy gallery. Not finding John, I returned to the pit. He was at the pool edge 6 meters below me, having made his way through the low, wet sump passage clearing debris as he went. By drifting through a short stretch with his ear in the water he popped up the the Terminal Sump Room.

The sump measured 2 meters wide by 0.7 meters in height. The clear silt-free water would make it a good dive. Paddling and climbing our way back up Main Street, we were slowed down by one climb. John waded out into the pool up to his neck. Climbing up onto his shoulders, I pulled myself up over the lip of the drop. Wedging myself into a pothole I lowered a pack strap to John and he pulled himself out. On joining the others, we all started the arduous trek to the surface.

The survey

After a well deserved R&R day, we joyfully made our way through a now totally rigged cave. We slung an etrier on the climbdown that had given John and me trouble. Then to entertain my friends, I dropped my carbide lamp in a 3 meter deep pool. With Dave's large waterproof lamp in hand, I hyperventilated and dove. I grasped it with my finger tips only

to have it slip and fall back to the bottom. Finding it would be more difficult now with all the silt I stirred up. Two tries at blindly thrashing about on the murky pool bottom produced a brass lamp. We chained our way through all the lower section of the cave and up three drops, pulling the ropes as we went. Exiting the cave at 4:30 AM, after 18 hours of mapping, we were tired. It would be cutting it close, with three days left, to finish the survey and derig. We would not have time for a photo trip or to dive the sump.

The next morning, no one was in any shape to go caving. Vi and Dave went into El Pino to see Juan Flores about the burros for our return trip. John, Gerry and I surveyed the upper pit entrance.

For our final trip, the weather turned nasty again. Mapping our way in we wired the big drops, then finally closed the traverse. Gerry, who had by now memorized much of the cave, soloed in and was waiting for us at the top of The 337 happily singing away. Employing a trick used on the Trinidad expedition, we tied all the ropes together end-to-end. Then, Gerry hauled the single continuous strand up and we snaked it between pitches. That way no one was ever hauling the full weight of a rope. In the Dry Room we stuffed the ropes into duffel bags and finished off our last loaf of apple logan bread. We hauled the bags up the remaining pitches exiting Buque with our main mission accomplished.

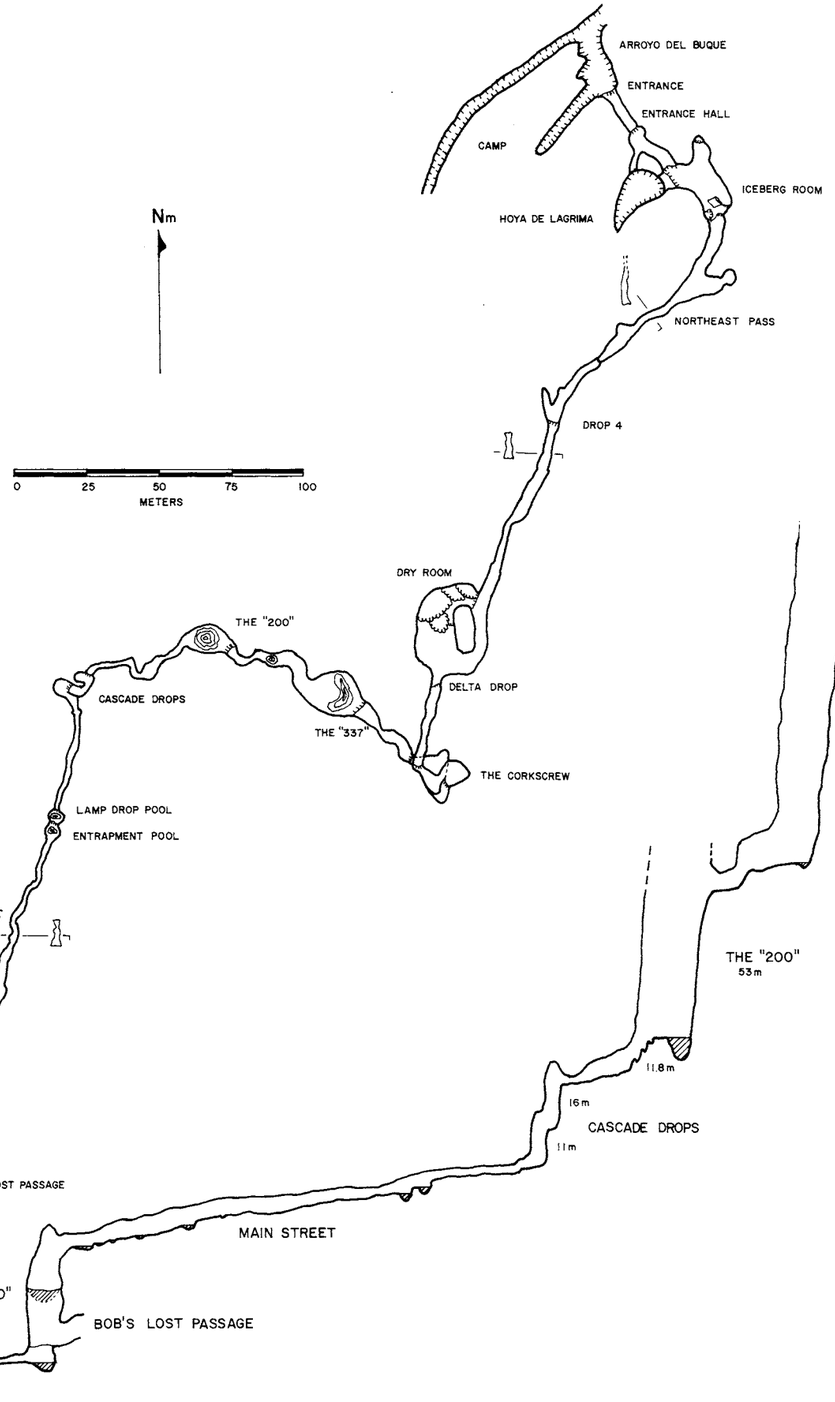
The air temperature was still hovering around freezing. It was noon and we had been in for 24 hours. After a day's rest, we packed up and headed for home. The total depth of the cave as calculated from the new survey is 506 meters.

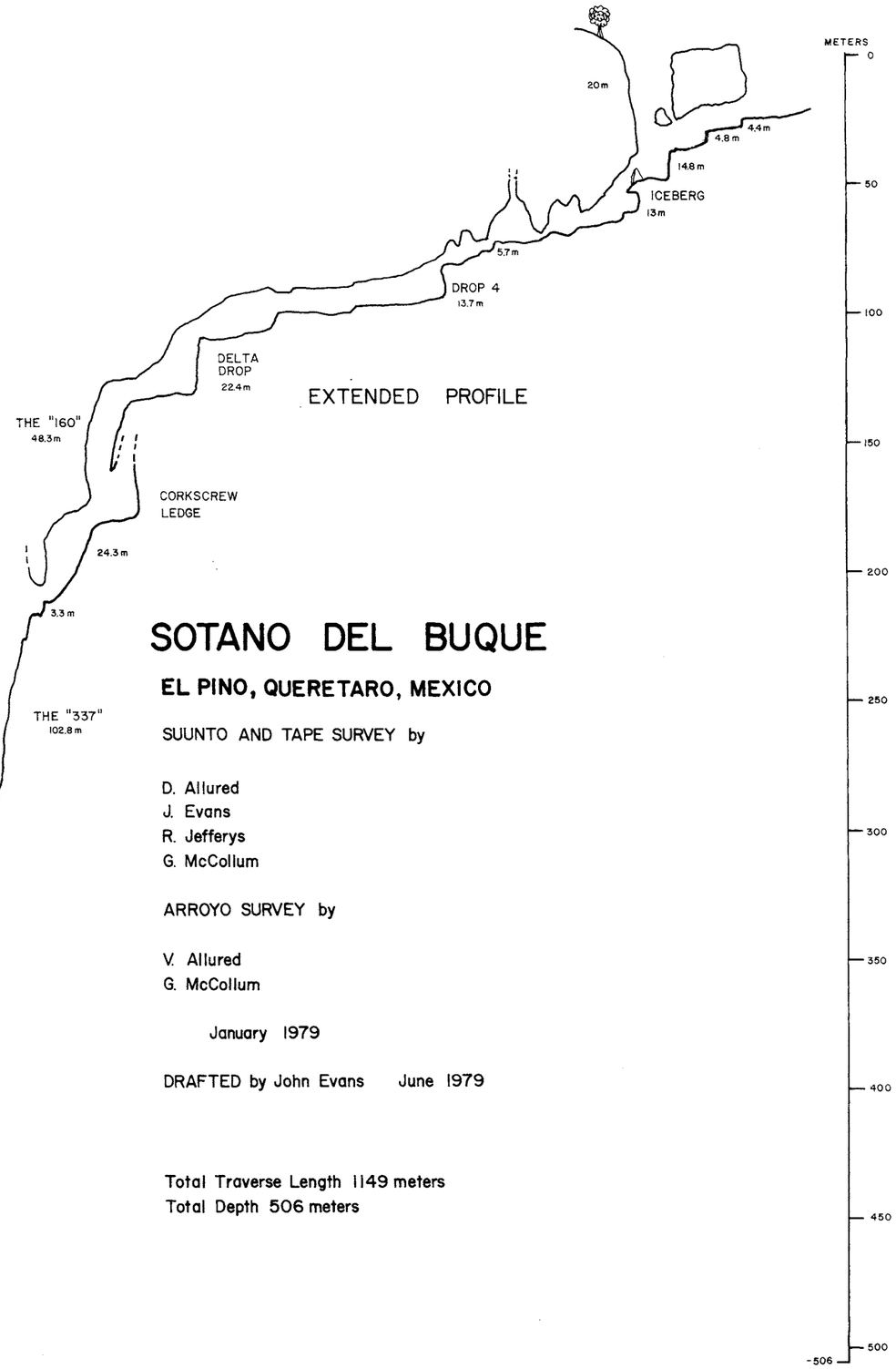
Dale Pate

Cave of the Río Jalpan

As I walked into the cave,
I felt a timeless flow.
The current of its river
Reached deep within my soul.
The endless churnings in the darkened pools
Carved winding passages through my mind.
The waters surged against me.
I felt its strength, its restlessness.
I began to flow with time
And it surrounded me.
For a brief instance, I felt the power
Held deep within the cave.

Even now, I feel the forces of the cave
Surging through me.
Even now, I feel the restless churnings,
The endless flowings.





EXTENDED PROFILE

SOTANO DEL BUQUE

EL PINO, QUERETARO, MEXICO

SUUNTO AND TAPE SURVEY by

D. Allured
J. Evans
R. Jefferys
G. McCollum

ARROYO SURVEY by

V. Allured
G. McCollum

January 1979

DRAFTED by John Evans June 1979

Total Traverse Length 1149 meters
Total Depth 506 meters

Cathy Rountree

The Bozo Bus, laid to rust
Decays in umber hues
Though oxide doth corrupt the flesh
The mettle still shines through.
Although the body's bent and cracked,
Agape at every seam,
Despite the aspect worn and wracked
The engine block still dreams--

It sees the distant winding road
Where clouds and mountains meet
Where rĭos flow to sŏtanos
To cut their pathways deep.
The carburetor conjures up
Memory's fading fumes--
Hairpin curves and slip'ry slopes
Beneath a blindfish moon.

And sometimes in the twilight's gloom
Or sunrise's rosy glow
Spark plugs sputter out of tune
This song of joys and woe:

"A hundred trips, ten thousand miles
I traveled in the cause
With wounds bound up with bailing wire
My body thick with scars.

I thrived in times that would have stilled
Toyotas, Jeeps and Ramblers
When broken glass and airless tires
Were every-day encounters.

I carried tons on broken springs
And pretense of suspension
Brakelines frayed to ragged strings
Sustained the deep declinsion.

Undaunted til the sudden flip
The final fatal blow--
That loosed the engine from its mount
Oil unstinted flowed.

It marked the start of my last trip
Tracking silent sotanos
I was martyred to the underground
Sacrificed by bozos."

And then the pistons softly pound
A slow and solemn dirge
That fills the air with mournful sounds
All echoed by the birds.

Oh stranger, if you know it not
Tis a worthy shrine to visit
Yea, once it was a Mighty Bus
With none but Bozos in it.

CUEVA DE XOCOTLAT

introduction by Gerald Atkinson

This year's expedition to the Sierra Nahuatl, Puebla had a twofold objective: to push Cueva de Xocotlat (Overflow Cave)* and to begin exploration of the nearby Sumidero del Río Xocotlat, both of which had been partially entered on previous trips. (See AMCS Activities Newsletters Nos. 5 & 8). Unfortunately, our plans were somewhat abbreviated due to local hassles and only the overflow cave, Cueva de Xocotlat, was brought to a satisfactory close. Hopefully the future will bring better relations and greater depth.

The discovery and early exploration of Cueva de Xocotlat encompasses a two year period, described by Preston Forsythe.

Shari Larason at the entrance of Cueva de Xocotlat. (Peter Strickland)

Initial explorations

Preston Forsythe

Cueva de Xocotlat was discovered on January 8, 1977 by following the Río Xocotlat trail upstream from our camp at the Sumidero del Río Xocotlat. A Nahuatl Indian along the way indicated that the river resurged from a cave. Although we did not reach this point, during the search a walk-in entrance was spotted by Shari Larason as we smelled out the cave in a steep canyon. The entrance was 1.3 meters above the river level and apparently once took a portion of the flow, and may now during floods.

On January 9, 1977, Bill Mayne, Peter Strickland, Shari Larason and I made the initial trip into the cave rigging five drops including a difficult traverse over the third pitch. Bill went down the last drop for the day and reported the cave still going. Marbling, as reported in other caves of the mountains to the south, was beginning to appear in the limestone. There was time for only one trip as some had to return to the US for classes.

Jim Rodemaker, Bill Mayne, Brian Clark, Jocie Hooper and I returned to the cave on December 25, 1977. The lead riggers arrived at the top of the third pitch traverse in short time. By squeezing up and chimneying-traversing across the top of the pit, a natural rigging point was reached which made the drop easier. At the bottom of the pitch Jim spotted a deep dry shaft which I descended approximately 60 meters before encountering a small wall pocket, a waterfall, and the end of the rope. At this point Bill and Jocie descended three more pitches in another section of the passage, the first two of which included a heavy waterfall and the third being a 65 meter drop. Afterwards we ascended and exited for the day, having a fairly short trip with a long enjoyable hike back to camp.

The first survey trip was made by Peter Strickland, Jocie and I on December 28, 1977, while Bill, Jerry Atkinson and Henry Schneiker rigged on ahead. Above the third drop Bill's battery pack fell, nearly beaning Henry. Short of light, Bill left the cave. The survey was steady and eventually caught up with Jerry and Henry who were chilled from waiting. Henry descended the 65 meter pitch in a waterfall passing a ledge halfway down. A side dome with water was noted to intersect this shaft near the bottom and this was suspected to be the pit that I had descended previously. Henry reported the stream flowing away in a large passage at the bottom of the drop.

On December 30, 1977, Fred Poer, Jim, and Mike Boon left camp before sun reached our camp. Their trip must have been interesting as they assumed other identities while in the cave. Below the 65 meter pitch there

*Ed. Note: This cave was incorrectly listed as "Cueva de Coyamilpa" in the deep caves list in Activities Newsletter No. 9.

was a sizable horizontal section which turned into a narrow downcutting rift and then changed to a vast steeply descending cascade. Mike led some difficult unroped downclimbs in water and heavy spray and was finally stopped by a sheer drop as they had long before run out of rope.

Fred, Jim, Bill and I gave Cueva de Xocotlat one more try on January 2, 1978. With plenty of rope we had no problem in descending two additional drops at the bottom of the cascades, rappelling down beautifully encrusted flowstone walls into a large divided room. One side contained a mud sump while the other led to a 1 by 2 meter passage which twisted down a short ways before becoming engulfed in water. A waterfall filled hole! The name Turbine had previously been applied to a feature in nearby Sótano de Coyomeapan and the term fit here also. Fred and Jim carefully scouted the new obstacle and decided to return during a drier time. We then surveyed out to the top of the 65 meter pitch derigging as we went, leaving the cave with a depth of 283 meters.

In search of hidden treasure

Gerald Atkinson

The Christmas '78 expedition found 14 cavers camped in a glade above Xocotlat. Permission to cave had been easily granted at Zoquitlán the previous day. Color 5 x 7 photos of Sótano de Coyomeapan and a copy of Newsletter No. 8 seemed to please the young presidente who also ran the junk repair shop. Our entrance to the area seemed well received and much good will generated . . . from the Méxican officials anyway. Ignorant of any possible problems we went about our business of transporting gear and setting up camp in the valley.

Camp was a vast improvement over last year's damp and sunless swamp. The sun actually shone before noon and dried out your wetsuit. Cueva de Xocotlat was an interesting 5 minute walk away, as was drinking water. Firewood was everywhere and of a varied sort, although some preferred using wet pitch pine. It burned with a ferocious sputter yielding grand quantities of smoke; early on we settled any mosquito problem we might have had.

Caving started out with a whimper as half the crew was stricken by turista or bronchitis (mal aire no doubt). Despite all this, Cueva de Xocotlat was rigged to the previous point of exploration and partially resurveyed by the 26th of December. Dino Lowery, Steve Zeman, Mike McKee, and Jocie Hooper extended the survey to the terminus of rigging on the 27th. On the way out

Opposite: Rio Xocotlat with Cueva de Xocotlat in background. (Peter Strickland)

Jocie's footboard fell apart and she had to jerry-rig a Texas system to climb the 65 meter pitch.

Peter Strickland, Andy Grubbs, Bill Cobb, Bob West, and Marcia Cossey headed off to the Sumidero del Río Xocotlat on the morning of the 28th. They got down only three drops, due to having to rig out of the force of the 15 to 20 cusec stream. At the bottom of the last pitch a short swim led to the top of another 10+ meter waterfall that would need bolting. On the hike back to camp, Bob and Marcia found a small sótano which was later discovered to contain an intact pot, probably of ancient age.

Pushing the Turbine

The next day Mark Minton, Bill Cobb, Andy Grubbs and Tommy Shiflett entered Cueva de Xocotlat armed with survey book and rope. It had been a dry year and the Turbine that had stopped Preston and crew was found to be quite negotiable. They soon rigged down several more drops through scoured marble-like bedrock and flowstone passage. Like most of the cave, this section was not overly large, averaging 3 meters wide by 15 meters high. The last pitch landed Mark and Tommy in a slow moving streamway curving out of sight. Rounding the corner the water was seen to be flowing 1 meter deep and twice as wide under a protruding flowstone curtain. Tommy kicked around in the sump, hearing water slap against the ceiling somewhere out of reach. At -339 meters Cueva de Xocotlat was finished . . . for the time being.

Treasure?

Trouble was happening upstairs. A delegation composed of the presidente and his officials arrived from Zoquitlán in the early afternoon. Everyone in camp was immediately concerned as the presidente's nervousness and embarrassment were plain to see. He told us that the locals believed we were taking gold and silver from the caves. Okay, we've heard this one before - what's the problem? The problem was that if we were allowed to stay it would appear that the presidente and his compadres were getting kickbacks from our mining operation. "So you see my friends, you will have to leave immediately."

At this point I was afraid we were going to lose the 700 meters of rope that was still in the cave. Mark and crew were down there still rigging! Bad scene.

Reticent at first, the presidente finally allowed us a grace period of two days to clear out. We would have to derig two caves, rent mules, up-camp, haul everything 4 kilometers to Zoquitlán and load the vehicles by the 31st. Busy, busy!

The final trip

The next couple of days were hectic to say the least, quite depressing at the most. No one likes to cave under a deadline. Amidst all the frenzy, Peter Strickland, Mike McKee and Marcia Cossey pushed Sumidero del Río Xocotlat down two more pitches before derigging. They

Cueva de Xocotlat

Municipio de San Pablo Zoquitlán

Puebla, México

Suuntos & Tape Survey by AMCS 1977-1978
Data reduction and plotting by ELLIPSE
Drafted by G. Atkinson & D. Pate - 1979

Idealized Profile

Meters
0
100
200
300
339

Entrance
The 300 Series
Flowstone Cascade Series
Cuarto del Lago
Terminal Sump

Terminal Sump
339
277
Cuarto del Lago
Cascade Series
The 300 Series
Connects to Upper Pit
141
H_2O
27°
35°

0 10 20 30
Meters

N

were stopped at the brink of another waterfall where it seemed that quite a few bolts would have to be placed. The water was funneling down into yet another of the "vertical siphons" that are becoming so common to Zoquitlán caves.

The afternoon of the 31st saw all of the rope and gear at Zoquitlán ready for packing into the trucks. Our departure was not to be unflawed, however. The presidente and his men showed up, insisting on searching our duffels before we loaded up. We had been prepared for this eventuality, but it was a pisser to have all your stuff gone through, prepared or not. Like a border crossing, only with much more dire consequences if we didn't pass.

We did.

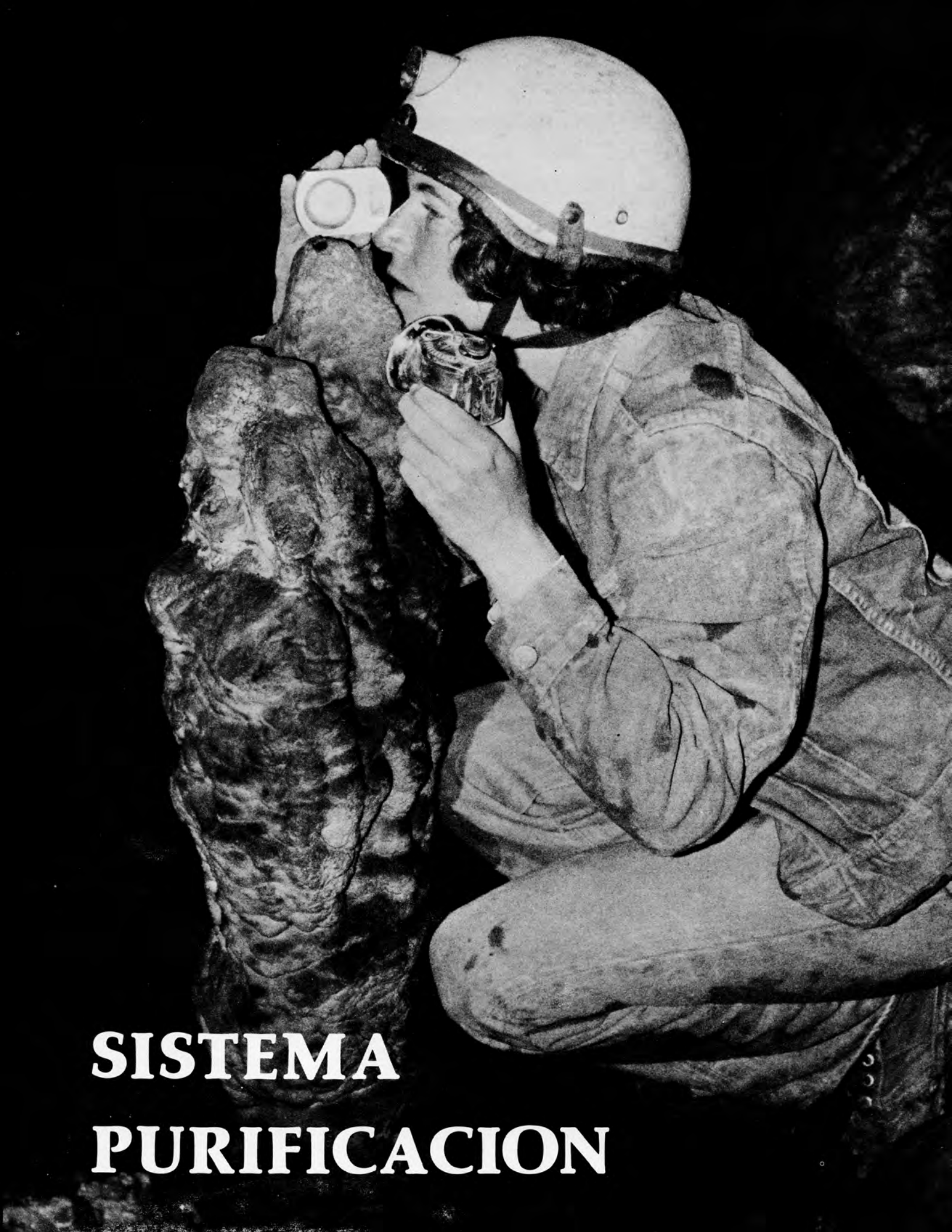
Summary

Cueva de Xocotlat is presently 339 meters deep with a traverse length of less than a kilometer. Further exploration will require diving the sump during the dry season, preferably late spring when there is the possibility that an airspace may exist. Sumidero del Río Xocotlat was pushed down five wet drops to where an intense bolting session will be needed to bypass the river. The cave is about 60 meters deep and less than 300 meters long, although it remains to be surveyed.

The Zoquitlán region is to be considered a sensitive area at present. Cavers are urged not to enter the area until large amounts of PR are pumped into the local government. An impromptu showing of what would appear to be gold-seeking gringos could severely set back any future negotiations that will be taking place. For more information on the area, contact G. Atkinson, c/o AMCS, P.O. Box 7672, Austin, TX 78712.

And if there be a difference in thought,
Concerning where-in lies the bitter end,
You say it be in the sumps inky depths...,
I say it lie at sweet airs end.

Anon.



SISTEMA PURIFICACION

1979 SPRING PROJECT

Dale Pate

Plans were made in early 1979 to return to Conrado Castillo and Sistema Purificación, located northwest of Cd. Victoria, Tamaulipas, for an extended stay in the mountains and a push on some of the more promising leads in the cave system. The goals for the spring were to extend the depth and the length of the system. The potential is definitely there, for below the deepest known point in Infiernillo, there are 600 meters of exposed limestone before the closest known resurgence is found. Eight hundred meters above the highest known portions of the cave system is an extensive karst field with literally hundreds of unchecked pits. Any major find going up or down could result in a new depth record for the world. When the 1978 push to connect Brinco to Infiernillo was in full swing, there were several large passages that had been partially explored but not mapped due to lack of time. One of the goals for the spring was to map as many of these passages as possible, as well as any new discoveries. Quite a few people were involved in the activities for the spring and it seemed that 4-wheel drive vehicles were arriving or departing almost weekly throughout the expedition. As of early March, the official length of the system was 21,055 meters.

Caving in Conrado Castillo

Spring activities got off to a start on Saturday, March 10 when two vehicles arrived in Conrado Castillo. In Paul Fambro's truck were Paul, Nye Nestman, Lisa Wilk, Kurt Schultz, Dale Pate and Gerald Atkinson. In Jim Rodemaker's truck were Jim, Denny Barnes, Terri Raines, Peter Sprouse, Leslie Turpin and Terri Treacy.

The ensuing weeks saw quite a few things happening. On 12 March, Terri, Lisa, Dale, Peter, Leslie, Paul, Nye and Jerry entered the system through the Cueva de Vapor entrance and proceeded to the Phreatic Preattic Room where two mapping teams were formed. This large chamber was mapped as well as part of the Attic Room. Several leads were pushed, including one that headed upward above the Attic at the top of a large flowstone formation around 7 meters high. This turned out to be the passage that Hal Lloyd, Jim Smith, and Jill Dorman had found over the Christmas holidays.

On March 14, Peter, Leslie, Terri and Dale returned to the Attic Room via the Vapor entrance and completed

Opposite: (Paul Fambro)

In the delicate recesses of Valhalla. (Paul Fambro)

the survey above the Attic to a small room named the Roots Room, which is the highest known point in the system at this time at 893 meters above the Infiernillo sumps. Peter dug two hours in a fissure filled with surface dirt, tree roots and leaves. From there, the team returned to the Attic Room and mapped the Ain't Bad Helictite Room, the Helictite Jail, and the Seven Totems Room, all of which are adjacent to the Attic Room and are very well decorated with lots of helictites as the names suggest.

During this time, Terry Raines, Denny, Jim and, Kurt were taking photographic trips to the Historic Section and the World Beyond. On March 13 they headed to Cueva de Infiernillo where they explored several new passages near the Balcony Borehole. They returned to the fieldhouse in Conrado Castillo the next day and then on March 15, they once again returned to Infiernillo along with Paul, Lisa and Nye where they did a photographic trip to the Netherhall. While in the cave, Nye slipped while doing a climbdown and broke his right wrist, but he was able to return to the entrance and traverse the hike to the vehicles under his own power. Once again, another accident shows that all the climbs throughout the system should be taken seriously by any who enter. These six then headed out of the mountains and back to the States.

March 14 saw the arrival of Mark Shumate, who had come to stay for the duration of the spring project. He was driven up to Conrado Castillo by Larry Clay and a couple of his friends, who stayed a few days to visit the Historic section. By March 17 Peter, Leslie, Terri, Jerry, Dale, and Mark

were the only ones left at the fieldhouse. All the others had returned to the States and prior commitments.

Plans to camp in Infiernillo for a week were postponed when Terri came down sick, so once again most of the efforts were put forth working in the upper reaches of Brinco and taking day hikes in the general vicinity of Conrado Castillo. On March 16 Mark, Leslie, and Peter surveyed at the end of the Helictite Passage in Brinco for a total of 140 meters. Computer plotting shows it passing underneath Tin Can Alley. The next day, Peter, Leslie, and Dale went into Valhalla via the Vapor entrance to continue mapping windy leads out of the Attic area. They mapped up a small stream named Calcite River for the calcite crystals laid out on top of some sticky mud deposits in the first section. They followed this 150 meters through some nicely decorated passage, which included the first cave pearls to be found in the system, to a boulder choke very close to the surface. A breeze could be heard blowing through the pine trees a few meters above their heads. Rat's nests in this area had green leaves in them, another indication of being close to the surface, so it was named the Rat's Loft.

The breakdown pile was impossible to dig through from below so they returned to the surface via the Vapor entrance once again. The following day Jerry and Mark did a surface survey to locate the area above this new section of cave. It was left as a good digging lead to be pushed later during the stay.

Several day hikes were taken in the immediate area over the next few

Nye Nestman in the Entrance Crawl, Cueva de Vapor. (Paul Fambro)

days, and a push on Entrada del Viento Baja was made by Jerry. He explored the cave through some very tight crawlways to a 3 meter drop where the passage continued onward with good airflow. On March 19, Jerry, Mark and Dale discovered a small cave near the summit of Cerro Zapatero. It was named Cueva de Coral for the large amounts of cave coral found there and the fact that Mark left shredded pieces of his wool shirt throughout much of the cave! It was estimated to be 50 meters long.

A new find

Leslie only had a few days left before she was to return to Ohio and Terri had recovered from her illness, so a 3 day hike to the logging village of Yerbabuena was planned. On a previous trip, Peter and Terri had reported seeing what appeared to be a large black hole in a massive cliff face close to Yerbabuena. The cliffs are similar to those Infiernillo is located in, so with hopes of finding another large cave system the crew of six began their hike on March 22. Following old logging roads and crashing through the forest for part of the distance, the hike to Yerbabuena took approximately eight hours. One small cave, Cueva de Musgo, was discovered on the hike. The cave was very small, but had some interesting fauna in it. While walking down one logging road that was virtually blasted out of a 100 meter high cliff face, the magical sounds of the Río Corona drifted up from the canyon 400 meters below. Since it was the height of the dry season, this meant that the stream might be emerging from a very large cave system. This gave everyone added enthusiam and they arrived in Yerbabuena at dusk and proceeded to set up camp. The original plans were to hike into the canyon and search for the black hole, but there appeared to not be enough time to accomplish this goal, so the following morning Peter, Jerry, and Mark talked to some locals at the sawmill about the canyon and caves in the area. They were told that the river in the canyon came out of a cave and that a guide to the cave could be obtained on a weekend, but not during the week. They were also told of a large sótano nearby that had an arroyo emptying into it. This sounded like a more feasible project, so after breaking camp, the six hikers were led to Sótano de las Calenturas. It was indeed a large impressive sótano with an entrance approximately 10 meters by 15 meters and 20 meters deep. Large boulders could be seen on the floor below. Using the only available gear, Mark, then Jerry, rappelled into the cave and spent 3

Sótano de Las Calenturas. (Dale Pate)

to 4 hours exploring and sketching very large trunk passages. They explored approximately 750 meters and left 4 major leads, most with good airflow. It was also evident that the cave takes enormous amounts of flood waters due to the fact that a 10 meter long tree trunk was found wedged high up in a large passage. One passage had a steep slope of large rounded cobbles that Mark described as "just like trying to walk up a pile of big marbles." Since the hike was only for reconnaisance and a minimal supply of food and gear had been brought, it was decided to leave for Conrado Castillo the next day. The crew departed and following a more direct route, arrived at the fieldhouse in less than six hours. Everyone was surprised to find a group from Kentucky camped on the doorsteps. Phil O'Dell, Dan Quinlan, and Rick were cleaning and rearranging their gear while Don Coons and Sheri Engler had gone into Brinco in search of the World Beyond. They turned back in a small mazy area without reaching their goal.

Zona de Manantiales

Peter and Leslie caught a logging truck to Cd. Victoria where Leslie caught a bus bound for the States. Peter was to return a few days later with lots of provisions not available in Conrado Castillo. Meanwhile the rest of the group, which now included Terri, Dale, Mark, Jerry, Sheri, Don, Phil; Dan and Rick solidified plans for a hike to the Zona de Manantiales located in Cañon los Hervores, some 1500 meters lower in elevation than Conrado Castillo. This resurgence is thought to be one of, if not the main resurgence for the waters that flow in Sistema Purificación. It is approximately 600 meters below the lowest known point in the system and several kilometers to the north. On March 26, everyone piled into and onto Phil's truck, and after stopping briefly at an airplane crash site, they arrived at the trail head that led down into Cañon de Infiernillo, which ultimately intersects Cañon los Hervores.

The trail was well marked, and in slightly over one hour the entire crew was sitting amid the boulders of Cañon de Infiernillo. The trail continued upward and onward to Cañon los Hervores and further to some mines. At this point though, it was decided to abandon the trail and boulder hop downstream and several hours later they came upon the crystal blue waters of the Río Purificación as it flowed from Cañon los Hervores. There had been some concern as to whether there would be water flowing in the Río Purificación, so it was a welcome sight to see the beautiful pools and cascading waters. Some elected to take a quick swim first, while the rest immediately began the hike up Cañon los Hervores in search of the manantiales which were marked on the CETENAL topo maps as being perhaps 200 meters upstream. The geology of the canyon was some of the most incredible displays of its kind ever seen. Chevron folding was very prominent on both sides, with one high wall having at least seven Chevron folds, one next to the other. The canyon was explored until it narrowed, and it was apparent that the only way onward was to swim. A pool stretched from wall to wall and turned a bend to continue out of sight. Darkness was closing in, so camp was made back at the intersection. The nights were definitely much warmer here, 1.5 kilometers in elevation below Conrado Castillo.

The following morning saw everyone but Rick attempting the long swim. It promised to be an exciting day

with what everyone hoped would be the discovery of a lower entrance into Sistema Purificación. Unfortunately, beyond the first swim there was another one, even longer. Beyond that, another pool and then another. After about the seventh swim, the sun disappeared behind the clouds and it became evident that the group would not reach their goal, at least at this time. They returned through the long, cold swims back to camp after having explored close to 1 kilometer of canyon. Cañon los Hervores was incredibly beautiful and wildlife abounded in the pools, in the trees and brush, and in the air. At one point in exploring the canyon it sounded as if a freight train was barreling down upon the swimmers, and within a few moments a pair of Military Macaws came screeching by overhead. This was the third attempt to reach the Zona de Manantiales and was unsuccessful. Sr. Grimaldo of La Curva has said that there is a cave in Cañon Hervores and it may possible that the springs flow from an enterable cave. This area is one of the more important objectives and hopefully will be reached on the next attempt into the canyons.

Back at camp, everyone packed and headed up and out of the canyons, reaching the truck around dusk. After a large meal, everyone was getting settled in when the unmistakeble sound of a logging truck was heard grinding up the mountain. A short time later two trucks appeared. One had Peter on it returning from his journey to civilization in Cd. Victoria. Mark, Terri, Jerry, and Dale piled onto the truck and within a few hours, the five were back in Conrado Castillo. Don and his crew left the mountains the following day. Thomas Moore and Becky Bell had arrived at the fieldhouse sometime during the canyon trip, so this brought the total up to seven. Their vehicle had not made it past La Curva and Sr. Grimaldo's house!

Infiernillo - Camp I

On March 30, everyone but Thomas and Becky caught a logging truck to La Curva, where after briefly visiting with Sr. Grimaldo they set off for Infiernillo, arriving there by three in the afternoon. Unlike the trip over Thanksgiving, the pool at the base of the cliff was completely dry. With the aid of a tyrolean line, everyone's gear was hauled up the entrance drop and the trek to Camp I was uneventful. Everyone rooted out their favorite camping spots and then a trip was made to the Main Sump for water and to check on the water level, which turned out to be fairly low. The objective for this first week long stay in Infiernillo was to catch up on some loose ends and to push as many downward and westward trending leads in the Camp I area as possible.

Saturday, March 31 was the first work day inside Infiernillo and the first order of the day was to remap (for the third time) from the Four Way Junction in the Main Passage down the West Loop to a tie-in station on the Puente de Oztotl. From there, the group headed to the the Balcony where Mark and Dale took a small right-hand passage that Jim Rodemaker had reported leading up in the Balcony Borehole. Terri took a left hand passage, while Peter took a middle passage. The right hand passage, named the Thru Tube, led into a small maze area that eventually ended up in the Balcony Borehole, just like Jim had said. The middle passage joined the left passage, connected over to the Thru Tube, and also led to a pit Charles Fromén had seen on an earlier trip. It was named Lost Pit. After this initial exploration, the crew of five surveyed the Thru Tube and the Balcony Borehole. Five

persons working on this mapping team went smoothly with Dale being the route finder; Jerry, the lead tape; Terri, reading Suuntos; Peter, the sketcher; and Mark, the permanent station marker. It has become a policy that when mapping, a permanent station is left at each passage intersection. A permanent station is a 1/4" diameter drilled hole deep enough to distinguish it from any natural holes or cracks in the rock. Though it takes time and energy, it is a must for any type of continuous mapping project to succeed in this system.

As the team mapped the Balcony Borehole, Mark climbed into the Complex Dome at the end of this passage and discovered several smaller passages. Soon he found himself high above the floor in a large, dry passage circling around the Complex Dome. This area appears to be very complicated. Meanwhile, the mapping team was contemplating sending in a search party to locate Mark. After only looking for an hour, though, he finally found his own way back to the rest of the crew. The team surveyed slightly over 600 meters for the day.

April 1, (April Fool's Day) saw the crew of five stopping in the West Loop to check the Cobble Leads. Immediately, the main lead split in three different ways. Mark crawled down one tube and was not heard from for an hour or more. He had a habit of disappearing like this for long periods of time. The other two leads came together at the bottom of a 10 meter pit entering from the main passage above and continued. The passage got larger and a hole on the right wall led up into the Worm Dome,

Calcite banding in the Main Passage - West Loop. (Thomas Moore)

a 10 meter wide room covered in silty dirt and mud. Continuing in the passage a short distance onward, it ended in a pile of large cobbles and boulders. Indications are that it ends under the Cobble Drain in the West Loop of the main passage. Everyone regrouped in the West Loop and continued to the Balcony Room, where they divided into two survey teams. Peter and Jerry leap-frogged ahead to the Lost Pit area and started their survey in a tube taking a lot of air. Terri, Mark, and Dale stayed behind and surveyed through Lost Pit to the other team's beginning point and then surveyed down a 3 meter in diameter tube named the April Fool's Tube, also taking lots of air. It was evident that the passage was totally filled with water during heaving floods - tiny scallops in the rock covered the floor, walls, and ceiling as well as any boulders that were too large for the water to push through the passage. After setting many permanent stations, they stopped the survey and checked ahead. A few meters further along, they broke out in a very large passage heading downward and trending northwest. Was this the elusive passage that would tie into the system believed to be to the west? The excitement ran high as the three ran several hundred meters down this major trunk until they came upon a familiar landmark, the Puente de Oztotl. It was indeed April Fool's Day - they were back in the main passage!

The passages Peter and Jerry had mapped connected into the Thru Tube, with several going leads along the way. On the way back they entered the West Passage, off of the West Loop, to look at the blowing crawl at the end of it. Peter removed a few rocks and they entered virgin passage. They followed a stoopway 50 meters to where a crawl continued.

Moria

On April 2 two mapping teams went out. Terri, Dale, and Mark headed back to the Balcony Borehole and surveyed the Shoetube, a tube that had been explored over Thanksgiving to a small stream named the Río Shumate. At the Río, the team ended the survey and re-explored an overflow route that had been partially explored by Rodemaker, Raines, Barnes, and Schultz a few weeks before. It was found that this connected into the passages circling the Complex Dome. They returned to the Río and followed it downstream. The passage split into several sub-human size holes, all taking air.

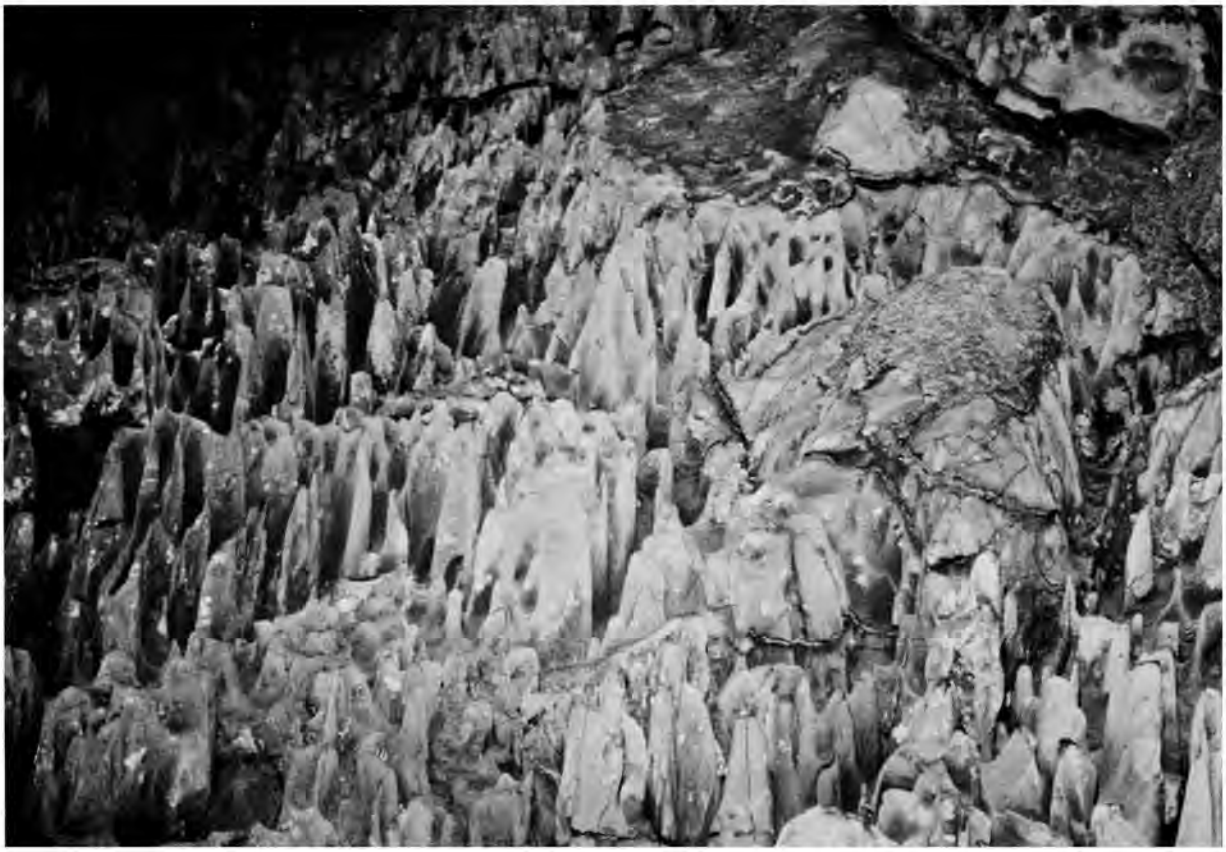
Peter and Jerry took off to push the crawl at the end of the West Passage. But, halfway there, down a slope along the right wall, Jerry noticed a tremendous blast of air blowing out of some breakdown. After a couple hours of moving rocks, a tight vertical squeeze was opened up and they dropped into a large passage heading downward. This new area was named Moria, as it seemed to be heading down to deeper levels. It had lots of mud and sediments throughout most of the passage. They mapped to an intersection where a 3 meter climbdown led off to the right, and then left 50 meters to a 15 meter drop into a sizeable room. Lacking vertical gear, they returned to the climbdown where Peter explored into several rooms connected by crawlways. As the two teams headed back to Camp, they heard the distinctive sounds of a harmonica and found that Thomas and Becky had arrived.

The dreams of the group that night were probably all of breaking

Fifteen meter drop in Moria. (Thomas Moore)

depth records, for Moria was the best lead found yet on the trip. The following day, April 3, all seven in camp gathered their vertical gear and headed through the Gates of Moria to the 15 meter drop. Jerry rappelled in, complaining of lots of mud and then Dale, followed by Peter, Becky, Thomas, and Terri. The most obvious way was a duckway on the left wall of the room that led to another high ceilinged room also covered in mud, and a breakdown choke that took air into it. This is a promising lead if the breakdown can be pushed, since it is heading west into unknown territory. Back at the drop, on the opposite side of the room, was another passage that could be seen. It was 5 meters up on the wall and after trying several routes, the passage was reached. The 5 by 5 meter tunnel sloped downward at a 30° angle for 20 meters to the stillness of a large pool named The Black Lagoon. Air rushed across the Lagoon to unseen passages they hoped would lead westward. Asellid isopods resembling those found in the Main Sump were found, which indicates the possibility of a hydrological connection.

No one felt like swimming the 15°C water, so they returned to mapping. Peter, Jerry, and Dale mapped everything below the 15 meter drop and connected it into the survey of the day before. Then they proceeded to map and explore what lay below the 3 meter climbdown. They passed a going crawl on the left and the main passage was followed 150 meters to where it appears to have come out under the Cobble Drain in the West Loop, similiar to the end of the Cobble Leads.



Bedrock solution and flowstone remnants, Puente de Oztotl. (Thomas Moore)

Terri, Mark, Thomas, and Becky returned to above the Gates of Moria and continued mapping in the West Passage. They mapped it to the end of exploration and stopped at the low crawl which continued on with slight air movement. The efforts to go westward, at least for the time being, halted once more.

April 4, Jerry, Mark, and Peter surveyed the 17-Hour Tube in the Confusion Tubes. This was a tube that Charles Fromén and several others had proved connected to the Balcony Borehole over the Thanksgiving holidays. It was also the tube Mike Connally and Charles had become so familiar with last year when they were lost for 17 hours in the Confusion Tubes. Terri, Thomas, Becky, and Dale returned to the April Fool's Tube to tie it into the West Loop. They took several photos in that area.

The following day was to be the last day to map and explore, so Peter, Terri, and Dale went further into the system to Jersey Turnpike where they added more detail to the original sketch and set a few more permanent stations. At Turkey Lake, Terri decided to go for the swim and with only boots, carbide light, helmet and a cyalume, she swam an estimated 150 meters more to where the passage continued as a swim in a narrow channel. There was no air movement in this area. On the way back through Jersey Turnpike more tubes were explored that led to more tubes (they're everywhere!), and some had airflow.

The group packed and headed out of the cave early Friday, April 6. The team had added slightly over 2 kilometers of passage to the map.

French delegation arrives

After several days of rest, it was time to return to work, so Jerry hiked up to Cerro Zapatero to work on the geology of the area and Terri, Peter, and Dale went into Cueva del Borrego to begin its survey. Borrego is located close to the upper sections of Valhalla, and due to its complica--ted nature it could possibly connect into the system. After mapping only a few stations, the trio elected to explore ahead and found it to be a very complex area with airflow. Re-turning to the survey, they started mapping down another section and once again stopped to explore a high-ly decorated area. The highlight was when Peter found a calcite formation he dubbed "The Taco!" He proclaimed it to be a rival to "The Butterfly" in Caverns of Sonora, TX.

That night Dick Cruse and Kay Null from Houston showed up, indicating that Charles Fromén and Harry Walker were close behind with the French cavers, Paul Courbon and Claude Chabert. Sure enough, the next day Charles' 4-wheel drive truck arrived with Harry, Paul and Monique Courbon, Claude Chabert and Niki Boullier. Paul and Claude had made prior arrange-ments to go on a through trip from the Brinco entrance to the Infiernillo entrance with Peter. This was a long awaited trip and was the first oppor-tunity for many who had been working in the Sistema to see the middle por-tions of the cave. This same day Jerry caught a ride down the mountain and spent the next month or so caving in southern Mexico.

Anticipating the need to have a vehicle for transporting people in after the through trip, Charles of-fered to drive his truck to the In-fiernillo trailhead and leave it there. Dick and Kay offered to follow him there and give him a ride back to the Conrado Castillo area; those two then continued westward to Dulces Nombres to check some pits in the area.

While the vehicle maneuvering was taking place, several others took a hike to look at many of the cave entrances in the Conrado Cas-tillo area. Paul and Claude showed a lot of interest in the dig at the Rat's Loft and made plans to dig it out after the through trip. There were hints of a French Connection in the air!

A through trip

April 11 arrived and everyone who was to go on the through trip were packing and preparing. Only two hours before they were to leave, Peter, who had climbed upon the sun deck, yelled, "OH NO! The Hog of Steel!" Much to everyone's amaze-ment, Blake Harrison had arrived with Gill Ediger, Peter Keys, Randy Rumer, Steve Pitts, Kasey and Gin-ny Reel. Blake, Gill, Steve, and Peter decided to join the through trip. The next couple of hours were mass pandemonium. This brought the total to 13, a number the French though might be unlucky. Making the trip were the four mentioned above, plus Paul, Claude, Peter, Dale, Terri, Thomas, Mark, Charles, and Harry. The first of the group entered Brinco at 2:00 PM and the last arrived at the entrance to In-fiernillo 23 hours later at 1:00 PM on Thursday, April 12. The group stayed fairly strung out through the Chute Area and all the way to the Hall of the Angels, a large room in the World Beyond several kilometers into the system. Ediger became weak and ill at this point, but got decidedly better and continued on. Harry began losing lots of his strength less than halfway through

the trip, but fortunately he was able to finish the trip under his own power. Claude was testing a new ascending/descending device on the two rope drops in the cave. He claimed it had a few more problems to iron out. The route led down Lisa's Lampfall and then into the Connection Passage, and finally the Arne Saknussem Borehole, (ASB) and into the Communion Hall, where everyone took a long rest and ate their cave food goodies. From there Peter S and Peter K took Paul and Claude to the Nile River to map upstream. However, the instruments were not in working order, so they explored 300 meters upstream through fine swims before rejoining the main group in the Foggy Mountain Breakdown. The Netherhall was next and before the last echoes were heard in the large chamber, the first of the group were skiing down the massive breakdown pile heading towards Camp II and Isopod River. Ediger had several comments to make as everyone clambered through the 600 meters of the Monkey Walk. Everyone regrouped at the beginning of the Breakdown Maze and continued on, stopping at Camp 1-1/2 to rest before tackling the "every passage looks the same" Confusion Tubes. Here Peter S took Paul and Claude down the 17-Hour Tube and the Balcony Borehole. He showed them the sumps along this route, while the others headed for the entrance via the East Loop. At the entrance, once again regrouped, everyone compared their wet, soggy, wrinkled feet. Claude's were deemed the grossest as he emptied the water out of his boots for the final time. By 3:00 PM everyone was packed in Charles' truck for the drive up to Conrado Castillo. Several hours later the 13 extremely hungry and tired cavers arrived at the fieldhouse. Those who had stayed there commented that everyone looked 20 years older. By the time Harry left he was almost his normal self again.

Ancient river course in the Main Passage - West Loop. (Dale Pate)

French Connection

Friday the 13th saw almost everyone digging on the Rat's Loft dig, trying to open up a new, easier route to the Valhalla area. Two digs were started, the Americans vs. the French; but, as luck would have it, Paul and Claude had picked the best spot. In fact, it was probably the only spot a breakthrough could occur. Four hours after starting, Sistema Purificación had its fourth entrance, aptly named La Entrada de los Franceses. Peter, Paul, and Claude tied in this new entrance to the survey station 5 meters inside, and then it was time to celebrate. The Cueva de Vapor entrance became obsolete with the opening of this new entrance, for access to the entire Valhalla area was much easier, and the new entrance will undoubtedly be a major factor in the future exploration of this large maze area.

On April 14 Charles, Harry, Paul, Claude, Monique, Niki, Kasey, and Ginny headed down the mountain. The French were bound for Palenque and then back to France, while the others were bound for the U.S. The same day saw Peter S, Randy, Blake, and Dale headed for the upper sections of Valhalla via the newly opened entrance to check some of the high leads. Close inside the entrance, Randy made the mistake of putting his hand on a large 150 kilo rock only to have it immediately shift and pin him to the passage wall. With the help of the others, he was set free, but he couldn't believe it had happened. The rock is now known as Randy's Rock. Continuing on, the first lead led to a fair sized room with several large

Excavating the boulder choke for a new entrance. (Thomas Moore)

Surface surveying above Valhalla. (Paul Fambro)

columns reminiscent of Carlsbad Caverns. It was too nice a place to call Carlsbad, so it was named the Carlsgood Room. Several other leads were pushed to no avail.

The next couple of days were spent by most of the group doing surface surveys and mapping in some of the smaller caves around Conrado Castillo. Terri headed two separate teams which mapped Cueva de Tecolote and most of Cueva de Desmontes. Cueva de Los Sierpes was pushed and all the cave entrances in the area were tied together with a surface survey. One more trip was taken into Valhalla by Peter, Randy and Peter where they wound up partially exploring and mapping what they hoped to be a new, easier route to the Valkyrie River, discovered last July.

Infiernillo - Camp II

Six cavers were to camp in Infiernillo for another week. Blake, Gill, and Mark drove Terri, Peter, Randy, Dale, Peter, and Steve down to the trailhead to Infiernillo. On the drive down, several caves were discovered at Galindo, including one that was basically one large room with a low, flat ceiling. Blake dropped the six off and returned to Conrado Castillo after stopping at the sawmill for lumber. Everyone else headed down the trail and by the time the arroyo was reached, it had begun to rain as it had for the past few afternoons in Conrado Castillo. People climbed into the cave and hauled gear up. Camp I was reached with no difficulties and

everyone prepared for the hike to Camp II the following day. The Main Sump was down a meter or more from the previous trip into the cave. It took approximately 6 hours to reach Camp II with the large duffels and once again camp was set up. Unlike the silence of Camp I, the sounds of Isopod River filled the area around Camp II.

Nile River

April 20 saw the "wet team", consisting of Peter, Peter, and Randy, who would be doing the wetsuit caving, and the "dry team" which consisted of Terri, Dale, and Steve heading for the Communion Hall. Peter, Peter, and Randy began the survey from a permanent station at the Horeshoe Bend of the Nile. They mapped a short way downstream to the beginning of low airspace, then attacked the main objective - upstream. One shot took them across a long pool and up a climb to wide sandy floored passage lacking the stream. Ahead the stream flowed in a narrow channel along the right wall to enter a parallel side passage. This passage was surveyed 100 meters or so and continues. The stream sumps in a pool, jogging in a hidden course over to the main river passage. Continuing upstream, (north), the river soon made another 180° bend to the south. Here swimming became necessary for long distances through deep, green canals. This proved interesting for Peter S, who was sketching and had to keep the book dry while doing so. At one point in the swim the ceiling dipped down to within 40 cm of the water and a good breeze could be felt blowing out of the passage ahead. Eventually a small island provided relief to the swimmers, and Peter K took off down a side passage on the right. He ran 150 meters down a south trending tunnel to a fork before returning. They elected to continue the main river survey before mapping side leads.

At a large sand chamber (named Alexandria) the river again reversed direction, flowing from the north. After 100 meters or so of wading, the team was confronted by another deep swim. Randy and Peter K swam ahead to discover a blank wall with no continuation of the river. High overhead yawned a wide dome, but the water apparently flowed through a sump under one of the walls. Leaving Lake Victoria (source of the Nile), they returned to Peter's side lead and mapped 500 meters or so to the south in blowing passage, named Never Stops Going. They ended the survey at a climbdown, which Peter K explored down to a tight crawl blowing air that would need to be modified to permit exploration.

The ASB

The "dry team" began their surveying at the point where the Connection Passage breaks into the ASB. They mapped 400 meters down the ASB to a short 5 meter overhung drop which required some type of climbing assistance, and then explored in several passages running off the ASB leading into a tube-like area. One small stream, Riverdale, was mapped to also. It is suspected that this might be an overflow route for the Nile. Total surveyed length between the two teams was 1500 meters for the day.

Camp II survey

The next day the "wet team" stayed dry. Their first project was to resurvey the south continua-

tion of the lower Isopod River trunk. It basically paralleled the main passage (Camp II) for 150 meters to a sump. Resurvey was also started in Sheila's Lead off the main route just north of the Monkey Walk. It forks after 40 meters and they took the survey left. This eventually led to a windy breakdown zone where some recon investigation was required. Peter K disappeared for quite a while and the others finally heard a distant yell. "I've found the Monkey Walk," was the message, indicating a new loop had been discovered. They surveyed through complex breakdown to tie in to the Monkey Walk survey near the Seven Leads Room.

The "dry team" mapped 5 loops in the large passages close to Camp II. Total surveyed length for both teams that day was 946 meters.

Isopod River

April 22 was to be the last full day of mapping in the Camp II area, so the "wet team" returned to the water - Isopod River. The first step in the Isopod River survey was to map downstream to the sump discovered by Smith, Lloyd, Kerr and Stone in November '78. Two short loops were mapped along the way, and the approach of the sump was announced by the accumulation of calcite ice on the water surface. From the sump, the survey proceeded into a right hand side passage which soon led to a breakdown choke blowing a stiff breeze. Peter K and Randy explored into it, removing obstructing rocks as they went. Soon history repeated itself when they again popped into the Monkey Walk, creating another large loop. When this survey was tied in, they returned to Sheila's Lead, in order to survey the right hand fork. This led through sandy stoopways to the shore of Isopod River downstream from the sump. Surveying upstream, the passage made a brief jog to the right. At this point a high lead could be seen continuing on the original trend, and Peter K dared a tricky climb to get into it. He explored down a windy passage to an area of tubes. To get back down off the climb he leaped into the deep river, making an enormous splash.

From that point on, the river was all swimming. The lead surveyors mapped ahead calling survey data, while Peter S plotted the figures until a place could be found to sketch from. Then he swam ahead memorizing the passage shape to be drawn while crammed into a wall alcove. An inner tube would certainly facilitate this type of surveying. Eventually they reached the sump, and the team retreated back to where they'd begun the river survey. The downstream river beckoned, so Peter K and Randy swam a 100 meter lake to yet another sump, however Randy discovered an upper level passage which may prove to bypass the sump. But time was running short and it was left for another trip.

Windsump

The "dry team" started at the latrine and mapped a passage that loops over Isopod River and connects back in above Camp II and then continues as the Wind Sump Passage. This passage was mapped to its end where a large mass of breakdown fills the passage. The wind could be heard humming out its song through the small cracks in the breakdown. Several leads were left in the passage. Computer plotting puts this Wind Sump very close to the Netherhall and is probably part of its massive breakdown pile.

Total surveyed length for the two teams for the day was 1279 meters.

Terri, Dale, and Steve returned to camp first and changed into their camp clothes to await the others return before fixing supper. Soon, three black creatures with strange heads and one large burning eye, and a green, glowing light about their chests entered camp whooping and screaming. The three at camp were glad that they knew who these strange looking creatures were! Wetsuits definitely give their wearers a different look. Later that evening, it was noticed that Isopod River had risen a couple of centimeters.

Back to Camp I

April 23 was the day to return to Camp I and they took only 3-1/2 hours getting there. The duffel bags had gotten lighter it seemed. Upon arrival at Camp I, the Main Sump was visited and it was noticed that the level of the water had risen a meter or more. Another interesting fact that was noticed was the wind. When the group had entered the cave, it had been blowing into the Infiernillo entrance and did so for several days more. By the time the group had arrived back at Camp I, the winds had completed their switch which had started the day before and were now blowing out the Infiernillo entrance. Unlike the winds in the main portion of the known cave, the winds blowing across Camp I never changed directions. In fact, it has never changed directions as far as anyone knows. It always blows across Camp I in the direction towards the sumps and disappears up some very promising looking domes. It is these winds that indicate that there is some type of passage to the west that is not affected by normal outside temperatures or pressures. Of course, this has led to may different speculations,

The Confusion Tubes. (Paul Fambro)

but only continued exploration will reveal the true reasons for this occurence.

April 24, the "wet team" swam the Main Sump to double check for any passages leading west. Finding nothing substantial, they went to Moria and swam the Black Lagoon. Unfortunately, it was found to be a sump also. Peter K did a high traverse leading into several virgin rooms and eventually connected into the Sand Slide, a partially filled sand room discovered by Peter S and Jerry on the initial trip into Moria. Steve had decided not to map that day, so Terri and Dale mapped and explored a small tube area that looped off the East Loop. It tied back into the East Loop further a-

long close to the Balcony area and was named Tube 28.

The day to depart arrived, and everyone was at the entrance by 10:00 AM and at the beginning of the logging road by 1:00 PM, waiting for Blake and the rest who had stayed at the fieldhouse. The week long stay in Infiernillo had produced close to 4 kilometers of mapped passage and a better understanding of what is happening in the Nile River, the ASB, Isopod River, and the Camp II area in general.

Work at the fieldhouse during the week had mostly consisted of work done on the fieldhouse itself. Gill, Blake, and Thomas did take a 9 hour trip into Brinco to retrieve the ropes that had been left at the two drops past the World Beyond. Mapping was also wrapped up in Cueva de Los Sierpes.

Blake arrived to pick up the cavers and everyone headed out of the mountains. Ediger, Thomas, and Becky drove down in the vehicle that had been left at La Curva, dubbed the "Caca Verde", and the rest were in Blake's "Hog of Steel."

Thomas and Becky returned once more to Conrado Castillo later. While there, they discovered a pit to the south that was taking air into it. It was left to be explored at a later date.

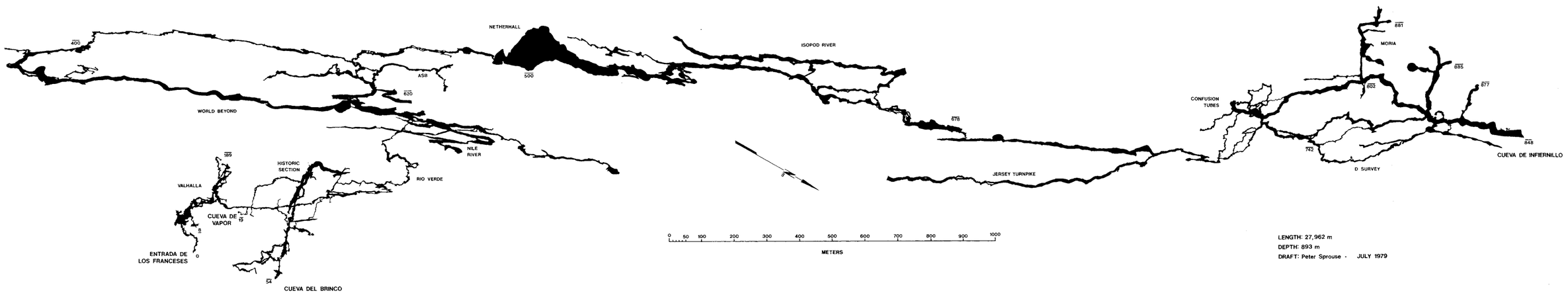
Randy Rumer at Cueva de Los Sierpes. (Gill Ediger)

SISTEMA PURIFICACION

Municipio Villa Hidalgo, Tamaulipas, México

Preliminary Plan

Based on a Suuntos, Brunton, and tape survey 1973-1979 by the
PROYECTO ESPELEOLOGICO PURIFICACION



LENGTH: 27,962 m
DEPTH: 893 m
DRAFT: Peter Sprouse - JULY 1979

PROYECTO ESPELEOLOGICO PURIFICACION

ASSOCIATION FOR MEXICAN CAVE STUDIES

Results of the Spring Project

The spring 1979 project was very productive as a lot of work was accomplished. However, there are many life times worth of work still remaining to be done. The discovery of Sótano de las Calenturas and rumors of a large resurgence coming from the cave in Cañon el Olmo suggests that another large cave system exists just to the south of Sistema Purificación. The waters of the Río Purificación in Cañon los Hervores were estimated to be 6 to 8 times the amount of flow in Isopod River, which indicates that passage development in the entire drainage system could be that much greater. Drainage patterns in the cave are such that the waters appear to be sliding off to the west and only use the main trunk of Infiernillo for an overflow route during massive flooding. No stream in the system has been followed to its conclusive end as of yet. The Valkyrie River in lower Valhalla has not been followed or mapped, but it may well be the stream that is found in the World Beyond. The World Beyond stream disappears near the end of this trunk passage but may appear further below as the Nile and even further along as Isopod River. The complexities of of the passages evolving around these streams and others that might not have been discovered as yet make it difficult at this time to understand the hydrology of the system. There are undoubtably many factors that enter into our understanding of this hydrologic system that we know nothing of, and only with continued exploration and mapping will we be able to view this system as a whole.

The current traverse length of Sistema Purificación is 27962 meters and the number of leads have increased to 732. The depth is currently 893 meters in vertical extent of which 885 meters are below 0 datum at Entrada de los Franceses, and 8 meters are above 0 datum. The system remains the longest and the deepest in Mexico. The potential of the cave system and of the area is, indeed, awesome. Work has just begun on both.

Letters to the Editor

To the Editor:

Because of some recent acrimonious debate about cave rescue in general and the December 1978 Brinco rescue in particular, the National Cave Rescue Commission (NRC) has been invited to comment on the subject to Activities Newsletter readers.

Cave-related aspects of the rescue were discussed in an excellent article by Gill Ediger in Activities Newsletter No. 9 and it is not my intent to quibble over details therein. Some of the assumptions and conclusions, however, deserve comment. We think the rescue went very well, all things considered, and we agree with Gill that that resulted primarily from the caliber of people involved. There are still some important lessons to be learned from the rescue, however. Before getting into specifics, I think it is necessary to make some general points about rescues.

Everybody has to realize that in-cave operations are only part of the overall rescue. Government types, local officials, non-caving search and rescue groups, etc., are never going to do things entirely to our liking. They are, in general, eager to listen to competent advice; but, they judge competence on the basis of certifications, Air Force Rescue Communications Center recommendations, personal contact, and other such things that are of limited interest to most cavers. Anytime the world of officialdom gets involved, they have to be interacted with in a manner that makes sense to them. That means they want a contact who understands their jargon and their problems.

Hindsight is always better than foresight, but one has to actually act on the basis of information available at the time decisions have to be made and live with the consequences. Decision makers therefore tend to behave conservatively when they can. If you want to do something unusual in a hurry, like fly a truck and cavers into México, you must have already established contacts with high levels of officialdom, and they have to know you well enough to trust you.

Now, let me try to clear up some specific items, with respect to the Brinco situation. What few problems the rescue did encounter stemmed primarily from the fact that nobody at the cave knew much about the "official" version of search and rescue operations. Terry Jones may or may not have been needed in the cave, but he was needed on the surface. Better communications from the cave, using equipment that was right there, could have avoided sending in the backup group and would have relieved a lot of anxiety back here in the U.S. The resources at the cave turned out to be capable of coping with the problems encountered, but how much margin was there? If Chris had been hypothermic, unconcious, or had a back injury, would everything still have worked out as well? Gill concludes that the success of the rescue without having a leader shows that leadership and "rescue squad mentality" are unnecessary or even counterproductive. I will concede that in this particular set of circumstances with that particular group of people, it worked at least adequately. Implying that such a process is best for other situations with other people is totally unjustified and even dangerous.

I think that what we should learn from the rescue is the "THE SYSTEM", imperfect though it is, works. Neither the NCRC or the Air Force had ever actually planned for a rescue in México, but most of the right people and equipment were delivered to the right place in pretty good time. The more that cavers are willing to organize along lines

that "THE SYSTEM" can recognize, the more cavers will be allowed to control things.

PEACE,
Rick Rigg
Deputy Director NCRC

POSTLOG:

Flying vehicles and cavers into México is not something we can depend on being able to do. I have met with Mexican cavers and rescue personnel and have concluded that we will be on our own for a while yet. There is a group of doctors with airplanes in México that may be willing to help with the medical, communications, and transport problems inherent in cave rescue in México, but we need volunteers who spend time in México to develop the contacts and procedures. If you want a better rescue system, please help.

BOOK REVIEWS

Boletín Numero Uno, Asociación Mexicana de Espeleología, A.C. 1978. Edited by Jorge Ibarra S. and Peter Lord. Available from AME, General Cano 10a, México 18, D.F., México. Price $2.00 per copy.

Introducing their first bulletin, the AME makes an eloquent plea for communication and cooperation among cavers in México. The enormous cave resources of México are recognized as well as the growth of sport caving, el "cavernismo." The editors point out that rivalry and lack of organization inhibit the growth of the Mexican speleological community, and that better communications need to be established with American cavers caving in México. Toward this latter goal, the AME has done this bulletin completely bilingual, in Spanish and English. Included are accounts of AME activities in several areas of central México.

Vicente Silva Estrada describes the exploration and survey of Cueva de La Mantilla, Michoacán. A long journey by jeep and burro was required to reach the Río de La Mantilla which flows from the cave. A main river gallery goes 2 kilometers upstream to a boulder choke/sump area which may continue. AME members have also mapped 2.5 kilometer long Gruta de La Joya, near Taxco, Guerrero. A sinking stream enters the cave, which was explored down three drops to a fourth pitch of 50 meters. Below that a terminal sump was encountered which showed signs of heavy flooding.

AME cavers have also been quite active in the Cuetzalan area in Puebla, in partnership with American cavers. Explorations in Grutas de Tenextepec and Sumidero de Jonotla are described, as well as the connection between Sima Esteban and Cueva de Guayateno. Peter Lord summarizes explorations in the components of the extensive Sistema Cuetzalan. Cueva del Arbol de Resistol was pushed upstream to a connection with the Ateschalla system, which was then connected to Sumidero de Chichicasapan to form the present Sistema Cuetzalan.

Boletín Numero Uno is packed with caving and it is hoped that future issues will follow to document the efforts of the AME. Cavers who support the AMCS are urged to lend their support to the AME also. Cooperation between the two groups is essential to the future of Mexican caving, at a time when the government is just becoming aware of México's outstanding cave resources.

Peter S. Sprouse

ATLAS DES GRANDES GOUFFRES DU MONDE by Paul Courbon. Editions LAFITTE, 2, place F. Chirat, 13002 Marseille, France. February 1979, 199 p. soft-bound.

The long awaited second edition of Paul Courbon's atlas of deep caves has finally appeared. It was originally scheduled to be published in English and other languages by an American firm in 1977, who dropped it after being unable to make the translations. However, the author was able to keep it up to date until it was finally published in French in early 1979.

Since the first edition of the Atlas was published in 1972, the number of deep caves in the world has increased phenomenally. While the 1972 edition contained maps of 57 systems over 500 meters deep, the 1979 edition contains 94. These maps comprise the bulk of the book and are invaluable reference material for anyone interested in the major caves of the world. México is well represented with eight cave maps, although unfortunately the maps of Sistema Purificación, México's deepest at 893 meters, and Sótano del Buque, 506 meters, were not ready in time for publication.

The Atlas also contains additional lists covering many aspects of speleology. Included are lists of: the world's longest caves, deepest shafts, caves highest above sea level, largest chamber, deepest through trips, and more. Many fascinating facts may be gleaned from this mound of information. For instance, the longest dye tracing recorded is from Homat Burnu to Yedi Miyarlar in Turkey, a distance of 75 kilometers. The largest resurgence, also in Turkey, is at Dumanli with a flow of 50 m^3/sec. The deepest gypsum cave in the world is Italy's Pozza A at -200 meters. Rikhiot Pic Cave on Nanga Parbat in the Himalaya stands higher than any other cave at 6600 meters above sea level.

Atlas des Grandes Gouffres du Monde is a must for the library of any caver interested in deep caves. While the French text will not be of much use to the English speaking reader, the lists are quite understandable and the cave maps speak for themselves. The French printing is good, although the high cost of printing in France will probably put the price at about $30.00 U.S.

Peter S. Sprouse

inside back cover: Solution pothole in Sótano de San Agustín (Bill Stone)
back cover: Rounded stream cobbles in Sistema Purificación (Dale Pate)