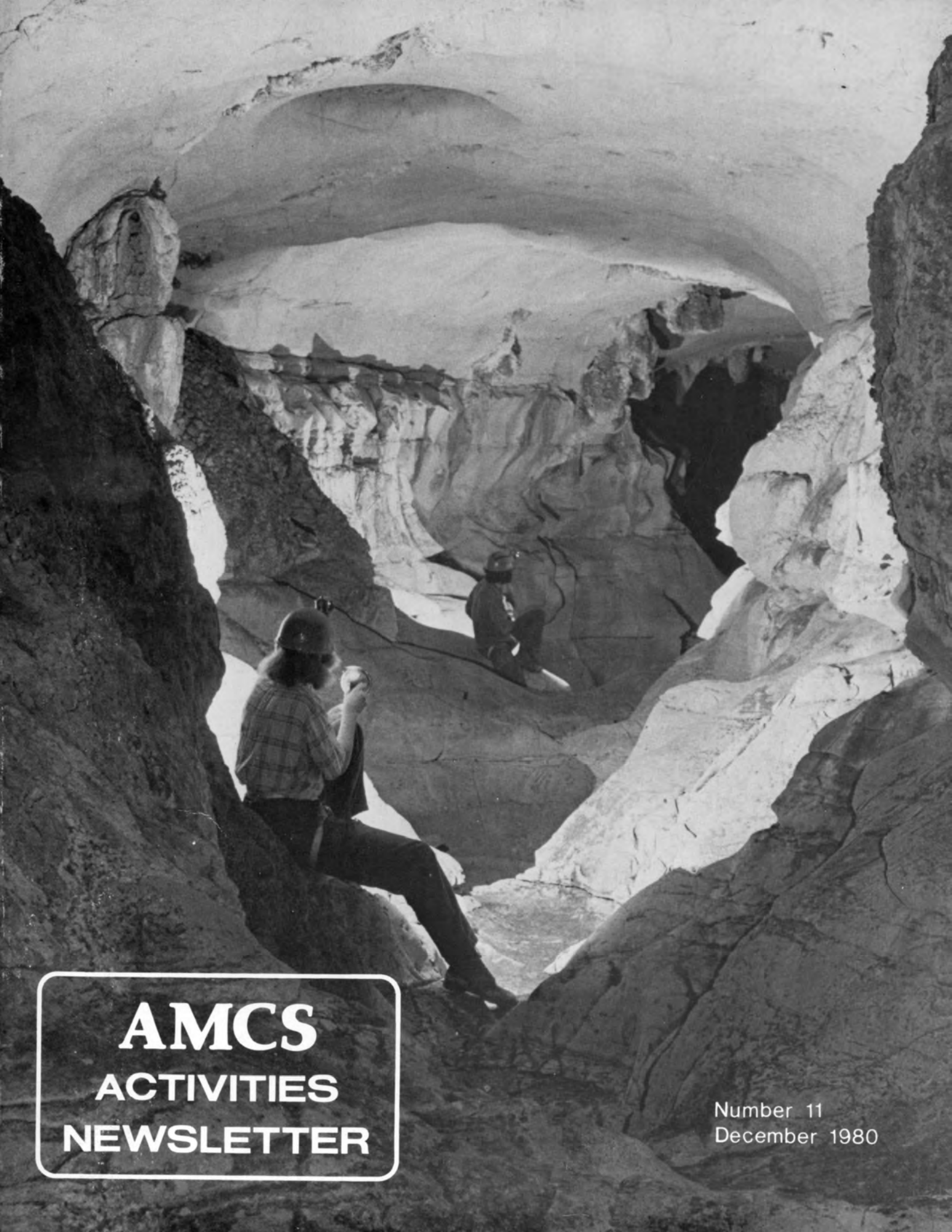

AMCS ACTIVITIES NEWSLETTER

Number 11
December 1980

This Issue Is Dedicated to the Memory of Dr. Féderico Bonet Marco

front cover: Cueva de los Misioneros (William Elliott)
inside front cover: The Crevice in Sotano de las Golondrinas (Terry Raines)

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The AMCS Activities Newsletter is published 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

The caves and caving in México are spectacular, and it is not surprising that they have attracted worldwide attention. The dramatic increase in the number of active cavers in México over the last two decades has had, and is going to have, a significant impact on Mexican caves and their exploration. For the most part, this impact has been very positive. The discoveries, studies, and accomplishments have been carried out cooperatively, and with continuous emphasis on their preservation by the AMCS, several Mexican caving groups, and various groups from the U.S., Canada, and Europe.

Recently, however, this impact has been showing negative signs. The two most serious areas are that of cave vandalism and rivalry. It has always been an AMCS policy that cavers conserve the fragile cave environment; this means carrying out all personal belongings, including garbage and spent carbide. Caves are a wilderness; some of the last wilderness left on the entire planet–let's keep them that way!

The unexplored caving areas of México are vast; therefore, rivalry and unfriendly competition are pointless and non-productive. It has always been AMCS tradition to cooperate with groups that are actively working in a cave. The cooperation enhances the quality of the work and avoids overpopulation of the caves. Initiative, not rivalry, is the key to success and satisfaction in the discovery and exploration of caves.

We would also like to take this opportunity to clear up some of the ambiguities of the AMCS. The AMCS was conceived in 1962 by several Texas cavers for the "advancement of knowledge of Mexican caves." Through the years it has remained apolitical and unstructured. Today the AMCS as an "organization" is only a post-office box and a small closet where the publications are kept. It has very little in the way of structure–no actual membership, no meetings, no officers, no office. It does occasionally produce a newsletter or a bulletin, but again, even this aspect has little structure–the existence of the publications relies exclusively on individual initiative.

In essence, the AMCS is a set of ideals: To explore and study the great caves of México; To preserve the wondrous beauty and magic of these caves; To produce a high level of quality in our surveys, studies, and publications; To impart a deep respect for the lands, caves, and peoples of México; And to achieve these ideals in a friendly and cooperative way.

The AMCS is not a political, national, or rival group. It is open to, and includes, all cavers who share these ideals. The Activities Newsletter is a tangible example of this, and we encourage *everyone* to participate by sending in their trip reports, articles, maps, photos, etc. The newsletter is an invaluable repository for the vast amount of information that is continually being acquired. By developing a feeling of unity, we all stand a better chance of achieving our common goals: to explore and learn about the caves we all think are magnificent–the caves of México.

Dale Pate
Terri Treacy

México News

Three Florida divers of the NSS Vertical Section have mapped over 1100 meters in a largely submerged cave on the coast of the Yucatán Peninsula called Cueva de Xcaret. Ned DeLoach, Sheck Exley, and Karen Exley found that diving was hampered by a strange phenomena: ceiling silt disturbed by exhaust bubbles would collect on the fresh water/salt water contact, and create a "false floor" effect suspended in the passage. The system has a wide main entrance and several cenote entrances among the ruins of the Mayan city of Xcaret. It is the longest mapped underwater cave in México.

South of Xcaret, the divers explored the extensive cenote system of Nonec. Visibility was so clear in the underwater tunnels that from the main cenote, the light from an adjacent cenote could be seen 116 meters away. Troglobitic isopods two centimeters long were seen in the salt water (lower) layer.

Source: Sheck Exley, Caving International No. 8

Paul Duncan and members of the Greater South Texas Grotto have been exploring several deep caves in the Sierra Sabinas, near Sabinas Hidalgo, Nuevo León. One cave has a large chamber with three pits in the floor, and has been mapped to a total depth of 100 meters. Another pit has been bottomed at around -200 meters. The owner of the ranch is encouraging the cavers in the hope that they might find a water source. Down the range, and considerably lower, is the large resurgence of Ojo de Agua.

Source: Paul Duncan

MEXICO DESCONOCIDO is a monthly outdoor magazine published by Editorial Novaro in México, D.F. Virtually every issue contains references to caves in México. Number 47, October 1980, is perhaps typical in that respect. It contains a well written article on the rescue of the Polish cavers fron Sótano de San Agustín, with excellent color photographs. Another well illustrated article describes the karst landforms around Taxco, Guerrero. Elsewhere, mention is made of a Cueva de la Malinche, a pictograph cave near San Agustín Mezquititlan, Hidalgo. There is an account of a helicopter trip to a deep canyon in Durango in search of a cliff dwelling. Parking the helicopter at the canyon bottom, the author climbed 3 hours to reach the ruin, located in a shelter 10 meters wide and 2 meters high.

The featured state in this issue is Coahuila, and many caves are mentioned around Torreón: Cueva del Tabaco, Cueva de Candelaria, Cueva de los Indios, Cueva Tlaxcalteaca, Cueva del Coyote, Cueva del Aguila, Cueva del Macho, and Cueva Hundida. Several of these are apparently those described by James Reddell elsewhere in this issue of the Activities Newsletter.

A group of Austin cavers visited Pozo de Gavilán near Galeana, Nuevo Leon in May 1980. They initially failed to recognize it because the lake, normally 100 meters below the entrance, had risen to within 30 meters of the surface. Apparently, recent recharge had raised the water table in the gypsum plain.

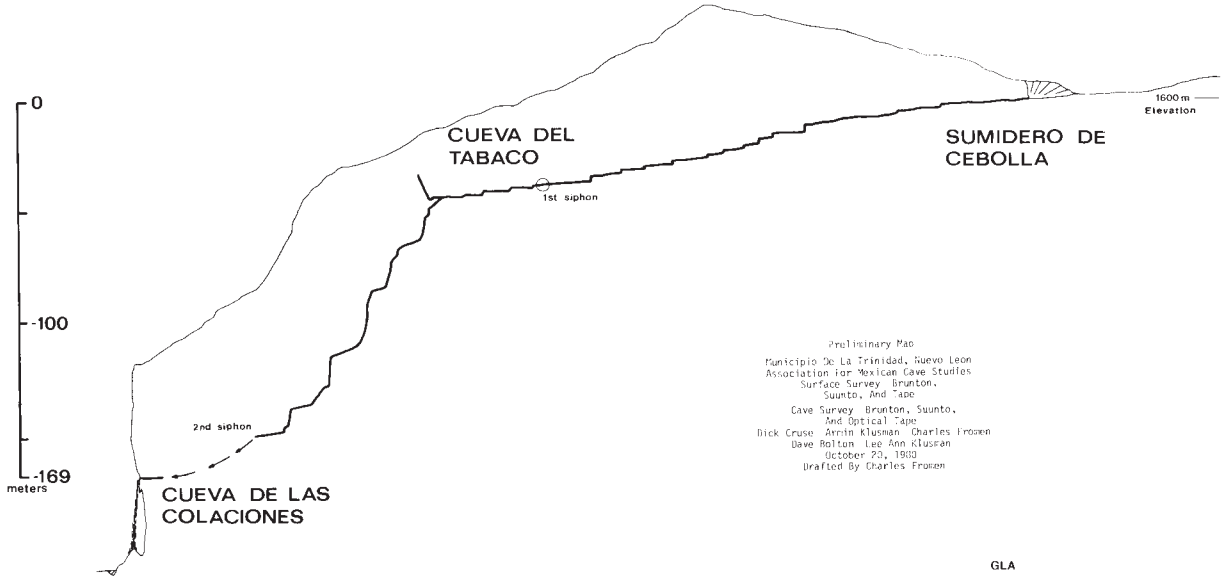
Source: Tom Byrd

Members of the Greater Houston Grotto have encountered a second sump at -150 meters in Sumidero de Cebolla, a stream cave 35 kilometers south of Monterrey. This sump lies only 60 meters from the upstream sump in Cueva de las Colaciones, a resurgence cave formed on a cliff, from which tumbles the 45 meter Cascada de las Colaciones. The 6 km^2 La Trinidad valley drains into Sumidero de Cebolla. Houston caver Bill Campbell was the first to enter Cebolla in 1970, exploring 150 meters to where the passage was blocked by logs, sticks, and mud. Over several years Charles Fromén and Mike Connally made several unsuccessful attempts to pass the blockage. In 1976, Fromén and Marc Conover dug through, and explored 170 meters to a sump. Fromén then attempted to gain access to Cueva de las Colaciones by rappelling down the cliff from a rig point 50 meters above the entrance, but could not get close enough to swing in.

In July 1980, seven of the Houston cavers entered Sumidero de Cebolla with scuba tanks to dive the first sump. The dry summer had opened a 10 centimeter airspace at the sump, which they passed through to find a second entrance, Cueva del Tabaco. From a junction room near this overflow entrance, they explored down to the second sump in a 17 hour trip.

Another attempt to reach Cueva de las Colaciones was made by Fromén, Dick Cruse, Michele and Dave Bolton in September 1980. After 2-1/2 hours of slinging a grappling hook, Fromén managed to pull himself into the waterfall entrance. The stream, flowing at a rate of 100 liters per second, sumped out after 30 meters.

Source: Charles Fromén



International News

France

The Pierre St. Martin system has passed 40 kilometers in length. Connections are close but still elusive with the grotte d'Arphidia, réseau de Arres Planeres, gouffre No. 3 de Bourrugues, and SC 60.

French divers have been quite active in long and deep cave dives. The Emergence de la Finou has been pushed to 2100 meters in length, and in the Emergence de l'Infernet, divers have penetrated 1100 meters. The Emergence du Ressel has been pushed by a Geneva groups to 1150 meters, depth -56 meters. The Speleo Club de Paris claims a "cold water depth record" (!) for their -99 meter dive in fontaine des Chartrea.

Source: Claude Chabert

In March 1980, French diver Patrick Penez succeeded in diving 40 meters through the sump at the bottom of the 1358 meter deep réseau Jean Bernard. He found a descending passage that went 300 meters to an 8 meter drop. The depth at the bottom of this drop, 1410 meters, is a new world depth record, although not surveyed.

Source: Paul Courbon

Italy

Climbing efforts in early 1980 by Italian cavers to connect Antro del Corchia with Abisso C. Fighiera have resulted in the discovery of a series of high galleries and breakdown areas. This passage ascends 180 meters thus far, and is still going.

Source: Sottoterra 55

Spain

In the Picos de Europa, the Lancaster University Speleological Society has pushed Sima Tera to -550 meters. They had stopped at -484 meters in 1979.

The Pozu del Xitu, explored last year to -356 meters, has now been pushed to -831 meters by the Oxford University Caving Club.

The Spéléo Club de la M.J.C. de Rodez has connected Torca de los Caballos to Cueva del Vallé, making a 23 kilometer long system with a through trip of 10.6 kilometers.

Source: Claude Chabert

During the summer of 1980, two more Spanish systems passed below the kilometer level. Cavers of the Groupo Espeleológico Badalona connected Sima B.15 (elev. 2200 m) with Fuente de Escuain, providing an 1105 meter deep through trip. Unusual drought conditions opened up sumps that normally would be closed.

In the PSM karst along the French border, a Spanish-French team pushed the new Sima Budoguia down to a depth of 1195 meters. They stopped at the top of a large waterfall.

Source: Paul Courbon

Turkey

French cavers have explored Turkey's second and third deepest caves. Sakal Tutan dudeni is 303 meters deep, and Sakal Tutan deligi is 302 meters.

Source: Claude Chabert

Honduras

In spring 1980, an American expedition led by Steve Knutson investigated the 2700 meter "cloud forest" karst of the Montaña Santa Barbara. Their major find was Sumidero Maigual, bottomed at -420 meters.

Source: Steve Knutson

Texas

Honey Creek Cave, a resurgence west of San Antonio, has been opened up after successful attempts to lower the water level in the low airspace canals. Rapid mapping progress by Texas cavers has racked up 4.2 kilometers of survey. The cave involves swimming long distances with low ceilings.

Source: Gary Poole

Sorcerer's Cave in West Texas has been connected to nearby Apprentice Cave through a short dig not far from the entrance. This added a few meters to the cave, which remains Texas' deepest at 178 meters. Completion of mapping to the upstream sump in the Sirion River brought the total length to 2440 meters.

Source: George Veni

Texas cavers hauled dive gear to the downstream sump in O-9 Well for a dive attempt in July, 1980. This Crockett County stream cave is one of the state's longest (1400 m) and deepest. Divers George Veni and Steve Damon found the sump to silt up at 5.4 meters depth, deepening the cave to 101 meters.

Source: George Veni

U.S.A.

Wyoming's Great Ex Cave has been bottomed and connected to a resurgence cave, Great Exit. A laser theodolite survey between the two entrances, and a survey between the lower entrance and the lowest point in the cave, show the depth to be 429 meters, (1408 ft.), a new U.S. depth record. Efforts to survey the connection have been hampered by a low, 300 meter long watercrawl in wetsuit shredding rock.

Source: Louise Hose

American cavers continued exploration in Montana's Silvertip Cirque during the summer of 1980. The main focus of the expedition was Blood Cave, where a new southern extension was discovered through a window in a domepit. This section has crossed underneath Silvertip Mountain and out under the cirque to the south, giving rise to hopes of another entrance. New surveys brought the length of Blood Cave to 4 kilometers. While a connection with Blood still proves elusive, the main Silvertip System grew to 9.6 kilometers after a connection with Tipfish Cave and further mapping in the Bell section.

Source: Mike McEachern

Ronald Langston, 33, a diver from Rome, Georgia, died in a small cave near Sublinga, Georgia on August 1, 1980. Although he was an experienced diver, he apparently wasn't familiar with cave diving. Using a "pony" tank, he entered a sump alone, with no dive line. His tank floated out a short time later. He had apparently taken if off in a constriction.

Source: The Potomac Caver

International News

A thirty year old Denver caver, Bruce Unger (NSS 10663), drowned while exploring in one of the Lost Creek granite caves in Park County, Colorado, on August 9, 1980. Bruce, Louise Hose, Tom Strong, and Scott Trossen followed a cold 600 l/s stream 80 meters into the cave where Bruce began ascending a steeply sloped water chute. While attempting to bridge over the rushing stream at the top of the chute, Bruce slipped and his leg jammed in an underwater crack. Attempts by his companions to help him were thwarted by the force of the water and a lack of foot holds. They were repeatedly flushed down the chute, while water forced Bruce under. The body was completely inside the underwater void, and could not be pulled out.

A retrieval team of 8 cavers came in the next day, but also failed to remove the body from the crack. The body was successfully retrieved two weeks later with a winch and pulley system.

Source: Louise Hose

During the summer of 1980, an eight member British expedition spent a successful five weeks investigating lava tubes on the island of Hawaii. Twenty-four kilometers of passages were mapped in many caves. The initial objective was the recent 1974 Mauna Ulu lave flow on the south slope of Kilauea (1228 m). Apua Cave, a large, well decorated tube, was mapped, totalling 1.3 kilometers. Two other 300 meter long caves were mapped in this flow. Further west on Kilauea, Ainahou Ranch Cave proved to be almost 7 kilometers long; however, broken up in the middle by a large collapse. This system, and several others, contained artifacts and burials left by early Hawaiians. Interestingly, some important burial chambers were protected by booby traps, such as perched boulders with tripping mechanisms, which seemed to have been subsequently triggered by the many volcanic tremors.

Kazumura Cave, a long known tube at the eastern end of the island, was mapped by the expedition to 11.55 kilometers. Thus, it passes Kenya's 11.1 kilometer Leviathan Cave to become the world's longest lava tube. The expedition held high hopes for the vast flow on 4170 meter high Mauna Loa, stretching 50 kilometers over a vertical range of 3200 meters. Upward pushes in Kaumana Cave, a tourist cave near Hilo, and at the bottom of the flow, showed it to end after a kilometer, with the cave being surveyed to a length of 2 kilometers. They point out however, that exploration on Hawaii's vast lava fields has hardly even begun.

Source: Chris Wood,
Caving International

Rapid growth in West Virginia's Friar's Hole System has recently made it third longest in the U.S. at 60.75 kilometers. Bill Stone and Bob Jefferys completed the waterfall climb in the Monster Cavern room in July, 1980, discovering 200 meters of canyon passage. In September, a large group hauled in diving gear for Stone to attempt the downstream Crookshank sump, only to find the sump open due to a summer drought. Over 2.5 kilometers of large passage was mapped to another sump. High leads with airflow provide hope for more progress towards the suspected resurgence, over 11 kilometers away. At the northern end of the system,

a considerable amount of passage has also been surveyed in the area of the Rocky River II. The Friar's Hole System now stretches an amazing 6,280 meters end to end in maximum linear extent.

Sources: Dug Medville, Roy Jameson

Recent explorations have opened up a new section at the bottom of West Virginia's Walt Allen Cave. A base level crawlway was pushed through tight squeezes, lots of mud, and a long sump to a streamway. Downstream, a canyon crosses above the stream and leads to a large trunk passage. This was surveyed 450 meters to a terminus. Several tight leads and an elusive wind still provide hope of a connection to nearby Shinaberry Cave. Cavers should note that access to this cave is very tentative at this time.

Source: Bob Anderson

The survey of Roppel Cave now stands at 36 kilometers. An interesting recent discovery was the presumed upper reaches of Flint-Mammoth's new Hawkins River. Whether a connection can be made or not is problematic for a permanent sump marks the upstream limit in Flint-Mammoth. Other leads in Roppel are heading for 17 kilometer Crump Spring Cave and other potential connections.

Source: Bob Anderson

Kentucky cavers have been busy in the caves surrounding the 345 kilometer Flint-Mammoth Cave system. Whigpistle Cave now has 26 kilometers of surveyed passage. In the first part of 1980, a major upper level extension was pushed into a ridge to the south of known parts of the cave. Many leads are within a few hundred meters of the Sinkhole Plain. Northtown Cave is a new find with 3.5 kilometers of passage, and prospects are good for a connection with nearby Roppel Cave.

Source: Don Coons

Hot Cave, a new find in Perry County, Missouri, could provide the long sought link between Mystery Cave (25.5 km) and Rimstone River Cave (22.5 km). Tex Yokum and others have thus far explored about 5 kilometers of passage, heading towards Mystery.

Source: Steve Boehm

The World's 1000 meter systems

1.	Reseau Jean Bernard, France	1410 meters*
2.	Complexe de la Pierre Sainte-Martin, France and Spain	1332 meters
3.	Sistema Huautla, México	1222 meters
4.	Sima Budoguia, Spain	1195 meters
5.	Snieznaya, USSR	1180 meters*
6.	Gouffre Berger, France	1148 meters
7.	Schneeloch, Austria	1111 meters
8.	Sima B.15-Fuente de Escuain, Spain	1105 meters
9.	Sima GESM, Spain	1098 meters
10.	Lamprechtsofen, Austria	1024 meters
11.	Reseau Trombe, France	1018 meters

*Need verification by survey or resurvey.

Source: Paul Courbon

Long Caves of México

1.	Sistema Purificación, Tamaulipas	36,795
2.	Sistema Huautla, Oaxaca	21,300
3.	Sistema Cuetzalan, Puebla	21,000
4.	La Grieta, Oaxaca	8,782
5.	Sótano del Arroyo, San Luis Potosí	7,200
6.	Actún Kaua, Yucatán	6,700
7.	Atepolihuit de San Miguel, Puebla *	6,502
8.	Gruta del Río Chontalcoatlán, Guerrero	5,827
9.	Gruta del Río San Jerónimo, Guerrero	5,600
10.	Grutas de Juxtlahuaca, Guerrero	5,098
11.	Sótano de Las Calenturas, Tamaulipas	5,078
12.	Sumidero de Jonotla, Puebla	5,000
13.	Cueva del Nacimiento del Río San Antonio, Oaxaca	4,570
14.	Cueva de la Tinaja, San Luis Potosí	4,502
15.	Sótano de Japonés, San Luis Potosí	4,500
16.	Sima Zoquiapan-Cueva Piloztoc, Puebla	4,107
17.	Sótano del Río Iglesía, Oaxaca	4,100
18.	Sima del Borrego, Guerrero	4,007
19.	Atepolihuit de San Andrés, Puebla	4,000
20.	Cueva del Río Jalpan, Querétaro	3,440
21.	Actún Xpukil, Yucatán	3,353
22.	Cueva de la Laguna Verde, Oaxaca	3,350
23.	Sumidero Yochib, Chiapas	3,316
24.	Cueva de El Chorreadero, Chiapas	3,280
25.	Sumidero La Joya, Guerrero	3,100
26.	Atepolihuit de Nauzontla, Puebla	3,066
27.	Sistema de Montecillos, San Luis Potosí	3,022
28.	Sótano de Huitzmolotitla, San Luis Potosí	3,002
29.	Sótano del Tigre, San Luis Potosí	3,000
30.	Boca del Río Apetlanca, Guerrero	2,750
31.	Actún Loltun, Yucatán	2,682
32.	Sistema Santa Lucía, Puebla	2,500
33.	Cueva de Juan Sanchez, Oaxaca-Veracruz	2,493
34.	Grutas de San Cristobal (Rancho Nuevo), Chiapas	2,250
35.	Xocomanetlán, Guerrero	2,223
36.	Grutas de Estrella, México	2,100
37.	Sótano de Yerbaníz, San Luis Potosí	1.980
38.	Grutas de Tenextepec, Puebla	1.920
39.	Cueva de la Mantilla, Michoacán	1,900
40.	Cueva de la Puente, San Luis Potosí	1,830
41.	Cueva Tecolo, Puebla	1,830
42.	Sistema Guayateno, Puebla	1,782
43.	Cueva San Fransisco, Chiapas	1,750
44.	Sótano de Matapalma, San Luis Potosí	1,722
45.	Sótano de Agua de Carrizo, Oaxaca	1,693
46.	Grutas de Balankanche, Yucatán	1,600
47.	Grutas de Xtacumbilxunam, Campeche	1,600
48.	Cueva de Los Sabinos, San Luis Potosí	1,500
49.	Sótano de Tlamaya, San Luis Potosí	1,500
50.	Zacatecolotla, Guerrero	1,500

* Formerly known as Sumidero de Atepolihuit.

Peter S. Sprouse

Deep Caves of México

1.	Sistema Huautla, Oaxaca	1,222
2.	Sistema Purificación, Tamaulipas	895
3.	Sótano de Agua De Carrizo, Oaxaca	848
4.	La Grieta, Oaxaca	760
5.	Cueva de Diamante, Tamaulipas	621
6.	Nita He, Oaxaca	600
7.	Sótano de Trinidad, San Luis Pótosi	559
8.	Sótano del Río Iglesía, Oaxaca	535
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.	Sistema Cuetzalan, Puebla	490
14.	Hoya de Las Guaguas, San Luis Potosí	478
15.	Cueva de San Agustín, Oaxaca	458
16.	Sótano del Barro, Querétaro	455
17.	Sótano Itamo, Veracruz	454
18.	Sótano de Tlamaya, San Luis Potosí	454
19.	Cueva de la Peña, San Luis Potosí	448
20.	Nita Nanta, Oaxaca	445
21.	Atepolihuit de San Miguel, Puebla *	443
22.	Sótano de La Joya de Salas, Tamaulipas	376
23.	Cueva de El Chorreadero, Chiapas	345
24.	Cueva de Xocotlat, Puebla	339
25.	Grutas de San Cristobal, Chiapas	330
26.	Sótano de los Hernandez, Querétaro	330
27.	Sotanito de Ahuacatlán, Querétaro	320
28.	Hoya de Zimapan, San Luis Potosí	320
29.	Cueva de Santa Cruz, Oaxaca	314
30.	Sótano de Javalín, Querétaro	308
31.	Sótano de los Monos, San Luis Potosí	291
32.	Sótano de Soyate, San Luis Potosí	287
33.	Cueva del Rancho de Agua Amarga, San Luis Potosí	283
34.	Sótano de Vásquez, Tamaulipas	275
35.	Sumidero La Joya, Guerrero	257
36.	Sótano de Huitzmolotitla, San Luis Potosí	245
37.	Sótano del Macho Rey, Querétaro	244
38.	Sótano de Otates, Tamaulipas	244
39.	Pozo Meléndez, Guerrero	229
40.	Sótano de Ojo de Agua, Querétaro	228
41.	El Sotanito, Querétaro	225
42.	Sótano de Sendero, Tamaulipas	223
43.	Sótano de Sauz, Chihuahua	220
44.	Sótano de Coatimundi, San Luis Potosí	219
45.	Sótano de la Cuesta, San Luis Potosí	217
46.	Sótano de San Francisco, San Luis Potosí	217
47.	Sótano del Arbol Sangre, Tamaulipas	216
48.	Cueva de Salto, Querétaro	215
49.	El Socavón, Querétaro	214
50.	Sumidero Yochib, Chiapas	213
51.	Sumidero de Tenejapa, Chiapas	209
52.	Sótano de la Navidad, San Luis Potosí	200

all units in meters

Peter S. Sprouse

PROJECT REPORT

THE XILITLA KARST

Peter Sprouse

View of the Xilitla cone karst from the top of La Silleta. (Terri Treacy)

The extensive Xilitla karst area of San Luis Potosí and Querétero was among the first studied by speleologists, namely Dr. Frederico Bonet in 1953 and Dr. Robert W. Mitchell in 1958. It was the scene of the blossoming of Mexican caving during the 1960s. By the middle of the decade Sótano de Tlamaya had been bottomed at 454 meters, setting a Western Hemisphere depth record. In 1967, the world's deepest freefall pit was descended, and still yields new discoveries today. The pit is Sótano de las Golondrinas.

A considerable amount of information on caves of the Xilitla area has appeared in AMCS publications, and been documented. I am currently compiling, with John Fish, information on the area for an AMCS Bulletin, hopefully to be published in 1981. The geographic boundaries of the area to be covered are as follows: on the north, the Río Santa María; on the east, the Inter-American Highway;

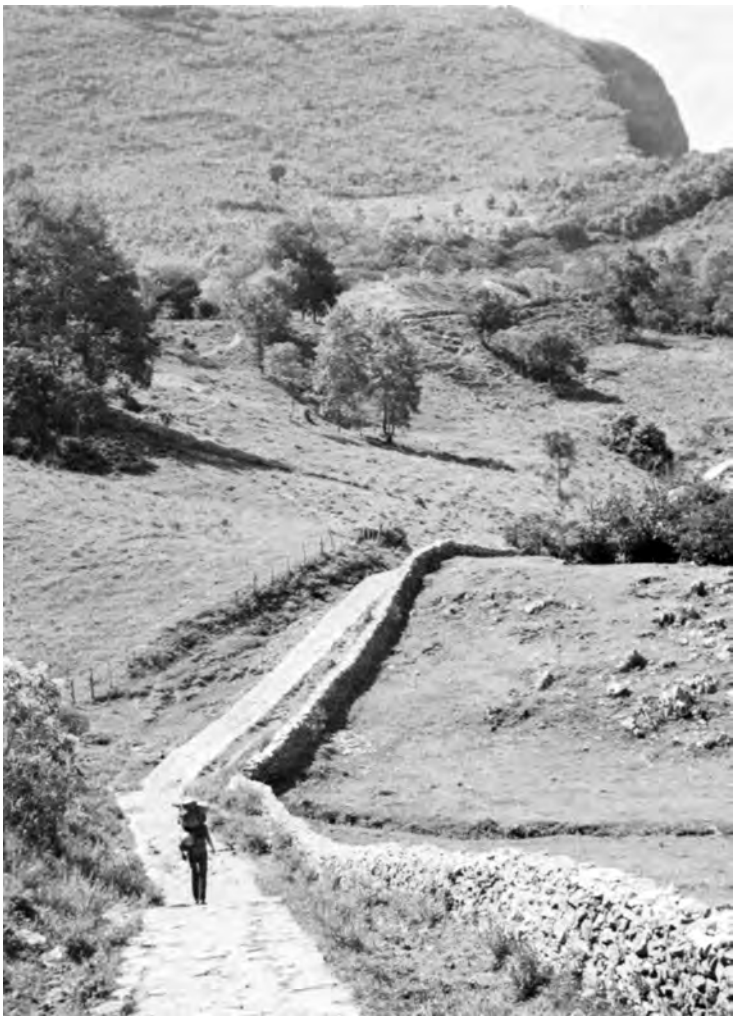
on the south, the Río Moctezuma; and on the west, the eastern edge of the San Juan Plateau, which was described in AMCS Bulletin 7. Elevations in the area range from 100 to 2900 meters above sea level; vegetation changes correspondingly from lush tropical jungle to high pine and hardwood communities. Karst landforms are spectacular throughout the region, with some of México's best examples of cone karst located south of Tampaxal.

Although the number of documented caves in the area currently totals 206, there are undoubtedly hundreds more remaining to be discovered. Field efforts towards the Xilitla bulletin have necessarily been limited to completing accurate surveys of major caves in the area. When the bulletin is published, it may then serve as a framework for future work. Several mapping trips were made to the area in 1980, and help is needed to survey other major caves in the coming months.

In March, 1980, 13 cavers participated in survey and exploration work at Sótano de las Golondrinas. (See article in this issue.) Don Broussard led continued mapping efforts in The Crevice off the bottom of the entrance pit, while other supplemental survey work was done on the pit floor. A surface survey was done to the west to tie in nearby Sótano de Guadalupe, a 22 meter deep cave, significant mostly for its fauna.

During April, the same group spent six days in the La Silleta area. (See article in this issue.) They mapped Sótano de La Silleta, Cueva de La Silleta, and five new caves.

In late August, another AMCS group attempted to collect troglobitic crayfish in the sump pool in Hoya de las Guaguas, and began the survey of Cueva de Oxtaljá near Tamapatz. Oxtaljá is a 150 meter deep cave formed along a thrust fault between the Agua Nueva and El Doctor formations. It was explored in 1966 and 1968, but no mapping was done.



Cobble trail from Tamapatz to Sótano de las Golondrinas. (Dale Pate)

Several other significant caves need mapping and would be good for groups looking for a project. These include:

SOTANO DE TLAMAYA - Needs to be surveyed. This 3 kilometer long, 454 meter deep cave is one of the largest in the area, yet lacks a good map. It will be an extensive mapping project.

CUEVA DE POTRERILLOS - Located near the village of Potrerillos, 1 kilometer west of Ahuacatlán, S.L.P. Needs mapping.

CUEVA DE MUHAUT - This is a 450 meter long cave that needs mapping. It lies 300 meters southeast of Muhaut, south of Tamapatz.

SOTANO DE SIETE SEGUNDOS and SOTANO DE LAS PENAS - Two undescended pits, with 6-7 and 5 second rockfall times respectively, that need checking.

SOTANO DE LA LINJA NO. 2 - A large pit 100 meters deep and needs mapping. It is located 1500 meters northeast of La Linja, north of La Laja.

SOTANO DE LA LAJA - A 100 meter undescended shaft near La Laja, first located by aerial reconnaissance. Needs checking and mapping.

If you are interested in any of these projects, or in the Xilitla Bulletin, please contact Peter Sprouse, P.O. Box 8424, Austin, Texas, 78712. We are also looking for contributions of good photos or slides to help illustrate the bulletin.

Xilitla

Se comenzaron los estudios de la región karstica extensiva de Xilitla en S.L.P. y Querétaro en 1953 por el Dr. Federico Bonet, y por el Dr. Robert Mitchell en 1958. Aunque ya se han documentado 206 cuevas en la región, sin duda quedan centenares para descubrir.

Peter Sprouse y John Fish están juntado información de la región para producir un boletín AMCS. Además de proporcionar la información recolectada, servira como base para futuras investigaciones.

En las sigientes meses, se necesita ayuda para topografiar unas cuevas principales en la región. Algunas de las cuevas importantes que no están levantados son: Sótano de Tlamaya, Cueva de Potrerillos, Cueva de Muhaut, Sotanito Occidental, Sotanito Escondido, Sótano de La Linja No. 2, Sótano de La Laja. Si tiene interés en alguno de estos proyectos, o en el boletín, comunicase con Peter Sprouse, P.O. Box 8424, Austin, Texas 78712.

TAKE NOTHING BUT PICTURES

LEAVE NOTHING BUT FOOTPRINTS

Sistema Huautla

Gerald Atkinson

On May 9, 1980 the Huautla Project composed of Jerry Atkinson, Jill Dorman, Jan Fitzsimmons, Bob Jeffreys, Dino Lowrey, Mark Minton, Doug Powell, Henry Schneicker, Ron Simmons, Jim Smith, Bill Steele, Bill Stone, and Steve Zeman succeeded in connecting Li Nita and Sótano de San Agustín, achieving a total depth of 1221.5 meters and a length of 21.3 kilometers. This brought Sistema Huautla up to the number 3 slot on the world depth list. It is the only kilometer deep cave outside of Europe. The spring activities culminated many years of work in the area, as the first connection between any of the Huautla caves was realized. Although the potential through-trip would be quite spectacular, it nonetheless will be a rare event, as the Li Nita-San Agustín breakthrough required the use of diving gear through a series of 4 sumps.

The connection occurred late in the expedition, which was fielded from February 21 to May 21, and came as the crowning event in what was an extremely eventful trip. On the eve of departure, the expedition was notified that a member of a Polish caving team had received a serious back injury in Sótano de San Agustín while attempting to give aide to a fellow teammate with a broken ankle. Upon arrival in México City the next day, our group learned that at least one of the injured men was still underground and that our assistance was requested. Twenty hours later found us in the middle of a wild array of tents strung around the San Agustín schoolhouse and a barrage of inquiries in French, English, German, British, Spanish, and Polish. A PEMEX helicoptor lay parked below the town with an armed guard quietly dozing in the hot sun. Winding our way down to the Sótano amidst whirring movie cameras, we added our energy to this already massive international effort. Despite language barriers and sheer fatigue, the victim was successfully pulled out of the cave on the 22nd.

After the general hubbub died down, the expedition settled down to the spring objectives, one of which

Rescuing Josef Cuber of the Polish Expedition in Sótano de San Agustín. (Henry Schneiker)

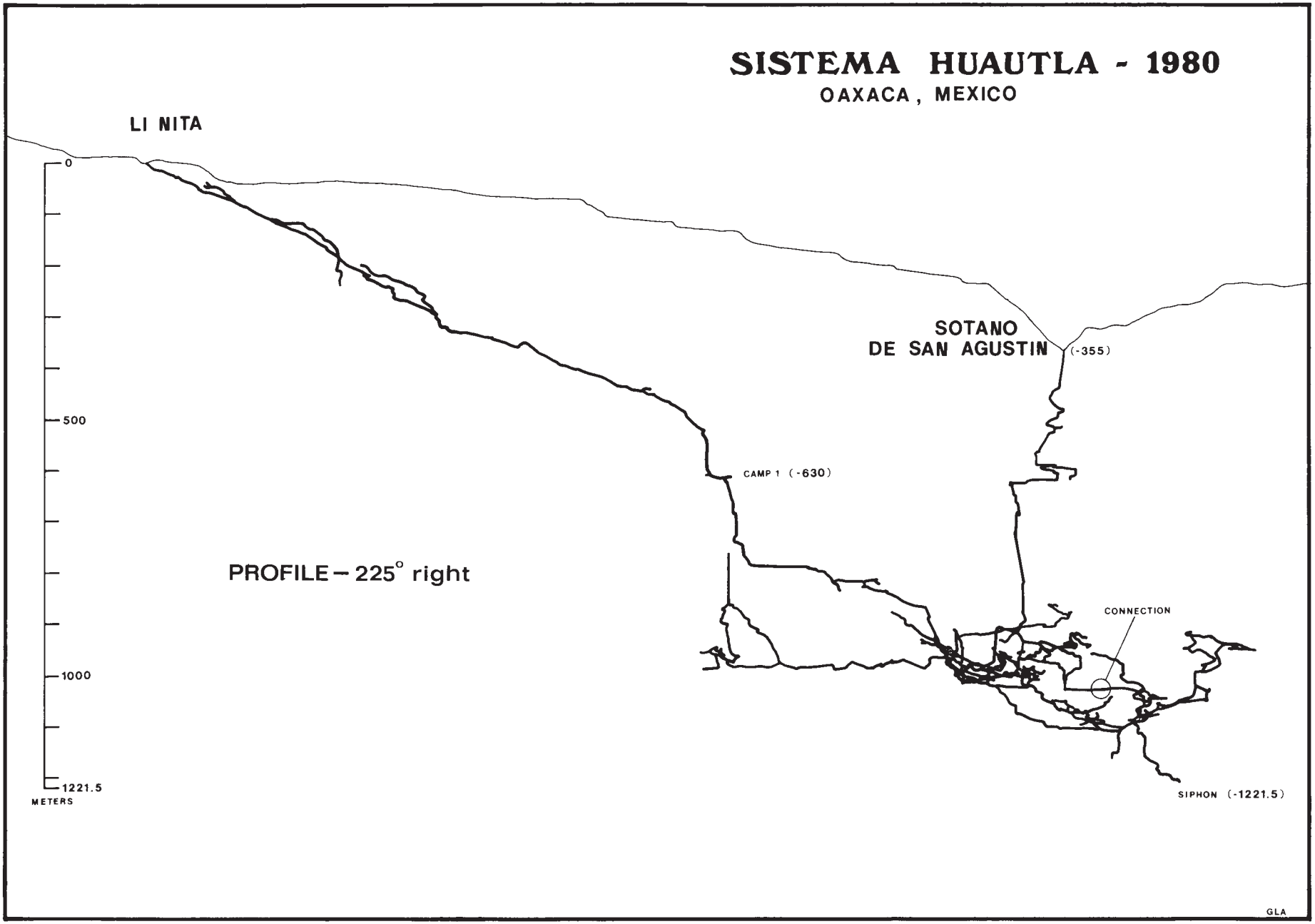
was the possible connection of Sótano del Río Iglésia to Sótano de San Agustín. Although several hassle-intensive trips in Río Iglésia netted about 400 meters of new passage, all leads choked or led back to known cave. The main passage itself had silted shut at the -400 meter level, precluding any digging attempts in the lower reaches which are nearest to Sótano de San Agustín.

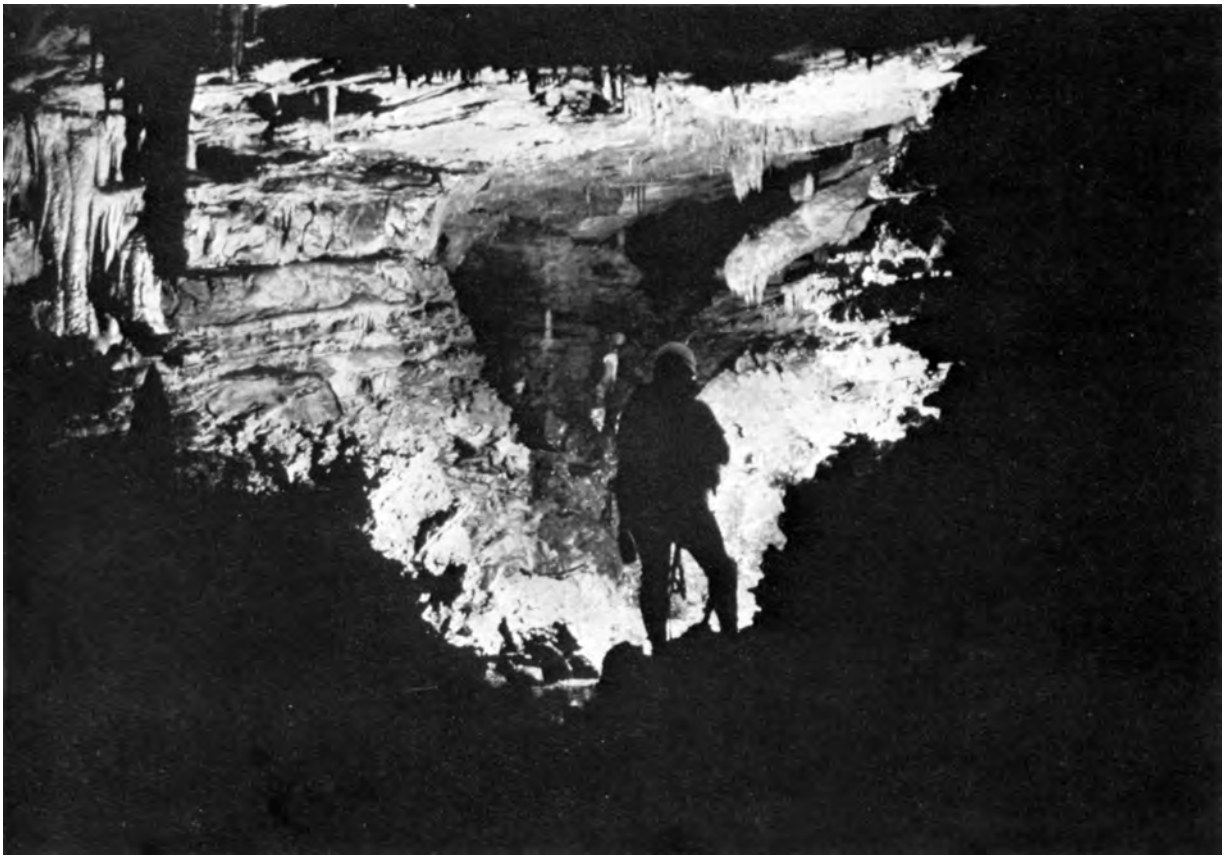
Another cave that received considerable attention was Nita He (Deep Cave in Mazatec), which had been discovered, but not entered, the December before. The cave was explored down a series of spectacular shafts and large rooms to a sump at -599 meters. The sump presented a rather dismal diving prospect, and a general lack of airflow in the lower portions would seem to preclude any possible connection to the larger caves.

Distractions aside, the main focus of the expedition became Li Nita, which means "Flashlight Cave" in Mazatec. Discovered on December 29, 1979 by Ernie Garza and others, it had been pushed to -162 meters prior to the spring expedition. Two trips down predominantly dip-slope fissure-type passage brought the depth to -525 meters and the length to a little over 2 kilometers. At this point, the bottom dropped out of the cave in a series of water shafts that led the third attempt to -681 meters. A fourth assault from the surface reached -812 meters, and a decision was made to establish a camp at the -630-meter level. A total of twenty-seven days were spent in this camp during three separate stays of seven, seven, and thirteen days.

The first push from camp seemed to be stymied when the team discovered

The entrance series of Li Nita. (Bill Stone)


SISTEMA HUAUTLA - 1980
OAXACA, MEXICO
LI NITA
0
500
1000
1221.5
METERS
SOTANO
DE SAN AGUSTIN
(-355)
CAMP 1 (-630)
PROFILE – 225° right
CONNECTION
SIPHON (-1221.5)
GLA



Li Nita. (Bill Stone)

a sump at -825 meters, but careful checking uncovered a high-level gallery bypass. This led to another sump at -1020 meters and the discovery of the Mil Metro, a higher-level trunk passage at the -1005-meter level. With several high leads to check, the team left for the surface.

During the second camp, a combination of digging and aid-climbing brought us to a dig within 50 meters of Sótano de San Agustín. Elsewhere, a nasty fissure was negotiated to a new downstream sump at -1028 meters. As this sump was plotted to be only 130 meters from San Agustín, the team opted to surface and return with diving gear for the sump and explosives for the dig.

Accordingly, an attempt was made on the -1028 sump early in the third camp. Unfortunately, the sump continued well beyond the air capacity of the small tanks being used,and the team turned to pushing other leads. A series of digging and aid-climbing trips succeeded in extending the cave an additional kilometer to yet another sump at -1030 meters. In what was to be the final push of the expedition, a last-ditch diving attempt was made on the -1030 sump. With only 2 meters of dive line left, Bill Stone emerged in the East Redball Canyon of Sótano de San Agustín after having dived four shallow sumps. Thus, ironically, an expedition that had begun with a near tragedy had made the first major connection in the Huautla system and broken the kilometer mark in Mexican speleology.

Jim Smith and Bill Stone preparing to dive the 1030 Sump in Li Nita. (Ron Simmons)

Sistema Huautla

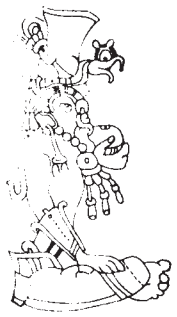
La primera conexión entre cualquiera de las cuevas profundas de Huautla, Oaxaca, fue descubrida después de varios años de trabajo en la región. La conexión entre Li Nita y Sótano de San Agustín fue hecha el 9 de mayo de 1980. Después de cuatro viajes para dentro de Li Nita, el grupo bajó 812 metros y se hizo una decisión para establecer un campamento al nivel de -630 metros. En tres diferentes ocasiónes el grupo pasó siete, siete, y trece días respectivamente en este campamento, haciendo un total de 27 dias. Del campamento subterráneo el grupo encontró varios sifones, pero encontraron otros pasajes para pasarlos. Finalmente, después de varias excavaciones y escaladas artificiales alcanzaron un sifón a -1020 metros. Bill Stone, en equipo completo de buceo, pasó este sifón y tres mas sifones. Emergió en el Sótano de San Agustín. El Sistema Huautla tiene un total de 1,221.5 metros de profundidad y 21,300 metros de longitud.

PROJECT REPORT

ASOCIACION ALPINA DE MEXICO, A. C.

Grupo Expedicionario

XAMAN-EK



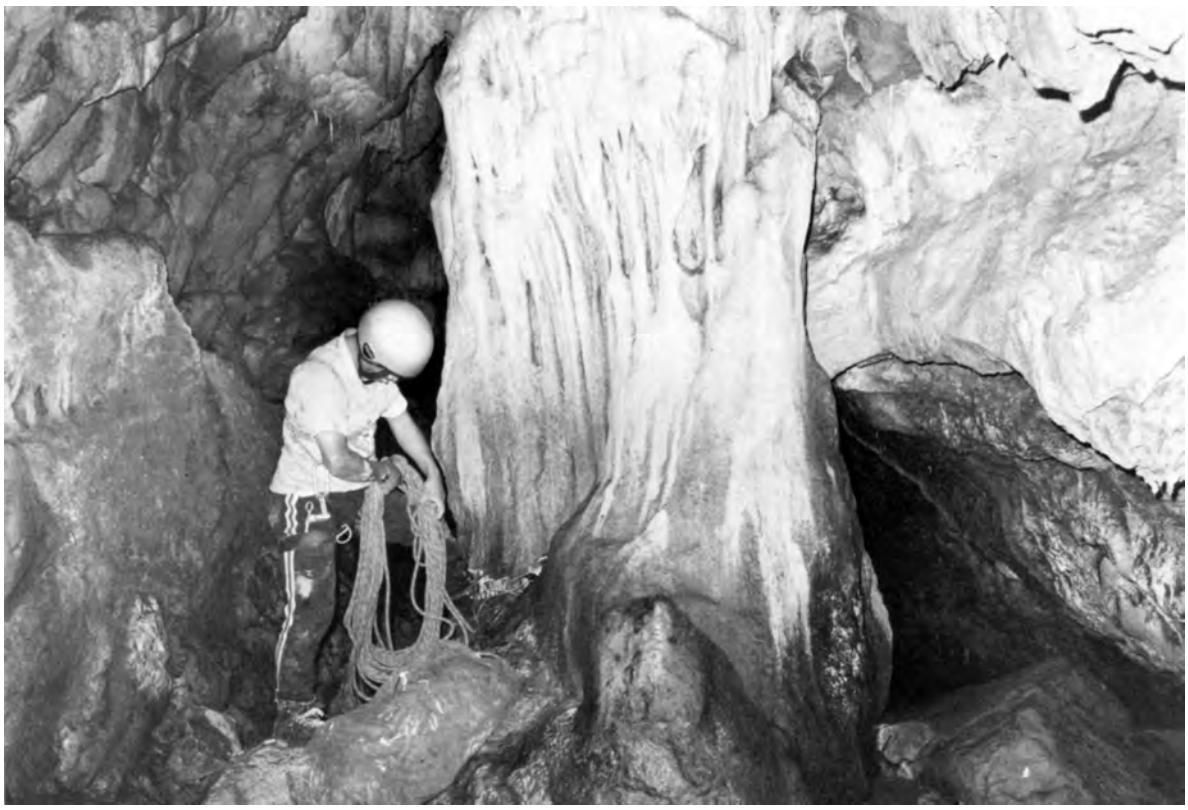
TILACO

Sergio Zambrano

Our first visit to Sótano de Tilaco, Querétaro was over Easter week of 1975. At that time, Raúl Pérez Martínez, Hugo Montejo, and I (all members of the Asociación Alpina de México, A.C.) explored the cave to the 150 meter level. We returned 8 months later, in December of 1975, to continue our exploration. Raúl P. Martínez, Enrique Mendoza, Guadalupe Hernandez, and myself (all A.A.M. members) explored down to the 250 meter level with the cave continuing downward. During Easter week of 1977, we returned with Gabriel Barrera joining our group. Our explorations ended at the 350 meter level. We returned in November of 1980 and reached the 500 meter level before running out of rope.

On March 24, 1980, members of the Grupo Expedicionario Xaman-Ek and the A.A.M. reached the bottom of Tilaco. A sump was encountered at a depth of 600 meters plus. A group of cavers from the U.S. joined us for the purpose of making a survey of the cave. The survey was done to the -175 meter level. A joint expedition is planned in 1981 to complete the survey.

Sergio Zambrano at entrance of Sótano de Tilaco. (Dale Pate)



Raúl P. Martínez in the Salón de las Columnas.
(Sergio Zambrano)

Tilaco

La primera visita a Sótano de Tilaco, Querétaro fue durante la Semana Santa en el año 1975. En aquel tiempo, los espeleólogos Raúl Pérez Martínez, Hugo Montego, y Sergio Zambrano (Miembros de la Asociación Alpino de México, A.C.) exploraron el sótano hácia la profundidad de 150 metros. Volvieron ocho meses después para continuar su exploración. Raúl Pérez M., Enrique Mendoza, Guadalupe Hernandez, y Sergio Zambrano (todos miembros de la AAM) exploraron hásta 250 metros con la cueva continuando hácia abajo. Durante la Semana Santa de 1977 regresó este grupo con Gabriel Barrera. Sus exploraciones terminaron en el nivel de -350 metros. En Noviembre 1978, llegaron hasta 500 metros antes de que se les acabó la cuerda. En el 29 de mayo 1980, miembros del Grupo Expedicionario Xaman-Ek y la AAM llegaron al fondo del sótano. Encontraron un sifón al nivel de más de 600 metros. Un grupo de espeleólogos de los Estados Unidos se juntaron con la intención de levantar la cueva. Una mapa estaba hecha hasta el nivel de 175 metros. Otra expedición colectiva está planeada en el futuro para completar el levantamiento.

PROJECT REPORT

Sierra de Guatemala

William R. Elliott

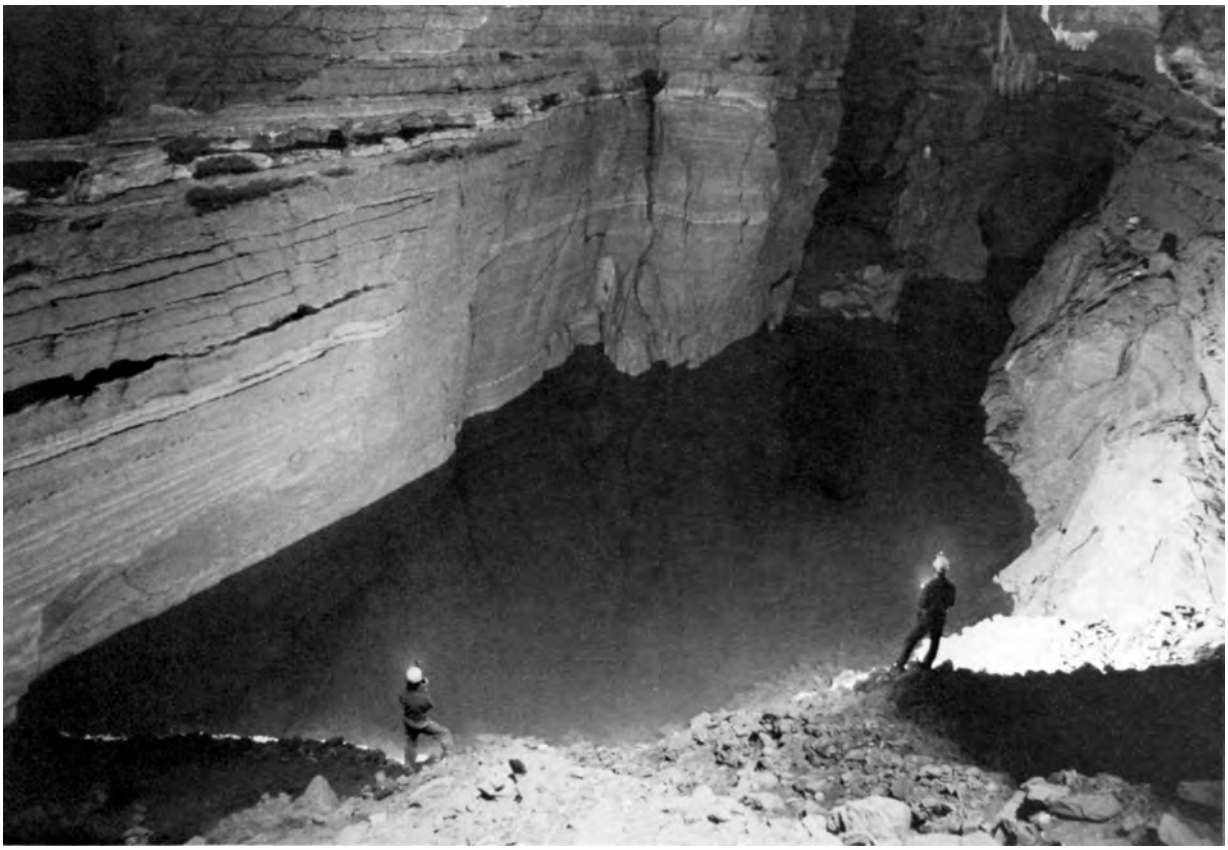
At least 115 caves have been reported in the Sierra de Guatemala region, a front range of the Sierra Madre Oriental in southern Tamaulipas, bordered (roughly) on the north by the Río Guayalejo and on the south by the Río Boquillas/Comandante. Familiar towns in the area are Encino, Joya de Salas, Gómez Farías, Chamal, and Ocampo. Since the first AMCS trip to Gómez Farías in 1964, there have been at least 70 speleological expeditions to the area. The major cave of interest, Sótano de La Joya de Salas, has been visited eleven times since 1965. This sótano continues to frustrate the designs of vertical speleologists despite its great depth potential.

Cave types abound in the area. Sótanos in the lowland Gómez Farías area often have short arroyos leading to multi-pitch fissures and blind fish pools. Deep, open shafts are found in the Chamal/Ocampo area. Many small blind pits are found in the highly karsted highlands, along with 376 meter deep Sótano de La Joya de Salas. Small phreatic caves and spacious, well-decorated "grutas" are found in many areas. Some caves, such as Cueva de los Misioneros, appear to be abandoned resurgences. Cerro Partido, a volcanic peak of Miocene age southwest of Ocampo, has several lava tubes, complete with troglobites.

In 1978, James Reddell and I conceived an AMCS Bulletin, Caves of the Sierra de Guatemala, Tamaulipas, México. Work has been progressing slowly since then. A progress report by me appeared in AMCS Activities Newsletter #10. Since then there have been five trips to the area with several caves surveyed and studied biologically.

One of the goals of the Bulletin is to document about 65 caves that have been biologically sampled, and other caves as well. The caves and pits of the area harbor a wide variety of cavernicoles that have attracted biospeleologists from México, the U.S.A., Switzerland, Italy, and Japan. The fauna ranges from blind Astyanax fishes in the lowlands to many species of troglobitic planarians and arthropods in the highlands and in between. The cave fauna is one of the more spectacular in North America. Reports on the caves and fauna of the area may be found in AMCS Bulletins 1, 4, and 5, and many issues of the AMCS Newsletter (now moribund).

In November, 1979 I mailed a detailed Bulletin proposal to 25 interested cavers. Old surveys and photographs have appeared and the AMCS files have disgorged many old trip reports, sketches, and Bill Russell area maps. I am currently compiling a lengthy chronology of all the trips I know of to the area. This will be a basic reference for writing many of the cave descriptions in the Bulletin. We hope to receive contributed articles on geology/physiography and archaeology. Reddell and I are updating a fauna checklist and will write an article on the fauna. I have drafted many maps and now have 22 inked and several others nearing completion. The Bulletin will probably contain 40 to 50 cave maps and many photographs. It may also include a detailed area map to aid



Lake in Sótano de Caballo Moro. (William Elliott)

future field work. Considering the known distribution of caves (near roads), there may be many hundreds left to be found. Finding caves is difficult because of the rough terrain and dense forest. For instance, two large sótanos were discovered by airplane reconnaissance in 1969, but have never been visited.

In August, 1979 Paul Duncan, Jim Clements, and Wayne Russell visited Cerro Partido and discovered a new lava tube, "Tubo del Piso Colorado" near the peak. Duncan rappelled down a 6 meter pit which hung into a lower level like a stovepipe. Further details are forthcoming.

In September, 1979 David McKenzie, Craig Rudolph, Frank Endres, and I returned to Cueva del Ojo de Agua de Manantiales and finished our survey in two days. The current length is 1293 meters, depth 56 meters. A few crawlways were left for future surveyors to take on. Blind planarians were discovered in a pool and sent to Dr. Roman Kenk. They are the first ones from a lowland cave in the area. A new species of troglobitic Ptomaphagus beetle was also found in Manantiales in January, 1979. David McKenzie will soon have the map of this cave ready for inking. We also investigated areas northwest of Ocampo where we located a 25 meter pit, Sótano del Monumento, near Aniceto Medrano (Allende). Craig and I collected in the pit and made a sketch. We were amused by the shaky ladder that had been placed by locals in the pit to aid an apparently aborted dig at the bottom. We continued to Los Flores and La Laguna, on the west side of the range, where we hiked up to Joya de Don Juan Mesa. The Joya was a nice large dolina, but the rumored sótano proved to be only 8 or 10 meters deep. We then drove back to Chamal and out to Cueva de los Misioneros, a cave I had not visited since 1969,

where we explored, collected, and photographed. McKenzie rappelled 40 meters into a pit at the end, but ran out of rope before reaching bottom.

In November, 1979 the eleventh expedition to Joya de Salas was made. I have not received a written report of this trip, but Bill Stone, Mark Minton, Bill Steele, and others pushed a new system of shafts paralleling the old section of the sótano. Apparently little depth was added to the survey. (See article in this Activities News.) During the same trip, Terry Sayther, Denis Breining, and Margaret Hart hiked 5 kilometers north of Joya de Salas, then east to check out sinks and intermittent lakes marked on the topographic sheet. The sinks were heavily overgrown with scrub and thorns. No caves or particularly interesting features were seen. They connected with a passable road leading south to "La Trementinera."

In January, 1980 I travelled with six cavers from Texas A&M (Barbra Vinson, Duwain Whitis, Steve Boehm, Del Holman, Sheila Jones, Heather Fannin) and two other biologists (Craig Rudolph and Jennifer Matos). We surveyed Cueva de los Misioneros and found it to be about 450 meters long and 60 meters deep. Boehm and I descended the pit at the end, only to find terrifically bad air. Boehm's carbide lamp would not burn, so he prusiked up by electric light while I somehow managed to sketch the bottom and note a muddy pit at the end where a rock rattled down for seven seconds. It took most of our energy to climb back up. The air did get progressively better toward the top of the 50 meter pit.

The next day we were guided by Alfonso Herrera to Sótano del Caballo Moro, which I had last visited in 1970. Alfonso, a local rancher, had been in the sótano with T.R. Evans and others in 1969. The large, overgrown Dolina del Caballo Moro was surveyed by half of our crew and proved to be 128 meters deep to the lip of the pit. Descending the 41° slope at the southeast end of the dolina was treacherous because of loose talus. Duwain, Del, and I surveyed the sótano, which has a 49 meter entrance drop to a slope that plunges into a large, deep lake (see photo). A few fish were noted on this trip, but we didn't spend much time looking at them. The lake had a population of hybrid eyed and blind fish in 1970. We surveyed along the right wall, then across the lake on tubes and into a 163 meter long passage with a second, smaller lake and a terminal crawlway that was not pushed for lack of time. Back at the large lake I plumbed the depths in two places at 4 and 15 meters. A strong current moves the clear water to a siphon at the north (far) end. At a constriction, I estimated the surface flow at about 1 or 2 kilometers per hour (my speed in a tube), and the volume flow at 10-20 m^3/sec. It would be interesting to see a dye trace between here and the Nacimiento del Río Frío, 15 kilometers to the northeast. We surveyed 326 meters in the cave, which is 67.5 meters deep below the entrance, or 196 meters including the dolina.

The next day we hiked to Cerro Partido to see Cueva del Cerro Partido. The volcanic peak was too overgrown to locate the cave in the short time available, but we did collect fauna in a one-room cave on the south side. Two species of blind milliped were taken, and some other arthropods as well. I noted an apparently unexplored pit in a small cone on the south side of the Cerro. We returned to Texas the next day.

Apparently Sótano de los Guacamayos was visited in January, 1980 by Mike Wharton and others, but full details have not yet been obtained.

No other trips have been made to the area in 1980, to my knowledge. A trip I planned for May never gelled. Much more field work could be done to add to the Bulletin, but the work could be endless, so at some point we will just work up what is avail-

able and publish. Rumor has it that Roy Jameson may resurvey Sótano de Vásquez this fall. This would be welcome as the old map was never finished and Vásquez is probably the world's deepest (about 275 meters) blind fish cave. It is hoped that someone will be able to do some geology work in the Sierra de Guatemala for the Bulletin.

No deadlines have been set for the Bulletin, but I hope to have it ready for publication in 1981.

I need finished maps of Sótano de La Joya de Salas and Sótano de Vásquez. I could use some expert drafting help on a myriad of small maps. Color slides or black and white prints of Salas and any other caves would be appreciated. I can copy the slides to black and white negatives and return them promptly. Photos, trip reports, maps, and other material should be sent to me, Bill Elliott, at 2225 North Parkwood, Harlingen, Texas 78550.

Sierra de Guatemala

William Elliott está trabajando en un boletín del AMCS tratando con las cuevas de la Sierra de Guatemala, un parte de la Sierra Madre Oriental en el sur de Tamaulipas. La región está rodeado al norte por el Río Guayalejo, y al sur por el Río Boquillas/Comandant. Desde 1964, se han localizado 115 cuevas, y estudios biológicos extensivas se han realizado.

El boletín incluirá descripciones de las cuevas y de 30 a 40 mapas y varias fotografías. Contendrá reportajes de la biología de las cuevas. Elliott espera recibir articulos tratando con la geología, fisiografía, y arqueología de la region. Posiblemente incluirá una mapa detallada del área para facilitar futuras exploraciones.

Elliott espera publicar el boletín en 1981. Aunque sin duda hay cientos de cuevas por descubrir, ya es la hora de publicar la información en un sólo informe. El informe será de ayuda incalculable para futuras exploraciones en le región. Si tiene algun interés en la región y el boletín, favor de de ponerse en comunicación con William R. Elliott, 2225 North Parkwood, Harlingen, TX 78550.

PACK IT IN....

PACK IT OUT!

PROJECT REPORT

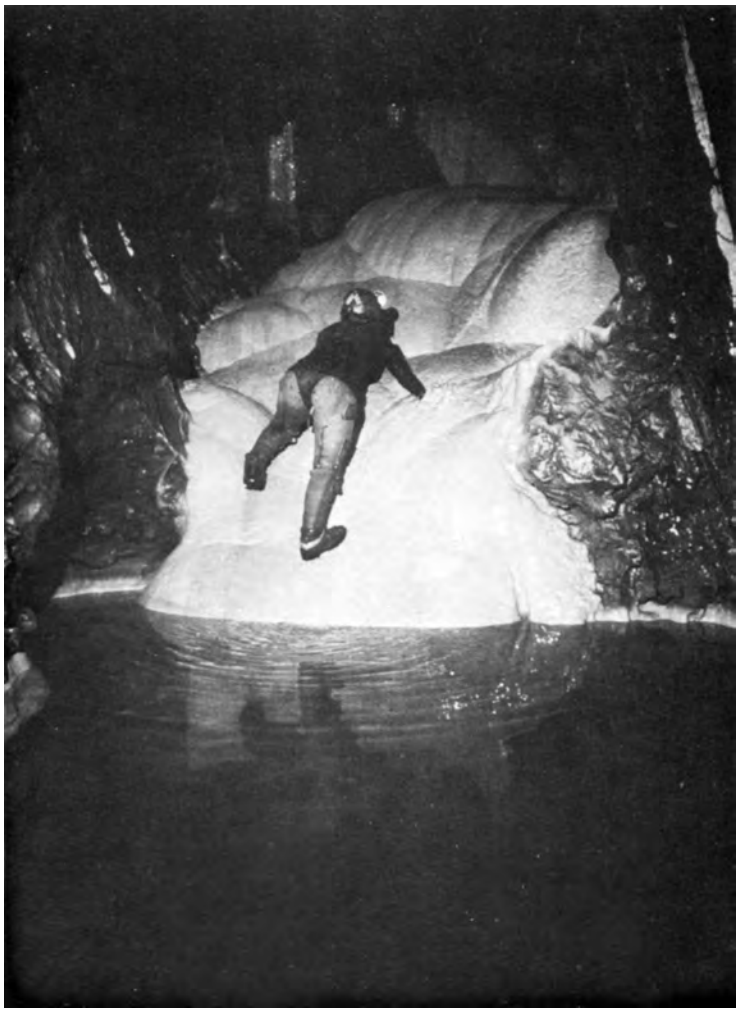
PURIFICACION AREA

Terri Treacy

Since the last report in Activities Newsletter #10, project members have spent 3-1/2 months in the Purificación area. The length of Sistema Purificación has increased 8833 meters, bringing the total length up to 36,795 meters. Due to some new loops that were surveyed, the adjusted depth of the system is 895 meters.

One large chunk of these kilometers came with the connection of Sumidero Oyamel to Upstream World Beyond. (Please see separate article in this newsletter.) A side passage, off the connection area, yielded an additional kilometer and a half of passage. The Dragon River begins with a series of swims in a wide passage with a very low ceiling. The passage continually becomes narrower and the ceiling rises. Eventually the passage takes the shape of a narrow canyon with gravel bars, shallow pools,and small cascades. At one point a large flowstone mass fills the passage; the only way on was a belly-crawl in water underneath the mound. Growing from the underside of this flowstone was a forest of helictites, spawning the name Macaroon Saloon. Beyond, the sound of water cascading down Dragon Falls could be heard. This flowstone cascade led up to more stream passage with deep, green pools and gravel bars. The passage walls were composed of highly sculptured and sharp limestone and calcite. The passage was explored a short way beyond the survey; it appeared to be pinching down.

At the opposite end of the World Beyond, below the Fool's Paradise, the Angel's Staircase section was surveyed. This section had been previously explored by a non-PEP group, who unfortunately saw fit to write on the walls with carbide soot, and leave spent carbide in the passage and cans in the terminal sump. Below the Gonzo Pit, this passage was surveyed for 1000 meters down climbs, rope drops, and canals to the sump at 683 meters below the highest point of the system.



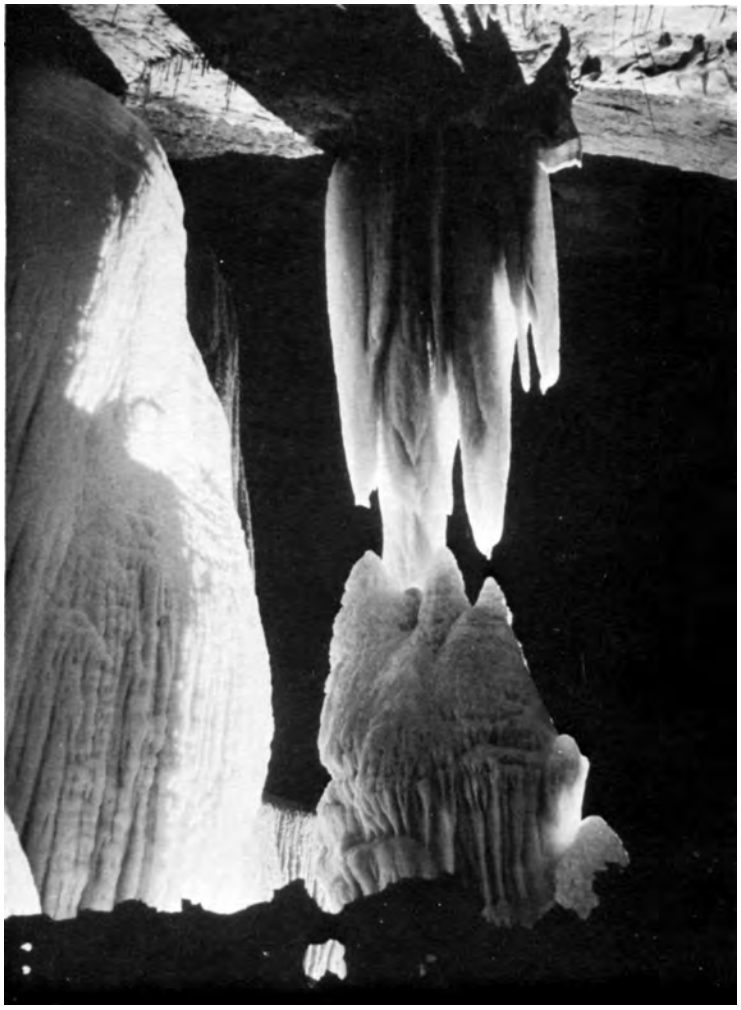
Angles' Staircase. (Don Broussard)

Another section of Sistema that had been explored, but not mapped, was the Valkyrie River in Valhalla. About 200 meters below the entrance, the water of the Valkyrie River flows from a large, deep sump through a pleasant stream passage of sand and gravel bars and clear pools; beautiful formations adorn the ceiling. The passage narrows to a canyon filled with deep water. Louise Hose placed fluorescein dye in this stream as part of her thesis work, and when the downstream section was surveyed one month later the canals were still vivid green.

Down in the lower portion of Sistema, 2 kilometers were added to the Confusion Tubes. Dozens of loops were surveyed in the unique, multi-level maze of bedrock tubes. Generally, the tubes are pleasant walking-size passage, though, occasionally they shrink down to crawlway size or open up into large borehole. Naming the tubes is all part of the fun of "tubing," and some of the names adopted were Misty Borehole, Carrot Tube, Potato Tube, Mrs. Lubner's Tube, Octupus Tube, Redneck Borehole, and Silly Rabbit Tube.

Throughout the rest of the system smaller mapping projects were undertaken, including the fall 1979 connection of the fifth entrance to Sistema through Cueva del Oso. On the surface, much overland surveying and cave hunting was done. To date there are 65 caves in the Purificación area which have been mapped, or in a few cases only sketched. A pre-numbered, aluminum tag has been placed at each entrance. The main purpose of the tags is to avoid confusion and duplication; some caves in the area have been "discovered" 4 and 5 times!

A couple days were spent on the highest point of the ridge (2700 meters) in the Mesas Juarez area searching for caves. This intense karst area has numerous caves, though time only permitted the exploration and mapping of a few. Most were blind pits, 10 to 60 meters deep, filled at the bottom with sediment and debris.



The Hall of the Angles. (Don Broussard)

Sótano de la Cuchilla, to the north of the Cueva del Brinco entrance, is a multi-drop cave which was mapped to -177 meters where it ended at a hopeless pinch. The main route to the bottom consisted of 8 rope drops between 10-20 meters long. The nastiest drop, Rock Drop, was named for the chunks of rock that continually peeled off as people lowered themselves past several sharp ledges. The longest drop,

Helictites in Sistema Purificación. (Dale Pate)

Chevron Drop, led to a large room (20 x 30 meters) noted for the chevron fold in the ceiling. Snow Drop was by far the prettiest drop. The rappel down a white flowstone drapery led into a room which was named December Madness for its abundance of pure white flowstone formations which sparkled like a fresh snowfall. Over a kilometer of passage was mapped in Cuchilla; many of those meters came from pushing side leads which either looped back into the main passage or pinched off.

Other caves in the area were explored and mapped, including Sótano de las Calenturas, (5 km long, 120 meters deep), and Cueva de Tecolote, (1341 meters long, 106 meters deep). El Hundido, the large open-air pit discovered by PASS cavers in 1973, was descended and the bottom checked for leads, but nothing was found.

Sistema in flood

In addition to the usual project mapping and exploration, Louise Hose has spent several months doing fieldwork for her master's thesis on the geology of the cave system and surrounding area. She will be finishing up in early 1981 and her results will be available at a later date. In December 1979 she had a unique experience of observing Sistema in flood. Following are a few interesting statistics.

During a 50 hour period, Louise measured 19 centimeters of rainfall. She and Joseph Lieberz made daily trips to check stream flows in the upper part of the system. "The stream activity had been high. The normal trickle of First Stream had a flow of 1.5 to 2 liters per second. Another stream of similar size flowed near the Bat Room (the Bye-Bye Stream - ed.). The Chute had not been flowing before the rain, but we observed an 18 to 20 liter per second flow during the rain. I spent several hours in Tin Can Alley; it had an estimated flow of at least 15 liters per second."

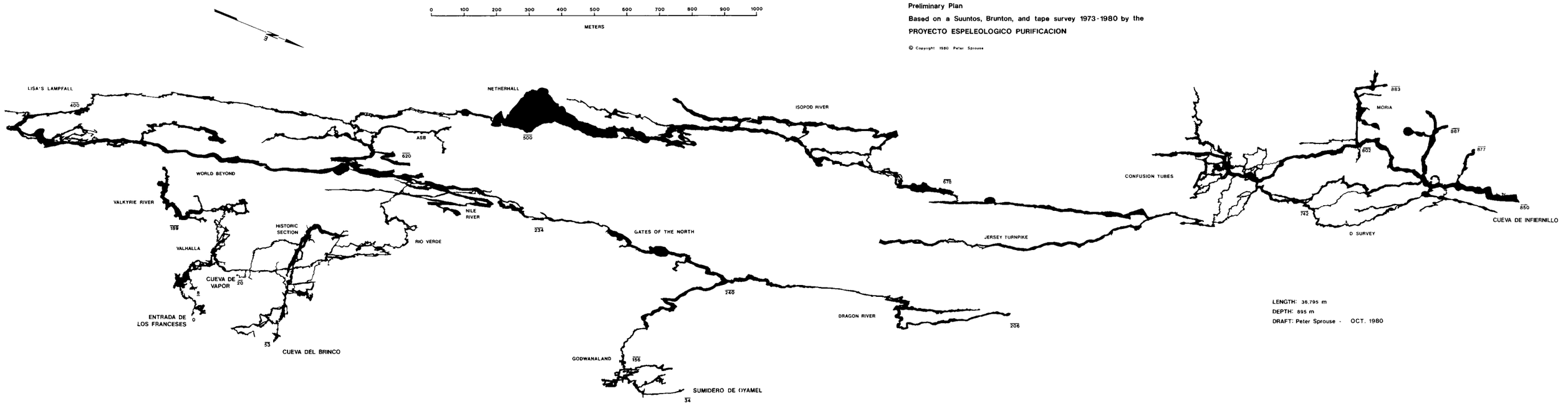
Two days after the rain finally stopped, Louise and Joseph made a trip to Infiernillo. "Two springs cascaded down the cliff walls downstream from the Infiernillo entrance. Each spring had a flow of approximately 10 to 20 liters per second. At the base of the cliff below the entrance, two springs gushed more than 50 liters per second of water." After a treacherous ascent into the cave they discovered that the nor-

SISTEMA PURIFICACION

Municipio Villa Hidalgo, Tamaulipas, México

Preliminary Plan

Based on a Suuntos, Brunton, and tape survey 1973-1980 by the
PROYECTO ESPELEOLOGICO PURIFICACION



LENGTH: 36,795 m
DEPTH: 895 m
DRAFT: Peter Sprouse - OCT. 1980

PROYECTO ESPELEOLOGICO PURIFICACION

ASSOCIATION FOR MEXICAN CAVE STUDIES

mally dry boulders were quite wet and slippery. "Just beyond daylight there was a pool of water which necessitated wading. Finally, at the 4-Way Junction we encountered the sumps." At this point the sumps, normally below Camp I, were up 52 meters from their normal level. "Since Camp I was under 24 meters of water, we took our backpacks up the now dry East Passage. Along the way we found the high water line. The flood, issuing from the sumps, had reached -827 meters below the system's highest point, Entrada de los Franceses. This was a rise of about 64 meters above the surveyed level of the sumps. The passage we camped in, which is also the main throughway into the system, had been closed by a sump only a few hours previous to our arrival."

During this time Louise and Joseph were experiencing incredible, loud rumbling noises. Fearing at first that a wall of water was going to come rushing at them, they later concluded that the noises were the result of rooms and domes opening up to the cave's barometric system as the water receded back into the sumps. "In the evening I returned to the lakes to gather water and once again the passage roared. The sound was rhythmic, but different from what we had heard before. It was a low pitched noise similar to water being drained from a sink. I sat at the edge of the lake and watched the shoreline. After about a minute, small waves with an amplitude of 5 millimeters were on the lake. They pulsed in the same rhythm as the sound. The water level was dropping so rapidly that I could observe the change. Since we had placed our stone water-level marker 80 minutes previous, the water level had dropped 60 centimeters."

The two took a trip back to the Nile River, four kilometers from the entrance. Water levels in the stream along the way seemed to be back down to near normal flow, however evidence of recent flooding in these areas was observed. Upon their return to the upper portion of the system in Brinco they observed that the water flows were almost back to normal. "All the springs were dry except the perennial ones used as water supplies. The Chute and Tin Can Alley both were down, but still flowing. Below the system, large rivers were flowing in the normally dry canyons of Infiernillo and Hervores." Eleven days after the rain had stopped Louise and Joseph returned to the Infiernillo portion of the system. "The Main Sump had dropped 24 meters since our first visit six days earlier. Camp I formed the shores of the Main Sump. The sounds of the cave were still present, but quieter, and most of the front portion of Infiernillo had dried out, leaving no evidence of the very recent flood."

Two weeks later Louise made a trip to The Canal, at the end of the Rio Verde in Brinco. "We discovered that The Canal had flooded to the ceiling since my trip the previous month. Sistema Purificación had definitely been sumped-off at both ends. This cave, and probably many other caves in México, are much more dangerous in early winter than commonly thought. They deserve our respect as well as our curiosity."

Following is a list of the people who participated in the above mentioned projects: Jerry Atkinson, Sheila Balsdon, Don Broussard, Leslie Clarfield, Ruff Daniels, Frank Endress, Paul Fambro, David Honea, Jocie Hooper, Jeff Horowitz, Louise Hose, Peter Keys, Joseph Lieberz, David McKenzie, Martha Meacham, Dale Pate, Peter Quick, James Reddell, Steve Robertson, Elizabeth Ross, Randy Rumer, William Russell, Mark Shumate, Peter Sprouse, Peter Strickland, Terri Treacy, and Lisa Wilk.

In December 1979, Don Antonio Grimaldo Camero died at his home in Puerto Purificación at the age of 81. Don Antonio was a great friend of cavers in the area. He had spent most of his years in the sierras, except for a period during the revolución. His home was always open to travellers in the mountains, and many cavers sheltered there over the years. Don Antonio had a great knowledge of the caves of the area. He guided Charles Fromén and others to the entrance of Cueva de Infiernillo in 1976. He had complete confidence that Brinco and Infiernillo would be connected, as they were in 1978. Don Antonio's departure leaves a great void in the sierras.

PSS

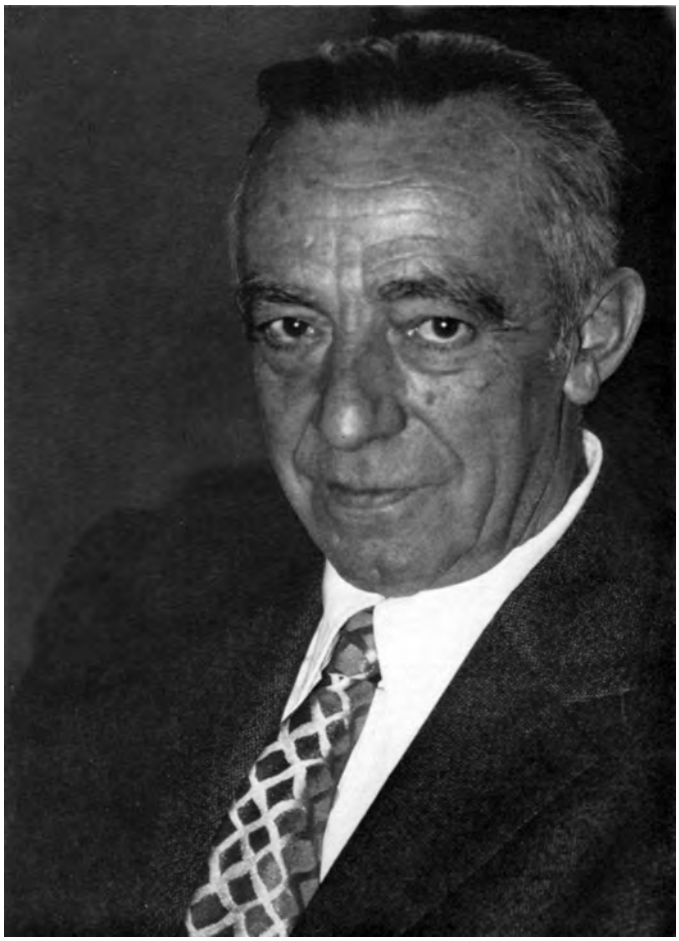
Don Antonio Grimaldo. (Terri Treacy)

Purificación

Debido a los esfuerzos de los espeleólogos del Proyecto Espeleológico Purificación, el Sistema Purificación ha alcanzado una longitud de 36,795 metros y una profundidad de 895 metros. La conexión del Sumidero de Oyamel añadió 2.5 kilometros al sistema (vea el artículo en este boletín). Un pasaje cerca de la área de la conexión, el Dragon River (Río Dragón), rendió dos kilometros adicionales. La sección aguas abajo del World Beyond (Mundo Mas Allá) fue levantado mil metros sobre subidas, tiros, y canales a un sifón en el nivel de -683 metros. Otro chorro, el Río Valkyrie, fue mapeado aguas arriba a un sifón, y trescientos metros aguas abajo. En la porción baja del sistema, la Cueva de Infiernillo, mas de dos kilómetros fueron levantados en los Confusion Tubes (Tubos de Confusión) un laberinto único con niveles multiples de pasajes tubolares.

Otras cuevas en la región que fueron levantados son: Sótano de la Cuchilla--más de un kilómeter de longitud y 177 metros de profundidad. Sótano de Las Calenturas--5 kilometros de longitud y 120 metros de profundidad. Cueva del Tecolote--1341 metros de longitud, 106 metros de profundidad. El Hundido--un hoyo grande que fue descendidad y el piso fue examinado pero ningún pasaje fue encontrado.

Louise Hose, una geóloga estudiando el sistema tuvo la experiencia singular de observar Sistema Purificación durante una indunación en diciembre, 1979. En un período de cincuenta horas, 19 centimetros de lluvia fueron medidos. Chorros en Cueva del Brinco que previamente estaban secos tenían corrientes de 10 a 20 litros de aguas por segundo durante la inundación. Los sifones de Infiernillo subieron 64 metros arriba de su nivel normal. Indicaciones de inundaciones fueron observadas desde el Nile River, a 4 kilómetros de la entrada de Cueva de Infiernillo. También se observó que El Canal, 180 metros bajo la entrada de Brinco se había sifoneado. Louise advierte que esta cueva, y quizá otras en México, se inundan más frecuentemente en el invierno de lo que previamente se pensaba.



Federico Bonet Marco

1906 - 1980

Federico Bonet Marco was born on October 18, 1906, in Madrid, Spain. He received his Doctor of Science degree from the Universidad Central in Madrid in 1931, becoming Professor of Zoology at the Escuela Veterinaria, Universidad de Madrid in 1932. He remained in this position until he emigrated to México in 1939. In 1940 he became head of the Department of Zoology of the Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional in México City. During the latter part of his career, he held a position as a stratigraphic geologist for Petróleos Mexicanos. He died in México City on June 10, 1980.

Dr. Bonet, like other biospeleologists from Spain (including Dr. Cándido Bolívar y Pieltain), brought to México an expertise and enthusiasm for cave biology not known there at that time. Already having published several papers on the Collembola (springtails) of Spain, he immediately began an active program of collection and study of the then virtually unknown cave and endogean fauna of México. His collecting forays, frequently in company with Bolívar y Pieltain, took him throughout much of the country. Until the work of the Association for Mexican Cave Studies in the early 1960's, virtually everything known about the cave fauna of México was the direct result of the work of Dr. Bonet and his collegues. Although he published several major papers on the Collembola of México, which included many troglobitic and troglophilic species, his major contribution to Mexican cave biology was certainly his pioneering collections.

Bonet's studies on Mexican caves were not restricted to biology, however, and he published three important reports on the caves of different regions in México. A deep knowledge of stratigraphic geology assisted him greatly in his speleological work. The first of his reports on Mexican cave areas was published in 1953 and covered the caves of the Sierra de El Abra. In the same year he published a volume on the caves of the Xilitla region, which included maps, careful descriptions, and meteorological and biological data. It remains an outstanding report and was certainly as good as anything being done in North America at the time. His final major contribution to physical speleology was a detailed study of the caves of the Cacahuamilpa region in Guerrero and adjacent México. This study, richly provided with maps and photographs, is an outstanding contribution to our knowledge of the caves of México.

A final word should be said about his other work of great value to the study of Mexican speleology. In addition to many highly technical reports on the geology of the Sierra Madre Oriental and other areas, he published several papers on the general stratigraphy of the Sierra Madre Oriental. In particular, his guides to the geology of the Inter-American Highway between Ciudad Victoria and Tamazunchale, prepared for the 20th International Congress of Geology in México in 1956, are of great value for an understanding of the geology and karst hydrology of this area. In 1963 a paper with Dr. Jacques Butterlin defined the major geologic formations of the Yucatan Peninsula; also included was a geologic map which remains the best available map for the Peninsula.

The death of Dr. Bonet marks the end of the first era of the study of Mexican speleology. His contributions, both geological and biological, to the study of México and its caves will remain for many years models to follow.

James Reddell

Photo by: Robert Mitchell

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Federico Bonet Marco

El Dr. Federico Bonet M. murió en la Ciudad de México el 10 de Junio, 1980. El Dr. Bonet fué un pionero en la recolección de fauna de las cavernas de México. Sus contribuciones geológicas y biológicas al estudio de México y sus cuevas permanecerán como ejemplos admirables.

Golondrinas... ¡otra vez!

On the last day of December, 1978 Beth Dayton, Bob Lloyd, Katherine McClure, Russell Hill and I rappelled into Sótano de las Golondrinas. The objective of our trip was to finish checking leads in the Crevice in order to finish the map which John Bassett and Neal Morris began in 1969. Although we were camped 350 meters below the surface for three days, we were able to maintain communications, via C.B. radio, with the topside crew of Cynthia Van Hoosen, Ken Smith, and Mike Mooney.

After reaching the bottom of the drop on the first day, we rigged the first two pitches past the awkward chimney/crawl areas at the top of the Crevice. The second day was spent checking the rest of the Crevice for passages possibly missed on the previous surveys. The goal was to find a way past the mud plug where Golondrinas now ends at -512 meters. Air could be felt blowing strongly through the constricted area at the top of the Crevice, but since the passage bellows out into comfortable dimensions below the constriction,no one has been able to trace the airflow to any particular side passage.

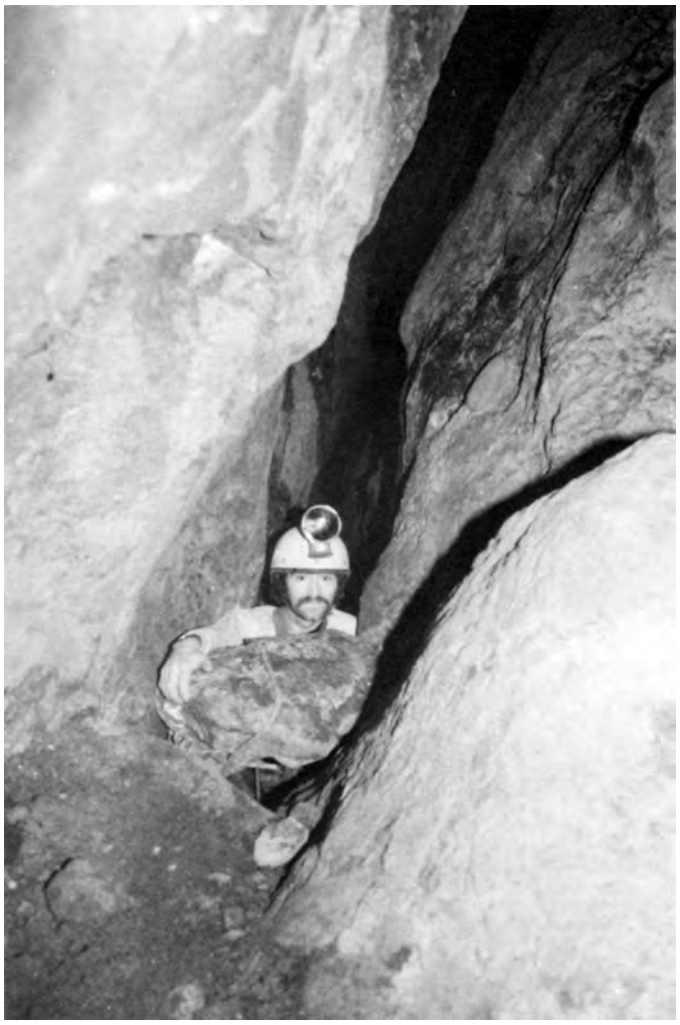
In my avocational opinion, the Crevice is a series of fractures secondary in solutional importance to the fracture which formed the entrance chamber. The east end of this series of fractures was solutioned into the large offset dome-pits through which a caver rappels. The west end had less vadose water in it and retained its parallel-walled crack appearance. In this narrower west end, there are two major horizontal side passages, one 24 meters above the other and parallel to the vertical "trunk" crack. The passages intersect it at both of their ends. There was possibly very little phreatic development in these small side passages, just vadose enlargement and wall collapse. The west section of the Crevice has breakdown wedged between the walls which comprises suspended floors sometimes cemented together with flowstone, but occasionally held in place with only a wedging action. A thin layer of mud has coated the rocks in sections of the upper half; whereas in the bottom half of the Crevice,thick mud covers everything.

Although no new passages were found, while Russell was prusiking up the 43 meter Grieta pitch he discovered rocks falling past. I had prusiked up the pitch before he did and chimneyed with Beth to the extreme west side to check a lead in the half-meter wide, breakdown choked crack. No airflow could be detected through the breakdown, thus, we decided it wasn't worth chimneying further down through the precarious boulders. Apparently the rocks I tossed down the crack came out somewhere above Russell, so I assumed the crack did too.

Our base camp on the floor of the entrance chamber was spread out on a flat clay-feces area in the low end of the six acre floor. Water was a fifteen minute walk up the breakdown floor to a seep in the wall above some black flowstone, but the entrance to the Crevice was only a couple minutes from our sleeping bags. Katherine found a swallow with a slight wing injury. Her new friend perched on her shoulder for two days listening to Katherine play her flute. Three mouse-sized rodents were observed scurrying over various areas of the floor. Perhaps they can live off the young coffee bean seedlings sprouting over much of the sunlit bottom, but how did they get there in the first place?

On the third day, the surface crew told us of hail falling on their heads and of hot coffee the local coffee grower had supplied. We had noticed a cold breeze flowing down the breakdown slope and across base camp. Everyone had already put

(Paul Fambro)



Bob Lloyd in the top of the Crevice. (Don Broussard)

on extra shirts and were glad to be on the bottom. The surface crew had ice crystals growing on their mustaches. By the time everyone on the cold surface had waited for the last caver to prusik to the top they welcomed the activity of pulling out 50 kilos of rope.

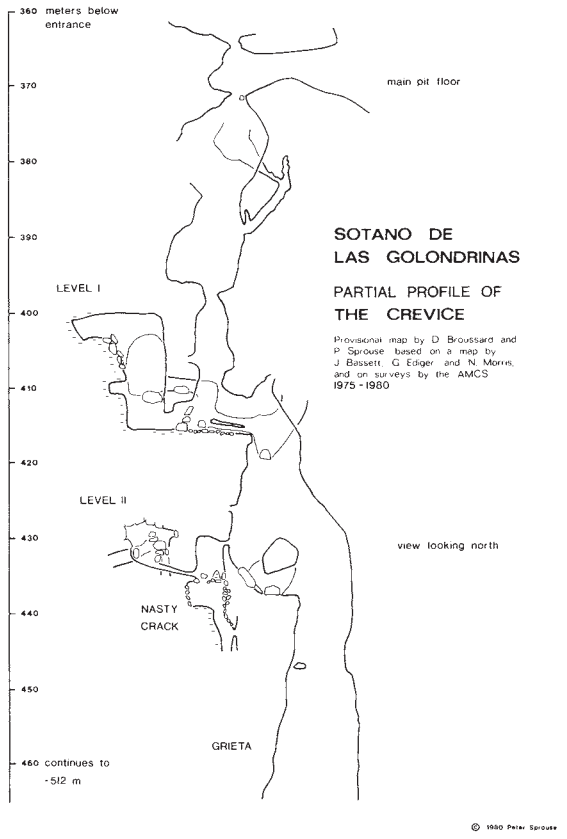
Return to the Crevice

Over a year later, in March of 1980, I returned to check out the Crevice once again. The rocks bouncing down past Russell Hill in '79 meant that there was still some cave I hadn't pushed yet.

Sheila Balsdon, David Honea, and I rappelled in the first night we arrived. I was first on rope. It was rather eerie rappelling for 45 minutes in total darkness and not knowing for sure that the rope even reached the bottom until I was on the bottom! The night was spent to the accompaniment of the birds twittering incessantly.

The next morning Peter Sprouse came down to sketch in the entrance chamber, while Randy Rumer and Peter Quick came down to help Sheila, David, and I rig the Crevice. We stopped at the top of the Grieta pitch because at this level is the nasty crack where I had stopped last year, and where we began surveying this year. The crack was easily climbable to a hole in the floor which dropped 3 meters to a steeply sloping shelf looking out into a shaft. We thought at first this was the 43 meter Grieta pitch, but it may not be. On the way out, at the room where the nasty crack began, we stopped at a lead which I had seen before, but not mapped. The 4 meter long, but low, passage turned 90° into a large breakdown maze. We mapped a few stations into the maze and called it quits. It had been a long day of Crevice pushing. As I squatted on top of a boulder trying to make sense out of my survey notes, Randy crawled up, Peter Q. wiggled away, and David scrambled off somewhere else. The three came back raving about rooms big enough to stand in, formations, and enough passage descriptions to convince me that it really does go. We left the maze for a future mapping trip. The Crevice still goes!

MAP
next page

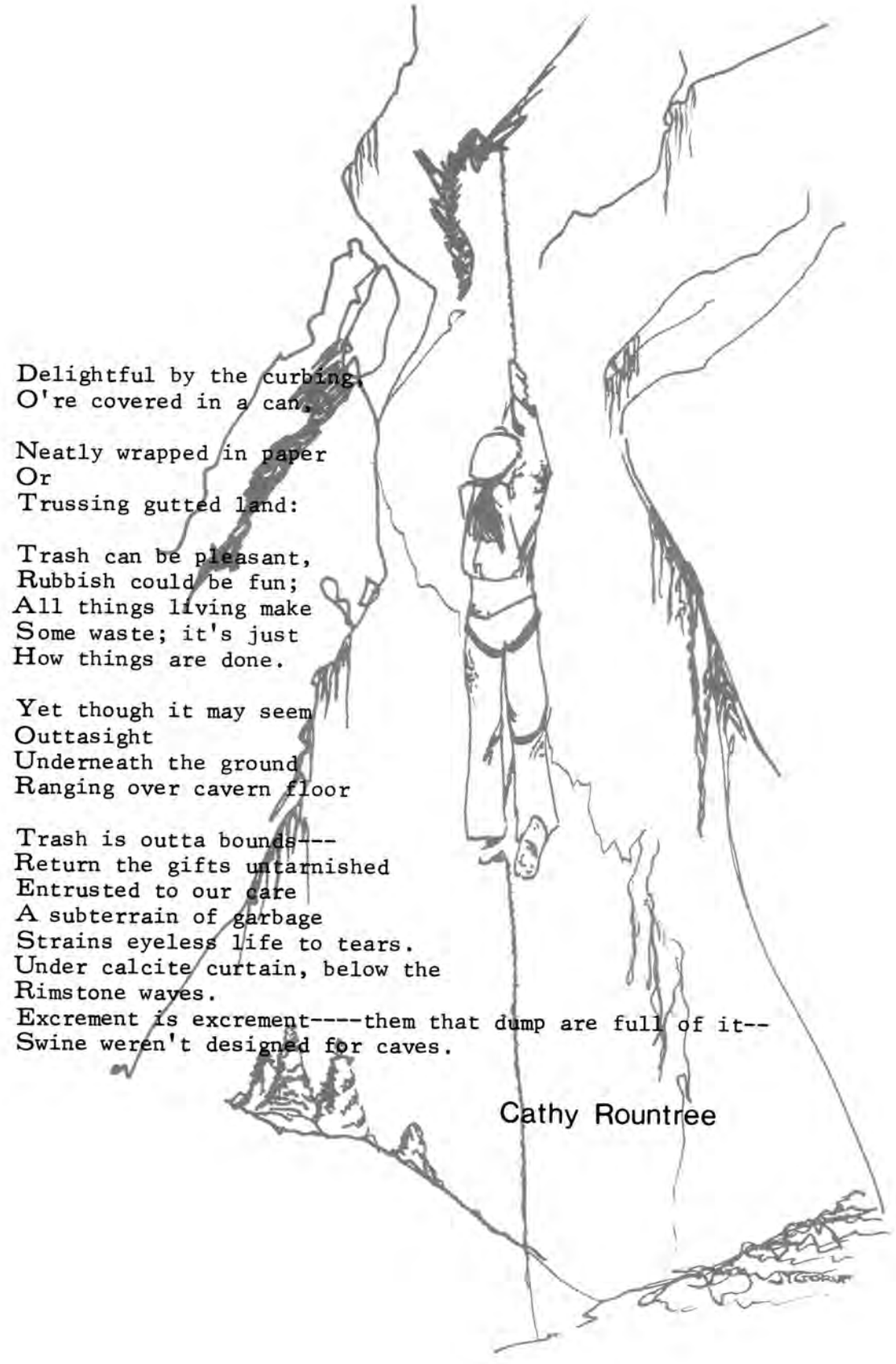


Editors' Note: On the March 1980 trip to Sótano de las Golondrinas, an enormous quantity of garbage was found on the floor of the pit. All of the trash, which included an assortment of batteries, boots, cans, cooking pots, plastic, and paper was packaged into three large bags and hauled out of the pit. Many thanks go to the crew for hauling the garbage out. Please cavers, take all of your belongings and trash with you when you leave a cave. And should you have the misfortune of encountering trash which others have left previously, please do your share in helping to clean up.

Golondrinas

Debajo de la inmensa entrada del Sótano de las Golondrinas, La Grieta se extiende hasta los -512 metros y allí termina en lodo. Una corriente de aire en la entrada de la fisura he causado que various grupos traten del hallar una manera diferente de segiur adelante. Los útimos dos esfuerzos de espeleólogos texanos conducieron a una fisura que circula hácia otras y continua metiendose a ambos la fisura principal y un laberinto de cantos rodados. Este laberinto está parcialmente explorado y levantado. Esta área puede ser extensiva, pero mas exploración t topografía será necesaria para averiguarla.

El Grupo encontró mucha basura de otros visitantes. Limpiaron el sótano completamente, y esperan que pueden conservirlo muy limpio en el futuro.



Delightful by the curbing,
O're covered in a can,

Neatly wrapped in paper
Or
Trussing gutted land:

Trash can be pleasant,
Rubbish could be fun;
All things living make
Some waste; it's just
How things are done.

Yet though it may seem
Outtasight
Underneath the ground
Ranging over cavern floor

Trash is outta bounds---
Return the gifts untarnished
Entrusted to our care
A subterrain of garbage
Strains eyeless life to tears.
Under calcite curtain, below the
Rimstone waves.
Excrement is excrement----them that dump are full of it--
Swine weren't designed for caves.

Cathy Rountree

Recent Biological Discoveries in Mexican Caves

James Reddell

In the Tenth Anniversary issue of the Association for Mexican Cave Studies Newsletter (vol. 4, no. 1, 1973), I prepared a summary of the biological work of the AMCS during its ten years of existence. At that time, 145 species, including 64 troglobites, had been described on the basis of collections made by members of the AMCS. In the eight years since that report was written, work on the biological collections of the AMCS had continued unabated. An additional 168 species, including 86 troglobites, have now been added to the Mexican cave fauna as a result of the collecting efforts of AMCS cavers. A large part of the material obtained during the last 18 years remains unstudied, particularly that material collected in the Purificación, Huautla de Jiménez, and Cuetzalan regions. The purpose of this brief report is to summarize work in these and a few other areas. Most of the species collected during the last few years remain undescribed, but many will be published in a forthcoming biological bulletin of the AMCS.

Purificación Area, Tamaulipas: The first collections to be made in this area were by Roy Jameson and David McKenzie in 1973. This early reconnaissance trip resulted in the discovery of several of the more notable species known from this region, but by far the most exciting finds were not to be made until the Proyecto Espeleológico Purificación got well under way. The only troglobite described from the area is a blind leiodid beetle, Ptomaphagus (Adelops) mckenziei Peck, from Cueva de California and Cueva del Brinco. This is only the second known troglobite in this family in México, the other being known from the Sierra de Guatemala.

Other exciting species of terrestrial troglobites known from this area include a new genus and species of chactid scorpion (now known from three caves), three new species of eyeless pseudoscorpion, a blind tarantulo, blind harvestmen of the genus Hoplobunus, the most highly cave adapted centiped in México (a new species of the scolopendrid genus Newportia), blind millipeds belonging to several families but still largely unstudied, and three species of eyeless trechine beetle of the genus Mexaphaenops. This last find is particularly notable in that nowhere else in México do more than two species of trechine beetle occur in a single area (and then they belong to very different genera). Furthermore, there are only four other species of the genus known; thus, almost half of the known species of the genus occur in the limited confines of the Purificación area.

Another remarkable aspect of the cave fauna of the region is the presence in it of four species of troglobitic aquatic isopod. Undescribed species of the delicate, elongate isopods of the genera Mexistenasellus and Caecidotea occur in the sump lakes in Cueva del Infiernillo. A new species of Speocirolana is known only from Sótano de las Calenturas, where it is fairly abundant in the deeper lakes in that cave. Species of Mexistenasellus are know from caves and springs in Coahuila, Nuevo León, San Luis Potosí, and Veracruz. The nearest records of Caecidotea are in Texas to the north and Veracruz to the south.

Speocirolana is a widespread genus ranging from Coahuila south to Puebla in the Sierra Madre Oriental. The most spectacular discovery in the area, however, was a species of marine-derived isopod of the suborder Valvifera. There are no records of this suborder from caves in the New World and only one or two doubtful records of its occurrence in freshwater. Its presence in the stream in the World Beyond in Sistema Purificación is amazing.

Cuetzalan Area, Puebla: Although some collections were made in this area in 1973 and 1976, little of this material has been studied. The only troglobite described from the area is the spirobollelid milliped Reddellobus troglobius Causey. This is the only New World troglobite in the order Spirobolida and is a good indication of the unique fauna of this region. Among the more unusual animals known from the region are several species of blind spider (including a blind tarantula), glomerid millipeds (commonly referred to as pill millipeds because they roll into a tight ball much like pillbugs, with which they can be easily mistaken), a possibly troglobitic scorpion of the genus Vaejovis, and a troglobitic beetle of the genus Mexisphodrus. Recent finds have included a new species of troglophilic crayfish of the genus Procambarus, subgenus Villalobosus. This brings to three the number of crayfish known from the caves of the area, more than in any other part of México.

San Pablo Zoquitlán Area, Puebla: Few collections have been made in this interesting karst region, but these give promise of many exciting things to follow. Included in the fauna is a new genus and species of snail belonging to the family Charopidae and a completely eyeless spider of the genus Nesticus (only the second species in México to totally lack eyes.

Huautla de Jiménez Area, Oaxaca: A few collections were made in this area as early as 1966, and troglobitic millipeds, collembola, and carabid beetles have been described. The most notable finds, however, have been made during the recent expeditions to La Grieta, Sótano de San Agustín, and other caves. One discovery stands out more than any other: the largest and most highly cave adapted scorpion known from caves in the world. This amazing new genus and species was found first by Roy Jameson and Patty Mothes in Cueva del Escorpión. It has more recently been collected at depths up to 820 meters in Sótano de San Agustín, La Grieta, and Li Nita. Study has shown that its closest relatives are the small troglobitic and endogean species of the genus Typhlochactas. Other notable finds in the Huautla region include the first completely eyeless tarantula in the world, one specimen of which was found in La Grieta.

Xilitla Plateau Area, San Luis Potosí and Querétaro: A few small collections were first made in this area in the late 1960s. Recent collections have included specimens of blind planarian, a completely eyeless diplurid spider, a new record for the troglobitic tarantula Schizopelma stygia (Gertsch) (previously known only from caves near Ahuacatlán), and new species of blind millipeds and harvestmen. Most of these collections remain unstudied.

Aquismón Area, San Luis Potosí: A few recent collections have been made by Peter Sprouse, Terri Treacy, and others in the area, but all remain unstudied. The most important find since the initial collections in the 1960s was of an eyeless crayfish of the genus Procambarus from the sump pool in Hoya de las Guaguas. This species, collected by Andy Grubbs, is the only troglobitic crayfish in México north of Oaxaca and Veracruz and possibly belongs to a subgenus (Scapulicambarus) not previously known to have cave representatives.

The significance of this discovery is that the deep base-level waters of more northern México may harbor a very distinctive fauna.

Potrero Redondo Area, Nuevo León: Recent collections were made in this poorly known area by William Elliott in May 1980. The only material identified from his collections are the carabid beetles. Surprisingly, a series of small eyeless beetles proved not to be trechines but instead were representative of a new blind species of Rhadine. The only other record of blind Rhadine from México is from Cuesta de Chipinque, Nuevo León, collected in 1969 by Stewart Peck and lost until a few weeks before Elliott's specimens were identified. These two species are most closely related to Rhadine persephone Barr from Tooth Cave, Travis County, Texas. This indicates that the northern end of the Sierra Madre Oriental, sorely neglected by cavers, is potentially of great interest.

The most interesting thing about all of the recent biological work in México, most of it quite incidental to other goals (such as mapping record setting, and basic reconnaissance), is that we still know appallingly little about the biology of México's underground. The recent collections in Mexican caves, in areas reasonably well known now, still produce startling finds. Only in the most intensively studied regions (Sierra de Guatemala, Yucatán Peninsula, Sierra de El Abra) do we have any hope that we have found the majority of the species present. And even here we cannot be all that sure. As an example, two recent collections made in Sótano del Arroyo and Sótano de la Tinaja, two of the best studied caves in México, produced interesting specimens: in one, a new record for the rare troglobitic mysid, Spelaeomysis quinterensis (Villalobos), and in the other a new species of troglobitic pseudoscorpion. These two casual collections point up vividly the need for collecting by any caver willing to stick a small bottle of alcohol in his pocket and take a few minutes to turn over rocks or look in a pool.
(Editors' Note: All biological collections must be labeled with the following information: 1) Name of cave and its location, including the state. 2) Name of person(s) who collected. 3) Date collected. Print this information with a pencil (ink will smear in alcohol) on a small piece of paper and put the paper in the bottle. Send the collection to the AMCS, P.O. Box 7672, Austin, Texas 78712.

Resumen de Biospeleología Mexicana

Un resumen de las colecciones biológicas del AMCS de 1963 a 1973 se publicó en el AMCS Newsletter, Vol. 4, No. 1, 1973. En aquel entonces, se habían descrito 145 especies, incluyendo a 64 troglobios. Durante los 8 años subsiguientes, otros 168 especies adicionales, incluyendo 86 troglobios se han añadido a la fauna subterranea de México. Este artículo es un resumen del trabajo que se há realizado en varias regiones de México desde 1973.

The Piloztoc Connection

Bill Liebman

On Christmas evening, 1978, in Cuetzalan plans were made to investigate a 4.1 second virgin pit in Cueva Piloztoc. The cave was found in late 1977 by Peter Lord who explored it a short way to a 3 meter drop. In the late Spring of 1978 Peter, Rick Rigg, and others continued the exploration and mapping to 300 meters where they encountered the deep pit and they timed rockfalls at 4.1 seconds. Low on gear and time, the pit was left to go unchallenged until the next season. Cueva Piloztoc is perched high along and at the opposite end of the valley from Sima Zoquiapan. A connection seemed inevitable.

December 16 found Rick Rigg (ID), Will Howie (MS), Jim Eyre (England), Gareth Davies (England), Alejandro Villagomez (México), and myself (CA) getting the usual late morning early start. With visions of uncertain depth and a possible connection to Sima Zoquiapan a kilometer away, we loaded ourselves down with gear and ropes. Cueva Piloztoc is located in a large sink, a kilometer long, 500 meters wide and nearly 200 meters deep. Lying to the north, at the opposite end of the sink is the 62 meter entrance shaft to Sima Zoquiapan.

A relatively small stream entered the somewhat hidden entrance to Cueva Piloztoc. The entrance is small by Cuetzalan standards. You can stand up inside, but that's about all. The passage is 2 meters high and averages 2 meters wide. It took about 30 minutes for us to scramble down the first few hundred meters of cave to the lip of the pit. The upper portion of cave is mostly walking passage with a few areas where you have to stoop. The passage is eroded out of a thinly interbedded shale seam that is black in color with dark gray-black limestone. The shale seam cross section exposed in the wall of the passage is very contorted with individual layers broken and discontinuous. Many kink folds are visible among the contortions displayed in the walls of the passage. This explains the ease with which the passage formed where it is. Unlike the walls, which you can pull pieces of broken rock out of, the ceiling is of good gray-black limestone. This upper section of cave exhibits signs of frequent flooding in the form of stringers of clothing and debris hanging off of protrusions in the walls. Considering the frequent flooding and the ease of erosion of the shale out of the country rock, it is not surprising that this section of cave is devoid of formations.

Upon reaching the pit, a few rocks were tossed to stimulate our senses, and then we began the task of rigging. Looking across the pit, you can't help but notice that the shale seam does not continue in the far limestone wall. The pit is formed on the plane of a vertical fault. The lip of the pit serves as a launching point for the debris pile and over an hour was spent cleaning loose material away from the edge. Finally the rope was lowered into the pit, and we all made the descent. The bottom of the pit was unimpresseive. In fact, it was down-right disappointing. It was triangular in shape, about 4 meters on a side. Not too big for a 4.1 second drop. There were 3 leads off the bottom, all of them crawlways.

We crawled off down the largest of the leads, a hands and knees crawl that takes the main flow of the stream with a little airflow. After about 10 meters we got to a

1-1/2 meter waterfall and more crawling. We crawled and periodically stooped on down the passage for well over an hour. Due to the logistics of six people in crawling passage, we were moving very slow. This however, gave one the opportunity to take in the features of the cave. This portion of the cave was in limestone, unlike the upper portion of the cave that is a shale seam. The passage is very low and very narrow. The average height of the passage is 1.5 meters and width about a half meter on the floor, becoming narrower towards the nearby ceiling. The passage evidently has eroded down to the present floor which is a very resistant basal conglomerate, typical of most caves in the area. Not being able to penetrate this resistant unit, the passage has eroded sideways, forming an upside down "T" shape. Many bends and half meter waterfalls and cascades constitute the continuation of the passage. Interesting soda straws were seen in various places, including some which stair-stepped downwind in helictite fashion. Many chert lenses were present in the walls of the muddy brown colored limestone.

Finally, word came back that we had entered a borehole up ahead! This passage immediately split, going two directions. To our right, about 60 meters away, we could see daylight. Wandering over to the light, we found a large lake at the bottom of a beautiful sunlit shaft; a deep one. Although none of us had visited Sima Zoquiapan, we assumed that we had made our connection. Everybody was rather burned out from having crawled at least a half kilometer and knowing we had to return through that nasty stuff. We discussed the merits of getting this new section mapped and getting the heck out. Nobody really felt like mapping, but we all knew the rule: Map what you scoop! So we broke into two survey teams, and leapfrogged back through the crawl to the pit.

At the bottom of the pit some fossils were preserved in the limestone. I did not view them, but their description matches the cretaceous pelecypods and cephlapods I have encountered in nearby Cueva La Providencia. The climb out of the pit was interesting. The limestone is a muddy brown color with a high concentration of lensoidal chert interbeds. As you ascend the pit, the concentration and the thickness of the chert layers reduces drastically. The chert is much more resistant than the limestone and weathers out as ledges, sometimes up to 3 or 4 inches wide protruding from the wall. As you climb, the far wall overhangs the pit, and for a short way you are virtually against the wall. The wall recedes again and it is once more free the last 20 feet to the lip.

After everybody was up top we got the measurement of the pit... it was 226 feet deep. We exited the cave at midnight, having spent 12 hours underground. It was drizzling outside and a might chilly. We warmed up with some hot Boon Stew upon our return, mellowed out, and got some much earned sleep. The Sewer was bigger!

Cueva Piloztoc

Este artículo describe la Cueva Piloztoc en Cuetzalan, Puebla, y su conexión con Sima Zoquiapan en diciembre 1978. Las dos cuevas quedan en extremidades opuestas de una dolina que tiene un kilómetro de longitud y 200 metros de profundidad.

Unstudied Karst Areas of México

Peter Sprouse

Despite the intensive exploration over the last two decades, the caves and karst of México remain poorly known. Many significant karst areas have not been visited. This article will describe some, but by no means all, of the karsts (limestone, gypsum, and lava), that are largely uninvestigated and likely to be fruitful for cave exploration. These areas represent large voids in our knowledge of the caves of México. The descriptions here are made in the hope that groups investigating these cave areas will send in reports to the AMCS. The following list will generally describe areas rather than specific leads, as was the case in an article by William Russell in Inside Earth No. 1, (Russell, 1972). Many of the leads listed in that article remain unchecked.

Areas are grouped by state and, if available, the Detenal 1:50,000 topographic map is listed in parentheses. These maps were used to describe most of these areas, and should be considered essential for field use. The UTM coordinate grid on these maps provides a good method for recording cave locations. I have listed high and low elevations for local areas, although these should not necessarily be interpreted as the vertical potential, which can be affected by any number of geological and geographical factors.

Chihuahua

RIO BRAVO RANGES (covered by several topo maps). A string of isolated limestone ridges extends northwest from Ojinaga along the Texas border. Only a few caves are known in this large (5000 km^2) area.

Coahuila

SIERRA LA GAVIA (G14A83 Reata). A desert limestone ridge with two caves, "Cueva (Guano), Cueva Prieta", shown at 1300 meters elevation.

LOS LIRIOS (G14C35 San Antonio de las Alazanas). Near the town of Los Lirios are several high limestone ridges with good cave potential. Peaks at 3700 meters, base level at 2000 meters.

HUACHICHIL (G14C44 Huachichil) Coahuila and Nuevo León. Three ridges up to 3000 meters near Huachichil. Cave indicative features are shown on the topo: "Cerro la Cueva, Cañada la Cueva, Cerro las Cuevas."

Guerrero

PLAZA DE GALLOS (E14A67 Pilcayos). Plaza de Gallos is located on a limestone ridge 15 kilometers west of Taxco on the road to Ixcateopan de Cuautemoc. The map shows several dolinas at elevations up to 2400 meters, with nearby base levels at 1400 meters.

TLAMACAZAPA (E14A68 Taxco, E14 A78 Iguala). A 2200 meter high uvala karst plateau containing the village of Tlamacazapa, base level 1200 meters. Located 10 kilometers east southeast of Taxco, and 15 kilometers south of Dos Bocas. Good cave potential.

HIDALGO HIGHLANDS. A large, high (2000+ meters) area along the Inter-American highway between Tamazunchale and Actopan. Some caves are known, but many parts of the area remain uninvestigated. Grutas de Xofafi, an unmapped, but well-known cave northeast of Lagunilla, is a complex descending cave that is rumored to be quite deep.

HIDALGO LOWLANDS. The eastern flank of the Hidalgo highlands. This area undoubtedly contains large caves as does the adjacent Cuetzalan to the east. Northeast of Ixmiquilpan is another well-known, but unmapped cave, The Grutas de Tonoltongo - a hot water resurgence cave. The nearby Laguna de Meztitlán is rumored to mysteriously drain at times. A large river is reported to go underground east of Grutas de Xofafi.

México

MONTE GRANDE AREA (E14A58 Tenancingo). A karst plateau 10 kilometers southwest of the religious shrine of Chalma. Elevation 2300 meters, base 1500 meters.

SIERRA LA GOLETA (E14A66 Amatepec). A wide range, elevation 2200 meters, with several caves marked on the map: "Caverna Pedro Ascencio, Cavernas Leona Vicario, La Cueva (three of these)." Located 50 kilometers northwest of Iguala.

Nayarit

LA CUEVA (F13B81 San Pedro Ixtacan). Two features called "La Cueva" and "La Cueva Prieta" at 1400 meters, base level 500 meters, possibly in volcanics. Located in a remote area 30 kilometers east northeast of El Venado.

Nuevo León

SIERRA EL AZUL (f14A35 Sierra el Azul). Nuevo León and San Luis Potosí. A 2500 meter high, 1400 meter base level range with a "Cueva de los Riscos" marked on the map. Located 30 kilometers southeast of Matehuala.

POTRERO LAS HOYAS (F14A36 Mier y Noriega). A 2000 meter high range with cave indicative localities: "Cañon la Cueva Caida, Cañon las Cuevas, Arroyo Cueva Urbana, Picacho el Socavón." Base around 1400 meters. Located 15 kilometers southwest of Mier y Noriega.

CANON DE HUASTECA (G14C25 Garza García). A series of highly folded limestone ridges with good cave potential, stretching west to Saltillo and beyond. High elevations 2000 meters, base 900 meters. Several caves known.

LA VENTANA AREA (G14C46 Rayones). A high limestone area, 2700 meters, with a large "window" 100 meters wide near the top of a ridge. This entrance, La Ventana, apparently opens in the bottom of a large pit. Cavers have not reached it. Base level in the area is around 1100 meters.

GALEANA AREA (G14C56 Galeana). A 2500 meter high gypsum karst plateau lies 10 kilometers southwest of Galeana and 6 kilometers southwest of Pozo de Gavilan. Base level may be around 1800 meters, level of the Galeana plain. Good potential for deep gypsum caves.

LA POZA (G14C66 San Jose de Raices). A gypsum karst area 15 kilometers north of Pabillo, at an elevation of 1800 meters. Two features marked on map are "Dolina" and "Resumidero."

LAGUNA SANTA ROSA (G14C67 Iturbide). A 5 km^2 polje sits at an elevation of 1500 meters, whose water probably resurges to the northeast at a wet weather resur-

gence on the road from Linares to Iturbide, elevation 600 meters. Limestone peaks in between rise up to 2400 meters.

San Luis Potosí

SIERRA LA TRINIDAD (F14A65 Guadalcazar). A gypsum karst ridge. 6 kilometers northwest of the town of Guadalcazar. Elevation 2100 meters, base 1800 meters.

SIERRA EL PINAL (F14A68 Salto del Agua). A massive limestone karst ridge, 1800 meters with several parallel karst ridges. Base level 700 meters, 20 kilometers northeast of Cd. del Maiz.

PAPAGAYOS (F14A78 Cd. del Maiz). Four hundred square kilometers of closed drainage, tropical karst. A series of north-south ridges with large uvalas and several poljes. High points at 1800 meters, base level at 500 meters. This area is south of Highway 80 between Antiguo Morelos and Cd. del Maiz. Few caves are known.

SIERRA TREJO (F14A85 Santa Catarina). A ridge 6 kilometers northeast of Santa Catarina with a cluster of deep dolinas or pits on its western slope. Elevation 1600 meters, base level at 1200 meters.

LLANO EL RESUMIDERO (F14A87 San Francisco). A gypsum plain, elevation 1000 meters, with sinking streams. Six kilometers southeast. of San Francisco.

LAGUNA GRANDE (F14A88 Alaquines). Six hundred plus square kilometers of closed drainage, tropical karst. A southern continuation of the Papagayos karst. Contains a 4 km^2 polje, Laguna Grande. Located north of Highway 70 between Cd. Valles and Río Verde. A few caves are known, but the area is mostly unexplored and very promising.

MICOS (F14A89 Damian Carmona). A 700 meter high karst ridge cut through by the Río Valles at Micos. Base level 100 meters. Few caves are known in this highly karsted range.

Tamaulipas

MESA LA LIBERTAD (F14A48 Llano de Azuas). An extensive, 2000 meter high limestone karst ridge flanked by two parallel ridges. Base level 800 meters. Good cave potential.

LAGUNA LA ESCONDIDA (F14A58 Ocampo). A wide limestone karst ridge at 1400 meters. Base level is probably at 400 meters in the Malpais Lavafield, although this also has underground drainage. The ridge contains several poljes, including Laguna la Escondida. A very promising area located 20 kilometers west of Ocampo.

SIERRA DE TAMAULIPAS. A large limestone uplift southeast of Cd. Victoria. Pits and karst have been seen on top from the air. A large unmapped "drive thru" cave, Cueva de Cuarteles, is mined for phosphates northwest of Aldama, off Highway 180.

SIERRA CUCHARAS (F14A59 Loma Alta, F14A69 Quintero). The northern extension of the highly cavernous Sierra de El Abra, this 35 kilometer long ridge extends from the the northern El Abra pass to the Sierra de Guatemala. Elevation 400 meters, base level 100 meters. Several springs emerge at the base of the range including the large Nacimiento del Río Mante (see Exley, 1979). A few large caves are known in the southern section. In a rumored pit above Quintero, rocks bounce for 12 seconds to water.

Tabasco

Northern extensions of the Chiapas ranges in Tabasco are known for their cockpit karsts (Jennings, 1971). However this promising area remains almost entirely uninvestigated.

Veracruz

COFRE DE PEROTE. A volcanic area of good lava tube potential. One tube, Cueva del Volcancillo, has been mapped to a length of 590 meters and a depth of 140 meters and may continue (Reddell and Elliott, 1974).

More information on these areas may be obtained from the AMCS and its publications. In Austin, the AMCS maintains files on the caves of México and also a collection of topographic maps. The Detenal maps may be purchased in México, D.F. at Balderas No. 71 P.B., Col. Centro, México 1, and in Monterrey at 15 de Mayo 545 Oriente, Escobedo y Zaragoza.

Reports, maps and photos are requested from all caving projects in México for AMCS publications. It is also hoped that groups caving in México will practice good cave conservation and extend utmost courtesy to landowners and local inhabitants. It is generally AMCS policy to apply local names to caves. Should a cave not have a name, then the name of a local place or nearby feature is usually given.

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Jennings, J.N.,1979, Karst, The MIT Press,p. 192.

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Regiones no estudiados del karst mexicano

Muchos regiones de karst en México no han sido visitadas por espeleólogos. Este artículo describe varias de estas áreas (de caliza, yeso, y lava) cuales son, por su mayor parte, inexploradas. Estas descripciones se presentan con esperanzas de que grupos investigando estas regiones proporcionarán informes al AMCS. Las regiones están agrupadas según el estado en que se localizan, y si es disponible, se dá el numero de la mapa topográfica DETENAL 1:50,000.

PRACTICE CAVE CONSERVATION

Caving in Western México

James Reddell

Entrance to Cueva Hundida in the Sierra de San Lorenzo. (David McKenzie)

Despite the proximity of northwestern México to western Texas, New Mexico, and Arizona the vast limestone areas of Chihuahua, Coahuila, and Durango have been seldom visited. In 1977, I wrote a summary of our knowledge of the caves of Chihuahua and Durango (AMCS News. vol. 5, nos. 2-3, pp. 84-93), in which I listed seven explored caves for Chihuahua and four for Durango. No new caves have been visited since that time. The caves of Coahuila have been a little better studied, but with the exception of Cueva del Porvenir south of Cuatro Ciénegas, no major finds have been made in the last ten years. This entire area holds considerable promise for significant caves. The limestone exposures are extensive, and there are many rumors of large caves throughout the region.

On June 6, 1980, David McKenzie, Mark Shumate, and I left Austin with the intention of checking some of the many leads in southwestern Coahuila, Durango, and Chihuahua. I was hopeful that we would find some good biological collecting caves since all of the large caves that had been previously visited contained a rich fauna. In this we were dis-

appointed, partly because of the time of year and partly because some of our better leads could not be visited this trip.

Sierra de Texas

South of Cuatro Ciénegas in the Sierra de Texas, the topographic map showed Cueva de Tabaco. We were startled to see a highway sign pointing the way down a paved road to "Cueva de Tabaco." Certain that we were on to a great start in some commercial or semi-commercial cave we soon arrived at an impressive monument. This consisted of a large platform on which had been built large stela-like pillars. On these were inscribed the names of the heroes of a battle in which Benito Juarez had saved the archives of México which had been hidden in Cueva de Tabaco. The cave itself, however, was somewhat less impressive than the monument. It consisted of a single dusty chamber about 6 meters long and 8 meters high, with only a narrow sloping fissure leading from it.

Sierra de San Lorenzo

At the town of Coyote we found an excellent guide who took us to the Sierra de San Lorenzo, where I had heard of a cave containing a lake with blind animals. Our guide proceeded to take us to six cave entrances: Cueva del Vapor, Cueva del Granjeno, Cueva del Guano, Cueva de los Indios, Cueva Hundida, and an unnamed cave. Cueva de los Indios, supposedly once a long cave, had only a short crawlway left following a collapse of the entrance. Cueva Hundida was a large sinkhole about 15 meters in diameter and 10 meters deep. This drops into a large breakdown floored room, but we did not enter. It supposedly had held Indian mummies at one time. The unnamed cave was a climbable sink leading into a single breakdown floored passage about 5 meters wide and up to 3 meters high. It ended in a breakdown choke after about 25 meters. We mapped Cueva del Vapor, which is situated at the base of the Sierra and has a large opening 10 meters wide and 5 meters high. A breakdown floored passage extends back for about 50 meters before ending in collapse. To the left of the main passage, a low crawlway extends down a short slope before it drops 3 meters into a high 200 meter long walking passage. A strong airflow throughout the cave indicates that additional passage might be found. Cueva del Granjeno is located on the opposite side of a ridge from Cueva del Vapor and is entered by a steeply sloping sinkhole into which some water runs. At the bottom of the entrance slope a narrow winding passage about 1.5 meters wide and up to 3 meters high extends for approximately 100 meters before washed-in silt makes it necessary to dig to continue. Airflow indicates that the cave may be much longer. A white scorpion, and numerous dead troglobitic millipedes indicate that the cave is of possible biological interest and it should be revisited during a wetter time of year. Cueva del Guano, once called Cueva de Agua because of a now dried-up stream in it, was entered through a rubble floored sinkhole between two limestone ridges. A scramble down this slope leads into a large breakdown floored room. After about 75 meters a mine shaft intersects the cave. Beyond the shaft the cave changes character and becomes a steeply sloping passage. The bottom side of this slope soon ends in breakdown, but it is possible to walk along the upper part of the passage for several hundred meters to where a narrow passage leads into an extension of the main passage for a hundred or more meters before apparently ending. The most notable thing about the cave was an enormous number of dead bats. These littered the floor and some still hung from the cave walls. No live bats were seen. The

presence of sick and dead bats was also noticed in Cueva del Vapor. Whether this represents poisoning from pesticides (heavily used in the Laguna District of Coahuila) or from a rabies epidemic is not known.

The caves investigated in the Sierra de San Lorenzo appear to be formed as the result of the solution of gypsum beds from the surrounding limestone. In Cueva del Vapor and Cueva del Guano, virtually no gypsum is left; only in a few places can gypsum be seen on the cave walls. Cueva del Granjeno, however, is a good intermediate example of cave development. With the exception of the entrance room, where a little limestone is exposed, the entire cave is formed in gypsum. It will be interesting to look at more caves in the Sierra de San Lorenzo to see if there are any limestone caves. Many caves were known to our guide in the immediate vicinity and others doubtless exist in the more eastern part of the range.

Torreon Area

We spent several days looking for caves in the vicinity of Torreón. A copy of the Torreón 1:250,000 topographic map had three caves marked on them. The first one, Cueva del Indio, was never reached. The second lead led us to a high fissure-like opening several hundred meters up on a cliff face. With no easy way to reach the cave, we decided to look for the third lead. Located near Presa Francisco Zarca, Cueva del Guano was found to be a short cave with a large shelter-like entrance. The cave was dry and dusty, and was of little interest.

From Presa Francisco Zarca, we drove through a short tunnel to emerge in a beautiful canyon. High cliffs with knife-edged ridges of vertical bedded limestone reminded us of Hausteca Canyon near Monterrey. Several cave entrances were spotted, but only one 10 meter long cave was checked.

Mapimi

Grutas de Mapimí is located in the Sierra del Rosario and is about 18 kilometers SSW of Mapimí. A road extends to just below the entrance, and some mining has been done near the cave. The cave itself is gated and only our official guide had a key. Just inside the entrance, an iron spiral staircase leads down the 8 meter drop to the floor of the cave. One enormous, well decorated room contains numerous formations, some of which remain intact. It was surprising to see that the cave had not been completely vandalized, although some very large formations had been sawed off. Still there remain an abundance of totem poles and other delicate formations. The cave was not mapped, but it is estimated to be several hundred meters long and up to 50 meters wide in places. A collection here included a rare eyed species of Rhadine beetle. Our guide knew of several other caves in the area, and also described a long, lower-level passage (unknown to us) in Cueva de los Riscos. (Riscos is located 6 kilometers south of Mapimí, and is described in the PEMEX Guide to Mexican Caves to be Grutas de Mapimí.)

Gomez Palacio

Near Gómez Palacio, there is a cave described in Geografia de Chihuahua as "one of the marvels of the Sierra." This cave, Grutas de Santo Domingo, is located near the village of Guadalupe y Calvo close to the border of Chihuahua and Sinaloa. We learned that a 20 to 30 kilometer hike through some rugged country is required to reach the cave. We were not prepared for such a hike, so we turned back. On route, we stopped at Cueva del Diablo near Salaices (see AMCS News. vol. 5,

no. 2-3 for description and map), to look for aquatic isopods. Rocks dropped into a previously unentered pit seemed to hit water, so I decided to check it. This pit proved to be about 15 meters deep, dead-end, and dry.

Jimenez Area

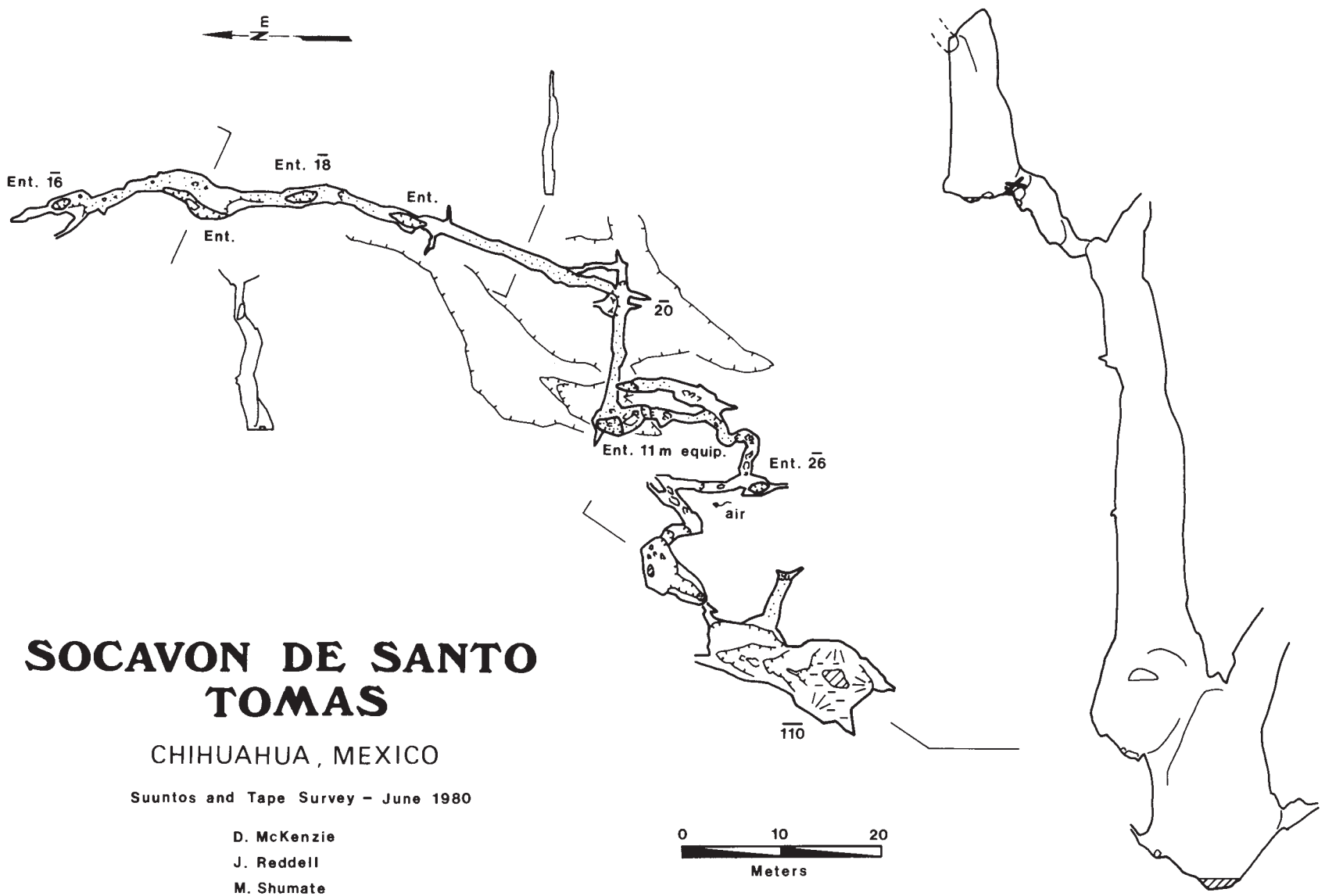
Back on the main highway to Chihuahua, we inquired about caves in the Jimenez area. We were told of a cave or mine some 20 kilometers south. Upon investigation, what we found was Mina Adargas, which had been abandoned for about 40 years. There were several deep shafts nearby, but the main mine entrance was easily recognized by a large flight of bats exiting from it at dusk. At the bottom of two 10 meter drops was a steep slope held back by timbers. From the bottom of this slope an additional drop led down a slope into a mine tunnel. From here several tunnels extended, either dead-ending or ending abruptly in pits. Our enthusiasm was not whetted by the sight of great masses of rock being held in place by cracked timbers and even the thought of troglobitic crustaceans couldn't send us back into the cave when we were finally stopped by an unclimbable drop. We climbed out of the cave, coughed part of the dust out of our lungs, and headed for the cool highlands of the Sierra Madre Occidental.

Santo Tomas

I had visited the Santo Tomas area, Chihuahua with Bill Bell in February 1966, but we had not found the fabled Socavón de Santo Tomas. This time, after many wrong turns we finally located the real Socavón, as well as two caves Bill and I had been to earlier.

Two long arroyos extend from the base of the igneous hills to the south and then intersect the limestone, where they join and shortly afterwards empty into the socavón. A series of 3 drops leads to the main cave passage. Upstream a high, narrow, fissure-like passage connects all the upper entrances before finally ending in breakdown. Downstream it continues about 15 meters to the top of a 15 meter drop, into a small circular room. A blast of cold (12°C) air blows through this room, down a 5 meters handline drop, and on down a deep pit. Mark descended about 35 meters to a ledge and discovered that the rope was not on bottom. We returned to this pit a couple days later; David descended to a terminal room with a muddy lake along one side.

Entrance to Socavón de Santo Tomas.
(David McKenzie)



SOCAVON DE SANTO TOMAS

CHIHUAHUA, MEXICO

Suuntos and Tape Survey – June 1980

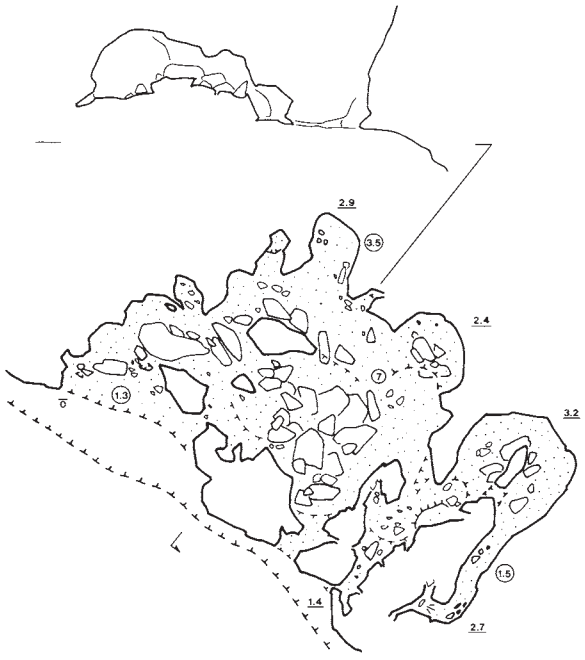
D. McKenzie
J. Reddell
M. Shumate

Drafted: D. McKenzie and G. Atkinson

Another cave in the area, which we named Socavón del Pino, has a small arroyo emptying into it. Two climbable drops led to a digging crevice lead. I excavated my way to the top of a 5 meter drop. I looked down into a small room in which the walls were covered with names.

Creel Area

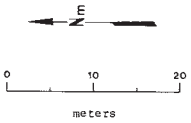
The Geografía de Chihuahua had described a large cave known as Grutas de Chumachi near Creel, and was also marked on a tourist map of the Creel area. Located near the lumber camp of Chumachi, the most obvious cave in the canyon, Cueva de Murcielagos, is a large shelter entrance on the right side of the arroyo. The entrance is about 20 meters wide and 10 meters high and extends over breakdown into a couple rooms about 10 meters in diameter and inhabited by a large colony of bats. One short passage loops back to the main entrance. Several other small, nearby caves were checked, but none, we felt, could be the Grutas de Chumachi. A Tarahumara Indian appeared and told us the main cave was across the canyon. The crawlway entrance of Grutas de Chumachi led into an elongated room paralleling the cliff face. It continued through a constriction and up to another entrance. To the right, it led into another room with several alcoves and finally back through a fissure-like passage with breakdown along one wall and ended. A third entrance was found near the second entrance. Mapping became difficult when several Tarahuamara Indians appeared in the cave carrying pitch-pine torches. Of interest is the fact that these caves are found in ash-flow tuff, an igneous extrusive rock.



GRUTAS DE CHUMACHI

CHIHUAHUA, MEXICO

Suuntos and tape survey 19 June 1980
D. McKenzie, J. Reddell, M. Shumate
Drafted by D. McKenzie, P. Sprouse



In Coyame, northeast of Chihuahua, I knew of a large cave which had been briefly visited by Ronald Fieseler and others a couple years ago. Grutas de Coyame was at one time a commercial cave. The one meter in diameter entrance drops about 10 meters to a sloping floor. At the bottom of the slope the cave opens into an elongate room about 40 meters wide and more than 200 meters long. This room must have once been extremely beautiful, but there is now nothing left but the stubs of thousands of stalactites and stalagmites. Trash and graffiti are everywhere. Alcoves along the sides and a narrow passage at the back leading into a series of small rooms still retain much of their beauty, and indicate what the cave was once like. Numerous delicate

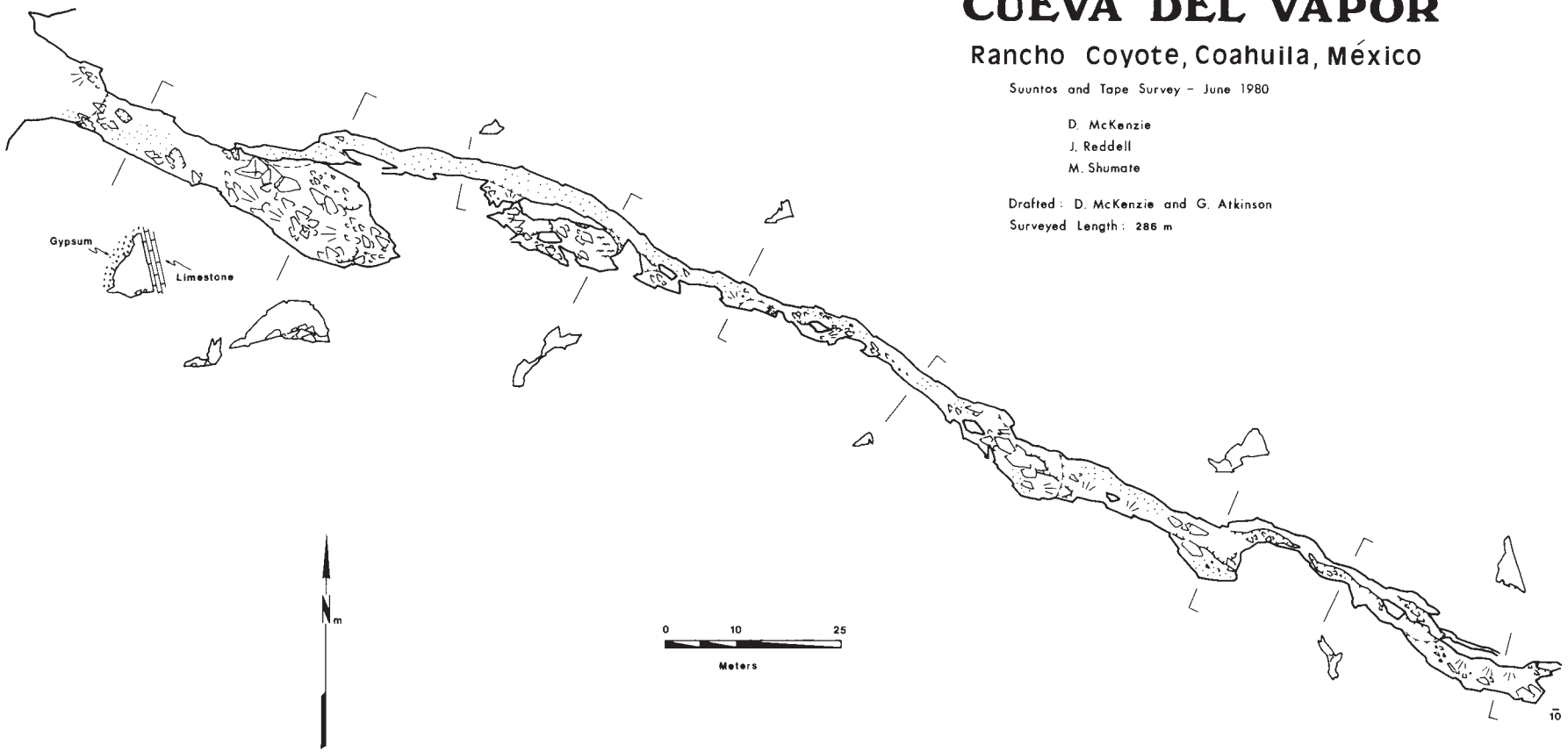
CUEVA DEL VAPOR

Rancho Coyote, Coahuila, México

Suuntos and Tape Survey - June 1980

D. McKenzie
J. Reddell
M. Shumate

Drafted: D. McKenzie and G. Atkinson
Surveyed Length: 286 m



formations, including helictites, can be found in these out-of-the-way places. The floor of the room is of mud and flowstone and generally flat. A collection here included troglobitic isopods, many small spiders, and a species of Rhadine beetle.

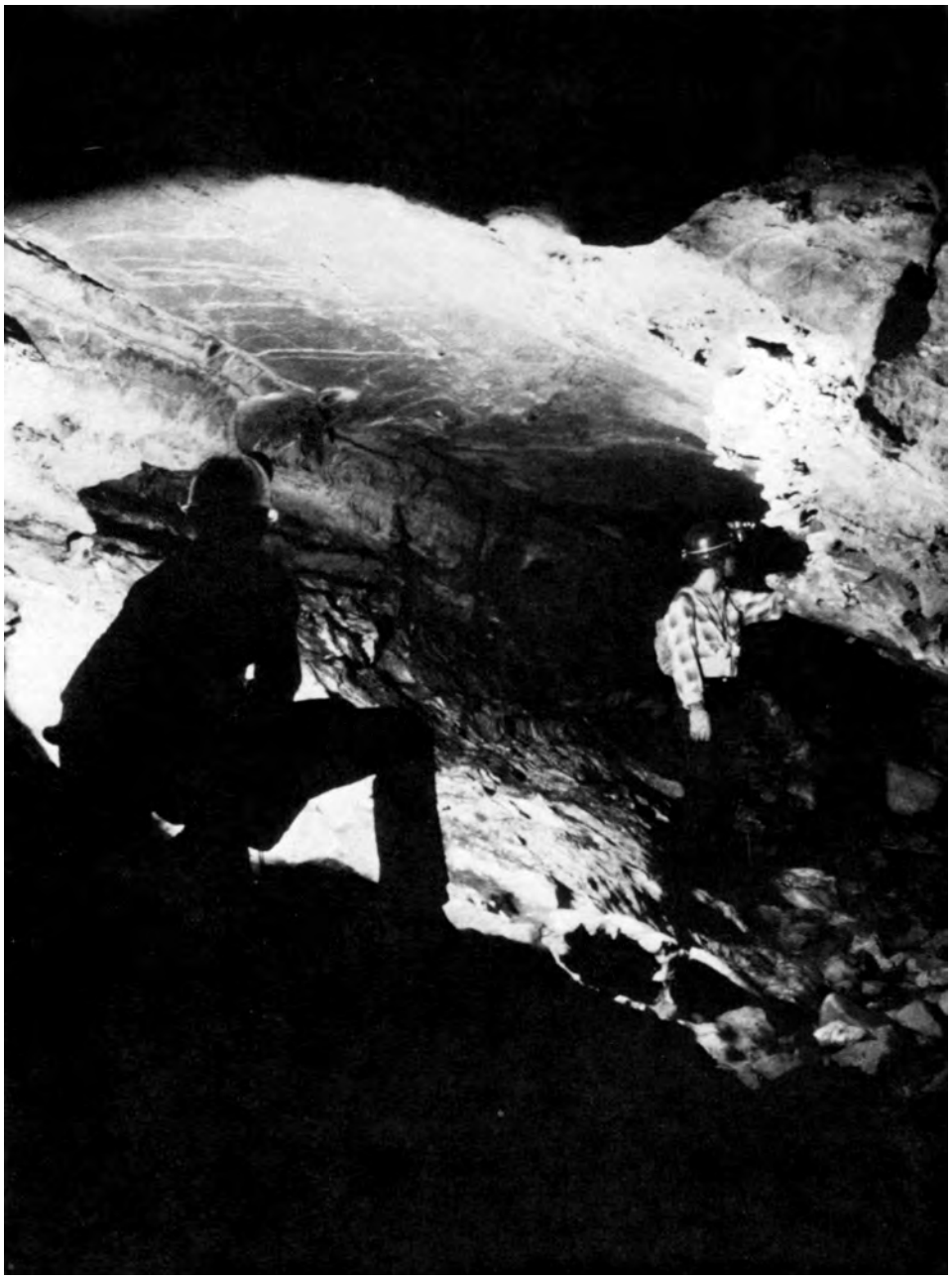
This trip to northwestern México was somewhat less successful than earlier trips, but still we were able to locate and explore several nice medium-sized caves, and to obtain leads to many others. Caving in western México can be both a frustrating and a rewarding experience, but the potential is there for major caves. For the caver interested in geology, the caves are fascinating. For the biologist, there is the possibility of discovering completely new groups of species. In the middle of the Chihuahuan Desert, two tropical species of ricinuleid were discovered. Our trip yielded four new species of spider and two new records for Rhadine beetles in México. Other collections are still not studied, but should prove of interest. Any caving trip armed with the new topo maps of this large area should result in the discovery of some major caves.

México Occidental

Este artículo trata con exploración de cuevas en los estados de Chihuahua, Coahuila, y Durango. En Junio de 1980, las siguientes cuevas fueron levantados: Socavón de Santa Tomás (Chih.), Cueva de Vapor (Sierra de San Lorenzo), y Grutas de Chumachi (Creel, Chih.). Además de Cueva de Vapor, cinco cuevas mas fueron visitadas en la Sierra de San Lorenzo. Estas cuevas se formaron de la disolución de yeso en la caliza. Cueva de Tabaco (Sierra de Texas), Grutas de Mapimí (Sierra del Rosario), y las Grutas de Coyame son cuevas semi-comercializado para turistas.

La posibilidad de encontrar cuevas mayores en la occidental de México es muy buena aunque muy poco trabajo se há hecho en el área. De las cuevas que han sido visitadas, la mayoría son muy interesantes geologicamente y biologicamente.

THE EXPLORATION OF
SUMIDERO DE OYAMEL

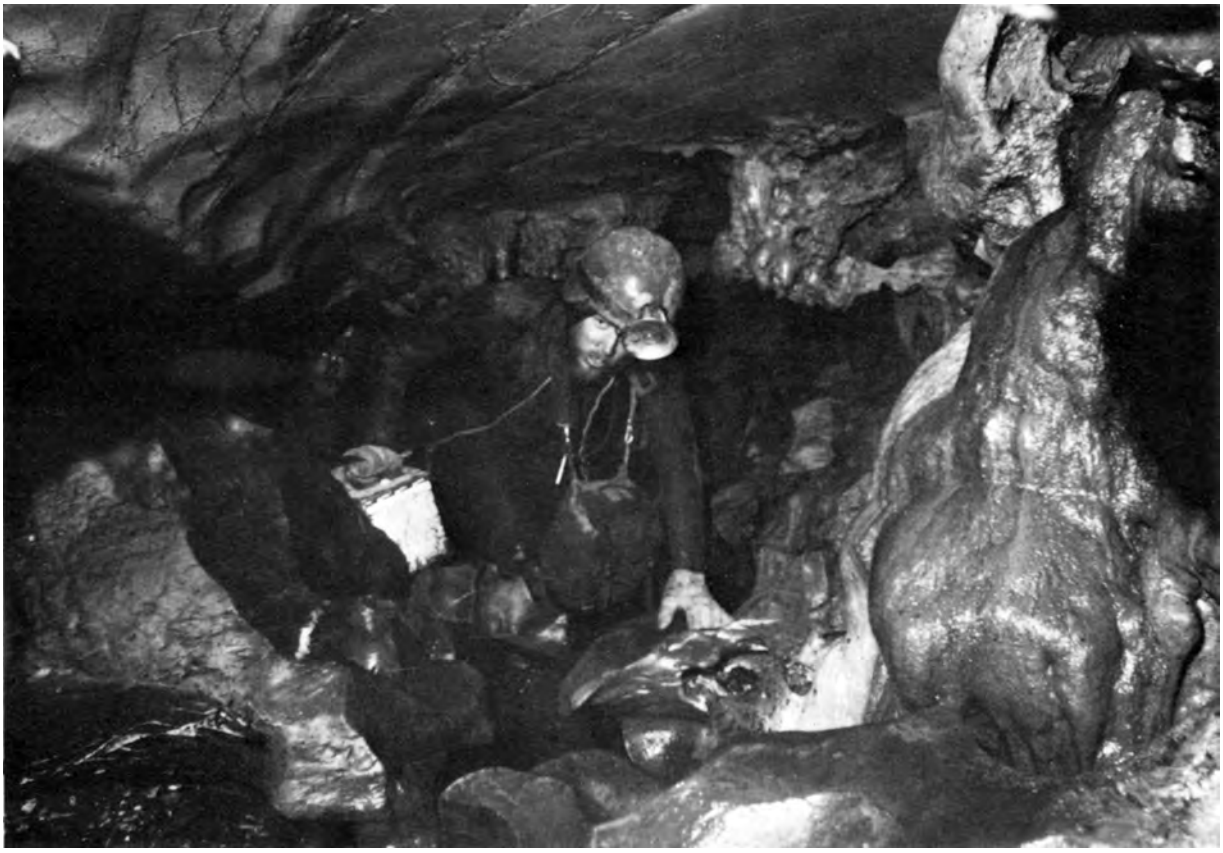


The Upper Sections of Oyamel. (Dale Pate)

Late one evening saw David Honea, William Russell, Peter Sprouse, Terri Treacy, Jerry Atkinson, and myself rolling south, headed for the mountains of Tamaulipas and a cave called Cueva del Brinco. At this time Brinco had been surveyed for a distance of 5.2 kilometers and The World Beyond was only recently discovered. We were planning on spending a full week during the Thanksgiving 1977 holidays in the Purificación area and seeing how it was my first trip to this particular area, I was eager to see it. We were to meet Gill Ediger, Sara Cloyd, Cindy Kane, Wayne Ranney, John Delano, and Mark Burns at the Proyecto Espeleológico Purificación campground located near Brinco, at an elevation of 1900 meters.

The first couple days were spent surveying in Brinco, so the fourth day was to be a day of rest. William, who is usually up before everyone else, took a short hike to a high ridge south of Brinco and looking back to the north, he saw an interesting karst field that appeared to drain a small arroyo. It was only a kilometer or so from camp. Returning to camp, he persuaded Sara, Mark, John, Jerry, Wayne, and Cindy into taking a short hike to check out his new find. They discovered a small arroyo emptying into a karsted area and disappearing. Six entrances to Sumidero de Oyamel were found on this day. Three small entrances led to a crawlway maze area named the Worm Tubes. A larger, double entrance shaft (the Sumidero entrance) fell 20 meters to a deep pool and the Lower Pit entrance dropped 8 meters to connect into a water passage that led to the 20 meter entrance to the north. Heading south from this point, the cave continued 3 meters wide and 1 to 1-1/2 meters high and had a strong airflow blowing in. It was known that Brinco had strong air movement, and also further down the mountain, Cueva de Infiernillo at 4.1 kilometers in length had strong air movement. This suggested to us that the cave was probably tied into the same system, though very little was known at that time concerning the true extent of what lay before us. The name, Sumidero de Oyamel, came from the many hemlock trees growing in the area.

The following day William, John, Jerry, and myself returned to this new find with the purpose of exploring, mapping, and biological collecting in it. Rigging the 8 meter Lower Pit drop with a 10 meter long cable ladder, we entered and immediately began mapping. Jerry had worn his wetsuit bottoms, while the rest of us wore regular caving clothes. We started mapping to the south and the passage we followed stayed about the same, 3 meters by 1 to 1-1/2 meters, for a good distance and then it began hitting small, climbable pits. The first pit was named Apricot Pit (8 meters) which led to a tight vertical squeeze aptly named Apricot Squeeze. Just ahead, we took a break for some lunch and named the spot Comida Corrida. Beyond this point, things started getting out of hand as far as names go. A little further down the passage we came upon Avocado Pit, another 8 meter drop that had a beautifully scoured tinaja in the bottom of it. The passage turned underneath itself here and wading around a deep pool was necessary before reaching the next pit, Apple Pit. This 8 meter drop led into a junction room where we continued down, reaching another 10 meter drop named Anchovy Pit. We were able to bypass the pit and below this we took a rest in a nice cozy room with a pool and cobbles. We had been collecting insects on the way down, but here we found them in larger numbers, so we named the room The Bug Farm. Two new species of troglobitic psuedo-scorpions have been found in this small room as well as other insects. Exploring a short distance onward, we came upon a 7 meter drop, Artichoke Pit, that led to the top of yet another drop.



Typical Dimensions in Godwanaland. (Don Broussard)

We turned around and left it for another day. The cave was getting bigger and we still had good airflow.

Thursday, Thanksgiving Day, saw another 4 vehicles full of cavers arrive at the PEP campground. This threw everything into mass confusion. Nevertheless, the following day, Jerry, Bill Mayne, and myself returned to Artichoke Pit and started the survey where we had left off. Beyond Artichoke Pit, we encountered 2 pits close together and these are now known as the John Delano Memorial Double Pits. Their total drop was 15 meters or so. It was here that the drops started getting a lot harder to climb down. Below this the passage entered a very scoured, cheesy area with deep tinajas and many small holes. Here was the beginning of Godwanaland, a crawlway maze area that angled downdip at 30°. Being lead tape, Bill forged on to briefly scout ahead. Almost 30 minutes later Jerry and I were wondering what had happened to Bill. We thought he would be gone for maybe 5 minutes. A short time later we could hear him crawling up to us, but he was coming from a different way. His report confirmed our worst suspicions - ahead lay a 3-D crawlway maze. The airflow was not as detectable since it had many small holes to go down. We decided to end the survey and return to the surface.

That same day, William and Sara had entered the cave via the Worm Tubes and began surveying that portion of the cave. More mapping was done the following day by William and Jerry, but they did not succeed in tieing these entrances to the rest of the cave. By this time, it was time to head home. Our total surveyed length for the week was approaching 1 kilometer in length and 100 meters in depth.

Slightly more than 3 months later, Oyamel was revisited during the Spring of 1978. Brinco was now 6.5 kilometers in length and 257 meters deep. March 19, Marcia Cossey, Cece Green, Andy Grubbs, and myself took a short collecting trip into the cave. The following day turned out to be a push day with six of us entering the cave to continue the exploration and mapping. At this time, it had been thought that the cave could possibly intercept the upstream portion of the World Beyond in Brinco, but the possibilities of it missing the World Beyond and continuing downdip to Infiernillo, 400 to 500 meters below were never ruled out. Robert Hemperly, Jocie Hooper, and myself were to be the survey team, while Kurt Schultz, Henry Schneiker, and Pete Strickland were the lead explorers marking the route through Godwanaland. Fortunately, only 125 meters or so away lay larger passage where a definite channelling of the water flow was evident again. Always dropping downward, the cave trended downdip to the west and the lead team explored down tinaja lined passages and stopped in a canyon passage that was in places 8 to 10 meters high, but divided up by old flowstone partitions. The airflow was good. Meanwhile, our survey team spent hours mapping the crawlways and squeezes through Godwanaland. The two teams met just as we were breaking out of the mazy area and everyone opted for returning to the surface. This downstream portion of Oyamel was not returned to for 2 years after this. The main effort of the PEP was concentrated in Brinco and Infiernillo, which were connected in July, 1978 to form the Sistema Purificación.

Work still continued in the upper levels, however. Peter Sprouse and Jerry Atkinson returned to the Worm Tubes on March 21, 1978 to begin a resurvey of that section, and they succeeded in tieing all the entrances together. Eventually 6 entrances were connected in. The total length of Oyamel was then 1040 meters and 125 meters in depth.

In November, 1979 Peter S., Terri Treacy, and Mark Shumate began the resurvey from the main entrance down to the last surveyed station near the end of Godwanaland. The sketches from the previous surveys had not been up to the high standards of quality that were being used in Sistema Purificación and we were all sure that the cave would eventually connect in. On one such trip, the trio found a nice horizontal passage at the top of Apricot Pit. Small leads often yield large discoveries. This team succeeded in resurveying to the point where the initial survey had ended in the Spring of 1978.

After a 3 week caving tour further south, a crew of ten cavers arrived in the area on April 8, 1980. These cavers included David Honea, Peter Sprouse, Terri Treacy, Randy Rumer, Peter Keys, Leslie Clarfield, Jeanne Williams, Don Broussard, Peter Quick, and myself. Already present was Louise Hose who is working on a Master's thesis of the geology of the cave system. By this time, Sistema Purificación had been a reality for almost 2 years and it had become the deepest cave in the western hemisphere at 893 meters deep and the longest in México at 29 kilometers. It was time to see what Oyamel was doing. It could provide a major link to the drainage that was coming in from the north if we could connect it in.

On March 10, Randy, Peter Q., and myself entered Oyamel with wetsuits on. Our intentions were to push and map from the last survey station the previous team had set, if we could find it. Although the wetsuits we wore were fairly comfortable, most plunge pools were sought out to cool off in. After many moans and groans and several wrong turns in Godwanaland, we stopped for a much needed rest. Much to our surprise, the station

we sought lay right in front of us. Amazing! This was a good sign and we began surveying in good spirits. The passage was dropping rapidly, but we were still able to climb down everything we encountered. In places we climbed from one water-filled tinaja to the next. The passage continued to enlarge and the scoured limestone walls were beautiful. One area which was in the section the 1978 lead team had explored was named Pools and Jewels for the many tinajas and rounded cobbles we found there. Below this stretch, the passage started trending west and stopped the zig-zagging that had been prevalent up to that time. Off to the right a passage emptied into the main passage we were following. Naming this Pine Cone Junction, we continued on. Immediately past this we came to a piece of flagging tape; this indicated the point where the exploration team of 2 years ago had stopped. Finally, we were entering virgin passage once again. Soon after Pine Cone Junction, the passage dropped into one of the more beautiful parts of the cave, Black Canyon. This was a steeply dipping, water-scoured, black limestone canyon. As always, it was dropping down. After a distance, the canyon became more narrow and we were afraid that it was going to enter another Godwanaland type area. Instead though, it emptied into a horizontal, wide trunk passage.

We knew this passage had to be an extension of Upstream World Beyond in Brinco. We were at the right level, but we estimated that we were a kilometer or so from the last surveyed station in the World Beyond. There was still a lot of cave to go through, and that last survey station in the World Beyond had been set at the top of a very slimy, muddy, 5 meter drop.

After mapping a short distance in this new passage, we came upon what appeared to be deep water and low airspace. At this point we turned around and began the long climb out, leaving the hoped for connection for another day. At this point we were over 200 meters below the entrance. Up, up, up, and more up, the whole way out was one climb after another. The pine scented mountains and twinkling stars were a perfect ending to this trip.

A connection seemed imminent, and the following day Peter S., Peter K., and Leslie entered Cueva del Brinco to push upstream in the World Beyond. David, Don, and Terri entered Oyamel and traveled to the last surveyed point and the low air space. To the Oyamel team's dismay, the survey pencil had no lead in it so they couldn't survey. After going all that distance, they decided to explore ahead. The low airspace started at 15 centimeters and gradually increased. Soon it was a stoopway with a couple of large mudrooms and then more low airspace. They reached a "T" Junction, explored right to a sump, and then left to another junction. There were no signs of the other team, so they placed a cairn and left the cave with plans to return the next day to survey.

Meanwhile, Peter, Leslie and Peter had rigged the mud funnel drop, later named the Gates of the North. At the bottom, a clean scoured passage led two directions. Downstream went through 200 meters of canal to a sump, but it was the upstream way which pointed north towards Oyamel. Sixty meters down this, a short passage went right to a sump, and 80 meters further on the passage enlarged into a high, 40 meter wide chamber with a mud mountain in the middle. Peter Keys attempted a climb into a high lead while Peter Sprouse investigated the continuation of the passage to the north. There, where a sandbar crossed the passage, were footprints! They hurriedly continued the survey on from the Hall of the Footprints and soon came to the other team's cairn. Surely the tie-in station must be close now, but Peter K. re-

The Nose Dives. (Dale Pate)

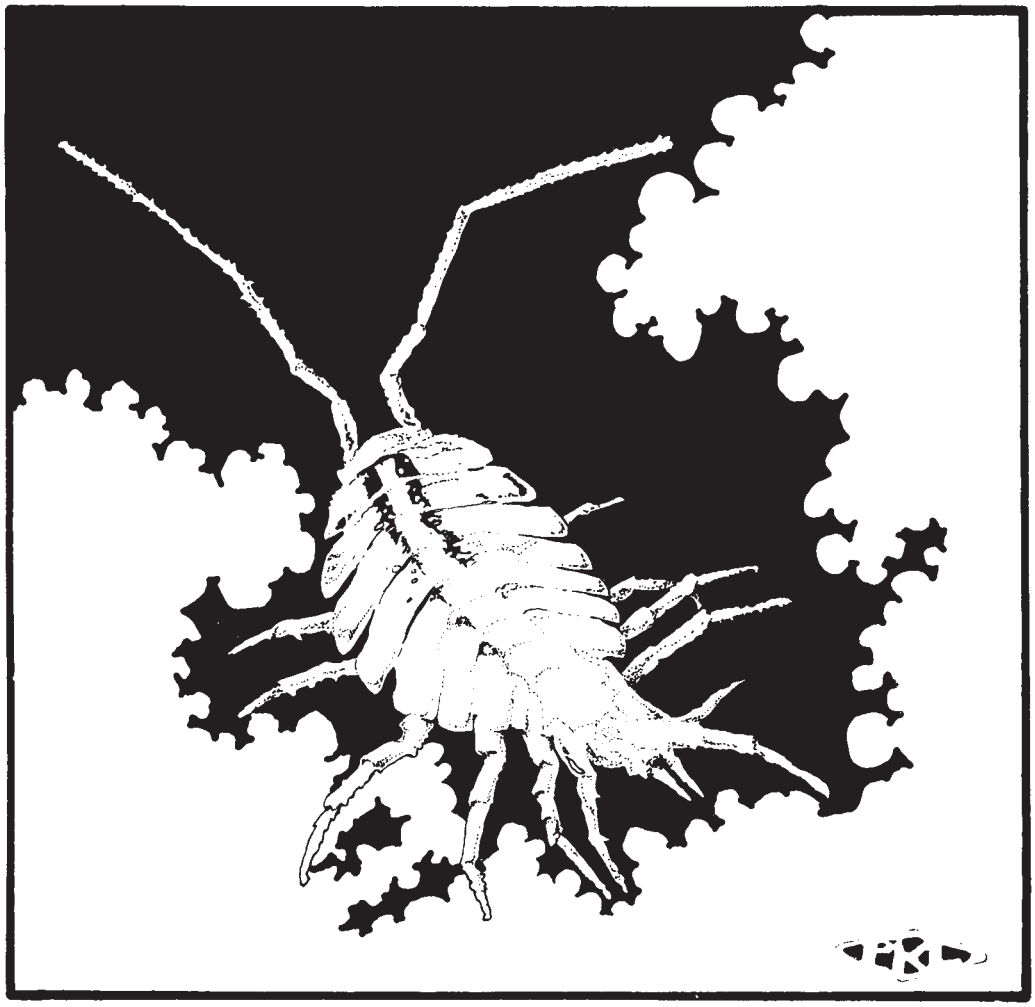
conned ahead for several hundred meters without finding a station. But with a connection realized, the survey had to be done, so they mapped on past the "T" Junction, through the low airspace, The Nosedives, to tie into the station Randy, Peter Q., and I had set the day before. Their total survey was 922 meters in a 17 hours trip and they had made the connection.

Oyamel was now officially part of Sistema Purificación and it added 6 entrances to the already known 5 entrances. This connection added approximately 2.5 kilometers to the length of Sistema, bringing it to a field total of 31,567 meters. Peter S., Peter K., and Leslie continued on out of the Oyamel entrance, thus making the first entrance to entrance trip from Brinco. A few days later, Louise and Don entered the Oyamel entrance to inspect the geology in this part of the cave and came out the Brinco entrance, thus, making the first entrance to entrance trip from Oyamel to Brinco.

The connection of Oyamel to the World Beyond in Brinco added a significant link, another piece to the puzzle, in the hydrologic research presently going on in Sistema Purificación. The connection represents only a part of the systematic exploration and surveying that members of the Proyecto Espeleológico Purificación are involved in.

Sumidero de Oyamel

Las seis entradas de Sumidero de Oyamel se localizan al norte de Cueva del Brinco, una entrada superior del Sistema Purificación, Tamaulipas. La exploración y topografía fue iniciada en 1977 y 1978 hasta 125 metros de profundidad y 1040 metros de longitud. En 1979, levantaron unos pasajes nuevos y repitieron unas partes de la topografía. En la primavera de 1980, se continuó con la exploración y la topografía al nivel -200 en un lago con techo bajo. Se pensó que este pasaje era una extensión del pasaje "World Beyond" de Sistema Purificación. Al día siguiente, un equipo entró a Brinco y comenzó la topografía desde la última estación en la parte aguas arriba del World Beyond. Al término de 922 metros de levantamiento, se habían conectado las dos cuevas.



Across the Sima Grande

Mark Minton

The Entrance to Sótano de La Joya de Salas. (Steve Robertson)

Still convinced that a major deep system lay below Joya de Salas, a large group of cavers (Denis Breining, Tom Byrd, Monte Fisher, Margaret Hart, Russell Hill, Hal Lloyd, Johanna Reece, Steve Robertson, Terry Sayther, Bill Steele,Bill Stone, Lisa Wilk, and I), returned for yet another look at the Sótano and surrounding area over Thanksgiving of 1979. The main objective was a series of passages and shafts found on the last day of our trip the previous year by traversing around the Sima Grande, the second drop in Sótano de la Joya de Salas (see AMCS Act. News. No. 8). In addition, some interesting looking sinks to the northeast and an old lead near the lake were to be checked out.

Bill Stone led the short, but treacherous, traverse around the Sima Grande. A side passage, previously assumed to end in a plunge pool, was descended by Bill Steele who beckoned us onward - it went! Keeping out of the scuz filled pool is no easy feat, and the passage was dubbed "Can You Stay Dry." Unfor-

Monte Fisher on Rope Traverse.
(Steve Robertson)

Bill Steele diving the sump.
(Steve Robertson)

tunately it ends a couple hundred, enjoyable meters later at another pool. Back in the "main" passage, a sporting climb over a deep (50m) hole, which connects to the "old" cave below, and a short section of stoopway leads to a decorated cross fissure. A tight squeeze through flowstone while on rope, followed by a short rappel, brings one to a complex lower level. The prime lead was a 100+ meter deep shaft complex at the end of a large, decorated chamber. Several ledges break up the descent, and provide access to other parallel shafts and interconnecting crawls. Unfortunately all of these end in mud fill or water.

The only remaining lead was a narrow canyon with tremendous airflow leading off the second ledge of the shaft complex. It quickly opens into another drop which ends in a spacious, dirt floored room. A tight, damp crawl leads to a balcony overlooking a short drop with what appeared to be walking passage below. By now we were sure we had cracked the system, but our elation was premature. The passage at the bottom became too tight to the left, and sumped to the right. In desperation we returned with heavy artillery: Kinepak and scuba gear. The blast was spectacularly resonant in the 30 meter dome where we stood,

but the passage didn't go. Stone's dive, initiated through an extremely tight crevice, half filled with water, also failed to uncover going cave.

Meanwhile, a little searching around the karst near the main entrance finally turned up the "lost" second entrance to the Sótano. A short drop through a tight crack leads to a trash floored room with some beautiful flowstone. A pleasant canyon leads to a second drop. Both a crawlway taking off midway down the drop, and a canyon passage at the bottom of the drop loop back into the Sima Grande near the main entrance.

Most of the new passages were surveyed, but the depth of the cave was not increased, except perhaps by one or two meters gained by tying in the second entrance. A few leads still remain unchecked, and the baffling air circulation in the cave makes one wonder if the master system still eludes explorers.

We also checked a lead on the east face of the range near a barite mine. Hoya de la Mina Barita, which had been described as a very large pit, turned out to be at least 50 meters across, but only a disappointing 40 meters deep. The overgrown bottom contained no further passage. We were also told of a large pit, bigger than Salas, 9 kilometers to the northwest, but we didn't have time to check it out.

En Noviembre 1979, un grupo fue al Sótano de la Joya de Salas en la Sierra de Guatemala de Tamaulipas con el intento de explorar unos pasajes cuales habían sido descubiertos el año anterior. Dichos pasajes se terminaron o se volvieron a conectar con galerías conocidas, y un pasaje condujo a una nueva entrada. Se mapearon todos los pasajes. En el lado oriental de la sierra, un sótano llamado Hoya de la Mina de Barita se exploró. Tiene 40 metros de profundidad, sin pasajes en el fondo.

BATS NEED FRIENDS

AMCS CAVE MAP SYMBOLS

Peter Sprouse and William Russell

A current list of the AMCS Standard Cave Map Symbols has not been published since 1975 (Russell, 1975). Subsequent evolution of the symbols is reflected in this 1980 list. In compiling it, foremost consideration has been given to the techniques of AMCS cave mappers and to the components of modern cave maps.

A revision of the NSS cave map symbols was published in April, 1979 in the NSS Bulletin, Vol. 41, No. 2, compiled largely by James Hedges. This list contained many unconventional symbols and drafting techniques and was widely regarded as impractical by American cavers. It contained a vast number of symbols for things rarely encountered in caves, with most of the symbols bearing no visual resemblance to what they were supposed to represent. Although the NSS list is currently under revision, there is little hope of major changes. Therefore, cartographers are encouraged to utilize the AMCS list. It should be used as desired by the drafter, who is encouraged to use his own different or supplementary symbols if needed.

Evolution and use of the symbols

Some symbols have been changed or deleted, and symbols have been added for obvious needs. But an attempt has been made to keep the list concise, and it has not changed drastically since the first edition in 1965 (Anon., 1965). Changes, additions, and suggestions for use are discussed in the order they appear in the list.

The symbol for lower level passage walls, a dotted line, has been stretched into short dashes to help show wall shape and aid clarity. A symbol for breakdown walls has been added, which is essentially only an explicit use of the passage wall symbol. Ceiling height and water depth symbols have been eliminated for several reasons. These features may best be shown in cross sections and profiles in a form that conveys vastly more information. The plan view is intrinsically not designed to display these features, and their use inside the passage walls displaces floor detail, a primary function of the plan. For this reason also, the elevation above and below the entrance should be indicated outside the passage walls when possible. In surveys where loops provide statistical information on accuracy, the standard error may be indicated in parenthesis with the elevation. Arrows indicating airflow direction, scallop direction, or flow direction of a large stream should also be outside the passage walls. Two new water symbols: intermittent pools, and rapids (merely an undulation in the water symbol). The depiction of water in a blue screen is desirable and increasing in use. When blue screen is used, rapids may be depicted as small parallel hachures in solid blue. The floor flowstone symbol is in common use, and is being increasingly used to also depict

the direction of slope on flowstone. Rimstone dams are drawn with bold lines, and should be drawn to their correct shape and scale when possible. The old solid black symbol for flowstone on walls was unpopular since it tended to produce a dominant, lopsided effect on the map. It is replaced with the floor flowstone symbol attached to the wall. The stalactite, stalagmite, and soda straw symbols remain unchanged, but again, these features may again be best shown in profiles and cross sections, so their use should be minimized. Breakdown may be drawn "stacked" to indicate slope, and the larger breakdown blocks should be drawn to scale and shape, rather than a standard block shape. Shading or block detail may be shown, and if covered with mud, guano, etc., these symbols may be drawn on the breakdown. The symbol for survey stations should be used for the datum, or very important stations; the depiction of all stations detracts from true floor detail and is of little interest to the reader. A trail symbol has been added and is useful in caves where there has been much prehistoric (or modern) use. The splayed "crow's foot" slope symbol is another symbol that like ceiling heights, is being phased out of the modern cave map. Slopes are best shown in cross section and profile, and the use of the slope symbol in a plan displaces floor symbols that depict the actual floor content. In large rooms with complex relief, contour lines with elevations may be used. A symbol for organic debris has been added; the drafter may wish to draw larger branches and logs to shape and scale. The use of the geology symbols increases the value of a cave map; these should be more utilized than they are. Again, these generally appear outside the passage walls.

Such basic map components as a scale and north arrow hardly need pointing out; this article isn't intended as a complete guide to cave map drafting. However, we believe that these symbols can be used to construct a "state of the art" cave map. Such a map would have three views, all necessary for depicting a three dimensional cave: plan, profile, and cross sections. Floor detail should be complete, with no blank spots in the passage, for there is a symbol for any floor composition. The use of graphic symbols (that look like what they represent) and the de-emphasis of numbers and letters in the drawing have resulted in more informative and visually pleasing cave maps.

REFERENCES

Anon. 1965. AMCS Newsletter I:9:93.

Russell, William H. 1975. AMCS Map Symbols. AMCS Activities Letter No. 3:29.

Simbolos topograficos

Este es un revisión de los simbolos topográficos de la AMCS. El artículo describe las técnicas de construir mapas modernas de cuevas con los simbolos. La mapa necesita tener detalla completa del piso con simbolos gráficos, en lugar de números o palabras. Tambien se necesita las tres vistas: el plan, corto longitudinal, y las secciones transversales.

ASSOCIATION FOR MEXICAN CAVE STUDIES
STANDARD CAVE MAP SYMBOLS, 1980

PASSAGE SYMBOLS		SIMBOLOS DE PASAJES
	Passage walls	Pared del pasaje
	Lower level passage	Pared de nivel inferior
	Upper level passage	Pared de nivel superior
	Unsurveyed passage; indefinite walls	Pasaje que no está levantado
	Breakdown walls	Paredes de cantos rodados
	Sharp drop in floor, down in hatchured direction	Tiro en el pasaje
	Pit; if so indicated, entrance pit	Tiro, tiro de entrada
	Cross section of passage, viewed in direction shown by half barbed arrow, and rotated to horizontal	Sección
761	Depth below entrance (or datum)	Profundidad bajo la entrada
35	Height above entrance (or datum)	Elevación arriba de la entrada
WATER SYMBOLS		SIMBOLOS DE AGUA
	Direction and course of flowing stream	Chorro de agua corriendo
	Direction and course of intermittent stream	Chorro seco
	Standing water, lake or pool	Agua estancada
	Intermittent or relict pool	Laguna seca
	Sump (cross hatched)	Sifón
	Large stream, rapids	Río, rápido
STAL SYMBOLS		SIMBOLOS DE FORMACIONES
	Flowstone on floor; may indicate slope contours, with bulged side downslope	Piso de travertina
	Rimstone dams, drawn to scale and shape when possible	Gours
	Flowstone on walls	Paredes de travertina
	Stalactite	Estalactita
	Stalagmite	Estalagmita
	Soda straws	Macarones

CEILING SYMBOLS

SIMBOLOS DEL TECHO

Sharp drop in ceiling, hatchures point toward low ceiling

Techo bajo

Dome

Domo

FLOOR SYMBOLS

SIMBOLOS DEL PISO

Bedrock floor

Piso de piedra

Mud or clay

Lodo, barro

Sand or silt

Arena

Gravel

Grava

Rounded stream cobbles

Guijarros

Talus

Piedras

Breakdown

Rocas

Large breakdown, drawn to shape and scale

Cantos rodados

Guano

Guano

Pottery or other archeological material

Materia archeológica

Slope, down in splayed direction

Pendiente

Organic debris

Materia orgánica

Trail

Vereda

Survey station, survey datum point

Estación topográfica

GEOLOGY SYMBOLS

SIMBOLOS DE GEOLOGIA

Strike and dip of strata; dip in degrees

Echados

Vertical joint

Fractura

Dipping joint

Fractura inclinada

Fault, D side moved down relative to U side

Falla

The Caves of Cuesta Colorada

George Veni

México has been known as the land of "instant caves." Rumor has it that it's hard not to find a cave, even if you're not looking for one! This was the case in December, 1979 when Scott Harden, Gary Poole and I were cruising along Highway 85 in the state of Hidalgo and Mr. Poole spoke those fateful words, "When we get past this town, stop the car so I can go pee." Off he went down the hillside and into the bushes. Careful not to offend the locals, he kept glancing to either side until he finally looked down to see a large sink "taking water." Checking it out, he found that a small arroyo actually did feed into the sink and that its presently dry water course led to a small hole. Grinning like the proverbial cheshire cat, he returned to the vehicle for a light. The 3 meter entrance chimney was descended and followed a short way to what appeared to be a 25 meter pit. Exiting the cave, the land's proprietor was encountered and he told us of a "mas grande cueva" across the road and up the hill.

The cave wasn't quite up to its description, but it was nice; a 20 meter rappel into an oval room, 20 by 8 meters. At one end a slope led down a 5 meter drop, into a dry, decorated, terminal room. Deciding to get a better look at the first cave, we rigged a 40 meter rope and went down. At 25 meters we found that the "bottom" was actually a large ledge. Due to its steep overhanging nature, the true bottom couldn't be seen. An added 33 meters of rope was tied on and I continued down. After going a ways, I decided to stop and have a good look around.

A huge flowstone shield graced the opposite wall that lay 8 to 10 meters away. In contrast to the first 25 meters of dry pit walls, things here were starting to get moist. Pools of water could be seen far below on the floor. It also appeared that another large pit bordered the floor of this pit. Unfortunately, it couldn't be checked out because the end of all our rope was hanging 25 to 30 meters above the floor. As we drove off into the dark night, we were making plans to return.

Early May, 1980, Gary and I returned with Teeni Kern. Our first goal was to bottom and survey this deep pit cave. We had named it Hoya de Cuesta Colorada, after the town it is located near. As we carried all our gear to the sink, the proprietor's brother ran down to greet us. Excited by our return, he wanted to show us some other caves. He first took us to a couple holes, no real caves; but he soon made up for it by taking us to a pit that was 5 meters in diameter and rocks tossed in would bounce for 11-1/2 seconds. We estimated it to be about 100 meters deep. We weren't able to check it out then, however, because our enthusiastic guide had more caves to show us, and that's just what he did for the next couple days. We spent more time looking at cave entrances than going into them and I'll admit I was starting to get a bit flustered. We didn't want to be rude, but we didn't have that much time and we wanted to get underground. Besides, out of the many cave entrances he showed us, none showed anything near the potential of the Hoya or the 100 meter pit.

Deciding to do the 100 meter pit first, Gary and I rappelled to a small ledge about 17 meters down,

then I continued to a larger ledge at about -80 meters. While waiting for the others to come down, I noticed some commotion from above. It seems that one of the locals, from the gathering crowd, had gone to the rope and started to examine (?) the knot while we were on rope. Language differences made it difficult for Teeni to exert the authority needed to politely keep the people away from the rope and the edge of the pit. Knowing a male presence would have a stronger effect, Gary climbed out. Because of this nervous incident the pit was named Sótano de los Paranoicos. Hoping that the situation above was well taken care of, I proceeded 25 meters to the bottom of the pit. From there a downward slope led to a flat, dirt floored chamber with no apparent leads. It was also home to a small colony of vampires.

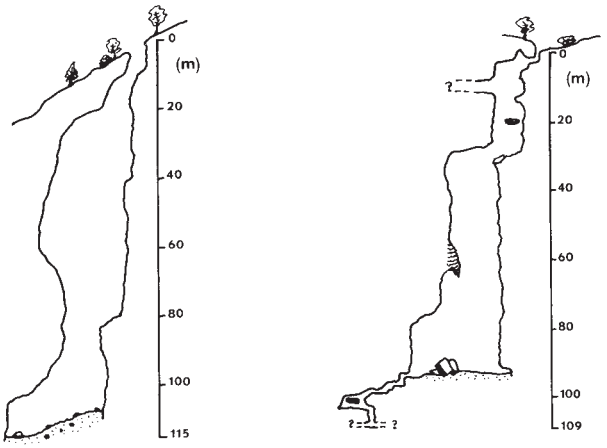
From this first experience, we tried not to attract a crowd when we went to the Hoya. We were unsuccessful. Gary volunteered to stay at the top of the pit and watch the rope. Teeni went to the ledge at 25 meters to facilitate communication as I proceeded to the bottom. A fine rappel was spoiled when my 90 meter rope proved to be 3 meters short of reaching the floor. Of course, I was carrying an extra rope for the pit I had seen in December, but at this point, 3 meters off the floor, I saw that there was no second pit. What I saw from far above were long shadows of large breakdown blocks that gave the impression of another large pit. Imagine the frustration of tying on another 90 meter rope, just to rappel three meters!

The cave's drain was into a series of short freeclimbable drops. At one point it pinched small and some sharp projections had to be removed. Even enlarged, it still tore off a few shirt buttons and some skin. I went down about 12 meters below the main pit and saw yet another freeclimb of about 4 meters. There appeared to be passage at the

SOTANO DE LOS PARANOICOS — HOYA DE CUESTA COLORADA

Hidalgo, Mexico

idealized profiles; memory sketches: g. veni, 9/30/80

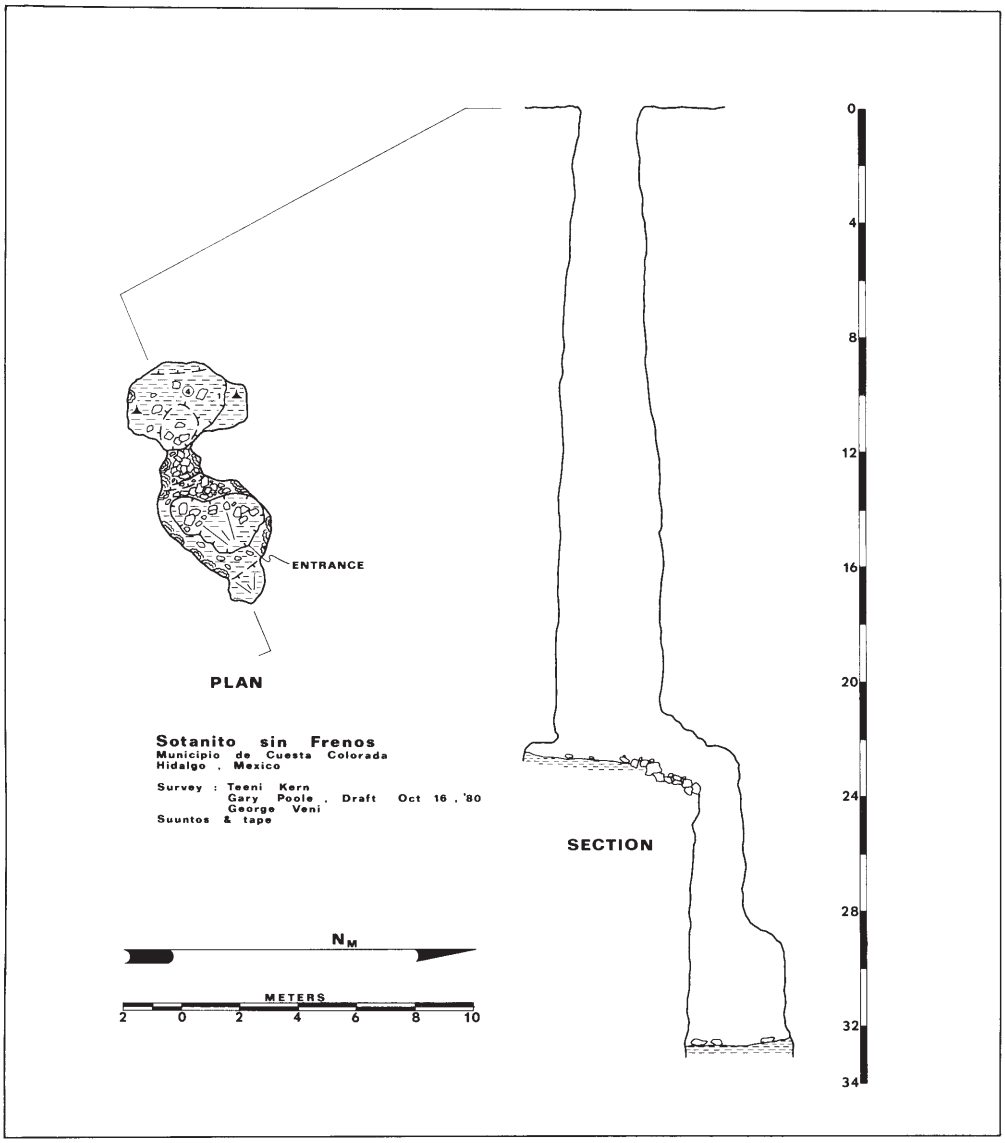


bottom. In view of the surface circumstances, my being alone, and that we were short on time, I turned back at this point.

Other than doing the two main caves, we surveyed Sotanito Sin Frenos, a cave near a road whose drainage ditch our car rolled into. The cave is simply a 22 meter pit followed by an 8 meter drop to a terminal room, noted for its incredibly high arachnid population. While being shown the many caves, we observed that many large karst pinnacles have associated pits at their base. The only one we checked was a 15 meter blind pit. An 8 meter shaft on the side of a huge sink dead ended, but the floor of the sink dropped into a large open-air pit. From the surface it didn't seem to have any offgoing passages, but it looked like a fun rappel. A couple of other caves were briefly checked and locations were made to various pit entrances ranging from about 8 to 25 meters in depth. We also saw lots of other holes that we didn't get the chance to draw up a location map for. So far, I'd say that this area has only two major caves and plenty of leads. Though the caves from these leads don't appear that they'll go far, there is only one way to find out and that's what caving is all about. Big or small, the caves of this area promise to give the visitor some easygoing, interesting and fun times.

Cuesta Colorada

En la región de la carretera Interamericana (85), cerca del pueblo de Cuesta Colorada en el estado de Hidalgo, hay numerosas cuevas. Algunas de las más aprometadoras fueron explorados. Hoya de Cuesta Colorada: Una chimenea corta conduce a un tiro de 90 metros. Al fondo, hay una serie de tiros cortos que se pueden escalar en libre. Exploración fue terminada en la borde de un tiro de 4 metros. Sótano de los Paranoicos: Un tiro de 100 metros tiene un piso plano sin pasajes laterales. Una pequeña colonia de murciélagos vampiros habita el fondo. Sótano sin Fresnos: Un tiro de entrada de 22 metros conduce a un tiro de 8 metros. Al fondo hay un gran salón terminal con una gran cantidad de arácnidos. Un sótano grande en una inmensa dolina fue visto, pero no se exploró.



SUMIDERO SAN BERNARDO

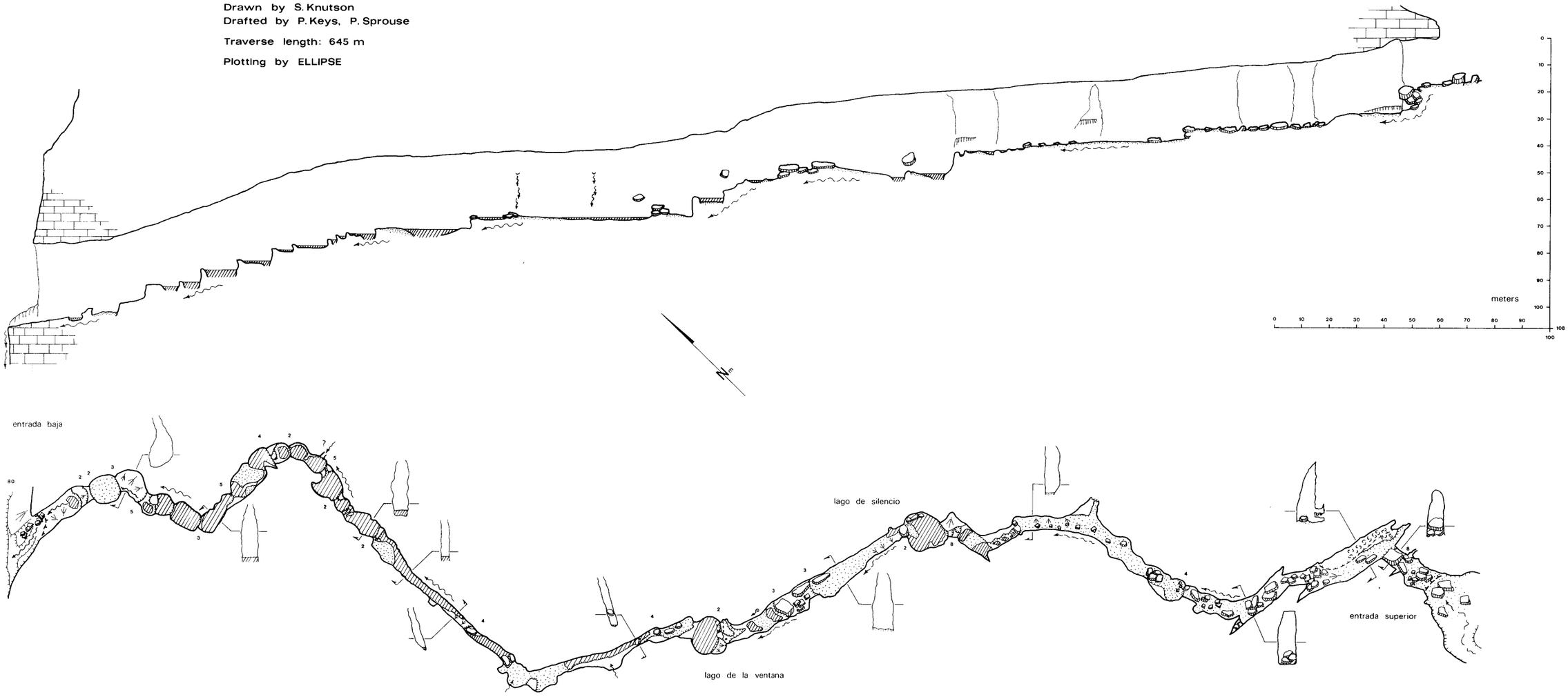
Xochitlán, Puebla, México

Surveyed 18-23 Jan. 1980
M. Cavanaugh, E. Garza, S. Knutson, W. Liebman, A. Villagomez

Drawn by S. Knutson
Drafted by P. Keys, P. Sprouse

Traverse length: 645 m

Plotting by ELLIPSE



Sumidero San Bernardo

Steve Knutson

Canyon passage in Sumidero San Bernardo. (Ernesto Garza)

The Río Zempoala is the northern limit of the Cuetzalan caving area in northeast Puebla. The very cavernous terrain around Cuetzalan is part of the slope of the high plateau of central México as it is reduced to the coastal plain by rivers like the Zempoala. If one travels west, south of the Zempoala, along this terrain, you get out of the wondrous karst into normal surface stream valleys. The first of these is the valley of the San Bernardo.

In January of 1980, we took a recon up the Zempoala and retraced some of the steps of David McKenzie, who had done a similar recon years before. The San Bernardo has the appearance of an ordinary stream valley. However, below the town of Xochitlan, before it can join the Zempoala, the San Bernardo runs into a sumidero. McKenzie called this Cuetzal Temanas, but folks at the local hacienda call it Sumidero San Bernardo, and so do we. The sumidero looked like a good little cave, so Bill Liebman, Maureen Cavanaugh, and I moved camp to a field near the entrance and commenced to explore it.

The entrance was known to have a short drop so we took a couple of short ropes. This first drop turned out to be about 7 meters over a huge boulder wedged in the passage. Beyond lay a cathedral-like corridor over 20 meters tall and some 7 to 10 meters wide. The floor is sandy with large rounded boulders. No water was flowing; the flow of the San Bernardo was apparently being pirated away higher up the valley, but

guano on some boulders indicated seasonal flow at least a meter deep. The walls are smooth and vertical. This is not the typical bedrock of the Cuetzalan caves, which is thinner bedded and prone to breakdown. It appeared to be metamorphosed into one complete bed, though a 2 meter fossiliferous band was obvious in the smooth wall.

We continued past a second short drop, admiring the easy, magnificent passage. A couple hundred meters took us to a somewhat deeper drop. A thrown rock took a second or so to produce an echoing splash. The 8 meter rappel took one to a ledge beside a broad, silent lake. Two swims and we were again moving down our fine passage. Soon, though, it abruptly broadened, divided by a large phreatic arch and sloped down steeply to a second lake. The edge was two meters high, and overhung. We were out of rope.

The next day we were joined by Alejandro Villagomez and returned to the cave with more rope. The lake, which looked so deep, proved to have a sandy bottom and was never over your head in depth. At the other side was a 7 meter drop. Beyond this, we ran into water showering down and the passage came alive with the sounds of flowing water. A 4 meter drop led to a long swim. The passage then became absolutely charming, with plunge pools, smooth surfaces, waterfalls and the same grand size. With no rope left, we were soon looking down a 5 meter drop needing a bolt or piton. The cave consistently showed signs of large volume flow with all surfaces rounded and smooth, huge plunge pools and no narrow canyons. Certainly it was

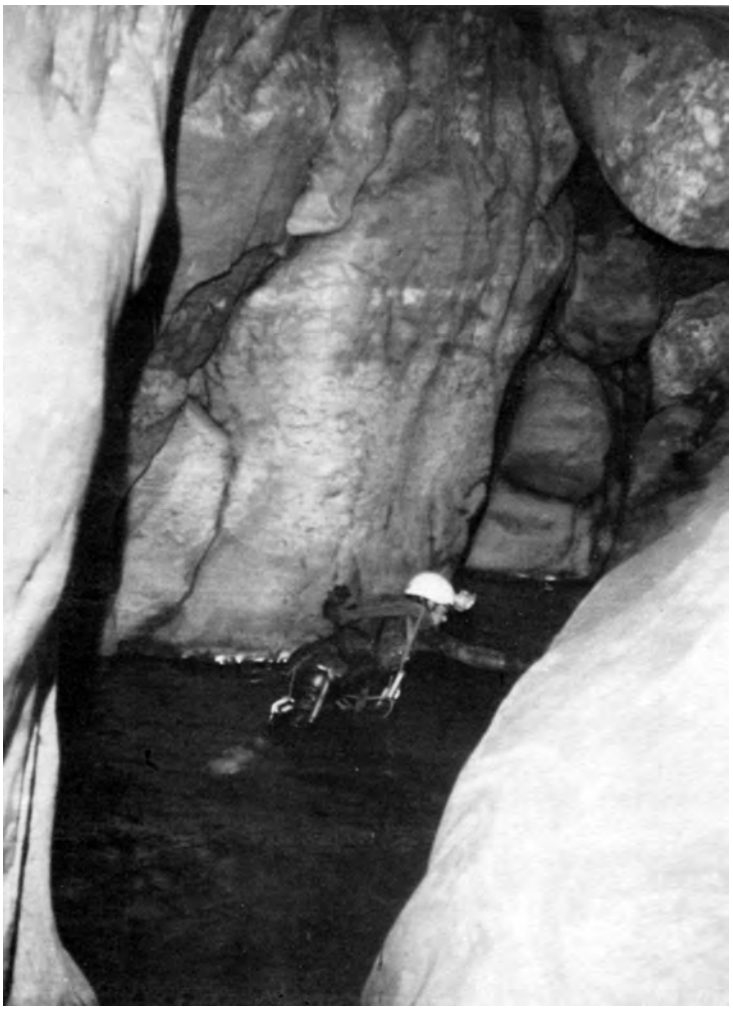
Bill Liebman in Sumidero San Bernardo. (Ernie Garza)

showing more resistance to exploration than we had expected. Two trips had gotten us only a little over 500 meters and used 5 ropes.

The cave was heading for the precipitous canyon of the Río Ateno, not far away. Maureen and I had a go at reaching the bottom, but the "trail" we followed down for a hundred meters or so, required the use of vines for vertical handline, and we gave up.

On January 23, Ernie Garza took Alejandro's place and we pushed on. The swim below the 5 meter drop led to a turn in the passage and from there you could see daylight - we had a thru trip! A couple more drops had to be done and by the time we reached our exit, daylight had faded to night. The cave broke out on a small shelf of the sheer canyon. Maureen and I tried to descend. To one side was a small area of coffee trees, but searching did not produce the trail. There were cliffs above and to all sides. Oh well, the cave had to be derigged anyway.

Sumidero San Bernardo is an extremely spiritual thru trip. The cave is easy, (only 600 meters long), but has 10 short rope drops and 5 more drops requiring handlines. These 15 drops need several pitons and bolts, and there are several swims. Both the cave and the canyon it empties into are magnificent.



Steve Knutson in Sumidero San Bernardo. (Bill Liebman)

Sumidero San Bernardo

Sumidero San Bernardo esta localizado debajo del pueblo de Xochitlán, Puebla. El sumidero es una cueva grande con muchos tiros en su descenso que termina en una entrada baja en el cañon del Río Ateno. El autor describe la cueva, diciendo que es muy ámplia, tiene paredes lisas, pisos arenosos, charcos hondos, y cascadas. El mapa que acompaña este artículo enseña estas caracteristicas en datalle. La cueva tiene 600 metros de largo y tiene 15 tiros que requieren el uso de varios pitones y clavijas de expansión. También hay lagunas donde es necesario nadar.

SHORT PENETRATION SUMP DIVING

Bill Stone

A few years ago there was a popular slogan in Austin, "A sump is God's way of telling you the cave ends there." Though it seemed like good common sense at the time, caving has changed considerably since then - teams now commonly wear full wetsuits, and use dual mountings for carbide and electric lights. Long duration underground camps are being utilized for deep assaults. Climbers are scaling underground "big walls." Caving can be a highly technical sport - the cutting edge of which is closely dependent on the available technology and its adaptability to meet a specific challenge.

Of all the "secondary" exploration techniques being used by cavers these days none is more controversial than sump diving. This stems from the fact that it is closely related to cave diving and its long history of fatalities. True, sump diving does involve the use of similar technology, but the objectives and personnel involved are quite different. The sump diver is a caver who is hoping to break into continuing airspace. The cave diver is a diver who explores underwater caves. The distinction is a profound one. With no restrictions on portability, cave divers have been able to develop sound methods for safely effecting explorations of long (up to 3 kilometers) and deep (up to 107 meters) underwater caves. There is still, however, a relative paucity of information on what techniques are best for sump diving, owing largely to the fact that there are still only a few serious groups of sump divers in the U.S. We are at an evolving state of the art where the limits of what has been "acceptable" are being challenged. A timely forum of ideas and rebuttal is thus warranted.

The following discussion deals with the very specialized topic of short penetration, deep cave sump diving, and the evolution of ideas on how to do it with the least amount of hassle. In essence, the goal has been to achieve the "quality poke," one step in range beyond free sump diving.

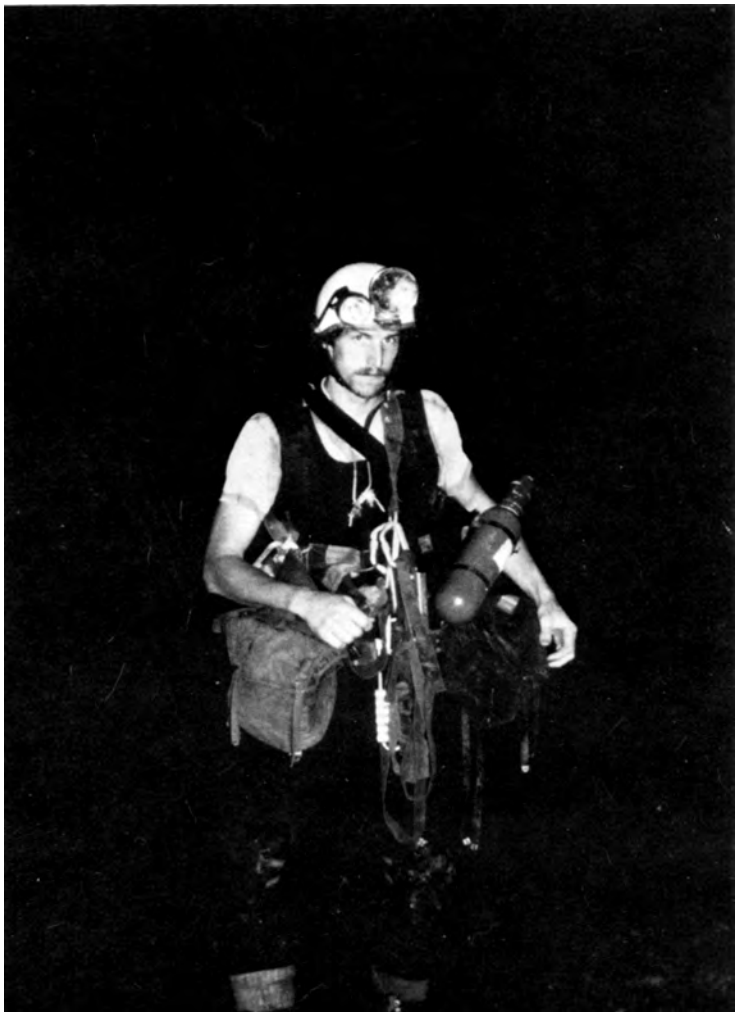
The quality poke. That notion dropped into your mind every time you rappelled into the so-called "terminal sump" which punctually ended so many deep systems. Some of them, of course, were quite terminal - the kind of submerged mud plugs that required the flip of a coin to see who would check it out. The kind where everyone breathed a sigh of relief when the sludge encrusted chosen-one flashed back a thin smile, eyebrows creased, and said, "Yep, terminal. Guess we ought to derig, huh?" It was those ones where you could see the crystal green fluid receding beneath a broad arched ceiling...the ones with the clean gravel floors... that drove you nuts! The more ambitious types - notably Jim Smith in the southeast - began carrying masks as standard equipment. Free sump diving became an acceptable, if not respected, art. But this had its limitations - a two to five meter penetration was about the safe limit on one breath of air. Even then you ran a heavy risk. You could pop up into an airbell filled with bad air (such as the

one in Langstroth Pot in England which claimed three lives in 1976), or you might get momentarily stuck - counting down those precious seconds.

Meanwhile, cave divers in Florida - Sheck Exley, John Zumrick, Court Smith, and other members of the NSS Caving Diving Section-were routinely effecting kilometer penetrations into the large spring systems there. In Colorado, Norm Pace, Tom Taylor, Jim Pisarowicz and crew were working on the sump 4 in Spring Cave. SCUBA appeared to be an attractive means of forging beyond the free dive radius for deep cave sump diving. It was also clear, however, that the technology which they had so successfully applied to the big springs of Florida would not work in many deep cave situations. The twin hard-lined 100 cubic foot tanks used by the Florida divers weighed well over 100 pounds - a rather ponderous load to be ferrying 43 pitches in and out from a sump at -800 meters. Add to this another 50 or 70 pounds of peripheral equipment - fins, four sources of light (the larger primary lamps used in Florida can weigh up to 20 pounds), line reel, regulators, etc. - and you wind up with a serious logistical dilemma: how will you get it all to the objective?

Enter Spring Cave, Colorado. Sump I, where they first began the diving effort, is approximately two kilometers from the entrance through some arduous territory, albeit horizontal. The Colorado cavers' plan evolved into a series of mini-weekend-expeditions of the classical British character: 10 or more "Sherpas" had to be rounded up so as to ferry the diving gear into Sump I. Things became more complex when Sump IV was reached. Then, mini expeditions, including diving sherpas, had to be organized to stage major mini-expedition penetration dives.

Various difficulties with sherpa organization at Spring Cave left



Carrying Sherwood steel 15 cubic foot tank at -700m in San Agustín.

us all a bit pensive. Clearly it was going to be a non-trivial matter to coerce 20 gung ho sherpas to leave their jobs for three months and gleefully carry those long, metal cylinders to -800 meters. Most times we were lucky to field 5 to 8, including the divers. The descent was not all that bad, mind you. It was the ahh...weight of the matter...that first caught your imagination (and breath) when it became time to derig. It gave you a wink of an insight into what motivated the unusual assault tactics used for the French diving efforts

at the -1122 meter sump in the Gouffre Berger during the mid 1960s. SCUBA tanks, being the heaviest item in their inventory, became expendable, and were conveniently "stored" at the bottom of the sump following the dive!

Being conservation minded, as well as monetarily conscious, disposable dive gear never caught on in Austin. Which brings us back to carrying all that metal out. The logical solution was to lighten the load by removing all non-essential items, and use smaller tanks. Hand in hand with this went the understanding that the equipment for three divers weighed 50% more than the gear for two divers and 300% more than the gear for one diver. The idea of solo cave diving has always been one of those not-to-be-discussed taboos among the sport diving community. Certainly, it is not to be recommended officially, and buddy diving should be adhered to whenever feasible. But the facts are that the majority of the serious sump divers in the world today - the ones doing the original exploratory work - will confirm that they prefer to dive solo when laying a line into virgin territory where visibility may be a problem. Anyone who has had to worry about what a "buddy" was doing in a zero visibility silt-out in constricted quarters can appreciate the statement. Additionally, diving solo actually increases the diver's air reserve safety factor when using the third rule. The way the rule normally works is that the dive is called when the first diver reaches 2/3 of his starting pressure, read from a submersible gauge. One half of what is left should be enough to get each diver out. The remaining is in case the return is slow, or for your buddy, should his life support malfunction. When diving solo, this extra air constitutes a higher safety margin since the probability of having to buddy breathe is zero. For short penetration sump diving, this extra margin may be critical since any delay will consume a larger percentage of the air supply in a small tank. At the time I began diving it was common practice to use one back-mounted tank with one regulator and sub-gauge. The idea of solo diving with such equipment immediately beckoned the question: "Suppose it was your gear that malfunctioned?"

This left me wondering for some time, until one day Mike Boon happened to pass through town. "So, I hear you've taken up sump diving," he said, raising his thick, black-rimmed glasses and rubbing a short stubble of a beard, "dangerous stuff you know." As I nodded, he pointed a bony finger at the Texas emblem on my T-shirt and cautioned, "Well, you had best get it right then." Boon, for those who have never met the fellow, or read any of his books, is an engaging British Canadian whose international caving escapades span more than a score of years. Perhaps most notably he was Britian's best sump diver throughout most of the 1960s. Boon's system for sump diving called for using two completely independent, hip-mounted air supplies. "The key is redundancy you understand," he lectured, "the odds of both of them going on the same dive are quite small." "You mount them on your hips, like this...see," he motioned, positioning the bottom in a holster-like fashion, "for two reasons. First it gives you a lower diving profile, and second, perhaps more importantly, you can easily reach the valve should your second stage free flow - very important with small tanks, you know. I've known of chaps turning them on and off all the way out when silt clogged the regulator."

Meanwhile, an alternate solution to the redundancy problem had recently been developed in Florida by NSS divers. Instead of the standard double tank yoke - which allowed for only one first stage to be attached - a "Dual Valve Manifold" was designed in which two independent regulators were attached to

the yoke, each capable of accessing the entire air supply (both tanks), even if one regulator were turned off. Although this system was actually safer than two independent tanks - if the first stage on one of the tanks jammed you could not access that reserve air - it was logistically unacceptable. Single tanks are easier (and safer) to handle in rugged terrain. In theory, as it is yet untested, the inherent safety of the Dual Valve Manifold could be obtained with single tanks by using "slingshot" Y-type valves (instead of the standard K-valves), and linking them together with a flexible, high pressure equalizer at the sump. Both items are currently available on the commercial market.

As for air consumption, the "British" method allowed for one half of the starting pressure on one tank (each tank has a complete regulator and sub-gauge) to be used before calling the dive. One would thus return with a completely full backup tank under normal circumstances. Most Brits dived dual "40s," but we considered this to be too weighty for the short dives we had in mind, preferring instead to use two of the much lighter 15 cubic foot capacity "pony" tanks. Given the short duration of the air supply for these tanks, a more conservative rationing schedule was adopted: a "1/6 rule" whereby only 1/3 of one tank is used for exploration before the dive is called. Under good conditions (clear water, no silt, fins for propulsion), this gives the diver a 5 to 7 minute penetration radius, which can be a substantial distance (up to 100 meters) at shallow depth. This radius can be extended with minimal extra weight by "overfilling" the tanks to 150% of the rated capacity. A 2250 psi tank would thus be filled to slightly over 3000 psi, with the blow out disks plugged to prevent leakage. Although this may appear to be an alarming procedure to some, hydrostatic ultimate strength tests indicate that pressures as high as 10,000 psi can be tolerated before rupture of a 2250 psi rated steel tank. Engineers at the Luxfer Co. stated that 5625 psi was the absolute minimum ultimate pressure achieved for their aluminum tanks (2015 psi rated), and that during the required hydrostatic test that all tanks must undergo every five years, pressures reach 5/3 of the rated value, or 3750 psi. It is to be emphasized that this should be done only with relatively new, clean tanks. Weight wise, the 7 pound "Luxfer" 2015 psi aluminum tank (15 cu. ft.) is to be preferred over the 8.5 pound "Sherwood" 3300 psi steel tank. It is

Zeman mounting 15 cubic foot steel tank for portaging to 861m sump in San Agustin. Quick release seat belts are used for fastening the tanks. During a dive the tank is mounted at hip level.

also much easier to obtain the 150% overfill in the former case since most dive shops are not yet capable of pumping 5000 psi pressures. The aluminum tanks, although lighter, are at least 50% more bulky than the steel tanks. In some cases, the use of the lower profile tank may be justified.

There are a few caveats to be brought up concerning high pressure tanks. For one, it may not be possible to find a cooperative dive shop to do an overfill, despite the data presented above. When dealing with 3000 psi pressures in the aluminum tanks (2015 psi rated), there will be little problem with using off-the-shelf regulators. The jump to 4000 and even 5000 psi, to the contrary, has a profound effect. The Teflon piston seats for the first stage of a 3000 psi rated regulator can wear out, and begin to leak seriously in fewer than ten tank fills. Worse, however, is the fact that the yolk-type arrangement which couple the regulator to the tank is subject to relatively large deflections under high pressure. The yolks are designed for what is known as a "plastic yield," that is to say not a brittle rupture. If extreme care is not taken in the seating of the regulator (tighten screws, pressurize to 3000 psi, release, retighten screws, pressurize to 4000 psi, etc. up to 5000 psi) the possibility is good for blowing the main O-ring pressure seal if the regulator is banged during the course of the dive...with rather disastrous consequences. The only system presently on the market that can solve this problem is the Poseidon high pressure valve and regulator that are rated to 6000 psi operating pressures. In this system the first stage is actually screwed into the valve - no yolk assembly is used. All major SCUBA manufacturers in the U.S. have prototype systems similar to this presently on the drawing boards, as high pressure technology will be the next step forward in SCUBA during the 1980s.

It is interesting to note that systems very similar to the dual pony tank method mentioned above were independently developed and used recently by Belgian cavers of the G.S.A.B. (Etienne Degrave) to dive the sump at -970 meters in Schneeloch (Austria), and by French cavers (Frederics Poggia and Vergier) to dive the -1077 meter sump in the Sima GESM (Spain). The basic philosophy appears to be the same: a limited penetration dive can be safely effected with a very small team at great depth. The benefits of such tactics are threefold: If a sump turns out to be short (less than 10 meters), a handline can be rigged for equipment hauling and free diving. If the sump continues beyond the penetration limit its exact nature can be ascertained for planning a more serious effort. And lastly, derigging logistics have been minimized.

With the air supply out of the way, a few other modifications were made to lessen the peripheral equipment load. Wheat Lamps (Koehler) have been used for primary dive lights since 1978 for all deep system dives involving U.S. cavers. Similar lights are regularly used by both British and European sump divers. Either two or three of these were mounted on a standard caving helmet. This system of lighting offers numerous advantages for short penetration dives over the large hand-held models used in Florida; the helmet not only protects the diver from an unpleasant rap to the head, but it also frees the hands for the intricate maneuvers more likely to be encountered in a sump than in a big spring. Each lamp has a twin filament bulb so that in the rare event of a burnout one need only to flip the switch. The bulbs themselves have been tested to 70 meter water depths with no ill effects. Although the headpiece will leak water at excessive depths, this will not cause failure of the light, provided the working parts and contacts are cleaned and greased before each major dive.

The above data is presented for reference only. It is unlikely that one would want to go much deeper than 10 meters with pony tanks on a short penetration dive. At shallow depths, the Wheat Lamp can actually be made water tight. The special emphasis placed here on using the Wheat Lamp is due to the fact that most everyone on a deep caving team will already be using one for regular caving, and they need only to be pooled for the diver when the sump is reached. Thus, no extra primary lights have to be carried in. This does not preclude,however, the necessity of having an additional two or three secondary lights along. Commercial lightweight models such as the "Tekna-lite" and the "Super Q light" are preferable.

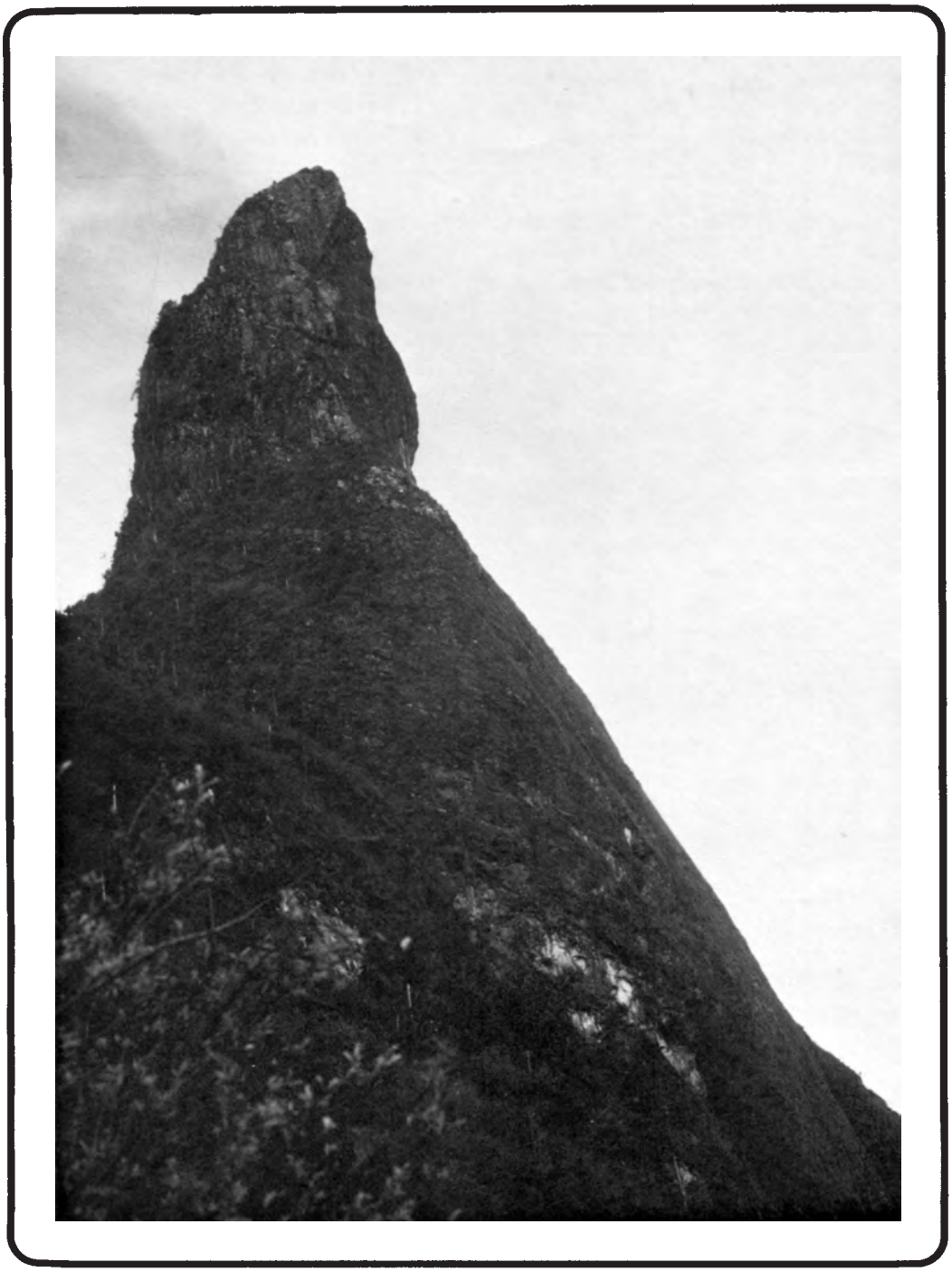
The last item, one of some controversy, is propulsion technique. The method to be used on a short penetration diving effort will depend a great deal on the nature of what must be traversed on the way to the sump, and during the dive itself. There is no question that fins will give the diver a threefold increase in penetration radius, provided the sump is a large one. In tight, awkward sumps they may be more of a hinderance than a strategic edge; both from their size and tendency to stir up silt. If fins are not used, the following alternative propulsion technique may be quite useful. Due to the lightness of the tanks, and the lift given by the wetsuit, the diver will almost always have positive buoyancy. For this situation, it is possible, to flip upside-down and crawl along the roof for propulsion, provided that ceiling silting is not a major problem. This technique has a number of advantages. All airbells will be easily located; the depth of the dive will be minimized (thus increasing the allowable duration); and bottom silting will be avoided. If the diver finds that he must decrease buoyancy, there is, technically, only the alternative of carrying in lead weights and a Buoyancy Compensator, or if he is not greatly positive buoyant, tucking an appropriate rock under the wetsuit to achieve the same effect. The former solution may be a difficult item to sell to the sherpas.

As for the future, we can count on technological improvements to enable bolder explorations than heretofore achieved. High pressure, lightweight Fiberglass and Kevlar wrapped tanks - such as those used on the Space Shuttle - may be adaptable to cave diving. Hundred cubic foot tanks weighing less than 20 pounds will be available soon. And that will mark the advent of the golden age of deep cave diving.

Note: Comments and suggestions on the above article are encouraged. For further reading on the general subject of cave diving the reader is referred to "Basic Cave Diving - a Blueprint for Survival" by Sheck Exley, available from the NSS Cave Diving Section, 10259 Crystal Springs Road, Jacksonville, Florida 32221.

Espeleobuceo

Este artículo discute las técnicas que se están usando y desarrollando para bucear a través de sifones. Las logísticas de través de cuevas profundas requieren el uso de luces y tanques pequeños y livianos.



Cerro de la Silleta. (Peter Keys)

LA SILLETA

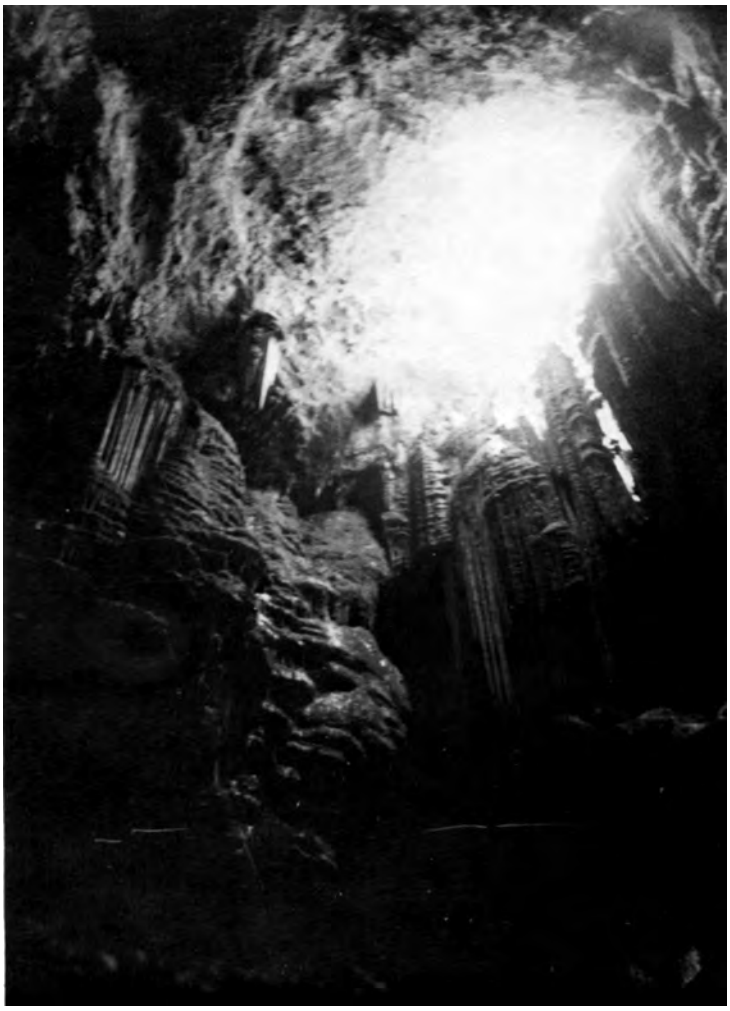
Gateway to the Xilitla Plateau

Peter Sprouse

Cerro de la Silleta, the Matterhorn-like pinnacle above Xilitla, San Luis Potosí, is a well known landmark to cavers. The karst of the Xilitla area was among the first visited by Texas cavers, and it's still not uncommon to run into one of them in the streets of Xilitla today. After the successful exploration of 488 meter deep Sótano de Tlamaya in the early sixties, cavers looked toward the high plateau around La Silleta. On December 22, 1966 a reconnaissance team of Danny Evans, Kirk Holland, Ken Krans, Richard Schreiber, and Tony Thompson set off for La Silleta with a guide who said he knew of a deep sótano no cavers had ever seen. A long, steep hike brought them to an impressive pit entrance in the shadow of La Silleta. The group returned two days later to explore Sótano de La Silleta, pushing the cave down to a pinch at an estimated depth of 215 meters. Return trips to the La Silleta area in 1967, 1968, and 1969 resulted in the discovery of several more caves, including Sótano de la Navidad, a wet multi-drop fissure cave which was surveyed to a depth of 200 meters. Sótano de La Silleta, however, was not surveyed. No caving expeditions returned to La Silleta for eleven years.

On March 28, 1980, an AMCS group returned to hike into the highlands to map Sótano de La Silleta, to see if it could be pushed deeper, and to locate any new caves. Don Broussard, Leslie Clairfield, David Honea, Peter Keys, Dale Pate, Peter Quick, Randy Rumer, Terri Treacy, and myself left our vehicles at the phosphate mine above Tlamaya and packed up a westward trail towards the plateau. We passed through the small villages of San Pedro and La Tinaja as we drew ever closer to the towering La Silleta. We paused for a cerveza in Ejido La Silleta, located in a flat floored dolina 800 meters below the peak. About halfway up the final climb to the peak,we located Gruta de la Navidad, a 200 meter long, horizontal cave used by the previous expeditions as a camp, and also our objective for the day. We found it to be a nice, flat floored entrance passage, ample to house our whole crew. The cave had a well used feel to it -- hundreds of potsherds littered the floor. We later discovered that the local name for this cave is Cueva de los Muertos.

The following morning, we located a guide from the ejido, Gregorio Galfan, who would guide us up to the sótano and also guide us to the top of La Silleta. Gregorio said he had guided climbers up before which surprised us, as the ascent looked tricky at best. After breakfast, all of us, but Dale and Randy, hiked up the steep trail which led the final 300 meters up the rim of the plateau itself. The vegetation on the plateau (2000 meters elev.) was less tropical than lower down; tall hardwoods and pines were abundant. Gregorio showed us a small cave about 500 meters east of La Silleta he called Cueva del Silgero, then took us on to the entrance of Sótano de La Silleta. The high side of the entrance is undercut for about 15 meters horizontally, then drops vertically in heavily flowstoned walls. We left a duffle of ropes we'd need for the next day's survey trip and set off for the top of La Silleta, 200 meters higher. A trail led around the south side and switchbacked up, getting progressively steeper. At only one point was a rope really useful, and soon we reached the false west summit. Our mountaineering guide led us along the windy, knife edge to the summit where an orgy of "summit shot" picture taking ensued. The view was spectacular. We could see north to Tamapatz and the valley in which lies Sótano de las Golondrinas. East lay the coastal plain. To the



Entrance shaft of Sótano de La Silleta. (Don Broussard)

south we could see limestone karst beyond Tamazunchale which led over towards Cuetzalan. Just below us were two funnel shaped dolinas containing Sótano de la Navidad and Cueva (not Sótano) de La Silleta. And to the west, was the karst of the Xilitla Plateau, gradually climbing some 800 meters above us. Gregorio and some of his companions who had joined us said they knew of a deep pit about 2 kilometers to the west, so we set off with them to see it. On the way, we were shown another cave called Cueva de los Ladrones. It consisted of a large, sloping passage, 70 meters long, leading to a flat, mud floor with a few pools at the depth of 36 meters. On further, we encountered a small logging camp with a tree hut, which inspired the name "Cueva de los Viet Cong" for a small cave that we located nearby. Further progress on vague trails got us to their pit, called Sótano del Tigre. It was a large fissure pit with a double entrance. We could walk down partway into the east hole, but were stopped at a vertical pitch of around 30 meters. We made a sketch of what we could see, but never got back to this pit to do a proper exploration.

We split into two survey teams for the mapping of Sótano de La Silleta. Randy Rumer, Peter Keys, and Peter Quick were to proceed to the middle of the cave and map to the bottom, while David Honea, Terri Treacy, and I surveyed in from the entrance. We dropped a minus ninety degree shot for 51.6 meters and rappelled down the entrance drop, spectacularly adorned with huge draperies and stalactites. As I sketched the flowstone floor of the entrance chamber, David and Terri uncovered several new troglobitic species in the washed-in surface debris. Two stalagmites were encountered at the top of a sloping flowstone handline drop. A ledge traverse on the left led to a short side passage and a balcony overlooking the handline slope, providing an excellent vista of the spacious entrance room.

At the bottom of the 20 meter handline, the passage abruptly constricted down to a half meter diameter hole. A reasonable breeze and a small, but cold, stream of water tumbled down a 7 meter drop. The bottom team had wetsuits, but we did not, and the cave temperature was a surprisingly cold 11.5° Celsius. On a narrow ledge below, we looked at a small room off to the right and rappelled down another 7 meter drop, basically a continuation of the one above (kindly rigged by the bottom team!) At this level, we did a side shot into a circular mud floored room 12 meters in dia-

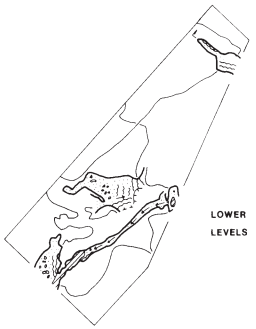
Sótano de La Silleta

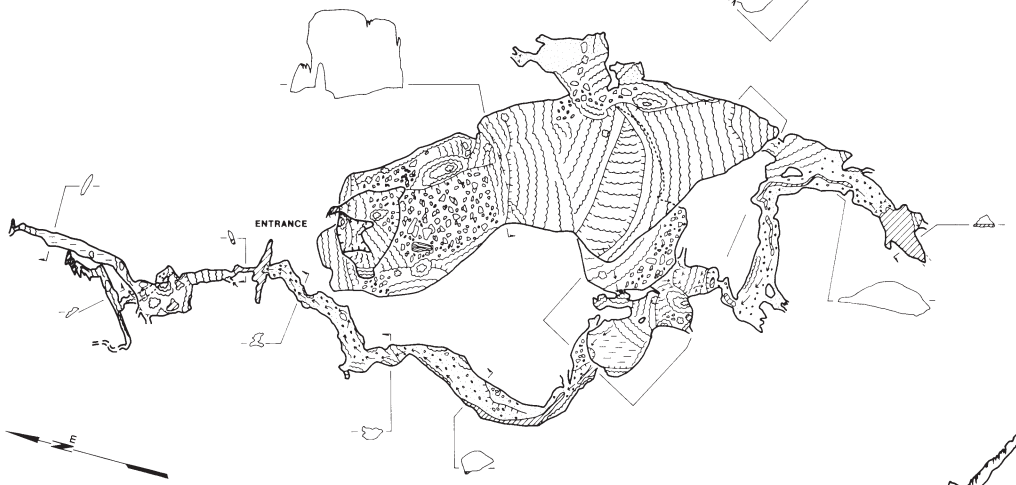
Xilitla, SLP, México

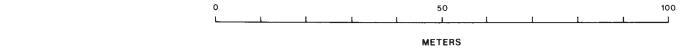
Suuntos and tape survey 30 March 1980
David Honea, Peter Keys, Peter Quick, Randy Rumer,
Peter Sprouse, Terri Treacy AMCS

Drawing by P. Keys, R. Rumer, P. Sprouse
Drafting by P. Sprouse
Plotting by Ellipse

Length: 638 m
Depth: 191 m







meter. A further 6 meter drop and flowstone climbdown tied us into the other team's survey at a horizontal stream passage. We met them returning from having mapped 80 meters upstream, past two small side leads, to a flowing sump with a climbing lead on the far side. We agreed to survey these leads while the wetsuiters pushed on into the increasingly wet cave. The two side leads ended shortly, and we passed up the wade to reach the climbing lead. It appeared to go, however, and pine needles in the stream suggest that it could lead to another entrance. This passage we named the Blindworm River, for its large, white, aquatic earthworms. The bottom team mapped 250 meters further to two terminal breakdown pinches at 192 meters below the entrance. Our survey line through the cave was 638 meters long. In our remaining few days on the plateau, we surveyed several caves to the south and west of La Silleta, including Cueva de La Silleta. Don and David mapped 150 meters in this cave to a half submerged, tight constriction. A strong breeze indicated that this constriction might be worth pushing. Close by our base camp at Gruta de la Navidad was 100 meter long Cueva de Agua, where we obtained our drinking water in pools near the entrance. While at the back of the cave adding information to Ron Bridgemon's map, I noticed a strange thing. A well decorated stoopway lowered to an apparent end in a mud floor, but the rush of a fast stream could plainly be heard beyond. Certainly a promising digging lead.

Peter, Peter, and Leslie returned to the west of La Silleta to map Sótano del Tigre, failed to locate it, and instead found an interesting cave in an arroyo. Containing many potsherds and bones, the cave was named Cueva de los Antiguos. Peter, Peter, and Don stayed to map Antiguos while the rest of us began our hike down the mountain. In La Tinaja, David and I obtained a guide to show us a pit we'd heard of 500 meters north of the village. It was called Sótano de El Ranchito. We found it to be a large diameter pit dropping what looked to be 50 meters or so into a large, well decorated passage going two directions. This would be a good day long mapping project accessible from the Tlamaya Mine road.

La Silleta

Este articulo discute la exploración y levantamiento de varias cuevas debajo del pináculo de Cerro de la Silleta. Sótano de La Silleta fué explorada por la primera vez en 1966, pero no fue mapeada hasta 1980. La bella entrada de travertina tiene 51.6 metros de profundidad. A treinta metros por enzima de cantos rodados hay un tiro empinado de 20 metros. El pasaje bruscamente se encoje hacía una estrechura de medio metro en diámetro. Dos tiros cortos y una desescalada conducen a un pasaje horizontal con un chorro. Ochenta metros aguas arriba el pasaje termina en un sifón. Un domo alto arriba del sifón aparece continuar más pero no fué revisado. Aguas abajo del chorro el pasaje continúa 250 metros más y termina en un canto rodado. La cueva tiene 192 metros de profundidad, con 638 metros de longitud. La temperatura registrada fué de 11.5°C. También levantaron varias otras cuevas, inclusiva la Cueva de La Silleta de 150 metros de longitud.

CUEVA DE LA SILLETA

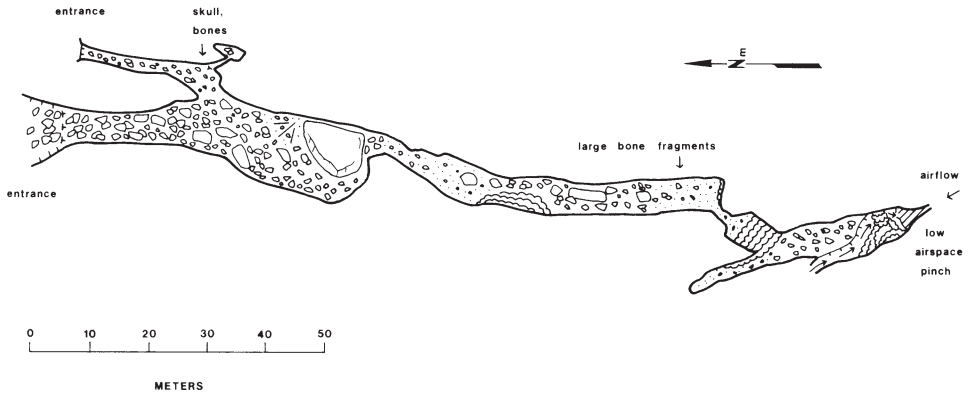
XILITLA, SLP, MEXICO

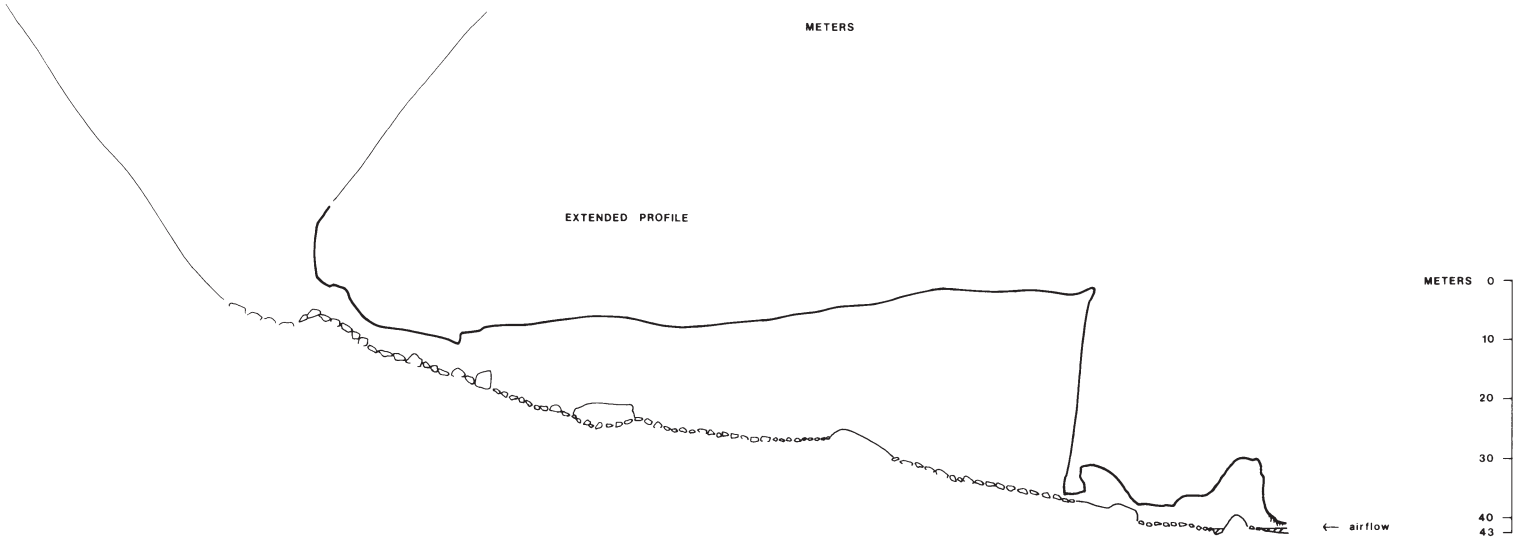
SUUNTOS AND TAPE SURVEY 1 APRIL 1980

DON BROUSSARD, DAVID HONEA

LENGTH: 166 m

DEPTH: 43 m





PSS 8-80

Computer-Drawn Passage Walls

David McKenzie

Recently, while inspecting the existing map of Powell's Cave, Texas with the thought of "computerizing" the data, I noticed that the passages were suffering from a self-avoidance syndrome. Different parts of this 16 kilometer long crawlway-maze would encroach each other on the map, but instead of joining neatly, the passages on each side would suddenly just fade away, perhaps overlapping first as if on different levels. You would recognize the phenomenon if, like Pete Lindsley, you have ever tried to coordinate the efforts of many surveying teams in a large cave over a period of years. In this case, Pete was unwilling to severely distort new surveys to make them fit the extensive drawings already made on his master map. So in fact they do not fit.

One of my interests during the past several years has been in developing a computer program, ELLIPSE, for manipulating cave survey data. It is presently being used for most AMCS mapping projects. One might expect that a modern computer system (unavailable to the Powell's Cave surveyors) would have eliminated the kind of problem described above. Now, with the addition of new surveys to a project, all of the existing information can be examined for consistency and then "averaged" in a statistically appropriate way. No longer do we have the confusion caused by "closing loops" sequentially -- an archaic method with virtually no advantages.

Unfortunately, even though ELLIPSE will do simultaneous adjustments and error analyses of the largest networks, it still turns out that drafted versions of major cave systems hardly ever reflect the most recent station location estimates. For example, if you overlay Peter Sprouse's pencil draft of Sistema Purificación with the latest computer plot of the baseline, there will be significant disagreement. Obviously, no one is going to redraw large portions of his map each time a new adjustment changes the existing baseline.

The computer-processed information, however, is important to maintain if one cares about survey quality. Particularly important is the ability to isolate bad measurements which new loops may reveal. At the same time, up-to-date maps with accurate passage outlines are nice to have if you are trying to survey a complex cave systematically. Therefore, I recently decided to include in ELLIPSE a feature which at an earlier time I would have judged completely impractical: an option to process and draw passage "walls" in addition to the usual baselines and annotation.

The computer-drawn walls I had previously seen, which were derived from passage dimensions recorded in the cave at each station, were not realistic enough. Besides, many surveyors don't bother to obtain this information. (Some maze caves are bad enough to map without worrying about distances to "right and left walls".) At the other extreme, adequate depiction of the detailed sketches made by good surveyors would require, I thought, expensive graphics hardware. Fortunately, this last point is no longer valid. Digitizing tablets, when compared to line plotters and printers, are inexpensive computer periferals. (A fancy graphics tablet is avail-

able for the Apple II for $650.)

The line plot accompanying this article, a window view into the North Maze of Actun Kaua, demonstrates the type of output possible with the revised program. It was produced with a Zeta 3600 series (4-color) plotter using a black felt-tip pen. Other colors, of course, might depict survey vectors, station markers and names, or different passage levels. More important than versatility in scales and formats, however, is the ability of these walls to maintain their positions with respect to "local" stations that change slightly in relation to one another as more of the maze is surveyed, and loops are adjusted. Otherwise, we would be asking the computer to do something a good draftsman could do better and more cheaply. Hence, wall digitizing is not recommended for caves that are finished in a couple of surveying trips.

Wall Adjustment Details

Use of digitizing equipment is reasonably straightforward; with a little practice its not much harder to "trace" a pencil sketch, or a copy of one, with a button cursor than with a rapidograph. The problem that interested me most was how to represent digitized walls so they can be efficiently adjusted, stored, and drawn. The U.S. Geological Survey recently used an "elastic body-fit" program to bring their digitized Idaho State Base Map (1:500,000) up to required standards of accuracy (see USGS Yearbook, Fiscal Year 1978, p.64). Presumably, their method is analogous to copying the original figure on an infinite, stretched sheet of elastic, attaching pins at a selected set of "critical control points" (37 in the case of Idaho), then moving the pins to the revised control point positions and photographing the resulting figure.

Though elegant in theory, this approach would be inappropriate for our purposes since it would ignore the way a cave surveying team actually obtains its data. When drawing walls, the sketcher doesn't "see" stations hundreds of meters away, or even three meters away if they reside in separate passages. For reference he uses only a few stations close by, perhaps aided by a stretched tape connecting them. Some sketchers, in fact, take pains to do this quite accurately, using protracter and ruler. Therefore, what we would like to preserve in a survey adjustment are the relative positions of wall features with respect to the displacement vectors (usually sight lines) between stations that are nearby.

Now suppose that the coordinate pairs (X_1,Y_1) and (X_2,Y_2), obtained from the digitizing tablet, are the head and tail positions of a chosen "reference vector" for a wall point with coordinates (X,Y). Then we can replace (X,Y) with transverse and normal components in the vector's frame of reference:

$$\bar{X} = \left[(Y_2-Y_1)(X-X_1)-(X_2-X_1)(Y-Y_1)\right] \;/\; R^2,$$

$$\bar{Y} = \left[(X_2-X_1)(X-X_1)+(Y_2-Y_1)(Y-Y_1)\right] \;/\; R^2,$$

where $$R^2 = (X_2-X_1)^2+(Y_2-Y_1)^2.$$

The new representation $(\bar{X}, \bar{Y})$ is such that whatever translation, rotation, or scaling of the reference vector we may desire to do later, the wall location would be obtained simply as

$$X' = (Y'_2-Y'_1)\bar{X} + (X'_2-X'_1)\bar{Y} + \bar{X}_1$$

$$Y' = (Y'_2-Y'_1)\bar{Y} + (X'_2-X'_1)\bar{X} + \bar{Y}_1$$

where the primes denote coordinates in the new frame of reference. The numbers $(\bar{X}, \bar{Y})$ have the added virture of being of relatively small size range, so they can be efficiently stored provided they are grouped with vector identifiers.

How can the "nearby" reference

vector be chosen? After considering several ways of automating the task, none of which were consistently reasonable, I decided it would be better anyway to let the draftsman have full control. With the cursor in "point mode" he enters each wall as a sequence of two or more station coordinate pairs interspersed with a much larger number of wall coordinate pairs. Each wall point in a coordinate sequence would then assume for reference the vector whose endpoints are the stations on either side. For signaling the type of coordinate pair a 4-button cursor works particularly well (buttons signify "station," "move to wall," "draw to wall," and "erase to last station or terminate"), and the resulting data file is structured so that it can be easily edited if necessary.

Having decided on such a representation, we must solve a final problem relating to the wall adjustment itself. Many wall sequences will contain several points of transition from one reference vector to the next. If we simply use the above formula for $(\bar{X}, \bar{Y})$, allowing abrupt transitions between reference vectors, then there is a good chance that our passages would literally come apart at the seams when they are finally drawn by the plotter. The reason for this, of course, is that patterns formed by adjacent survey vectors are not preserved in an adjustment. Therefore, the equations for $\bar{X}$ and $\bar{Y}$ have to be complicated by the addition of a "smoothing"term.

Since we are dealing with relatively small local discrepancies which can be smoothed out over the wall points in a number of satisfactory ways, I omit the particular equations used in ELLIPSE. The result is that, strictly speaking, each wall position inherits its adjustment, not from one vector, but from a weighted average of up to three vectors in sequence. It works well enough, I believe, that severe adjustments to the network due to earlier bad measurements or plotting errors could, on many occasions, result in an "acceptable" reshaping of the passage walls.

- - - - -

The methods outlined above can no doubt be improved upon, and I hope this discussion encourages further experimentation. Digitizing the passages of a large cave is certainly no less tedious than drafting with pen and ink. But a computer can do remarkable things with digital data, and there is satisfaction in knowing that each passage need be "drawn" only once.

```
      SUBROUTINE WALLS
C
C*****************************************************************
C
C  ELLIPSE WALL ADJUSTMENT ALGORITHM --
C
C  ACCEPTS DIGITIZED PASSAGE OUTLINES (2 DIMENSIONS) AND TRANSFORMS DATA
C  TABLET COORDINATES TO NEW COORDINATES WITH RESPECT TO LOCAL, POSSIBLY
C  ADJUSTED SURVEY STATIONS.  THE OUTPUT FILE, <TAPER>, IS IN A FORMAT
C  SUITABLE FOR PLOTTING WITH THE #E=<N>$ OPTION ON AN ELLIPSE #PLAN$
C  DIRECTIVE.  (N IS PEN COLOR.)
C
C  THE #WALLS$ DIRECTIVE ADMITS THE FOLLOWING KEYWORD OPTIONS:
C
C     READ    - PREPROCESSED SURVEY DATA WILL BE READ FROM FILE <DATA>.
C     LIST    - THE TABLET DATA, <TAPE7>, WILL BE PRINTED IN A
C               FORMAT THAT FACILITATES EDITING.
C
C-----------------------------------------------------------------
C
C                        -- INPUT (<TAPE7>) --
C
C     <TAPE7> CONTAINS ONE OR MORE TABLET AREAS OF DIGITIZED WALL
C     LINES.  DATA FOR SURVEYED BASELINES WILL BE READ FROM <DATA> OR
C     WILL ALREADY RESIDE IN MEMORY, PROCESSED BY EITHER THE #COMPUTE$
C     OR #ADJUST$ DIRECTIVES OF ELLIPSE.  EACH TABLET AREA HAS THE
C     FOLLOWING ARRANGEMENT:
C
C     FORMAT:  (8A10)          -- TITLE LINE;
C              (/R5)           -- REFERENCE STATION NAMES, ONE PER LINE,
C                                 TERMINATED BY SLASH (/) IN COL 1.
C              (2H 1,2I4)      -- LINES OF TABLET COORDINATES OF NAMED
C                                 STATIONS: 0 < X,Y < 2200.
C              (R(12,2I4))     -- <ID><X><Y> -- WALL COORDINATES IF
C                                 ID=2 OR 4 (4 POINTS PER LINE), OR
C                                 POSITION OF NEXT LOCAL REFERENCE IF
C                                 ID=1 (ONE POINT PER LINE).
C              (1H/)           -- DENOTES END OF TABLET AREA.
C              EOR             -- DENOTES END OF WALL DATA.
C
C     AFTER THE REFERENCE STATION COORDINATES, DATA ARE GROUPED
C     BY WALLS, WITH EACH WALL HAVING THE FOLLOWING ARRANGEMENT:
C     STARTING LOCAL REFERENCE (ID=1), WALL POINT COORDINATE PAIRS
C     (ID=2 OR 4), LOCAL REFERENCE (ID=1), WALL POINT COORDINATE
C     PAIRS, ..., ENDING LOCAL REFERENCE (ID=1).
C     GAPS IN THE WALL MAY BE PRESENT; ID=0 WILL RESULT IN A LINE
C     CONNECTING THAT WALL POINT WITH THE PREVIOUS POINT.  COORDINATE
C     PAIRS WITH ID=0 ARE IGNORED.
C
C  NOTES:
C
C  AFTER PROCESSING, THE FIRST AND LAST POINT OF A WALL WILL BE
C  FIXED WITH RESPECT TO THE LOCAL REFERENCES ON EITHER SIDE, WHILE
C  INTERMEDIATE POINTS WILL BE ADJUSTED TO EFFECT A SMOOTH TRANSITION
C  BETWEEN LOCAL REFERENCES.  THEREFORE, TO INSURE CONTINUITY, A WALL
C  LOCATION PRESENT AT THE BEGINNING OR ENDING OF TWO WALL
C  SEQUENCES, OR OF ONE CLOSING SEQUENCE (LOOP), SHOULD BE BOUNDED BY
C  THE SAME PAIR OF REFERENCES AT BOTH PLACES IN THE FILE.
C
C  LOCAL REFERENCES ARE IDENTIFIED BY COORDINATES THAT AGREE TO WITHIN
C  15 UNITS (.075 INCHES).  A CROSS-HAIR CURSOR IS EASILY REPOSITIONED
C  TO WITHIN 5 UNITS ON A 200 UNITS/INCH TABLET.
C
C-----------------------------------------------------------------
C
C                        -- OUTPUT (<TAPER>) --
C
C     FORMAT (7(I1,2I5) -- <IPEN><L1><L2>, WHERE L1 AND L2 ARE INDICES
C     (IN THE SURVEY DATA ARRAYS) OF VECTOR ENDPOINTS IF IPEN=1, OR ELSE
C     THE TRANSVERSE AND NORMAL COMPONENTS OF A WALL POINT WITH RESPECT
C     TO THE PREVIOUS VECTOR IF IPEN=2 OR 3.  THE UNITS ARE TENTHS OF A
C     PERCENT OF THE VECTOR'S HORIZONTAL LENGTH.  HENCE, IF (VX,VY) ARE
C     THE SCALED VECTOR'S COMPONENTS AND (VX0,VY0) ITS TAIL POSITION,
C
C              WX = (VY * L1 + VX * L2) / 1000 + VX0,  AND
C              WY = (VY * L2 - VX * L1) / 1000 + VY0,
C
C     SPECIFY THE CORRESPONDING (SCALED) POSITION OF THE WALL POINT.
C
C  NOTE:  WHEN DRAWING WALLS ELLIPSE WILL IGNORE POINTS OUTSIDE THE
C  FRAME OR INSIDE THE TITLE BLOCK, OR THOSE WHOSE REFERENCE STATIONS
C  HAVE NOT BOTH BEEN SCALED BY THE PARTICULAR #PLAN$ DIRECTIVE.
C
C*****************************************************************
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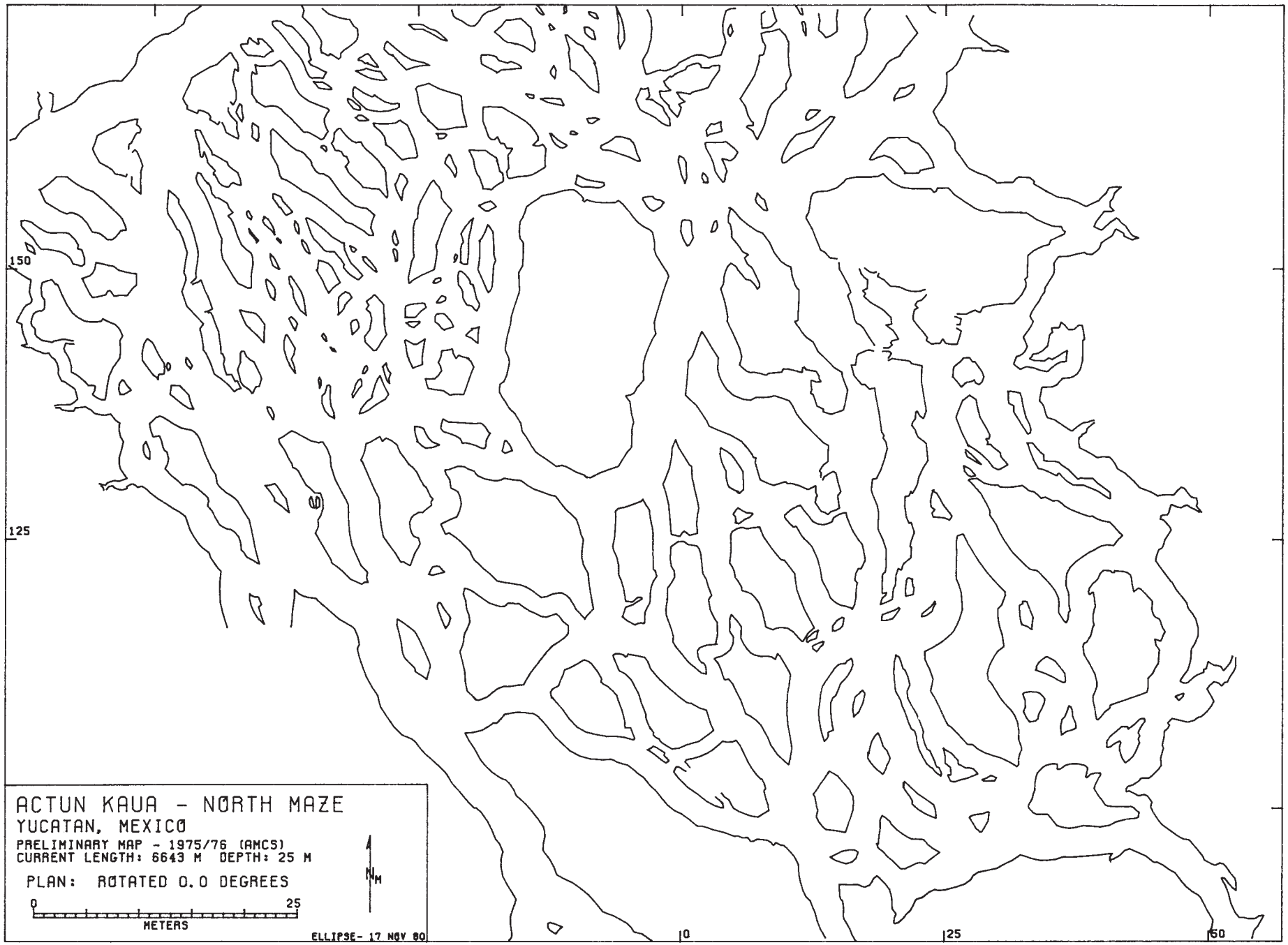

150
125
0
25
50
ACTUN KAUA - NORTH MAZE
YUCATAN, MEXICO
PRELIMINARY MAP - 1975/76 (AMCS)
CURRENT LENGTH: 6643 M DEPTH: 25 M
PLAN: ROTATED 0.0 DEGREES
0
25
METERS
ELLIPSE- 17 NOV 80

BOOK REVIEW

ATLAS SOUTERRAIN DE LA PROVENCE ET DES ALPES DE LUMIERE by Paul Courbon and S.C. Sanary. Second Edition 1980.

Aha! It inevitably happens to anyone who has been caving for any length of time, and who has returned to those beautiful caves of the past to find them gone. The hole is still there, but unrecognizable as that place that held so much attraction. Like going back to some childhood fishing spot and seeing only a mudhole. And boy, are you mad at whoever did this, but...maybe as a young, novice caver you plucked a stalactite when no one was looking? You can see the results of your carelessness now, and you want to warn everybody about what you've learned. And you'd better do it because we humans have the utterly amazing inability to see beyond our noses. We act without thinking.

The author of this publication seems to have had this experience. He has been caving at least 25 years and has seen lots of caves fall by the wayside, some at the hands of cavers themselves. So, he has cleverly added anti-pollution chapters, cartoons and slogans to this deep-cave publication. In fact, the publication begins with a chapter on the respect and cleanliness of caves.

Why has it taken French cavers so long to do something about this problem? Especially since their history of caving goes a long way back, and to some very renowned cavers who themselves recognized some of these problems? Although Martel had his collection of formations (as Courbon states), he realized the health danger presented by dumping animal carcasses in caves, and got a law passed outlawing this. Also, Norbert Casteret repeatedly recounts tales of beautiful caverns being totally stripped of all formations. Courbon suggests that since antipollution concern just isn't an integral part of French daily life, much as it is here in the U.S., then there is no conservation consciousness underlying French caving. Hence, French cavers themselves just by their numbers (in an area half the size of Texas there are more cavers than in the entire U.S.), will wreak havoc if they are not conservation minded. It seems pretty obvious that since most people aren't careful on their own initiative, then they must be taught to be careful and "sneaking" this instruction into caving publications is one way of exposing conservation to the general caving public.

As for the rest of the publication, it is basically a reference list of the deepest vertical caves ("gouffres" not "grottes" which are horizontal caves), in the southeasternmost part of France. No caves under 100 meters deep are included in the descriptions and maps, but are merely named. One hundred and fifteen "gouffres" are briefly described, (location, maps, history, bibliography, and resurgence when appropriate). There is absolutely no information on biology, and very little on geology. This is strictly big pits and deep caves. The maps are mostly profiles with very few plans, and the profiles emphasize one thing, depth. However, for a reference book (Courbon implicitly states that this is not a guide) it is poorly organized. There is no useful table of contents (the one given has no page numbers), and no list of caves and maps with corresponding page numbers which would be immensely useful in a publication such as this.

Basically, this publication's most favorable feature is its concern for the destruction of caves, and its attempt to teach other cavers about this problem. It is good to see this happening in other countries.

Teeni Kern

LETTER

Dear Cavers,

Bill Stone, in cooperation with the National Cave Rescue Commission (NCRC), is attempting to expand the NCR network to provide assistance to cavers in the event of a serious accident in Mexico. This might be organized along the lines of the present NCR system in the United States where arrangements have been made with the American Air Force to fly a team to a serious rescue when the local cavers request specialized help or additional manpower. To extend this service into Mexico and to enable the NCR to quickly reach the cave, advance arrangements need to be made with the Mexican Government to allow the Air Force plane to enter Mexico and with the Mexican Red Cross to provide local transport and coordination. In view of the eventual likelihood of a serious accident deep within a Mexican cave that could involve a rescue beyond the capability of the group present, this service would be a valuable asset to all who cave in Mexico. All interested groups and persons are urged to send suggestions and letters of support to:

Lee Noon, Director
N.C.R.C.
169 S. Bath Avenue
Waynsboro, VA 22980

William H. Russell

CARTA

Estimados espeleólogos,

Bill Stone, en cooperación con el Sistema Nacional de Rescate Cavernario, está trabajando para extender este sistema para ayudar en accidentes subterráneas en México. En este plan, será posible obtener la ayuda de la Fuerza Aérea de un equipo de rescate a México. Pare extender este servicio, es necesario obtener permiso oficial y permanente para la entrada de los aviones a México. También, es necesario tener la cooperación de la Cruz Roja para proporcionar la transportación local y ayuda médica. Siendo alta la probabilidad de un accidente grave en una cueva profunda, este sistema de rescate es importante para espeleólogos en México. Personas y grupos que quieren ayudar en este proyecto pueden comunicarse con:

Lee Noon, Director
N.C.R.C.
169 S. Bath Avenue
Waynsboro, VA 22980

William H. Russell

Cave Safety is
NO ACCIDENT

Traducción del Editorial

Las Cavernas y la espeleología de México son espectaculares, así que no es sorprendente que hán atraido atención mundial. La multiplicación fenomenal de espeleólogos diligentes en México durante los últimos 20 años ha tenido y seguirá teniendo un impacto significante sobre las cavernas y su exploración. Por su mayor parte, este impacto há sido muy positivo. Los descubrimientos y estudios han sido llevadas a cabo, cooperativamente y con continuo énfasis sobre la conservación por la AMCS, varios grupos espeleologicos mexicanos y otros grupos del E.U.A., Europa, y Canadá.

Sin embargo, recientemante este impacto há demonstrado rastros negativos. Las dos temas mas sérias son el vandalismo y la rivalidad. Conservar el frágil ambiente subterraneo siempre há sido el curso de acción del AMCS; esto incluye el sacar de todos los equipos personales, incluyendo la basura y el carburo gastado de las cuevas. Las cuevas son un mundo virginal, el último que quedamantenemoslos intactos y limpias.

Las áreas de grutas inexploradas en México son muy extensivos; por lo tanto, la rivalidad y competición antipático son sin razón y contraproductivos. La AMCS siempre há seguido la tradición de cooperar con grupos que están trabajando activamente en una cueva o región. Este cooperación enriquese la calidad del trabajo y evita el popularización de las cuevas. Iniciativa sin rivalidad es la vía al éxito y satisfacción en el descubrimiento y exploración de las cuevas.

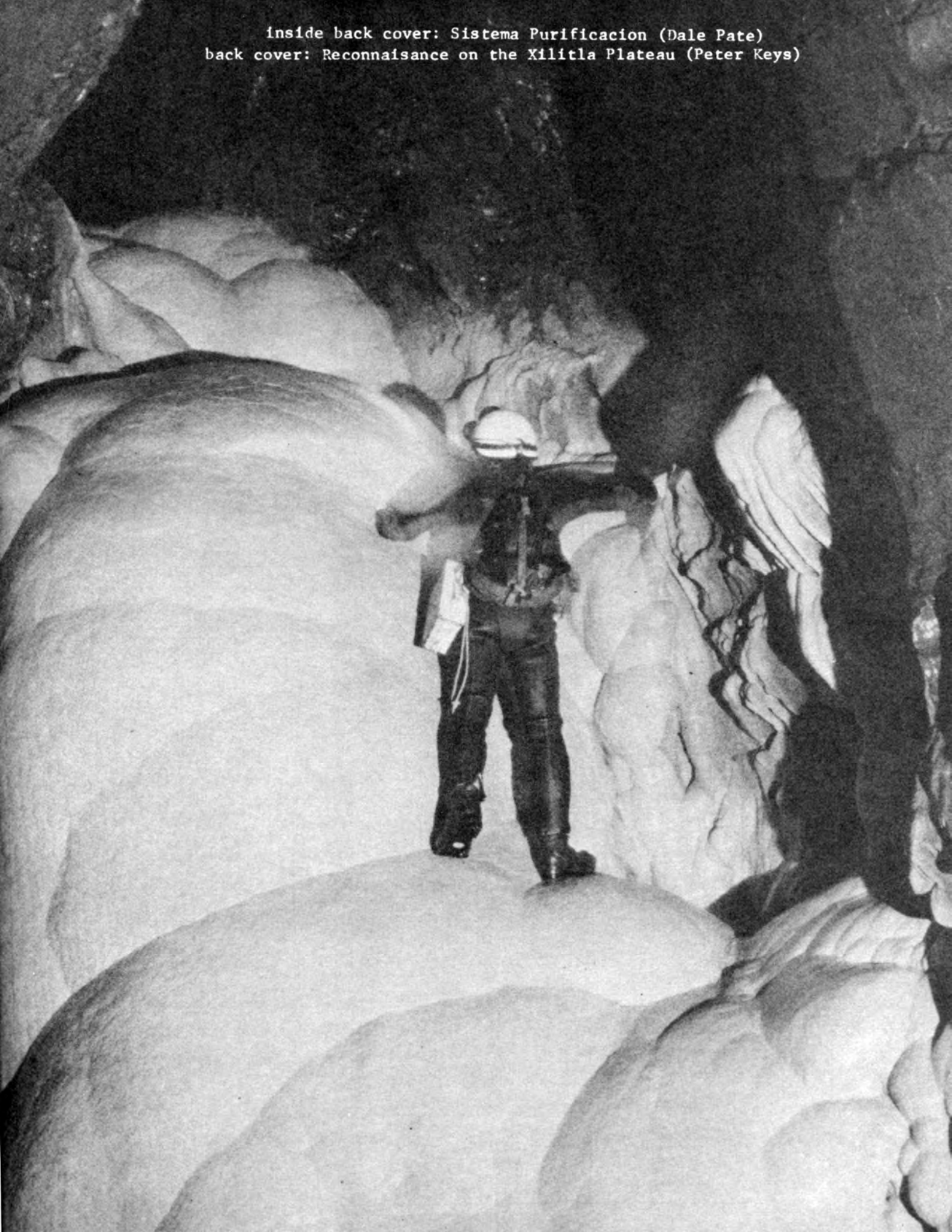
Quisiéramos tomar este oportunidad para aclarar algunos de las ambigüedades sobre la AMCS. La AMCS fue formado en 1962 por varios espeleólogos texanos para el avanzamiento de los conocimientos de las cavernas mexicanas. A través de los años ha permanecido sin politica y estructera. Hoy día el AMCS como organización es solamente un apartado postal y un gabinete en donde se guardian las publicaciones. Tiene muy poca estructura -- no hay miembros officiales, ni asambleas.

De vez en cuando, produce boletínes, pero hasta en esto tiene poca estructura. La existencia de las publicaciones cuenta exclusivamente con la iniciativo individual.

En pocas palabras, el AMCS tiene ciertos ideales: Explorar y estudiar las cavernas magníficas de México; Conservar la belleza y mágia de estas cavernas; Para producir un nivel alto de calidad en nuestras topografías, estudios y publicaciones; Impartir un gran respeto para la tierra, las cuevas, y la gente de México; y alcanzar estas metas de manera cooperativa y amistosa.

El AMCS no es un grupo político, ni nacionalista. Está abierto a todos los espeleólogos que comparten estas ideales. El "Activities Newsletter" es un ejemplo de esto, y quisieramos que todos participaran, mandando informes, artículos, mapas, fotos, et. El boletín es un repositorio de valor incalculable, con una gran cantidad de información espeleológica que se está juntando continuamente. Por medio de desarollar un sentimiento de unidad, todos tendremos mejor probabilidad de alcanzar nuestra meta común; la exploración y estudio acerca de las cavernas de México.

Dale Pate
Terri Treacy



inside back cover: Sistema Purificacion (Dale Pate)
back cover: Reconnaisance on the Xilitla Plateau (Peter Keys)