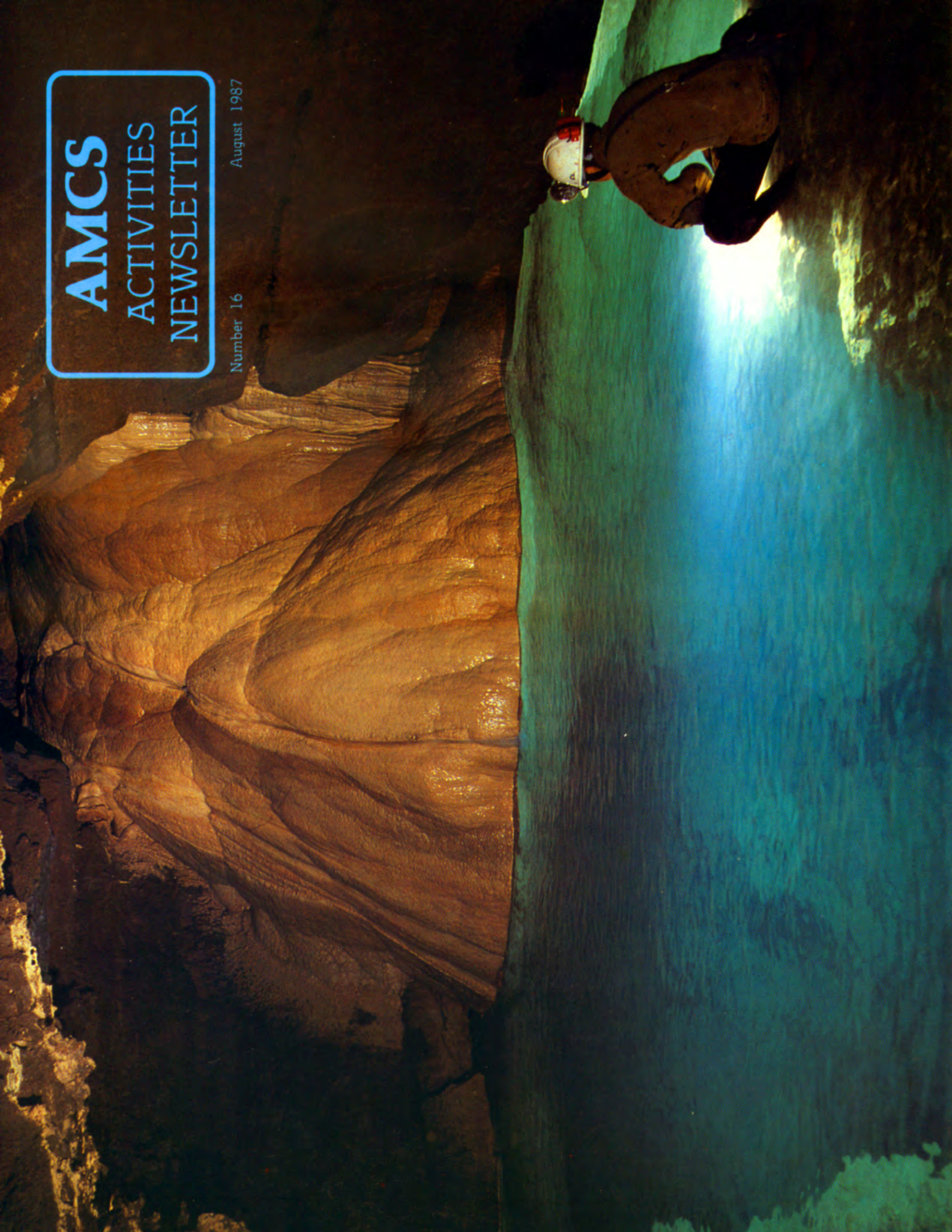


AMCS ACTIVITIES NEWSLETTER

Number 16

August 1987





MÉXICO

PLACES IN THIS ISSUE

LORETO

PURIFICACION

QUINTANA ROO

IXHUATLAN

CHILCHOTLA

TEAPA

HUAUTLA

SAN CRISTOBAL



AMCS ACTIVITIES NEWSLETTER

EDITORIAL

Number 16

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Publisher

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Contents

4	México News	
18	Long and Deep Caves of México	
20	Nanta-Huautla Tie-in	Mark Minton
21	Chilchotla '85	Alan Warild
30	Caving in Tabasco	Jim Pisarowicz
38	UNAM Expedition to Veraacruz	Andrea Raz-Guzman MacBeth
43	Chiapas—The Dutch Expedition	Laurens Smets
51	Belgian Explorations at Zoquitlán	Georges Fellers, Patrick Bestgen, & Richard Grebeaude
59	Underwater Caverns of Quintana Roo	James Coke
64	Sótano de Ocotempa	Terry Raines
68	Sea Caves of Loreto	Dave Bunnell
72	Camp Challenger—PEP 1986	Peter Sprouse & Carol Veseley
80	Camp V—PEP 1987	Peter Sprouse
89	Cueva de la Llorona	Dale Pate, Peter Sprouse & Terri Sprouse
94	Cueva del Tecolote	Terri Sprouse, Peter Sprouse, & Carol Vesely
100	Book Reviews	

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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Although an Activities Newsletter did not appear in 1986, this in no way means that the caving activities have been slack the past eighteen months. On the contrary, caving activities in México have been numerous, diverse, and at the forefront of world-class speleology. Most significant is the connection between Sótano de San Agustín and Nita Nanta. On 26 March 1987 Huautla cavers succeeded in making the elusive connection they had sought for six years. With a depth of 1353 meters Sistema Huautla is now number three in the world. Good going, cavers!

This issue of the Activities Newsletter brings you information on caving projects in thirteen different states, by cavers of ten different nationalities. With the influx of these various cultures comes differences in style, technique, attitudes, and results. If you have been reading the *NSS News* lately, you know that the European-style of re-belay and the use of bolts in Mexican caves has been an issue of hot debate. And with the resurvey of Ocotempa in Puebla, that shows an 80 meter discrepancy in the depth of the entrance drop, survey technique and accuracy is sure to become a lively issue. Let's keep the lines of communication open and flowing, so that we may all glean the knowledge and experience from our collective methods.

Before releasing you to devour this information-packed book, I want to pat some deserving people on the back. First off, kudos go to Terry Raines for his expertise and support over the last several years as our printer. Aside from the actual expenses incurred in producing this book, his services have been for the most part gratis. That includes the extra work involved in printing the color covers. Thank you, Terry. Thanks also go to Bill Russell, who has continually put up the front-money, interest-free, to cover the printing expenses. Two other names appear on the staff list year after year without proper recognition. Bill Mixon, along with his red pen, *Chicago Book of Style*, and humorous comments, has been an invaluable asset to this publication. Steve Boehm has donated many hours of his professional skill in the darkroom by helping us shoot and develop the negatives. And last, but not least, thanks go out to all the people who volunteer their time to help with typing, editing, proofing, translating, drafting, and writing. Now, please read and enjoy.

Terri

Cover Photo: Tokamak River in Sistema Purificación (Peter Sprouse)
Frontispiece: Bottom of entrance drop to Sótano de Ocotempa (Marc Tremblay)
Back Cover: Dale Pate encounters the ubiquitous death coral in Sistema Purificación (Terry Raines)

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México News

CHIAPAS

Members of Base Draco explored three pits and one cave during a five-day reconnaissance in Chiapas in June 1986. The three pits have approximate total depths of 30, 60, and 250 meters. In the 250-meter-deep cave, the cavers ran out of rope, but plan on returning to continue exploration and to survey the 18 caves that have been located thus far in the area.

source: Javier García Egan
Draco Folleto Informativo No.1

In January 1987, cavers from Rome, Italy found that the sump in **Grutas de Rancho Nuevo (San Cristóbal)** was open, enabling them to push the cave to a depth of 500 meters and a length of 9 kilometers. The cave continues, and they have not yet reached a "main drain."

source: Carlos Lazcano S.

Marian Napieroca and others of the Polish group AKSIA mapped **Cueva del Arroyo de Tenejapa** to a depth of 317 meters in March 1985. The cave trends north down a series of 10 waterfall drops to a sump. The surveyed length is 1910 meters, and the total explored length is 2110 meters. It is at an elevation of 2046 meters, and is located at 16°49'10" north, 92°30'32" west.

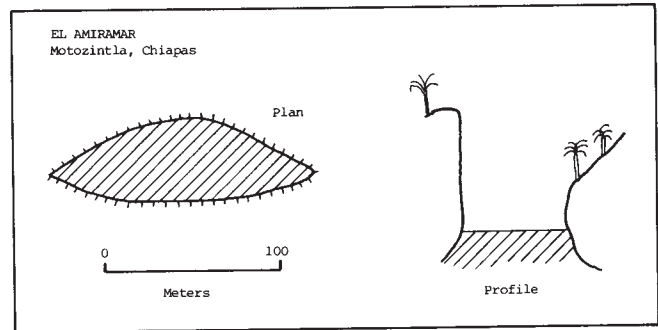
source: Tullio Ferluga, Louis Torelli
Atti e Memorie, Vol. XXIV 1985
Progressione 14

In late January 1986, following the British expedition to Xilitla, SLP (see reviews), four cavers continued down to Chiapas to an area near Motozintla. Several caves were found on the 2700-meter-high plateau, including a cenote called **El Miramar**.

source: Laurens Smets
Pierk No. 1, March 1986

COAHUILA

On 16 March 1986, Steve Allen, Alan Cobb, Patricia Herrera, Joe Ivy, Linda Palit, Susan Roothaan, and William Russell explored **El Consuelo** mine near Candela, where phosphates were mined from a cave



about 300 meters long. They found several passages and a large bat room.

source: William Russell

Mike Kilpatrick, Peter Sprouse, and Terri Sprouse mapped a small bat cave at Cañada la Cueva, on the west side of the Sierra la Rata east of Monclova on 1 February 1987. **Cueva de Guano de San Antonio** slopes upward for 24 meters to a pinch. About halfway in is a dome where several hundred bats were roosting. The day before, the cavers checked three breached sinks on Cerro el Hundido at the south end of the mountain, but no caves were found.

source: Peter Sprouse

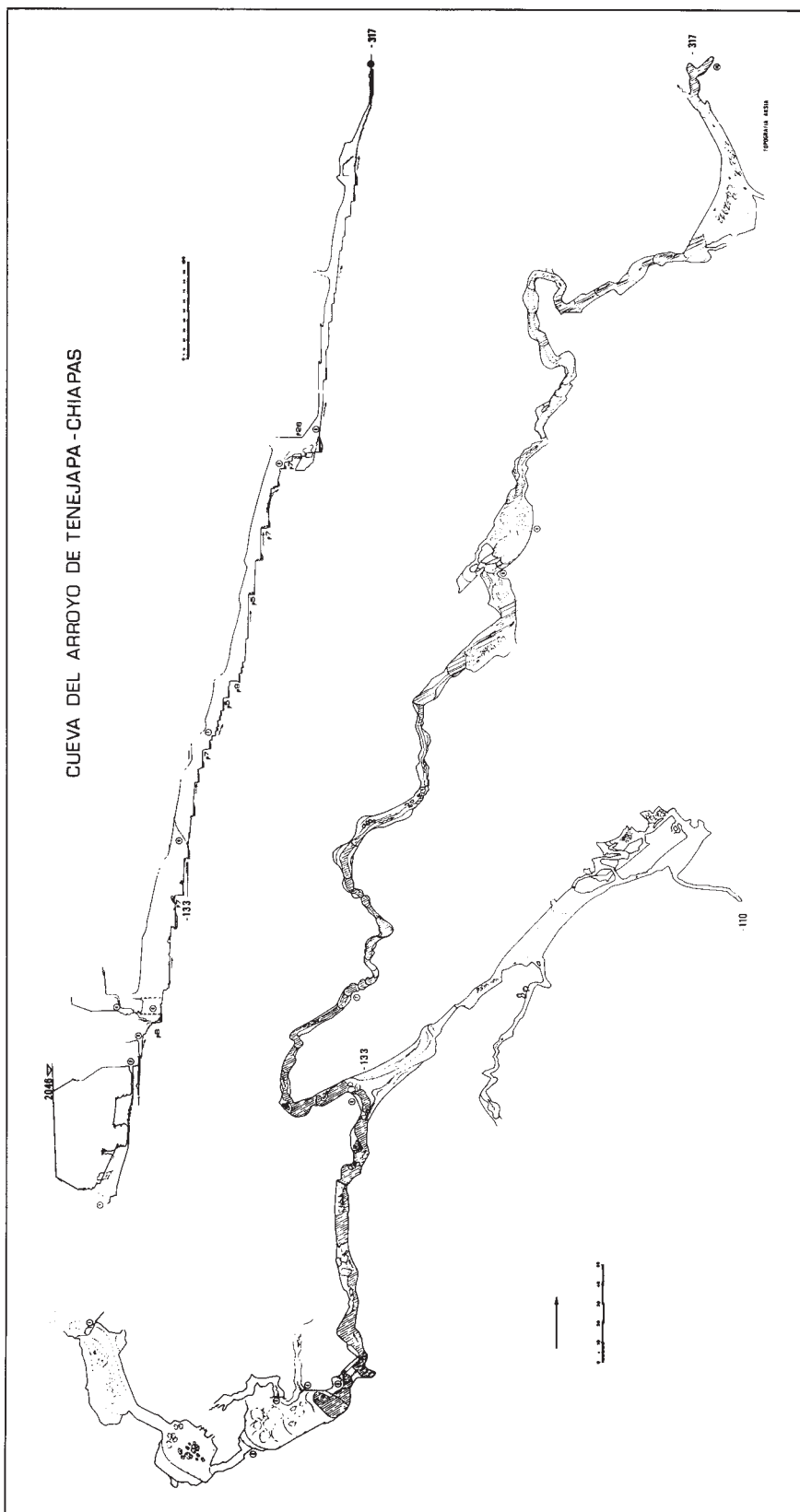
GUERRERO

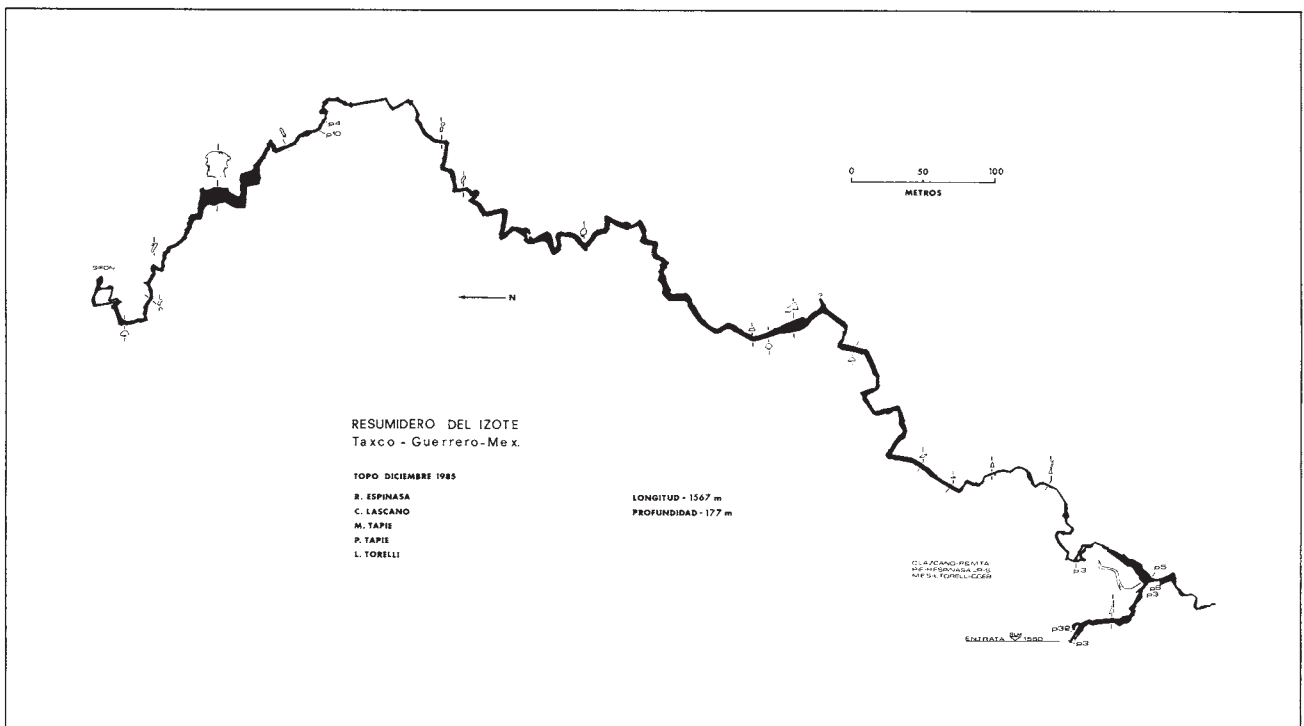
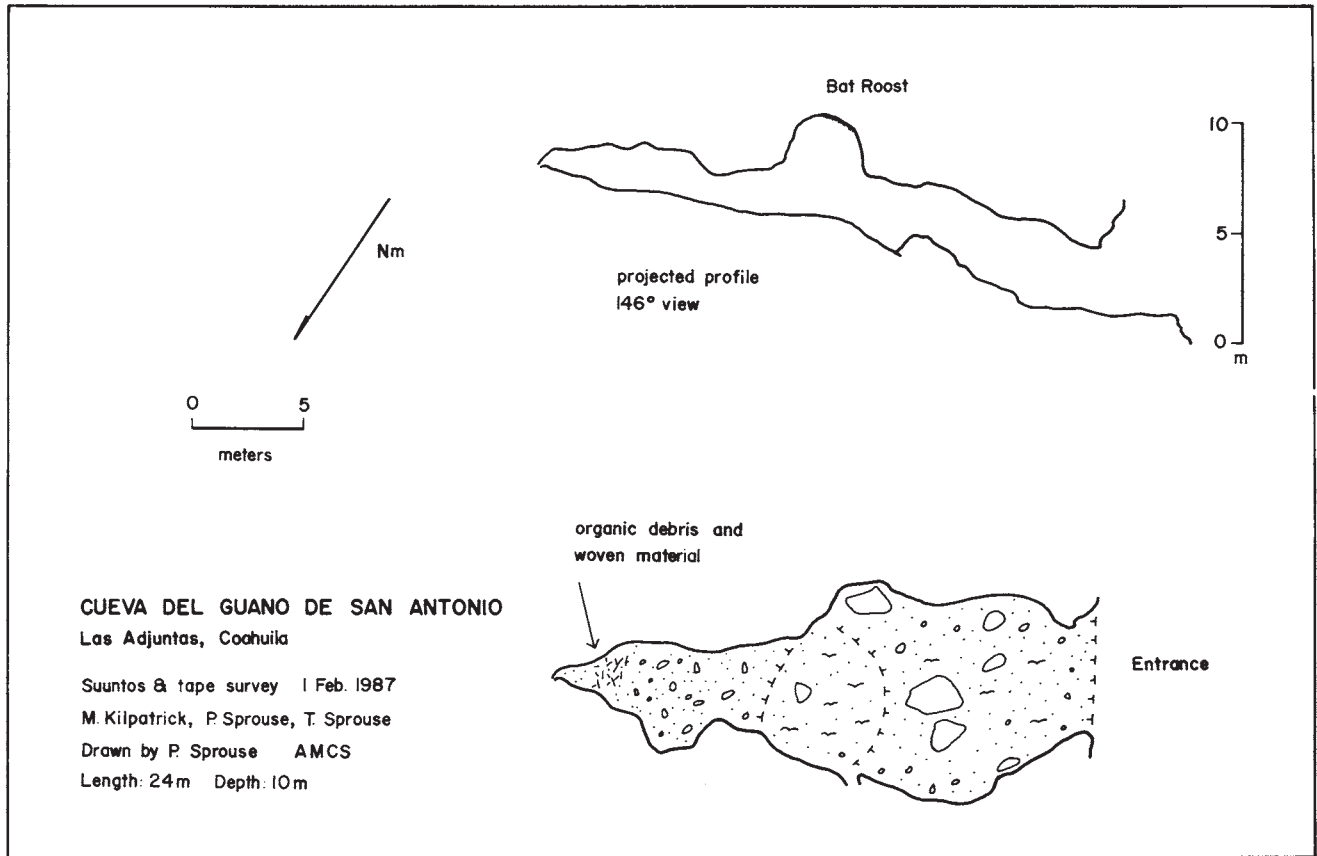
Resumidero del Izote, west of Taxco, was surveyed to a sump at -177 meters in December 1985 by SMES and Italian cavers. It had originally been explored in 1981 by a Draco team to a plug at -76 meters. In two trips in 1984 SMES cavers were able to explore an extensive, well-decorated passage to the sump. The total surveyed length is 1567 meters.

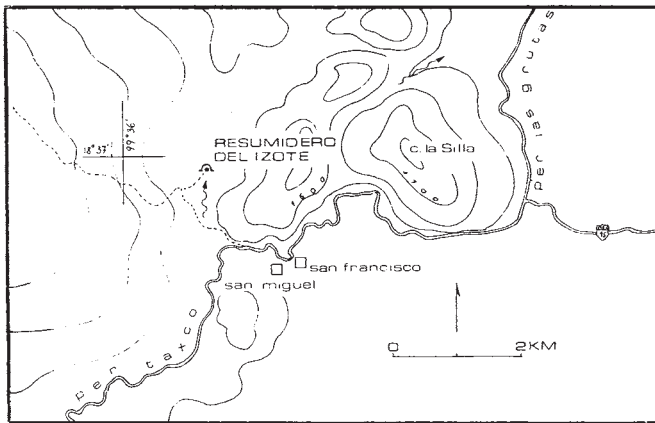
source: Ramon Espinasa P.
Tepeyolotli No. 1
Louis Torelli
Progressione 15

While conducting a caving course at **Cueva del Tecolote** in May 1986, Base Draco members located seven new entrances, including a pit with a 45-meter entrance shaft.

source: José Montiel Castro
Draco Folleto Informativo No. 1







meters above the village, there is a shallow depression 50 meters wide and several hundred meters long that lies parallel to the flank of the sierra. This depression lies just above a line of cliffs that dominate the village and mark the upper end of a conical slide area, the source of the material that created the large natural dam where Laguna de Sánchez is located.

All of the caves explored were between the depression and the cliff line 50 meters

In August 1986, Base Draco members returned to **Cueva del Diablo** near Cacahuamilpa, where they had discovered a new passage the year before. This passage was explored to a sump, and most of it was surveyed.

source: José Montiel Castro
Draco Folleto Informativo No. 1

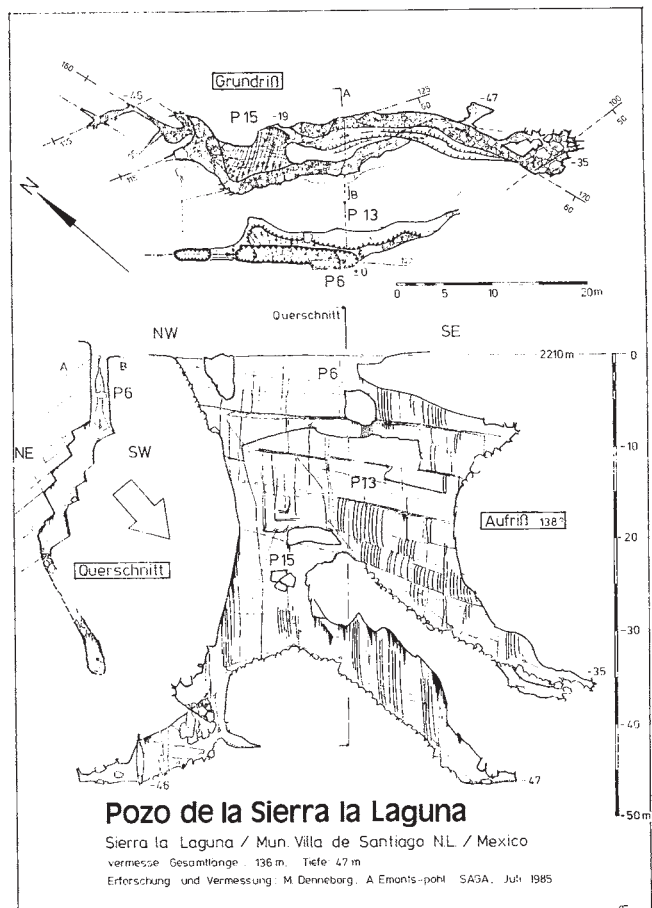
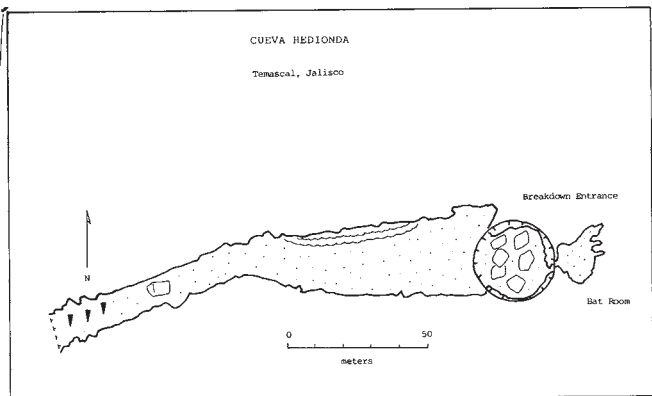
JALISCO

John Pint and friends from Guadalajara have located two bat caves near El Grullo, southwest of Guadalajara. **Cueva Hedionda** is located on a hill above Rancho Cucuciapa. The upper entrance is in a 25-meter-wide sink filled with blocks of limestone conglomerate. The main passage, decorated with white flowstone cascades, leads 120 meters to a lower entrance. A crawl off of the upper entrance leads to a dead-end bat chamber. The 11-meter pit entrance to another bat cave called **La Goña** was found north of El Grullo, but was not descended.

source: John Pint

NUEVO LEON

While conducting geological studies around Laguna de Sánchez in the summer of 1985, German cavers Michael Denneborg and Andreas Emonts-pohl found a number of small caves. At an altitude of 2200 meters, 300



to the southwest. None of the caves appear to have been formed by running water to any great extent. The most significant cave is **Pozo de la Sierra la Laguna**, which is formed by a series of interconnected tension cracks parallel to the cliff. The sliding of a large block toward the valley has formed a crevice with a maximum width of 2 to 3 meters. The NE-SW profile clearly shows that the two walls have the same shape and once fit together like two pieces of a puzzle. The maximum depth reached is about 47 meters at two different points, and a total of 136 meters of passages were mapped on multiple levels.

source: Andreas Emonts-pohl

Charles Fromén points out that **Infierno de Camotera**, described in Activities Newsletter No. 15, was first surveyed by cavers from Houston in late May 1982. Dave Bolton did a solo survey showing it to be 83 meters deep. It had been discovered several years before, and partially descended by Charles, whose rope was 15 meters too short. Their map appears in the October 1982 issue of the GHG Newsletter.

source: Charles Fromén

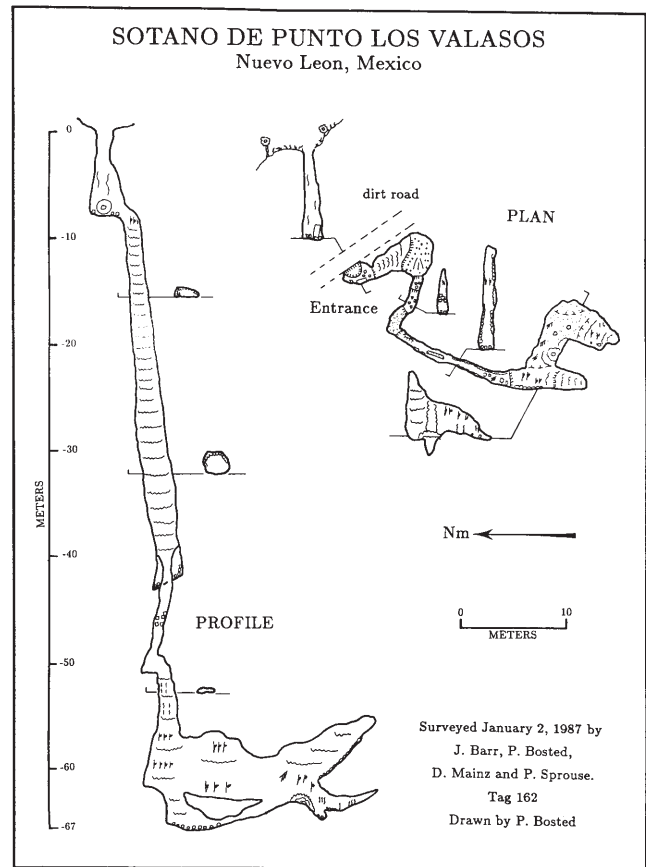
A number of pits and caves were explored along the eastern boundary of Nuevo León in late December 1986 and early January 1987 by cavers of the Proyecto Espeleológico Purificación. Near Agua de las Vacas, two pits were mapped: **Sótano de Agua de las Vacas** (-30 meters), and **Sótano de los Cuisillos** (-21 meters). Also explored was **Cueva de Agua de las Vacas**, a steeply dipping cave 25 meters long.

To the south at Cuautemoc, a number of pits were located. The deepest of these was **Sótano de Punto los Valasos**, which went down three drops to end in a formation chamber at -64 meters. Also surveyed were **Pozo de los Riscos** (-35 meters) and **Pozo del Encino Doble** (-9 meters).

source: Peter Sprouse

OAXACA

In December 1986, Bill Farr and Carol Vesely made a reconnaissance trip to the mountains northeast of the city of Oaxaca and located three caves. The largest of these, **Cueva Cheve**, has a stream that flows



into a large entrance room 200 meters long, 60 meters wide, and 20 meters high. A side passage off of this room leads to a second, slightly higher dry entrance. From the entrance room, the main stream flows north for 100 meters to descend through breakdown in the floor of the Basket Room. This room was named for the bits of weaving found along with potsherds on the floor. Following the airflow down the dry main passage, the cavers descended three short pits to the top of a stair-step fourth pitch, with two deep plunge pools visible below. Here exploration stopped temporarily.

They returned in February 1987 and continued down another three pitches to rejoin the stream that had flowed into the breakdown in the Basket Room. Upstream at this junction led to an 8-meter-high waterfall, and downstream the cave continued down several short waterfall climbs. Exploration stopped at a waterfall drop approximately 4 meters high.

Another side passage off of the entrance room led to an stream inlet that was

followed upstream to a 6-meter-high waterfall, and downstream to a short overhung drop. The surveyed length of Cueva Cheve now stands at 1400 meters, and the depth is 194 meters.

Also mapped was **Grieta de los Bichos**, a tight, buggy fissure cave that is 133 meters long and still going. Two other caves and a pit were also located but not explored or surveyed. A return trip with a larger team is planned for late 1987.

source: Carol Vesely and Bill Farr

A multinational group of cavers spent three weeks in March 1987 exploring the extensive Cerro Rabón karst east of Huautla. Although an area of great interest, it has previously seen little exploration due to difficult access. Local permission, a sensitive issue due to nearby archeological finds in caves, was at first refused, necessitating a trip to México, D.F. Fortunately two previous reconnaissance trips had laid the appropriate groundwork, and official permission from INAH was obtained in one day.

The team consisted of five Americans, Ernesto Garza, Karlin Meyers, Judith Ogden, Don Coons, and Sheri Engler; seven Swiss, Philippe Roullier, Pierre Eve, Ursula Sommer, Peter Keller, Urs Widmer, Jasmine Ustentag, and Christine Loosli; and one Brit, Linda Gough. A base camp was installed at the edge of a large dolina near the remote village of San Martín, accessible by trail only. Heavy rains plagued the first part of the expedition. The area in fact receives much more rainfall than Huautla, and supports a lush tropical rainforest.

Despite the rains, expedition members immediately began checking the numerous sótanos in the area. Several horizontal caves were also found. A number of spectacular open-air pits were dropped, including a large pit that had captured the attention of cavers who had flown over the plateau in earlier years. This pit, which they named **Ojo de las Mazatacas**, is about 150 meters in diameter and is approximately 250 meters deep. The shaft has a rectangular joint-or fault-controlled shape that tapers to about 75 meters across at the bottom.

Most of the vertical caves consisted of a series of shafts to a pinch. The sharp nature of the rock lent itself well to the

European technique of rebelaying. Chocks and slings were used extensively to minimize the use of bolts. The deepest cave that was explored, **Kajáhe Xuntúa**, has a series of drops, the deepest of which is 180 meters. This was first dropped by the Swiss cavers on 8mm rope. Further drops were descended before rope and time ran out at approximately -400 meters.

In a horizontal cave called **Nika Tunso-o**, a promising lead was followed to a dry stream passage that opened up into a beautifully decorated borehole. Tarantulas were seen in abundance in this cave. This was also left unfinished at 1200 meters in length and 90 meters depth. Well over two kilometers of vertical cave and approximately five kilometers of horizontal cave length were surveyed. The caves are developed in nearly horizontally bedded black-to-gray limestone, which appears to be dissected by numerous joints and small faults. A complete article with text and maps will appear in a future issue.

source: Karlin Meyers

PUEBLA

In December 1985, Dave Bunnell, Herb Laeger, and Matt Oliphant explored several pits near Ixtepec on the north side of the Río Zempoala near Xochitlán in northern Puebla. A year earlier Matt and Bill Liebman had located two pits just north of Ixtepec but lacked enough rope to descend them. Driving the new road into Ixtepec on 28 December, Dave, Herb, and Bill relocated the two pits, and Dave was shown a third pit right by the road, where they set up camp. This pit, developed in the upper thin-bedded limestone common in the Cuetzalan area, turned out to be a nice 90-meter drop to a mud floor. They found a dead armadillo on the bottom.

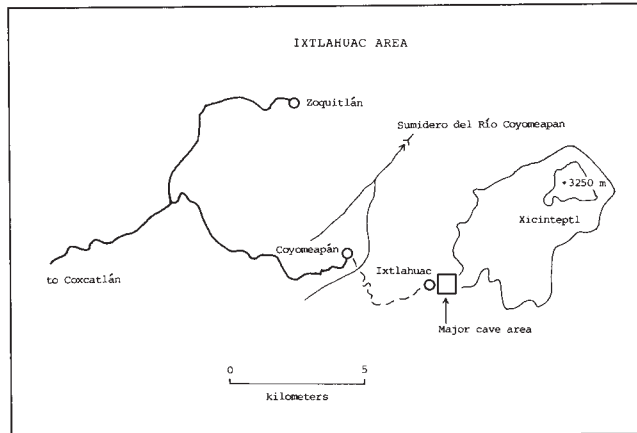
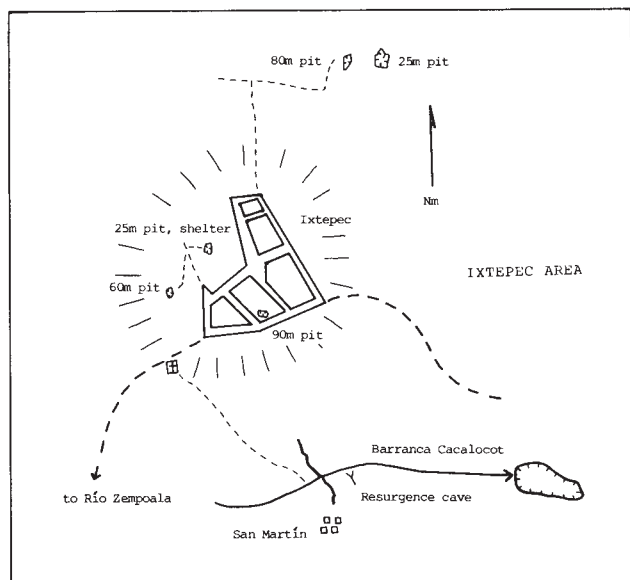
The next day they began with the deeper of the two pits found the previous year, which required some jungle clearing. It was 12 to 18 meters in diameter and dropped 73 meters to a 15-meter slope leading down to 30 meters of small dry stream passage. The second pit was 25 meters in diameter and 21 meters deep. A large passage at the bottom soon ended. A small stream entered partway down the pit.

Just northwest of the village they

were shown another pit by the locals. It is situated downhill from a shelter cave where water was being collected. This pit dropped about 20 meters to a large room with intricate folding visible in the walls. A climb at one end led up to a larger flowstone chamber. Altogether Dave and Matt explored about 130 meters of passage off the bottom of the pit. Meanwhile Herb found another pit about 150 meters away. This turned out to be a nice 76-meter drop, mostly free-fall. At the bottom a 5-meter climb up crumbly mud led to about 60 meters of mazy passage and some domes.

The following day they went to investigate a resurgence cave located in San Martín, in the valley below Ixtepec. From the low entrance, it opened up into a nice walking canyon heading upstream. The cave is developed in more massively bedded limestone and has some phreatic features. They saw numerous side passages, only a few of which they had time to explore, but all of which seemed to go. After climbing up several small waterfalls, they returned to the entrance and their guides. They had explored less than a kilometer. They were then led up a limestone arroyo to a shelter cave with a seeping spring. Matt and Herb pushed a crawl for 50 meters or so and it didn't get any bigger, so they abandoned it.

source: Dave Bunnell
The Explorer, July 1986



In September 1986, Base Draco members investigated a new area near San Miguel Acuexcomal. Two caves were located, **Oztoque** and **Oztoquito**. The first of these takes water, initially down a steeply inclined 45-meter ramp. This ramp is followed by a 30-meter drop. Then another slope of 7 meters leads to a lake 12 or 15 meters wide. Two wet passages with very smooth walls could be seen continuing and looked very promising.

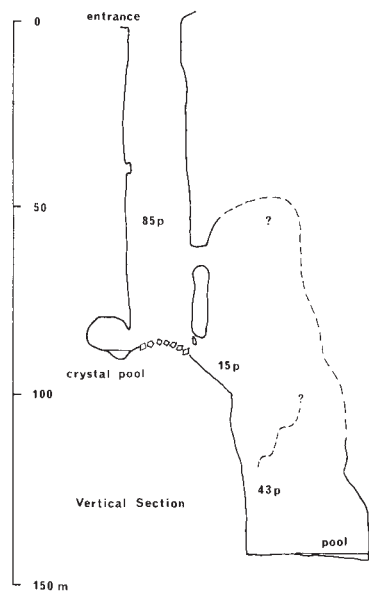
Oztoquito has an entrance drop of 122 meters to a lake. From this lake a large passage was explored for 500 meters to a sump in a big room. On the opposite side of the room was another room with a smaller, wet passage that was explored for 200 meters and continues.

source: José Montiel Castro
Draco Folleto Informativo No. 1

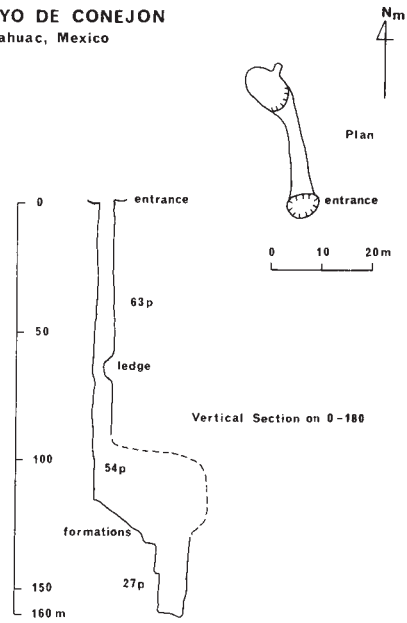
Ten Australian cavers prospected for caves around Cerro Xicinteptl south of Zoquitlán in late January and early February 1985 (see AN No. 15). This area is between the wet sumidero caves of Zoquitlán and the big systems to the south at Huautla, Oaxaca, but is higher than both, reaching up to around 3250 meters at the peak.

From a roadhead basecamp at the village of Coyomeapan, the cavers established a remote camp in a thinly forested north-south trending karst valley east of Ixtlahuac, 450 meters higher. A total of around 60 caves and pits were explored during the expedition. A couple of these were in the 80- to 100-meter depth range, and there were four spectacular shafts found quite close to Ixtlahuac. These all followed a similar pattern: an entrance pitch of 75

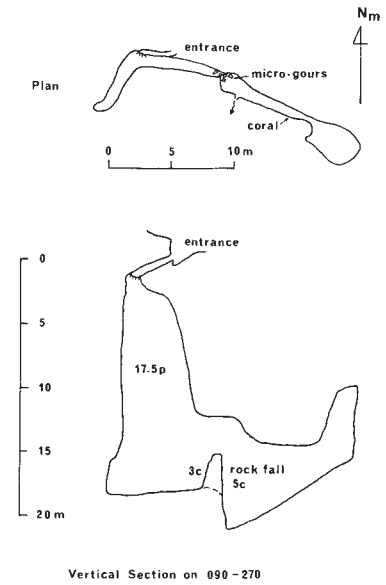
SOTANITO DE IXTLAHUAC
Ixtlahuac, Mexico



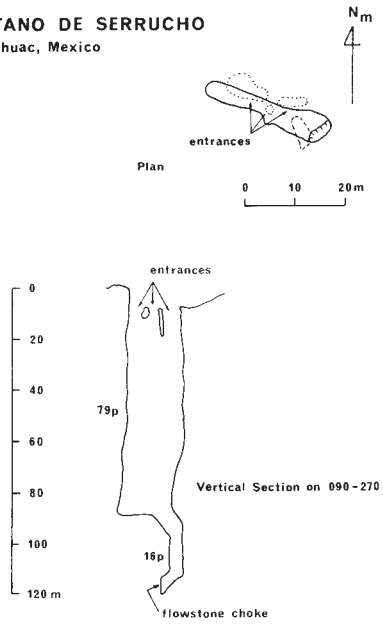
HOYO DE CONEJON
Ixtlahuac, Mexico



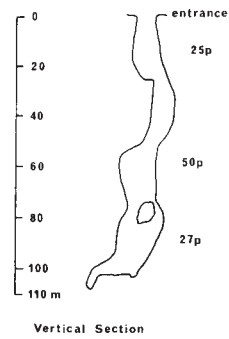
CUEVA DEL TELARAÑA
Ixtlahuac, Mexico



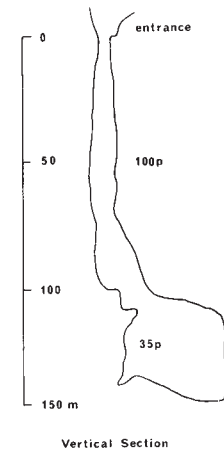
SÓTANO DE SERRUCHO
Ixtlahuac, Mexico



SÓTANO DE VAMPIRESA
Ixtlahuac, Mexico



SOTANO DE LOS MALVAISCOS
Ixtlahuac, Mexico



meters or more, followed by one or two short drops to an impenetrable choke. These shafts exhibited good airflow on cold mornings, but serious climbing efforts in three of them produced no leads.

A considerable surface area was checked out during the two-week expedition. Many of the dolinas close to Ixtlahuac contain cornfields that would cover any entrances that might exist. Prospecting was carried out right up to the summit of Cerro Xincinteptl, and a shallow pit was found at 3050 meters elevation. Members of the expedition were Carey Barlow, David Barlow, Mark Bonwick, Stephen Bunton, Ed Garnett, Anne Gray, Nick Hume, David Martin, Alan Warild, and Mark Wilson.

source: David Martin, Alan Warild

QUINTANA ROO

Since 1983, Dennis Williams and other cave divers have been exploring **Cueva Quebrada**, a completely submerged cave on the island of Cozumel. As of June 1986, 2759 meters of passage had been explored. The main entrance is on the shoreline within Parque Chankanaab, and the divers have been working with the park officials and biologists.

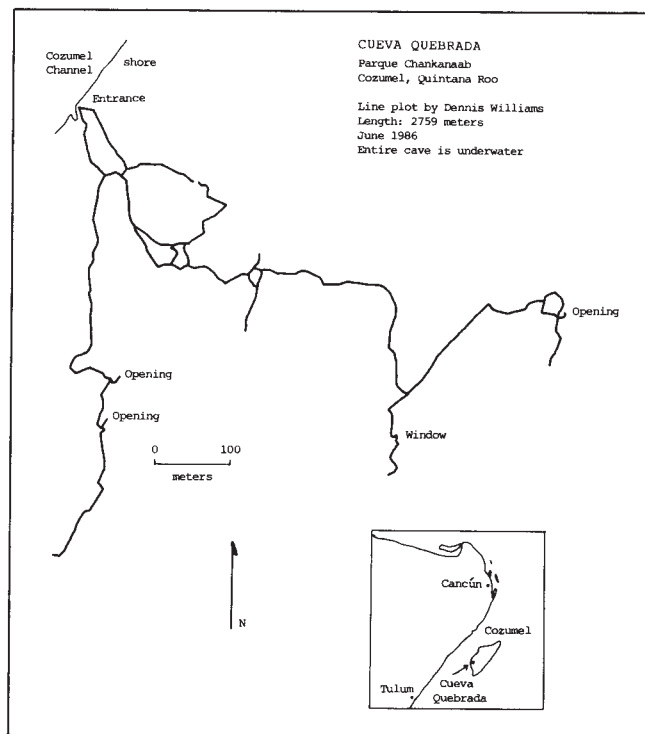
Many interesting biological discoveries have been made in **Cueva Quebrada**, including a possibly new blind cave fish, many range extensions of known species, and the fourth location for the primitive shrimp *Procaris* sp. This shrimp has previously been found in Bermuda, Ascension Island, and Hawaii.

source: Dennis Williams

SAN LUIS POTOSI

In late August 1986 a group of cavers from Austin investigated various caves in the Xilitla karst area. Just south of Xilitla, the group visited **Cueva de la Selva**, which had been explored 20 years earlier. Susan Raines and Peter Sprouse decided to look at the crawlway lead at the bottom. A series of crawls eventually ends at a wide bedding crack only 10 centimeters high. A lot of airflow was noted, and some jammed cobbles on the right side could be blasted to allow passage.

After a trip to **Hoya de las Guaguas**,



the cavers went to the north of Aquismón to look at the Sierra las Anonas. At the **Nacimiento de Tambaque**, they found the water coming from a breakdown-choked cave entrance. Just up to the right from the spring is another cave, which ends in a small sump after about 8 meters. Up on top of the range at Tampemoche, a 20-meter pit was located east of the village. Susan Raines, Terry Raines, and Peter Sprouse mapped **Sótano de Tampemoche** for 112 meters to an estimated 10- to 12-meter pit, at a depth of 40 meters.

source: Peter Sprouse

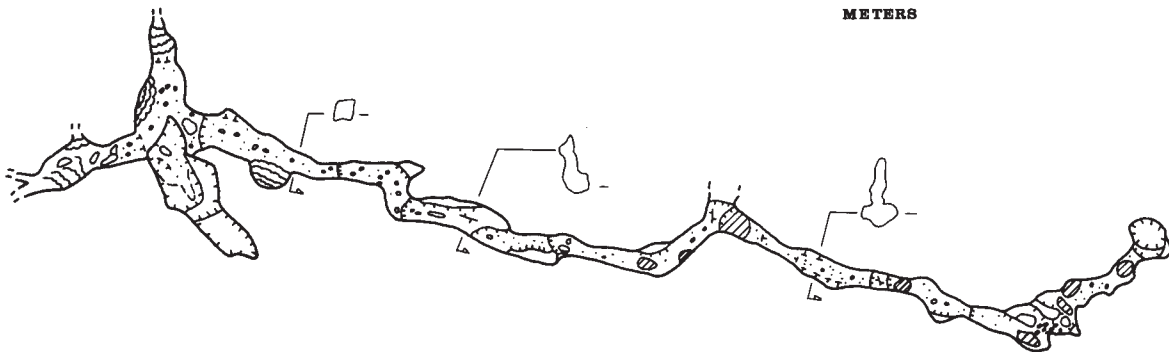
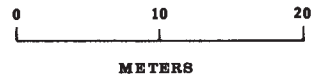
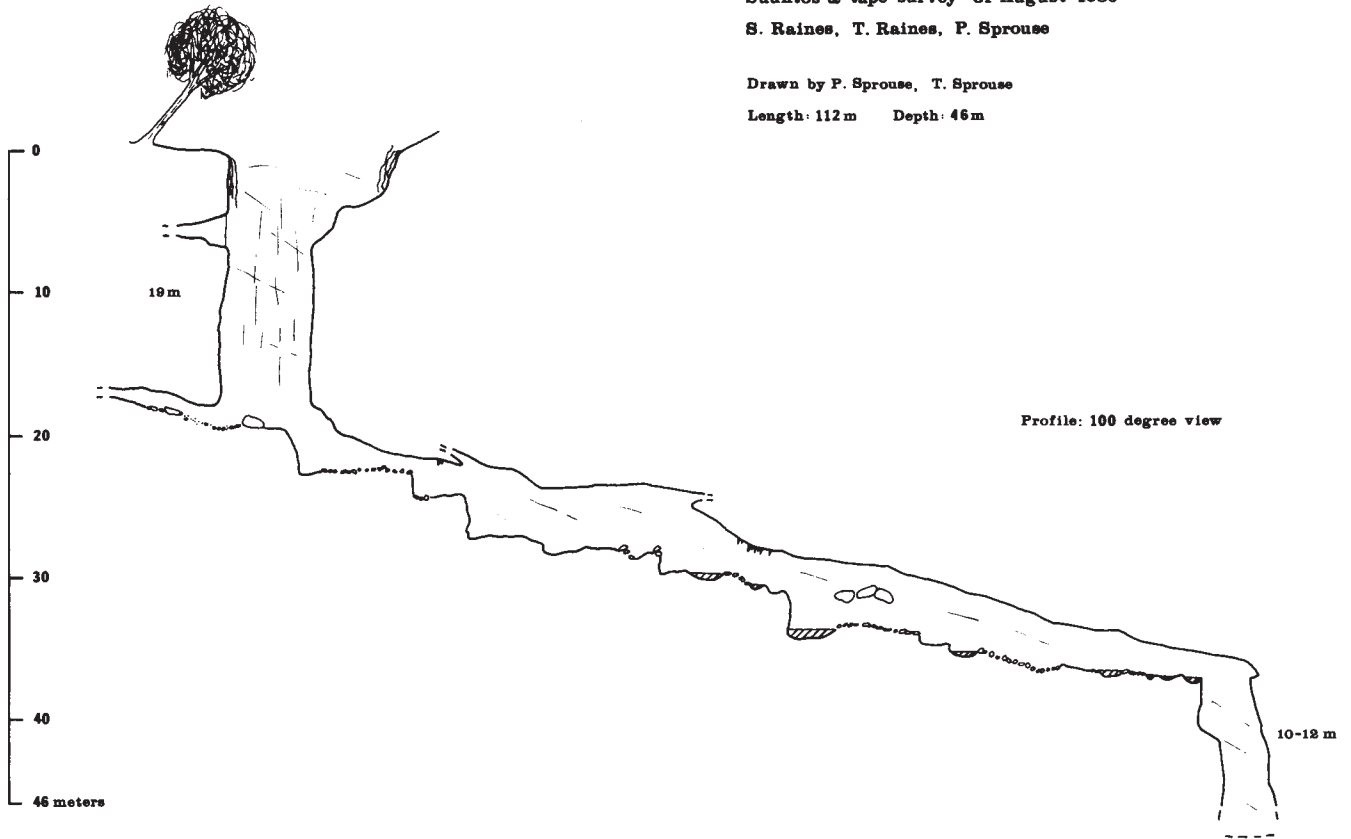
South of Río Verde along the highway to Jalpan is a road that goes west toward Mineral el Realito, Guanajuato. Along this road, at a village called Bagres de Abajo, Paul Reavely and a friend were shown a cave by local guide Martín Rivera in November 1986. It is on a hillside above the cafe at about 1100 meters elevation. From the 5-meter-high entrance the cave meanders gradually upward. After several upclimbs, they stopped about 50 to 80 meters from the entrance, and the passage continued. Other caves are reported nearby, as well as at Mineral el Refugio, 10 kilometers to the southwest.

source: Paul Reavely

SOTANO DE TAMPEMOCHE AQUISMON, S. L. P.

Suuntos & tape survey 31 August 1986
S. Raines, T. Raines, P. Sprouse

Drawn by P. Sprouse, T. Sprouse
Length: 112 m Depth: 46 m





The large entrance chamber to Cueva de la Selva. (Peter Sprouse)



The Sierra las Anonas, north of Aquismón, S.L.P. (Peter Sprouse)

TABASCO

Peter Lord and other cavers from Villahermosa have been exploring various caves in the Teapa area. Near **Grutas de Coconá**, they have explored a cave (Ed. note: this is referred to as Cueva de Teapa in the article in this issue by Jim Pisarowicz) with a stream that may be the source of the water in **Coconá**. Sixty kilometers east of Teapa, near Melchor Ocampo, they have been exploring **Cueva de Agua Blanca**, a resurgence cave developed in massive, gently dipping oligocene limestone. Two and a half kilometers of passage have been explored, with many lakes. In cooperation with the tourism department of Tabasco, they will be making recommendations as to the suitability of the cave for development as a show cave.

source: Peter Lord

TAMAULIPAS

Using aerial photographs as a guide, a group of cavers from Austin were able to chop a jungle trail to a new pit in the Sierra de El Abra in March 1986. Jerry Atkinson, John Gilliland, Margaret Hart, Jeff Horowitz, Mark Minton, William Russell, Kent Sanders, Paul Smith, Kyle Walden, and Nancy Weaver chopped 6 kilometers in from the west to **Hoya de los Guacamayos**, named for the flock of military macaws living in the entrance. The pit is 70 by 80 meters across, is 31 meters deep on the low side, and is a 46-meter drop on the high

side. A trunk passage 40 meters wide and 120 meters long with large formations led to another drop, taking air.

On a return trip one year later, many of the same team returned along with Terry Bolger, Bill Mixon, and Brian Smith. The next drop turned out to be 18 meters, followed by a third drop of 19 meters. This



View down the entrance pit of Hoya de los Guacamayos. (Margaret Hart)

drop landed in a large breakdown room. The lowest point was reached via a small formation crawl. Apparently, the airflow that had been noticed was caused by circulation in and out of the large chamber. Total depth of the cave is 151 meters.

source: Jeff Horowitz, Mark Minton

During the October 1986 expedition to **Cueva de la Llorona** (see separate article in this issue) cavers of the Proyecto Espeleológico Purificación surveyed various caves in the surrounding area. A kilometer west of Llorona were two finds, **Cueva del Fin del Burro** (30 meters long), and **Sótano de la Corona**, a 35 meter deep pit with a waterfall. Three small caves were located 2 kilometers to the south near **El Hundido**, a large pit. Also explored was a cliff-face cave east of **Llorona** that mysteriously caught fire as the cavers were leaving.

Higher on the mountain near Mesas Juárez two more pits were mapped. **Sótano de La Cueva** was 30 meters deep, and **Sótano de la Trampa Escondida** turned out to be 50 meters deep.

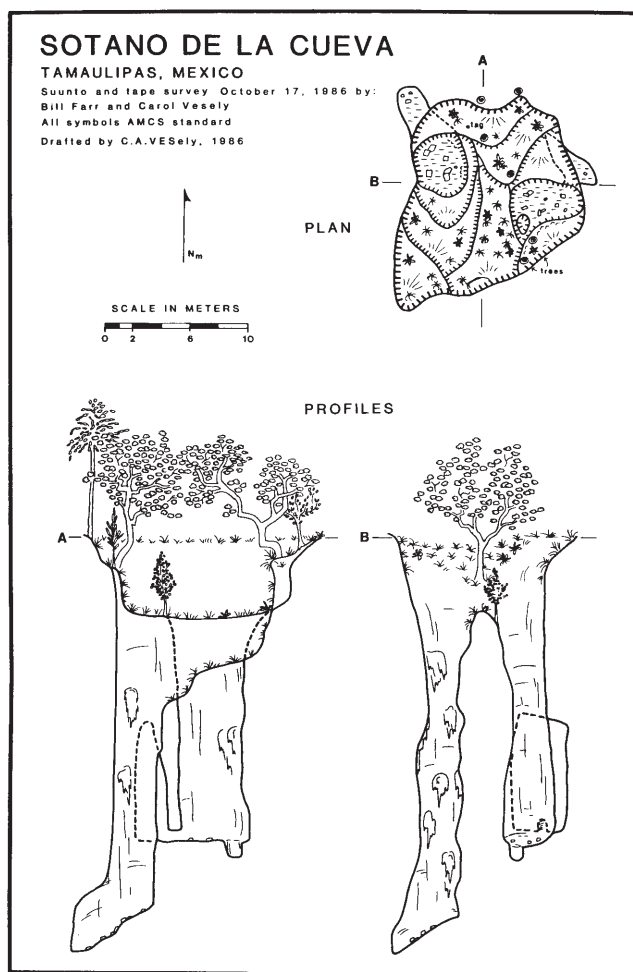
In late 1986 and early 1987, PEP cavers mapped various new passages in **Sistema Purificación** and nearby **Cueva del Borrego**. From the **Cueva del Brinco** entrance to the **Sistema**, two trips were made to the Scallop Speedway area at -200 meters near the World Beyond. Two loops were mapped off of the Speedway, the first of which connected above the X-Rated Climb near a virgin shaft. This shaft was also investigated, and it turned out to drop directly into the World Beyond. The second loop off the Speedway tied into the Canal.

A trip in the **Sumidero de Oyamel** entrance to the Dragon River section of the system was turned back by higher water levels in the low airspaces of the Nose Dives. A look at back-up leads in the Black Canyon area turned up a loop and several small side passages. In all, 309 meters was added to the survey of **Sistema Purificación**, making it 61,181 meters long.

Cueva del Borrego is a formation maze that lies only 60 meters from the closest known passages in **Sistema Purificación**. In two trips a number of loops were mapped in the mazes that extend north and south from the entrance, giving **Borrego** a surveyed

length of 1165 meters. While making routine faunal collections in the cave, the Sprouses found a new species of troglobitic scorpion. This is the third species of troglobitic scorpion now known from the **Purificación** area, and the first time two different cave scorpions have been documented from one cave.

Also close to the **Sistema**, a previously explored pit, **Grieta de las Flores**, was surveyed by Peter Bosted, Bill Farr, and Carol Vesely.

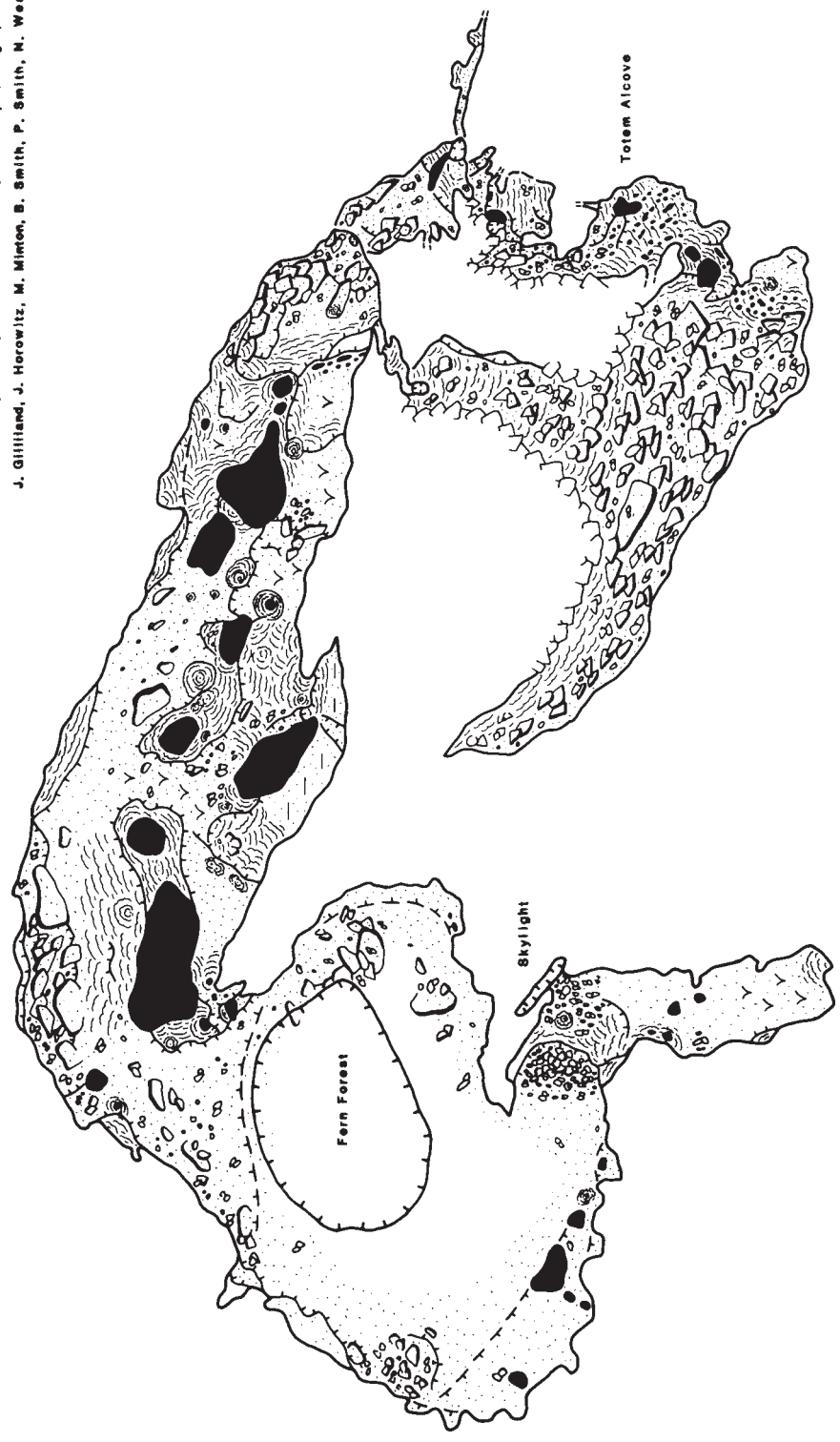


Please turn to page 42 for additional MEXICO NEWS.

HOYA de los GUACAMAYOS

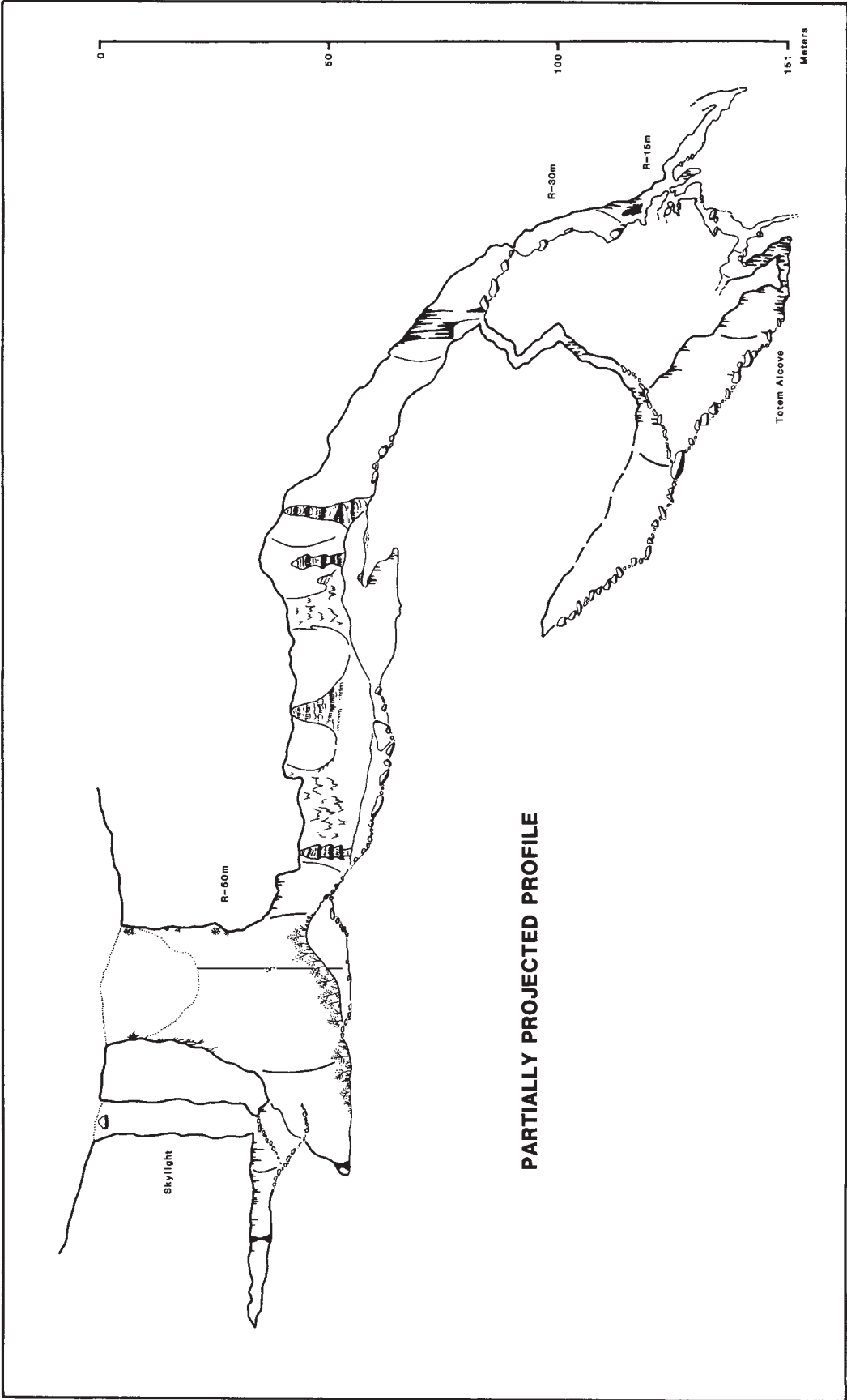
Tamaulipas, Mexico

Sound and tape survey: 3/17-19/1987 : G. Atkinson, T. Soiger,
J. Gilliland, J. Herowitz, M. Minton, B. Smith, P. Smith, M. Weaver



0 50
Meters

Nm



Long Caves of México

compiled by Peter S. Sprouse

1. Sistema Purificación	Tamaulipas	67,599
2. Sistema Huautla	Oaxaca	52,110
3. Sistema Cuetzalan	Puebla	22,432
4. Coyalatl	Puebla	19,000
5. Cueva del Tecolote	Tamaulipas	11,084
6. Sumidero Santa Elena	Puebla	7884
7. Cueva de la Peña Colorada	Oaxaca	7793
8. Atepolihuit de San Miguel	Puebla	7700
9. Sótano del Arroyo	San Luis Potosí	7200
10. Actún de Kaua	Yucatán	6700
11. Sumidero de Jonotla	Puebla	6381
12. Sótano de Las Calenturas	Tamaulipas	6032
13. Gruta del Río Chontalcoatlán	Guerrero	5827
14. Gruta del Río San Jerónimo	Guerrero	5600
15. Grutas de Juxtlahuaca	Guerrero	5098
16. Veshtucoc	Chiapas	4900
17. Cueva del Nacimiento del Río San Antonio	Oaxaca	4570
18. Sótano de la Tinaja	San Luis Potosí	4502
19. Sótano de Japonés	San Luis Potosí	4500
20. Sistema San Andres	Puebla	4471
21. Sótano del Río Iglesia	Oaxaca	4206
22. Sistema Zoquiapan	Puebla	4107
23. Sima del Borrego	Guerrero	4087
24. Aztotempa	Puebla	4000
25. Sumidero San Bernardo	Puebla	3931
26. Sumidero de Pecho Blanco No. 2	Chiapas	3790
27. Sótano de Agua de Carrizo	Oaxaca	3748
28. Nita Nashí	Oaxaca	3524
29. Cueva del Río Jalpan	Querétaro	3440
30. Actún Xpukil	Yucatán	3353
31. Cueva de la Laguna Verde	Oaxaca	3350
32. Sumidero Yochib	Chiapas	3316
33. Cueva de El Chorreadero	Chiapas	3280
34. Resumidero la Joya	Guerrero	3245
35. Cueva de la Llorona	Tamaulipas	3136
36. Atepolihuit de Nauzontla	Puebla	3066
37. Sótano de Tlamaya	San Luis Potosí	3057
38. Sistema de Montecillos	San Luis Potosí	3022
39. Resumidero de Toxin	Jalisco	3005
40. Sótano de Huitzmolotitla	San Luis Potosí	3002
41. Sumidero de Atliliakan	Guerrero	3000
42. Sótano del Río Coyomeapan	Puebla	3000
43. Tamazcalco	Puebla	3000
44. Sótano del Tigre	San Luis Potosí	3000
45. Cueva de Los Hornos	San Luis Potosí	2960
46. Cueva Quebrada	Quintana Roo	2759
47. Boca del Río Apetlanca	Guerrero	2750
48. Cueva Ayockal	Puebla	2702
49. Actún Loltun	Yucatán	2682
50. Cueva del Cinco de Abril	San Luis Potosí	2632

Deep Caves of México

compiled by Peter S. Sprouse

		meters
1. Sistema Huautla	Oaxaca	1353
2. Guizani Ndia Guinjao	Oaxaca	940
3. Sistema Purificación	Tamaulipas	895
4. Sótano de Agua de Carrizo	Oaxaca	836
5. Sótano de Trinidad	San Luis Potosí	834
6. Sótano de Ocotempa	Puebla	773
7. Sonyance	Oaxaca	745
8. Nita Xonga	Oaxaca	740
9. Aztotempa	Puebla	700
10. Sótano de Tilaco	Querétaro	649
11. Nita Nashí	Oaxaca	641
12. Cueva de Diamante	Tamaulipas	621
13. Nita He	Oaxaca	594
14. Sistema Cuetzalan	Puebla	587
15. Sótano de las Coyotas	Guanajuato	581
16. Sótano Arriba Suyo	San Luis Potosí	563
17. Sótano del Río Iglesia	Oaxaca	531
18. Sótano de Nogal	Querétaro	529
19. Sótano de Ahuihuitzcapa	Veracruz	515
20. Sótano de las Golondrinas	San Luis Potosí	512
21. Hoya de las Conchas	Querétaro	508
22. Sótano del Buque	Querétaro	506
23. Nita Chaki	Oaxaca	493
24. Hoya de las Guaguas	San Luis Potosí	478
25. Cueva de San Agustín	Oaxaca	461
26. Sótano del Barro	Querétaro	455
27. Hoyo de San Miguel	Guerrero	455
28. Sótano Itamo	Veracruz	454
29. Cueva de La Peña	San Luis Potosí	448
30. Sótano de Tlamaya	San Luis Potosí	447
31. Cueva de la Llorona	Tamaulipas	412
32. Cueva del Reefer Madness	San Luis Potosí	411
33. Cueva Tan-go-jo	San Luis Potosí	405
34. Kajahe Xuntua	Oaxaca	400
35. Sumidero Santa Elena	Puebla	400
36. Atepolihuit de San Miguel	Puebla	399
37. Veshtucoc	Chiapas	380
38. Sótano de la Joya de Salas	Tamaulipas	376
38. Hoya del Poleo	Guanajuato	375
39. Sótano Tomasa Kiahua	Veracruz	374
40. Sótano de la Virgen	Querétaro	352
41. Sótano del Perro Vivo	Hidalgo	350
42. Cueva de El Chorreadero	Chiapas	345
43. Cueva de Los Hornos	San Luis Potosí	341
44. Cueva de Xocotlat	Puebla	339
45. Sótano del Río Coyomeapan	Puebla	337
46. Grutas de San Cristobal	Chiapas	330
47. Sótano de Los Hernandez	Querétaro	330
48. Cueva de Santa Cruz	Oaxaca	327
50. Sumidero del Río Xocotlat	Puebla	323

NANTA-HUAUTLA TIE-IN

New Depth Record for México

by Mark Minton

On 26 March 1987 an historic connection was made between Sistema Huautla, Oaxaca and the highest known cave in the area, Nita Nanta. Since its discovery in 1980, tremendous effort had gone into linking Nita Nanta with nearby Li Nita, which was connected to Sótano de San Agustín that same year. But in spite of several close approaches, a connection remained elusive. The magic moment finally came when Jim Smith donned scuba gear and slipped beneath the surface of San Agustín's Scorpion Sump (-605 meters), soon to emerge less than ten meters away in the final pool of Nita Nanta (-1098 meters). The total depth for the system is 1353 meters, making Sistema Huautla once again the third deepest cave in the world. A spectacular through-trip is now possible. One could enter Nita Nanta's highest entrance, descend 1225 meters into San Agustín, then ascend 1100 meters and exit via Li Nita, all without retracing a single footstep!

After seven years, such an easy connection so early in the expedition was almost anticlimactic. And in spite of everyone's relief that it was out of the way, we still had over six weeks left in the field and no solid plan of action. Of course, it did not take long to find something to do. Even before the last person was out of San Agustín from the connection camp, we had found a major, new fossil route practically within sight of the entrance. The gently sloping, often flowstone-floored gallery went down 200 meters and then split into two independent routes. To the right a spectacular series of shafts, the Bowl Holes, dropped 315 meters into Tommy's Borehole, a previously known passage at -615 meters. The smaller lefthand branch also eventually connected into the same passage a short distance away. This new route adds three kilometers to the system and provides very rapid access to the bottom sections of San Agustín.

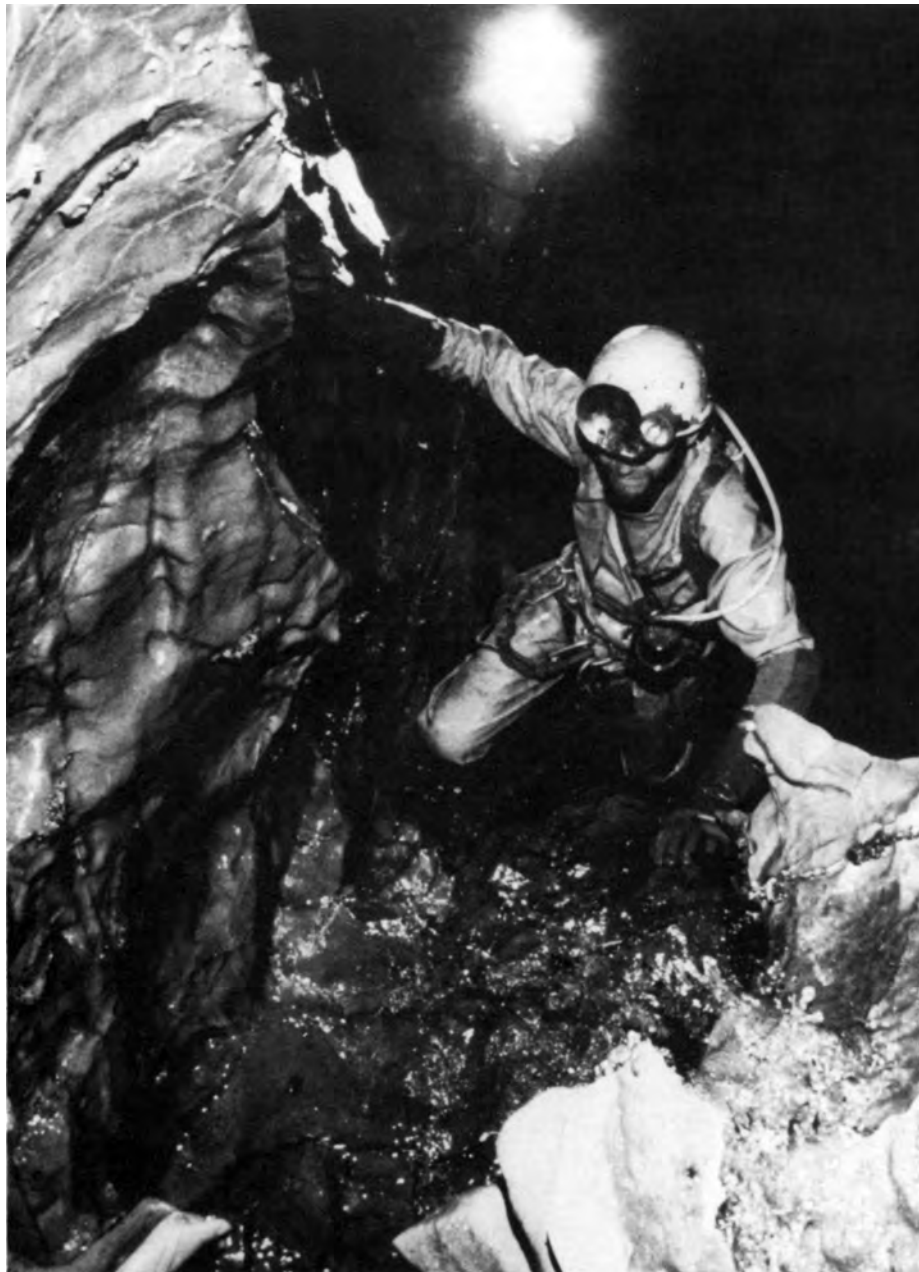
Another major discovery was made in the hills above La Grieta. Bernardo's Cave, a typically high, narrow canyon with a small stream and good wind was pushed to -315 meters on three trips. Nearby Nita Ina (Fern Cave) was then connected to Bernardo's Cave in two places, providing easier access. This cave was pushed 663 meters deep to a connection with Nita Nanta, adding another three kilometers and bringing the total length of the Sistema Huautla to 52.11 kilometers.

The 1987 Huautla Expedition surveyed 7.5 kilometers of new passage, including over 1 kilometer of new vertical traverse. A full report will appear in the next **AMCS Activities Newsletter**.

CHILCHOTLA '85

Australian Expedition to México

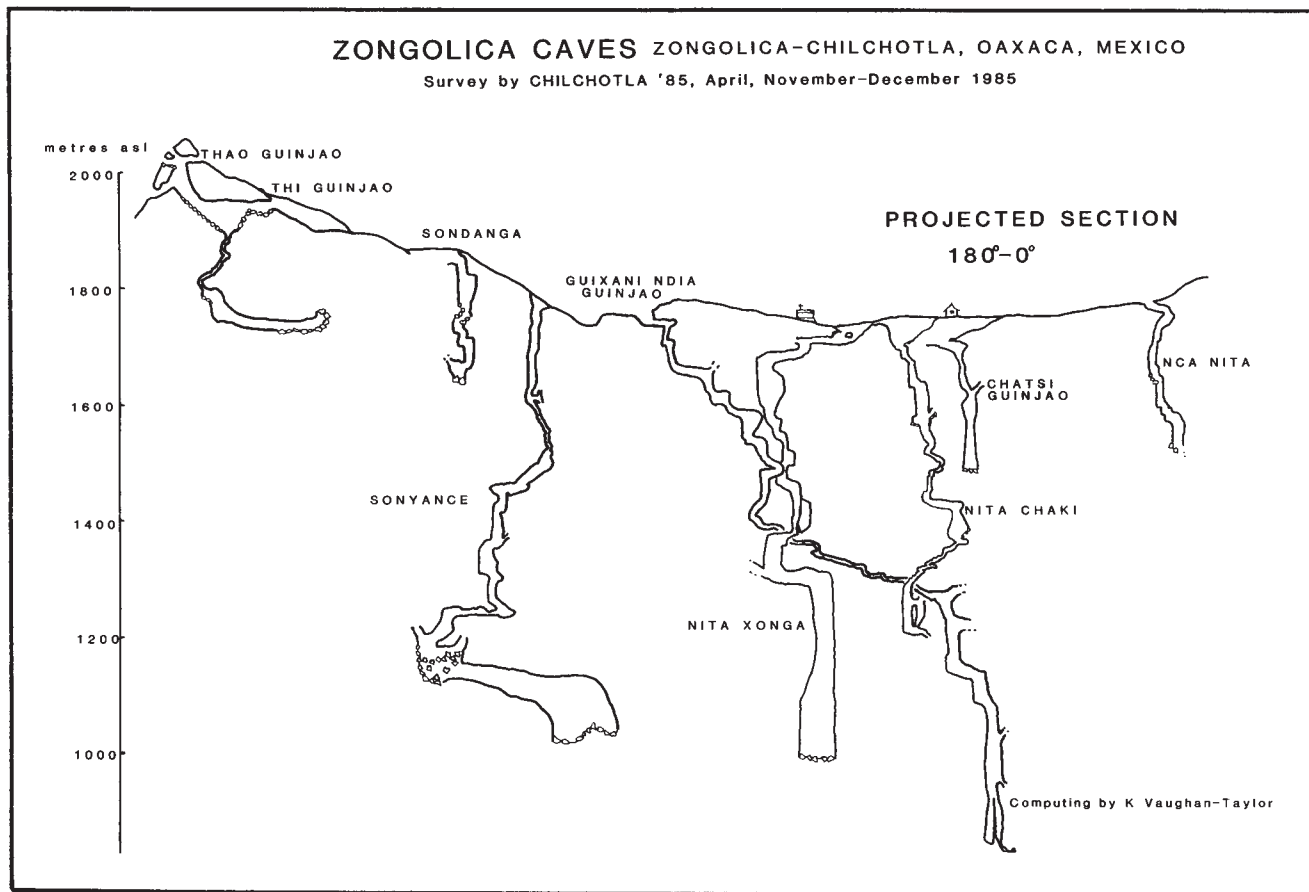
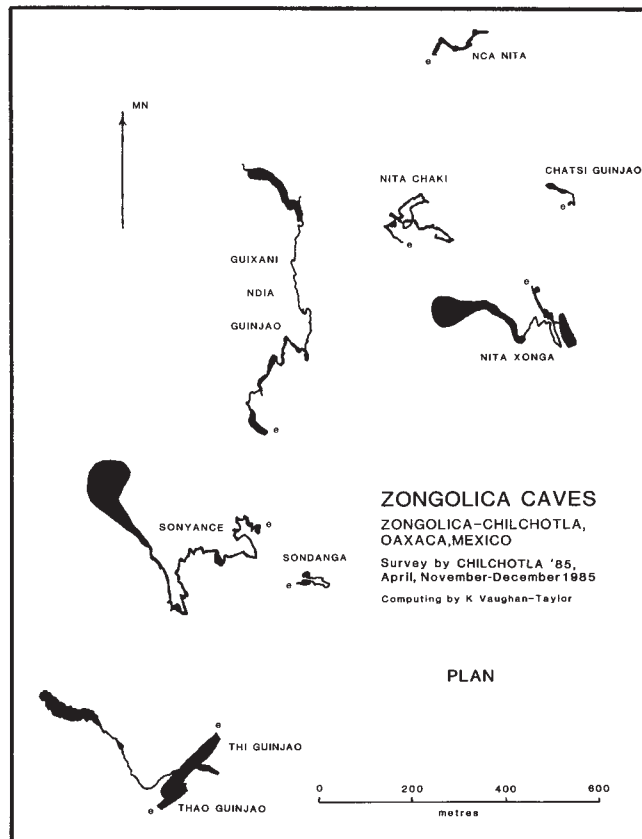
by Alan Warild



Alan Warild in the streamway of Guixani at about -350 meters. (P. Cole)

Chilchotla is a newly discovered caving area in the northwestern corner of the Sierra Mazateca, in the state of Oaxaca, central México. While in the same massif as the well-known Sistema Huautla, the area lay unexplored by cavers until we visited it in April 1985. The area had been spotted while we were on a reconnaissance of Xincinteptl, a limestone massif to the north. We were fruitlessly bashing through burnt-out scrub and looking across at the Meseta Huautla on the other side of the river. The hills to the south of the township of Chilchotla looked good, and an examination of the map and air photos showed it to be not the area of Sistema Huautla, but an overlooked area of karst at an altitude of 1700-2000 meters above sea level.

After four weeks on Xincinteptl, we had found only a few dry shafts, so we moved across the river to visit the Sistema Huautla and do some real caves. But within two weeks we had tired of touring and were looking for more constructive things



to do. A large Huautla Project team under the leadership of Mark Minton had arrived, and there was inadequate accommodation in the village of San Agustín. So we took a chance on wasting the last two weeks of our hard-won official permission and went to look at the hills above Chilchotla.

APRIL RECONNAISSANCE

From the village of Maria Luisa we scoured the slope above, but turned up mainly "grot-holes." During the first week of prospecting, only two caves worthy of comment were found. Sótano del Oso Muerto (Dead Bear Pit), 242 meters deep and 1130 meters long, starts with a spectacular 80-meter entrance shaft and continues through a series of rifts and loose boulder piles that become progressively worse, until no way on can be found through the breakdown. Sótano de los Ladrones (Pit of the Thieves) has a magnificent entrance with a nearly freehanging 170-meter pitch, and nothing more.

With eight days left on our permit we made our breakthrough. Three of us climbed the muddy hill to the pueblecito of Zongolica. Because of the heavy rain, we shel-

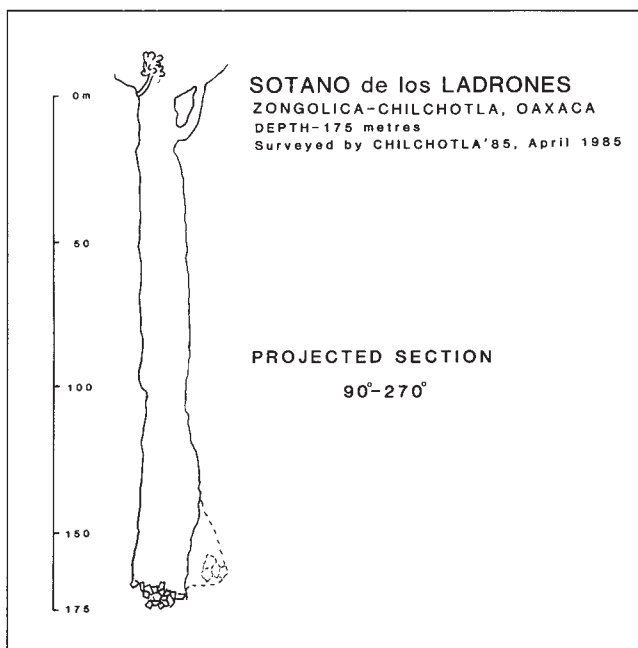


tered in an obvious streamsink. It was more than just a shelter however; it had walking passage, a breeze, and a pitch. Over the next week we pushed down the cave, but never wanting to drag too much gear up the hill meant that we were always running short of rope. On the last day, all six of us joined forces to descend a 55-meter pitch, only to be stopped by a longer pitch at -430 meters. We had clean black rock, a large stream, 30 meters of rope, and no time left. We called the cave Nita Xonga (Little Stream Cave) - a great objective to head for on our next expedition.

NOVEMBER RETURN

November was the earliest our group could return. Fortunately, this was also after the wet season, which runs from May to September. On this occasion, we rented a house in Zongolica only three minutes from Nita Xonga. In México the "alpine caving" drudgery of carrying enormous sacks up mountains can usually be avoided. Fourteen mules and burros did it for us.

Within a week we had bottomed Xonga. The pitch at -430 meters turned out to be 310 meters deep and took us three days to rig and survey. At the bottom was a giant chamber floored with boulders and with no passable leads. The only chance was a blowing slot, but none of us could fit through, and we had no bang to enlarge it. We also tried a parallel shaft system, but



NITA XONGA

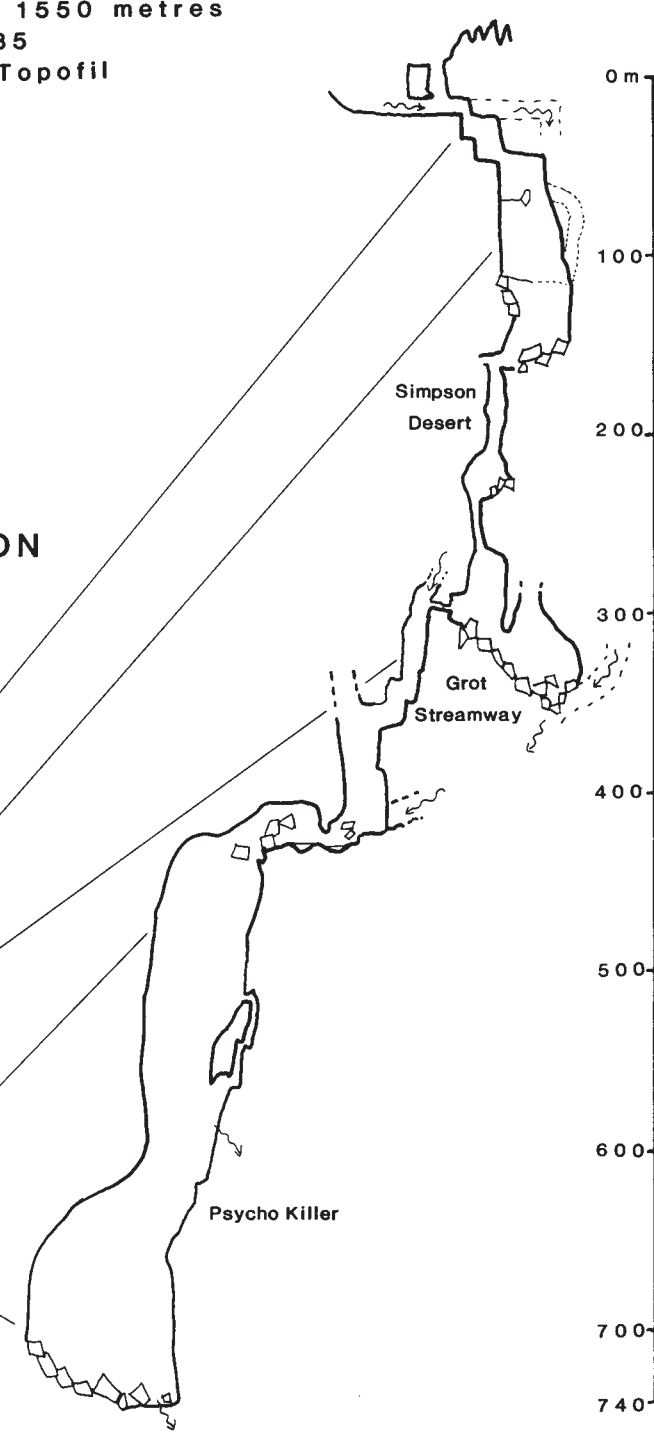
ZONGOLICA-CHILCHOTLA, OAXACA
 DEPTH-740 metres LENGTH 1550 metres
 Surveyed by CHILCHOTLA '85
 April, November 1985 using Topofil

PROJECTED SECTION

270°-90°

Pitch	Length(m)	Rope(m)	Anchors
1	12	20	nat + ring, lb-6.
2	3	6	lb.
3	90	100	nat + nat, nat-20, lb-30, ledge lb-50, 2b-60, lb-70, lb-85.
4	20	25	nat + lb.
5	30	35	lb, lb-5.
6	30	30	nat + lb.
7	45	50	lb + nat, nat-15.
8	20	—	4 ▣ ladder -climb up.
9	30	35	nat, r-5, r-20.
10	6	10	lb.
11	10	12	lb + pr.
12	12	14	2b, both poor!
13	4	10	nat.
14	55	65	lb + pr, lb-20.
15	10	15	2 nat.
16	310	360	nat + pr, 3b traverse(-1,-3, -8), lb-20, lb-40(opposite wall), nut-45, lb-50, lb-55, nat-85, ledge nat-80, r-110, lb-120, lb-130, lb-150, lb-190, ledge lb + peg-210 lb-215, peg-225, lb-230, 2b-240.

nat = natural belay. lb = bolt. r = redirection (deviation)
 pr = previous rope. Y = Y belay.



Computing by K Vaughan-Taylor



Anne Gray in the Mulligrubber, Nita Chaki.
(P. Cole)

it only connected back, so our total depth stayed at 740 meters. Not bad for the first one, but we were hoping for better!

Simultaneously with Xonga we were pushing down Nita Chaki (Cricket Cave). Smaller, wetter, and cleaner than Xonga, it kept us entertained for a few days, but the enjoyment turned to horror as the quality of the rock became abysmal. We had been suitably impressed by the Clean Bowled Pitch, got down for the Mulligrubber, but were mercifully "all out" for -493 (meters) in an impenetrable bedding-plane squeeze.

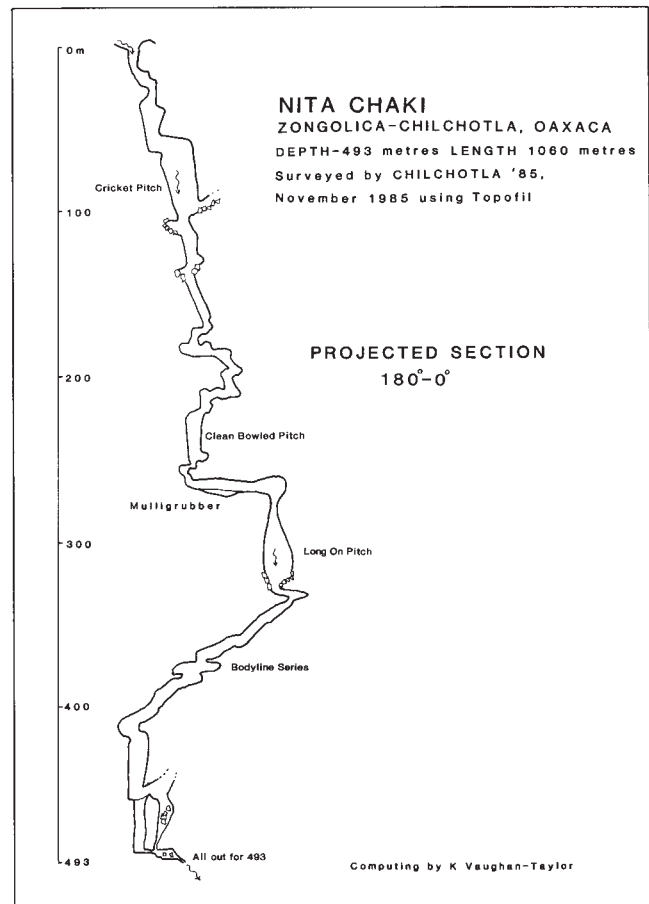
TWO GOING CAVES

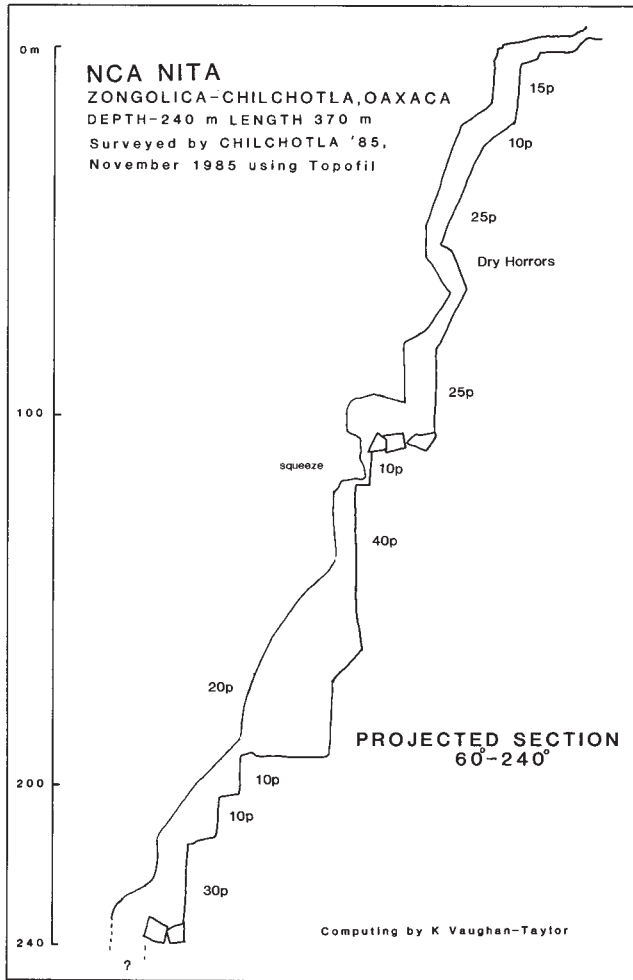
At this stage (early December) we had eight people and no caves left, but one day's surface bashing fixed that. Nca Nita (Hole 20) went easily, but with some interesting climbs to -240 meters, where exploration halted at the top of a 30-meter pitch. Another cave we called Puta, after the toilet-wall style graffiti on the roof, but that eventually got changed to Guixani Ndia Guinjao (You're About To Get Married Cave!), which the locals insisted was its real name. We had two good, going caves and not enough rope to do them simultaneously. We chose Guixani.

For two weeks Guixani had us rushing in day after day. The gentle streamways of

the upper section eventually gave way to a pitch series that took us to the bottom, a sand choke at -940 meters. The bottom was quite unpleasant, so a good climbing lead was left in favor of trying to connect in some higher entrances. The gear shortage hit us again. We had to derig Guixani before we could push any of the other caves.

Another hole, Sonyance (Place of the Trees), came to the fore. Unlike the previous caves, it was very clean and began to collect other streams from the outset. Hopefully this time we had found the "main drain" and would have great caving all the way down. In two weeks (interrupted by a flood) we pushed this truly superb cave to -750 meters. Only in two spots were we forced to search for bypasses through dirty rockpiles when we couldn't follow the water. A fine cave and once again a chance of continuation; only 50 meters from the bottom we lost the draught.



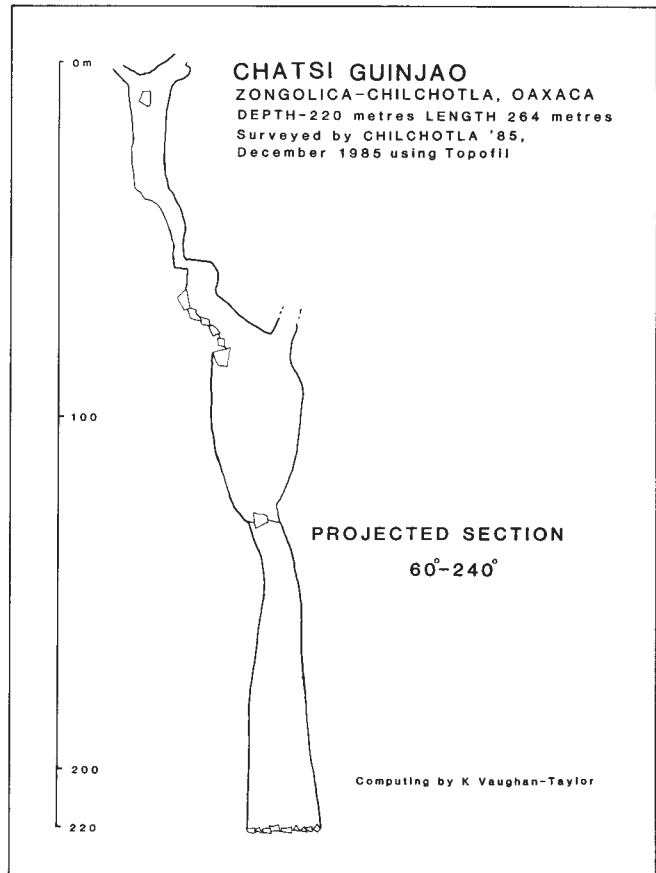


HIGH CAVES

The caves higher up the hill were a little disappointing. Sondanga (Place of the Deep) was a "certain" connection with Sonyance until it stopped dead at only -213 meters; again towards the bottom we lost the draught. Thao Guinjao (Wind Cave) and Thi Guinjao (Child Cave) started as large, dry fossil systems around 2000 meters above sea level. They were the only connection of the trip and between them reached -300 meters, heading parallel to, not towards, the known caves.

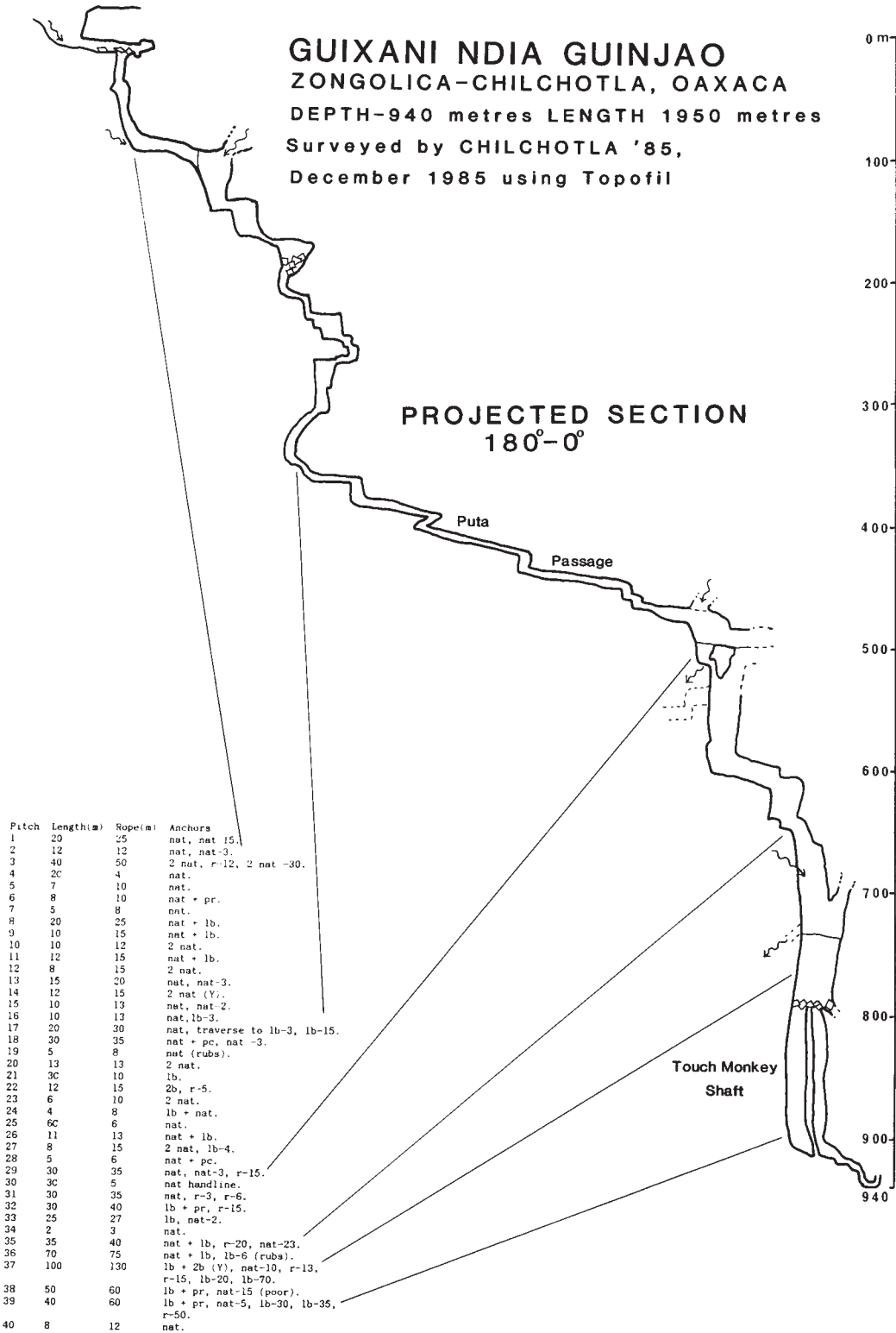
In nine weeks we had achieved quite a lot: 4300 meters of virgin vertical cave and 8355 meters traverse length explored and surveyed. The Zongolica caves are over 5 kilometers from the nearest Sistema Huautla cave and both systems head away from each other, so we had definitely found a new system. All we had missed was a cave

over 1000 meters deep to cap it off, but, with 1700 meters of potential, we should manage it when we return in 1987.



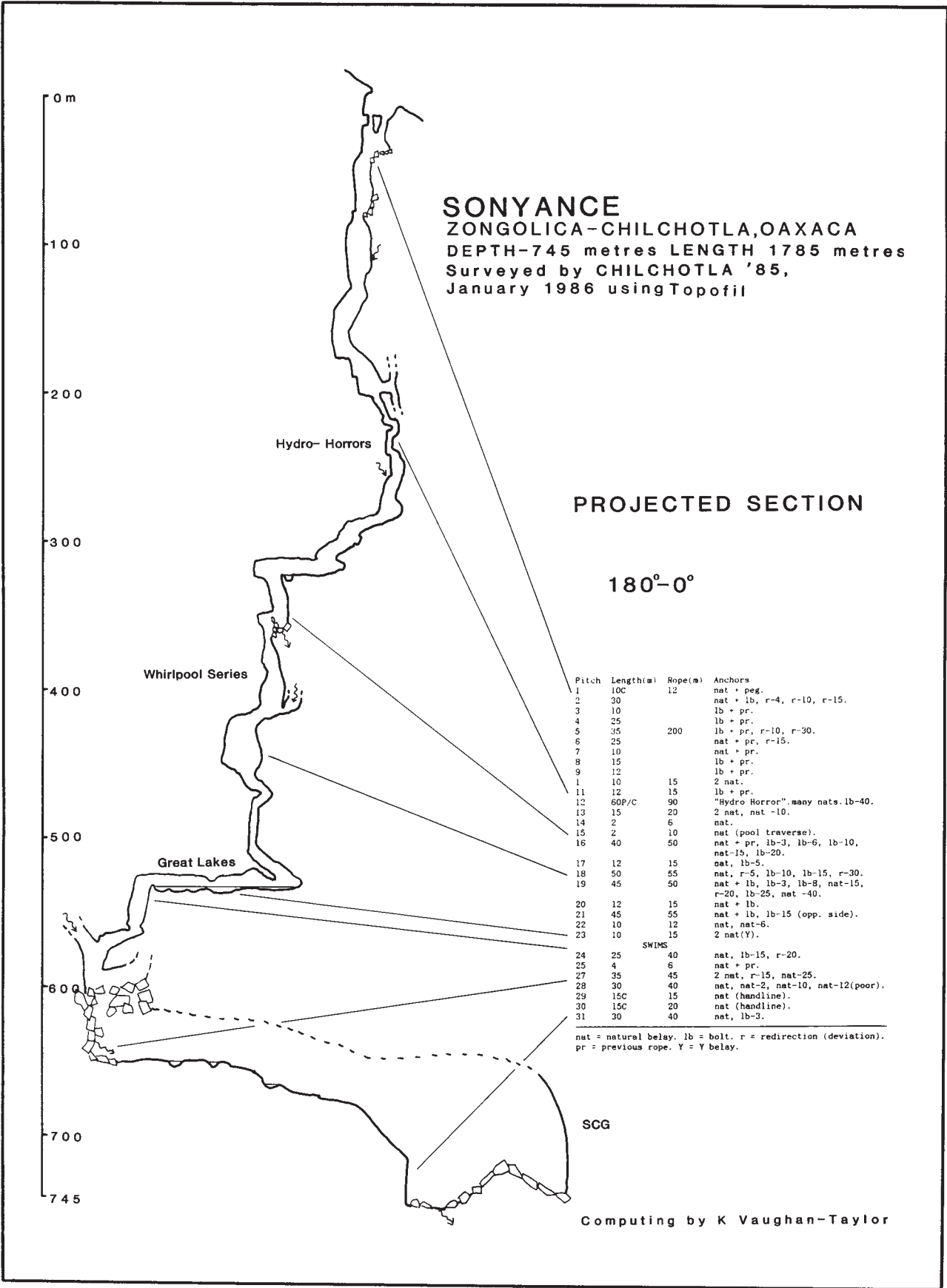
GUIXANI NDIA GUINJAO
ZONGOLICA-CHILCHOTLA, OAXACA
 DEPTH-940 metres LENGTH 1950 metres
 Surveyed by CHILCHOTLA '85,
 December 1985 using Topofil

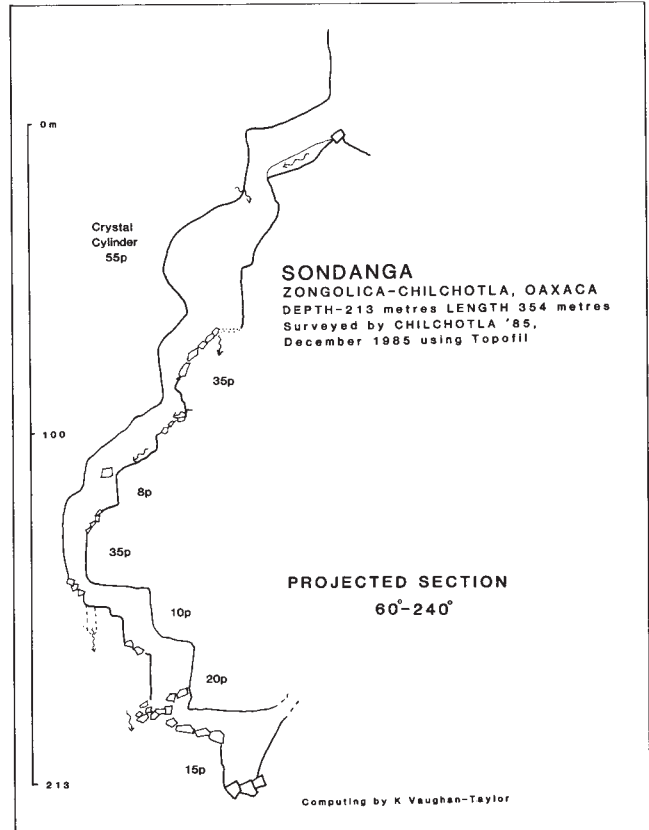
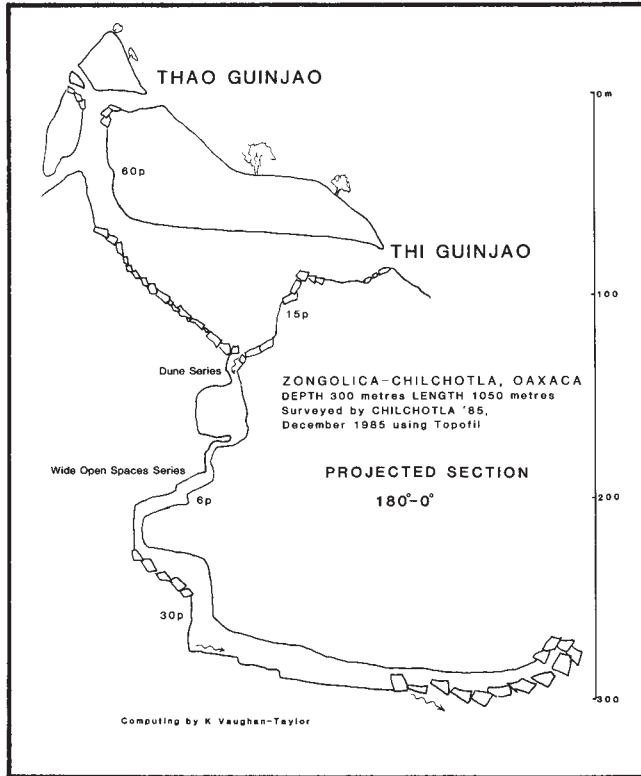
PROJECTED SECTION
180°-0°



nat = natural belay. lb = bolt. r = redirection (deviation)
 pr = previous rope. Y = Y belay.

Computing by K Vaughan-Taylor





CHILCHOTLA

Espeleólogos australianos exploraron algunas cuevas en el área norte de Oaxaca, cerca de Chilchotla. El área se localiza en el ángulo noroeste de la Sierra Mazateca, al norte del Sistema Huautla. En abril de 1985, un grupo revisó el área en busca de cuevas. La más sobresaliente que encontraron fué Nita Xonga, la cual topografiaron hasta una profundidad de 430 metros, en donde les faltó cuerda en la punta de un profundo tiro. El grupo regresó al área durante noviembre y diciembre de 1985 y continuaron la exploración en Xonga, llegando al fondo a los -740 metros. Otra cueva, Nita Chaki, se avanzó hasta una profundidad de 493 metros. Guixani Ndia Guinjao, la más profunda, terminó en los -940 metros. Sonyance fué avanzada hasta una profundidad de 750 metros. Varias cuevas más fueron exploradas y trazadas. El grupo planea regresar en 1987.

CAVING IN



by Jim Pisarowicz

I was standing in the middle of Teapa, Tabasco, framing a picture of a church. Suddenly I felt a sharp tug on my shirt. Surprised, I turned around to discover that an Indian woman was trying to get my attention. When I looked down at her, she said in Spanish, "There are lots of beautiful caves around here." I was dumbfounded! Was it that obvious that I was really more interested in caves than churches, or was it an omen that I should return to the Teapa area to look for caves?

That encounter with the Indian woman took place on 15 February 1986. Later that day, Karen Rosga and I drove around the

Teapa area and looked at the limestone. It was classic "haystack" karst. Rounded limestone hills rose to the east of town, and to the south one could look up into the high limestone plateaus of Chiapas. Tabasco was on the itinerary for 1987!

Few of the cavers I knew were interested in venturing into a new area, three days drive south of the border, to look for caves. Fortunately I convinced one caver, Warren Netherton from Iowa, that a trip to Tabasco would yield wonderful cave discoveries, and on 31 January 1987 we left Austin for a three-week venture into the karst of the Teapa area.

Above: Haystack karst of the Sierra Madrigal, Tabasco. (Jim Pisarowicz)

GRUTAS DEL COCONA

Finding a cave to begin mapping was relatively easy. Upon driving into Teapa, it's pretty hard to miss the bright blue sign that says "Grutas del Coconá" This cave has been developed as a show cave, and although AMCS cavers have visited the cave (David McKenzie and James Reddell in the early 1970s), no map has ever been published. Coconá would be our first project.

Warren wanted to take the tour of the cave before we began our survey, so on 4 February 1987 we waited around for the cave to open. We waited until 10:30, when the guide turned on the lights and turned us loose. The tour cost 200 pesos (\$0.20).

The cave is worthy of being displayed as a show cave, for stalactites and stalagmites abound almost everywhere throughout the cave. It is a very beautiful cave. More striking to the average gringo caver, though, is the temperature of the cave. In the entrance passages the temperature was a warm 19.5 Celsius, and beyond a constriction in this passage it really heats up, to 23.8 degrees.

Past the constriction, the trail forks, with the small right-hand passage turning into a duck walk that leads to a drop with a lake about 25 meters across at the bottom. The main passage continues to get larger until a room is encountered, 35 meters wide with the ceiling rising as much as 25 meters overhead. Huge stalactites hang from parts of the ceiling in this room.

Past this large room another lake is encountered. A bridge has been constructed to get across this lake without having to swim. Huge flowstone displays and massive stalactites and stalagmites can be observed from this bridge. The trail then goes up an incline past very fine rimstone, and the passage pinches to a close in a bedding plane/flowstone termination.

After the tour, we changed into caving clothes, which throughout our ventures underground consisted of T-shirts, gym shorts, boots, and kneepads, then returned to the cave to survey. The surveying was pretty easy, considering that we had a trail and electric floodlights to illuminate the cave. The main hindrance to surveying Coconá was the constant stream of



Columns in Grutas del Coconá. (Jim Pizarowicz)

people visiting the cave. Seeing that we appeared to know what we were doing, everyone stopped to ask us questions about caves in general and cave surveying in particular. Before long we were actually giving cave tours (in broken Spanish) to all the tourists. It was fun.

By the end of the next day we had completed the survey of Grutas del Coconá. The total survey was just under 600 meters. All that remained to be done was to take a few photographs of the cave, which we did the next night after all the tourists had left and the lights had been turned off.

CUEVA DE TEAPA

Most of the cave tours into Coconá were led by one of a group of seven boys who spent their days playing in the vicinity of the cave. We figured that if anyone knew of other caves in the immediate area, he would. At the end of our first day mapping in Coconá, Jorge led us to a rather small hole about 200 meters from the entrance to Coconá. This hole did not look very intriguing, but was better than the other cave, called Grutas Hueco, he showed us, a small resurgence cave that sumps in about 10 meters. When asked the name of the cave, he said that it did not have one. We christened the cave Cueva de Teapa, which met with Jorge's approval.

On 6 February we began the survey of Cueva de Teapa. Inside the entrance, the passage became just large enough to walk



The Grutas del Coconá cave guides: Robbin, Ernesto, Hernán, Jorge, Tomás, and Roberto. (Jim Pizarowicz)

upright. Huge spiders and amblypygids scurried up and down the passage. We named this area Arachnid Walk. Arachnid Walk has a very muddy floor, and in places we were almost up to our knees in mud. This passage continued for five stations, and then suddenly the passage enlarged as we intersected a stream gallery. We excitedly ran down the mud slope and then downstream in a gallery about 10 meters across. The little hole had led to a good cave.

The passage continued about 10 meters in diameter for about 90 meters, and then the stream filled the passage. I waded on ahead, and with every step methane gas bubbled up to the surface. Fortunately we were both using electric lamps. Soon we were swimming, and the passage was getting narrower. After we swam 40 more meters, with all the floating trash that had washed into the cave, the passage sumped, but we still had upstream leads.

Returning to the junction with Arachnid Walk, we continued the survey upstream. The passage got larger and larger, until we were standing on breakdown in a huge junction room. The room was 20 meters wide by 20 meters high. We called it Incredible Dimensions, and continued surveying in the left-hand passage. We named this the Parachute Passage, as it

seemed that every nook and cranny had parachute-shaped spider webs.

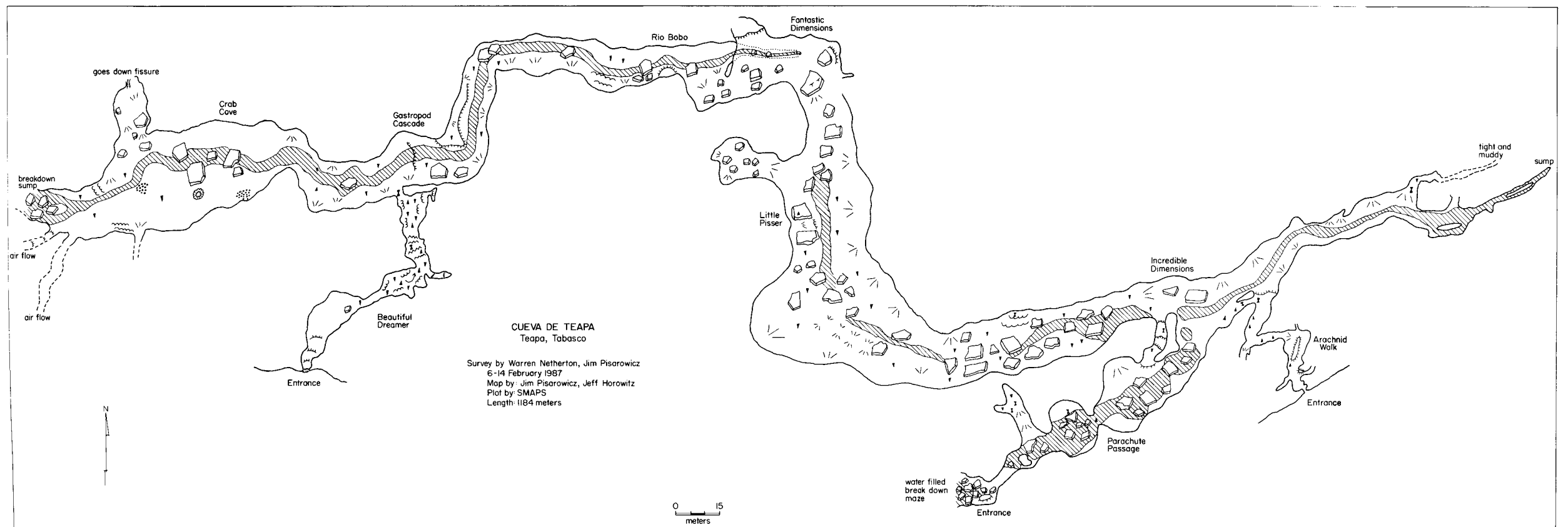
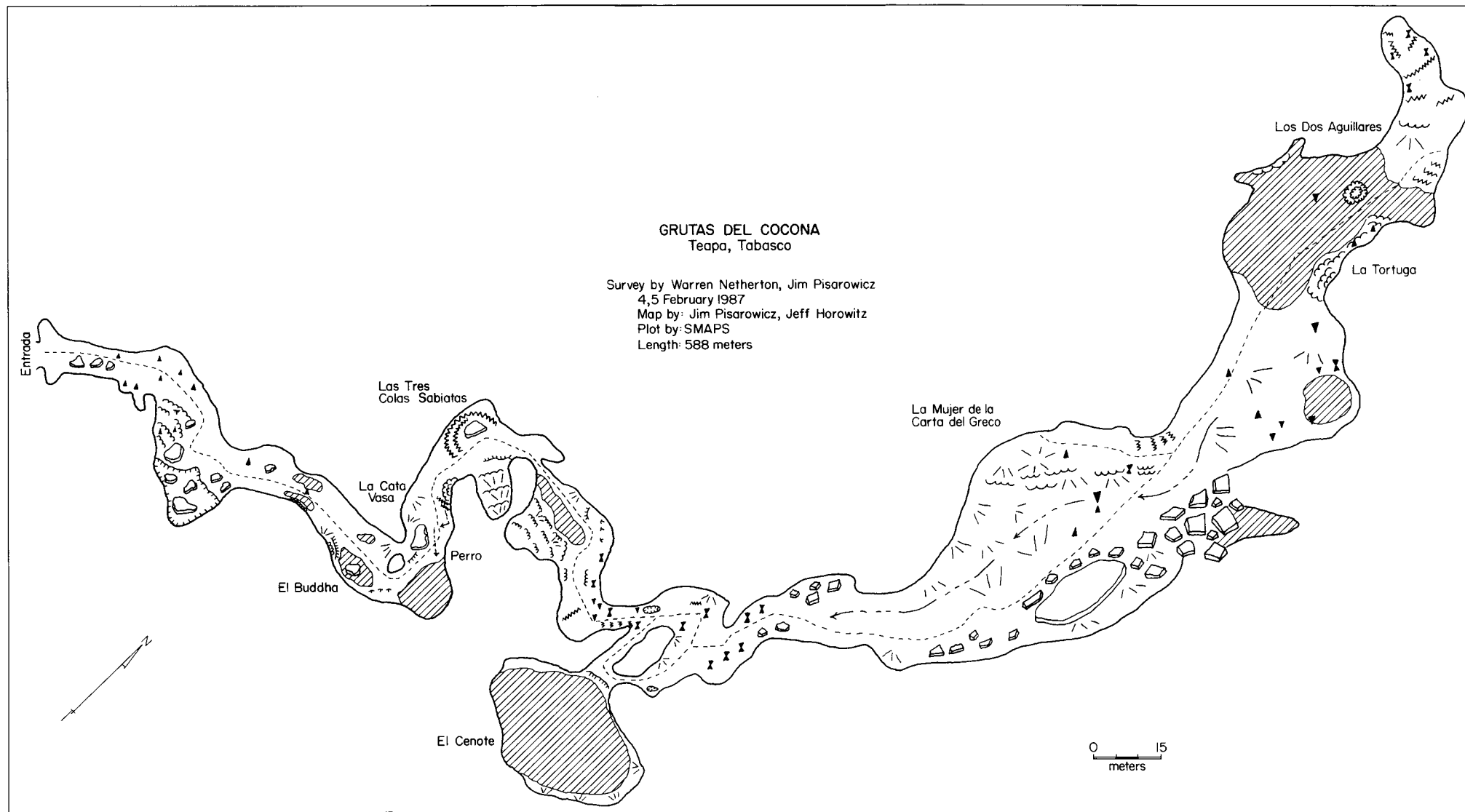
Five stations later, while making our way up and down the breakdown in this large passage, Warren dropped the survey book, and it went between the breakdown blocks and splashed into the water. Luckily we could retrieve the book, but it was hopelessly soaked. We called it a day, and left to dry out the book.

On 8 February we were back in the Parachute Passage where we had left off. The passage remained 15 to 20 meters wide, until we got out of the water and climbed up a steep slope. The air was blasting through this passage, and we were really excited. But just a short distance farther on we could see light. We had found a dome that led up to the surface. The passage continued on along the same trend for a short distance, but was breakdown filled and required crawling through the breakdown in the water. Large catfish swam among the boulders as we tried to make our way on. After several attempts to follow the trend, we gave up and started making our way back to Incredible Dimensions to try the right-hand passage.

We dubbed that passage the Parasol Passage because the parachute/parasol webs were found throughout this area also. To our surprise, this passage was even larger than the Parachute. As we made our way through the water and breakdown, the passage grew to 30 meters and then to 40 meters wide. The ceiling was 20 to 25 meters above our heads, and huge stalactites hung seemingly everywhere!

Two hundred meters or so later, we were climbing out of the water and up through breakdown into another huge room. This we called Fantastic Dimensions. It was a shattered room filled with breakdown and had a ceiling 35 meters high. This was the end of our second day in Cueva de Teapa.

The tenth of February saw us blasting our way back to Fantastic Dimensions to climb the breakdown to see where that would lead. At the top of the breakdown we looked down into a fog-filled passage. The climb down was done very carefully, as at any moment it seemed the entire mountain of breakdown might collapse. At last we were at the bottom and again in the river. At



this point it occurred to us that we had not named the river. One of the locals had told us that catfish were locally called bobos. The river became the Río Bobos.

The passage was still large, 15 meters wide, but not nearly so high (only 10 to 15 meters). After a couple hundred meters of this, we began to hear the sound of falling water, and soon we were looking at a small section of rapids and a 1.5-meter-high waterfall. We called the waterfall Gastropod Cascade.

Not far beyond Gastropod Cascade the walls began to fall away again as another huge room was encountered. This room is perhaps 25 meters wide and 10 to 15 meters high in places. In the Río Bobo just off this room we found a white crab with a shell 25 centimeters across. I have never seen such cave fauna in all my years of caving. We named the room Crab Cove.

Back near the Gastropod Cascade there was a walking side lead with a lot of air being sucked down it. We started surveying into this area and were rewarded by a passage decorated with the most amazing stalactites, stalagmites, columns, rimstone dams, and helictites. This became the Beautiful Dreamer passage. I was in the lead as we were mapping down the Beautiful Dreamer, and the wind was really blowing. Suddenly I heard a barking dog. I shouted back to Warren that I could hear a dog, and he and I began looking for the entrance that we knew had to be close by. After a few minutes of looking around we had found the entrance, but it was a mere crack. Warren excavated the crack, making it just large enough to crawl out. We left the cave knowing that we now had a cave over a kilometer long.

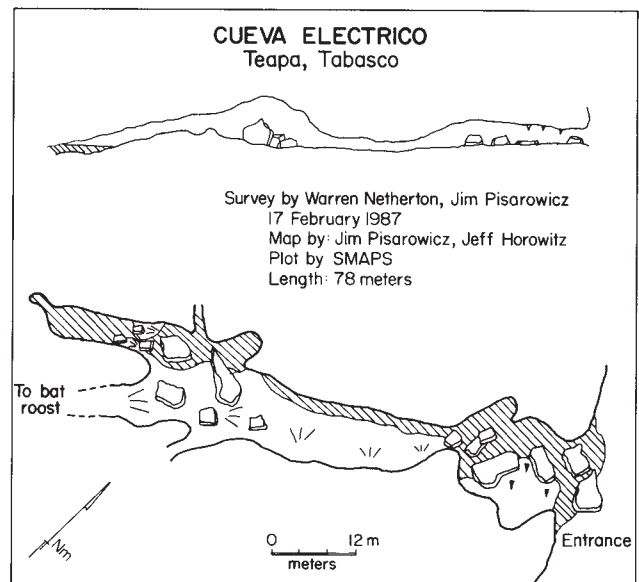
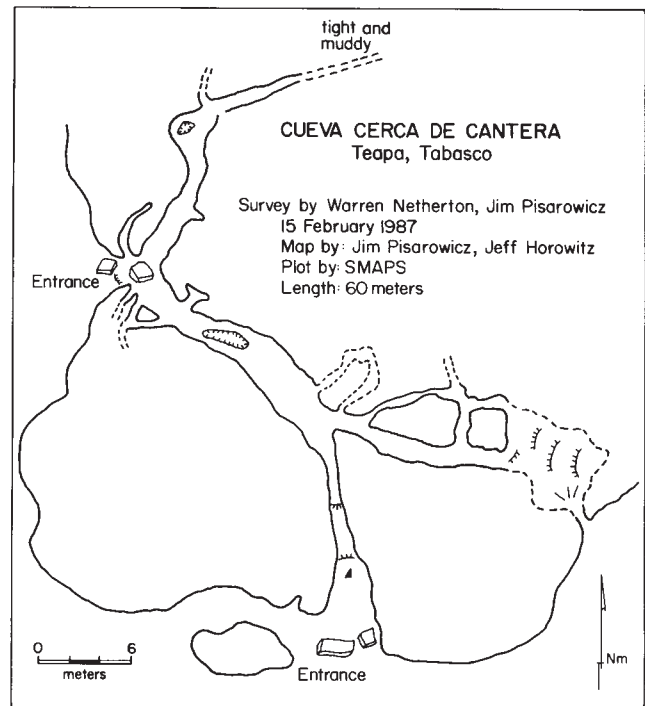
In the time we had remaining we made only one other trip into Cueva de Teapa, and we mainly mapped side leads. The surveyed length of this cave is now 1184 meters. Although many of the passages are very large, the cave is prone to flooding, and after one downpour we noted that the water rose 6 meters! Because of this we did not get any photos in Teapa.

OTHER CAVES IN THE TEAPA AREA

The limestone hills just outside Teapa have many small caves. We spent a consid-

erable amount of time hiking around the area looking for caves and asking locals about cave locations. On the western side of these hills there has been a considerable amount of limestone quarrying for cement and agricultural dolomite. Near this large quarry we mapped a small 60-meter-long cave called Cueva Cerca de Cantera, which was just behind a house.

In a valley in the center of these same limestone hills we found four small caves. Only one of these caves was mapped.





The milky-white sulphur river that flows out of Cueva del Azufre. (Jim Pizarowicz)



Passage walls in Cueva del Azufre are coated with sulphur, gypsum, and epsomite. (Jim Pizarowicz)

It was under the power lines that run through the hills and was named Cueva Eléctrico. This cave is about 80 meters long and contains a large bat roost.

The eastern side of these hills also contains several caves, but most of them were not very extensive. In these caves, along with all of the other caves that we visited, collections were made of the cave fauna. These are currently being analyzed by James Reddell at the Texas Memorial Museum.

The hills immediately outside Teapa are actually the smallest set of limestone hills in the area, and this was where we spent most of our time underground. We did scout out the karst south and east of Teapa in the Sierra Madrigal, Tapijulapa, and Plana. Several cave entrances were located in these areas, but no cave explorations were done.

CUEVA DEL AZUFRE

After two weeks in the Teapa area, we decided to check out a cave that many of the locals told us we should visit. This cave is located near the town of Tapijulapa. Tapijulapa is a small town at the intersection of the Ríos Tacotalpa, Amatán, and Almandro. Upon arriving in Tapijulapa, we asked directions, and before we knew it we were on the trail to the cave. The directions that we got to the cave were decidedly simple. Hike through the jungle until you come to a stream and then follow the stream to the cave. Soon the stream appeared. It was milky white. The stream was of sulphur water, and it was flowing out of the cave entrance.

Taking out our survey and caving gear, we were soon in the cave, and what a strange cave it was. The water flowing through the cave, as one might expect from looking at the surface stream, was a milky whitish-blue color. The walls of the cave are covered with spiders and other invertebrates crawling over gypsum and what appeared to be epsomite crystals. I have seen much gypsum in caves, and occasionally epsomite crystals, but I have never seen such displays of these minerals in any cave. But this was only the beginning. Further into the cave the walls appeared to be yellow in color. Upon closer inspection, the walls proved to have coatings of

elemental sulphur. In some parts of the cave, large sections of the walls were thick with sulphur crystals.

As if these surprises were not enough, when we reached several areas a long distance from the many skylights in the cave, we found stalactites made from what appeared to be moonmilk. These strange speleothems hung down like calcite stalactites but with a texture of partially dried moonmilk. A cave mineralogist would have a field day in this cave.

The water seems to course through this cave in many directions, and after a couple hundred meters of survey we concluded that we could not complete the survey of Azufre on this trip. We spent the rest of our time in the cave taking photos and scouting out the maze of passages.

Many of the water courses in the cave are shallow, incised vadose trenches in what appear to be phreatic passages. The travertine in the cave is strangely redissolved, and we found several interesting kinds of flowstone and stalactites with bizarre features. Some chambers are of considerable size, 20 meters or more wide and 10 meters high. In some places the water temperature was measured to be over 30 Celsius.

Also of interest in Azufre is the abundance of cave fauna. Biologists in the early 1960s collected specimens from Azufre, and in studying the fish concluded that a hybridisation was occurring between the surface fish and another species, not yet discovered, which is totally cave adapted. We collected several fish, crabs, snails, and many spiders and other invertebrates.

CONCLUSION

The limestone of Tabasco is quite extensive, and the karst development is very interesting. It is surprising that few cavers have ventured into Tabasco in search of caves, for the area seems riddled with them. The cave fauna is the most diverse I have ever seen in any area. And caves such as Azufre provide some of the most bizarre speleothems that I have encountered. I plan on returning to Tabasco during February or March of 1988. If any or all of the above sounds interesting to you, contact me at Wind Cave National Park, Hot Springs, South Dakota 57747.



One of the many skylight entrances to Cueva del Azufre. (Jim Pizarowicz)



Moonmilk stalactites against a wall of gypsum crystals in Cueva del Azufre. (Jim Pizarowicz)

TABASCO

Durante febrero de 1987, dos espeleólogos exploraron algunas cuevas cerca de Teapa, Tabasco. Primero topografiaron una cueva turística, las Grutas del Coconá. Esta apenas alcanza los 600 metros de largo. Es una hermosa cueva con numerosas formaciones. En la Cueva de Teapa, siguieron el pasaje río abajo de casi 90 metros hasta llegar a un sifón. Hacía arriba el pasaje se dividía en varios túneles. También encontraron varios salones colapsados y un riachuelo, y finalmente, una entrada superior. Cerca de Tapijulapa, fuera de la Cueva del Azufre, fluía un riachuelo de aguas blanco-azulosas. En la cueva se puede encontrar yeso y muchos cristales de epsomite, y hasta en algunos lugares se pueden observar las paredes cubiertas de azufre. Debido al corta tiempo con el que contaban los espeleólogos y a la extensión de la cueva se decidió regresar el año próximo. Las personas interesadas en incorporarse al autor, favor de comunicarse con él al Wind Cave National Park, Hot Springs, S.D., 57747, USA.

UNAM EXPEDITION TO

VERACRUZ



by **Andrea Raz-Guzman MacBeth**

This expedition was planned as a combination sports and scientific research project, a true speleological expedition. We visited the municipalities of Tepatlaxco and Ixhuatlán del Café in the state of Veracruz from 14-27 April 1984. Members of the expedition were Ing. Eduardo Martínez, Geol. Jorge Ortiz, Ing. Josué Escobar, Ing. Alejandro Sánchez, Biol. Hector Guzmán and myself, under the leadership of Ing. Guillermo Mora.

In this area of prominent karst development, drainage is mainly subterranean in

the dry season, and water holes are common. The geology of the area comprises quaternary sediments of clastic conglomerates of extrusive rock, clayey sands, calcareous rock, and volcanic ash, over which lie cretaceous sediments of three formations: the Mendez, rich in foraminifera, benthic clays, and calcareous sands; the Superior Escamela, rich in macrofossils, calcareous horizons, and dolomite; and the Median Escamela, rich in calcareous algae, sponges, gastropods, and bivalves. The area has a warm, damp climate, with a sum-

mer rainy season and vegetation that varies from jungle to forest.

The objectives of the expedition were, first, to explore the previously unexplored area we had selected on a map, find as many caves as possible, and map as many as time allowed; and second, to sample the animals, plants, rocks, and fossils of the area, and make observations on the geology. The paleontological and geological aspects are especially rich, this being one of México's transgressional extensions of reef origin. Also, notes were to be taken on ethnology and anthropological findings.

Our equipment consisted of the usual necessities for caving and surveying, as well as jars, plastic bags, alcohol, tags, etc., for the collection of samples. Each person fulfilled a particular role in the expedition's organization, from writing and preparing letters of introduction and data sheets to organizing caving, topography, and collection equipment. Others organized photographic equipment, planned the expedition menu, and bought food and first-aid supplies.

CAVES IN THE AREA

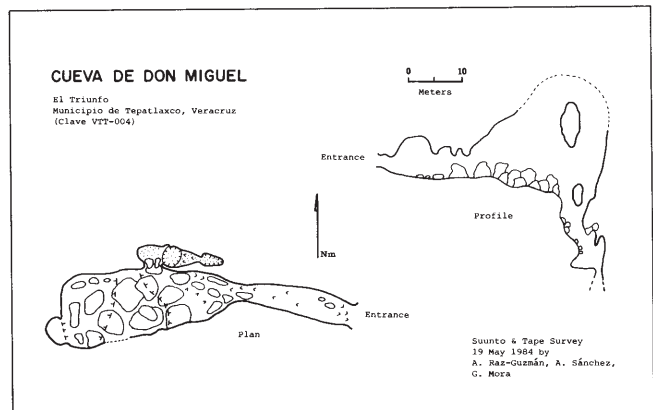
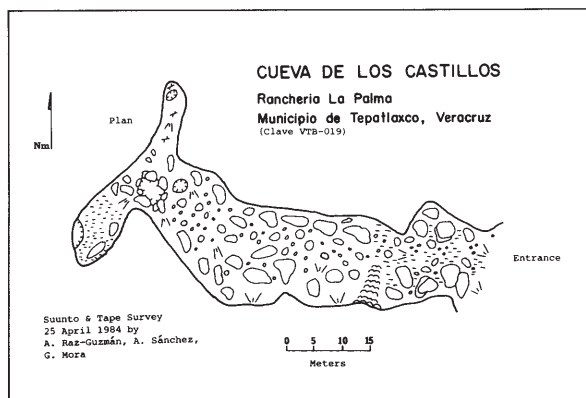
The expedition was divided into three groups. Group 1, Guillermo Mora, Alejandro Sánchez, and I explored an area that comprised the villages of El Triunfo, Buena-vista, La Palma, and Alta Luz del Castillo, located 1000 meters above El Pedregal, the base campsite. Group 2, Eduardo Martínez, Jorge Ortiz and Hector Guzmán, explored the

areas of Ocotitlán, Guzmantla, and El Bajío. Group 3, Ricardo Salas, Josué Escobar and Raul Sánchez, explored Ixhuatlán and Ixcapantla.

A total of 36 caves were explored, varying between 20 and 150 meters deep, of which 75 percent were mapped. Samples of animals, plants, and rocks were collected in most of the caves. Some fossils were also found and collected.

As it was not possible to get all the maps together, included here are five in the area that my group explored. Cueva de los Castillos, located in La Palma, is an ample horizontal cave with many boulders and no large drops. Cueva de Don Miguel, in El Triunfo, is also an ample horizontal cave that ends in a blocked-up vertical pitch of only 8 meters, inhabited by a respectable number of harvestmen (opilionids of the Phalangodidae family), grasshoppers and polydesmids. All animals were identified at the Acarology Laboratory of the Facultad de Ciencias of the Universidad Nacional Autónoma de México (UNAM).

Sótano de Guadalupe García, in El Pedregal, was found after exploring through dense tropical vegetation. It is mostly narrow, with calcite formations only near the entrance, the remainder being half buried in sticky mud. We stopped exploration at the point where it is too narrow for a person to pass through. Since large logs were found lodged along the way, and since the cave is located in a big doline, we assume it carries a fair amount of water in the rainy season. This was the only



Opposite: One of the large dolinas typical of the area.

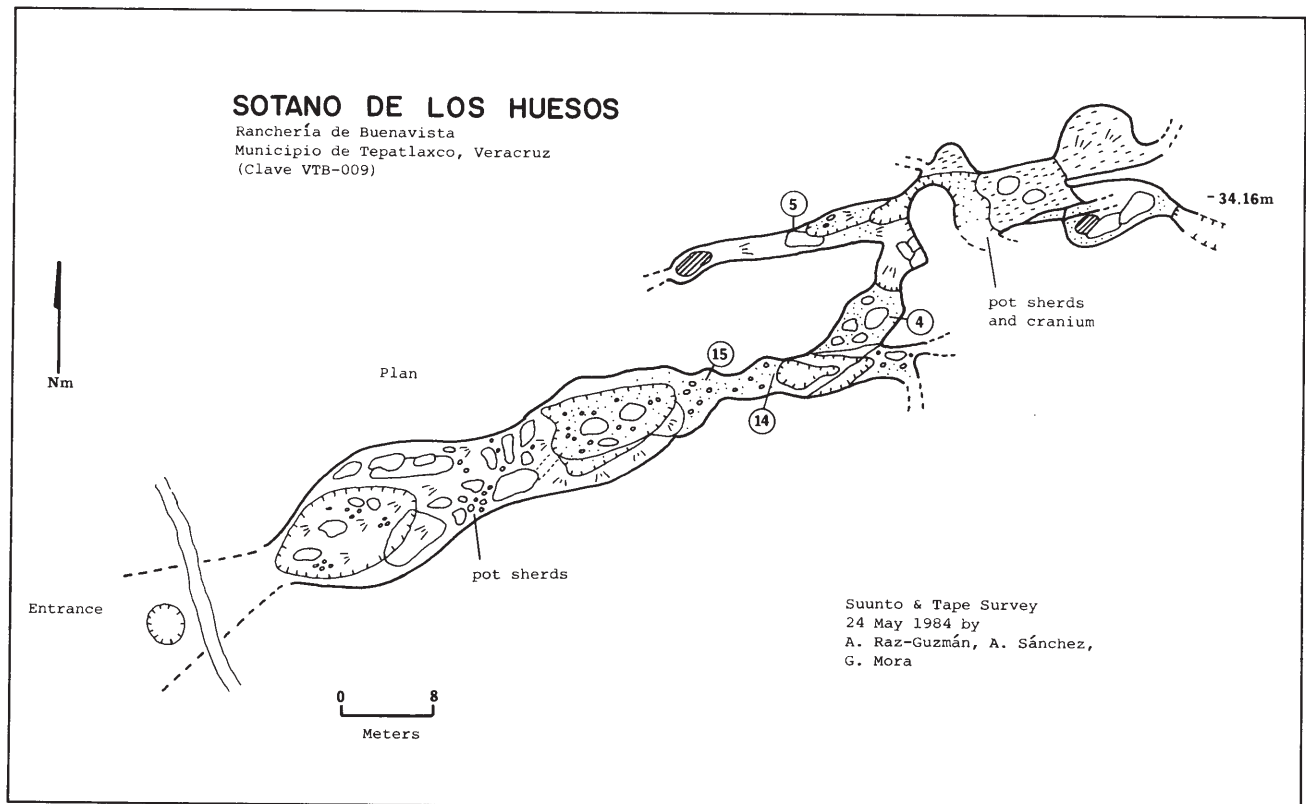
cave in which a uropygid (Mastigoproctus giganteus), commonly known as a vinegar-roon, was found.

SKULLS AND BONES

Sótano de los Huesos or Sótano de la Caja de Agua, in Buenavista, is one of the most interesting caves. It combines aspects of caving, local folklore, archaeology, and ancient burial traditions. It is located at the bottom of an uvala. The main entrance originated from a roof collapse, giving way to a boulder-scattered ramp that ends in a 9-meter drop. The walls have been greatly corroded, making them dangerous for ropes. After passing three side leads, we descended to a lower level and followed an irregular, narrow, sharp-rocked passage until we came upon a sandy drainage bottom. There we found a human cranium, some bits of bones, and bits of painted pottery. These, after talking to the village heads, we packed up carefully and sent to the Osteology Laboratory of the Institute of Anthropological Research of the UNAM to be studied.

We were later informed that the bones belonged to a 25-year-old man. From the ceramic style of the pottery fragments, the find is presumed to belong to the Classic Mesoamerican Horizon (approximately A.D. 200-800). The skull shows an intentional deformation of the erect fronto-occipital tabular intense type (determined by craniometry) that was traditional in prehispanic cultures for reasons of physical beauty or of ritual. The global analysis of the bones shows that there were at least one adult and six children of different ages buried in the cave. We also found opilio-nids of the Hoplobunus genus.

The villagers told us many stories of family feuds, fighting during the Revolution, and the burial of fortunes in caves of the region. One of their legends tells that on the 29th of June, the spirits that care for the treasures abandon their caves, giving the villagers an opportunity to search for them. Naturally, this has favored the sacking of caves believed to hide treasures.





Looking up towards the entrance of Sótano de los Huesos.

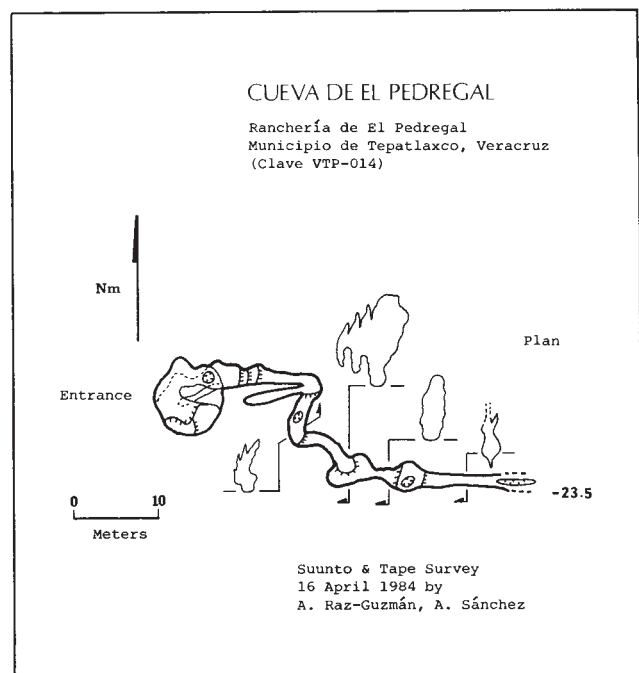
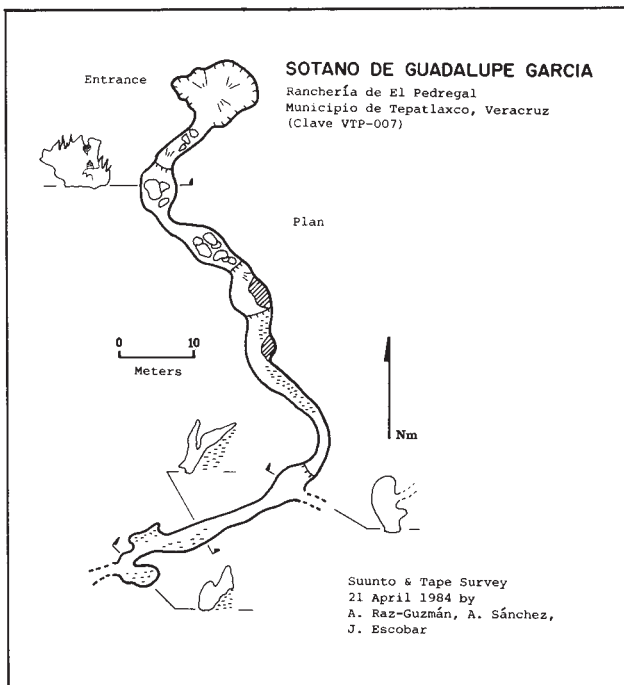
SEDIMENT CAVE

Among the other caves we explored, there was one in Buenavista that was, to us, of a completely new type. It started out as a water passage, easy to walk through, and

was followed by a very muddy 6-meter pitch. We then passed through a very low crawl that became a vertical fissure through which we were forced to proceed halfway up. This was most difficult, since the walls were formed by the differential erosion of layers of sediments differing in density. The sharp ledges caused our clothing to be caught and torn if we were not careful, and in the end made it a very tiring cave to explore. Nevertheless it is interesting, as it might connect with Sótano de los Huesos and other caves of the region, considering the direction of the main passageways. Several side leads were left for future exploration.

The very last cave we explored, Cueva de El Pedregal, turned out to be a very narrow cave, intricate, multi-leveled, and very nicely decorated in calcite formations. When we arrived at a 10-meter pitch we had to turn back, having taken no rope. Fortunately, I had kept the surveying equipment in my knapsack, and we thought it worthwhile to map the cave on the way out.

This area turned out to be so rich in caves, and the people so kind, we plan to return some day, in spite of the distance and difficulty in getting to the area.



VERACRUZ

Varios espeleólogos, bajo la guía del Ing. Guillermo Mora, exploraron algunas cuevas en los municipios de Tepatlaxco e Ixhuatlán del Café, en Veracruz, en abril de 1984. Se exploraron un total de 36 cuevas, variando entre los 20 y 150 metros de profundidad, de las cuales se trazaron 27. El autor discute cinco de estas cuevas, de las cuales se incluyen mapas.

MORE MEXICO NEWS

Chihuahua

The mountain ranges to the southeast of Ojinaga were explored via mountain bike by Jurgen Heise and Terry Bolger over the weekend of 17 to 19 April 1987. The Sierra El Mulato and the Sierra Rica are primarily of igneous origin and no caves or karst features were found in these ranges. A canyon through the Sierra Azul contained many holes in the limestone walls. Without climbing equipment we were able to get to only two of these caves. Both of these only went about 15 meters. There are at least five other holes in the canyon wall that need to be checked. A return trip, via mountain bike, is planned for the summer of 1987.

source: Terry Bolger

West Texas cavers, Terry Bolger and Bill Greenlee, spent the weekend of 3 to 6 July 1986 ridgewalking in the Sierra La Quemada, northeast of Ojinaga. They were told by a local rancher that they were the only norteamericanos he recalled having seen in this isolated region. From another

rancher they learned of a large bat flight originating high in the mountains. The approximate location of the bat flight was ascertained, but no bat flight was observed, (possibly due to stormy weather), nor were any caves found. This was the first reconnaissance trip into this largely unexplored region.

source: Terry Bolger

San Luis Potosí

Sótano de Apetzco, was explored by Terry Bolger, Mike Goar, and Bill Greenlee on 26 December 1986. The pit was explored to a depth of about 140 meters, but continues beyond that point. They were told by a local that the pit had been dropped three years previously, but the pit appeared to be virgin beyond the first drop.

Several other sotanos, believed to be virgin, were found but not explored during hikes into backcountry areas near Xilitla.

source: Terry Bolger

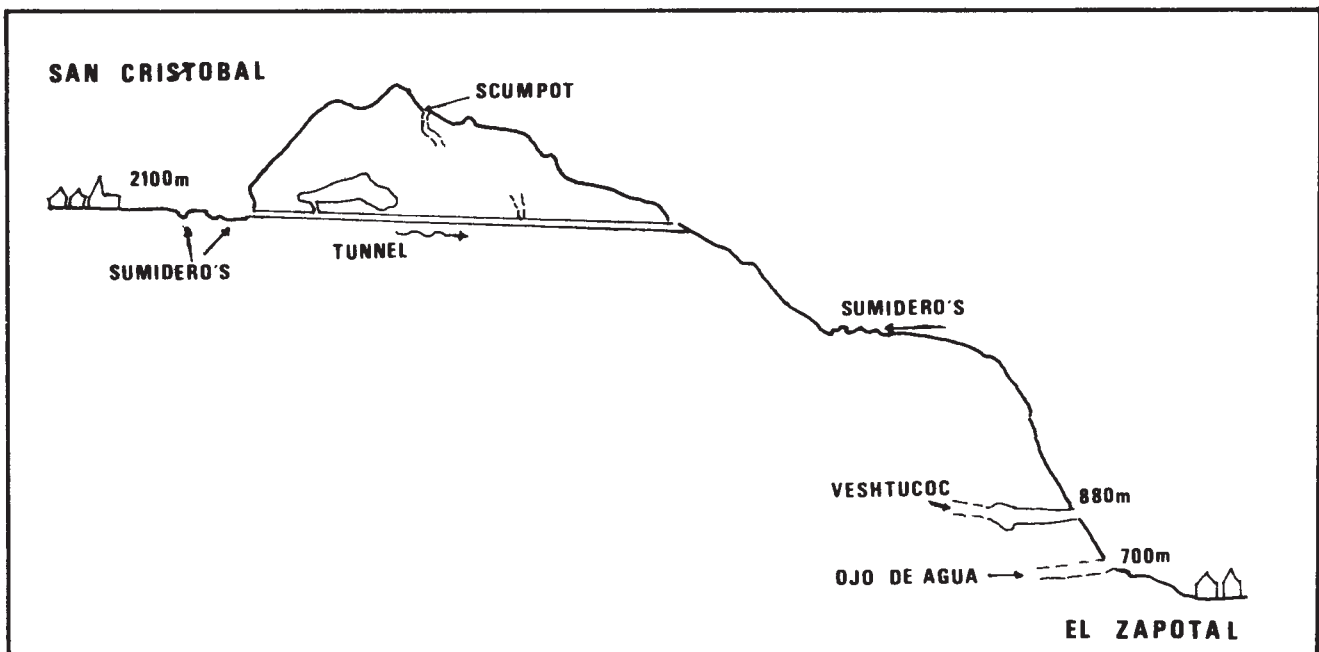
CHIAPAS

The Dutch Expedition

by Laurens Smets

The primary objective of the Dutch Expedition to México was to search for caves in the Sierra los Altos de Chiapas. Chiapas, the southern-most state of México, borders Guatemala and has an area more than twice as large as Holland. In 1824 Chiapas became independent from Guatemala and joined México as a state. There are parallel mountain ranges, with the highest in the west called the Sierra Madre de Chiapas. The most important rivers in the area are the Ríos Usumacinta, Jatate, Grijalva, and Suchiate. The northeastern part of the state has a tropical climate with lush vegetation.

The Sierra los Altos de Chiapas, which rises to an elevation of 2780 meters, consists mainly of limestone. San Cristobal de las Casas, at an elevation of 2100 meters, is situated in a polje containing several sinks or sumideros. The Río Chamula sinks there and resurges from Cueva del Agua, which is located near El Zapotal (San Lucas) at an elevation of 700 meters. In the rainy season the sinks could not drain all of the water from the plateau, and therefore a tunnel was constructed through the mountain to drain the surplus. At the base of the mountain there are two main resurgences: the Río Blanco from Cueva del Agua and the Río Salado.





Entrance to 5 kilometer long tunnel.

THE BRITISH EXPEDITION

In the years 1982-83 a British expedition, including Laurens Smets from Holland, went to this area. The group vainly searched for access to the cave system on the plateau. After two months, they found the resurgence cave, Veshtucoc, near El Zapotal. The cave was explored for a length of over 3600 meters to a height of 288 meters. At some point during the British expedition, most of the team members contracted histoplasmosis and were forced to terminate exploration in Veshtucoc.

THE DUTCH EXPEDITION

Continued exploration in Veshtucoc became one of the major goals of the Dutch expedition to México that took place from December 1984 through February 1985. By August 1984, the team members had been chosen and extensive organizing was taking place. Letters requesting sponsorship were written to organizations and companies, and the team received much publicity in the newspaper and on radio. They received sleeping-bags, underwear, boots, and medical supplies, as well as donations from 25 individuals. Much of the caving equipment was lent to the expedition by regional sections of Speleo Nederland and private individuals. Each team member was given a certain task, and together they practiced caving and rescue techniques on several occasions. An interpreter was recruited

for the expedition, as well as a German geologist-photographer.

The group equipment was sent in advance to Houston, Texas. On 23 November 1984 the first team left for Houston. In Austin they bought a 1975 Ford pickup and headed for México. The trip down was characterized by flat tires and oil problems. On one occasion the gear-box had to be dismantled because of a leaky oil seal. On 12 December the team arrived in Tuxtla Gutierrez, and here the authorities gave permission to the expedition by means of a letter of recommendation. A house was rented in El Zapotal for use as a base camp. The other team members arrived between the 17th and 21st of December.

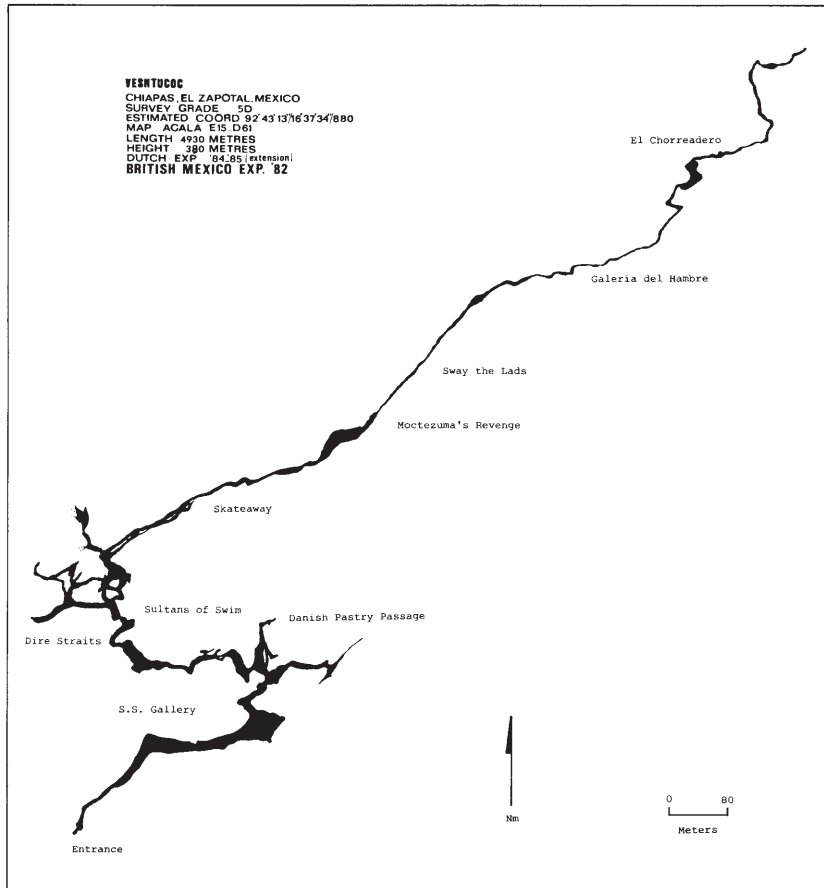
VESHTUCOC

When the cavers arrived at the entrance to Veshtucoc, they found the entrance "sump" to be completely open. The water level in sumps 2 and 3 appeared to be the same as two years before. The sumps were passed on 23 December, and new handlines were attached. Several trips were necessary to carry all the needed equipment to the end of the cave. Sump 3 caused a lot of trouble because the bags of equipment got stuck.

On 18 January 1985 a trip was made to Moctezuma's Revenge, the spot where the British expedition had stopped. The Dutch



Second sump in Veshtucoc.



descended an unstable boulder choke for about 28 meters, after which they found the river again. They pushed the cave for an additional 1300 meters of passage to a wide and deep sump. The last part of the cave contained a lot of washed-in materials such as wood and plastic. They suspected they were quite close to the surface, within 100 meters or less. They found white shrimp 10 centimeters long and flies.

The exploration of Veshtucoc took nine working days with a total of 60 caving hours, the longest trip lasting 18 hours. It is 4930 meters long and has a height of 380 meters.

FURTHER EXPLORATION

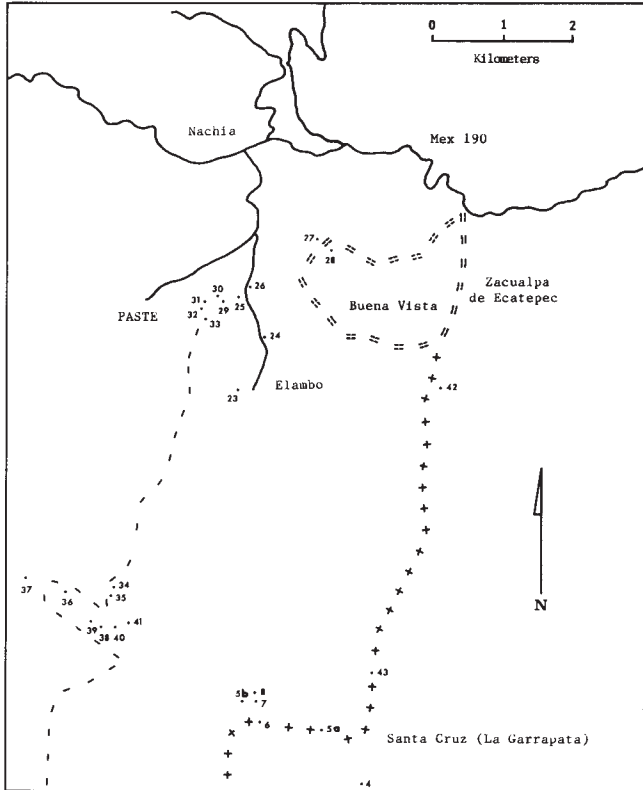
Cueva del Agua is a resurgence cave near El Zapotal, and the main source of water for the area. It was first explored by the British expedition in 1983. A new shaft was found with a height of 66 meters that ended at a flowstone constriction.

Cueva del Cascada del Río Blanco is located at the bottom of the waterfall of the Río Blanco, 3 kilometers northwest of El Zapotal. It is a small maternity cave for bats. Exploration ended at two small inlets.

RECON

The group spent several days checking the area to the north of El Zapotal. They explored several small caves around Santa Cruz and looked at the area near Paste, Elambo, and Buena Vista. The area around Paste is inhabited by the Zinacantecos, a group of Indians recognizable by their pink ponchos. They speak little Spanish, and when the word cueva or ch'en is mentioned they become very stand-offish. Although the area looked very promising on the map, permission was unobtainable. Several small caves and karst features were noted between

Paste, Elambo, and Buena Vista. Dolinas west of Zacualpa were explored, but they don't look very hopeful because of the amount of clay. South, towards Santa Cruz, about twenty other dolinas and karst features were visited, but no further caves were found. The water in the large dolinas mostly sinks through sand and clay. Recent subsidences were often observed. The caves in this part of the Sierra los Altos de Chiapas are all very small, sharp and often full of unstable boulders. In other words, not very promising. Locals told of



- 4 Cave, length 25m. 5a Cave, length 30m, depth 8m. 5b Cueva del Paco, length 20m.
- 6 Sumidero. Sumidero. 8 Unexplored cave, depth 8m. 24 Two caves, length 10m each.
- 25 Cave, very small. 26 Two small caves. 27 Cave, depth 8m. 28 Cave, length 10m.
- 29 Deep dolina, on private property, unexplored. 30 Blind dolina. 31 Cave, depth 3m.
- 32 Cave, length 7m, depth 5m. 33 Blind dolina. 34 Sumidero, too small to enter.
- 35 Sumidero, too small. 36 Cave, depth 10m. 37 Large Dolina. 38 Sima sin Luz,
- Depth 55m. 39 Pothole, depth 7m. 40 Pothole, depth 8m. 41 Cave, depth 12m.
- 42 Cave, not fully explored. 43 15 caves, longest 15m.

caves around the village of San Antonio, but that area remains unchecked.

The caves found were all inactive fossil systems in which further exploration was stopped because of too much calcite in the passages. The western plateau (1200 meters elevation) has a very dense overgrowth through which paths had to be cut to get to the cave entrances.

The dolinas marked on the map which looked very promising, were in reality silted up and overgrown. In the rainy season some of the dolinas contain small lakes, but none of them could be considered active sinks. After a week, it appeared that the area had very little potential.

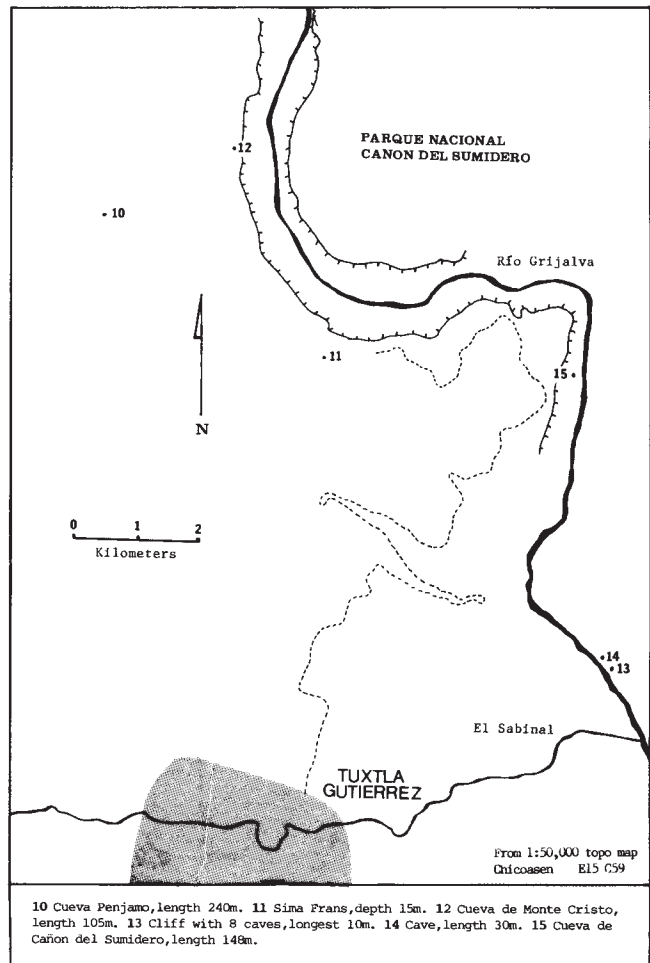
CAÑÓN EL SUMIDERO

The group received permission from SEDUE (Secretaria de Desarrollo Urbano y

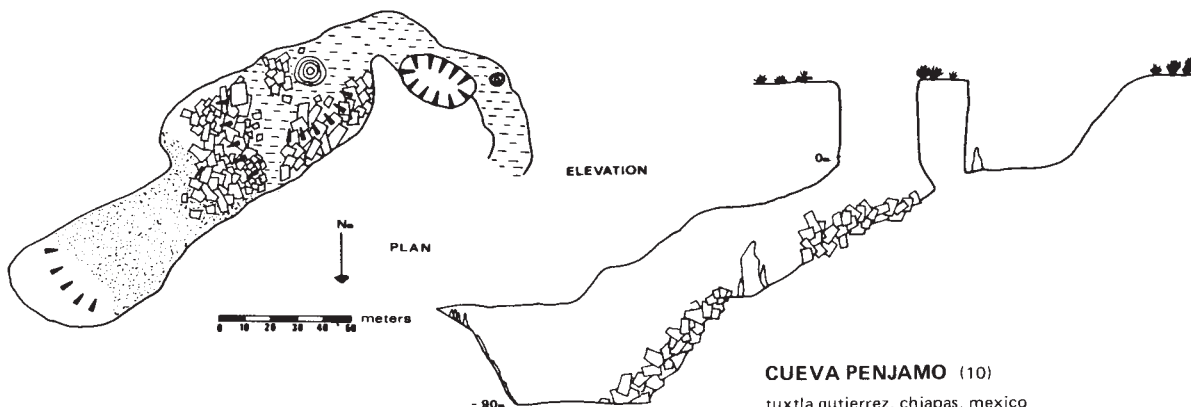
Ecologia) to look for caves in the Parque Nacional Cañon el Sumidero. This natural area is located just north of Tuxtla Gutierrez. They visited three caves on the plateau at around 1200 meters elevation, and an additional three caves lower down in the the canyon at 600 to 700 meters elevation.

EXCHUC

From 16-20 January the group checked the area around Exchuc for caves. This proved difficult because the Indians were rather hostile and suspicious. The caves were often on property that was owned by several people, making permission hard to obtain. A cave with a stream was explored downstream for 66 meters, but exploration had to be stopped since no further permission was granted.



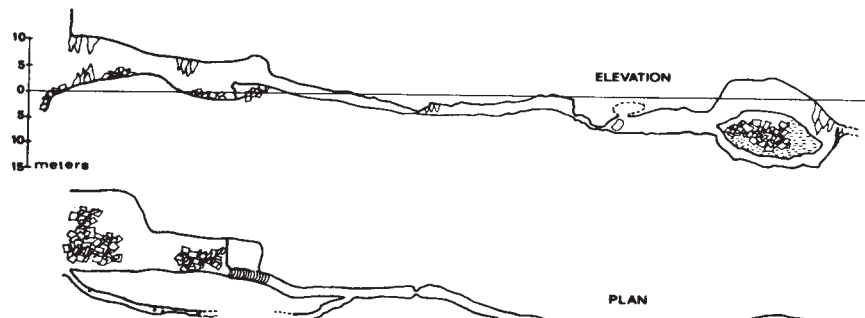
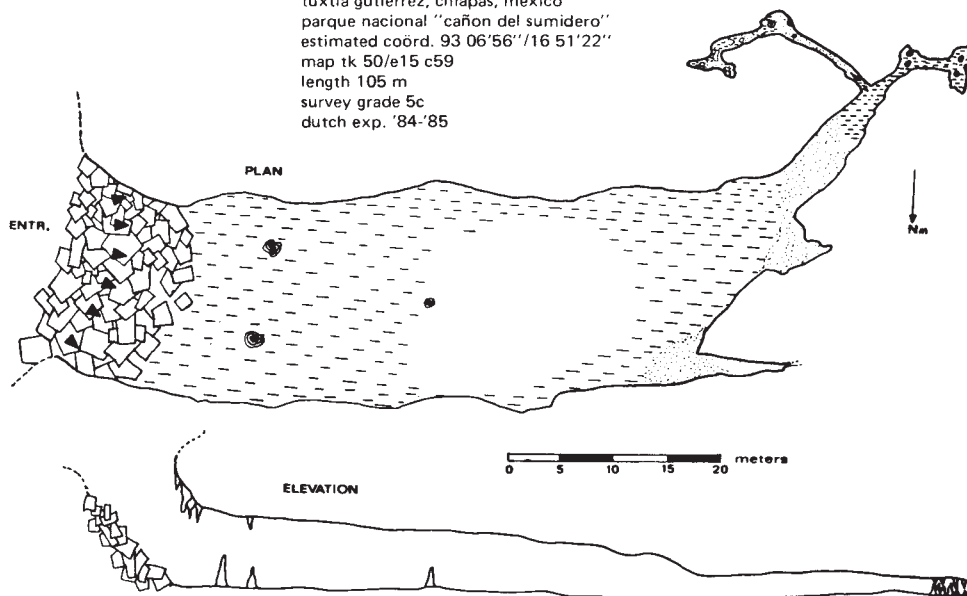
- 10 Cueva Penjamo, length 240m. 11 Sima Frans, depth 15m. 12 Cueva de Monte Cristo, length 105m. 13 Cliff with 8 caves, longest 10m. 14 Cave, length 30m. 15 Cueva de Cañon del Sumidero, length 148m.



CUEVA PENJAMO (10)
 tuxtla gutierrez, chiapas, mexico
 parque nacional "cañon del sumidero"
 estimated coörd 93 08'06"/16 50'49"/1160
 map tk 50/e15 c59
 length 240 m, depth 90m
 survey grade 5c
 dutch exp. '84-'85

CUEVA MONTE CRISTO (12)

tuxtla gutierrez, chiapas, mexico
 parque nacional "cañon del sumidero"
 estimated coörd. 93 06'56"/16 51'22"
 map tk 50/e15 c59
 length 105 m
 survey grade 5c
 dutch exp. '84-'85



CUEVA DE CAÑON DEL SUMIDERO (15)

cañon del sumidero, tuxtla gutierrez, chiapas
 mexico, survey grade 5c
 estimated coörd. 93 03'57"/16 49'28"/500
 map tk 50 e15 c59
 length 148m
 dutch exp. '84-'85

FRONTERA COMALAPA

During the last part of January, the group traveled to a small limestone plateau near the border of Guatemala. They at times observed a lot of tension and military activity. On the other hand, the local people were friendly and offered them help. The caves found were mostly situated on the east side of the Río Grijalva, 500 meters from the border with Guatemala. Maps of some of these caves appear here. A lot of help was given by Señor Humberto, a local agricultural secretary who used to be a teacher and who has much influence in the area around Chamic.

PROMISING NEW AREA

As a result of some conversations with locals, the group decided to check another nice mountain area in another part of Chiapas. Much ridge walking was done, and they came up with 20 new caves. Because of the promising nature of the area, the group has decided to launch another expedition in the future. For the time being they prefer not

to give the exact locations, but they have provided maps of the some of the caves they discovered.

TRINATARIA AREA

The group visited Cueva de San Francisco, situated near Trinataria. The cave is a place of pilgrimage for Mexicans. It is a horizontal system with two inactive sinks for water. Mike Shawcross and Pete Thompson partially surveyed this cave in 1972. The total cave length is 1750 meters.

Towards the end of February the expedition made its way north, stopping along the way to visit the lava caves at Teotihuacán, and then on to Sótano de las Golondrinas. Not having one continuous rope, they had to pass four knots in Golondrinas. They described it as a "great sensation." At the bottom of the sótano, their rope elasticity was 35 meters. Some of their people got seasick!

They had two injuries during the course of the expedition. One person broke his foot and had to return to Holland. Another caver was out of circulation for a few weeks because of a burned arm and leg, caused by a gas stove.

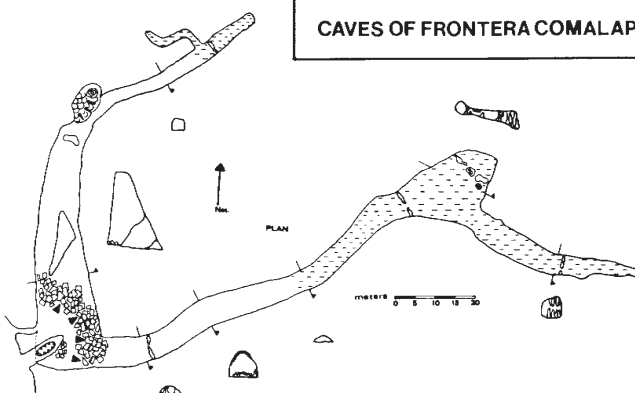
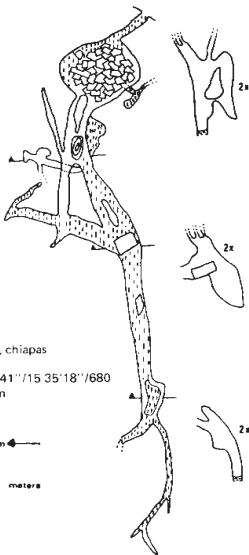
ESPELEO NEERLANDESA

En febrero de 1985, un grupo de espeleólogos holandesas fueron a Chiapas a continuar la exploración de Veshtucoc (primeramente explorado por una expedición británica en 1984). Estos avanzaron unos 1300 metros hasta un ancho y profundo sifón. La longitud de la cueva es de 4930 metros y 380 metros de altura. El grupo pasó varios días revisando el área en busca de cuevas. Ver las mapas de localización.

CAVES OF FRONTERA COMALAPA

CUEVA MALPASO

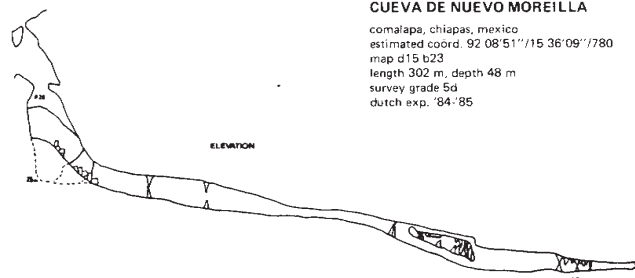
chamic, cerca comalapa, chiapas
 survey grade 5d
 estimated coord. 92 09'41"/15 35'18"/680
 length 121m, depth 19m
 dutch exp. '84-'85



CUEVA DE NUEVO MOREILLA

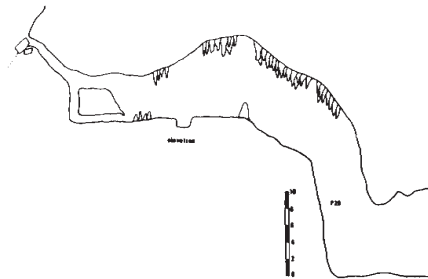
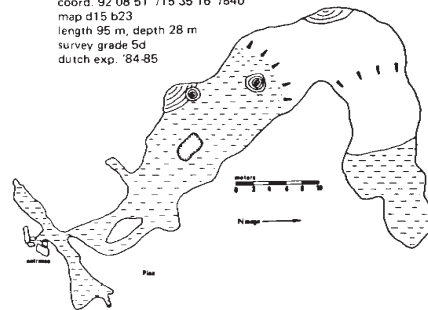
comalapa, chiapas, mexico
 estimated coord. 92 08'51"/15 36'09"/780
 map d15 b23
 length 302 m, depth 48 m
 survey grade 5d
 dutch exp. '84-'85

ELEVATION



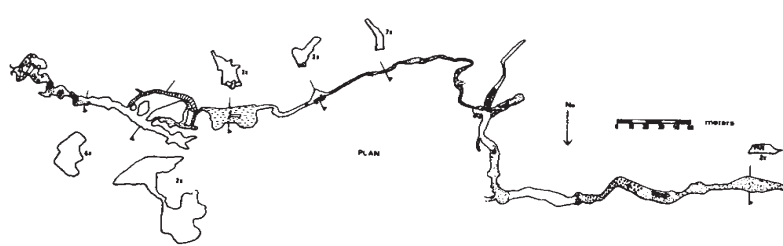
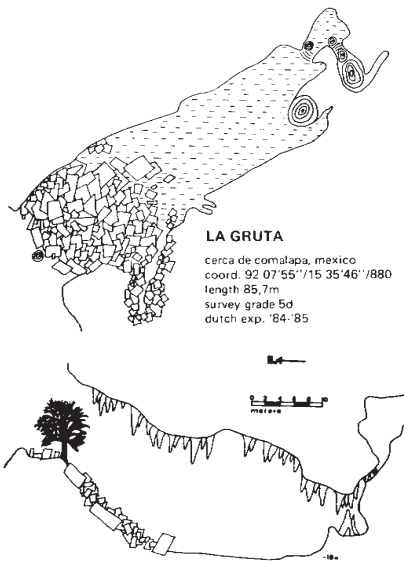
CUEVA TINO

gerero, chiapas, mexico
 coord. 92 08'51"/15 35'16"/840
 map d15 b23
 length 95 m, depth 28 m
 survey grade 5d
 dutch exp. '84-'85



LA GRUTA

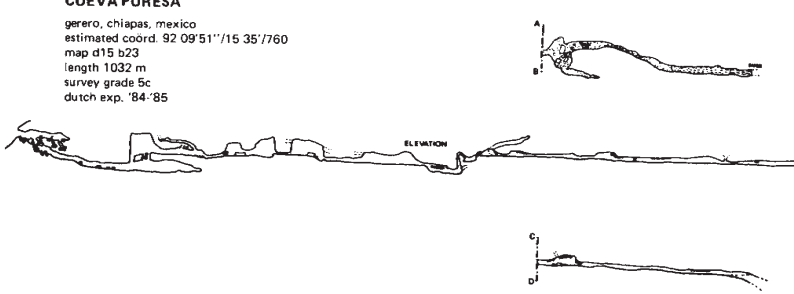
cerca de comalapa, mexico
 coord. 92 07'55"/15 35'46"/880
 length 85,7m
 survey grade 5d
 dutch exp. '84-'85



CUEVA PURESA

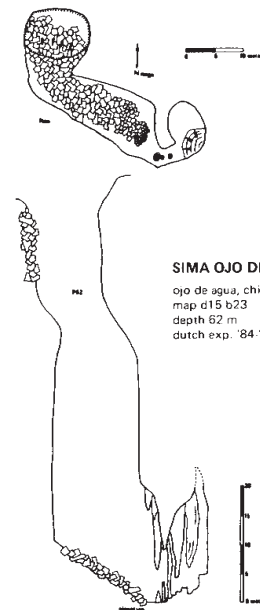
gerero, chiapas, mexico
 estimated coord. 92 09'51"/15 35'/760
 map d15 b23
 length 1032 m
 survey grade 5c
 dutch exp. '84-'85

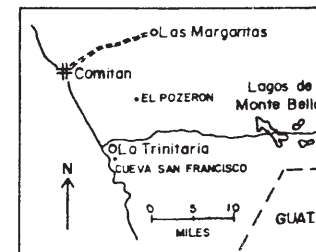
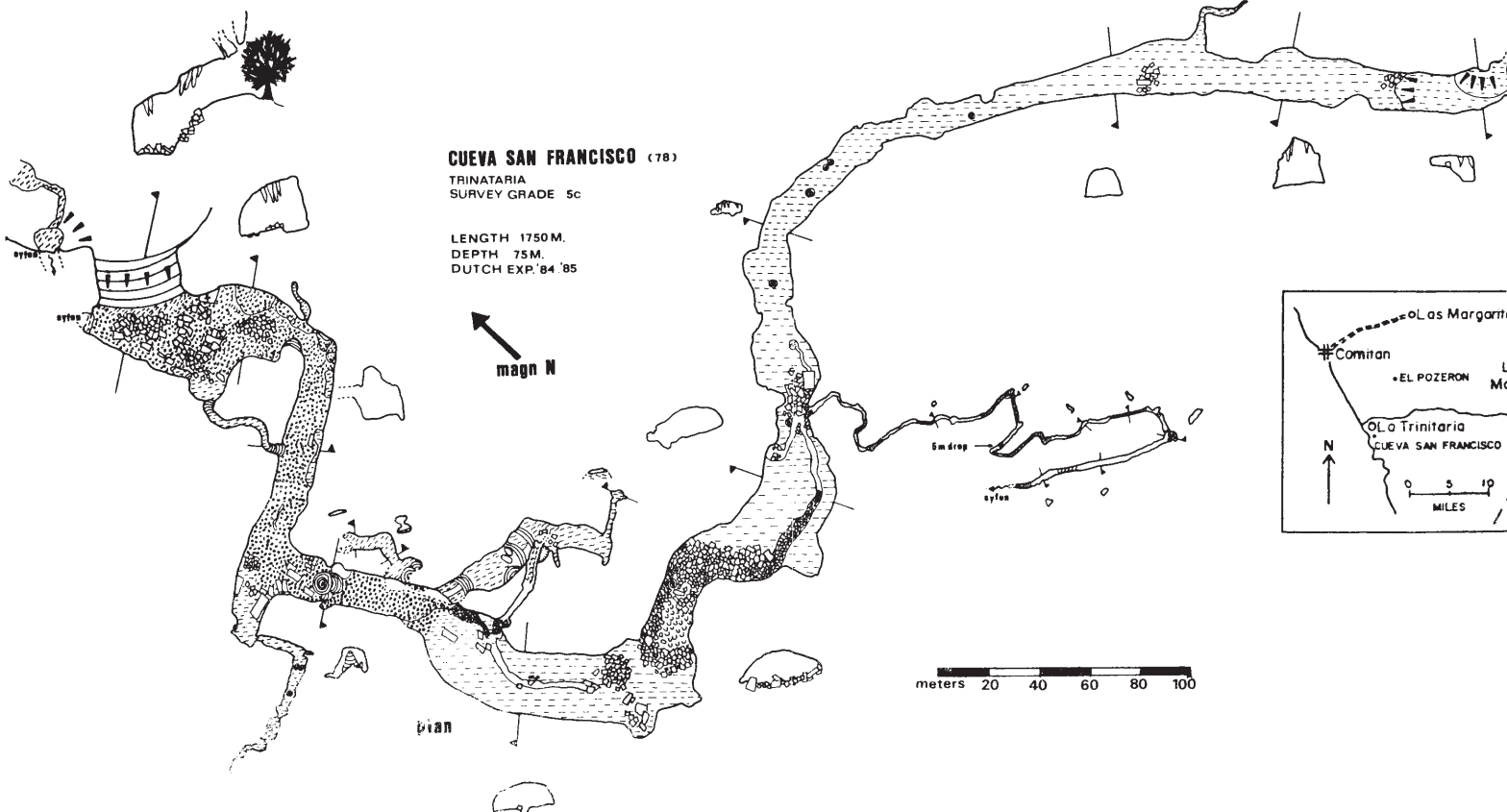
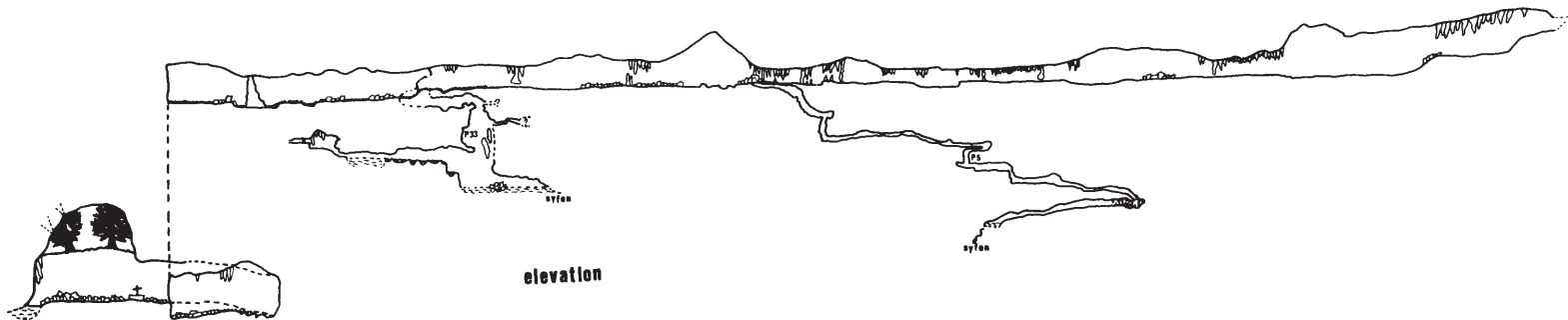
ELEVATION



SIMA OJO DE AGUA

ojo de agua, chiapas, mexico
 map d15 b23
 depth 62 m
 dutch exp. '84-'85





BELGIAN EXPLORATIONS AT ZOQUITLAN

MEXICAN PROJECT '85
by Georges Feller

Without a doubt Mexican karst has for many years shown that the El Dorado of Speleology is truly found in the land of sombreros and tequila. That alone is a good enough reason to organize a remote expedition. It's not that our ten years of excursions into Austria were boring (far from that), but the need to uncover new horizons and other ways of life far from the beaten path justified the trip as well.

From information gleaned by previous reconnaissance expeditions, we decided to investigate a zone in the heart of the Sierra Madre Oriental. We spent a fascinating two months on this limestone plateau between the desert and the jungle. The difficulties we encountered represent little compared to the discoveries made. One can judge for oneself: three archeological sites, 35 kilometers of passage, including two rooms that count among the largest in the world.

COYOLATL

Three days out of Belgium we were on a bad road that shook our truck interminably. We were the resurgence team, a sort of suicide commando team let loose on the tropical forest. Our goal was to locate the presumed site of the resurgences that drain the plateau. The rest of the expedition would explore the plateau.

In Tlacotepec de Diaz we met a guide who offered to show us the entrance to a resurgence cave. From a high point on a ridge 3 kilometers away, we could see the entrance to Coyolatl as well as hear the resurgence echoing through the whole valley. We continued on to the cave, chopping our way through the jungle.

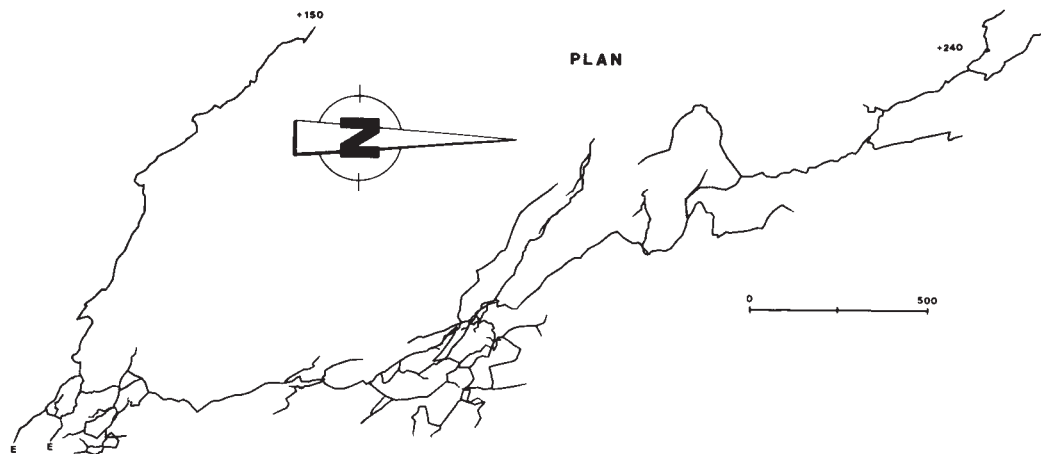
In the entrance room of the cave we found a lake that resurged as the Río Coyolatl. We measured the flow to be 10 cubic meters per second. The cave blew a lot of air, in fact as we headed in it blew our lights out. We went through several swims and climbs and soon came to a vast room with a skylight entrance. As we galloped around the immense room we found a river and large stalagmites up to 20 meters diameter. After getting lost for about an hour in the large room, we found our way out of the cave.

On 9 March we returned to Coyolatl with camping and survey gear to find the river had risen to 15 cubic meters per second. After mapping the large room, which we named Sébastopol, we mapped a large infeasible. The passage, La Fluette, was carved out of blue marble with a series of emerald green lakes separated by flowstone cascades up to 20 meters high. The rock became very jagged. We turned back at this point, although the passage continued.

On 13 March the river was back down to 10 cubic meters per second. Near the entrance, Francois and Michel found some archeological remains in good condition. Meanwhile, others mapped a kilometer of passage up the main river from Sébastopol to a sump.

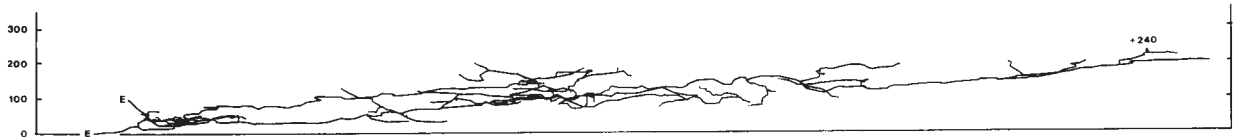
The 15th of March saw Francois and Michel retreating to the village to find out what had caused the red dots which covered their bodies. The rest of the group systematically explored all the passages off the river to find a way on. We found our way around the sump in a canyon passage with strong current. It was not possible to continue against the current, so we began looking for an upper level fossil route.

Several days later we found a high lead with a violent air current. We mapped



COYOLATL

COUPE PROJETEE



several kilometers of passage. Some of it was highly decorated, including gypsum needles that were 50 cm long. We named this passage La Fuite en Avant.

After a week of no rain, we returned to the canyon passage and were able to proceed upstream for several kilometers. Altogether we mapped 19 kilometers of passage in Coyolatl, to a height of 240 meters.

THE EMPIRE STRIKES BACK

by Patrick Bestgen and Richard Grebeaude

The resurgence group had joined the plateau team at Loma Bonita to look for caves that might connect to resurgence caves below. They went to Palapa, which is in a dry valley above Alcomunga. They explored 800 meters of a fossil maze cave called AL7. Meanwhile, four of the group went to San Miguel to check a pit found the

year before. It turned out to be 90 meters deep.

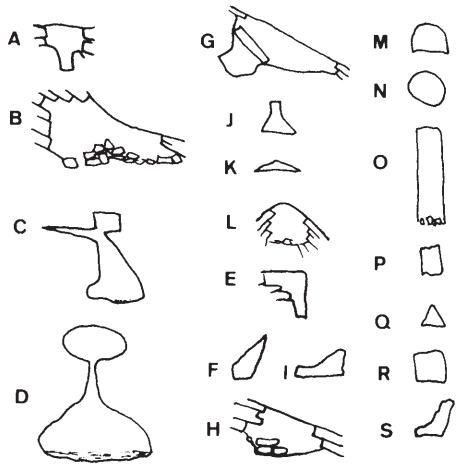
They turned their attention to the area around Ocotempa, where they had three pit leads. They noted that the pits were all located along the same fault.

Las Abejas or OC2 is a rectangular pit (30m by 7m) and is about 120 meters deep. The vegetation around the pit made it difficult to rig the drop on the free side. Instead they had to reelay. On the bottom they found three human skulls and other bones.

OC3, or Pozo Verde, was explored to the -150 meter level on the first trip. They returned with survey equipment and mapped it to the -380 level. At the bottom they found a large room with no apparent way on.

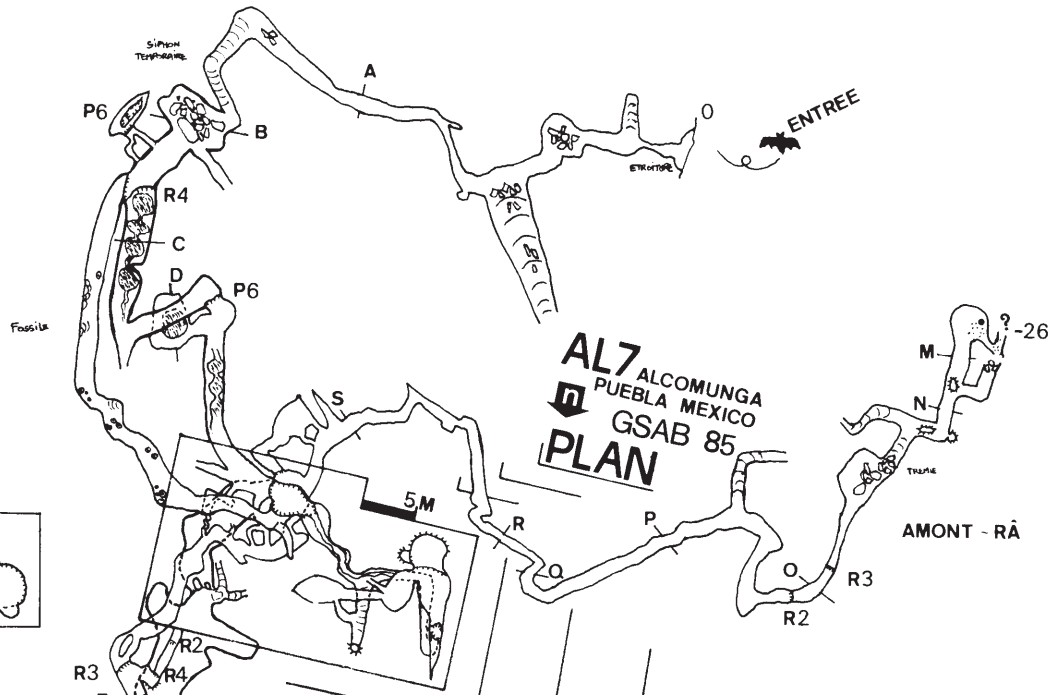
Another cave, with a small stream in it, was explored down a series of pits to the -150 meter level. The group decided that aside from some pretty pits, this area did not seem too interesting.

COUPES TRANSVERSALES 5M



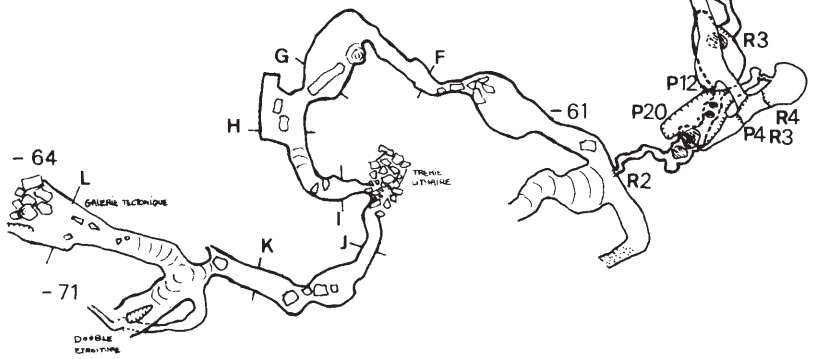
CARREFOUR DES CHOUX ERRANTS

SCHEMA A:

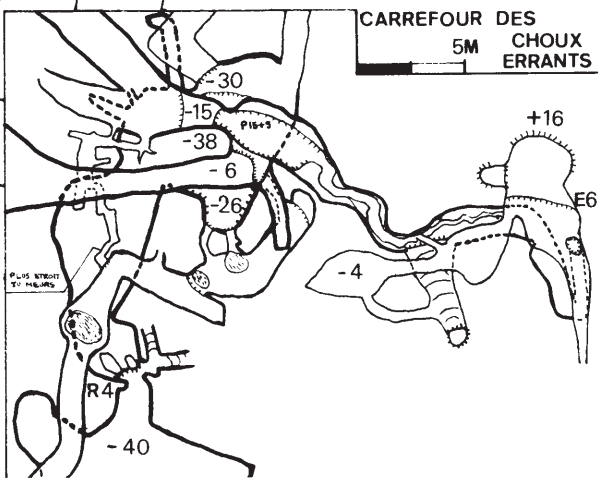


AMONT - RÂ

LES DESERTEURS TEMPORELS



CARREFOUR DES CHOUX ERRANTS 5M



SOTANO OCOTEMPA

(OC 3)

X:

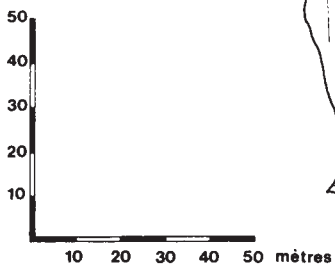
Y:

Z: 1.700m

P 380
Pozo VERDE

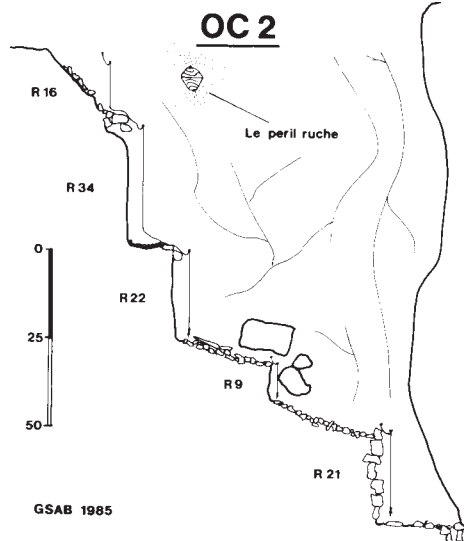


↑
Affluent amont



Etr. -400

Las Abejas



AZTOTEMPA: THE PLACE OF THE LYNX

Serge Delaby and Francois Guinard were shown a cave at 1400 meters elevation about 2 hours walk from Ocotempa. The beautiful entrance was located at the bottom of a vast doline. A large descending passage took them rapidly to -30 meters to the top of a 6 meter drop. They noticed strong air movement in the cave. The passage continued to drop down several short climbdowns to a pit. At the bottom of the drop they noticed flowing water cascading across slabs of rock. The passage followed thus far was clearly a water course.

They followed the stream down a 30-meter drop, over two 3-meter waterfalls, and down two more drops of 30 meters each. They came to a room with large breakdown blocks and a 2 meter by 2 meter passage leading off. This passage narrowed to a constriction at the ceiling with unstable breakdown overhead. Aware of the dangers they faced in working their way through this vertical constriction, they were determined to follow the strong air current. After dislodging one boulder, they managed to squeeze through the small hole. They found themselves standing in an enormous hall. They made preliminary reconnaissance of the 350-meter-long by 100 to 150-meter-wide chamber. Unable to find a continuation, they decided to return to Ocotempa and come back to the lead another day with more cavers.

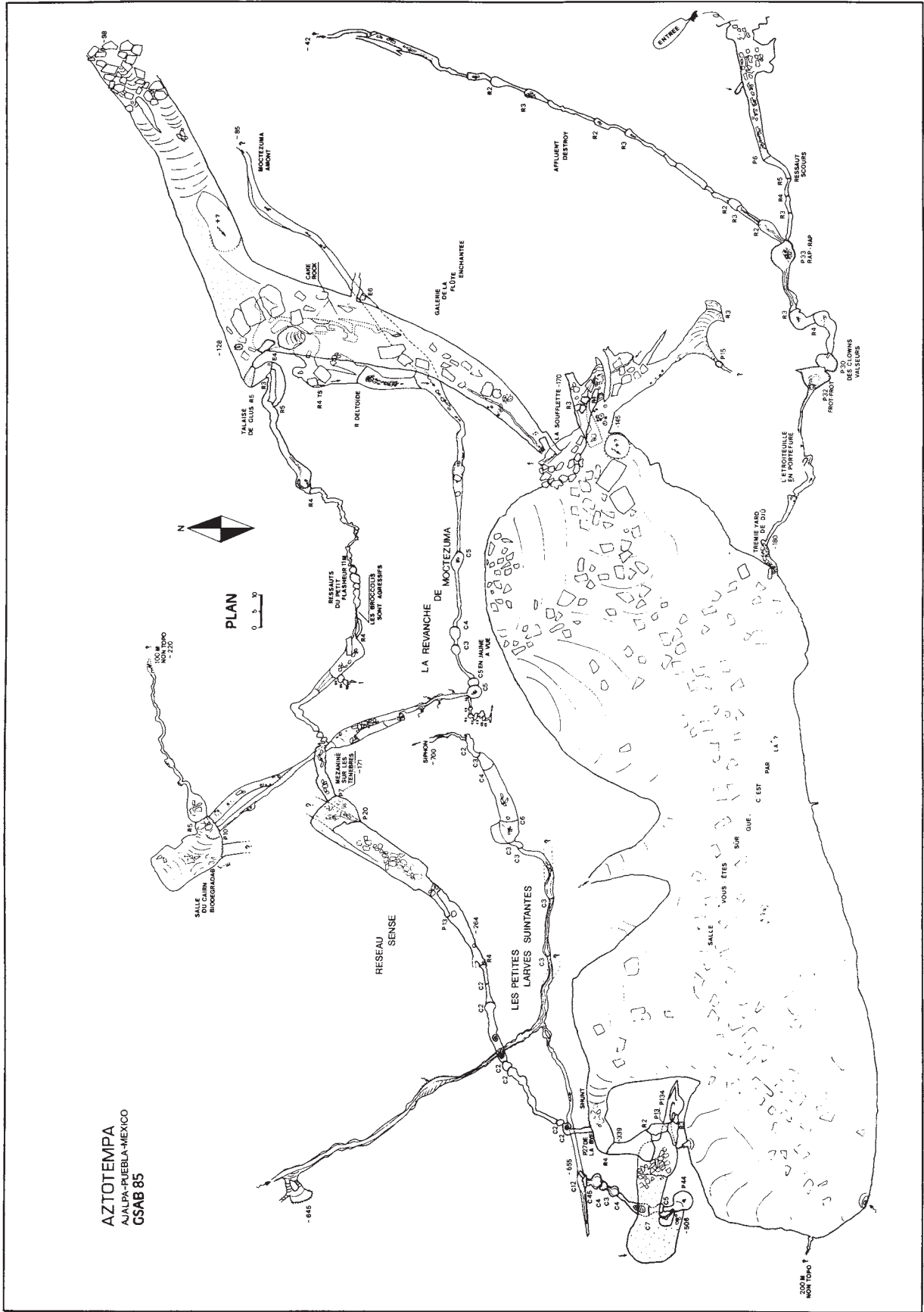
A group of five returned to the large

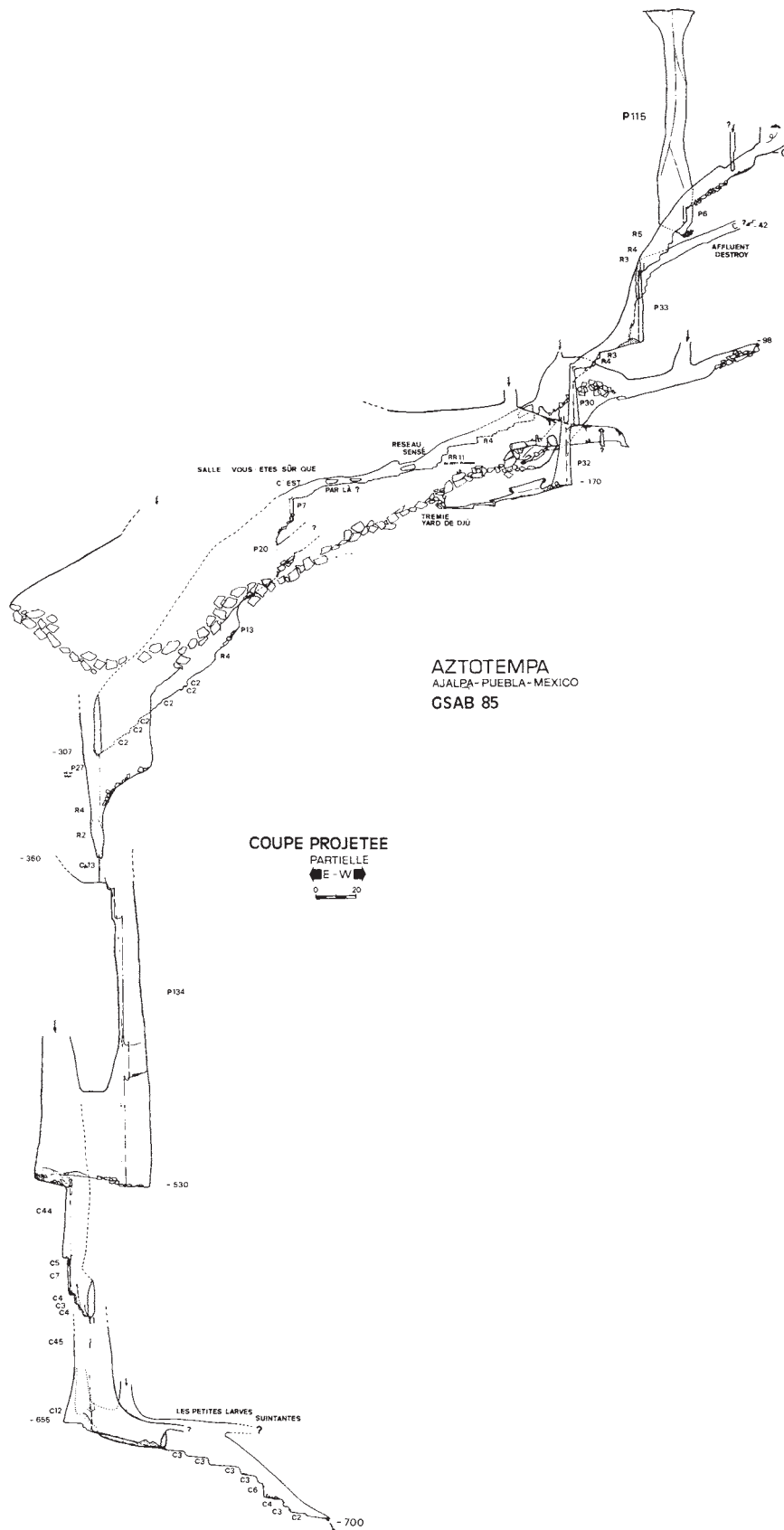
room, where they split up into two teams to survey. One team soon discovered a high lead hidden behind a huge breakdown block. They headed down the 10-meter-wide by 15-meter-high passage on recon. It was a fossil passage with many large, beautiful formations. It ended at a 3-meter drop, pinched with flowstone. An upstream lead with airflow remained unchecked.

Back in the large room, they tried in vain to go down through the breakdown and find the stream passage. They then noticed another high lead in the wall. The airflow shook the flames of their carbide lamps, and extinguished them after a couple meters of hands and knees crawl. The airflow calmed down as the passage got larger. They were in a bedding plane passage with a ceiling height of 3 meters that eventually rose to 10 and 15 meters. The dry, straight passage led to a rectangular room with pits in the floor. They followed a stream conduit through the breakdown on the left side of the room. They lost the airflow, but another 200 meters and several drops farther on they felt it again. They stopped exploration for the day in good-sized passage decorated with broccoli-shaped formations. On the way back to the rectangular room, Serge explored a network of fissures. He stopped at a hole in the floor where he could see a pool of water 25 meters below.

A team returned to the broccoli formation passage to continue exploration. A 7-meter pit took them to an enormous

AZTOTEMPA
 AJALPA-PUEBLA-MEXICO
 GSAB 85





AZTOTEMPA
 AJALPA - PUEBLA - MEXICO
 GSAB 85

COUPE PROJETÉE
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SALLE VOUS ETES SÛR QUE
 PAR LÀ ?

RESEAU SENSÉ
 TREMIC
 YARD DE OJU

AFFLUENT
 DESTROY

LES PETITES LARVES
 SUINTANTES

breakdown collapse and a 20-meter pit. As part of the group surveyed from there back to their previous station, Serge and the Little Swiss went ahead down the 20-meter pit. Eventually they came to a deep drop of nearly 140 meters. To avoid the water, multiple rebelayes were necessary. A future trip saw Serge, Georges, and Richard return to the 140-meter pit. Beyond the bottom of the pit they encountered numerous drops and waterfalls. They had a difficult time negotiating the drops without getting wet, and the wind in the passage always threatened to extinguish their carbide lamps. The passage eventually became very muddy and then intersected a larger stream passage. They followed the new stream down a series of small drops for 150 meters to a sump at a depth of 700 meters. Before retreating to the surface they looked at some high leads back up the passage, but they were impossible to get into since it was so muddy. They also mapped 150 meters upstream to a dome and a pit. They took a bath in a waterfall and headed out.

Another group returned to the 25-meter pit Serge had discovered in the fissure network. They found an alternate route down to the bottom and explored downstream. The large passage soon turned into a crawlway with lots of sharp formations. They intersected a large cubical room with

dimensions of 30 by 30 meters, but a crawlway led out of this room. They followed it for about 150 meters. It continues with some airflow.

The same day another team surveyed the large hall, took photos, and discovered a very large pit-passage in the lower section of the room. That re-fired interest in the cave and a team returned later to explore it. They discovered that it connected into known cave at the -350 level above the 140-meter pit.

About 4 kilometers of passage was discovered in Aztotempa. The depth of -700 meters was the deepest point reached by the expedition. The potential for more discoveries is great. Two downstream leads remain, one at the ceiling at the -670-meter level, the other in a passage at about -250 meters, and there are four upstream leads. All of the leads had perceptible airflow.

Expedition Members: Patrick Bestgen, Marc Birchen, Serge Delaby, Michel Dupuis, Georges Feller, Richard Grebeude, Francois Guinand, Jean-Claude Hans, Philippe Hubert, Jocelyn Kirsch, Jean-Claude London, Francois Saussus, Rene-Marc Thirion, Manuel Tries, Francois Vivier, Patrick Vanstraelen.

EXPEDICION BELGICA 1985

El expedición 1985 a Puebla descubrió un total de 35 kilometros de pasajes en varias cuevas. Las dos más importantes son Coyalatl y Aztotempa. Coyalatl es una resurgencia cerca de Tlacotepec de Diaz con una longitud de 19 kilometros y una altura arriba de la entrada de 240 metros. Aztotempa, lo calizada a los 1400 metros altrua snm, tiene 4 kilometros de pasajes, y terminaron a -700 metros de profundidad en un sifón. Tambien exploraron muchos sótanos profundos y cuevas chicas.

Underwater Caverns of



QUINTANA ROO

by James Coke

In the last few years a whole new area of cave exploration has opened in México's newest state, Quintana Roo. This is the systematic study of underwater caves by properly trained and equipped explorers. The Yucatán Peninsula has long been known as a rich karst area. One could cite the famous Sacred Well of Chichén Itzá and the Bolonchen as prime examples. These northern caves have become favorites for tourists and explorers due to their accessibility and proximity to several large cities. Quintana Roo, however, has had relatively few speleological studies due to past remoteness from civilization. Only in the

last decade have modern roads and towns been built, largely as result of growing tourism.

At the present time more than 20 individual underwater cave systems have been explored, each having its own particular character. Caves laying 6 to 10 kilometers from the coast tend to be different than those caves nearer the coast. Large dome rooms, complex tunnel systems, and highly decorated ceilings and walls constitute the character of these inland caves. Access is gained to the inland cave systems through cenotes. Cenote is a Mayan word for a collapsed sinkhole filled with water.

Above: Johanna deGroot in Cenote Hermana de Naharón. (James Coke)

CENOTE NAHARON

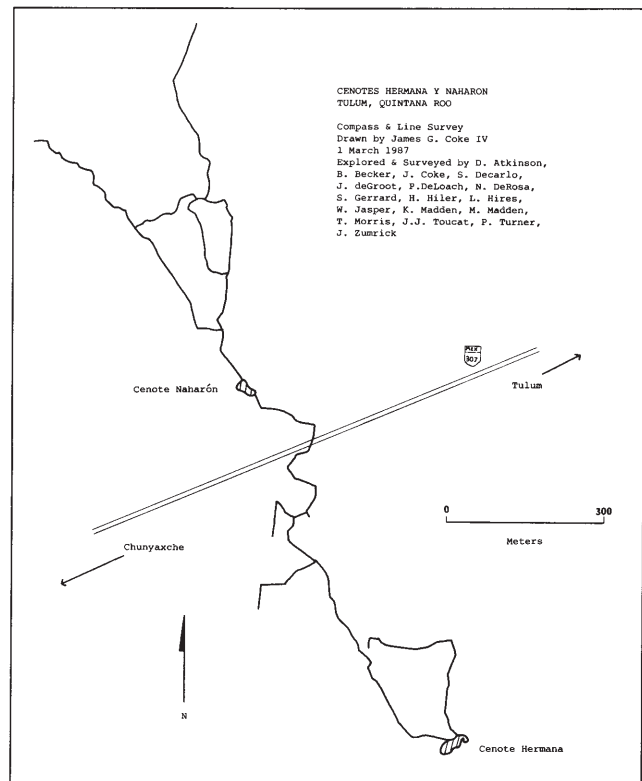
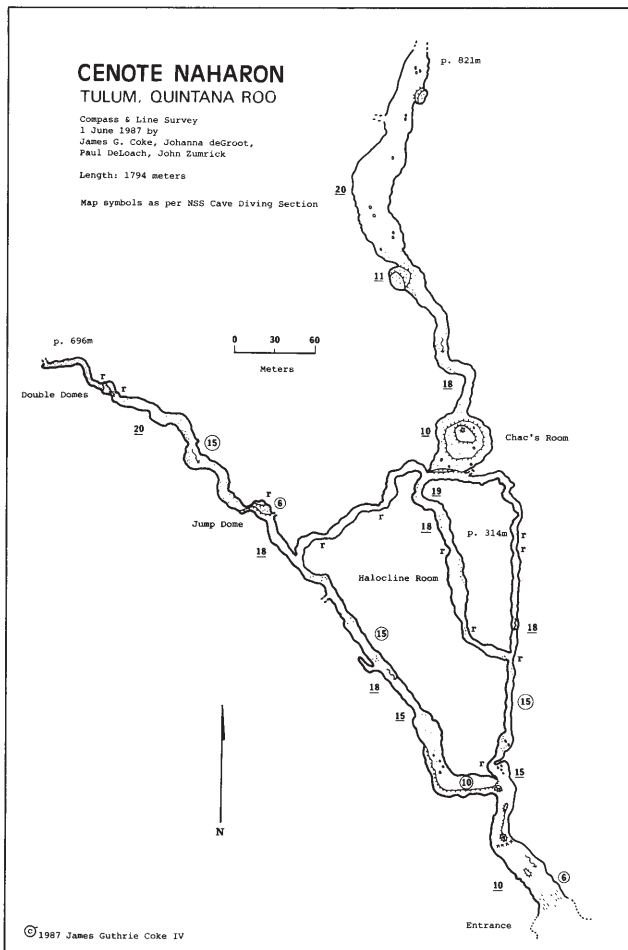
Naharón is one of the inland caves that has received much attention from local and visiting divers. To date, farthest penetration on the spring side is beyond the 1000 meter mark, and there are 1794 meters of surveyed passage, all entirely underwater. Characterized by dark walls and ceilings, it is considered one of the largest underwater cave systems in Quintana Roo. A halocline, the delineation between fresh and saline water, exists at a depth of 20 to 25 meters. Remipedia, a type of crustacean, have been collected below this halocline.

The siphon side of Naharón was explored for only 20 meters, due to the very restricted nature of the cave. In order for divers to enter the siphon side, they must remove their tanks and push them ahead

as they explore. Not being a particularly comfortable position, this was being done with a purpose in mind - the possible connection to be made with Cenote Hermana de Naharón.

Hermana de Naharón (also called Maya Blue) is characterized by bright walls and ceilings. The main tunnel system heads directly towards the Naharón system. Maximum penetration on the spring side is now 1000 meters. According to land and underwater surveys, the end of the permanent line in Hermana was only 100 meters from the siphon side of Naharón.

On 23 February 1987 a connection was made between the Naharón and Hermana de Naharón. Concerted effort of a number of individuals over four long work days found the elusive connection passage. This team of individuals used 2750 cubic feet of air to make the connection. Underwater propulsion machines (scooters) also played a large role in this accomplishment. They were used to ferry tanks in order to create an air-station 600 meters back into the cave, and to make the final push to the siphon cracks of Cenote Naharón.

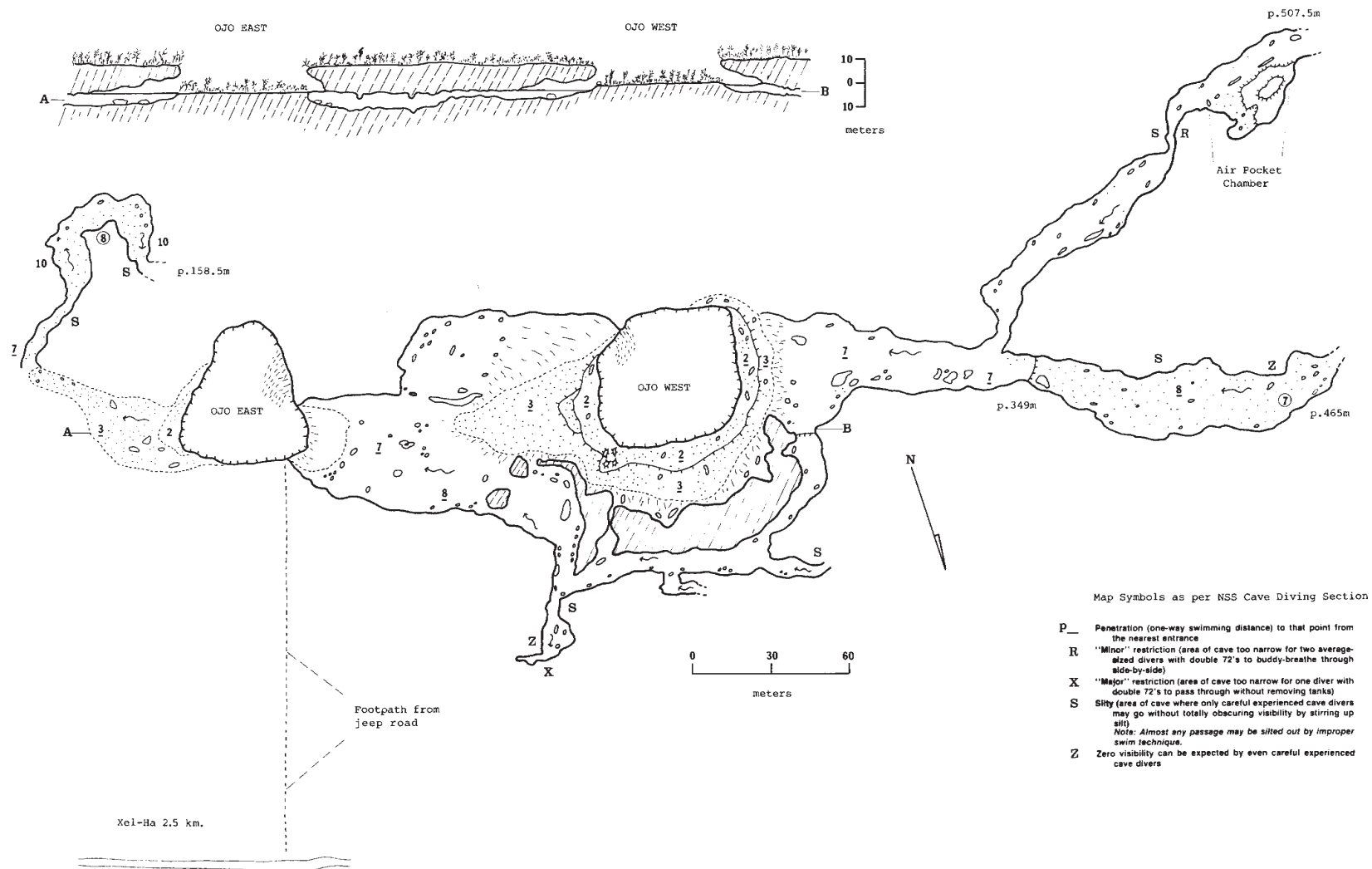


CENOTES DOS OJOS

XEL-HA, QUINTANA ROO

Compass & Line Survey
 1 July 1986 by
 James Coke, Johanna deGroot

Length: 958.6 meters



Map Symbols as per NSS Cave Diving Section

- P_ Penetration (one-way swimming distance) to that point from the nearest entrance
- R "Minor" restriction (area of cave too narrow for two average-sized divers with double 72's to buddy-breathe through side-by-side)
- X "Major" restriction (area of cave too narrow for one diver with double 72's to pass through without removing tanks)
- S Silty (area of cave where only careful experienced cave divers may go without totally obscuring visibility by stirring up silt)
 Note: Almost any passage may be silted out by improper swim technique.
- Z Zero visibility can be expected by even careful experienced cave divers

REMOTE CENOTE

Cenote Dos Ojos is a very interesting system just recently explored. Requiring a 4-wheel-drive vehicle in order to transport equipment, it is one of the more remote caves explored. Travelling on the road to Dos Ojos can be as exciting as the dive. Large cats, troops of monkeys, and flocks of parrots are seen regularly. Although not a particularly extensive system, the main room shared by both cenotes is the largest underwater cavern found yet in Quintana Roo. Mayan artifacts are also present near the edge of the water at the West Ojo.

UNEXPECTED DISCOVERIES

Cenote Carwash is perhaps one of the most famous cenotes in Quintana Roo. Both spring and siphon cave systems have been explored, revealing diverse cave character, with an exciting and unexpected discovery. Spring-side penetration is at the 500-meter mark, terminating in a beautifully decorated double dome room. The Room of Tears was a chance discovery, and it is now a highly coveted goal for the advanced cave diver. Soda straws, oddly shaped speleothems, and helictites festoon this dome, which is 10 by 15 meters.

The siphon side of the Carwash has a much different terminal room. Only 120 linear meters from the cave entrance lies the Chamber of the Ancients. At a depth of 30 meters, well below the halocline, a carved stalagmite holds the charcoal remains of a fire. Other bits of charcoal litter the floor, and worked limestone hand tools have also been found in this room. All items that have been found has been left in place for others to view.

This chamber is also the first place in Quintana Roo where Remipedia were sighted and collected. Remipedia is a new class of crustacean first discovered in the Bahamas and described by Dr. Jill Yager. Once thought to be confined to the Lucayan Caves, it has now been found in the Canary Islands and Quintana Roo.

COASTAL CAVES

Underwater caves closer to the ocean are also being explored with the same en-

thusiasm as the more inland caves. The environmental factors present in these systems, though, create more hazardous conditions for the dive team. Caves more proximal to the ocean are entered on land through cenotes or from the ocean through lagoons or Ojos de Agua (springs). The halocline is much shallower in depth here, and as the diver passes through it the disturbance of the salt and fresh water creates visual impairment. If the flow of fresh water is strong enough, mixing occurs naturally. Since flow tends to be stronger and the halocline higher, the actual limestone composition of the caves is remarkably different than those inland. Soft, white, friable limestone is present in these smaller tunnel systems. Extreme siltation becomes unavoidable in most cases, as the diver's exhaust bubbles dislodge silt from the ceiling. On the return trip, teams are greeted by a "snowstorm."

Many of these caves are generally small and limited in tunnel size and length. There are some exceptions to this, however. Cueva Quebrada on Isla Cozumel has a maximum penetration of over 2500 meters, with average depths of 8 meters. The cave is not continuous, as cenotes are encountered during the dive. Laguna No-Nec on the mainland is another exception. One of the first underwater caves to be explored in Quintana Roo (c. 1982), it has more than 500 meters of surveyed passage.

Many other cenotes, lagoons, and dry cave sumps have been explored. Aerial surveys have revealed new cenotes tantalizingly close to existing roads, while some cenotes are inaccessibly deep into the jungle. As the local population grows and more roads are built, new cenotes will become accessible to the underwater cave explorer.

LOGISTICS

Proper training and specialized diving equipment have allowed much of this kind of exploration to take place. Local dive-shop support has been invaluable for logistic services. The sheer amount of equipment needed to perform some of this exploration can be staggering. Longer dives require four tanks for each diver. Extra equipment provided by the dive shops makes this longer exploration possible.

Future exploration in these underwater caves will take two directions. The first and obvious direction will be deeper penetration and longer dives. More specialized equipment that is not presently available will be needed for these excursions. Less obvious side passages will eventually fall to light and reel, as well. The second

direction of exploration will take us further from the Tulum-Akumal hub. More accessible cenotes will be explored further north and south along the main coastal road. We have only seen the tip of the iceberg so far. Perhaps longer cave systems and new archaeological sites will be found. The future of cave exploration looks bright for Quintana Roo.

CUEVAS SUMERIGIDAS DE QUINTANA ROO

Este artículo discute algunas de las cuevas bajo el agua de Quintana Roo. El Cenote Naharón, está considerado como una de las cuevas sumergidas más largas de éste lugar. La penetración más lejana desde la entrada sobrepasa los 1000 metros, y hay 1794 metros de pasaje topografiado. La dirección de Hermana de Naharón tiende hacia Naharón, y en febrero de 1987 se hizo una conexión entre las dos. Cenote Dos Ojos es una cueva muy vieja que tiene como entradas dos cenotes. El salón principal es la caverna bajo el agua más larga en Quintana Roo. Cenote Carwash (Lavacoches) es una cueva muy bien decorada con muchas popotes y helictitas. En una parte de la cueva, el Chamber of the Ancients (Cámara de los Ancianos), se encontraron restos de carbón tallados en una estalagmita y herramientas de caliza hechas a mano. Estos artefactos se dejaron ahí para atracción de otros. El autor también describe las cuevas bajo el agua de la costa, como generalmente más pequeñas que las cuevas que se encuentran tierra adentro, y que la sedimentación es mucho más problema en éstas.

BATS
NEED
FRIENDS

Sotano de Ocotempa



by Terry Raines

Marc Tremblay in the Wind Crawl. (Terry Raines)

Sótano de Ocotempa has become a saga of cave exploration in quite a short time. The story began in the spring of 1985 when a group of cavers from Belgium went cave-hunting in the mountains east of the town of Tehuacán in the state of Puebla. When they eventually reached the village of Ocotempa, they were shown some pits in the area by the local people. Just below the schoolhouse was the largest pit, Sótano de Ocotempa. The Belgians explored and surveyed it, and reported in *Speleoflash* No. 148, "We reached (at last) the bottom of the entrance pit and landed in a great room. An upstream and a fossil network were quickly explored but they both end." The notes were calculated and the depth of the entrance drop determined to be 380 meters. A map was also drawn up and published in this issue of *Speleoflash*.

In France Paul Courbon was finishing up his 1986 issue of *Atlas de Grandes Cavites Mondiales* and evidently liked what he read in the Belgium report because he listed the Sótano de Ocotempa entrance drop, Pozo Verde, as the fourth deepest in the world and the deepest in the New World. When the book made it to this side of the Atlantic I read it and wondered about that new deep pit that I had not descended, and thus our group became involved. The group consisted of Aspen Adams, Dave Black, Don Broussard, Nancy Cantin, Holly Cook, Alan Cressler, John Donovich, Glenn Lemaster, Greg McNamara, Martha Meacham, Laurent Ouellett, Susie Raines, Terry Raines, Tina Shirk, Marion Smith, and Marc Tremblay.

When we arrived at the entrance on 1 January 1987 with our rope, we were looking forward to the 380-meter rappel. I guessed that the depth would be within 20 meters either way of the 380-meter figure when measured exactly with our electronic distance meter, but what a surprise we were in for. We rigged from the natural bridge as shown on their map and found two drops where they had found one! At first I wondered if we were in the same cave. Exploration and comparison with their map showed that we were indeed in the same cave. But our survey showed the entrance to be two separate drops of 221.3 meters and 82.4 meters, a total of 303.7 meters.

We continued the survey on down the

known passages, and as we neared completion, news came that Alan Cressler had discovered the Wind Crawl and then chimneyed up the Conglomerate Climb before being stopped by another climb. We surveyed in this new discovery with an additional three stations and started to leave. At this point I noticed that the tremendous amount of air that was blowing through the crawl was disappearing down a head-sized hole in the wall at eye level. Something strange was happening here, but I couldn't possibly get into this hole, so I resorted to going up the Conglomerate Climb and then climbing up the impossible climb and picking up the airflow again.

Immediately I found myself approaching a window on hands and knees, trying to keep my light from being blown out. I was at the edge of a great pit with air rushing down into it. A rock bounced for five to six seconds, and I was very excited as I rushed back to tell the others. It was the end of our time, so we left the cave and headed for home. We were already planning a return trip.

We did return, exactly one month later, this time the group being John Gilliland, Susie Raines, Terry Raines, Marion Smith, and Mauricio Tapie. We entered the cave on 2 February 1987 and proceeded down the two entrance drops and on to where we had left off surveying, a point just before the Wind Drop. Here we began, and soon had the drop rigged and Marion going down. This one proved to be right at 100 meters deep, and immediately we found ourselves at still another drop. This time rocks bounced for up to 13 seconds, but we estimated the drop to be a little over a hundred meters, and we were out of rope for the day. After about 12 hours underground we returned to the surface for a day of rest and more gear.

The following day found us back underground with all our rope at the top of the great drop, which was later to be named the Rain Drop. It proved to be 125 meters deep and quite spectacular. It led to four more drops one right after the other. Now we were wondering what we had gotten ourselves into as we stood at the top of what we knew would be the last drop we could descend this trip with the amount of rope we had



Mauricio Tapie on the Overhung Climb.
(Terry Raines)

brought with us. Marion descended to the bottom, and I to a ledge part way down to help get the measurement. This drop proved to be 63 meters, and our total depth reached below the surface was 647 meters. This time we were at the end of our rope, so we left the cave and headed for home, once again planning a return trip.

This time the earliest we could plan and organize the return was for the first week of May, and indeed on 4 May we were in Alcomunga once again. We arrived late at night, and early the next morning our old friends from town greeted us. We arranged for six beasts of burden to carry our 23 duffel bags, and off we went to the cave. This time there were ten of us: Brian Burton, Dave Doolin, Ray Gregory, Greg McNamara, Susie Raines, Terry Raines, Marion Smith, Paul Smith, Mauricio Tapie, and Marc Tremblay.

Late on 4 May the first of our group entered the cave to begin rigging and late

on 9 May the last of us left the cave. During this time we accomplished great explorations and left greater leads undone. First, Marion and Ray rigged the two entrance drops and left ropes at the top of the Wind Drop. The next day another rigging crew consisting of Marion, Marc, Greg, and Paul entered the cave and went deep. Past the Split Drop, which was the furthest point of exploration in February, they followed a fissure gently downward until the bottom dropped out. They rappelled 35 meters into the Junction Room, where several great infeeders converged. On the far side of this room they continued a short distance before finding themselves at the top of yet another drop. Out of energy, they returned to the surface. What a great day of exploration.

Now it was our turn to survey what had been discovered. Brian, Dave, Susie, and I entered the cave just after noon on 6 May and headed toward the bottom. At the Split Drop the surveying began, and it ended several hours later at the top of the drop where the rig group had called it quits. It was late for us, but we went ahead and rigged it, discovering a three part drop leading to a permanent streamway. It seemed that we were now in a major system, with the passage continuing in both directions. We headed out, but instead of returning all the way to the surface we set a camp at the bottom of the second drop.

Marion, Marc, Greg, and Paul returned to the cave as we slept and reported that it was raining outside. After a short rest they continued on into the cave to continue exploration. It was a damp trip down to the new streamway. They were wet by the time they got there, and wetter on the way out because of the continuing rain. However, they did discover new and exciting waterways. Upstream from the drop, a little more than one hundred meters was explored to a climb-up. Downstream about the same horizontal distance was explored, but in the process several downclimbs were made that got wetter and wetter until it was impossible to see or hear down the last drop reached. With a premature rainy season upon us, derigging was begun, and we all made it out.

With the 1987 caving season at an end,

we said goodbye to all of our friends of Ocotempa, promising to return just as soon as the rains stop to continue exploration in this new cave system. The surveyed depth of Sótano de Ocotempa is -763.2

meters, however, an additional 100 meters of depth has been explored. Horizontally, the end of the survey is 108 meters south and 108 meters west from the entrance.



Terry Raines found and photographed this carbide dump (left) and food wrapper with French writing (above) in Sótano de Ocotempa. Since only one other group of cavers has ever visited this cave, the origin of this trash seems obvious. The point here, though, is not to point fingers, but to urge **everyone** to keep the caves of México in their pristine condition.

PACK IT IN

PACK IT OUT!

SEA CAVES OF LORETO



by Dave Bunnell

On previous trips to Baja California we had found numerous and large sea caves near Punta Banda. While we expected to find more sea caves along the Pacific coast, we would never have bothered to look for sea caves in the relatively placid Sea of Cortez had not Walt Petersen told us that large sea caves were said to exist in the Loreto region. Walt is writing a reference book on Baja and has a special interest in caves. I had also seen reference to large sea caves on the Isla del Carmen in "Baja Book II," so armed with this information we planned a trip to the Loreto area over the Thanksgiving weekend of 1984, which coincided with some very low tides.

Thus it was that Carol Conroy, Bill Liebman, Ed Moody, Bob Richards, John Schmidt, and I arrived on an Aeroméxico flight to Loreto. We found a hotel only a short walk from the town's little marina.

Saturday morning we ventured out on a panga with a Mexican guide, and headed towards Isla del Carmen, located about 9 nautical miles east of Loreto. It is one of the largest islands in the Sea of Cortez, measuring about 32 kilometers in length and 11 kilometers in width. The island is uninhabited, but salt was mined there in the past.

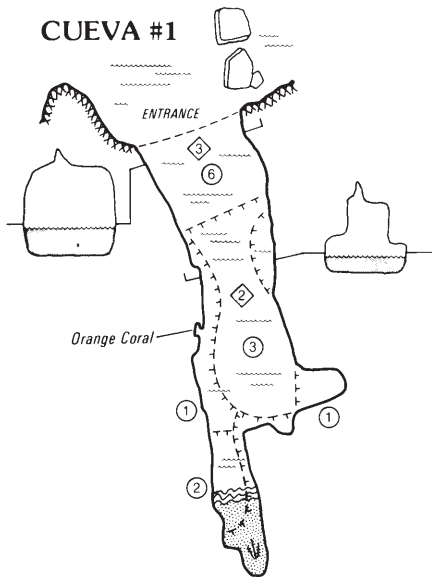
Much of the northern part of the island is composed of volcanic rock in 10- to 15-meter-high cliffs. However, as we approached the island on its northwest shore we saw little in the way of caves in the volcanic rock. About midway between the two points on the north coastline we entered a small bay with cave-studded white limestone cliffs and beautiful turquoise-green water. We beached the boat on a lovely sandy beach and donned our snorkel gear, since all the caves would require swimming to reach. As we snorkeled

Above: The Puerto Napolo caves are located in the peninsula in the left foreground.
(Dave Bunnell)

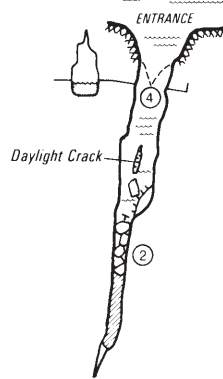
CUEVAS DE ISLA DEL CARMEN

ESTADO DE BAJA CALIFORNIA SUR

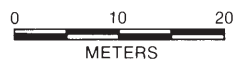
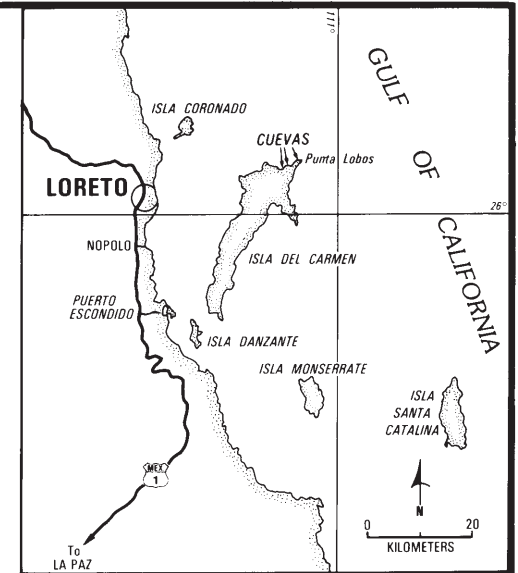
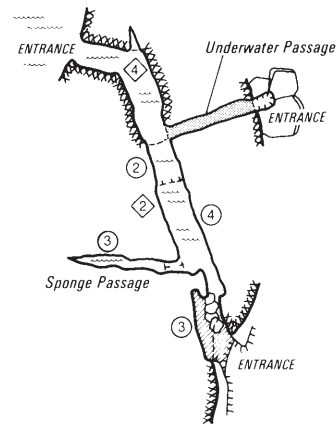
CUEVA #1



CUEVA #2



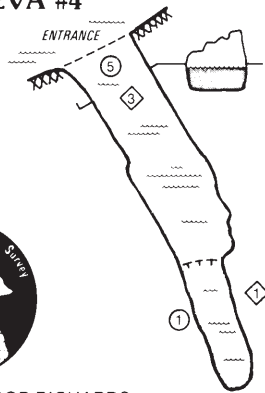
CUEVA #3
(Cueva Punta Lobos)



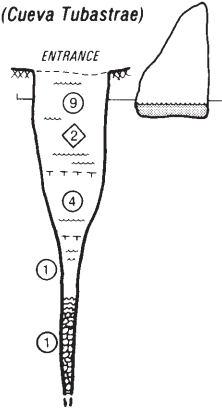
LEGEND

- Breakdown
- Dripline
- Cliff Face
- Ceiling Drop
- Ceiling Height
- Pool
- Ledge
- Slope
- Sand
- Water Depth
- Ocean Line
- Ocean Water

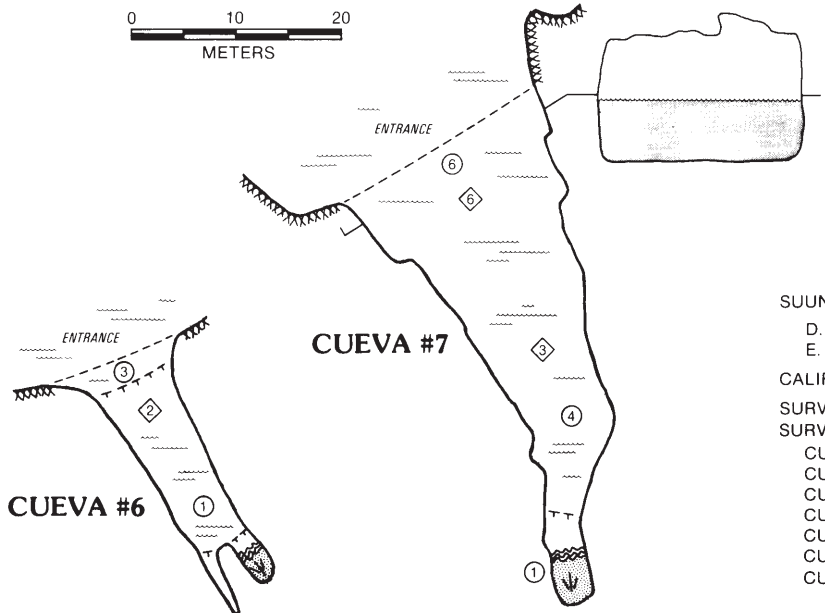
CUEVA #4



CUEVA #5
(Cueva Tubastrae)



CUEVA #7



SUUNTO and TAPE SURVEY BY:
D. Bunnell, C. Conroy, Wm. Liebman,
E. Moody, B. Richards, J. Schmidt

CALIFORNIA SEA CAVE SURVEY
SURVEYED: November 24 & 25, 1984
SURVEYED LENGTHS:

CUEVA #1—	57 m
CUEVA #2—	25 m
CUEVA #3 (Pt. Lobos)—	38 m
CUEVA #4—	37 m
CUEVA #5—	31 m
CUEVA #6—	24 m
CUEVA #7—	48 m

TOTAL: 260 meters

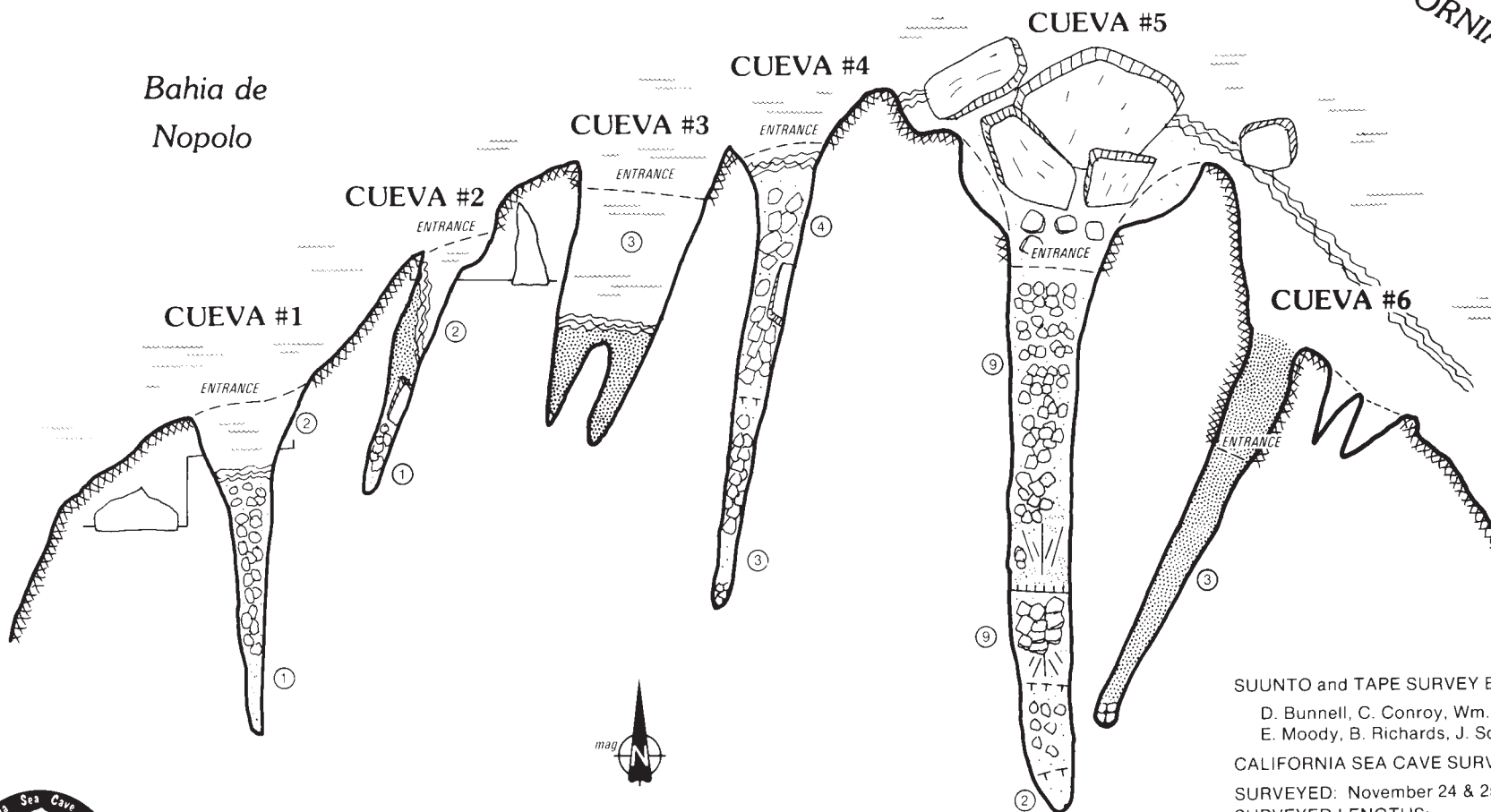


CUEVAS DE NOPOLO

ESTADO DE BAJA CALIFORNIA SUR

GULF OF CALIFORNIA

Bahia de Nopolo



SUUNTO and TAPE SURVEY BY:

D. Bunnell, C. Conroy, Wm. Liebman,
E. Moody, B. Richards, J. Schmidt

CALIFORNIA SEA CAVE SURVEY

SURVEYED: November 24 & 25, 1984

SURVEYED LENGTHS:

CUEVA #1—	18 m
CUEVA #2—	16 m
CUEVA #3—	18 m
CUEVA #4—	26 m
CUEVA #5—	31 m
CUEVA #6—	16 m

TOTAL: **125 meters**



© 1985, CSCS: BOB RICHARDS

along the cliffs we were impressed with the displays of tropical fish, particularly the large purple Cortez Angelfish.

As we swam into the caves they didn't appear too large, but most went back a good 30 meters or more. Several had low areas in the rear that only opened at low tide. We explored and mapped seven caves in this area, mostly water-filled. The most impressive of these contained large colonies of orange tubastrae corals, which in the reduced light of the cave were open. (Normally, corals only "come out" of their shells at night). Most of these caves were in the cliffs on the east side of the cove. On the west side were some interesting relict sea caves about 3 meters above water level.

Although these caves were interesting, they were not the huge sea caves we expected; indeed, on Santa Cruz Island, California these would be considered small potatoes. We questioned a number of folks in town, but none seemed to know of any other caves. We decided to head back to Isla del Carmen the next day. We weren't expecting to do much but snorkeling that day, but did find an interesting cave in the volcanic rocks at Punta Lobos. It basically cuts through the point. I did my first real cave dive here. Seeing a blue glow at the end of an underwater passage, I free dove, swimming 10 meters and coming up in a small third entrance. On the way through I was swimming so furiously that I lost both fins! I had to swim back through with a light, and I found them wedged up in ceiling alcoves! In one side passage in total darkness we saw large masses of white encrusting sponges, tubastrae corals, and schools of yellow snapper, which seem to favor the dark.

Unfortunately, our last day was too windy to revisit Carmen, so we did some land-based exploration. We headed south to Puerto Escondido. This is where a huge hotel complex was to have been built, but only one, the El Presidente, was ever completed. Just south is a large sea stack and some cliffs of conglomerate. In the stack we found a few small caves and a series of fissure caves, which we mapped. Some of these were impressively tall (see map). All in all, it was an enjoyable trip - Loreto has some outstanding seafood and

some good diving. From a sea caver's standpoint, though, I'll stick to the Pacific coast.

Postscript: On a later trip to the Cabo San Lucas region, we spent some time searching for caves. We found only one, behind the huge sea-arch at Land's End, on the tip of the Baja peninsula. We lacked survey gear that day, but we swam over to it and explored a large chamber and some short side passages that probably totalled 60 meters or more. The most notable thing about the cave was that it took water from two oceans, the Pacific and the Sea of Cortez. Not many caves can make that claim!

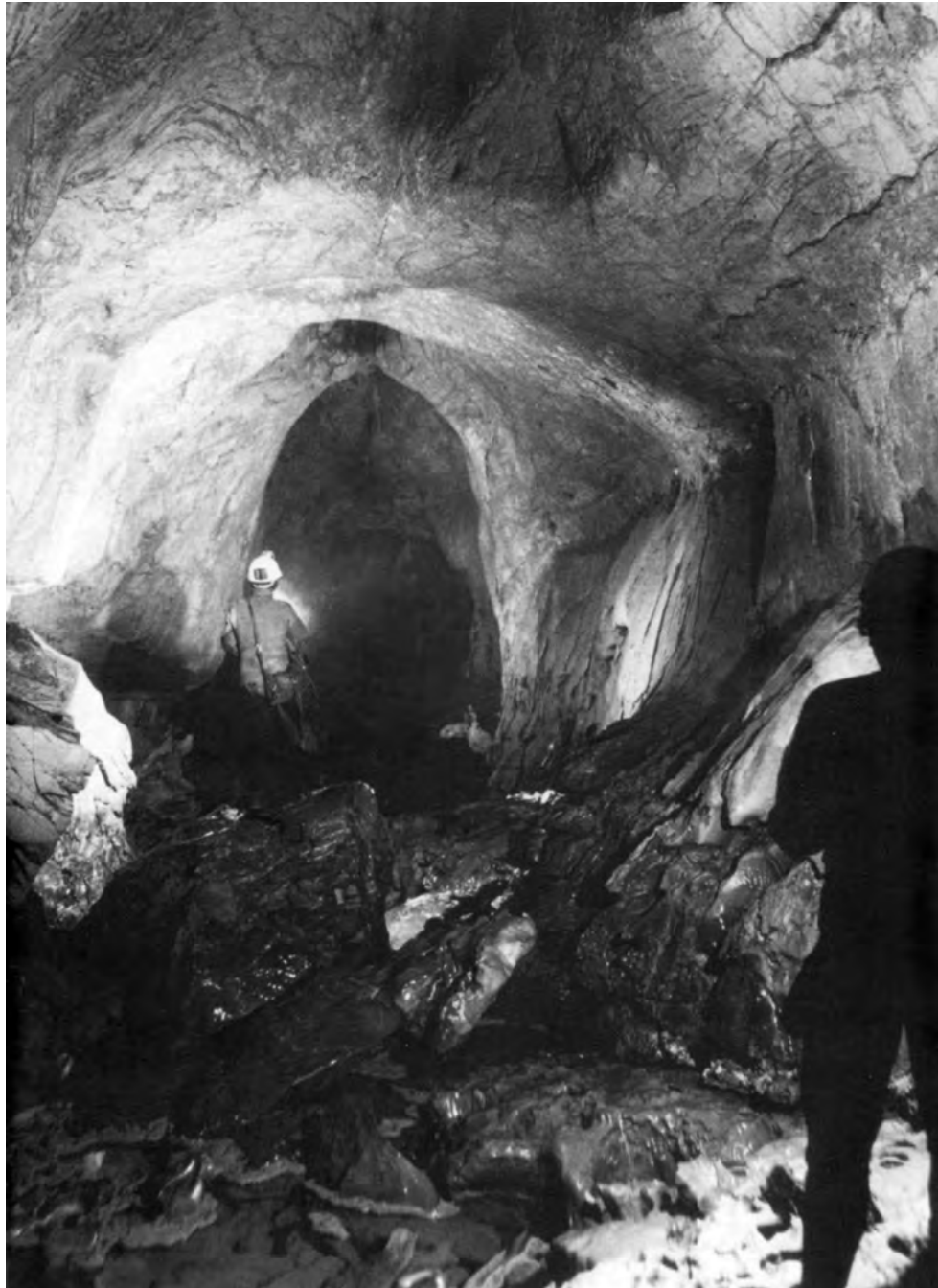


Bill Liebman prepares for the "big ones" on Isla del Carmen. (Dave Bunnell)

LORETO

Este artículo describe cuevas de la costa exploradas en la Isla del Carmen, cerca de Loreto en el mar de Cortéz. Se exploraron siete cuevas, casi todas con una longitud de 30 metros o más. También se exploraron algunas cuevas pequeñas en Puerto Escondido, y algunas otras cuevas con grandes grietas. Y en Cabo San Lucas, se exploraron otra cueva de 60 metros de largo.

CAMP CHALLENGER



SISTEMA PURIFICACION 1986

by Peter Sprouse and Carol Vesely

In March 1986, twelve cavers of the Proyecto Espeleológico Purificación made final preparations for the most ambitious underground camp in the ten-year history of the project: a seven-day push in the southern-most area of Sistema Purificación. The site chosen for Camp IV was 5500 meters in and 600 meters below the Cueva del Brinco entrance. It was in this area that many promising leads trended south under the high sierra, giving tantalizing hope of many kilometers of borehole and of higher entrances in the tower karst of Mesas Juárez. Attempts in previous years to find an easier route into the remote Southbound Borehole area via the lower Cueva de Infiernillo entrance had been fruitless, so now the decision had been made to force a camp in through Brinco's tight and wet route to the bottom. Taking some advantage of gravity, the plan was to leave the cave via Infiernillo, hopefully by a yet-to-be-discovered new connection, or by the original link between the two caves, which would involve some vertical backtracking.

Camp IV was nick-named Camp Challenger, in memory of the recent space shuttle tragedy that had killed seven astronauts, and also because of the challenge involved in getting there. The members of the expedition were Marcus Buck, Phil Deacon, Bill Farr, Dale Pate, Jim Pizarowicz, Susie Raines, Terry Raines, Peter Sprouse, Terri Sprouse, Mauricio Tapie, Carol Vesely and Cyndie Walck.

FIRST ENTRY

Due to tight obstacles like the Crack of Doom, Mudball Crawl, and the Main Squeeze, standard-size military duffle bags were deemed too large and had to be re-sewn to a smaller diameter. Compounding the equipment problem was the fact that waterproofing bags would be required to keep gear dry in the long swims, thereby increasing bulk. So a pre-camp supply run was needed to deliver group gear and the carbide supplies.

On March 17 at project headquarters near the Brinco entrance, Bill, Marcus, and Peter loaded their duffles with survey

gear, rope, and carbide, then charged into the cave. A number of round trips had been made to the Southbound Borehole from the surface, but not with these loads. After the bleak squeeze through the Crack of Doom, the flowstone cascades of the Río Verde were a pleasure. Once in the level borehole of the World Beyond, it was easy going, until Bill discovered that his load of carbide barely allowed him to keep his nose above water in the long lake swims. Then, after the last swim, his companions detected a dread odor from his duff: acetylene gas. Apparently, some of the waterproofing had failed on the carbide bundles, requiring inspection and repackaging. Fortunately, not too much was lost. Once down the two subsequent rope drops and into the dry Medusa's Maze, the cavers found that the dreaded Yawndwanaland tubes weren't so bad, since the duffles could be rolled through much of them. The bags themselves suffered, however. They were full of holes and still had to be used on the camp trip. The low, sandy campsite was reached after 13 hours, and, after unloading the bags, Bill, Marcus, and Peter took a much needed two-hour sleep.

The trip out was slow, but after a low point around the rope drops, second wind kicked in to carry them to the entrance, twenty four and a half hours after entering. Meanwhile, the other team members had shuttled vehicles down to the lower entrance, and on the advice of the returning supply runners, they took an extra day to get their duffles in past the Crack of Doom, the earliest and most arduous obstacle.

FAREWELL TO THE COMET

After a final view of the spectacular comet Halley, the crew entered Brinco on 20 March. Only a few hitches marred the trip that had been planned so long. At the low Mudball Crawl, no amount of force would coax Phil's duffle through, so he had to unpack the thing to free it. Pulling ropes down behind them as they descended, the crew had passed the last rappell and were leaving the Connection Passage when Susie

Opposite: Solution domes arch over the upstream section of the Tokamak River.
(Peter Sprouse)

slipped on a down climb and twisted her knee. She was able to proceed to camp, but unfortunately was only able to participate in one survey trip. Luckily, she recovered sufficiently for the trip out at the end of the week.

CAMP CHALLENGER

The last of the cavers wearily stumbled into Camp Challenger after 17 hours of travelling. The camp area was sandy, warm, and relatively dry, but the ceiling was low. To find flat spots, several people chose to sleep where the ceiling was only a meter high. A silt-bottomed lake beside camp, named Flamingo Lake for the inflatable pink flamingo Jim had carried in, was the source of drinking water. A bit of a crawl over death coral was necessary to get to the sandy trench that served as a latrine, but it was worth it to keep the smell away from camp.

Arising late and sore after a much-needed rest, the group discussion of the first survey projects centered on finding an easier route between the Brinco and Infiernillo sections of the cave. The still-fresh thoughts of dragging duffles up through the steeply-dipping tubes of Medusa's Maze and Yawndwanaland made finding a new connection for the trip out the Infiernillo entrance a high priority. So on the first day Terri, Marcus, and Phil went to push the end of the Columbia, since the map showed that this passage was close to connecting to the Wind Sump area in Infiernillo. After some digging and rock-rearranging, mainly on the part of Marcus, they actually did connect. Unfortunately the route was rather tight and unstable, and would be tricky to push duffles through.

Meanwhile, the remainder of the group split into two teams to survey two passages near camp which headed north toward Infiernillo from near camp. Both took off from the Southbound Borehole and rejoined near Shamrock Shores, a lake that had been explored for a long way by David Honea on a surface push in 1982. Carol, Jim, and Cyndie mapped the eastern leg of the loop, the Wimpering Way (they were a bit sore), which was mostly stooping and crawling, with numerous side leads. They tied into the

Arctic Way, mapped by Peter, Bill, and Mauricio, so named for the frigid wind blowing through it. Peter's team mapped a little past Shamrock Shores to where the water was unavoidable. The teams had only mapped 719 meters for the day, but considering that the group was not yet completely recovered from the long duffle haul, this was understandable.

A SECOND CONNECTION

Since the Columbia-Wind Sump connection was so unstable, Terri, Cyndie, Jim, and Marcus set off the next day to Shamrock Shores to try to find an easier alternative route to Infiernillo. They mapped 611 meters of stream canyon that often doubled back on itself in 170-degree turns. It became a low maze at the Fornicating Tubes before connecting through a breakdown squeeze into the Foggy Mountain Breakdown near the Netherhall in Infiernillo. This squeeze was more easily negotiated than the Wind Sump connection, and it was unanimously selected as the route of choice for hauling duffles out at the end of the week.

For others it was time to turn attention to the south. Dale, Mauricio, and Peter took the Southbound Borehole for 500 meters to the south, where it intersects



Bill Farr and Carol Vesely huddle in the low confines of Camp Challenger. (Peter Sprouse)



Death coral guards the edge of the first lake in Anticline Alley. (Peter Sprouse)

the Tokamak River at Fusion Chamber. Climbing up a cascade to the south, they mapped a nice but short section of streamway to a sump. A possible higher bypass off of Fusion Chamber, Southbound Burrito, proved to be only an alternate route to the Beeline Borehole, the southmost passage in the system, which ends at the Redrock Breakdown. So then they mapped downstream Tokamak River, to the north. Here the stream shoots down numerous cream-colored flowstone bosses to sump in a flowstone constriction. A climb into a dry, dipping tube led to a continuation of the river, which flowed underneath huge breakdown in a red limestone borehole. After several hundred meters this ended in a large sump pool, with a possible low airspace that was not pushed. They shot photos of this beautiful passage on the way back, having netted 504 meters of survey.

Meanwhile another wetsuit-clad team consisting of Terry, Bill, and Carol headed through the long stoopway called Anticline Alley to attempt to extend the cave farther south under the mountain. The previous survey to this area in 1985 had stopped at a death coral lake. From there the passage continued at a comfortable walking height with a breakdown floor interspersed with occasional waist-deep lakes. After about

100 meters, the passage intersected a large junction room, where a stream could be heard flowing beneath the breakdown. Surveying downstream in the newly-dubbed Texas Tunnel, the group passed two good-looking walking leads and came to an overhung climbdown to a beautiful lake. A small waterfall entered on the far side, and golden rimstone dams covered the floor downstream. On downstream, the passage was 3 meters high and 8 meters wide, with a shallow stream cascading down the rimstone floor. Shortly the passage narrowed and led to a deep wall-to-wall rimstone pool. After another 50 meters and two more swimming pools, the passage sumped. A dry south-trending passage, the Red Zinger, was followed through red, scalloped rock down several climbs to where it rejoined the (presumably) Texas River. A series of low lakes leading to sumps were explored but not mapped.

Returning to the Junction Room, they surveyed upstream as the Texas Tunnel continued at a grand size, enabling them to make a number of 30-meter shots. There was air movement, and the passage was heading in the preferred direction: south. Next came a beautiful, deep, almost-circular aqua marine pool that Terry christened The Cenote because it reminded him of similar features in the Yucatán. Just past the Cenote was a promising high lead in the ceiling that was impossible to climb into without a scaling pole. Then the ceiling dropped lower, and a deep pool stretched into blackness. Bill swam in until the airspace got low, but he could feel slight air movement. With over 727 meters surveyed, the group returned to camp. The three teams had mapped a total of 1842 meters, making Sistema Purificación 57,640 meters long.

SOUTHBOUND

With an easy connection finally established between Brinco and Infiernillo, all attention turned to the main goal of the expedition: to find a way under the main part of the mountain and extend the system to the south. So on 23 March three survey teams set out again. The first team of Peter, Phil, and Mauricio investigated a south-trending lead near camp, the Twelfth



Carol Vesely admires the numerous helictites that adorn Medusa's Maze.
(Phil Deacon)

Lead, which rejoined the Southbound Borehole south of the camp latrine. A bit farther to the north, a lead in Fantasia developed into some interesting tubes that, if pushed farther, probably would have connected back into the Southbound Borehole also. Bill, Carol, Dale, Marcus, and Terry headed to the Redrock Breakdown, a blowing boulder choke at the southernmost point of the system. This had been discovered in 1982 during a surface push and had been given only a cursory look. After persistent searching on the part of Bill and Marcus, Bill eventually made his way into a fair-sized room and the others surveyed 32 meters into it. At the base of the room was a tight phreatic tube with water in the bottom; it obviously served as a drain. It led to about 10 meters of tight belly-crawl, and then filled with water to within a centimeter or two of the ceiling.

There was some airflow, but it looked grim. Surely there must be a better way on.

The third team, Terri, Jim, Cyndie, and Susie, decided to push the continuation of the camp passage across Flamingo Lake, which served as the camp drinking water source. On the far side, the passage opened into a large south-trending borehole. Excitedly they raced down the passage, stretching the tape to almost full length on each shot. The passage made a 180-degree left turn to the north, and soon the sound of a small stream could be heard. Then Terri had to stop to change carbide. In her hurry and excitement, she picked up her bottle of gorp and dumped some into her carbide lamp, then tried to swallow some carbide from her other bottle. Hence the passage was christened the Flaming Nose River. Emerging from bedrock, the stream sumped 50 meters downstream. Between the three teams, another 905 meters had been mapped in the cave.

MEDUSA'S MAZE

With the southern effort seemingly run up against an impenetrable wall, the next day attention turned elsewhere. The map showed dozens of unchecked leads off the Medusa's Maze section of the cave. The area was named for a fantastic helictite formation (Medusa's Head) that had been seen on a recon trip into the maze in 1978, but never relocated since. Only one route through the maze had been surveyed. Which of these many leads went to the Medusa was anyone's guess. So Bill, Jim, and Carol formed one team, and Terri, Dale, Mauricio, and Marcus formed a second team to this area.

The two Maze teams had dozens of leads, but not surprisingly, most of these formed loops rejoining other sections of the maze. One lead near the upper section went for about 100 meters through a series of crawlways and tight squeezes, with a few branches and small rooms. In search of bigger passage, Jim, Carol, and Bill decided to survey a walking-height tube that they suspected was just another loop. However, in addition to looping back, the passage continued as a nice phreatic tube heading steeply down-dip. A few survey shots later the group came to some 150-



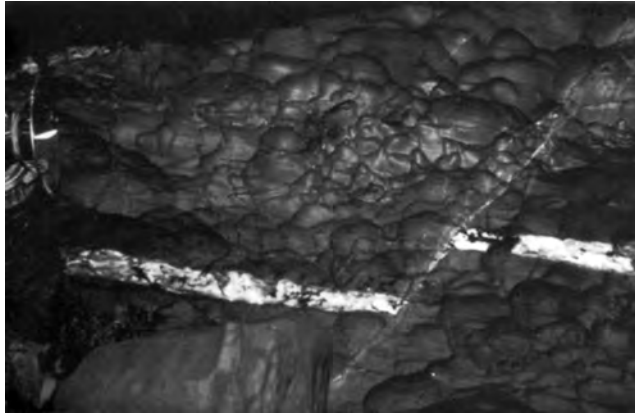
Cavers traverse the spacious Texas Tunnel. (Peter Sprouse)

centimeter soda straws and a massive helictite bush! Surely this was the long-lost Medusa's head. After a few photos they resumed surveying, noting numerous small side leads as they headed down, down, down. Eventually the passage leveled, branched, and got smaller, but there was airflow. The group turned around in some low, branching mud crawls after 550 meters of survey.

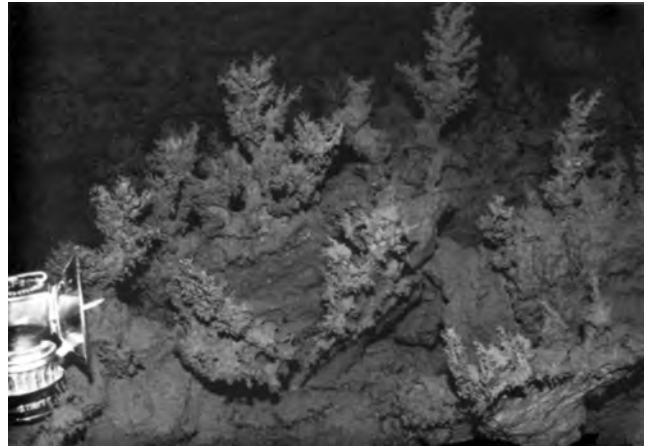
Meanwhile Peter, Phil, and Cyndie mapped into a lead off the Southbound Borehole that climbed up into the dipping fault maze to the south of the Medusa section. The Mashed Potato Tubes, which zig-zagged up into the mushy, weathered rock, became too steep to climb just shy of a probable connection to the Callisto Borehole, an upper-level passage that comes off of the Io Way closer to Brinco. After 310 meters of survey, Cyndie, Peter, and Phil were back in camp early, as were Terry and Susie, who had been shooting photos near camp.

A MAJOR MALFUNCTION

As Cyndie was changing butane canisters on her stove, she got her carbide lamp too close and KaBOOM! - a tower of flame shot to the ceiling. A classic O-ring failure - Camp Challenger lived up to its name! Miraculously, Cyndie emerged totally unscathed. Probably the worst part for her was the teasing she had to put up with afterwards. When someone mentioned that the day was Sunday the jokes really began. Before the trip, Cyndie had helped shuttle the trucks down to Infiernillo. When faced with a long, hot hike back up to town, Cyndie had pleaded, "God, please send me a logging truck to carry us up the hill and I promise I'll go to church on Sunday." To everyone's amazement, a truck appeared from around the bend and gave everyone a lift. Well, now it was Sunday and Cyndie hadn't kept her promise.



Low displacement fault in scalloped limestone, a common feature in the Southbound Borehole. (Terry Raines)



One of the many varied forms of death coral. (Terry Raines)

DISCOVERY

It was already the last day to survey in the cave. Where had the week gone? Four survey teams headed off in different directions to maximize the amount of surveying accomplished on the last day. Jim, Carol, and Phil headed back to Medusa's Maze, but their lead got muddy and small. Peter had said it might connect to another part of the cave, so they continued through a tight, sleazy area that Jim aptly named Thanatos (death wish). Hopes picked up when it opened into an abandoned streamway, but this was short-lived. After 320 meters of survey, the main leads ended with only a few loops and small side passages remaining.

A second team, Dale, Marcus, and Mauricio returned to the Wall, between Medusa's Maze and Yandwanaland. Marcus led the way up the 15-meter climb, unstable and exposed. At the top, the passage continued ascending steeply, then levelled out in a north-trending passage that still goes. Meanwhile, Terry R. and Terri S. (the T team) pushed the Tuba Rosa, a small tube off of the Columbia that could connect to the Wind Sump area with some more squeezing.

The fourth team consisting of Peter, Cyndie, and Bill went to check wet leads off the Texas Tunnel, the large southbound borehole that had been discovered earlier in the trip. While taking

pictures of the Cenote, Bill noticed a high lead that had been overlooked on the first trip. They abandoned their original plans and started surveying this new lead. At first it went north as a hands-and-knees crawl on soft sand with a helmet channel in the ceiling, the Perfect Crawlway. Soon it teed into the north-south trending Texas Avenue, and they chose south, of course. It took 150 meters of uncomfortable crawling over cemented shards before they were able to drop down through a tight, unstable chimney into a larger passage with a great ringing echo. They quickly mapped south for several hundred meters in the Tex-Echo to where it began to split up. Bill pushed ahead through a low-air-space crawl that opened up, while Peter explored a right-hand lead that split and seemed like it would lead to where Bill stopped. As is often the case, you find what you are looking for just when it's time to leave. So with 550 meters of survey, they returned to camp with the good news.

The following day the group thoroughly cleaned up the camp area and repacked the duffles for the long haul out. Although most of the food had been eaten, there was the group gear brought in on the supply run to carry out, and, of course, spent carbide was packed out too. The route out of Infiernillo was about seven kilometers, but with less elevation change and fewer tight squeezes than the route in. Taking a totally different route out of the cave was a

truly fine experience, especially for those who had never seen the giant Netherhall or been to the grand Infiernillo entrance. It was a perfect ending for a very successful camp trip: 5775 meters of new cave sur-

veyed, making Sistema Purificación 60,861 meters long, still by far the longest in México. Two new connections between Brinco and Infiernillo had been discovered, and great leads remained for the next journey under the mountain.

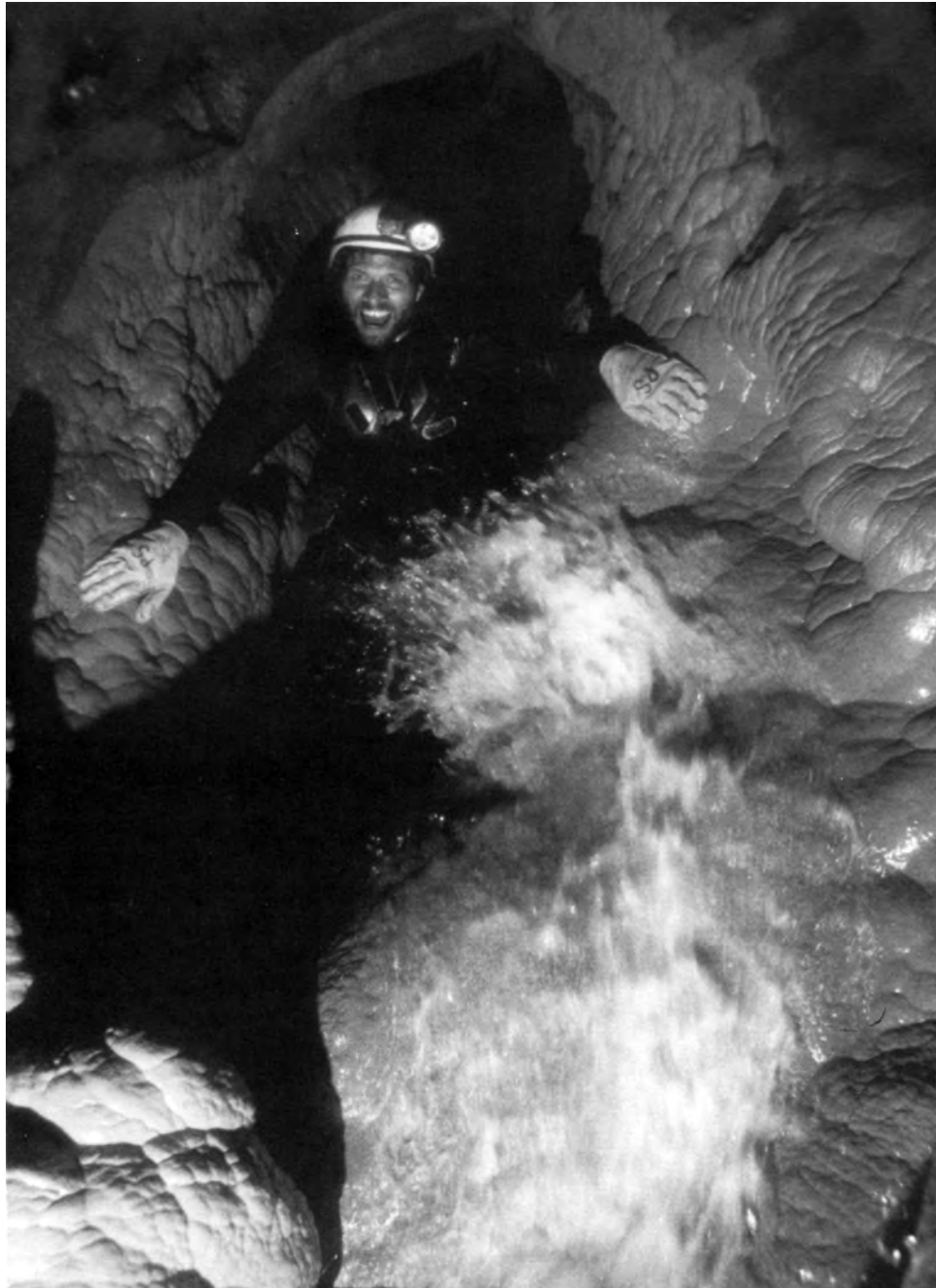
SISTEMA PURIFICACION - CAMP CHALLENGER

En Marzo de 1986, doce espeleólogos del Proyecto Espeleológico Purificación, instalaron un campamento subterráneo de siete días dentro del Sistema Purificación. El Campamento IV, también llamado Campamento Challenger (Desafiante), se localizaba 5.5 kilómetros dentro y a 600 metros bajo la entrada de la Cueva del Brinco. El objetivo principal era el de atender pasajes en dirección sue de ésta área. En total, se topografiaron 5775 metros de pasaje nuevo, incluyendo varios pasajes llenos de vapor, algunos muy largos, y otros muchos pequeños. El último día se descubrió una ruta prometedora en dirección sur, pero ya no había tiempo para continuar la exploración. Los primeros días de la semana se hizo una conexión a la sección de la Cueva de Infiernillo. A pesar de que los espeleólogos habían planeado salir por la entrada de Infiernillo, la nueva ruta recién hecha, era más rápida y más fácil. La longitud en el Sistema hasta Marzo de 1986 fué de 60,861 metros.

Mountain House Freeze Dried Foods gives substantial discounts to expeditions placing large orders. PEP wishes to extend its sincere thanks to Mountain House for this valuable assistance.

So Much Karst,
So Little Time

CAMP V



SISTEMA PURIFICACION 1987

by Peter Sprouse

Given the success of the Camp IV expedition in 1986, there was no doubt among the Proyecto Espeleológico Purificación cavers that there would be another camp in 1987. It was only a matter of where. Since the new connection to the Southbound Borehole gave easier access from Infiernillo, a remote camp could be put in from that entrance. Some good spots were known near the Nile River, where there were also a number of leads known from earlier years.

So it was that on 9 March 1987 fourteen cavers hoisted their duffles and set off on the trail to Cueva de Infiernillo. After spending the previous day in meticulous final packing, all were ready, in theory, for a ten day stay underground, the longest yet attempted in Purificación. Expedition members were Dave Bunnell, Bill Farr, Jim Goodbar, Jude Larkin, Dale Pate, Susie Raines, Terry Raines, Ron Simmons, Terri Sprouse, Mauricio Tapie, Carol Vesely, Jack White, Brad Wilson, and myself. Two ropes were rigged on the entrance climb, and the last cavers left the huge Infiernillo entrance at 12:30 p.m. For a group so large the trip into the cave went remarkably well. Duffles were hauled up the more difficult climbs on the way to the Confusion Tubes, and all went well until the Break-down Maze.

Suddenly, we could smell gas leaking from a stove in someone's duffle. There was a brief panic as carbide flames were extinguished and the leak was traced to Jack's pack. That was soon remedied and we were off to the Netherhall. Climbing the long



north slope of the Netherhall with camp duffles was a first, but it was no problem, and we made it up in the normal time of 30 minutes. At the Wind Tunnels I went ahead to choose a campsite among several candidates. The first choice was off of Communion Hall at the edge of a low-air lake that connects to the Nile River. The conditions were good: lots of soft sand, drinking water, and though it was a bit low overhead, it was better than the year before. Soon we were all arranging sand and settling into our new home. It had been only

a 12 hour trip from the entrance, and 15 hours from the truck, which was quicker than anticipated.

61,181 METERS - AND GROWING

After duffle hauling, the following day was naturally a bit slow. We started out lead-checking near camp around Communion Hall and photographing the spectacular Horseshoe Bend of the Nile River. Mauricio, Ron, and I found a lead up a small cascade not far from the Nile. Although we could not get all of the way up the climb, we did get into an upper level mud passage going north and south. We mapped north for 150 meters to an interesting looking pit, then returned to Communion Hall where we surveyed a previously known 50-meter-long loop over to the Wind Tunnels. Our total survey for the day was 211 meters.

Terri, Jude, and Dave mapped a short loop off of the Horseshoe Bend, then went a short way upstream in the Nile to a lead on

Opposite: Peter Sprouse enjoys the water cascading over the flowstone in the Downstream Nile. (Dave Bunnell) Above: Hauling duffles up the flowstone-climb below the Confusion Tubes. (Dave Bunnell)

the right side that was left unpushed from a trip in 1979. This went straight south through various degrees of death coral and ultimately tied into Never Stops Going, a parallel passage originally accessed from a point farther up the Nile. This was a fortuitous connection, since with only one wade it eliminated the need for wetsuits in pushing Never Stops Going, a principal southbound lead. They added 305 meters to the survey. Meanwhile Carol, Bill, Brad, and Susie descended Enigma Pit, another south-trending lead near the Nile that had been seen in 1985. At the bottom of the 15-meter drop they followed a passage that zig-zagged to the west to intersect a new flowing stream, the Enigma River. Their survey was 241 meters, making a group total of 758 meters for the day. México's longest cave was now 61,937 meters.

RIVERS AND DEATH CORAL

On March 11 we mustered our full complement of four survey teams. Terri, Susie, and Bill returned to the Enigma River, finding that it sumped both upstream and downstream. But they found a small infeeder that went a good ways, giving them 180 meters of survey for the day. Dave, Jack, and I suited up to map downstream in the Nile River, which had been a mystery since the halcyon days of summer 1978. We began mapping at a 5-centimeter low airspace, which quickly opened up into a large lake room. On the left was the low airspace which connected to Camp V, and ahead the passage narrowed to small cream-colored tubes with water crashing down them. Both Jack and I agreed that this was some of the neatest caving we had done in our decades of caving experience. After a series of alternating cascades and small horizontal tubes, the river got very vertical and finally pinched in flowstone after about a 30-meter descent from our starting point. Since we were done a bit early, we decided to map a bit near camp. The other teams trickled by us as we mapped a loop to Communion Hall and a side lead called the 26 Year Passage leading to a terminal lake, which got us up to 270 meters for the day.

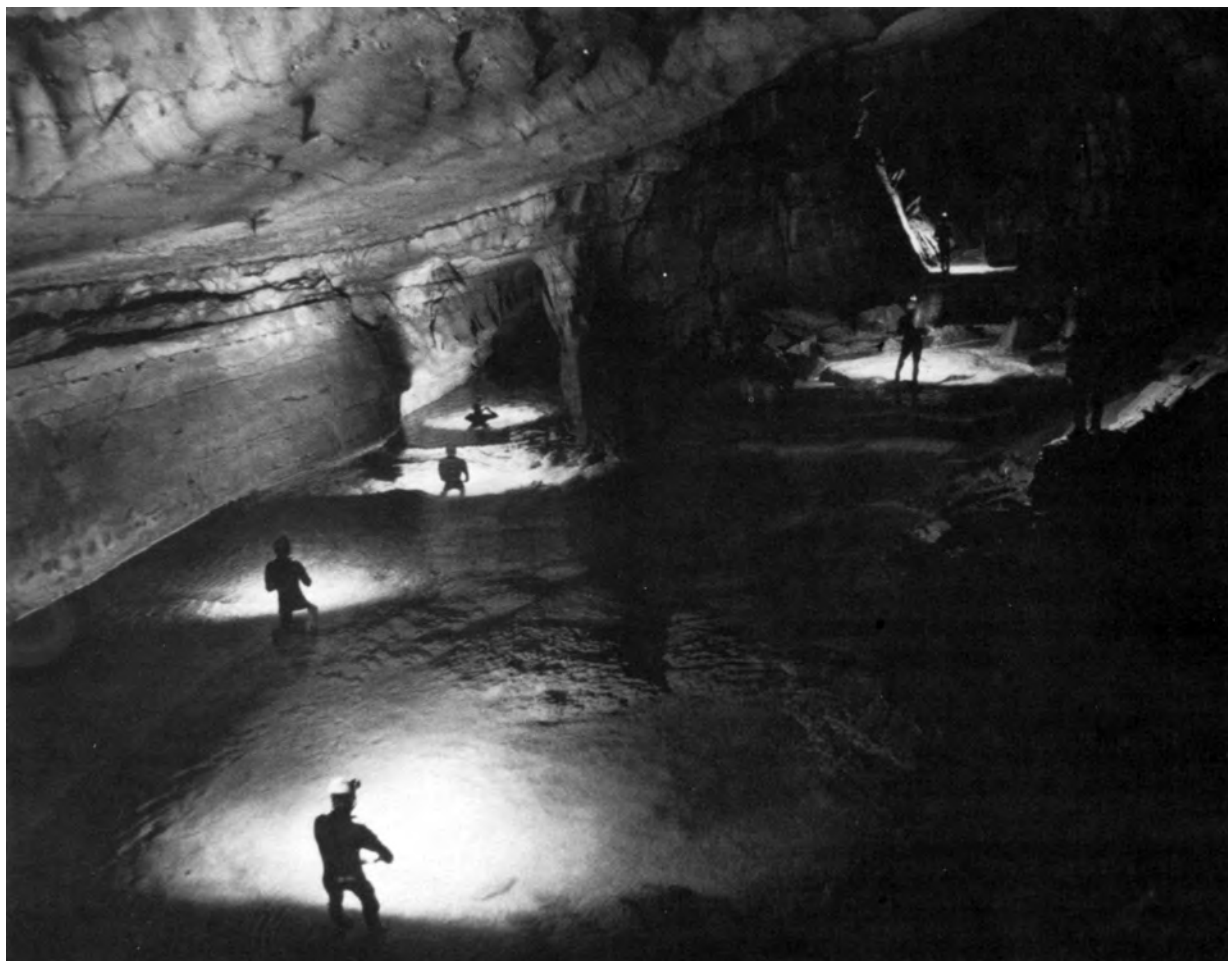
Dale, Terry, Mauricio, and Ron headed south from camp to Goes 2, to push a stoopway that Dale and Dave had left in 1985. A

wrong turn led them into a virgin passage (Hay Chihuahua Mamacita!), which they mapped out of to tie into the survey. They got 258 meters of survey and ate lots of death coral. Death coral also impeded Carol, Jim, Brad, and Jude in Goes 1, where they ended up in a side lead. They mapped 101 meters in what became known as God Let It End. All told we had done 809 meters of survey, making the cave 62,748 meters long.

TEX-ECHO

On 12 March we were ready for the long push back to the Tex-Echo, our best south-trending lead from the 1986 camp. Nine of us set off bravely without wetsuits, hoping for just a few wades to deal with. In the Shamrock Shores passage we found water levels higher than we had expected, including a neck deep wade. But we all warmed up as we proceeded through Anticline Alley to the Perfect Crawlway. There Terri, Susie, and Jack mapped north in a virgin lead that looped back down to the Texas Tunnel. Proceeding north to the next lead they mapped an extremely tight and windy tube which tied into the middle of Flatrock Chimney near Tex-Echo, for a total of 217 meters of survey.

A team consisting of Carol, Bill, and Jim continued the survey at the end of Tex-Echo, which soon became very wet. Needless to say, surveying in 15-degree Celsius swims with no wetsuits makes for a low endurance factor. After 244 meters of flowstone crawls and stoopways, they stopped at another swim. Meanwhile Dave, Brad, and I had leapfrogged ahead, giving Carol's team what we thought was an appropriate amount to survey. Actually we went a bit too far, perhaps because we were blasting ahead at full speed to keep warm! Where we started we mapped up a steep chimney that led to an upper level heading south in a linear crawl. Just as we were really beginning to chill from the wind we dropped into a larger lower level. We looked across a lake into a passage where the sound of a flowing stream originated. Another river! Brad waded across and reported a large breakdown passage with the river sumping downstream, but going upstream. Having already gotten 225 meters and being a long way from camp, we left it for the next trip. On the way



back we discovered that the others had not been able to map as far as our starting point, so ours was a hanging survey for the time being.

The fourth team for the day consisted of Dale, Jude, Ron, Terry, and Mauricio. First they went up the cascade near the Nile and descended the pit my team had left a few days before. It soon looped into the main passage near the Nile. They then proceeded on to Never Stops Going via the new connection route. It bore due south through ever larger death coral that reached up to 2 meters in height. They halted at a lake with 338 meters of survey under their belts. All told we had added 1024 meters to the system, for a total of 63,773 meters.

The following day was going to be a rest day of sorts, but we got motivated and wandered off to the Wind Tunnels for a little surveying. Susie, Terry, Dave, and I

mapped side loops off of the northern Wind Tunnels, and area that had been a bit hastily surveyed in the connection race in 1978. Even many of the undrilled stations were located after nine years, using the original survey notes. We tied up a number of loops and side leads for 184 meters of survey, and found an interesting new crawl that seemed to head north underneath the Netherhall. Dale, Ron, Bill, and Mauricio went to look at Anderson's Climb, a high lead near the Netherhall. They made it up and surveyed quite a bit, going up numerous climbs and finding horizontal tubes heading south. They left several leads after having completed 513 meters of survey.

The third team of Carol, Brad, Jude, and Jack went back to Never Stops Going with wetsuits. The passage continued on its south trend past the lake, but got smaller and grimmer. They felt that the previous

Above: The Horseshoe Bend of the Nile River. (Dave Bunnell)



Dale Pate crawling over some of the ubiquitous death coral. This passage was found above Anderson's Climb. (Ron Simmons)

good airflow had perhaps disappeared up some small ceiling holes. Their survey was 254 meters, the day total was 951 meters, and the system total was 64,724 meters.

TIME SHIFT - 14 MARCH

At this point in the trip we were experiencing fairly serious time shifts among the crew. Some stayed out caving longer than others, and everyone was awakened by others during their sleep periods. But still we managed to get together to plan work teams. Two groups pulled on wet-suits for the long trip out to Tex-Echo. Dave, Susie, and I worked on filling in the gap between the hanging surveys, as well as doing two loops and two side leads for a total of 248 meters. Several high chimneys were left unchecked in this area. Dale, Bill, and Jim went past us to survey the new river. As Brad had found, it quickly sumped downstream, but they were able to map the Midnight River for 311 meters upstream to the south before it sumped in that direction also. So we had now run out of major south-trending leads in the Tex-Echo area, although more hard pushing in this area should pay off, considering the airflow. But access is difficult, remote as it is.

Closer to camp, Carol, Brad, Jude, and

Mauricio began working on the numerous leads in the south Wind Tunnels, not far from Communion Hall. At first their passages formed a series of loops that were tied to the Wind Tunnels, but their last lead broke into a nice lower level passage, the Tétricos Trunk. This walking passage went well, enabling them to get 356 meters of survey in for the day. Meanwhile Terri, Terry, and Jack looked around in the Arne Saknussemm Borehole (ASB), where it is joined by the original Connection Passage. They mapped a descending passage off of the Connection Passage for 87 meters, and found an intriguing pit off of the ASB. Altogether, the four teams added 1000 meters to the length of the system, making it 65,725 meters long.

BUILDING LOOPS

Now it was the Ides of March, and it took some discussion and motivation before we all set out on survey projects. Dale, Bill, and Ron returned to the Goes 2 area south of camp to continue the never-ending battle against death coral. Having found Hay Chihuahua on a previous trip, they proceeded through Hay Tamaulipas and Hay Nuevo León, coming up with another 143 meters of survey, and more abrasions to treat, no doubt. Carol, Mauricio, Brad, and Jude returned to their good leads in the new Tétricos Trunk, mapping a number of loops, including a major passage which tied into the end of the ASB, making their survey 266 meters.

Working above them were Terri, Terry, and Susie, who dropped the pit at the beginning of the ASB to find a large passage that soon joined the Tétricos Trunk. They also mapped a side lead for a total of 120 meters of survey. On another level above them were Jim, Jack, and me, mapping odds and ends off of the beginning of the ASB, a maze of eroded flowstone. Then Jim, Terri, Susie, and I opted for more survey after a photo session in ASB, and worked a complex series off the north end of the ASB, the Pitufo Maze. We passed numerous side leads and ultimately looped back into the ASB. With my team's 269 meters, the day total was 799 meters, for a system total of 66,524 meters.

RETURN TO THE SOUTH

With our schedule shift, the survey trips for the 16th of March soon turned into the 17th. After eight days underground it could perhaps be said that a slight diminishment of enthusiasm was discernable among some of the crew, but after a lengthy session of camp photography, three teams were formed. Carol, Mauricio, and Dave mapped a crawl that I had noticed leading off of the northern Wind Tunnels that seemed to be heading north under the Netherhall. They pushed it about 70 meters before it got grim, and named it Sleazy Does It. Then they returned to the Tétricos Trunk area, mapping more side leads and loops to bring their total for the day to 192 meters.

Terri, Susie, and I put on wetsuits and proceeded south to the Tex-Echo. Climbing up into Texas Avenue and down Flatrock Chimney, we started to survey downstream (north) in Tex-Echo. We passed a deep low-air-space lake, and after 100 meters we tied directly into the upstream end of the Texas Tunnel. Being done so soon, we set out for another area to look for leads - the Red Zinger. This was the downstream portion of the Texas River, and none of us had been there before, nor did we have notes on hand for it. The scalloped red limestone walls were exceptionally beautiful. Past the end of the previous survey we looked at the downstream portion of the river. Two downstream leads and one going upstream all sumped. Not completely certain of the survey status in this area, we retreated to a dry side lead we were sure was unmapped. This we named the Green Zinger, due to it being St. Patrick's day. This looped back to the Texas River after 100 meters, via a tight ripping crawl named Shredderdale.

We had still not gotten our fill, so on the way back to camp we stopped at a hole in the floor in the Arctic Way. It led to a small lower level tube with occasional pools. The Uncle Arctic Tube, as we named it, eventually looped into the Southbound Borehole, giving us 340 meters for the day. While on our last survey, we were visited by the third team, Bill, Jude, and Brad. They had made the long trip south to the Redrock Breakdown to try again to find a way through. They were able to follow the



Polished limestone and flowstone in a side passage off the Tétricos Trunk.
(Dave Bunnell)

wind for a ways, but finally could not proceed without explosives. Although they didn't survey, the two teams that did got a total of 636 meters, making the cave 67,160 meters long.

FINAL SURVEYS

On the evening of 17 March we divided into teams for the last surveys. Terri, Carol, and Dave returned to the Tétricos Trunk area where they squeezed out another 115 meters of survey, mapping more tubes to a lake. Jack, Susie, and I worked the south Wind Tunnels area, mapping side leads and loops neglected since the first explorations in 1978. We got 213 meters of survey and did not complete the area by any means. Dale and Bill bravely gave the "Hays" area in Goes 2 another push, gaining only 38 meters, but - it still goes! Death coral



Dale Pate proved his adeptness at finding those death coral crawls. (Ron Simmons)

gives up secrets slowly. This final day produced 366 meters of survey, bringing the expedition total to 6341 meters (field calculation), and making Sistema Purificación 67,526 meters long. We had increased the number of surveyed loops up to 278, and the total of survey shots in the cave to 8772. México's longest cave marches on...

As the teams returned from work in shifts the morning of the 18th, we all went off to sleep one by one, awaking (arising, I should say) at 6 p.m. We broke camp and hoisted duffles at 9 p.m., planning on reaching the Infiernillo entrance after dawn. Jude and I were last out of camp, checking to make sure nothing was left behind that we had brought in. The only evidence was a large sandy mound down the passage, a gold mine for future scatologists?

Perhaps due to our conditioning from ten days of caving, the trip out was a

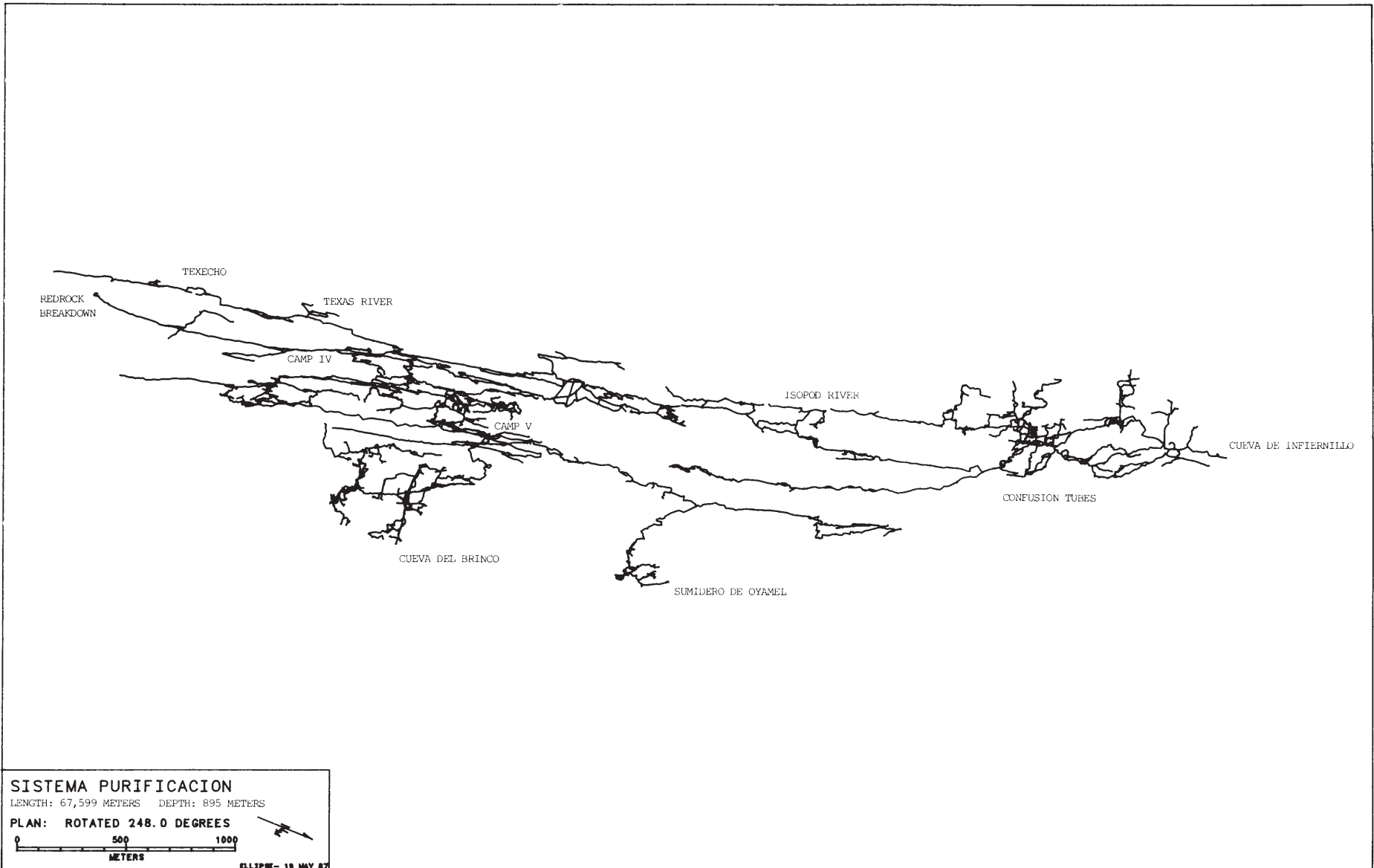
breeze, only seven hours. So it was still dark when we reached the Infiernillo entrance in the early hours of the 19th of March. Not wanting to find our way through the forest in the dark, we huddled in a chilly pile until first light. We laughed at the irony of spending ten days in a cave, then not wanting to leave because it was dark outside! But leave we eventually did, with Dale and I rappelling last on doubled rope for a pull-down. After the hike back up to the trucks, Terry, Susie, Brad, Jude, and Jack left for civilization, while the rest of us headed up the mountain to unwind at project headquarters in Conrado Castillo.

DRAGON RIVER

Everyone took it easy except for Bill Farr and I- we had a score to settle. I had promised him a trip to the Dragon River, since our trip there three months earlier had been thwarted by high water in the Oyamel Nose Dives. The others thought we were crazy to go on such a long trip the day after a ten day camp - and we were!

This time we went in via the Cueva del Brinco entrance, a longer route but with more guarantee of success. At the World Beyond we headed upstream in the Eerie Canal. Forsaking a dry bypass, I led us straight up the long swim as we used to do, back when we used thick diving suits rather than the thin surfing suits we now had. The cold water and reduced flotation sapped our already reduced energy level, putting a crimp in our endurance for the rest of the trip. We gradually warmed a bit through the fantastically beautiful Helictite Paradise, and the cable ladder we brought got us down the Gates of the North. Then through the low airspace called Locomotive Breath, and we were in the Dragon River.

Our first lead was in a downstream branch called the Rhino Run, which ended at a semi-sumberged belly crawl. Bill eased in on his back with no helmet, feeling for a passable route with his nose just out of the water, scraping the ceiling. Just before reaching the black void beyond, it became too tight, making underwater demolition the only option. So we wrote that off for the time being and pursued drier leads. We decided to go all the way to the source



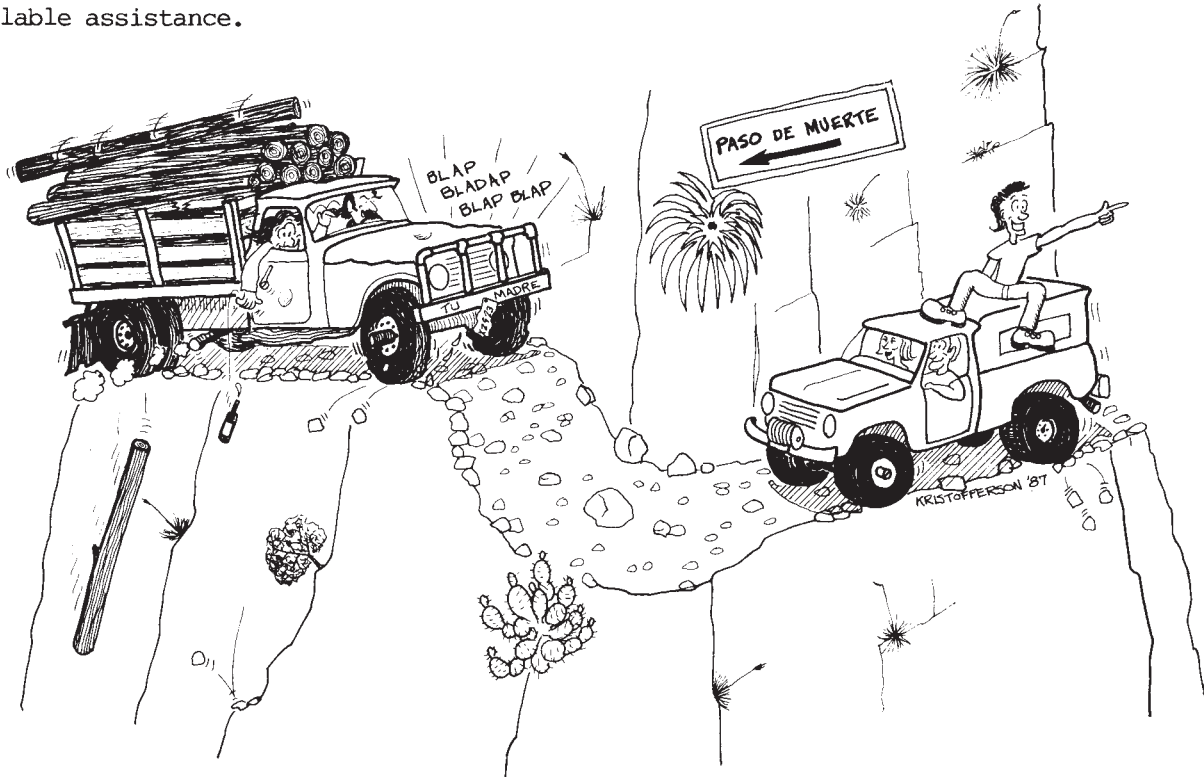
of the Dragon River, high over Infiernillo. We knew that waterfalls pouring in from the ceiling must hold the key to progress to higher entrances. At one cascade I was able to climb an eroded column to gain access to an upper stream passage that I followed for about 80 meters. Another waterfall required an overhung traverse to get into. After a few more cascades, I decided it would be

better to return with a little climbing gear. Being the worse for wear, we elected not to survey, since we knew we would now be coming back to the beautiful Dragon River another time. Five hours later we trudged up to the fieldhouse to be greeted by a roaring fire and all our friends, who had kindly stayed up late awaiting our return. Great way to end a fine trip.

PURIFICACION 1987

Catorce espeleólogos del PEP pasaron diez días en el Campamento V dentro del Sistema Purificación en Tamaulipas, en marzo de 1987. Se encontraron muchos pasajes nuevos, incluyendo el Midnight River, el cual se extiende al sur más lejos que ningún otro pasaje en el sistema. También se descubrió el Entronque de los Tétricos, un pasaje de bajo nivel y con un sistema largo de laberintos. En total, se topografiaron 6341 metros de pasajes nuevos, haciendo del Sistema Purificación 67,599 metros de largo, la caverna más larga de México.

Mountain House Freeze Dried Foods gives substantial discounts to expeditions placing large orders. PEP wishes to extend its sincere thanks to Mountain House for this vaulable assistance.



CUEVA DE LA LLORONA



by Dale Pate

with Peter and Terri Sprouse

The obscure entrance to Cueva de la Llorona lies hidden in a brush-filled dolina surrounded by large oaks near the crest of a hill in western Tamaulipas. The two-meter-high entrance, situated at an elevation of 1820 meters, opens into a steeply descending passage trending northwest toward a large valley. Near the northern end of this valley, three kilometers distant and 400 meters lower, lies the entrance to Sótano de Las Calenturas, a six-kilometer

long, 120-meter deep cave system. And four kilometers to the southeast is another valley that drains into Cueva de Tecolote, 11 kilometers long and 220 meters deep.

THE SURVEY BEGINS

On 20 November 1984, during a Proyecto Espeleológico Purificación expedition to Cueva de Tecolote, Gabino Torres showed the cavers the obscure entrance to Llorona,

named after a ghost of popular Mexican legend. The cave looked promising, so two teams entered to begin the survey and exploration. The first team, consisting of Jerry Atkinson, Mark Minton, Alan Williams, and Peter Keys proceeded in with a small amount of rope, and began rigging. They explored a fair amount of passage before beginning their survey. The second team, consisting of Paul Fambro, Erika Heinen, Bill Mixon, Peter Sprouse, and Terri Sprouse began at the entrance and surveyed in. The passage immediately started descending at a 40 degree angle, with noticeable airflow. Numerous short drops were encountered, many of which were free-climbable. Others needed handlines, and some required full rigging and vertical gear. They also surveyed an interesting side passage, the Tricycle Run, a pretty flowstone stoopway.

The passage was a nice comfortable size, averaging 5 meters wide and had a ceiling 5 to 6 meters high. The floor was beautiful, dry flowstone. At the bottom of the fourth rope drop, Fried Egg Falls, a flowstone blockage stopped exploration. The passage continued above this blockage, and an hour's work with a lasso was successful in securing the rope to a stalagmite on top. Leaving it at that, the team had mapped 460 meters into the cave to a depth of 90 meters. On 23 November 1984, the push continued, with two teams entering the cave. Beyond Lasso-up Drop, the cave dropped back to its previous level. A team consisting of Jerry Atkinson, Mark Minton, Dale Pate, and Alan Williams leap-frogged ahead, beginning their survey at the top of a 20-meter drop. The bottom was a blind mudhole, and the only lead was a climb-up. This easy free-climb led to another series of beautiful flowstone drops. The last pitch in this series dropped into a tall room 15 meters by 18 meters wide, dubbed Knots Landing. The descent into this room had been accomplished by stealing the rope from another drop a short distance back up the passage, the Stolen Rope Drop.

Several passages off of Knots Landing led to a dry upper level complex named the DARTH Vadose Maze, which eventually pinched. But a small hole at the bottom of



The initial passages in Cueva de la Llorona descend very steeply. (Peter Sprouse)

the Knots Landing room carried on through stoops and crawls to open into Ragtime Boulevard. This linear passage averaged 5 meters in diameter, and sloped steadily down through sculptured flowstone and bedrock to another drop. A window one meter across dropped into what appeared to be a very large passage. Out of rope, the eager cavers had to turn back at that point. Meanwhile, Paul Fambro, Roy Glaser, Erika Heinen, and Peter Sprouse had begun their survey back at Lasso-up Drop, and they were able to map through several crawlways that were the smallest passages so far. They eventually tied their survey into the lead team's first point. Total length of the cave was then 919 meters, with a depth of 273 meters.

RETURN TRIP

The PEP cavers returned to Llorona during the week of 12-19 October 1985 with

Opposite: The Blue Flowstone Room at -300 meters in Cueva de la Llorona. (Peter Sprouse)



The longest drop in Llorona is Knots Landing, a 25-meter flowstone descent. (Dave Bunnell)

more rope and high hopes. On the expedition for the week were Jerry Atkinson, Paul Fambro, Erika Heinen, Pat Kambesis, Mark Minton, Bill Mixon, Dale Pate, Susie Raines, Terry Raines, Rich Rohwer, Paul Smith, Peter Sprouse, Terri Sprouse, Nancy Weaver, and Alan Williams.

On 13 October, a rigging team entered the cave, followed by two survey teams. The pitch at the end of Ragtime Boulevard was rigged and it dropped 15 meters into the center of a large chamber, landing precariously at the edge of a flowstone precipice. This chamber was well-decorated, in places with blue-gray flowstone, hence the name Blue Flowstone Room. A search of the room turned up numerous crawls and pits, several of which led to an even larger room, the California Chamber.

The floor of the California Chamber was covered with sharp, angular breakdown blocks, including one such block named the Rock of Gibraltar, that was 12 by 10 by 6 meters. The room itself stretched for ap-

proximately 80 meters in length and was 60 meters wide at its widest point. Several passages off of the western side of the California Chamber were given a cursory look during the initial exploration of this room. Dale, Erika, Rich, and Paul S. spent the day surveying the northern and eastern portions of the Blue Flowstone Room. Another team, Peter, Terri, Paul F., and Bill mapped the southern and western sides of the BFR.

Four survey teams entered the cave on 15 October. Both Pauls and Bill mapped a series of rooms off the east end of the Blue Flowstone Room called the Shirt Pocket Rooms. These rooms were beautifully decorated, with lots of flowstone and meter-long soda straws. Peter, Terri, Terry, and Susie began the survey of the western side of the California Chamber. Dale, Alan, and Pat mapped along the eastern wall, and both teams eventually united to complete the survey of the large chamber. Of note was the discovery of a new genus of schizomid and a probable new species of pseudo-scorpion from this room. Numerous photos were also taken of the room while such a large contingent was on hand for firing bulbs.

THE DESCENT CONTINUES

Jerry, Mark, and Rich surveyed down a pit series heading west off the lowest point of the California Chamber. At first they followed the airflow through a jumble of cemented breakdown, but when they turned around they were back into good bedrock, with two leads. As the cavers left the cave that night they were surprised to find water beginning to pour down the drops. The rope climbs on the way out provided a refreshing shower, and on the surface stories were told of a heavy downpour that day.

On 17 October three teams entered Llorona for the last push of the expedition. Jerry, Bill, and Pat finished up the survey of the Darth Vadose Maze, while the other two teams worked on the leads below the California Chamber. Mark, Terry, Dale, and Paul S. worked on a blasting lead, where they removed a sharp rock from a flowstone mound that restricted a small hole with good airflow. The blast opened it up, but it immediately pinched.

Meanwhile Peter, Terri, Rich, and Paul F. followed the other lead to a muddy canyon bearing northwest, just the right direction toward Sótano de Las Calenturas. But soon a series of blind pits in the floor hampered progress. The other team came up to help scout leads. Mark rapelled the first one and found that it ended in a sump, while Rich reported that the second hole in the floor got too tight. The survey team continued across the second pit and the canyon was followed to where it got too tight, then a squeeze to a higher level led to a continuation to a short pitch. Unfortunately, they had no rope, but Peter managed to get down using his seat sling webbing. He was stopped shortly by a drop he estimated to be 15 meters deep. This area was now the deepest portion of the cave at -398 meters. On the way out, Peter and Terri mentioned that it was their anniversary. Paul whipped out a candle and passed around some beef jerky - a true caver-style celebration.

This expedition brought the length of Cueva de la Llorona to 2,256 meters.

THIRD EXPEDITION, 1986

The most recent expedition occurred 11-17 October 1986. Along this time were Dave Bunnell, David Dodge, Paul Fambro, Bill Farr, Bill Mixon, Dale Pate, Peter Quick, Susie Raines, Terry Raines, Peter Sprouse, Terri Sprouse, Mary Standifer, Carol Vesely, and Cyndie Walck.

Three teams entered the cave on 12 October to continue the exploration and survey. A team consisting of Peter S., Terri, Terry, Susie, Paul, and Peter Q. headed to the virgin drop at the bottom of the cave. This turned out to be yet another blind well, but a traverse partway down led to another horizontal continuation. They were able to map another 70 meters before bogging down in a maze of crawls that all pinched hopelessly. Although there was airflow, a lot of effort produced no way on.

The second team, Carol, David, Bill F., and Bill M., began their survey at the upper end of Ragtime Boulevard at a climb that Mark Minton had checked on an earlier trip. Their passage went up 20 meters, then turned and dropped 30 meters down a series



Cavers illuminate the expanse of Llorona's California Chamber. (Peter Sprouse)

of parallel pits and canyons that they named the Jumble Jungle. At the same time, Dale, Cyndie, Mary, and Dave went to look at side leads off the east wall of the California Chamber. One small lead, called the Maybe Yes, Maybe No Passage broke out into several nice rooms, the largest being 8 meters by 18 meters with a drain in the flowstone-covered floor.

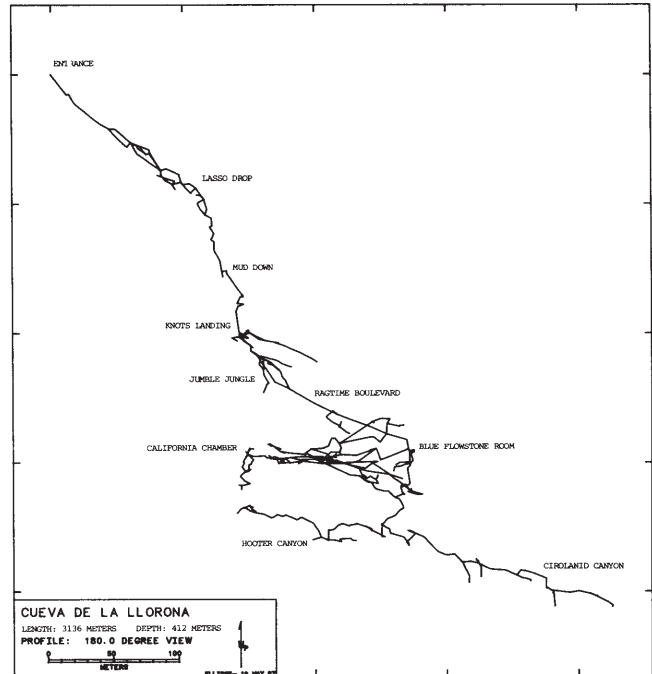
After a day of rest, three teams went back into Llorona. Carol, Dave, and Cyndie mapped the drain off the Maybe Yes, Maybe No Passage. It eventually closed down to 7.5 centimeters with lots of air going into it. Dale, Terry, and Susie were nearby, in another lead off the far end of the California Chamber. A crawl was pushed in that area which led to a small room with airflow. Beyond was a short climb to a squeeze over a large breakdown block. After a little bashing with a rock, Susie slid past the constriction to find going passage. She explored further to see that the lead continued, and then returned.

Peter, Peter, and Bill F. returned to the Blast Room area below the California Chamber. They mapped a side lead through various squeezes to a constricted drop they named Sick Well. It opened up immediately and dropped 7 meters into a stream passage, Hooter Canyon. Downstream soon pinched, while upstream led to a confusing bedding-plane maze. Beyond that was a squeeze that had to be hammered open, giving access to a

room with a flowing stream. Pushing this stream would require a return trip with wetsuits. Above the stream was a small windy hole into a large room that would need blasting.

On 16 October a team composed of Carol and Bill F. headed back to the Jumble Jungle to continue the survey. They pushed various muddy crawls and were turned back at numerous pinches, but leads remain. Peter S. and Susie went on to the Blue Flowstone Room, where they descended a lead known as Paul's Pit. This landed them in a vertical breakdown maze that proved to connect to the lower route below the California Chamber. Then they climbed back out of the BFR and derigged that drop, advancing up Ragtime Boulevard to a drain in the floor. This immediately split, with the floodwater route going through a squeeze parallel below the boulevard. The dry way (Fluffy Down) sloped down to a drop into what probably is the Blue Flowstone Room.

Derigging of the cave was finished the next morning. The week-long trip had brought the length of Llorona to 3,137 meters, and had increased the depth to 412 meters. Llorona was by no means finished, only more complicated. Situated between two large cave systems, it could ultimately tie in to one or both of them. But judging by the way things have gone, the route could be very obscure.



CUEVA DE LA LLORONA

Cueva de la Llorona está situada en el area de Purificación, al oeste de Tamaulipas. Fué explorada por primera vez en noviembre de 1984 hasta una profundidad de 273 metros. El resultado de una nueva expedición en octubre de 1985 fué el descubrimiento de dos grandes salones alcanzando un nivel de -300 metros. Siguiendo un pasaje bajo estos salones, los espeleólogos se detuvieron hasta llegar a un tiro a los -398 metros. La tercera expedición en octubre de 1986 alcanzó llegar hasta el fondo a los -412 metros. También se exploraron otros pasajes adyacentes, haciendo de la Cueva de la Llorona, de un total de 3,137 metros de largo.

CUEVA DEL TECOLOTE



by Terri Sprouse

with Peter Sprouse and Carol Vesely

The Extreme Borehole in Cueva del Tecolote. (Peter Sprouse)

During the last ten days of November 1986, a Proyecto Espeleológico Purificación expedition returned to Cueva del Tecolote in western Tamaulipas to resume exploration of the virgin boreholes discovered the previous year. This cave, with its picturesque arroyo entrance, is located in the village of Los San Pedro near the eastern edge of the Sierra Madre Oriental.

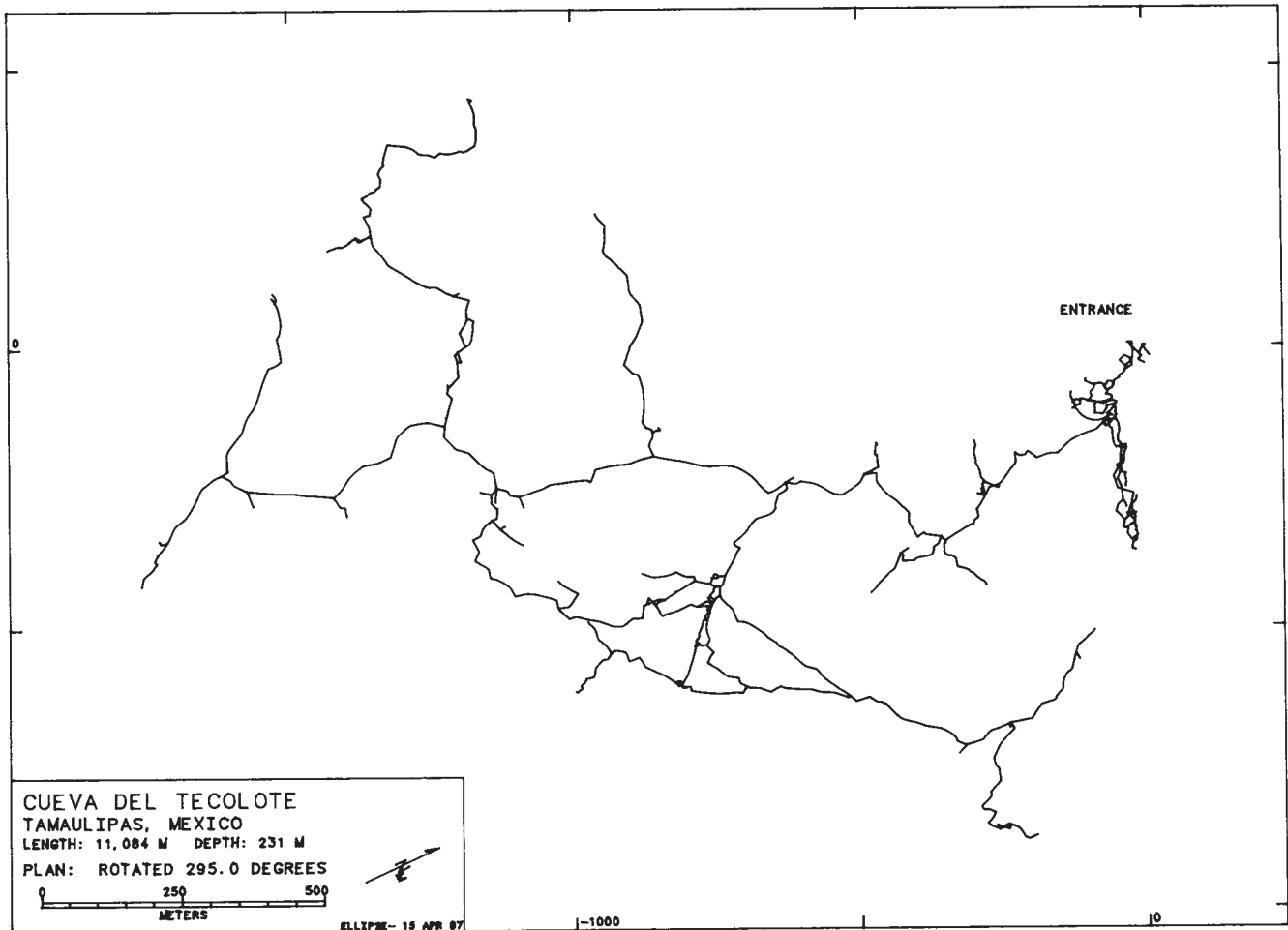
Cavers from Houston were the first to explore the cave in the early 1970's. They were stopped 300 meters in by what appeared to be a sump lake. In the spring of 1980, PEP cavers took time out from exploring Sistema Purificación to begin a survey of Cueva del Tecolote. After subsequent trips in 1982 and 1984, the cave had been surveyed to a length of 3301 meters and a depth of 211 meters. An expedition in November 1985 more than doubled the length of the cave to make it 7015 meters long.

The large and enthusiastic crew for the November 1986 expedition consisted of

Bill Farr, Sarah Gayle, Tyler Gill, Jim Goodbar, Margaret Hart, Erika Heinen, Peter Keys, Bill Mixon, Dale Pate, Susie Raines, Terry Raines, Scott Schiebner, Marion Smith, Peter Sprouse, Terri Sprouse, Carol Vesely, Cyndie Walck, Jack White, Aspen Adams, and Rosa Lockett. After rigging the nine drops and handlines in the initial portion of Tecolote, three survey teams charged off to the lower area of the cave called the Confusion Boreholes.

CONFUSION BOREHOLES

At Doll's Leg Junction, where the Serious Borehole begins, the group split up. Carol Bill Farr, Sarah, and Marion climbed down into the Major Abyss to a walking-sized passage. There was a good chance that this passage might connect into the end of the Spine Line, a passage surveyed the year before. It had been named for the ubiquitous sharp, spiney projec-



tions that covered the brittle rock, snagging your clothes and threatening to cut you to ribbons if you dared to slip. The new passage was much more friendly and grew larger as they progressed. They encountered a major side lead that went into a walking-height maze. The main passage was larger, so the maze was left for another day.

A little farther on, the main passage began to turn spiny, and then it forked. The left fork led to borehole of ever increasing dimensions. Too bad it had so many spines. It was named Son of a Spine, although some people wanted to call it Mother Pricker. Either way, the spines weren't as bad as those in the original Spine Line. To the team's surprise, the passage never connected back to the Spine Line, but it did connect back into the Serious Borehole.

Back at the fork, the team went the other direction in a tall and narrow passage. They were forced to climb along the spiny walls. Finally they reached a long downclimb that led to a beautiful lake. Flowstone cascaded 15 meters down one wall. The passage continued on the other side about 3 meters above the floor. But the climb was severely overhung. Bill thought that the best way to do the climb would be to use a rope to lasso the fat stalagmite at the lip, and then a cable ladder could be installed. But since neither a rope nor a cable ladder was available at the moment, the lead would have to wait until another trip. With almost 600 meters surveyed the group headed out. At Doll's Leg Junction they ran into Peter S., Cindy, and Scott.

The latter group had been mapping the maze around the Major Abyss. One of their passages, the Erection Connection, tied into the Spine Line. It wasn't until they had surveyed several shots that they saw a drilled station and realized they had connected. Then they proceeded to the end of the Spine Line survey and continued from the end of the previous year's exploration. It led to a large room where the passage split. Left tied into the Serious Borehole, and right led to a cobble slope and a drop of 5 to 10 meters.

Meanwhile, Terri, Jack, and Jim were on down the Serious Borehole, where they began their survey at the Goddess of Liber-

ty. They mapped down a steep mud slope, and then the passage began climbing up flowstone slopes with water-filled tinajas and lots of formations. Eventually they came to a junction with a side passage entering on the right. They decided to take a few shots into it to establish its trend, but it turned out to be such nice passage that they kept going for nearly 200 meters. The Dam Side Passage climbed up a series of silt-covered flowstone cascades, broken intermittantly with flowstone dams and deep water-filled tinajas. At the top of one very steep cascade, Jack reported that he had come to the Illinois Drop, and a handline would be needed to continue.

Terri, Jack, and Jim returned to the Serious Borehole and mapped another couple hundred meters to a pinch and breakdown drain in the floor that had some airflow. With almost 700 meters of survey for the day, they headed out. At Doll's Leg Junction they could tell that the other teams had already headed out by the position of the doll's leg indicator.

The first day underground was a great success, with almost 1800 meters surveyed. The trips were about 20 hours long, so everyone took the next day off. It was cold and misty, perfect weather for snoozing in the tent. Everyone managed to stay awake long enough that evening to enjoy a cozy campfire and making music.

READY FOR MORE

Sunshine warmed the air and dried out gear the next morning. By noon everyone was ready for caving. Armed with a cable ladder and rope, Carol, Bill, Cyndie, and Scott returned to the lake with the overhung climb. It wasn't long before they were up the climb and surveying virgin borehole again. They knocked off a few 30-meter shots for Scott's benefit, since he had never surveyed borehole before. Then the passage became less and less straight and eventually came to a T-junction. First they surveyed to the right up a mud-floored passage that got progressively smaller. It ended in a squeeze that popped into a high muddy room with a steeply-sloping floor. There was air movement, but no way out of the room except perhaps some hidden lead high on the walls.



Delicate helictites like these are not common in Cueva del Tecolote.
(Peter Sprouse)

They returned to the T- junction and headed downstream. This passage had a completely different character from the usual dry borehole. It was narrow and twisty with pools on the floor. Though it was heading downstream with some airflow, the survey shots had decreased to about 2 meters, and just traversing the passage was a pain. They turned around after about a dozen stations.

Needing more to survey, they retreated to the walking-sized maze, only to run into Dale, Marion, Sarah, and Jack, who had just completed the entire maze with the exception of a pit. Not having the appropriate gear for the pit, the two groups headed out.

Terri, Terry, Susie, and Jack returned to the Illinois Drop at the end of the Dam Side Passage. The drop turned out to be a simple climbdown, but it was fortunate that they had brought a handline. Only 40 meters ahead lay a steep slope and an overhung drop. After tying etrier loops in the rope, Terry descended into Jelly Bean Junction, a large, round room with marble-sized polished cobbles covering the floor. While Terry was negotiating the climbdown, Dale, Marion, Sarah, and Jim arrived. They had gone to poke in the breakdown at the end of the Serious Borehole, but didn't find much.

Terry reported that the passage continued two ways, so Susie and Terri climbed on down. Jack decided he didn't like the climb, so Jim joined our group and Jack

joined the others. At the bottom of Jelly Bean Junction was a high lead that Terry checked out. It went, but a handline for negotiating the climb would be useful. They decided to follow the other passage, which trended down. It soon degenerated into serious-swiss cheese confusion. The sketching was difficult, so Terri was not at all disappointed when Terry and Jim checked ahead and said it got too small.

Both Peters, Margaret, Erika, and Tyler first mapped a passage off Helectite Hall to where wetsuits are needed. They took photos in the Extreme Borehole and Fantasia Borehole to the beginning of their survey. They prepared to map down into the abyss at the end of Fantasia Borehole, but to their surprise they noticed that the borehole continued on the other side of the pit. Peter Keys explored a major lead on the left for 100 meters. They mapped about 500 meters of borehole before they decided to turn around. The passage was 15 meters wide and 6 meters high where they stopped, and heading west.

On the way out, all four teams ended up bottle-necking at the first drop. Peter, Terri, Carol, and Bill decided to survey side leads along the Ides March in lieu of freezing to death while waiting to climb. They mapped about 100 meters in several loops and a lead they named the Plate Passage. Upon returning to the Undressing Room (bottom of the second to last drop on the way in, where wetsuits were removed and dry clothes put on) someone was still on rope. Rather than don cold wetsuits and freeze while waiting at the bottom of each drop, the four decided to take a two-hour nap. The last of them emerged into sunlight around noon, making it about a 24-hour trip. The rest of the day was spent napping, eating, and visiting with the local children. By late afternoon the sunshine had turned to mist and fog. It rained most of the night, causing a bit of concern for the trip into the cave the next day.

FINAL PUSH

After much deliberation, it was decided that there was little threat of the low airspaces being sumped off. So off went two survey teams for the last day of mapping in Tecolote. Peter S., Terri,



A surprise continuation of the Fantasia Borehole led to considerable new passage. (Peter Sprouse)



The extension of the Fantasia Borehole eventually diminished in size to a comfortable walking passage. (Peter Sprouse)

Sarah, and Marion went back to Fantasia Borehole to pick up where the survey had ended on the previous trip. After a few long shots, a good looking side lead with airflow was mapped 80 meters to where it split into a multi-level maze. Beyond the lead, the Fantasia Borehole continued straight to a large mud and flowstone room. High on the left side was a lead that would require a difficult climb, but a stoopway to the right led to more passage. A confusing area of crawls, pools, and mudballs went to a T-intersection.

On the left was an unpromising crawl, but to the right there was a large passage containing beautiful helictites and two shields. Running water could be heard in the distance, but as the team progressed forward the sound receded. The sound was eventually traced to an impossible crawl. The survey ended when the passage reversed direction into a spiny canyon. With nearly 700 meters mapped, the team headed for the surface.

Meanwhile Carol, Bill, and Jack had gone back to the pit lead in the Walking Maze. The echoes from rocks splashing in the pool at the bottom of the pit made the passage below sound big. Excited, Bill rappelled 10 meters and shouted "It's virgin and it goes!" While the others got ready to descend, Bill explored ahead for a few minutes. He returned shortly with the news that it wasn't virgin afterall - it

was the same passage that they had mapped on the last trip. The pit came in at the lake next to the cable ladder climb. So the passage simply made a big loop.

They photographed in the Son of a Spine passage before heading off to check the high lead off Jelly Bean Junction. Bill freeclimbed the 8-meter overhung climb and rigged a rope for Jack and Carol to ascend. At the top of the climb was a canyon passage, developed on three levels with pools in the lowest level. The passage was wetter and smaller, and better decorated, than most of the cave. Finally they came to a place where the only ways on were either across a very hairy traverse or up an interesting, slightly overhung climb. Bill did the climb and scouted ahead for about 50 meters. The passage made a sharp 180-degree bend and kept going. They decided to end the survey at the bottom of the climb.

On the way out, everyone noticed that the breeze whipping through the cave was colder than usual. When they got to the surface just after dawn they realized why - a cold front had passed through. Frost covered everything, and the crystal clear sky was a deep blue. Soon the sun warmed the day and everyone was ready for more adventure.

MORE CAVES

Meanwhile another crew consisting of Wayne Bockelman, Mark Minton, Rich Rohwer, Tom Shope, Nancy Weaver, and Julia Palmer had arrived. They had been exploring roads and looking for caves higher on the mountain. Their finds included Sótano del Caracol, a 10-meter-long cave, Sótano Verde, a 73-meter-deep blind pit, and Sótano de Colibrí, a 57-meter blind pit. Also explored were La Fisura, a 42-meter pit, and another pit 37 meters deep. They wrapped up their trip with a jaunt into Tecolote to see the cave and degrid.

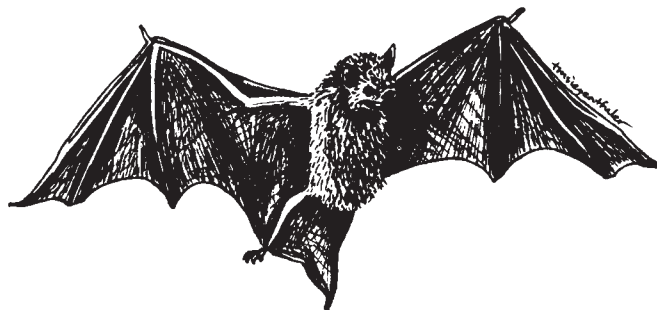
Although Peter S. and Terri had been on a 20-hour-long trip into the cave and hadn't slept, they didn't want to waste the last day on the mountain. A resident of

the village took them, Bill M., Erika, and Dale to a cave near Cueva de La Llorona. Cueva de los Chirrones was a 70-meter-long walking passage to a squeeze. Beyond the squeeze were two small, but well-decorated rooms. Meanwhile, Susie, Aspen, and Rosa mapped a small cave south of camp called Cueva de la Grieta. Dale and Margaret continued the survey of Cueva del Encino Mágico for 22 meters, and it continued as a tight crawl.

The week had come to an end, and it was time to pack up camp and head back to the States. The expedition added an additional 4069 meters, making the cave over 11,084 meters long. Although none of the teams turned around in giant borehole this time, numerous good leads remain for the 1987 expedition.

CUEVA DEL TECOLOTE

Durante Noviembre de 1986, 19 espeleólogos del Proyecto Espeleológico Purificación continuaron la exploración en la Cueva del Tecolote. El gran agujero (Serious Borehole) se extendió unos 500 metros hasta su final. Se trazó un pasaje secundario de 300 metros hasta llegar a una escalada. Una serie de pasajes adyacentes al abismo principal (Major Abyss) añadieron varios metros de topografía. El Fantasia Borehole fué explorado en 1200 metros hasta su parte más estrecha. En la exploración se topografiaron un total de 4069 metros, haciendo la cueva de más de 11 kilómetros de largo.



Cave myotis (*Myotis velifer*)

Borrowed from *Bat News*, the newsletter of the newly formed Austin Chapter of Bat Conservation International.

Reviews

Las Cavernas de la Sierra Gorda

Carlos Lazcano Sahagún. Universidad Autónoma de Querétaro; 1986.

Vols. I & II, 385 pages. Available from AMCS. Write for price.

Carlos Lazcano, who edited the two bulletins of the Sociedad Mexicana de Exploraciones Subterráneas (SMES) has produced another high-quality, professional publication. **Las Cavernas de la Sierra Gorda** covers virtually all the known caves in the northern portion of the state of Querétaro. The boundaries of his study area extend north across the state line into San Luis Potosí up to the Río Santa Maria and west to include the eastern tip of Guanajuato. The southern boundary is the Río Moctezuma and the eastern boundary is the San Luis Potosí state line. Numerous detailed area maps are well done and easy to read.

The first three sections of the book give the reader a general overview of the area, and its geology, archeology, and cave fauna. It also includes a history of exploration.

The fourth, and largest, section of the book is cave descriptions. Lazcano has divided the Sierra Gorda into eleven areas. Within these areas he has listed over 550 known caves. Maps are included for approximately 230 of them. Each description includes the following information: Location, including the coordinates, elevation, and municipio and state; the length and depth of the cave and a one paragraph description; the history of exploration; the geology and hydrology; a list of the cave fauna; and a bibliography.

Volume I includes the first three sections and four of the eleven areas. The remaining seven areas comprise Volume II.

The back of each book contains a bibliography, an alphabetical list of all the caves, and an index to the maps with the corresponding page numbers.

The covers of both volumes have the same color photograph, an aerial view of El Sótano del Barro. Inside the reader is treated to an additional 29 color photos, as well as many black and whites. The

typeset format and the well organized layout make this book aesthetically pleasing and easy to read. I was a bit perplexed at first because there was no table of contents, but then I found it at the back of each volume. Although it is not printed on the best of paper and the photos and maps are not always sharp, this book compares in quality to an AMCS Bulletin.

Las Cavernas de la Sierra Gorda is an excellent reference for the México caver. Don't let the Spanish scare you off.

Terri Sprouse

Las Formas Karsticas del Area de La Florida en la Sierra Gorda de Querétaro.

Carlos Lazcano. Instituto de Geografía, UNAM, 1984. 123 pages. Available from AMCS. Write for price.

This volume contains much of the information presented in the book reviewed above, although it is more limited in geographical scope. Following summaries of the area geography and geology, the bulk of the text consists of cave descriptions and maps. A large fold-out geology map is included in a pocket in the back.

Peter Sprouse

Mexico 85/86. Expedition Report; 122 pages

A large British expedition visited the Xilitla plateau area of San Luis Potosí in the winter of 1985-86. We have received one copy of their report here in Austin, but have no idea how more may be obtained. It lists no date or place of publication, or even an editor. Anyway, the group reports a reasonably successful stay, locating and mapping a number of medium-sized caves. The report includes maps of Cueva del Cinco Abril (2632 meters long, 286 meters deep), Cueva de los Hornos (2960, 341), Arriba Suyo Sótano (1126, 563), Cueva Tang-go-jo (530, 405), Cueva del Reefer Madness (1006, 411)--are you getting the impression they didn't inquire carefully about local names?--Sótano de las Víboras Muertas (670, 250), Cueva de Ixtacapa (1234, 293), Sótano de Puerto de Belen (380, 204), and Sótano de Rock a Jumar

(1420 meters long, 238 meters deep). Most of these are single, steeply sloping passages with numerous short drops. Some still have leads remaining, and in fact most might repay further visits, because they seem to have been explored and mapped hastily. Numerous smaller caves and pits are listed and pin-pointed on location maps.

The text is not especially useful, and in fact parts of it were obviously not meant to be taken seriously. It is often hard to relate the narrative to the cave map, since pit depths, for instance, seldom seem to match. They remark several places that they think they were welcomed by the local people because they were Brits and not Americans. Curiously, Americans who were in the area at the same time got the impression that the local people were relieved that they weren't more Brits.

In addition to the expedition's original explorations, they visited some of the well-known caves in the vicinity, such as Sótano de Tlamaya, Sótano de Huitzmolotitla (which they call Huichihuayan), Golondrinas, and Guaguas (which they call Wowas--no wonder the editor wants to remain anonymous). They seem to have had a good time.

Bill Mixon

Tepeyollotli SMES Gaceta No. 1.
Ramón Espinasa P., Editor (?)
June 1986, México D.F., 13 pages
Available from AMCS, \$2.00 postpaid.

With this issue the Sociedad Mexicana de Exploraciones Subterráneas inaugurates its second publication series. In contrast to the more monographical boletín series, of which two have so far appeared, the Gaceta is intended as a more timely, less formal publication. It is smaller, photocopied as opposed to offset printed, and does not contain photographs (so far). The dot matrix type is quite legible, and numerous cave maps are presented. English summaries are included for the major articles.

The issue begins with a summary of explorations in the San Juan Tenerías area in Guerrero, also covered in AMCS Activities Newsletter No. 15. There is a review of recent biospeleological work by SMES

cavers in Guerrero which includes the discovery of a population of the cave fish Astyanax, previously known only from the Sierra de El Abra in northern México. The 1985 explorations at Plaza de Gallos, Guerrero, are covered. These resulted in the exploration of Hoyo de la Perrita Capulina (-230 meters, now connected to Resumidero de Plaza de Gallos,) Sistema la Loma (-96 meters), Hoyo de la Mano del León (-92 meters), and various other caves and pits. Elsewhere in Guerrero, Resumidero del Izote was mapped to 1567 meters in length and 177 meters in depth (see México News). Cueva de las Pozas Azules, a possible resurgence for Izote, was explored about 1 kilometer upstream to a waterfall climb.

In Yucatán, more than fifty caves were investigated by SMES members, mostly cenotes.

In March 1986, SMES and Italian cavers located 6 caves in the Papagayos, SLP area. The longest was 100 meters, and the deepest was 25 meters. Afterwards they went south to the Huacalapan area in Guerrero, where they explored Sótano de las Guacamayas (-283 meters), which had a 94 meter drop, and Resumidero de Ixtamalco (-265 meters). Two highly decorated caves, Gruta de Huacalapan and Gruta de las Golondrinas, were also found.

Tepeyollotli is a welcome addition to the literature of Mexican Speleology, and should be very effective in increasing international communication regarding activities by Mexican cavers. While caving publications in México often seem to be short-lived, let's hope this one has a long run.

Peter Sprouse

Yochib: The River Cave. C. William Steele. Cave Books, 756 Harvard Ave., St. Louis, MO, 63130; 1985. 164 pp. Available from several sources; AMCS has it for \$11.50 softbound - \$16.50 hardbound, postpaid.

It is nine years late, yet right on time. It is the full story of the exploration of the Sumidero Yochib, a spectacular river cave in the southern Mexican state of Chiapas. In the passing of those nine years since the last expedition to Yochib,

Bill Steele labored on the story of what was done there, knowing that it was both unique and historic. The first version of the manuscript was ready in 1979, which says something about the monumental procrastination that had to be overcome to bring this book to print. But during that time Steele's writing style matured, and the story was polished. A great deal of the critical information that was lacking in 1979 was carefully added: the immense personality differences involved among very independent, strong-willed leaders, and the way that these influenced the exploration. The result is a book worth waiting for. It is the first such volume to be written by a contemporary American cave explorer and breaks the long silence between the days of Halliday, Watson, and Brucker, and the modern era of high-tech, international expedition cave exploration.

But it is more than that. It is a precious slice out of speleological history. The exploration takes place from the spring of 1974 through the spring of 1977, a short period of three years spanning the time when big pit discoveries had begun to diminish in northern México and the first return expeditions to the Huautla Plateau were being fielded. It was at a time when Goldline was still being used to rig a vertical pitch, when high quality miner's electric lamps, which are considered essential hardware for dealing with waterfalls underground today, were not readily available to the caving community, and when the idea of camping underground was still a novelty for Americans.

The prime element that sets the Sumidero Yochib apart, even today, is moving water. During normal conditions the flow in the river is about 140 cubic feet per second. For those who have difficulty grasping that figure, the following analogies will help. It would fill an Olympic size swimming pool in slightly over a minute; it would power a 20 kilowatt hydroelectric plant; and a person suspended from a rope under a waterfall of that flow would have to exert a force of between 150 and 300 pounds plus the weight of himself and his equipment. Furthermore, in a narrow passage the current caused by such a flow would be more than sufficient to sweep an unwary individual over a waiting waterfall.

The last two examples explain the immensely complex rigging requirements confronting an exploration team in Yochib. It also underscores the rationale for fielding expeditions only in the heart of México's dry season, from March through April, to minimize the amount of flow that must be dealt with.

Prior to this project very little was known concerning "heavy water" techniques, other than that it was obviously very risky business. Fatalities had already been reported in a river cave in Spain, the Hundidero Gato, and in other scattered incidents where flash floods had induced similar conditions in deep French systems. The decision to tackle Yochib in the mid-1970s was thus a very bold undertaking.

When its notoriety spread it attracted some of the best explorers the U.S. had to offer, including Jim Smith, Mark Stock, Norm Pace, Blake Harrison, Mike Van Note, and Bill Steele. Add to this list the likes of Canadians Peter Thompson and Ian Drummond and British explorers Peter Lord and John Donovan - all of substantial repute in their respective countries - and you get the idea of the tremendous intermixing of personality, technique, and experience that took place during this project. The fuse to this volatile mix was no less than the legendary Mike Boon, an expatriate British caver who had moved to Canada in the late 1960s under the lure of and offer to pursue caving professionally. His exploits spanned nearly a score of years across nearly as many countries. He was Britain's finest cave diver throughout the 1960s and was the singular catalyst that brought about the obsolescence of oxygen-rebreather technology and the broad acceptance of open-circuit Scuba for underwater cave exploration. He also was a top-notch technical caver. Boon's indomitable, eccentric personality, however, branded him as an unpredictable individual, and his leadership on expeditions tended to be totalitarian, rather than democratic. He was the type of individual who liked to assign blame with the point of a bony finger rather than accept responsibility for a plan gone wrong.

Nonetheless, without Boon there would likely have been no story of Yochib. He was the focal point, the magnet, headed for

the bottom of Yochib. His obsession with this goal grew, and spread to the others members of the team until the momentum became unstoppable.

Steele has managed to capture the essence of these interactions in a deftly handled style that is both realistic and usually fair to all sides. They are without question among the high points of the book. There are other high points that shine equally well and come across with the power of the river itself: the near drowning of team members on four occasions, the horror of being trapped in a flooding cave when no obvious escape existed, the numbing apprehension confronting the lead explorer on the first descent of a waterfall that shakes the very walls of the cave. And the elation that comes with having successfully completed an exceedingly difficult project.

Throughout the book, Steele is careful to describe the various techniques both successful and unsuccessful, that were used. Furthermore, well drafted sectional maps in each chapter show where the action is taking place. The only fault in these maps is the lack of information on the required tackle for rigging each pitch. This is certainly a minor point if one accepts, and as the book concludes, that the cave ends at Yochib's terminal sump, and that no one will be going back.

During the past ten years great strides have been made both in lightweight vertical rigging techniques, and in cave-diving apparatus and training procedures. The terminal sumps of the 60s and 70s are often today's frontiers. The final sump in Yochib, with its 50-foot by 40-foot cross-section, now stands beckoning to the current generation of explorers to complete the traverse to the Cruz Pilal resurgence some three miles distant and fully resolve the hydrologic riddle. In light of this, Steele's book, besides being a very good read, takes on another role. It is the Yochib manual, the guide that will lay the foundation for a return expedition.

Cave Books has done a good job both in the production of this fine volume and in seeing to it that a large number of photographs and maps were included. It is to be hoped that the publishing of **Yochib** will spare other potential authors to rise above the barrier of procrastination and help

fill in the colossal information void left in the wake of the many important speleological projects conducted both in México and in the U.S. during the past fifteen years.

Bill Stone

Manual de Bioespeleología

A. Hoffman, J.G. Palacios, J.B. Malacara
Universidad Autónoma de México, 1986. 274 pages. Available from AMCS.

This is a well done volume that should have a significant impact on written speleology in México. It provides reasonable introductions to speleology and biospeleology, and a general (nonspecific) review of the cave fauna and flora of México. The bibliography and history of speleological work by Mexicans is a valuable compilation. And the glossary of Spanish speleological terms is something that we American cavers have needed for some time.

Beyond its function as a "manual", this book also describes the results of eleven UNAM research expeditions to various caves in central México. In addition to details on the fauna and flora of these caves, descriptions and maps are also included, making this portion the most interesting to the average caver. Caves visited in the state of Morelos were Cueva del Diablo, Cueva de San Juan, Cueva del Salitre, Cueva Ocho de Julio, and Cueva del Idolo. In Guerrero the three caves investigated were Gruta de Acuitlapán, Gruta de Aguacachil, and Gruta de Juxtlahuaca.

The printing quality is the best I have seen among Mexican caving publications. The typesetting is good and done on high quality, white glossy paper, not the off-color rag paper seen in some others. The photographs, especially the color plates, are generally excellent.

Peter Sprouse

Le Spedizioni Speleologiche "Malpaso '81" e "Malpaso '84" in Chiapas. Notiziario del Circolo Speleologico Romano, Nuova Serie, No. 1, 1986. 159 pages.

This volume presents the results of two expeditions by the Circolo Speleologico Romano of Italy to the Malpaso region of

Chiapas in 1981 and 1984. This well-printed, attractive volume is divided into eleven chapters, each dealing with different aspects of the expeditions. The first chapter, by Maurizio Monteleone, is a narrative account of the two expeditions. Chapter 2, by Franco Terragni, briefly summarizes the climate, geology, and hydrology of the Malpaso area. In Chapter 3, Stefano Gambari and Marco Topani describe the caves explored during the course of the expeditions. A brief overview of the cave biology of the area is given by Valerio Sbordoni, Roberto Argano, and Vincenzo Vome-ro in Chapter 4. Stefano Gambaro briefly discusses the people inhabiting the area and the expedition's interactions with the populace in Chapter 5. In Chapter 6, Roberto Cusmano discusses medical problems encountered during the 1984 expedition. Chapter 7, by Tullio Bernabei, recounts physiological problems experienced by members of the expedition as a result of caving in the tropics. A brief discussion of dietary problems is given by Tullio Bernabei in Chapter 8. Chapter 9, by Filippo Iacoacci, is concerned with logistic and technical problems encountered by the 1984 expedition. Chapter 10, by Filippo Iacoacci, describes the descent of Sima del Copal, an enormous pit containing Maya pictographs and artifacts. In Chapter 11 Tullio Bernabei describes the exploration of an artifact-rich passage in Sumidero de Pecho Blanco No. 2. The book ends with two appendices, one summarizing earlier biospeleological expeditions to México, and the other recounting in a humorous way the 1981 expedition.

Malpaso is located along the border with Oaxaca in eastern Chiapas. An enormous man-made reservoir, Presa Nezahualcoyotl (Malpaso), inundates part of the area. The Italian expeditions resulted in the exploration of several major caves. The most spectacular of these is the Sistema de Pecho Blanco, which includes five caves not directly connected by underground passages. The largest of these segments is Sumidero de Pecho Blanco No. 2, with a length of 3790 meters and a depth of 253 meters. The total combined length of the separate caves in the system is 6281 meters, with a total depth of 341 meters. Other major caves explored include Sistema de los Camarones

(1200 meters long, 18 meters deep) and Sistema de la Lucha. Lucha has a huge upper pit entrance 250 meters across and 200 meters deep, and a lower horizontal entrance. Maps are provided for all of the caves described.

The chapter on biology briefly describes the ecology of the caves and summarizes the fauna for each cave. Most of the results of the collections, however, remain unpublished. The most interesting species encountered during the expeditions was a blind catfish of the genus Rhamdia, similar to those known from the Acatlán region of Oaxaca and the Zongolica area of Veracruz.

The presence of the quality cave maps and numerous photographs make this a valuable book for anyone seriously interested in Mexican caves, even if they cannot read Italian.

James Reddell

