AMCS ACTIVITIES NEWSLETTER

Number 38 May 2015

AMCS

ACTIVITIES NEWSLETTER

Number 38 May 2015

AMCS
ACTIVITIES NEWSLETTER
Number 38 May 2015

The *AMCS Activities Newsletter* is published by the Association for Mexican Cave Studies, a Project of the National Speleological Society. The AMCS is an informal, nonprofit group dedicated to the exploration, study, and conservation of the caves of Mexico.

The *Activities Newsletter* seeks articles and news items on all significant exploration and research activities in the caves of Mexico. The editor may be contacted at the address below or at editor@mexicancaves.org. Exceptional color photographs for the covers or other full-page applications are also sought. They need not pertain to articles in the issue, but need to be high-resolutions scans or digital originals.

This issue was edited by Bill Mixon, with help from Yvonne Droms, Mark Minton, Mimi Alexander, and Fofo González.

All previous issues of the *Activities Newsletter* are available in print, as PDF files, or both, as are various other publications on the caves of Mexico. Contact sales@mexicancaves.org, see http://www.mexicancaves.org, or write the address below.

ASSOCIATION FOR
MEXICAN CAVE STUDIES
BOX 7672
AUSTIN, TEXAS 78713
www.mexicancaves.org

Front cover

Paul Winter on a traverse at the bottom of the entrance drop of Sótano de San Agustín, Oaxaca. Photo by Liz Rogers.

Back cover

Cueva del Rayo, Chiapas. Photo by Mattia Cannatà.

CONTENTS

NEWS

Gilly Elor in the Refresher passage in the La Grieta part of Sistema Huautla during the PESH 2014 expedition.
Kasia Biernacka/kasiabiernacka.com.

MEXICO NEWS

Compiled by Bill Mixon

CAMPECHE

Members of Grupo Espeleológico Ajau visited Cueva Rancho San Felipe the morning of April 4, 2015. The cave is at Bacabchén in *municipio* Calkiní, and its entrance was opened by quarrying limestone. The cave had already received some vandalism before the cavers' visit, and it is dangerously unstable. *Source*: Fátima Tec Pool.

CHIAPAS

Grupo Espeleológico Jaguar has a lot of information on its web site at www.grupojaguar.org on its projects in Santa Rosa (see article in this issue), San Fernando, and Metzabok. The material includes project summaries, PDF files of published articles, and a blog.

CHIHUAHUA

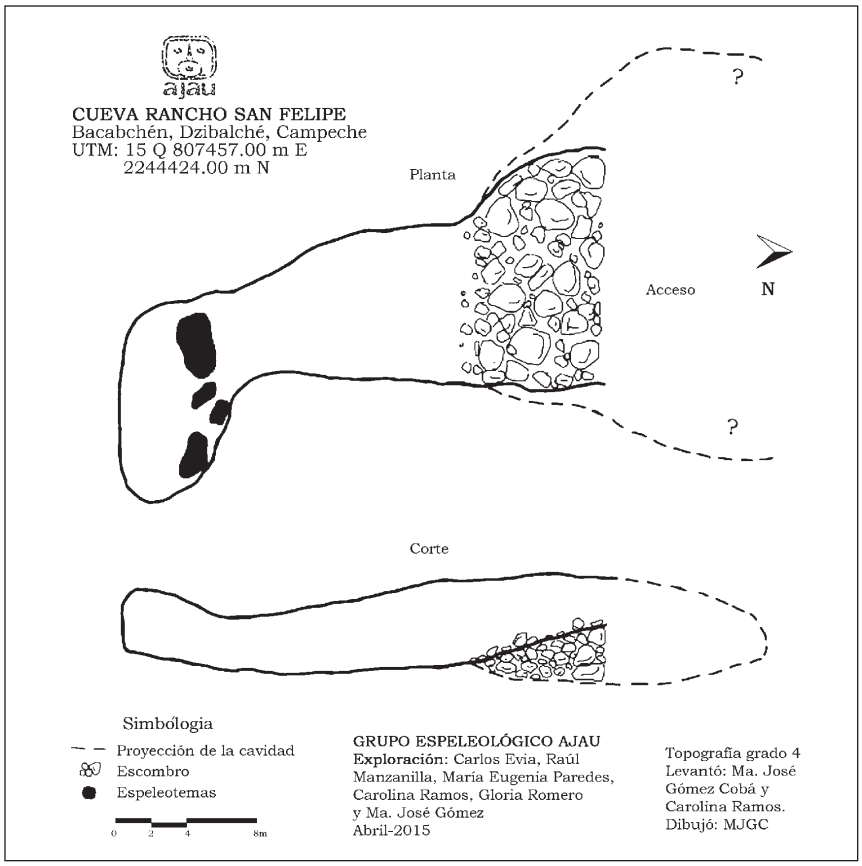
The BBC's radio program *The Forum* included a program on July 29, 2013, on crystals. Among those interviewed during the forty-four-minute program was Penny Boston, who talked about Cave of the Crystals, Naica. The program may be listened to at http://www.bbc.co.uk/programmes/p01cdg7j. *Source*: NCKRI Annual Report 2013-2014, page 21.

DISTRITO FEDERAL

Abstract: Detection of Volcanic Caves in Mexico City Using Seismic Tomography and MASW Methods, by W. Flores-García, F. Centeno-Salas, R. Gutiérrez-Calderón, and D. Carreón-Freyre.

The Cerro de la Estrella is a volcanic dome located within the Iztapalapa Municipality in Mexico City. It is formed by andesitic lava flows intercalated with basaltic scoria, pyroclastic flows, and fall deposits. In the study area many collapses have been reported, associated with the presence of large cavities related to the structure of the volcanic deposits. The origin of these structures is probably due to the high concentration of volatiles and gases during the emplacement of the andesitic materials. Apparently, gas bubbles of various sizes had been trapped within the fractured volcanic rocks, creating secondary structures (branches and vaults) of various magnitudes. The stability of the structure is closely related to the degree of fracturing, erosive processes, and gravity determining their susceptible to collapse. In this work we present the application of two seismic techniques for the detection of these volcanic caves that allowed us to assess the geological hazard associated with their instability.

The seismic tomography and multichannel analysis of surface waves (MASW) methods were very useful in locating a volcanic cave in a highly populated urban zone, Iztapalapa. For the tomography a series of 16 geophones with 17 shots throughout a line array was designed. Many seismograms were obtained, and the first arrivals were inverted. With the MASW-2D method the dispersive nature of the surface waves was analyzed. The results obtained with both methods were compared among a 2D section of P-wave velocity (Vp) from seismic tomography and the quasi-2D sections of S-wave Velocity (Vs) obtained by MASW. Different anomalies were identified in the location corresponding to the cavity, by the decrease of shear wave velocities (Vs) and compressional waves (Vp) for each method. The application of both methods allows us



to identify the average thickness of the roof structure of the cavity. Corroboration of the results was made by detailed mapping in the study area and geological characterization. This preliminary study allowed us to obtain a pattern of cavities by the mapping of the roof thicknesses of these volcanic structures and to estimate the geological hazard related to their possible collapse in the study area.

Source: Abstract Volume and Field Guide, 16th International Symposium of Vulcanospeleology, Galapágos, Ecuador, 2014, http://www.vulcanospeleology.org/sym16/Field%20Guide%20Galapagos%202014.pdf, page 33.

Gustavo Vela, a cave photographer whose work has often been featured in the *AMCS Activities Newsletter*, gave a forty-hour course in cave photography in Mexico City over several days in June and July 2014. See his two photo essays in this issue.

MICHOACÁN

An article posted in September to the *Business Insider* web site by Jan-Albert Hootsen reports on the discovery of mass graves due to drug violence in a place near Dos Aguas where "the bottom is so deep it's shrouded in complete darkness." The location, Barranco del Manguito, appears to really be a canyon, not a pit, but reports on caves in the area by Chris Lloyd have appeared in *AMCS Activities Newsletters* 23, 24, and 28. More recently, reports of lawlessness in the area have discouraged further caving. *Source*: http://www.businessinsider.com/drug-war-mass-graves-in-mexico-and-making-the-country-resemble-swiss-cheese-2014-9.

OAXACA

Abstract: Exploring Rancho Arco Iris, 2014: Proyecto Sierra Mazateca, Oaxaca, Mexico, by Marion and Tony Akers.

Proyecto Sierra Mazateca completed another successful trip this January, with eleven cavers exploring great caves in several regions of the Sierra Mazateca. The majority of our cave exploration occurred in a beautiful valley south of Río Santiago called Rancho Arco Iris (Rainbow Ranch), where we spent more than ten days. We explored sections of the valley at elevations from 1,300 and 1,500 meters and found karst features and pits wherever we went. An NSS International Exploration Grant provided more survey equipment and caving gear for the group and helped fund our exploration efforts. We explored eighteen caves or pits and completed the survey of thirteen caves, totaling over 440 vertical meters and 629 meters of horizontal passage.

We promoted our conservation and education goals this trip as well. With financial assistance from both the Southern Colorado Mountain Grotto and the Central Indiana Grotto, we were able to donate school supplies to three different municipalities in the Sierra. We began a new reforestation project in Río Santiago with a donation from Carlota Gardens. The project began with a joint effort by a community collective group and the local elementary school. Over four hundred cedar trees, a federally protected species, were planted along the river that serves as the town's water source.

We gained a better understanding of the karst ecosystem at Rancho Arco Iris and still have more than twenty leads in the valley alone to explore and document. We strengthened our friendships, both with each other and new Mazatec friends. Since the mid-1990s, we have documented over two miles of vertical cave in the Sierra Mazateca, and on this trip, like the rest, we never ran out of caves to explore, only time.

Source: 2014 NSS Convention Program Guide, p. 85.

Abstract: Proyecto Espeleológico Sistema Huautla, Oaxaca Mexico, by Bill Steele.

Proyecto Espeleológico Sistema Huautla (PESH) was launched in 2013 as the restarted speleological project of the Huautla area. PESH is an NSS project, was awarded the 2013 NSS Ron Simmons Grant, is a project of the U.S. Deep Caving Team, and carried the flag of the Explorers Club in 2014.

The Huautla caves were discovered by Texas cavers in 1965, and a flurry of caving took place until the early 1970s. From 1976 to 1994 expeditions were held most years as an NSS major project. In 1988 the project was awarded an NSS Certificate of Merit. Two books have been published about the caves, *Beyond the Deep* and *Huautla: Thirty Years in One of the World's Deepest Caves*. A chapter about Sistema Huautla is included in the *Encyclopedia of Caves*. Since 1994 a handful of American expeditions have been conducted, and in 2013 a major British expedition explored Sistema Huautla to a depth of 1,545 meters, reestablishing it as the deepest cave in the Western Hemisphere, the eighth deepest cave in the world, and, at 64.8 kilometers

in length (40.3 miles), the longest of the world's sixteen deepest caves.

The 2014 expedition had thirty-one participants from six countries (USA, Mexico, Canada, Switzerland, Poland, and Australia). It was successful, with advances in diplomacy with local leaders, six new species collected underground, more than twenty new caves explored, and a significant cave paleontological site discovered. A team camped underground for over a week and made a major breakthrough, turning around in a 20-meter-diameter borehole headed north toward the highest possible entrances to the system.

PESH plans to field annual month-long expeditions with the goal of exploring Sistema Huautla to over 100 kilometers in length and over 1,610 meters in depth, which is a vertical mile.

Source: 2014 NSS Convention Program Guide, p. 86.

Abstract: The Relative Importance of Chemical and Mechanical Erosion Processes in Caves: An Example from Cueva J2, by Matt Convington.

A common assumption within the bedrock channel literature is that chemical erosion processes, such as dissolution, are dwarfed by mechanical erosion, and thus play a minor role. However, the community of researchers studying speleogenesis typically assumes that dissolution processes are dominant. Despite an apparent conflict, each of these two communities is likely correct within a certain range of shear stress, stream chemistry, rock strength, and rock solubility. While these factors should all play a role, the controls on the switch between dominantly chemical and mechanical incision have not been quantified.

Here, I present a framework to quantify the relative importance of chemical and mechanical erosion within stream channels. This framework considers how erosion processes' rates scale with discharge. While mechanical erosion increases as a power law of discharge, dissolution rates increase to a maximum value and then plateau, such that higher discharges do not increase the rate of dissolution. Therefore, the time distribution of discharge and its relationship to the threshold for mechanical erosion play a crucial role in the relative importance of chemical and mechanical processes. This framework is illustrated with a field example from Cueva J2 in Oaxaca, Mexico. A set of reaches were identified where micro-morphological erosion features displayed strong evidence for a dominance of dissolution or mechanical erosion. The observed pattern of erosion features within Cueva J2 can be explained within the context of the theoretical framework described above.

Source: 2014 NSS Convention Program Guide, p. 76–77.

Eleven-year-old Simon Akers wrote a report about the January 2014 project of the Proyecto Sierra Mazateca that appeared in the August 2014 *NSS News*. The group explored caves three hours' hike above the town of Río Santiago.

Spelerpes, magazine of the Verbond van Vlaamse Speleogen, for June 2014 contains a nine-page article on the spring 2013 J2 expedition by Patrick van den Berg. The article is in Dutch and illustrated with a lot of nice color photographs, many by Elliot Stahl. *Source:* Mark Minton.

Stephen Eginoire was a participant in the British expedition to Sistema Huautla in the spring of 2013. He

CAVE EXPLORATION IN THE SIERRA MAZATECA: 2014

PROYECTO SIERRA MAZATECA

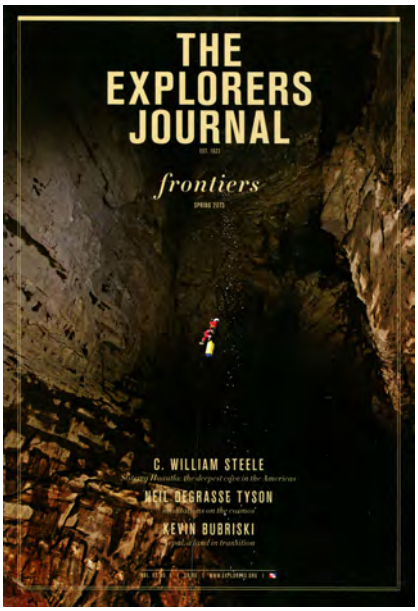
OAXACA, MEXICO

			METER		
CAVE NAME	Municipal Region	TOPO QUAD	Elevation	LENGTH	DEPTH
Sótano de Archimedes	SAN JOSE DE TENANGO	E14B87	1196	24.8	54.6
Sótano de Mariachi	SAN JOSE DE TENANGO	E14B87	1080		27.0
Sótano de los Chivos Perdidos	SAN JOSE DE TENANGO	E14B87	**1065**	12.5	36.0
Cueva Agua Obscura	SAN JOSE DE TENANGO	E14B87	**1120**		
ndá xo'mii - Water Spring Cave	HUAUTLA DE JIMÉNEZ	E14B87	1352	42.9	5.1
Cueva Viento Chico	HUAUTLA DE JIMÉNEZ	E14B87		13.7	7.9
Sótano de las Mariposas - Pit of the Butterflies	HUAUTLA DE JIMÉNEZ	E14B87	1536	6.1	43.8
Sótano Espiritu McLain - Spirit of McLain Pit (1st entrance - cilantro)	HUAUTLA DE JIMÉNEZ	E14B87	1504	216.9	100.0
Sótano Resbaloso - Slippery Pit	HUAUTLA DE JIMÉNEZ	E14B87	1421	32	47.2
Sótano Diente Engancha - Snaggletooth Pit	HUAUTLA DE JIMÉNEZ	E14B87	1404	78	67.1
Cueva Naciemiento de Agua - Water Spring Cave	HUAUTLA DE JIMÉNEZ	E14B87	1395		
Cueva Arbol - Tree Cave	HUAUTLA DE JIMÉNEZ	E14B87			
Sótano de Cincuenta Pesos - 50 Peso Pit	HUAUTLA DE JIMÉNEZ	E14B87	1395	37.5	40.0
Cueva de Calle - Road Cave	SAN JOSE DE TENANGO	E14B87		78.6	9.8
Cueva Margarita - Margarita Cave	HUAUTLA DE JIMÉNEZ	E14B87	1695	66.3	8.4
Sótano Sequia - Drought- Pit	HUAUTLA DE JIMÉNEZ	E14B87	1142	16.8	12.5
Cueva Jaguar	HUAUTLA DE JIMÉNEZ	E14B87	1339		
Nda Ya - Rainbow Ranch Cliff Water Cave	HUAUTLA DE JIMÉNEZ	E14B87	1349		
Sótano de Arroyo Coyol	SAN BARTOLOME AYAUTLA	E14B87	903	3	7.8
TOTALS				**629.1**	**467.2**

has a blog on the trip at http://stepheneginoire.com/blog/?p=209. It includes many nice photos. *Source*: Yvonne Droms.

At its 111th annual dinner on March 21, 2015, the Explorers Club presented Bill Steele with a Citation of Merit for his efforts in exploring many of the longest and deepest caves in the U.S.A., Mexico, and China. He is currently co-leading an official NSS project, Proyecto Expeleológico Sistema Huautla to further explore that cave, which in 2013 regained its title as the deepest cave in the Western Hemisphere. The spring 2015 issue of *The Explorers Journal* contains an article by Steele, "Sistema Huautla: A Half Century in the Deepest Cave in the Americas," about the history of its exploration and its resumption in 2014. The article includes several large photographs by Stephen Eginoire, and another of his photos is on the cover.

Red Bull TV has a twenty-five-minute video on the 2013 British cave-diving expedition to Sistema Huautla on the web at http://www.redbull.tv/episodes/1393399865559-638517006/journey-to-inner-earth. It is co-produced and narrated by expedition leader Chris Jewell. *Sources*: Ernie Garza, Bill Steele. Articles on the expedition appear in *AMCS Activities Newsletter* 37 and the expedition report is AMCS bulletin 25.



A group of twenty-three cavers from the Asociación de Montañismo at UNAM undertook to reach 1000 meters deep in Li Nita, part of Sistema Huautla. The entire project took twelve days in April 2015. Ramsés Miranda Gamboa, leader of the group, explained that the project was more difficult than expected. They had to rig more drops than planned, and high water stranded some members of the team at depths up to 700 meters for forty-eight hours. María de los Ángeles Verde and Alejandra López-Portillo Chávez became among the few Mexican women who have reached –1000 meters. Others in the team were Hugo Salgado, Jonathan Martínez, Gustavo Vela, Arturo Robles, Daniel Castro, David Cilia, David Tirado, Edgar Prado, Héctor Muños, Iván González, Jimena Forcada, Juan de Díos León, Lorenzo Ortiz, Matiss Castorena, Myriam Miranda, Tepeu Eldae, Ulisas Rivera, Victor Bravo, Vitza Cabrera, and Sandra Vásquez. *Source*: April 21 post at www.deportes.unam.mx/noticias.php?id=2660.

There is a short video on the 2013 expedition to Sistema J2 at http://room608.com/the-cave. This appears to be extracts from the Discovery Channel video made about the expedition that have been assembled as a promotional video for the production company. The full show has been seen in Europe, but it apparently is not going to be broadcast in the United States. *Source*: Bill Steele. Articles on this expedition, too, appear in *AMCS Activities Newsletter* 37.

Along the road near our little town of Piedras Anchas, Paco pointed out this little hole that had airflow. As a little errand to knock off before going to another area cave, we attacked this hole with a big iron crowbar and sledge hammer. We removed the small rocks and were left with one big rock that became precariously balanced in the entrance hole. We worried that the rock would slump deeper into the passage and block the cave. When the crowbar wasn't enough, our two local friends chopped nearby small trees to fashion sticks to supplement the crowbar. This still wasn't enough to pull the rock out. About then, a man on a horse rode by and offered to pull with his lasso and horse. No luck. We used his rope, though, to attach to the bumper of the truck, and *voilà*!

The hole led to a short pit about 10 meters deep and a spiraling passage 10 meters wide. While it looked like it was ending after 30 meters, it continued down under a little roof and opened up fairly nicely, with nice mud-coated formations and an ant-trap gully. This continued a roughly 100 meters to where an upward lead joined from the left, but the main trend continued into a crawlway with great air. The crawlway was too tight, so we had the locals lower the tools down to us. After two hours, we made it through and ended up connecting to a cave we had previously surveyed that was about 1 kilometer long called Paco's Ranch Cave. When we followed the upward lead to the left, it lead to a wonderful passage of stals, pagoda towers, and rimstone dams, still kind of mud-coated but cleaner as we gained elevation. This went for about 400 meters of nicely decorated passage gently going up. Eventually, however, we started trending back down, dropping, say, 50 meters. At this point we hit a very wide trunk passage that was obviously a very powerful whitewater river during the rainy season. There was no flow when we were there, but the scouring was very thorough—really dramatic passage. The passage was 15 to 30 meters wide both up- and downstream. We explored up first, since this was heading into the mountain. In about 400 meters we hit a sump lake where I swam a long ways before hitting low airspace that spooked me. Downstream from the intersection, it went 250 meters before hitting a terminal sump. We ended up getting 1.5 kilometers of really interesting cave in three days with a two-man survey crew. We had airflow even into the river passage, so there's more to do here.

Source: Ron DeLano e-mail

describing a find during a spring project 2014 at Cerro Verde. There is a video that Ron admits is poor quality at youtube.com/watch?v=rWBviazIVhQ.

The 2015 expedition of Proyecto Espeleológico Sistema Huautla in the Huautla de Jiménez area, Oaxaca, area lasted nearly six weeks from late March to early May. At 1,545 meters in depth, Sistema Huautla is the deepest cave in the Americas and the eighth deepest cave in the world. It was discovered in 1966 by Texas cavers. This year's expedition had speleologists and support people who either live in now or were originally from the following ten countries: USA, Mexico, England, France, Germany, Poland, Switzerland, Austria, Romania, and Australia.

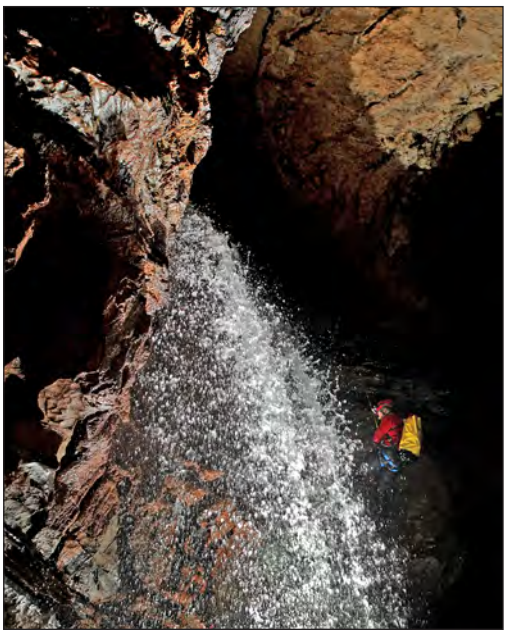
Accomplishments were many and include:

- Carrying the flag of The Explorers Club.
- Exploring the upstream sump in Red Ball Canyon 700 meters deep in the Sótano de San Agustín section of Sistema Huautla, not visited since 1979, and aid-climbing up 180 meters vertically beyond it, where it still goes, getting bigger.
- Discovered a new and potentially extensive new part of the La Grieta section of Sistema Huautla. The new part has the best formations yet in the 71-kilometer-long system and was named Mexiguilla because the only two people who have seen it said it resembled Lechuguilla in New Mexico.
- Explored and mapped small caves in the area with the potential to lead to new sections of Sistema Huautla.
- Supported the work of Mexican scientists in the caves, both biologists from UNAM, the major university in Mexico, and a paleontologist from INAH, a government agency. The biologists collected six new species of troglobitic lifeforms. The paleontologist found bones of Pleistocene animals, and further study will be done.
- Six accomplished cave photographers took excellent photos, and plans are progressing for a book of photographs.
- Progress was made in public relations to gain access to unexplored entrances where Mazatec Indians believe cave spirits reside and fear offending them.
- Installing a permanent museum-quality exhibit in the government building in Huautla.
- Began a new overland survey between entrances, starting and ending at high-precision benchmarks established by the Mexican government in 2012.
- A presentation will be made at the International Session of the July 2015 NSS convention.

Source: Bill Steele

The Sierra Mazateca, a cloud forest tropical region in Oaxaca, Mexico, is filled with amazing karst limestone plateaus and sinkholes. Proyecto Sierra Mazateca 2015 marked another year of cave exploration and conservation efforts, based out of Cafetal Carlota, in the municipality of San Bartolome Ayaulta, during the month of January. The major part of our expedition was spent in the wilderness at Rancho Arco Iris, south of Río Santiago, in the municipality of Huautla de Jiménez. Daily we worked on pit leads in the high valley, at elevations of over 1400 meters up to 1770 meters. We explored eleven pits around the valley and above it onto the plateau, with depths ranging from 15 to 80 meters, and five more pits in other areas. The total vertical depth of pits explored and surveyed equaled 603 meters, with over 357 meters of horizontal passage. We accomplished the expedition with the help of various donors and our Mazatec friends. We also gave school supplies to the elementary schools in Río Santiago and in Cafetal Carlota. Permission was obtained from two different municipal regions, with some challenges faced along the way, and we were soaked in the complex political and social environment of the Mazatec

Derek Bristol climbing beside the Redball Canyon waterfall during PESH 2015. *Kasia Biernacka.*



CAVE EXPLORATION IN THE SIERRA MAZATECA: 2015
PROYECTO SIERRA MAZATECA
OAXACA, MEXICO

			METER	
NOMBRE	**NAME**	**Municipal Region**	**LENGTH**	**DEPTH**
Campana de Eleazar	Eleazar's Bell	San Miguel Huatepec	0	42
Sótano Marcelino	Marcelinos Pit	San Bartolome Ayautla	10	42
Sótano de la Caléndula	Marigold Pit	San Miguel Huatepec	6	19
Sótano de las Siete Barras	Seven Bars Pit	San Miguel Huatepec	9	15
Sótano Huesos de Serpientes	Snake Bones Pit	Huautla de Jiménez	21	38
Sótano Ojo Jabalí	Boars Eye Pit	Huautla de Jiménez	9	22
Sótano Trasero Jabalí	Boars Butt Pit	Huautla de Jiménez	14	18
Sótano Bambú	Bamboo Pit	Huautla de Jiménez	0	27
Hoyo Hundio de Mayo	Sinkhole de Mayo	Huautla de Jiménez	123	59
Cañon Shakedown	Shakedown Canyon	Huautla de Jiménez	53	35
Sótano Pozo Triángulo	Triangle Shaft	Huautla de Jiménez	16	47
Sótano 45	Pit #45	Huautla de Jiménez	12	41
Sótano Milpiés Blanco	White Millipede Pit	Huautla de Jiménez	16	23
Hoyo Gusano de Seda	Silk Wormhole	Huautla de Jiménez	27	45
Sótano Hoyo Maíz	Cornhole	Huautla de Jiménez	42	85
Sótano Bravo		San Bartolome Ayautla	0	29
Sotano Osorio		San Bartolome Ayautla	0	16
			357	**603**

people. Cave and cultural exploration are combined in the Sierra Mazateca, where the experience of food, traditions, and people, is as much of an adventure as the caves themselves. Participants: Ron Adams, Tony, Marion, and Simon Akers, Jorge Barrera, Mike Frazier, Donna Renee Frazier, Rolland Moore, Rusty Riley, and Adam Scherer. *Source*: Tony and Marion Akers.

PUEBLA

The thirty-fifth expedition of the Groupe Spéléo Alpin Belge took place from February 14 to March 9, 2015 in the Sierra Negra, Puebla. Ten Belgians, four Frenchmen, and four Mexicans participated in the expedition. We explored 4.5 kilometers of new passage. On the plateau at 1,800 meters elevation, we found, explored, and mapped several pits, two of which were 150 meters deep, two 100 meters, and two smaller, but all were blind. They all seem to hit a layer of hard rock, which makes it impossible for the cave to grow. On the other hand, at 1,500 meters on the plateau, Cueva Venus reached a depth of 250 meters and a length of 1 kilometer. Another important discovery was the connection of TZ-7 with Sistema Tepetzala, which brought the system to a depth of 735 meters and a length of almost 29 kilometers.

Halfway through the expedition, an entrance with very good airflow was found. Since the cave was explored by members of three different nationalities, it was named Cueva Roseta. About 1 kilometer of passage was explored and mapped, to a depth of 300 meters, and the cave continues with water and good air. It could connect with Tepetzala or, even better, with Sistema Esperanza-Coyolatl, but we'll have to wait for an entire year to find out where the new passages will take us.

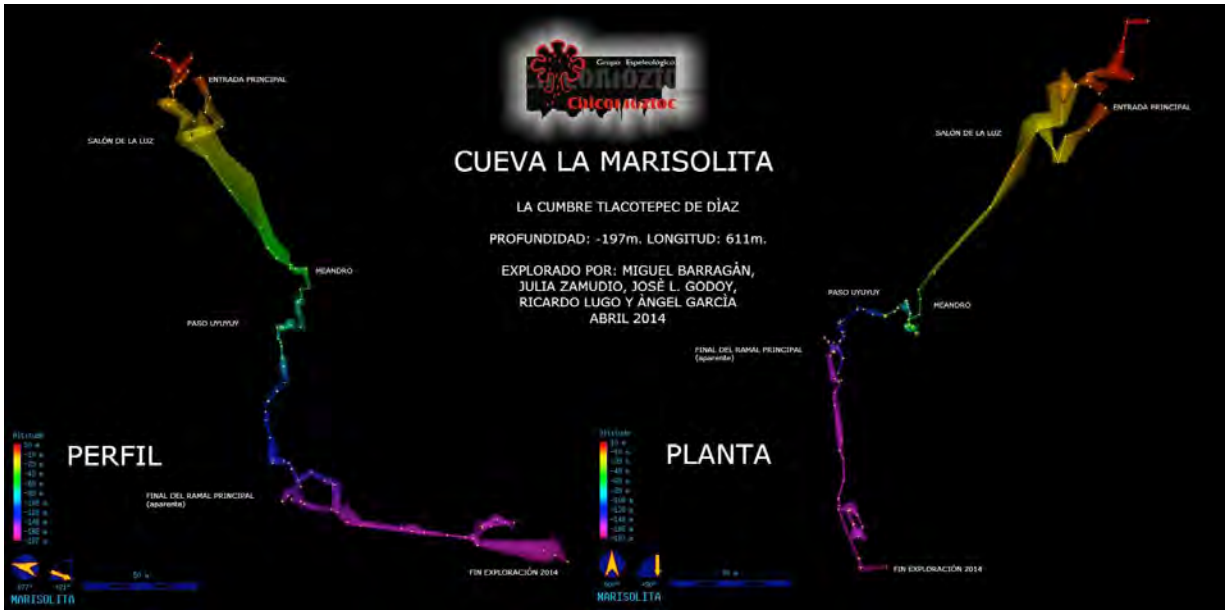
It is worth mentioning that of the participants, one was 19, four were in their 20s, two in their 30s, two in their 40s, six in their 50s, and three in their 60s. Interesting, isn't it? During our stay, there was a small party to celebrate 35 years of exploration in Mexico by GSAB, and 15 years by GSAB-Mexico. *Source*: Gustavo Vela, translation by Yvonne Droms. See also Gustavo Vela's photos elsewhere in this issue.

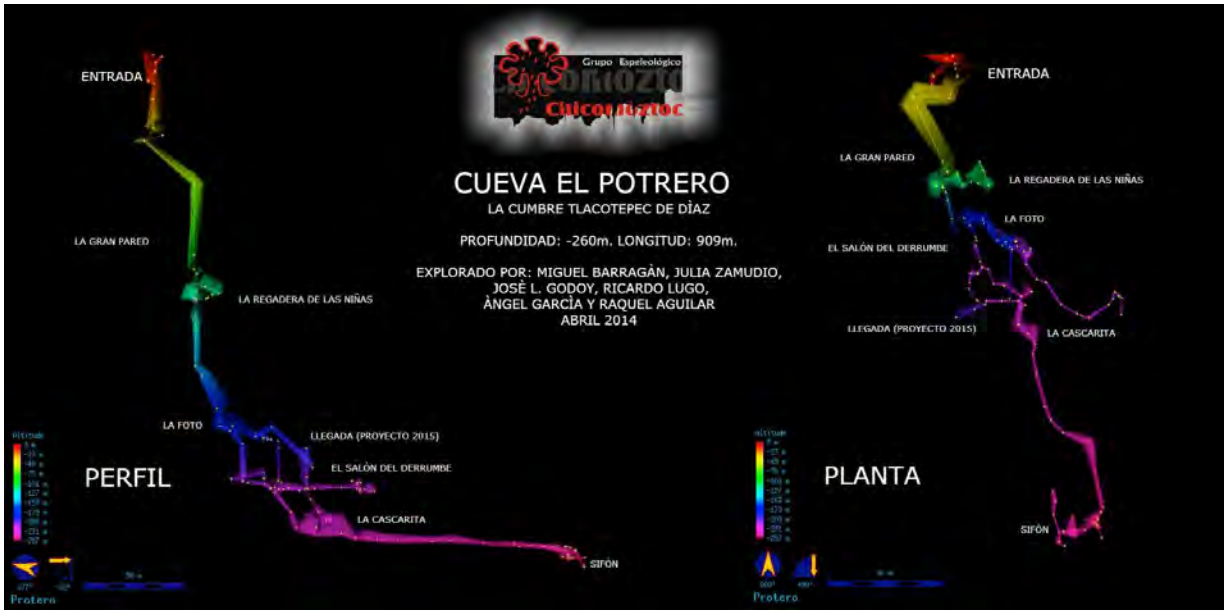
The Grupo Espeleológico Chicomoztoc had a Yei-Caña expedition in Puebla for three weeks in April 2014. During the first week, Sistema La Virgin was rerigged and pushed in an attempt to connect to Ixtololo Atl, but this was not successful. Later, El Potrero and La Marisolita were explored and surveyed, and work in Cueva El Globo was begun. Members of the expedition also participated in Easter celebrations with the local people. *Source*: *Reporte Sierra Negra 2014* at https://xa.yimg.com/kq/groups/27864331/1135007294/name/Reporte+Sierra+2014.pdf.

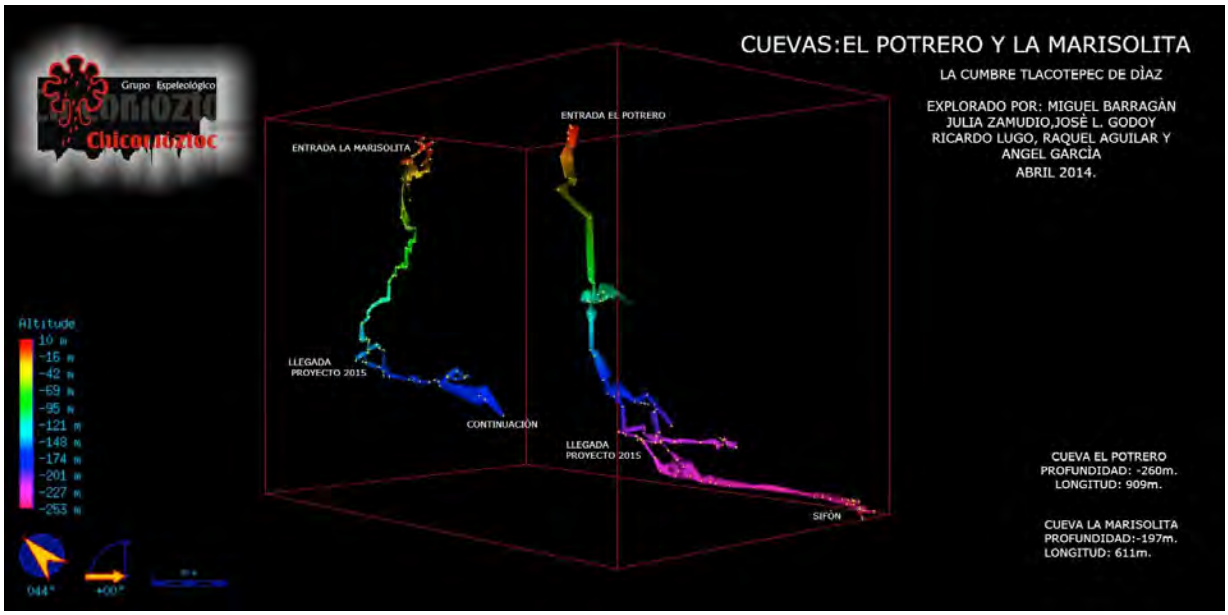
The web site of *México Desconocido* contains articles by Gustavo Vela Turcott at http://www.mexicodesconocido.com.mx/espeleologia-huizmaloc-puebla.html (Oztotl Altepetlacac), http://www.mexicodesconocido.com.mx/el-misterio-de-las-cuevas-profundas-akemabis.html (Olbastl Akemabis), and http://www.mexicodesconocido.com.mx/sistema-tepetzala-puebla.html (Sistema Tepetzala). None of these is dated.

Abstract: Tzinacamóztoc, Possible Use of a Lava Tube as a Zenithal Observatory near Cantona Archaeological Site, Puebla, Mexico, by Ramón Espinasa-Pereña and Ruth Diamant.

An artificial structure was discovered under a natural skylight inside Grutas de Tzinacamóztoc, in the vicinity of the archaeological site of Cantona. The structure is made up of piled rocks, defining a pentagonal enclosure with a central


CUEVA LA MARISOLITA
LA CUMBRE TLACOTEPEC DE DÌAZ
PROFUNDIDAD: -197m. LONGITUD: 611m.
EXPLORADO POR: MIGUEL BARRAGÀN, JULIA ZAMUDIO, JOSÈ L. GODOY, RICARDO LUGO Y ÀNGEL GARCÌA
ABRIL 2014
PERFIL
PLANTA
ENTRADA PRINCIPAL
SALÓN DE LA LUZ
MEANDRO
PASO UYUYUY
FINAL DEL RAMAL PRINCIPAL (aparente)
FIN EXPLORACIÓN 2014
MARISOLITA


CUEVA EL POTRERO
LA CUMBRE TLACOTEPEC DE DÌAZ
PROFUNDIDAD: -260m. LONGITUD: 909m.
EXPLORADO POR: MIGUEL BARRAGÀN, JULIA ZAMUDIO, JOSÈ L. GODOY, RICARDO LUGO, ÀNGEL GARCÌA Y RAQUEL AGUILAR
ABRIL 2014
PERFIL
PLANTA
ENTRADA
LA GRAN PARED
LA REGADERA DE LAS NIÑAS
LA FOTO
LLEGADA (PROYECTO 2015)
EL SALÓN DEL DERRUMBE
LA CASCARITA
SIFÓN
Protero


CUEVAS:EL POTRERO Y LA MARISOLITA
LA CUMBRE TLACOTEPEC DE DÌAZ
EXPLORADO POR: MIGUEL BARRAGÀN JULIA ZAMUDIO,JOSÈ L. GODOY RICARDO LUGO, RAQUEL AGUILAR Y ANGEL GARCÌA
ABRIL 2014.
ENTRADA EL POTRERO
ENTRADA LA MARISOLITA
LLEGADA PROYECTO 2015
CONTINUACIÓN
LLEGADA PROYECTO 2015
SIFÓN
Altitude
CUEVA EL POTRERO
PROFUNDIDAD: -260m.
LONGITUD: 909m.
CUEVA LA MARISOLITA
PROFUNDIDAD:-197m.
LONGITUD: 611m.

mound. Detailed measurements and computer modeling allowed tracing of the sunbeam path projected on the structure and on the cave floor, particularly for dates of astronomical and/or Mesoamerican calendrical importance. This corroborates the possible prehispanic use of this site as a complex and sophisticated gnomon.

Source: *Latin American Antiquity*, v. 23, no. 4 (December 2012), pp. 585–596, called to our attention by Peter Sprouse. Article is at http://www.jstor.org/stable/23645614 (registration required). The cave has also been known as Cueva Chinacamoztoc; see AMCS bulletin 19, pp. 298–299 and www.mexicancaves.org/maps/1974.pdf.

QUERÉTARO

Espéleo Rescate México held rescue training and practice at Cueva La Calera, Cadereyta, Querétaro, on November 15–17, 2014.

QUINTANA ROO

The on-line supplementary material for the article in the May 16, 2014, issue of *Science* on Naia, the young girl whose skeleton was found in Hoyo Negro, a pit in the Aktun Hu part of Sac Actun, Quintana Roo, is freely available at http://www.sciencemag.org/content/suppl/2014/05/14/344.6185.750.DC1/Chatters.SM.pdf. The abstract was printed in Mexico News in number 37. The actual article is not freely available, but the supplementary material contains everything that was in the article and a lot more. It is fifty-five pages in all, including figures and tables. Much of it is "methods" details about age dating and DNA analysis, but the first five pages are a good overview of the pit, and a couple of the figures are maps. Articles on Hoyo Negro appear in *AMCS Activities Newsletters* 33, 34, and 35. The large bones in the front cover photo on number 34 are from a gomphothere, an elephant-like extinct American animal.

Abstract: The Jaguar Paw and Other Tales from the Jungles of Quintana Roo, Mexico, by Peter Sprouse.

Cavers from the Paamul Grotto cut a new trail into the jungle near Paamul in December 2013, following the trench of a collapsed passage. They reached an extensive maze cave known as Jaguar Paw, and after mapping 2.5 kilometers, the extent of this is still unknown. Seven kilometers to the southwest, another dry maze cave, named Cech Chen, was mapped for 1.3 kilometers to connect to Sistema Ponderosa, a 15-kilometer-long underwater cave system. It appears that there may well be a very extensive dry maze overlaying the underwater passages in this system. Other caves up and down the Caribbean coast of Mexico are being discovered, mapped, and connected into rapidly growing systems.

Source: 2014 NSS Convention Program Guide, p. 86.

Abstract: Recent Underwater Cave Explorations in Quintana Roo, Mexico, by James G. Coke IV.

The Quintana Roo Speleological Survey (QRSS) supports safe exploration, conservation, and survey documentation of the underwater and dry caves in Quintana Roo, Mexico. Our present study area incorporates 6,300 square kilometers in northeastern Quintana Roo. At this time we have archived over 1,206 kilometers of confirmed underwater survey data for 294 underwater caves and cave systems. We have added nearly two hundred kilometers of new underwater survey data to our archive over the past two years.

Explorations continue in the Muyil and Chumpón areas southwest of Tulum. The Muyil area has produced a number of significant underwater caves. Several groups of explorers are involved in these latest studies. Their mapping efforts support a contemporary hydrological hypothesis for the local coastal drainage zone.

Explorations continue in the Xel-Ha and Chemuyil areas. Sistema K'oox Baal is now over 75 kilometers in length. Satellite caves are being explored for possible connections to the Dos Ojos region of Sistema SacActun. Recent inspections in the Maravilla area of Dos Ojos are producing new passage between Dos Ojos and the K'oox Baal cave. Revived efforts in the central region of Dos Ojos are investigating connections between Dos Ojos and Sistema Xunaan Ha.

New explorations are being fielded in the Abejas Region of Sistema Sac Actun and Sistema Murena. These explorations reinforce alternate drainage patterns for caves found under coastal tourist resort lands.

Source: 2014 NSS Convention Program Guide, p. 86.

Underwater Speleology, volume 41, number 4, November/December 2014, contains an article on Cenote Chan Hol, part of Sistema Toh Ha near Tulum. Despite being barely over two hundred words, it has three alleged authors, Luis Sánchez, Ricardo Castillo, and Alfonso Caballero. But it also has many color photos over pages 18 though 20. The cover photograph on the issue is also from Chan Hol, taken by Castillo.

Abstract: Decapod Crustaceans Distributions in Underground Cave Systems in the Riviera May, Quintana Roo, Mexico, by C. O. Martínez-Lozano, L. M. Mejía-Ortíz, M. López-Mejia, and J. M. Pakes.

This work shows the distribution

of decapod shrimps in the subterranean network (cenotes, caves and grottos) of the Riviera Maya (Tulum, Solidaridad, and Benito Juárez Municipalities), which is characterized by a calcareous soil where the trickle of water and time has produced significant underground formations. Sampling was conducted in the area of influence of the sea coast using an aquarium net, traps made with PVC with 2-to-4-inch diameter and chicken as bait to lure individuals into them, within 24 hours. In each subsystem was recorded geographic location from entrance as well as the values of temperature, dissolved oxygen, pH, and salinity. Organisms were preserved for later laboratory analysis using dichotomous taxonomy keys for identification. Decapods were recorded in two different environments; a) Anchialine: *Barbouria sp., Tricanthoneous akumalensis, Callismata nohochi, Janicea antiguensis, Parhippolyte stereri*; b) freshwater: *Macrobrachium carcinus, Macrobrachium acanthurus, Creaseria morleyi, Typhlatya pearsei,* and *Typhlatya mitchelli*. These results show that species richness is similar in both environments, but freshwater species have a greater representation in the underground systems of the Riviera Maya.

Source: edited from Program and abstracts 22nd International Conference on Subterranean Biology.

Abstract: Agonistic Behavior from Two Anchialine Shrimps in Cozumel Island, by L. M. Mejía-Ortíz and M. López-Mejia.

The anchialine caves are natural laboratories to identify several adaptations process in the animals exclusively from these environments. Among the adaptations to cave life the behavior aspects (feeding, reproductive, and agonistic) are the more difficult to see because in the most of cases is necessary transfers the animals to laboratory conditions that induce factors that generally the researchers can't control. For this reason we designed a system to obtain records directly from environments like caves, avoiding additional alterations. *Barbouria yanezi* is a shrimp that lives in a cenote in Cozumel Island that has 30 meters of depth, and the animals are more abundant after 20 meters of depth where the oxygen conditions are almost anoxic. *Agostocaris bozanici* inhabit another cenote with a 25-meter depth; the animals are more abundant where the H_2S values increase. We introduced two water-resistant video cameras connected directly to a recorder outside and registered ten observations series, each with a duration for two days, in order to study feeding and agonistic behavior. In the case of reproductive behavior, we don't yet registered it. In general the response to food by shrimps is very quick, and the use of antennulae and antennae complex is very common to identify food and some congeners, but in general they not fight as others shrimps from epigean environments. Also we compare the responses and norms with a previous study on feeding behavior in the lab for the same species. In case of agonistic behavior, the animals identify very quickly using the antennal complex and in some occasions they touch between them using the cheliped appendages. The guideline charts for feeding and agonistic behavior for both species are shown.

Source: edited from Program and abstracts 22nd International Conference on Subterranean Biology.

Abstract: Mexican Anchialine Fauna, by Fernando Calderón-Gutiérrez and Carlos A. Sánchez Ortiz.

Due to the poor and scattered information on Mexican anchialine ecosystems we realized a bibliographic review, selecting those that mentioned anchialine systems or the presence of a halocline. We identified a total of fifty works from 1939 to 2013 (50% in the last decade) generally performed just in the cenote (not in the cave). We identified forty cenote/systems in Quintana Roo and Yucatán, presenting a lot of synonymies. Geographic information was not available in a lot of cases, and many works do not even mentioned the name of the cenote; as in all the studies in Campeche. In 24 cenotes/systems were reported fauna with a total of 230 records (including 40 uncertain and 8 common names) corresponding to 11 phyla with a total of 161 taxonomic units, from which 97 were identified to species level, the richness being the El Aerolito system with 43 records. Unfortunately, despite the very few studies, negative anthropogenic effects have been recorded, including species with a grade of extinction danger according to the Mexican legislation NOM-059 (7 spp.) and the red list of the IUCN (7 spp.). Two are in critic extinction danger. Because of that we need to protect cave systems in the short time.

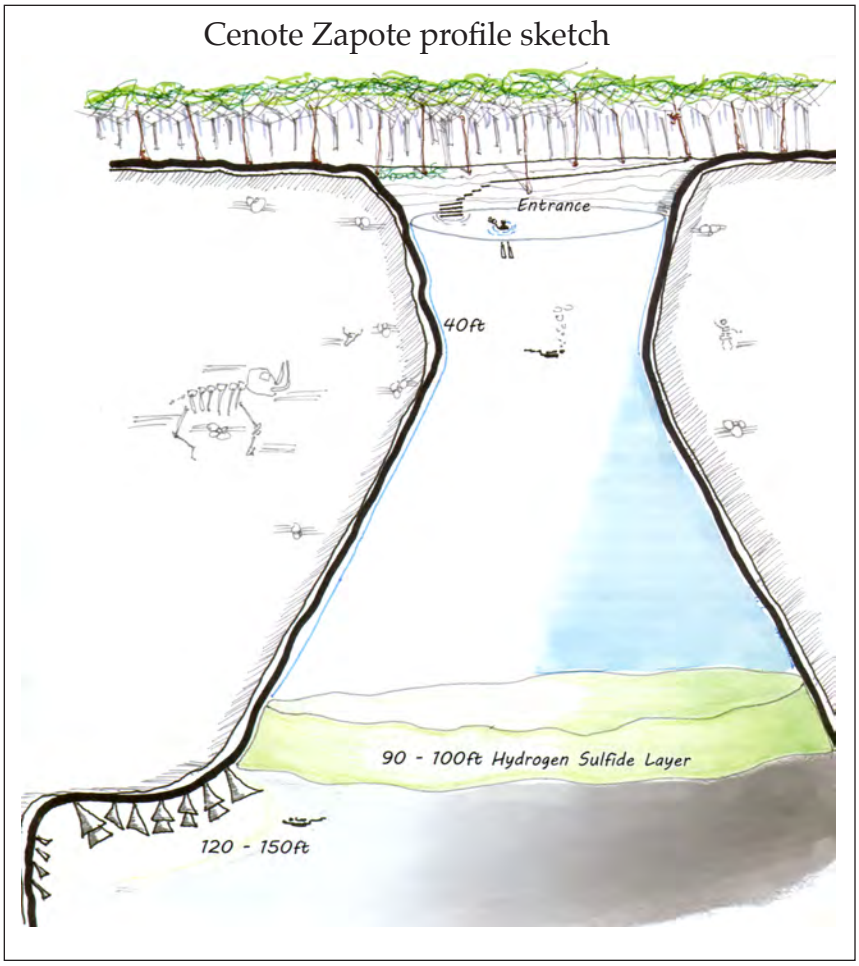
Source: edited from Program and abstracts 22nd International Conference on Subterranean Biology.

Abstract: Worldwide Cave-Dwelling Echinoderms and Ecological Study in El Aerolito System, Cozumel, Mexico, by Frenando Calderón-Gutiérrez, Francisco A. Solís-Marín, and Carlos A. Sánchez-Ortiz.

As a result of a bibliographic review we found that in 1985 García Valdecasas reported for the first time an echinoderm inside of an underwater cave in, Canary Islands, Spain. Since then 26 species have been reported in Bahamas (1), Canary Islands (2), and Mexico (24), including two troglobitic species: the starfish *Copidaster cavernicola* (Mexico) and the brittle star *Amphicutis stygobita* (Bahamas). Furthermore we realized a quantitative ecological study of echinoderms in the El Aerolito anchialine system, in which we made belt transects of 15x1 meters where counted all the macroinvertebrates. We identified 35 species which correspond to 8 phyla, of which echinoderms were the second richness group (9 species), and the first in density with 47.4 org/10 m^2. That is in contrast with previous reports in other caves in the world, where crustaceans are dominant taxa. El Aerolito system is unique in the world and should be protected before anthropogenic pressures damage it.

Source: edited from Program and abstracts 22nd International Conference on Subterranean Biology.

I have a theory about the genesis of the unusual speleothems in Cenote Zapote pictured on page 22 of *AMCS Activities Newsletter* 35



(reprinted here), in the March 2012 *NSS News*, and the April–June 2014 issue of *Underwater Speleology*. My bet is that they are biokarst, or constructive phytokarst. During the most recent Ice Age, sea level was such that they would have been above water level in the cenote, growing in low light under the ledge deep in the pit. They were growing toward the light, guided by algae or moss on their outer edges. The light-seeking flora would have induced the precipitation of calcite either by simply providing structural support or by consuming CO_2, as plants do, thereby locally reducing the acidity of water flowing over them so that calcite would precipitate. A lot of surface tufa deposits grow in a similar way. The fact that the bells are currently below the hydrogen sulfide layer is not relevant to their origin, as they grew initially in a moist, but not submerged, environment. The flat bottom edges reflect the times the rising water level reached each developing bell, and the horizontal ridges on their surfaces were likely added, either with or without biological help, as they became submerged. *Source*: Bill Mixon, photos reprinted from *Activities Newsletter* 35, sketch profile from *Underwater Speleology*.

In response to an environmental impact statement for a proposed fuel terminal and storage area near a quarry at Playa del Carmen (http://app1.semarnat.gob.mx/dgiraDocs/documentos/qroo/estudios/2014/23QR2014G0008.pdf), the Círculo Espeleológico Mayab and other conservation organizations pointed out that the statement hardly mentioned caves or the aquifer. The first figure shows the plan; the second figure shows numerous cave entrances and other karst features known to the Paamul Grotto and other cavers in the area. Mario Zabaleta, one of the leaders in the conservation effort, learned shortly before he died in February 2015 that the project has been cancelled. *Sources*: Mario Zabeleta, Peter Sprouse.

On April 28, 2015, a solitary diver using a single tank was found

Underwater formations in Cenote Zapote. *Andreas Matthes.*

drowned just off the Bat Cave line at Dos Ojos. He appeared to be a male Mexican, mid-40s. *Source*: Mark Ormesher on Facebook.

The Círculo Espeleológico Mayab continues to offer educational programs in the Riviera Maya area, in conjunction with groups such as the Paamul Grotto and the Fundación de Parques y Museos de Cozumel. *Source*: Mario Zabaleta.

There is a six-minute video of exploring a cave in Quintana Roo by Germán Yañez Mendoza of the Círculo Espeleológico Mayab at https://www.youtube.com/watch?v=Ku0kxBoIlFc. There is a four-minute TV news feature about stopping the destruction of a cenote by quarrying at http://tv.milenio .com/estados/xenote_a_punto_de_desaparecer-playa_del_carmen_quintana_roo_3_347995221 .html; Mario Zabaleta and some local officials are interviewed. *Source*: Mario Zabaleta.

Abstract: A Low-cost Submersible Data Logger System for Environmental Monitoring Networks, by Edward Mallon and Patricia Beddows.

The cost of commercial hydrological sensors poses a significant barrier, often limiting the number of sites and temporal scope of monitoring projects. We present a data logging system designed for monitoring projects that require more than one year of continuous operation. These units are relatively easy to build for $50-$150 using Arduino micro-controllers housed in standard PVC fittings. They are powered by standard AA batteries, and save csv-formatted data on removable SD cards. Variables such as sampling frequency are user-adjustable, and the driver software is easily modified to support a variety of different analog or digital sensors.

Two beta-model configurations will be presented. The first records water flow using the principle of the hydro-metric pendulum, where drag-force induced tilt of a freely swinging body allows current speed and direction to be derived. This design has already survived more than three months of salt water submersion at 5 meters depth in a flooded cave environment and has been pressure tested to greater than 30 meters. A second prototype, designed to study vadose hydrology, records the number of individual drops of water on the housing using an accelerometer.

The goal of this open-source project is to provide a robust platform that is inexpensive enough to bring large-scale monitoring networks within the range of modest research

budgets. In addition, exploratory "tattle-tale" deployments of these loggers is a low-risk strategy for identifying locations within complex systems that are worthy of more intensive study with commercial equipment. Working physical models will be presented, and links to the construction plans and software provided.

Source: https://gsa.confex .com/gsa/2014AM/finalprogram/abstract_243506.htm. See Ed Mallon's blog at https://edwardmallon.wordpress.com for information about the Cave Pearl Project loggers that have been used in caves in Quintana Roo.

Abstract: Calcite Rafts: Rapid Deposition of Transgressive Infill Cave Sequences as a New Paleo Sea Level Proxy, by Kayleen T. McMonigal and Patricia A. Beddows.

Paleo-sea-level records for low-latitude sites based on coral or mangrove deposits have uncertainties of 1 to 10-plus meters, due to the depth range over which coral species grow and the compaction and decay of mangrove peat. Within the extensive coastal cave systems along the Caribbean coast of the Yucatan Peninsula, the polygenetic flooded caves contain sequences of calcite rafts. The rafts form on the water table due to off-gassing of CO^2. Once sedimented, the raft deposits are well preserved due to their stable mineral form, resistance to hydrological reworking, and limited effects of physical and biological processes inside the caves. Near the modern water table, flat-topped sequences are "catching up" to the base of the water table, placing them within 0.1 to 1 meters of the water table. In turn, the water table in the eastern Yucatan coastal aquifer lies very close to sea level due to the extreme permeability in this post-Paleozoic karst system; the hydraulic gradient is 10^{-5}, and tidal fluctuations extend to 10 kilometers inland.

Field experiments in cave sites near the Caribbean coast provide observations on the mineralogy and physical nature of calcite rafts, sedimentation processes, and formation and sedimentation rates. Under some conditions, rafts form over days to hours; they may reach visible size in 72 hours, and over three months cover 80% of 1 m^2 experimental berms. While the greatest raft formation rate was observed in quiescent waters, floating rafts were transported intact, particularly at higher water levels, when flow at the water table was greatest. Sedimentation within each site was noted to be spatially heterogeneous within passages. Manual push-cores from flat-topped raft banks revealing intact stratigraphy, with variation in raft textures, size, and organic content. Raft sedimentation rates are on the order of 1 centimeter/100 years based on accumulation rates in traps and dating down-core.

These results support the potential of calcite rafts deposits as a valuable new record for low-latitude carbonate coastlines, particularly with the elevations of flat-topped infill sequences sedimented near the modern and paleo watertable level reflecting sea-level transgressions.

Source: https://gsa.confex.com/gsa/2014AM/finalprogram/abstract_250509.htm.

SAN LUIS POTOSÍ

The Asociación Potosina de Montañismo y Espeleología has been exploring a new area in the Sierra de Álvarez. They have found pits around 80 and 130 meters deep, as well as several smaller ones. The area is between Las Rusias on the highway to Río Verde and the El Durazno ranch. An article is promised for a future issue. *Source*: Sergio Sánchez-Armass.

SONORA

Nuestra Tierra, Órgano de Difusión de al Estación Regional del Noroeste, UNAM, number 22, December 2014, contains the article "El Medio Subterráneo y los Seres Vivos: La Bioespeleología en México y Sonora," by Luis Omar Calva Pérez and Reyna A. Castillo Gámez. It is about biospeleology in Mexico in general and the state of Sonora specifically. Once the issue appears on the magazine's web site, it will probably be at http://www.geologia-son.unam.mx/images/nuestratierra/otono2014.pdf. *Source*: tlamaqui e-mail list post by Luis Calva.

TABASCO

A team of fourteen investigators from a variety of NASA centers and universities was recruited by Dr. Boston to work on a suite of scientific questions about the sulfuric acid cave Cueva de Villa Luz, in Tabasco, Mexico. Dr. Boston and others have been investigating this fascinating cave since the late 1990s. Chemistry, geology, microbiology, and other topics were addressed. Formal reports of results are anticipated in the coming year. *Source*: National Cave and Karst Research Institute Annual Report 2013-2014, page 5.

Abstract: Hydrogeology of Northern Sierra de Chiapas, Mexico: A Conceptual Model Based on a Geochemical Characterization of Sulfide-Rich Karst Brackish Springs, by Laura Rosales Lagarde, et al.

Conspicuous sulfide-rich karst springs flow from Cretaceous carbonates in the northern Sierra de Chiapas, Mexico. This is a geologically complex, tropical karst area. The physical, geologic, hydrologic, and chemical attributes of these springs were determined and integrated into a conceptual hydrogeologic model. A meteoric source and a recharge elevation below 1,500 m are estimated from the spring-water isotopic signature regardless of their chemical composition. Brackish spring water flows at a maximum depth of 2,000 meters, as inferred from similar chemical attributes to the produced water from a nearby oil well. Oil reservoirs may be found at depths below 2,000 meters. Three subsurface environments or aquifers are identified based on the B, Li^+, K^+ and SiO_2 concentrations, spring water temperatures, and CO_2 pressures. There is mixing between these aquifers. The aquifer designated Local is shallow and contains potable water vulnerable to pollution. The aquifer named Northern receives some brackish produced water. The composition of the Southern aquifer is influenced by halite dissolution enhanced at fault-detachment surfaces. Epigenic speleogenesis is associated with the Local springs. In contrast, hypogenic speleogenesis is associated with the brackish sulfidic

springs from the Northern and the Southern environments.

(Notables manantiales cársticos sulfídicos fluyen de carbonatos cretácicos al norte de la Sierra de Chiapas, México. Esta es un área cárstica tropical con una geología compleja. Se determinaron los atributos físicos, geológicos, hidrológicos y químicos de estos manantiales integrándose en un modelo hidrogeológico conceptual. En base de su composición isotópica se infiere que el agua de estos manantiales tien un origen meteórico y un área de recarga a elevaciones menores de 1500 m, sin importar su composición química. El agua salobre de los manantiales circula a una profundidad máxima de 2000 m usando como referencia su similitud con el agua de producción de un pozo petrolero cercano. Además, es posible que existan reservas petroléras a profunidades mayores a 2000 m. Se identificaron tres ambientes subterráneos o acuíferos caracterizados por su concentración de B, Li^+, K^+, SiO_2, la temperatura del agua y la presión de CO_2. Existe evidencia de mezcla entre el agua de estos tres acuíferos. El acuífero designado como *Local* se encuentra a poca profundidad y contiene agua potable vulnerable a la contaminación. El acuífero del *Norte* recibe agua de producción salobre. La composición del acuífero del *Sur* está influenciada por disolución de halita la cual se incrementa en las superficies de despegue de las fallas. La espeleogénesis epigénica se asocia con los manantiales Locales. En contraste, la espeleogénesis hipogénica se asocia con los manantiales salobres sulfídicos de los ambientes del Norte y del Sur.)

Source: *Hydrogeology Journal*, v. 22, no. 6, pp. 1447–1467, September 2014, doi:10.1007/s10040-014-1135-z. This is the study reported in AMCS Bulletin 24, *Sulfidic Karst Springs and Speleogenesis in the Sierra de Chiapas*, by Laura Rosales. The Spanish abstract is from the journal's web site; it is not in the published paper.

VERACRUZ

The August 2014 issue of *México Desconocido* contains an article by Denise and Gustavo Vela and photos by Gustavo on lava tubes near Xalapa. See photographs by Gustavo on page 27 in Mexico News in *AMCS Activities Newsletter* 37. *Source*: post to Tlamaqui e-mail list by Gustavo Vela.

Tourism promotion in the Zongolica Sierra and the exploration of the region's deep caverns in the Mexican Gulf state of Veracruz will be part of the National Speleology Congress from Jan. 30 to Feb. 2, organizers said.

The deepest cavern in the Zongolica region reaches 375 meters (1,230 feet) down in the Sótano de Tomasa Quiahua [Kiahua], a shaft named for a woman who fell in and whose remains were recovered years later by French explorers, according to local lore.

Zongolica is known as the "Himalaya of caverns" due to its challenging shafts, many of which have yet to be explored, Pedro Pablo Cruz Cano, of the organizing committee, told Efe.

Participants will study the Zongolica area in general, will discuss technical issues and examine the adoption of safety measures in caverns to have sustainable tourism and prevent impacts on phreatic mantles, he said.

"The goal is to show the general public the attraction caves have for visitors," Cruz said, referring to economic expectations in the region, one of Mexico's most marginalized areas.

Currently, the Zongolica caves receive, on average, one group of visitors a month, and promoters hope to increase the number of spelunkers from Mexico and other countries.

"There is a need for promotion since there is one visit per month, and that's why we brought the Congress to Zongolica, to make it better known," Cruz said.

Cruz acknowledged the paucity of infrastructure, since the municipality is small and there are few hotels.

Tourism and spelunking could benefit hotels, restaurants, and the communities in cities like Orizaba and Cordoba, the main access routes to the Zongolica Sierra, he said.

Cruz emphasized that speleologists working in the region have the equipment required to safely guide tourists through the intricate network of caves and rivers on the Zongolica.

Source: Fox News web site post January 27, 2015, http://latino.foxnews.com/latino/news/2015/01/27/spelunking-draws-tourists-to-caverns-in-mexican-gulf-state/. See the program for the congress under Miscellaneous.

A good friend invited me a few months ago to check some caves in Hidalgo for tourists-attraction potential, but none was suitable. However, the lava tube Tengonapa in Veracruz has all the features to be an excellent attraction, providing jobs and helping the community. But instead it serves as a dump and a drain. Why does the government not provide garbage collection and proper sewage treatment? *Source*: January 2015 e-mail post by Gustavo Vela Turcott.

YUCATÁN

Abstract: Preliminary Investigation of a Ritual Cave Site in the Puuc Region of Yucatán, Mexico: Actun Xcoch, by Eric Weaver (M.A. thesis 2011).

Within the Lowland Maya site of Xcoch is a deep freshwater cave first described by John Lloyd Stephens in 1843. Evidence indicates the Maya settled the area during the Middle Preclassic (800 BC) and continued to maintain occupation at the site until the Terminal Classic. The cave's central location within the Xcoch site and its location at the base of a pyramid indicate that the cave played an important role in replicating Maya cosmology. Initial exploration of the cave in 2006 by Michael Smyth

Garbage in the entrance to a lava tube at Tengonapa, Veracruz. *Gustavo Vela.*

revealed examples of the oldest ceramic known in the Yucatán - Yotolin Patterned Burnished. Mapping of the cave in 2009 and 2010 revealed a cave heavily used for ritual purposes. Throughout its reaches are broken ceramic vessels and the lowest chamber, which contains a pool of water, contains piles of ceramic meters deep. As few caves in this region contain freshwater and the land above is void of natural surface water, it is assumed that the focus of interest was the water in the cave and Chaac, the Maya rain god, was the principal deity for which the offerings were made. An obsidian blade found in a passage suggests evidence of bloodletting, and human bones indicate the cave was used for funerary purposes or for human sacrifice. It is evident that this cave was an important religious site for the Maya, and future excavations will produce a better understanding of the site.

Source: The entire thesis is available at https://etd.ohiolink.edu/ap/10?0::NO:10:P10_ETD_SUBID:84283. An article on the cave appears in *AMCS Activities Newsletter* 35.

According to a *Washington Post* obituary on June 23, Geoge E. Stuart III died on June 11, 2014, at the age of 79. Stuart was an archaeologist with a particular interest in Mesoamerica, including the cave at Balankanche. He was also an editor for *National Geographic*. A tribute by the magazine is at http://news.nationalgeographic.com/news/2014/06/140612-maya-archaeology-george-stuart-national-geographic-mesoamerica/. There is an 18-minute Flash video of a talk by Stuart at the Maya Field Workshop in December 2013 on his visit to Balankanche at http://mayaglypher.com/2014/05/31/george-stuart-explores-balankanche-cave-yucatan/. The video is also at https://www.youtube.com/watch?v=p7ObWN0q9j4. *Sources*: Preston Forsythe, Allan Cobb.

Abstract: Predation and Spatial-Temporal Use of Yucatan Centotes by Stybobitic Crustaceans *Creaseria morleyi* and *Typhlatya* spp: Preliminary Results, by E. M. Chávez-Solís, M. Mascaró, and F. N. Dias-Marques-Simões.

Studying the distribution, population dynamics and behavior of stygofauna in their natural habitat may be difficult, technically challenging, and somewhat dangerous, as cave diving is involved. Nevertheless, many different taxonomic groups have been found, described and studied. Most of these studies focus on taxonomic, evolutionary, or genetic trends, allowing the behavioral and ecological questions to surface. Stygobitic crustaceans are the most diverse group found in underwater caves, with 42 species. Two genera of decapods from different trophic levels (*Creaseria* and *Typhlatya*) were studied to evaluate the depth distribution during the day and night in the penumbra zone of two cenotes (sinkholes) of Yucatan (Kankirixche and Tza-Itza). Both populations will be observed for a year to assess demographic variations of the population. The trophic interaction between these species was video-recorded with infrared devices under laboratory conditions.

Preliminary results indicate: 1) *Creaseria morleyi* occurs more frequently during the night at the shallow areas that are otherwise illuminated during the day; 2) Higher densities of both genera are found in cenote Tza-Itza; 3) The abundance ratio at which these species occur are: 1:4 and 1:3 *Creaseria*/*Typhlatya* during the day and night respectively in cenote Kankirixche; and 1:16 and 1:2 *Creaseria*/*Typhlatya* during the day and night respectively in cenote Tza Itza; 4) *C. morleyi* may hunt and feed on live *Typhlatya* spp. Whilst both species may take advantage of the entrance of external biomass and organic material at the sinkholes, observed distribution patterns may also be explained by trophic interactions revealed by this study; *C. morleyi* is an active predator that preys on the filter feeders *Typhlatya* spp.

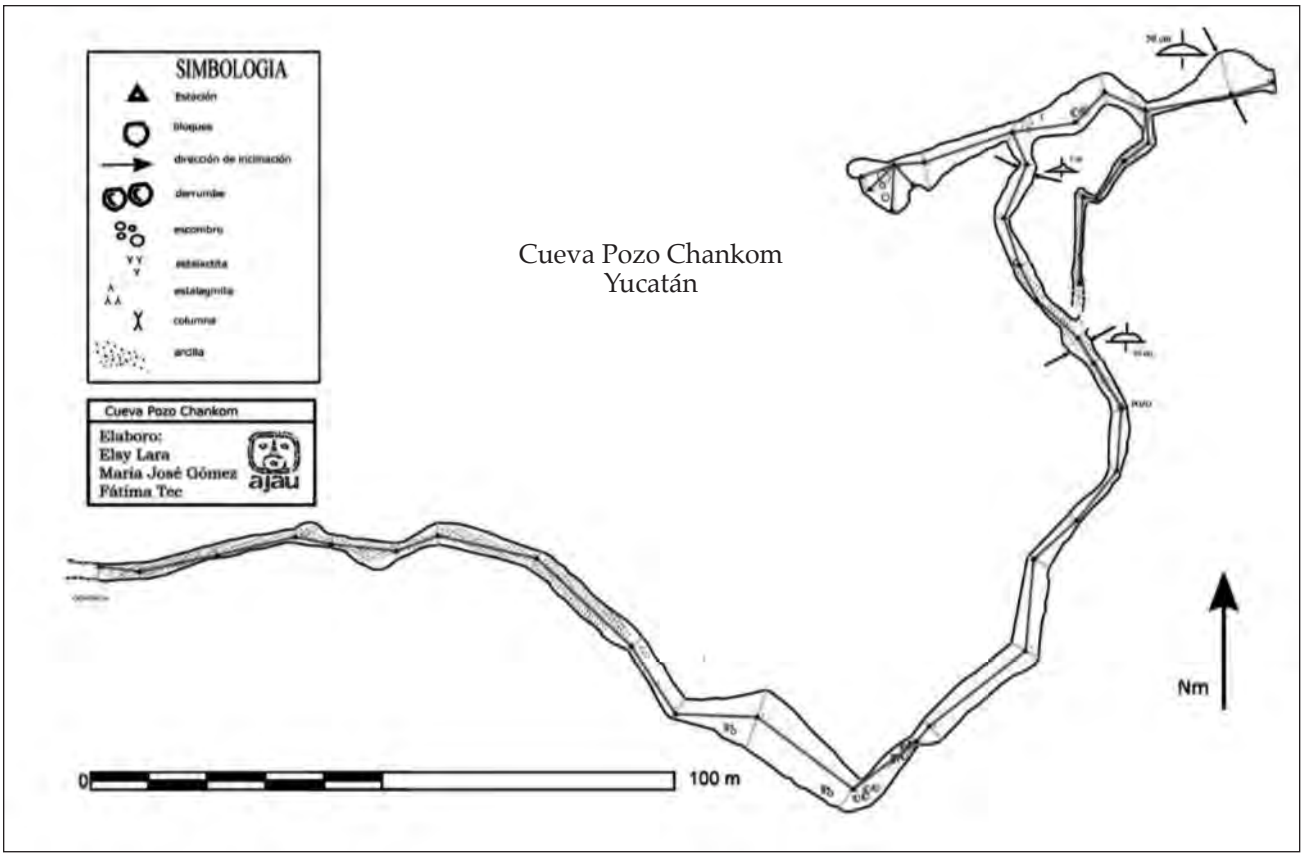
Source: Program and abstracts 22nd International Conference on Subterranean Biology.

In August 2013, Grupo Espeleológico Ajau visited the town of Chankom. Among the karst features in the town are Cenote Chankom on the main square and Cueva Pozo Chankom, entered by a drop of about 20 meters down a well dug to reach water. The cave was mapped to a length of about 460 meters, and more has been explored. *Source*: https://app.box.com/s/jid0pbw51oqz5svzp33z.

See also abstract on Mexican anchialine fauna under Quintana Roo.

MISCELLANEOUS

Arturo Montero's year 2000 MS thesis "Historia de la Espeleología en México" is on the web at http://www.montero.org.mx/cavernas/



historia_espeleologia.

The fourteenth Semana de Cuevas was hosted by the Facultad de Ciencias at the Universidad Nacional Autonoma de México. The program is organized every year in order to bring together researchers in the country who specialize in the study of the environments and organisms that inhabit caves so that specialists and the general public can hear the latest on the work being carried out in caves, which are interesting and abundant in Mexico but unfortunately little studied. The following were on the program:

18 November

Los murciélagos: huéspedes de parásitos y patógenos, by Dr. Juan B. Morales-Malacara.

Sistemática Filogenética y Taxonomía Cibernética, by Dr. Fernando Álvarez-Padilla.

Los mamíferos fósiles del Pleistoceno de la cueva del Zumbador, Venezuela, by Est. Guillermo Vázquez Garibay.

Estructura de la fauna anquialina del sistema Ox Bel Ha, Quintana Roo, by Est. Sergio Abdiel Benítez León.

La Cueva de los Sueños Olvidado, film by Werner Herzog, 2010.

19 November

Arañas cavernícolas de México, by Ignacio M. Vázquez Rojas and Mercedes G. López Campos.

Proteus anguinus el anfibio de las profundidades, by P. de B. Mariana Gamboa Vargas.

Argásidos (Ixodida: Argasidae) asociados con murciélagos de México: Estudio preliminar, by Andrea Rebollo-Hernández and Carmen Guzmán-Cornejo.

Plancton de cenotes y cuevas del sistema Ox Bel Ha, Quintana Roo, by Est. Olinka Cortés Gándara.

Trogloraptoridae (Araneae, Haplogynae): un nuevo habitante de cuevas, by Est. Antonio Galán Sánchez.

Nuevos registros y datos sobre la fauna anquialina de Yucatán, by Dr. Fernando Álvarez Noguera.

Resultados de las exploraciones en la Sierra Negra 2013 y 2014, by Gustavo Vela Turcott.

20 November

La primer especie troglobia del género *Phrynus* Lamarck, 1801 (Amblypygi: Phrynidae) de México, by Ali Abadallan Guzman Toledo, Daniel Andres, Chirivi Joya, and Oscar F. Francke Ballve.

Pero... ¿Cómo se forman las cuevas?, by P. de B. Mariana Servín Pastor.

Adaptaciones y estrategias para la vida cavernícola en crustáceos decápodos, by Luis M. Mejía-Ortíz, Marilú López Mejía, and Joey M. Pakes.

Pseudoescorpiones: pequeños gigantes de las cuevas, by P. de B. Dulce Flor Piedra Jiménez

Exploración y primeros reconocimientos espeleogenéticos de la zona kárstica de Rafael Delgado, Orizaba Veracruz, by Rogelio Hernández-Vergara, Hugo E. Salgado-Garrido, and Rafael López-Martínez.

Dípteros parásitos de murciélagos, by Est. Ali Zeltzin Lira Olguín.

Adaptaciones del pez *Astyanax mexicanus* a la oscuridad, by Biól. Ana Ofelia Santacruz Vázquez.

Karstologia, nueva oferta académica del Posgrado en Ciencias de la Tierra, by Hugo Salgado Garrido.

Rickettsias asociadas con argásidos (Ixodida: Argasidae) de cuevas en México, by P. de B. Yecenia Martínez Nájera.

Variación de la homeostasis energética entre el pez *Astyanax mexicanus* de cueva y de superficie, by Fausto Arellano Carbajal.

¿Qué fue primero la eco-localización o el vuelo? Un paradigma en la evolución de los murciélagos, by Est. Jerónimo Morales Toledo.

Pintando Cuevas de México, by Víctor Cruz.

Monitoreo ecológico en cuevas subacuáticas, by Fernando Calderón Gutiérrez and Carlos A. Sánchez Ortiz.

21 November

Ectoparásitos asociados a murciélagos de la región centro-noreste de la península de Yucatán, México, by P. de B. Violeta Jiménez Parejas.

Troglomorfismo: un convergencia evolutiva, by Est. Josué López Granados.

Mesofauna de la Cueva Serpientes Colgantes "Kantemo", Municipio José María Morelos, Quintana Roo, México, by Leopoldo Querubín Cutz Pool and Pedro Sala Ac.

Amor y desamor entre los murciélagos y el hombre, by Est. Hugo Abraham Valdés Saucedo .

Periglischrus herrerai (Acari: Mesostigmata), parásito de murciélagos vampiros *Desmodus rotundus* procedentes de la región central y sur de México, by Linda Aldana, Juan Morales-Malacara, Hugo Ruiz-Piña, Enrique Reyes-Novelo, and Alan Cuxim-Koyoc.

Ojos para qué los quiero: Aspectos evolutivos sobre la pérdida de ojos en la especie de pez (*Astyanax mexicanus*) en las cuevas de México, Est. Francisco García Bullé Bueno.

Las dolinas, arcas de la biodiversidad y la cultura, by M. en C. Joab Raziel Quintero Ruiz and Dra. Laura Yáñez Espinosa.

La vida bajo la tierra, by P. de B. Dulce Flor Piedra Jiménez.

El libro Rojo Especies Amenazadas: Cenotes una ventana al inframundo, video.

Fauna epizóica de *Eptesicus fuscus* (Chiroptera: Vespertilionidae), by María del Carmen Flores Martínez, Juan B. Morales-Malacara, and Juan B. and Laura L. Del Castillo-Martínez.

Amebas cavernícolas, ¿Un motivo de gusto o de susto?, by Manuel Iván Valle Calle, Fernanda Jacqueline Jasso Cerón, Marco Antonio Guerra Ramírez, Mariela Esquivel Solis, Norma Angélica Montes Colima, Itzel Sigala Regalado and Elvia Manuela Gallegos Neyra.

Diversidad de moscas ectoparásitas (Diptera: Streblidae) de murciélagos en Yucatán, by Alan Cuxim-Koyoc, Enrique Reyes-Novelo, Juan B. Morales-Malacara, Beatriz Bolívar-Cimé, and Javier Laborde-Dovalí.

I have registered on INEGI's website in Mexico at http://www.inegi.org.mx/, and I've been downloading 1:50,000 topographic maps for a few weeks, mostly for the *Astyanax* cavefish area in Tamaulipas and San Luis Potosí. I've been getting TIFFs, which are georeferenced for GIS work, and PDFs, which are sharper and more compact, and you can just view them with Adobe Reader.

Problems sometimes happen in trying to get registered on the INEGI website. It does not discriminate against people from other countries, and you can download many maps without too much problem. You just have to keep trying until they send you an email confirming your username and password. Here's a tip: I could not register until I entered my birthdate in the *wrong format*. It asks for dd/mm/yyyy format, but that did not work. So I input mm/dd/yyyy (American style) and it worked. I then got the email confirming my registration and I was able to download maps.

You don't log in when you go to the INEGI website, not until you try to download a map. Go to the Geografía tab, then drill down to Cartas topográficas. Note that you can search for maps within a state, just for 1:50,000 usually, and it will give you a big table of all in that state. When you try to download a map it will ask you to log in. Then you download one file at a time from that table. If you ask for a specific *clave* (topo index number), but in the wrong state, the thing may get Mexico to obtain the *claves* of the topos you might want to download. So you really must try INEGI's Mapa Digital de México. It does not require you to register. Go to http://gaia.inegi.org.mx/mdm6/. Here's a description: "A Geographic Information System hardware and software architecture aimed at use over the Internet/intranet, composed of robust open source components. Contributes to consultation and analysis of geographic and statistical information generated by the INEGI, and applies the best application development practices. 158 vector data layers are offered, with more than 66 million objects and 4 raster coverages, of the national territory."

I should add that you can select layers in the MDM, so it's a web GIS, but with fewer controls than a full GIS. Layers and tools of interest are zoom, state and *municipio* boundaries, topo numbers, basic topography with hill-shading, reference map, place names, roads, and a search tool (*buscar*) that is quite powerful. You can search for a place name, and it will give you a table of matching names and their states, and you select one and it will zoom you right there on the map. There are contour lines, but not a full topo map.

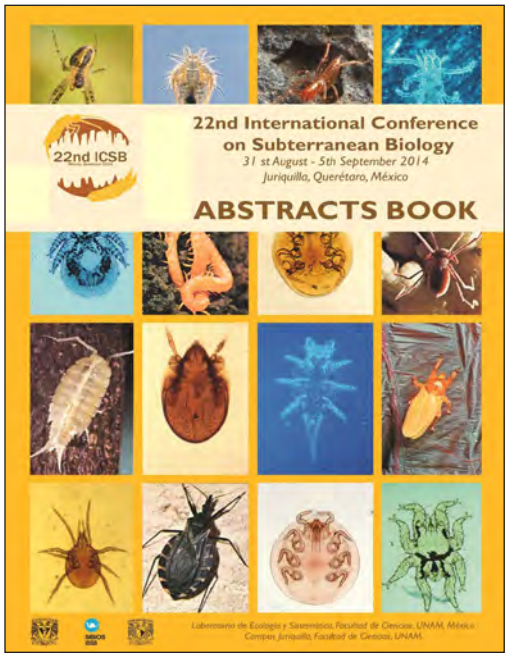
Important tip: I could not get MDM to work reliably for a long time. It seemed to stall and show only a pink screen no matter what I did. I have a large, high-resolution monitor. I discovered that you should not maximize your window or it won't display the map, just a pink screen. Resize the window smaller, and the map will pop in. At least it works for me. *Source*: William Elliott.

The 22nd International Conference on Subterranean Biology was held from August 31 to September 14, 2014, in Juriquilla, Querétaro. The program and abstracts for the conference are on the web at http://sistemas.fciencias.unam.mx/~22icsb/Download/Abstrac%20Book.pdf. Abstract of papers about Mexican cave biology appear in this section and under Yucatán and Quintana Roo.

Abstract: Distribution of Mexican Stygobiontic Crustacea, by Luis M. Mejía-Ortíz.

In Mexico there are six karstic provinces and one volcanic region: Sierra Madre Occidental, Edwards Plate, Sierra Madre Oriental, Central Volcanic Belt, Sierra Madre del Sur, Karst System from Chiapas and Yucatan Peninsula, where there have been registered 7500 entrances of caves, karst sinkholes and springs. In many of these formations there can be found crustaceans, which are the best-represented group mainly in underground water systems. In Mexico there are over 150 species of crustaceans that inhabit groundwater, either brackish or marine. In this study the species-richness, genera, and families were analysed by state and karst province. The results show that there are five groups in the analysis by state: a) < 5 species, Durango, Hidalgo, Michoacán, Sonora, Tabasco and Puebla; b) 6 to10 species, Nuevo León, Campeche, Guerrero and Tamaulipas; c) 11 to 20 species, Quintana Roo, Veracruz, Coahuila, Oaxaca; d) 21 to 30 species, Chiapas and San Luis Potosí; e) > 30 species: Yucatán. In the analysis by karst province, species richness is best represented in the Yucatan Peninsula, Sierra Madre del Sur, and Sierra Madre Oriental. However, in the analysis of genera and families, only the Yucatan Peninsula has a wide range, while the other two provinces have fewer families. The points of high diversity of cave crustaceans are located in tropical caves, and few species have been reported in temperate caves of the Sierra Madre Occidental or Edwards Plate. In the caves of the Yucatan Peninsula there are species of orders and classes that are present only in this area. The analysis showed that richness species, caves abundance, their location in tropical areas and the heterogeneity of environments within the caves explain these diversity patterns.

Source: Program and abstracts 22nd International Conference on Subterranean Biology.



Abstract: History of Mexican Biospeleology, by Juan B. Morales-Malacara.

Centuries ago, the ancient inhabitants of Mexican territory had an empirical knowledge of caves; for example, for some of them caves were their water source, burial sites, and places for water supply. Especially for the Maya people caves and cenotes were sacred places, where the "inframundo," or underworld heaven inside the motherland, dwells, where different kinds of animals lived, and some of them were idolized as gods. Among these were the bats, known in Mayan language as *sotz*. Long afterwards, in the middle of the XIX century, Empress Carlota, the wife of the Mexican Emperor Maximilian, visited the wonderful cave of Cacahuamilpa in the state of Guerrero. Along with her came her confessor Friar Dominik Bilimek, who was a naturalist and was the first European who collected and described different cavernicolous animals from Mexico, including one of the first species of troglobitic arthropod. At the turn of the XX century there were other researchers interested in the study of animals in caves in Mexico. In the year of 1938 two Spanish biospeleologists, Cándido Bolívar and Federico Bonet, came to Mexico as refugees during the civil war in their country, and they formally began a biospeleological research tradition that would last for more than 20 years. They worked in the National School of Biological Sciences from the National Polytechnic Institute in Mexico and undertook many expeditions to the underground world of Mexico, collecting fauna, describing new species, even surveying some geological features from these caves. Thanks to their influence some other researchers have followed in their footsteps.

During the 1940s, 1950s, 1960s, and1970s, several Mexican researchers stand out for their contributions to the study of Mexican cave fauna. Dr. Bernardo Villa (1940-1966) was the pioneer in the study of bats, and especially in the study of rabies problems derived from bites of vampire bats of Mexico, Dr. Caballero (1942-1960) with studies of parasitic helminths from different hosts that inhabit caves, Dr. Álvarez (1946-1970) with his studies of cave fishes, Dr. Villalobos (1951-1974) with studies of crustaceans, and Dr. Anita Hoffmann (1944-2007), who was the pioneer in the study of mites, including those parasitic of bats.

The Association of Mexican Cave Studies (AMCS) was constituted in the United States, with its headquarters in the state of Texas. This association made intensive expeditions that resulted in different contributions to the study of caves. From this association, it is important to mention all the contributions of James Reddell, who brought together all records of fauna from caverns of Mexico, Guatemala, and Belize and published outstanding checklists in 1971 [AMCS bulletin 3] and 1982 [AMCS bulletin 8].

Later in the XXth century, Dr. A. Hoffmann opened a biospeleology course at the Faculty of Sciences of the National Autonomous University of Mexico, the only one in Latin America up to that time. This series of lectures represented a breakpoint in the paradigm of field studies of cave fauna, and gave rise to different contributions, that resulted in the publication of the *Manual of Biospeleology*, authored by Hoffmann, Palacios-Vargas and Morales-Malacara

in 1986, which includes records of cave fauna from several locations in Mexico. Up to the present time this course at the UNAM has continued under the leadership of José Palacios-Vargas, Gabriela Castaño-Meneses, and Juan Morales-Malacara, along with associated professors Arturo García Gómez, Fernando Álvarez Padilla, Miguel Hernández Patricio, Adriana Espino del Castillo, Ricardo Paredes-León, Itzel Sigala, among others. Some of them are during the present century the new generation of biospeleologists of Mexico.

Currently, J. Palacios-Vargas and G. Castaño-Meneses have a group of enthusiastic students that follow this study's tradition. In addition Morales-Malacara still continues with his work on caves, and he has the responsibility to follow the biospeleological legacy of Hoffmann and has continued with the course of biospeleology in the Faculty of Sciences, UNAM, to the point that his present laboratory has the name of Speleobiology and Acarology. Morales-Malacara has different research subjects, such as faunal biodiversity and bats and their parasites as his major ones, with grants to support his research, along joint ventures with other colleagues.

Source: edited from Program and abstracts 22nd International Conference on Subterranean Biology.

The table shows the caves most important for the conservation of bats in Mexico, according to a 2003 publication of the Programa para la Conservación de los Murciélagos de México, http://pcmm.bioconciencia.org.mx.

DESCRIPCIÓN	ESTADO	ZONA	No. spp	ESPECIE IMPORTANTE
Cueva de la Boca	Nuevo León	Norte	14	*Tadarida brasiliensis*
Cueva del Pinacate	Sonora	Norte	1	*Leptonycteris yerbabuenae*
Cueva de Quintero	Tamaulipas	Norte	14	*Tadarida brasiliensis*
Cueva de Cuaxilotla	Guerrero	Centro	12*	*Leptonycteris yerbabuenae*
Cueva de Juxtlahuaca	Guerrero	Centro	9	*Leptonycteris yerbabuenae*
Cueva "Las Grutas"	Ciudad Hidalgo, Michoacán	Centro	14	*Leptonycteris yerbabuenae y L. nivalis*
Cueva de Xoxafi	Hidalgo	Centro	6	*Leptonycteris yerbabuenae*
Cueva El Salitre	Hidalgo	Centro	6	*Leptonycteris yerbabuenae*
Cueva del Diablo	Tepoztlán, Morelos	Centro	4	*Leptonycteris nivalis*
Cueva El volcán de los murciélagos	Límites de la Reserva de Calakmul, Campeche	Sur	7	-
Cueva de Los Laguitos	Tuxtla Gutiérrez, Chiapas	Sur	9	*Leptonycteris yerbabuenae*

The XII Congreso Nacional Mexicana de Espelelogía was held in Zongolica, Veracruz, in early 2015. It was organized by the Unión Mexicana de Agrupaciones Espeleológicas in conjunction with Ruta Náhuatl Expediciones. The following presentations were on the schedule:

Friday, 30 January

Pintando Cuevas de México, by Victor Cruz García.

Episodio Zongolica Mil Islas Pachamama, by Manuel Rousermberg.

Zongolica y su Cultura, Dolores Lucia Ortega Tzitzihua.

Sierra Negra, su Gente sus Cuevas, Julia Jiménez Zamudio, Ángel García Carlos, José Luis Godoy Átala, Wilfrido Hernández Rivera, Miguel Carlos Barragán Torres.

Saturday, 31 January

La Cueva de Totomochapa: Un Ejemplo de Ritualidad del Xochitalis, by Karin Jiménez Román, Carlos Rojas Ortiz, Elizabeth Tocohua.

Ciclo de Conferencias del C.E.M., by Mario Zabaleta.

Exploración y Reconocimiento Espeleogenético de la Cueva Atl, Orizaba, Veracruz, by Rogelio Hernández Vergara, Hugo Salgado Garrido, Rafael López Martínez.

Análisis Simbólico de Mito del Hombre Salvage, by Carlos Augusto Evia Cervantes.

Rescate de Cecilio en la Cueva Inti Machay, by Luis Díez, José Guerrero.

Valorización de la Arqueología Subacuática y su Afectación en el Descarrollo Local: Caso los Cenotes Mayas del Municipio de Tulum-México, by Mónica Cecilia Suárez Arteaga.

Proyecto Rescate Espeleoléogico Árbol de Navidad—Cañón del Sumidero, by Tullio Bernabei, Luis Dávila, Alicia Dávila, Kaleb Zarate.

Exploración en la Sierra Mixteca, Oaxaca, by Adrián Miguel-Nieto.

Expedición Tlaloc 2014 Zongolica, Giorgio Pannuzzo.

Expedición Tlaloc 2014 Hueytamalco, Claudio Cruz García.

Resultados de las Exploraciones en la Sierra Nega 2013 y 2014, by Gustavo Vela Turcott, Franco Attolini, Al Warild.

El Circulo Espeleológico del Mayab, A.C., by Roberto Rojo.

Recientes Exploraciones en Villa Las Rosas, Chiapas, by Omar R. Orgega Chavarría, Kaleb Zárate Gálvez, José B. Guerrero Alegría, Claudia V. Sánchez-Flores.

Marco Juridico Regulatorio de Instructores y Guias de Deportes Alternativos en México, by Edgar Hernández Anaya.

Rescate en Cuevas, by David Belmonte López.

Sunday, February 1

Exploración Ixtacxochitla, by Ramés Alejando Miranda Gamboa, María de los Ángeles Verde Ramírez.

Karstologia, Nueva Oferta Académica del Posgrado en Cienciasde de Tierra: Inicios del P.K.N y Una Linea de Investigación en la

UNAM, by Rafael Antonio López Martínez.

Importancia de la Conservación y Estudio de las Cuevas en Contextos Paleontológicos, by Jair Peña-Serrano, Fernando Miranda-Flores.

Datos Preliminares Relacionados de la Morfología y Génesis de la Cueva del Diablo, Taxco, Guerrero, Rogelio Hernández Vergara, Hugo Salgado Garrido, Rafael López Martínez.

Ceremonia de Xochitlalis, by Doloses Lucia Ortega Tzizihua.

Resumidero de la Joya Jonda "la Cueva Más Profundo del Estado de San Luis Potosí," by Roberto Carlos Legaspi Balderas.

El Espeleobuceo en Sifones, Nacimientos y los Estándares de Seguridad Internacionales, by Germán Yañez Mendoza.

Projecto Inti Machay, by Cecilio López Tercero, Gustavo Vela Turcott.

Las Cuevas en el Estado de Sonora, México, by Luis Omar Calva Pérez Reyna A. Castillo Gámez.

Bioespeleotemas Asociades a Tubos de Lava del Sistema Chinlatepec, byRafael López Martínez, Ricardo Barragán, Hugo Beraldi Campesi, Tomáš Lánczos, Juan Ramon Vidal Řomaní, Romas Aubrecht, Juan Pablo Bernal Uruchurtu, Teresa Pi Puig, Ramón Espinasa Pereña.

Exploraciones de la Asociación de Excursionismo y Montañismo del Instituto Politécnico Nacional en Hidalgo, México.

FLASHLIGHT PICTURE TAKEN IN THE COALCITE CRYSTAL CAVES AT NAICA, A MINING TOWN NEAR SANTA ROSALIA, CHIHUAHUA

These caves have not been fully explored. Many of the crystals retain water of crystallization, and are sometimes used as hand-levels by the native miners.

National Geographic Magazine, 1914,volume 25, page 480. *Coalcite* is probably a misspelling of *calcite*; the crystals are actually gypsum.

DEEP CAVES OF MEXICO

Mark Minton
May 2015
Depth in meters

1	Sistema Huautla	Oaxaca	1545
2	Sistema Cheve	Oaxaca	1484
3	Cueva Charco	Oaxaca	1278
4	Sistema J2 (Ozto J2 (Faustino, Barbie) + Last Bash (Hija Puta))	Oaxaca	1229
5	Akemati - Akemasup	Puebla	1226
6	Kijahe Xontjoa	Oaxaca	1223
7	Sistema Nogochl (Olbastl Akemabis - El Santito)	Puebla	1182
8	Sistema Ocotempa (OC3 + OC11)	Puebla	1070
9	Soncongá	Oaxaca	1014
10	Sistema Tepepa (Ehécatl+Niebla+Xalltégoxtli+Pozo 4)	Puebla	968
11	Sistema Purificación	Tamaulipas	957
12	Guixani N'dia Kijao (Guinjao)	Oaxaca	955
13	Sistema Perrito (Nia Quien Nita + Nia Nga'co Nita)	Oaxaca	906
14	Resumidero de la Joya Jonda (Hoya Honda)	San Luis Potosí	895
15	Nita Chó	Oaxaca	894
16	Sótano de Agua de Carrizo	Oaxaca	843
17	Sótano de El Berro	Veracruz	838
18	Sótano de Trinidad	San Luis Potosí	834
19	Hard Rock Cave	Oaxaca	830
20	Resumidero El Borbollón	San Luis Potosí	821
21	Las Tres Quimeras	Puebla	815
22	X'oy Tixa Nita	Oaxaca	813
23	Nita Ka	Oaxaca	760
24	Sistema H31-H32-H35	Puebla	753
25	Sonyance	Oaxaca	740
26	Nita Xongá	Oaxaca	739
27	Sistema Tepetzala (TB84-TB1-CO2-CO4-TZ7)	Puebla	735
28	Yuá Nita	Oaxaca	705
29	Aztotempa	Puebla	700
30	Sótano de los Planos	Puebla	694
31	Sótano de Alfredo	Querétaro	673
32	Cueva Santo Cavernario+Tototzil Chichiltic	Puebla	667
33	Sistema de los Tres Amigos (Te Chan Xki)	Oaxaca	659
34	Sistema Cuetzalan (Chichicasapan+San Miguel)	Puebla	658
35	Cueva Tipitcli (Tipitli)	Puebla	653
36	Sótano de Tilaco	Querétaro	649
37	Nita Nashi	Oaxaca	641
38	Cuaubtempa Superior	Puebla	640
39	Oztotl Altepetlacac (Cueva Paisano)	Puebla	638
40	Sistema Soconusco - Aire Fresco	Chiapas	633
41	Sistema Atlalaquía	Veracruz	623
42	Cueva de Diamante	Tamaulipas	621
43	Sistema Coyolatl-Esperanza	Puebla	620
44	R'ja Man Kijao (Nita)	Oaxaca	611
45	Nita He	Oaxaca	594
46	Meandro Que Cruce (Meandre Qui Traverse, H54)	Puebla	588
47	Olbastl Koltik (Sótano Chueco)	Puebla	587
48	Yometa	Puebla	582
49	Sótano de las Coyotas	Guanajuato	581
50	Sistema Los Toros	Nuevo León	576

Mark Minton
May 2015
Length in meters

LONG CAVES OF MEXICO

1	Sistema Sac Actun (+Dos Ojos)	Quintana Roo	335230
2	Sistema Ox Bel Há	Quintana Roo	256909
3	Sistema Purificación	Tamaulipas	94889
4	Sistema K'oox Baal (+Tux Kupaxa)	Quintana Roo	75870
5	Sistema Huautla	Oaxaca	71412
6	Sistema Xunaan-Há (María Isabella, 3B) - Tixik K'una - Templo	Quintana Roo	60445
7	Sistema Toh Há	Quintana Roo	42506
8	Cueva del Tecolote	Tamaulipas	40475
9	Sistema Yok Ha' Hanil (Río Cristal, Pool Tunich, Río Secreto)	Quintana Roo	38212
10	Sistema Cuetzalan (Chichicasapan+San Miguel)	Puebla	37676
11	Sistema Garra de Jaguar (Jaguar Claw)	Quintana Roo	31491
12	Kijahe Xontjoa	Oaxaca	31373
13	Sistema Tepepa (Ehécatl+Niebla+Xalltégoxtli+Pozo 4)	Puebla	29401
14	Sistema Tepetzala (TB84-TB1-CO2-CO4-TZ7)	Puebla	29000
15	Sistema Soconusco - Aire Fresco	Chiapas	27793
16	Sistema Sand Crack	Quintana Roo	26746
17	Sistema Cheve	Oaxaca	26194
18	Sistema Nohoch Pek	Quintana Roo	25161
19	Sistema Coyolatl-Esperanza	Puebla	22221
20	Chjine Xjo (Xine Xao, Chine Xao)	Oaxaca	19515
21	Sistema Aerolito	Quintana Roo	18288
21	Sistema PonDeRosa (Pondazul, Edén)	Quintana Roo	17356
23	Cueva de Alpazat	Puebla	15200
24	Sistema J2 (Ozto J2 (Faustino, Barbie) + Last Bash (Hija Puta))	Oaxaca	14840
25	Sistema Murena - Aak Kimin (Yal Ku Lagoon)	Quintana Roo	14269
26	Sistema Dos Pisos (Ka'p'el Nah)	Quintana Roo	14176
27	Sistema Caterpillar	Quintana Roo	13452
28	Sistema Camilo	Quintana Roo	13396
29	Sistema Sac Muul	Quintana Roo	13378
30	Sistema Doggi	Quintana Roo	12036
31	Sistema Atepetaco (Miquizco + Viento + Mama Mia)	Puebla	11876
32	Cueva Quebrada - Sistema Dos Coronas	Quintana Roo	11555
33	Sistema Cupul Ha	Quintana Roo	11153
34	Atlixicaya	Puebla	11120
35	Sistema Río La Venta	Chiapas	11020
36	Sistema San Andrés	Puebla	10988
37	Cueva de la Mano	Oaxaca	10841
38	Sistema El Puente	Quintana Roo	10474
39	Actun Káua	Yucatán	10360
40	Grutas de Rancho Nuevo (San Cristóbal)	Chiapas	10218
41	Cueva del Arroyo Grande	Chiapas	10207
41	Sistema Quijada de Jaguar (Jaguar Jaw)	Quintana Roo	10015
43	Sistema Ek Be	Quintana Roo	9905
44	El Chorro Grande	Chiapas	9650
45	Sistema Muul Three	Quintana Roo	9630
46	Sistema Tepetlaxtli	Puebla	9600
47	Sistema Brumas-Selváticas	Puebla	9324
48	Sistema Nohoch Kai	Quintana Roo	9292
49	Sistema Chac Mol - Mojarra	Quintana Roo	9193
50	Sistema Minotauro	Quintana Roo	8740

Updates and corrections: Mark Minton, 8758 Frog Hollow Road, Linville, Virginia 22834, mminton@illinoisalumni.org

DEEP PITS OF MEXICO

Mark Minton
May 2015
Depth in meters

1	El Sótano (de El Barro)	Entrance drop	Querétaro	410
2	Sótano de las Golondrinas	Entrance drop	San Luis Potosí	376
3	Sótano de la Culebra	Entrance drop	Querétaro	336
4	El Zacatón (mostly underwater)	Entrance drop	Tamaulipas	335
5	Sótano de Tomasa Kiahua (Quiahua)	Entrance drop	Veracruz	330
6	Sótano de Alhuastle	P'tit Québec	Puebla	329
7	Nita Xonga	Psycho Killer	Oaxaca	310
8	Sotanito de Ahuacatlán	2nd drop	Querétaro	288
8	Pozo Poseidon	Entrance drop	Coahuila	288
10	Sótano del Arroyo Grande	Entrance drop	Chiapas	283
11	Sima Don Juan	Entrance drop	Chiapas	278
12	Sima Dos Puentes	La Ventana	Chiapas	250
12	Hálito de Oztotl	Entrance drop	Oaxaca	250
14	Cueva Santo Cavernario	El Santo Tiro (Pozo Fabian)	Puebla	245
15	Sótano del Aire	Entrance drop	San Luis Potosí	233
15	Resumidero del Pozo Blanco	Entrance drop	Jalisco	233
17	Sistema Ocotempa (OC3)	Pozo Verde	Puebla	221
18	Sótano de Eladio Martínez (S-CHIC 1)	Entrance drop	Veracruz	220
18	Live in Busch	Entrance drop	Oaxaca	220
18	Sótano de los Planos	Puits Tannant	Puebla	220
18	Sistema Soconusco	Sima de la Pedrada	Chiapas	220
22	Sótano de los Coatimundis	Entrance drop	San Luis Potosí	219
23	Pozo del Cerro Grande	Entrance drop	Jalisco	218
24	Sótano de Sendero	Entrance drop	San Luis Potosí	217
24	Resumidero el Borbollón	Tiro Grande	San Luis Potosí	217
26	Sima del Chikinibal	Entrance drop	Chiapas	214
27	Sistema H3-H4 (HU3-HU4)		Puebla	210
27	Unnamed Pit	Entrance drop	Chiapas	210
29	Kijahe Xontjoa	So On Jan	Oaxaca	209
30	Nacimiento del Río Mante (underwater)	Macho Pit	Tamaulipas	206
31	Hoya de las Guaguas	Entrance drop	San Luis Potosí	202
32	La Hoyanca	Entrance drop	Tlaxcala	201
33	Fundillo de El Ocote	Entrance drop	Chiapas	200
33	Hueholvastempa	Entrance drop	Puebla	200
33	Akemati-Akemasup	Gran Salto Acuatico y Barbaro	Puebla	200
33	Hard Rock Cave		Oaxaca	200
33	Sistema de la Lucha	Entrance drop	Chiapas	200
33	Nita Gatziguin	Entrance drop	Oaxaca	200
39	Kijahe Xontjoa	Lajao Se	Oaxaca	199
40	Cueva de la Funda	Entrance drop	Chiapas	198
41	Sótano de Soyate	Entrance drop	San Luis Potosí	195
41	Sótano de Tepetlaxtli No. 1	Entrance drop	Puebla	190
41	Sótano de Alpupuluca	Entrance drop	Veracruz	190
44	Cueva de los Murmullos (Cueva del Tízar)	Tiro de los Murmullos	San Luis Potosí	190
45	Sótano de Puerto de los Lobos (Sótano Hondo)	Entrance drop	San Luis Potosí	189
46	Hoya de la Luz	Entrance drop	San Luis Potosí	188
46	Cuaubtempa	Pozo con Carne	Puebla	188
47	Sótano de Hermanos Peligrosos	Orgasmatron	Veracruz	186
48	Sótano Cirque Cuauxipetstli	Entrance drop	Puebla	180
48	Sistema Ocotempa (OC11)	Puits Analogue	Puebla	180
48	Croz 2	Entrance drop	Puebla	180
48	Atlalaquía (Sótano) de Ahuihuitzcapa	Entrance drop	Veracruz	180
48	Sima de Veinte Casas	Entrance drop	Chiapas	180

EL SÓTANO DEL PROFESOR

During the first week of June [1964] the Association for Mexican Cave Studies made a trip to the area of Tequila, Veracruz, to explore more deep sótanos or pits.

Upon arriving at the town of Tequila, Bill Bell and Terry Raines of the University of Texas Grotto, NSS, were told of a rather unusual incident that had happened near the town back in January. It was told to them that the teacher in Tequila had gotten mixed up with a man and two *mujeres publicas*. The situation had gotten quite involved and then out of control, and they took the poor professor, beat him with sticks, and threw him down a sótano. Shortly afterwards the culprits were captured and turned over to authorities in Zongolica, where they were each sentenced to thirty years in jail. It seemed also, as the ones who related the story told it, that the sótano had a rather deep drop, and without the proper equipment or means the townspeople were unable to recover the body.

That night after they heard this story, the two cavers stayed with Sr. Emiliano Ixmatlahua, and he confirmed the story. He also added that it was such a horrible way to die for a man of only twenty-two years. They questioned him further and decided to enter the sótano the next day.

With a feeling of expectation the cavers ate breakfast and headed for the cave. Accompanied by several local men, they soon found the pit and rigged the rope. As the time for descent grew near, a large crowd gathered until it numbered well over fifty. Bell gave Raines the honor of going down first, so he quickly readied his equipment and started down the pit on a brake-bar rappel. Once he was below the surface, all kinds of horrible thoughts ran through his head.

He rappelled slowly at first, not knowing whether he would find the corpse dangling from a ledge or in little pieces scattered up and down the walls. But as soon as he touched bottom of the 354-foot sótano he saw it. It was lying face down with hands above its head, but the head was several feet away, in four pieces, obviously having been torn from the body during the fall.

At first Raines did not know what to do, but he decided to inspect the corpse more closely. The body was in an advanced stage of decomposition, but surprisingly it did not smell too bad. After scrutinizing it for several minutes, he turned his attention to the cave life and bugs and collected quite a large number, including one good-sized salamander. This collecting business lasted for about thirty minutes, after which Raines made a quick ascent to the surface, not looking back,

As soon as he reached the top, everyone for miles around gathered to hear the story. After Raines finished the story, a man, talking in a very sincere manner, stepped forward and said he was representing the dead man's father. He explained that the family was very interested in having the body for burial and that they would be willing to pay. The caver then told him that very little remained, but he insisted on any little sign that could be recovered. After several minutes of discussion, Bell and Raines decided to go down without charge, only asking that the man show them all the sótanos in the area.

Bell was elected to do the grisly. job. He rappelled down and returned an hour and a half later, swearing he would never put another body in a bag again. The men started hauling up the rope to which the bag was tied securely. As soon as it arrived, the contents were dumped on a large straw mat and probed for personal articles. While this animal-like business was going on, the two Texans braided the rope, staying as far away from the scene as possible. Much to their dislike, however, they were required by a local camera enthusiast and big wheel to squat quite near that body for a never-to-be-forgotten photograph. After this they were taken into town, where they were given a good meal and then escorted to many four-, five-, and six-second sótanos. While locating the promising pits, they chanced to go by the house of the dead teacher. Inside they saw that the people had placed the remains in the center of the floor and surrounded them with candles and other religious articles, a truly interesting ceremony.

Although this was quite a gruesome experience, it was well worth it, just to see what might happen to a caver in some careless moment. It would sure be bad hauling a friend out like that.

—Terry Raines, *Texas Caver*, August 1964.

ARTICLES

Jenny Morales in Tengonapa lava tube. *Gustavo Vela.*

DIVING REDBALL CANYON

Liz Rogers

After crossing the world twice and two weeks of hard work, I'm back in Australia from the wilds of the Mexican mountains. The Proyecto Espeleológica Sistema Huautla 2015 expedition is now complete, with the two main cave entrances used de-rigged and returned to their natural state. The 2015 trip was the second annual expedition; trips are planned for each April until 2023. Over the course of ten years the PESH team aims to expand the known depth of the Huautla System beyond a mile and the surveyed horizontal passage to over 100 kilometers. This year's expedition cracked the 70 kilometer mark, and with the total depth at 1545 meters now, a mile can't be far away.

The Huautla System is composed of passages that were explored from several main cave entrances that join up deep below the surface. In 2015 the main caving activities occurred via the La Grieta and Sótano de San Agustín entrances. While I did a day trip into the very top of La Grieta on my first day in Mexico, most of my time was spent in San Agustín. Within the large team of fit cavers we had seven cave divers. Our aim was to push the never-before-dived sump in Redball Canyon and see what lay upstream. Redball Canyon Sump is in a higher tunnel, above Camp 3 and well above the base-level Sumps 1 to 9. [Reports of dives in the deeper sumps appear in *AMCS Activities Newsletters* 21 and 37.] With the water perched above the water table, we expected that the sump would be short and shallow, but it's best not to rely on assumptions with undived sumps, and in the absence of information there was only one thing to do—we'd have to go diving.

liz@lizrogersphotography.com
www.lizrogersphotography.com

After a 10 p.m. bus departure from Mexico City for what was advertised as a six-hour bus ride, I arrived in the town of San Agustín Zaragoza slightly disorientated at 7 a.m. (I think it was about 2 a.m. the following morning in Australia.) The early news was that the rigging team had emerged from an early foray into Redball Canyon, having discovered a dry bypass of the sump. As they'd already taken dive gear to the start of the canyon it was not happy news. I set up my sleeping gear in one of the rented local houses and contemplated the wetsuit and mask that I'd carefully packed. The second half of the dive team was now in the canyon and continuing to rig upstream. After a rest day on the surface to recover from five days spent underground by Dave Bardi, Sandy Varin, Andreas Klocker, and Andy Chapman and two days spent on planes and buses by me, we headed into the cave. Given the news, I left my dive gear on the surface.

The entrance to San Agustín is spectacular, but there was no time to stop for photos on the inbound trip. I took entrance shots on a day trip later in the expedition when Paul and I went early to catch the sunbeams down into the cavern. After walking down the hill and skidding down the Jungle Drop in the doline, Scott Wahlquist, Andreas, Dave, Sandy, and I climbed up and over the bank and through a small crawlway into the Fool's Day Extension, a shortcut discovered in the late 80s. While there is a little bit of horizontal cave between the twenty-three short ropes in the Fool's Day Extension, the Bowl Hole Series below more than makes up for that. In the Bowl Hole Series, which includes a 60-meter drop, a 110-meter drop, and the 77-meter Space Drop with the rope bouncy, free-hanging, and free-swinging at the bottom of it, you can, in nearly every case, see the start of the next drop from the bottom of a long rope.

Having passed more than a few rebelays, I made it to the bottom of the Space Drop and we were at the 620 Depot. This massive rock has a good view of the Space Drop rope in one direction and the route to the top of the Upper Gorge in the other. Heavy rains the week before I arrived had filled the gorge with rushing water and prevented trips for a couple of days. The water level was low again, and the trip down the river uneventful. The rocks are beautiful here. Thousands of years of rushing water have worn the surfaces smooth and scalloped, revealing mineral lines and layers. Some of the small potholes have pebbles inside that circle around and around until they are worn away or the bottom of the pothole gives way. It's hard to be heard over the rushing of the cascades. Despite Sandy's advice from the previous week's experience, I did my best to stay dry. Unfortunately there are at least two spots where the only options are levitation or swimming; I should have saved my energies.

From the bottom of the Gorge and into the Metro the water quieted down. With one last swim we were on the hill up to Camp 3. The camping location certainly beats our muddy little sleeping fissure in Elk River Cave here in Australia. With a wide sandy rockpile to spread out on and a ring of rocks around the kitchen, we had underground luxury. I gathered a sleeping bag and

Andreas Klocker returns from the Redball Canyon sumps. *Liz Rogers.*

inflatable mat and found a flat spot to call my own. Dinner was delightfully rehydrated mystery mixes of various textured-vegetable-protein, freeze-dried chicken or beef, strangely colored vegetable bits, and either powdered potato or quick pasta, occasionally both. Putting nuts in the dinner mix did assist with providing a texture away from the gluey, slimy side of the spectrum. Breakfast was suitably rehydrated oatmeal and a bit more familiar than the dinners. The joy of caving all day is being so hungry that it all tastes good, and by turning off your light you can't see what you're eating anyway.

We met up with the other divers at Camp 3 when they returned for the day and learned that they had discovered a sump. Shortly beyond the deep pool with the dry bypass the Redball Canyon streamway sumped for real. Zeb Lilly, Katelyn Mahoney, and Victor Ursu had retrieved the dive gear from where it had landed near the Metro and gotten ready to dive. On his first dive Zeb successfully passed sump 1 and surfaced on the other side to see another sump beginning immediately. The two sumps added up to about 75 meters. After more than a few days underground they were ready to head out, and it was our turn to take over. I spent an entertaining night staring at complete blackness as I realized I wasn't quite over my jet lag. The next morning, according to the clock but without a single crowing rooster or barking dog, we headed up Redball Canyon. The canyon starts with a short rope up beside a spectacular waterfall. Then it turns into a narrow passage with varying degrees of climb steepness and water depth. The ridges and ledges in the walls are beautiful. The gearing-up spot before the sump is even better, a spacious sandy beach with more than enough headroom to stand up. Andreas got his stuff together while I dragged the camera out of the Pelican case for the first time. With a few strobes around it was time to capture the moment. We discovered Zeb had used less than 30 bar out of the carbon-fiber tanks, and they still had nearly twice a normal fill. The water looked clear and inviting. It was an object lesson in not leaving your dive gear on the surface, and I may have spent a few minutes sizing up Zeb's wetsuit for possibilities.

While he was gone, Scott and I scrambled up above the sump to have a look at a blowing hole in the flowstone. In fact, there were two. The first was the size of a fist but looked like it opened up quite quickly on the other side. The second was twice the size with much more air coming through, it but also went small for much farther. Neither looked particularly promising as a dry bypass for someone human-size. I was contemplating photographic possibilities when bubbles signaled a return. Andreas surfaced with an empty reel and a grin. He'd successfully passed the slightly longer, just-as-shallow sump 2 and surfaced in the cave beyond. The canyon immediately headed up a steep waterfall that was going to require aid-climbing equipment. So we headed back down the canyon to Camp 3 for our second night underground, with a few short stops for photos along the way.

The next underground morning, Dave, Sandy, and Andreas headed off to Redball Canyon to ferry three divers through sumps 1 and 2 with two sets of dive gear. They took a dry bag of drill and batteries, rigging bolts, and rope, intending to tackle

Scott Wahlquist in Anthodite Hall. *Liz Rogers.*

Katelyn Mahoney above the third pitch in Cueva de Eduardo, another cave explored during the expedition. *Liz Rogers.*

the first waterfall and whatever lay beyond. While they were gone, Scott and I spent the day with the camera. Our first objective was Anthodite Hall. From Camp 3 we walked up the rocky hill to the short rope. The opening to the room is hidden between the high, flat wall and the sculptured ceiling far above. Neither Scott nor I had been up there before, and the entry passage is not that large. We kept climbing up the rocks past small stalactites. Over another set of rocks the ceiling suddenly opens up. Anthodite Hall is *Huge* with a capital *H*. On the right hand side it has a low floor cracked into mud bricks. On the left a giant breakdown pile curls around the wall from end to end.

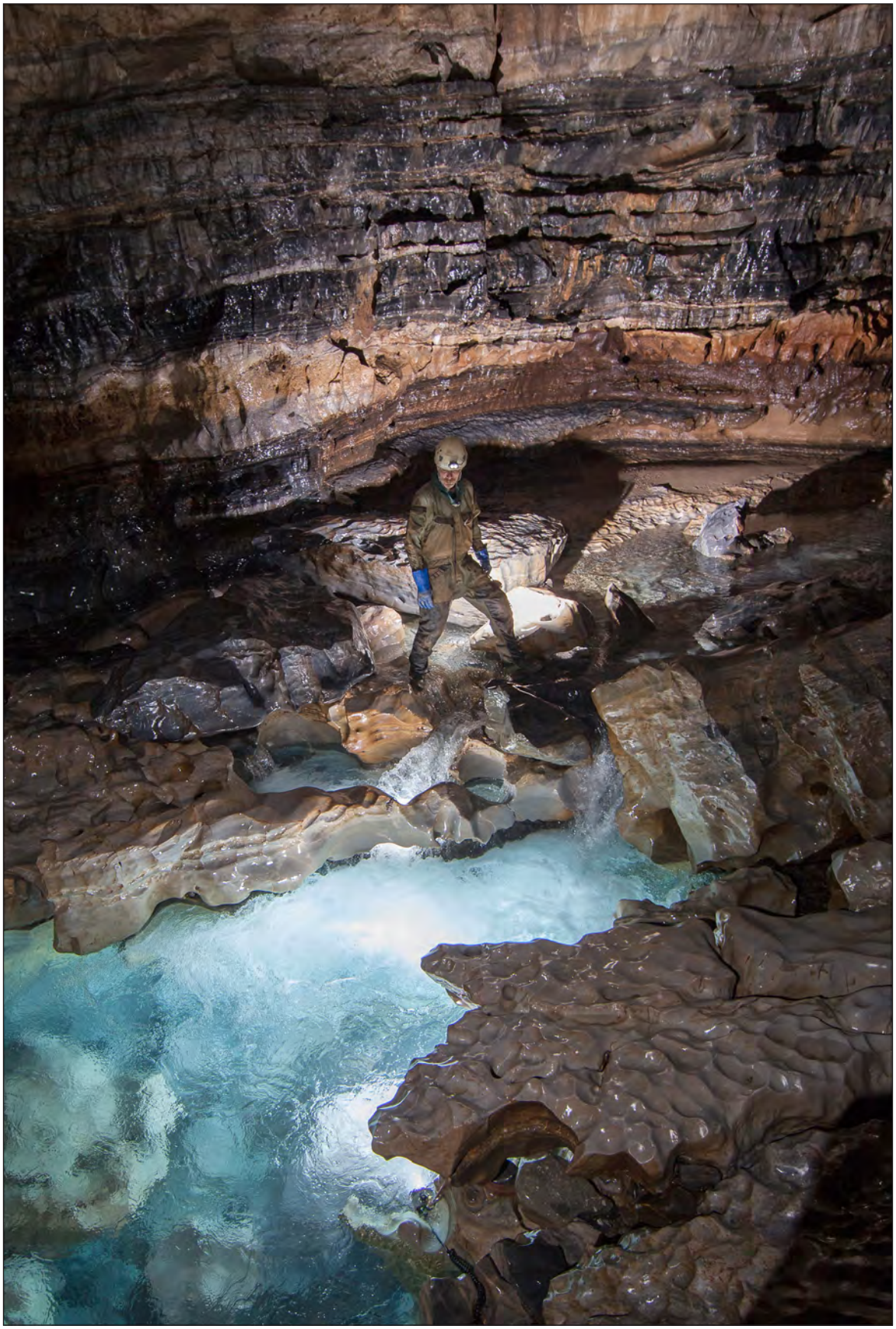
Of course, photos of a big breakdown pile in a massive chamber risk looking exactly like a pile of rocks. With only one model I struggled to get a true sense of scale of the room. I was lucky to return two days later with Kasia Biernacka, Derek Bristol, and Adam Byrd to try again. After a few goes at that, Scott and I picked up the strobes and headed for the massive flowstone formation at the top of the breakdown pile. All along the top wall here there are anthodites,the room's namesake. Unlike stalactites and straws they stick out in crazy directions. Clustered together on the wall, it was hard to isolate just one to photograph. The anthodites ranged from tiny-on-the-side-of-a-stal to extra large Christmas-decoration-size. Scott and I spent some time arranging lights up and down and trying to get the white decorations to stand out from the busy background without blasting them with too much light. After playing with the decorations until I was happy, we decided to do a lap of the hall. The first thing we came upon was the underside of a ledge, covered in white formations. I liked the regularity of them. Even better, the flat mud floor close underneath gave me a choice of angles. This was the last distraction before we headed down the rockpile along the wall and headed out and down. The rope into Anthodite Hall was so old and stiff I had to jump to get it to move through my Stop. It was replaced at the end of the trip with something a little more flexible.

The circumnavigation of Anthodite Hall had dried out our wet caving thermals. We decided to head down to the Metro for as many photos as possible without getting wet all over again. The rock here is beautiful, carved by rushing water. I spent a lot of time fiddling with strobes and trying to light the water appropriately without them washing away. Scott was very patient and I love those shots.

Back at Camp 3 for dinner we heard that the diving trio had discovered about 100 meters of passage, including a very short sump which they had duck-dived. They had eventually reached another steep climb that required more climbing gear and turned for home. The following morning Andreas and I headed for the sumps. I borrowed Zeb's wetsuit, which was somewhat large in the torso but good enough for the short dives. The intention was to survey what had been discovered and continue to push up the climb. I left the camera at camp.

We had a semi-successful day, with the canyon refusing to flatten out again after the climb they had stopped at the day before. Andreas placed all the bolts that were available, and we ran out of bolts and rope at about the same time. The climbs were on black rock covered with huge chunks of flowstone. The water had eroded the flowstone in waves, in some cases all the way back to the black rock. In a couple of places you could climb small chimneys out of the water. In others you were moving across the face of the flowstone with water running past. Some were incredibly slippery. It was all beautiful too, and I somewhat regretted not bringing a Pelican case full of camera gear beyond the sumps.

When we got back to camp, Gilly Elor, Adam, Derek, and Kasia had arrived from the surface. They'd brought food, including a whole bag of vacuum-packed salami. The next day I joined them on a photographic trip back up to Anthodite Hall. From there we headed up Redball Canyon, pausing at the waterfall to take some great shots. Instead of going to the Redball sump, we turned and climbed up into the passage that leads to the Li Nita sump. Dived previously to create the connection to Li Nita cave, it was not on our list for this trip. After stopped to photograph ledges, we found a lake that started knee-deep and got deeper. I placed the pelicase on a side ledge and cracked out the camera to catch these three grinning in the water. I was busy trying to walk backwards to find clear water, but as the water crept up past my armpits, I realized this was a job for a camera in a housing. We waded back out and headed for camp with a brief stop to photograph the guys coming back through



Scott Wahlquist in the Metro. *Liz Rogers.*

Kasia Biernacka, Gilly Elor, and Derek Bristol in the passage that leads to the Li Nita sump. *Liz Rogers.*

the shower into Redball Canyon itself. [Additional photographs can be found in the author's blog at lizrogersphotography.com.]

The next morning, after five nights underground, we decided enough was enough and it was time to head out. After a glorious rest day on the sunny surface with a trip into Huautla town, where we destroyed several roast chickens in one very rapid sitting, I felt much better. The following afternoon Corey Hackley reported that he had found a cave entrance very close to the highway, and we had a midnight trip to check it out. The day after that I persuaded Paul Winter to join me on a jaunt to the entrance of San Agustín to take entrance photos.

After that I was contemplating my options. With a sore shoulder from a short fall beyond the sump and 2.5 days left before I needed to be on the bus to Mexico City, going back into the cave didn't seem sensible. On the other hand, there was a lot of gear down there to come out. I packed the camera away on the surface, filled up on anti-inflammatories, added a few painkillers, and followed the others back down half a mile of rope. The trip in was much faster the second time around, and we arrived at Camp 3 in under five hours. Andreas and Zeb had gone underground early the day before, and we arrived to a note from them. With Redball Canyon still going strong, still heading uphill with the passage getting bigger, they advised that the dive gear wouldn't be ready to come out from the sump until the morning. After dinner of mixed remains of rehydrated food we went to bed.

The next morning the group took a trip to the sump to grab the dive gear, then started to ferry it and all of the equipment from Camp 3 up the Gorge to the bottom of the Space Drop. The intention was to spend the night at the 620 Depot atop a pile of gear. From there it was a short but painful trip up the ropes to the Fool's Day Extension. With a bus ticket on my mind, I grabbed a bag of wetsuits and headed out. My first trip out had been in a group of five and took me ten hours. The second trip out was solo, and I made it to the field house in just under eight. At the top of the ropes of the Bowl Hole series I extracted one wetsuit from my caving pack and deposited it on a handy rock. Halfway up the Fool's Day Extension I ran into Yvonne Droms and Dave, who were on a photo shoot. The Fool's Day Extension was much drier than at the start of the trip, and several of the traverses that had been rigged to avoid the water were completely superfluous. Twenty-three ropes and a crawl later I was at the bottom of the Jungle Drop, and shortly after that I was staggering up the stairs to dinner and the best bucket shower I have ever had.

The diving portion of this expedition was sponsored by Dive Rite, who kindly provided Nomad LTZ harnesses and LX20 primary lights.

Buceando el Cañón Redball

Uno de los objetivos de la expedición 2015 del Proyecto Espeleológico Sistema Huautla fue el bucear los sifones al final del Cañón Redball en el Sótano de San Agustín, parte del sistema. Los dos sifones, bastante cercanos uno del otro, requirieron en conjunto unos 75 metros de buceo, y el pasaje fue explorado corriente arriba más allá de ellos. La autora, quien es de Australia, tomó varias fotografías en la cueva. Visite la página lizrogersphotography.com.

Ruth Diamant descending the 35-meter drop into La Tubería.

Ramón Espinasa viewing the roots coming through the ceiling of lava tube El Borrego.

LAVA TUBES NEAR XALAPA, VERACRUZ

Arturo Robles and Jenny Morales in the Tengonapa lava tube.

Rodrigo Álvarez and Sofía and Ramón Espinasa surveying in Tengomapa.

PHOTOGRAPHY BY GUSTAVO VELA
December 2014

Sofía Espinasa getting instructions from dad Ramón.

Artura Robles in lave tube El Borrego.

THE PESH 2014 EXPEDITION

Bill Steele and Tommy Shifflett

PESH stands for Proyecto Espeleológico Sistema Huautla. The efforts in exploring and mapping what is now Sistema Huautla, located on the Sierra Mazateca, in Oaxaca, Mexico, began in 1965 with the first visit to the area and the following year with initial mapping of Sótano de San Agustín and Sótano del Río Iglesia. As time passed other caves were discovered, explored, and mapped, and the connection of Li Nita to Sótano de San Agustín in 1980 created Sistema Huautla, and first cave in the Western Hemisphere over 1,000 meters deep. Other caves were added, such as La Grieta and Nita Nanta.

Then in 2013 a British expedition dove the terminal sump, "The Mother of Sumps," discovered in 1994, to 81 meters depth, for an overall depth of 1,545 meters and length just over 65 kilometers. Bill Steele, Tommy Shifflett, Emily Zuber, and Herman Miller attended the last two weeks of that expedition with the goal of checking leads in Sótano de San Agustín near the old Camp 1 that had been used by Canadian and TAG cavers in 1968. Two leads were found, one requiring a short bolt traverse and the other digging out a sand and gravel plug. The first had very good air and led into nice-size canyon for approximately a half-kilometer of passage, to where the air went into a low bedding plane too small to follow. The other led for a couple hundred meters of passage and an intersection with the Fishure at a much higher level; this drop has not been done. Out of this came the realization that much potential remained, including side leads that had been passed by as a result of focusing on depth, connections to previously explored and mapped caves close to the system, and new caves with entrances in little-explored karst north, south, and east of the current system. Although there is little potential in exploration west of the system, as a fault zone that divides the drainsage lies just off the periphery according to Jim Smith's thesis [*Hydrogeology of the Sistema Huautla Karst Groundwater Basin*, AMCS bulletin 9], based on the potential elsewhere Bill Steele and Tommy Shifflett decided to renew efforts in and around Sistema Huautla by organizing annual expeditions during the month of April, the month determined to have the most favorable conditions for exploring the caves, and do so with the following main objectives:

to explore, survey, and conduct a comprehensive speleological study of the Sistema Huautla area caves, keeping survey data current,
to study the geology, hydrology, biology, paleontology, and archaeology of the area,
to conduct annual month-long expeditions for ten years, 2014–2023,
to reach 100 kilometers in length of Sistema Huautla,
to reach 1,610 meters in depth, which is 5,280 feet, a vertical mile,
and to publish all results.

All of this is easy to say, but if we're going to have annual month-long expeditions for ten years, it's very important that the first one be successful. This first one, the PESH 2014 Expedition, was successful on several fronts. Diplomacy at the state, *municipio* (like a USA county), and *agencia* (a smaller community around a town) levels was for the most part fruitful, with permission granted to go caving in the area for three years. One area remains a challenge, and a plan has been formulated to deal with it.

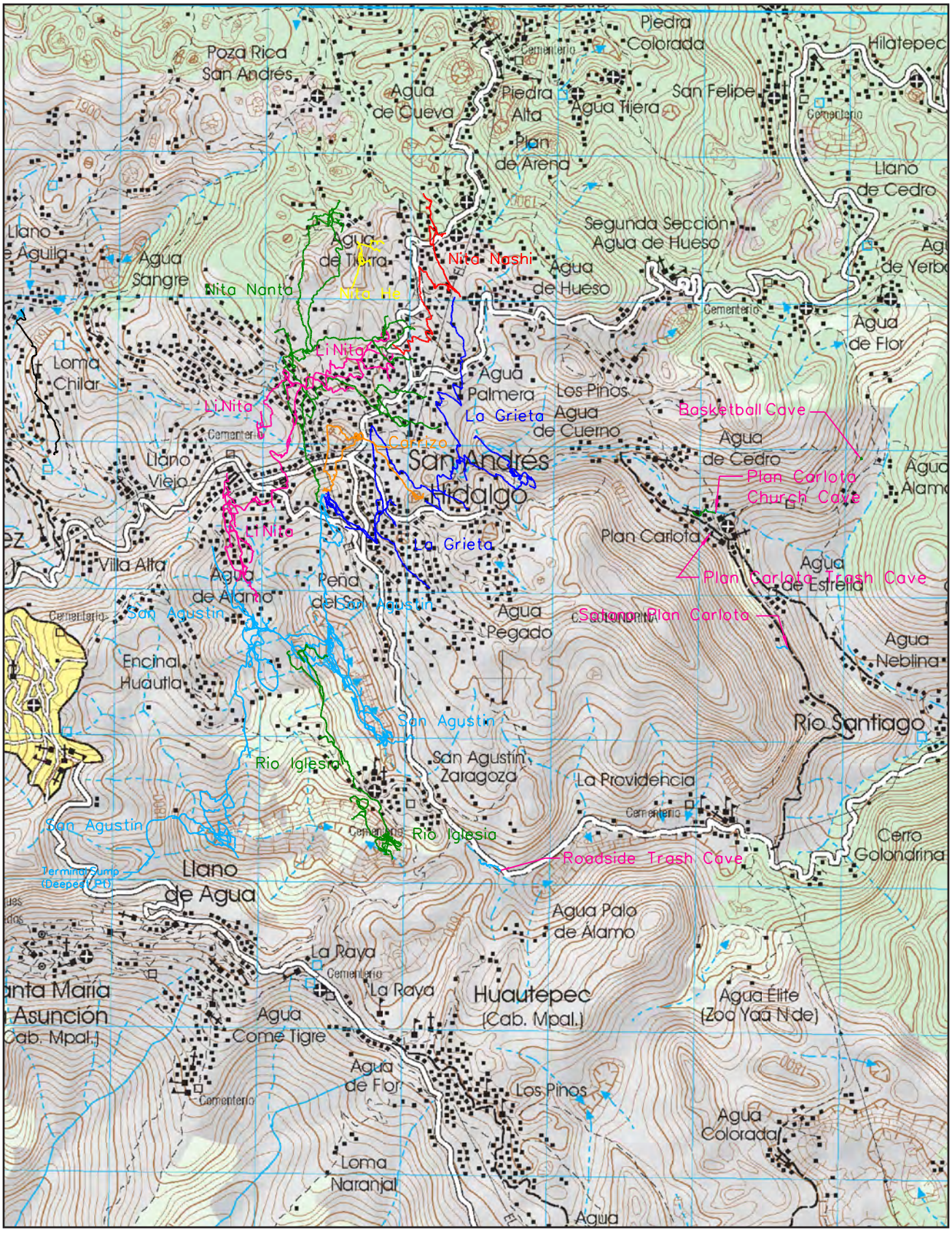
The area to the east of the known passages of Sistema Huautla, in the Plan Carlota *agencia*, was an objective, and around twenty new pits and caves were explored and mapped, without anything going real well. Some of the more significant are Sótano Plan Carlota (156.7 meters length, 70.5 meters depth), Plan Carlota Basketball Cave (136.6 meters length, 70.9 meters depth); and Plan Carlota Church Cave (308 meters length, 95.7 meters depth). It should be noted that good air flow was detected in all three of these caves but could not be followed, and Plan Carlota Basketball Cave was the site of a new species of tarantula of very sizeable proportions, up to 7 inches toe to toe.

Two caves in the San Agustín *agencia*, southeast of known cave passages in the system, show promise with strong airflow and will be explored during the 2015 expedition. One requires an aid climb to reach visible passage overhead, and the other the enlarging of a narrow crevice that had air sucking into it.

Dr. Oscar Franke, a noted arachnologist and scorpion expert and a professor at the Universidad Nacional Autonama de México in Mexico City, brought three students with him and spent four days with the expedition. They were elated that they collected three new species of tarantula, two new species of harvestmen spiders, and one new species of scorpion in the caves. They will return in 2015 and spend more time with us.

An important paleontological site was found in a cave, as well. In a series of large, adjoining rooms in

Speleosteele@aol.com
tommyshifflett@gmail.com



Area map showing line plots of components of Sistema Huautla and various other caves in the area. The grid is 1-kilometer squares.

A millipede goes into the collecting bottle.

Meal time in one of the basecamp buildings. PESH organizers Tommy Shifflett and Bill Steele are in the green and red jackets at left.

A biologist from UNAM inspects his treasure.

Projecto Espeleológico Sistema Huautla
2014 photographs by
Kasia Biernacka / kasiabiernacka.com

Yvonne Droms.

Bill Steele.

a cave we had not visited in over thirty years, not far from the village of San Agustín where we rent houses for our surface base, large bones were noticed in a talus cone on the floor. We think there must have been an entrance above the talus cone at one time in the distant past. A professional paleontologist in Mexico City feels, based on photographs taken with scale and sent to him, that at least one of the animals whose remains are there is an extinct Pleistocene ground sloth. The paleontologist is sending a Ph.D. student of his to join us for a week to investigate the site in 2015.

As was the plan, halfway through the month-long expedition five cavers arrived with packs already prepared to go underground and camp in the La Grieta section of Sistema Huautla. La Grieta, meaning the crack, is a significant section of Sistema Huautla. It's over 700 meters in depth to where it connects to the system and has tributaries feeding into it that were initially explored in 1977. No one had been back to them since then.

With their camp packs, the five cavers went into La Grieta to stay for a week or longer. These were Kasia Biernacka of Poland, Gilly Elor, Corey Hackley, John Harman, and Bill Stone. Three of them camped underground for seven days and two of them for nine. They set up an underground camp and explored an upstream tributary, the Refresher, partially explored without finding an end in 1977. They succeeded in discovering and mapping 1,586 meters of new passage extending upstream, most significantly a passage extending over 1.4 kilometers to the north, directly toward the highest topography in the area. They turned around in 20-by-20-meter borehole because they were running low on food and battery power for their lights. This continuing passage is a major objective for 2015. [See separate article in this issue.]

During exploration of the Refresher, other team members Zeb Lilly, Scott Wahlquist, Andreas Klocker,, Colin Dunn, Virginia Price, and Steph Davalantes explored the continuations of passages in the Merican Tubes and N Drop areas for an additional 576 meters of passage. Many leads remain in La Grieta, and plans are to continue their mapping in 2015.

A newly discovered cave, found within a 100 meters or so of the La Grieta entrance, was initially hoped to connect to La Grieta but ended in a too-tight narrow passageway; the cave mapped out to 268.3 meters length and 98.3 meters depth.

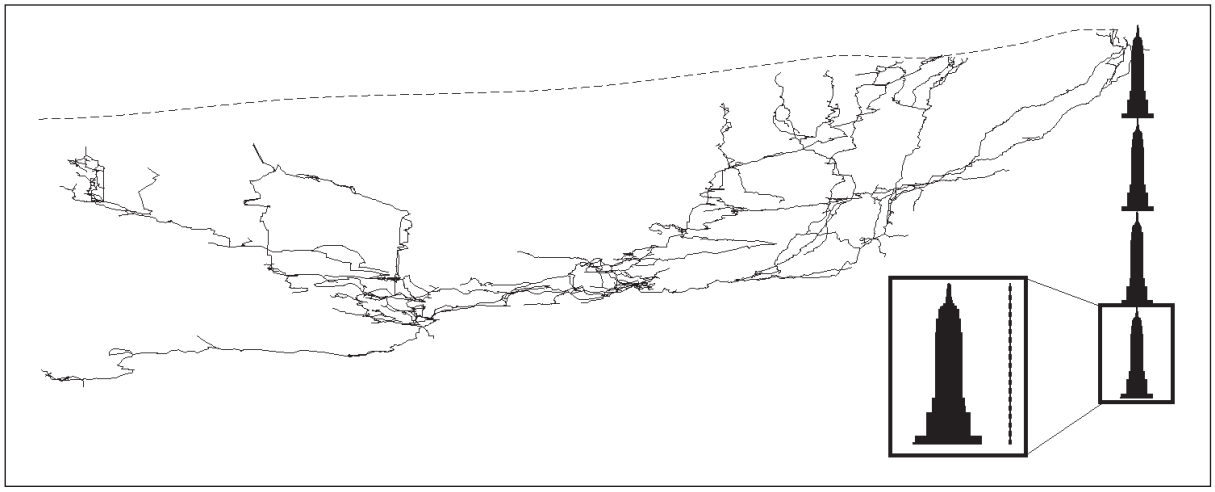
After the 2014 expedition, Sistema Huautla stands at 68.882 kilometers in length. The 1,545 meters depth is uncertain, so in 2015 we plan to establish better entrance locations and elevations by a more disciplined overland survey using four known control points located with centimeter or better accuracy within our project area.

One of Oscar Franke's students climbing the entrance drop in Plan Carlota Basketball Cave. *Tommy Shifflett.*

Thirty cavers participated on the PESH 2014 Expedition, with nineteen from the USA, seven from Mexico, one from Tasmania, one from Canada, one from Switzerland, and one from Poland. The participants were:

Yaz Avila, Mexico/Texas
Kasia Biernacka, Poland
Don Broussard, USA/Texas
Geraldo Contreras, Mexico
Jesus Cruz, Mexico
Steph Davlantes, USA/Florida
Virginia del Rosario, USA/Maryland
Yvonne Droms, Switzerland/USA
Colin Dunn, USA/Maryland
Gilly Elor, USA/Massachusetts
Oscar Franke, Mexico
Ernie Garza, USA/Texas
Ali Guzman, Mexico

Mark Minton, Bill Steele, Yvonne Droms, and Steph Devlantes in the bottom room in Sótano de Plan Carlota. *Tommy Shifflett.*



Cristina Estrada, Mexico/New York
Corey Hackley, USA/Virginia
John Harman, USA/West Virginia
Aubri Jenson, USA/Texas
Jim Kennedy, USA/Texas
Andreas Klocker, Australia
Zeb Lilly, USA/Virginia
Jorge Mendoza, Mexico
Mark Minton, USA/Virginia
Virginia Price, USA/Maine
Ron Rutherford, USA/Texas
Tommy Shifflett, USA/Virginia
Jim Smith, USA/Georgia
Bill Steele, USA/Texas
Bill Stone, USA/Texas
Scott Wahlquist, USA/Virginia
Peter Zabrok, Canada

All but one of the people present at the end of the expedition. The photograph was taken on a roof in the village of San Agustín Zaragoza, looking north, with the Sótano de San Agustín doline behind the group. The highest linked entrances to Sistema Huautla are in the hills in the center distance. From left: Andreas Klocker, Steph Devlantes, Scott Wahlquist, Yvonne Droms, Mark Minton, Bill Steele, John Harman, Don Broussard, Colin Dunn, Virginia del Rosario, Zeb Lilly, Tommy Shifflett, Corey Hackley, and Kasia Biernacka. Bill and Don are holding Explorers Club flag number 209. *Kasia Bienacka.*

La Expedición PESH 2014

La expedición del Proyecto Espeleológico Sistema Huautla de abril de 2014 exploró varias cuevas en los alrededores de Plat Carlota, Oaxaca, y los cueveros acamparon en La Grieta, parte del Sistema Huautla, para explorar el pasaje llamado Refresher, que se había dejado sin continuar desde 1977. Exploraron y topografiaron el pasaje corriente arriba por 1586 metros, y se les acabó el tiempo mientras mapeaban un pasaje de buen tamaño. Biólogos de la UNAM visitaron la expedición y encontraron varias especies nuevas en las cuevas. Al final de la exploración la longitud del Sistema Huautla era de 68.882 km.

THE JAGUAR KING

Juan Laden

Joining an expedition that has the potential for mapping the longest cave in the world can be a daunting experience. In the case of my return to Quintana Roo for the third time since this series of survey trips began in 2010, it comes with lots of excitement and also a sense of vastness. On one hand there is the excitement of lots of new cave and lots of surveying ahead, and on the other there is the realization that this whole system is bigger than our lifetimes.

I drove down to Austin, Texas, from Lander, Wyoming, to join Peter Sprouse, the expedition leader, and one other Austin caver, Gill Ediger. We flew to Cancun on March 21 for two weeks of surveying, mostly in caves in the Paamul, Quintana Roo, area. We would be working in the Jaguar Paw system that had been located by Paamul Grotto cavers Alan Formstone, Gil Harmon, and Liliana Viola. They had been chopping trails along a long collapse feature, flagging the way and locating innumerable entrances.

The cat was out of the bag by now. During the trip of December 2012 and January 2013 there was talk of getting LiDAR data of the coastline, which can show the terrain underneath the forest canopy. Peter got some of that, and with the help of others, has made a topographic map of most of where we have been surveying with about half-meter resolution showing the actual ground surface, with shading to show the elevation. The collapse features where the cave entrances are located jump out at you like great black eyes of a virgin pit, and the trends are also obvious. It is almost as good as having earth-penetrating radar. One can see the ancient coastlines and where there were bays and sand dunes. The days of using Google Earth and listening for motmots, which nest in the cave entrances and have a distinct call this time of the year, for finding entrances is mostly over. On this map were placed GPS locations of known entrances, and as we surveyed we could plot the day's survey and see the trends in relation to the surface topography. We would be putting our tents at Casa Mot Mot, a bed-and-breakfast that is just south of Puerto Aventuras. In the morning we went to a taco stand next to the overpass at Puerto Aventuras to have breakfast. This became our routine.

On March 22, our first day of caving, we headed out to Paamul to meet with Peter and Alan and then headed across Highway 307. We first went to Howling Man Cave, which is right at the end of a road cut into the jungle. From that lovely little open cave with water and signs of jaguars, we headed out the "punji-stake" trail that Alan and Gil had cut with machetes out along the main collapse feature. The punji stakes are the result of cutting the saplings and bushes with a machete. You leave a stick, already sharpened and about shin-high, just right to trip over and then impale yourself on. René Ohms, Alan Chuc, and I surveyed a cave that we later called Cueva Pecarí, due to the pig skull at the entrance. Peter, Gill, and Bill Koerschner went a little farther along the trail and surveyed a cave that had been named Media Vida. These were little caves that didn't seem to have obvious connections to the main caves in the area.

The whole Yucatan Peninsula, comprising the states of Quintana Roo, Yucatán, and Campeche, is the same karst. Originally, when I was first down in 2011, I felt like it was one large cave just under the surface with lots of collapses entering it and columns holding it up. Though it is all connected, and pretty well consistent in its geology and the aquifer, there are places where there may not be human-size cave. Still, there are extensive systems, and the potential is great for connections to actually make this area the holder of the longest cave system in the world. Already, the two longest underwater caves in the world are in Quintana Roo, and they are connected to large sections of the "dry," air-filled caves. At the Jaguar system, there is a large linear collapse feature that has numerous entrances on each side. There are gaps in the line of collapses, and way out in the jungle in the same line, there is a large circular collapse that promises to be part of the same cave. It looks like there was a massive maze-cave developed along a line that collapsed down the middle in places, leaving passage remnants on the sides. Often one can walk in the cave for a kilometer or more without really needing a head lamp due to the abundance of entrances. A lot of it is big walking passage, and as it goes inland the ceiling gets higher.

On March 23 we had our taco breakfast and met Peter, Gil Harmon, and Monica Torre, a local cave-diver. René, Bill, and Gill Ediger, whom we started calling Big Gill to distinguish him from Gil Harmon, started to survey in what we later called Jaguar Jaw, since it was disconnected from Jaguar Paw due to collapse. Monica, Peter, Gil, and I took off to see the farther end of the system. Peter wanted me to get to know the overall cave in order to lead others, and we just wanted to see what we were going to be dealing with. We

juantontomatoe@gmail.com

The Brain in Jaguar Claw. *Juan Laden.*

toured Jaguar Jaw, walking over a kilometer with a few jumps out into the jungle to get into another section of the system, as the cave got bigger and the ceiling higher. Gil, Alan, and Liliana had flagged and cairned the basic route, so navigation was fairly easy. They also named and flagged a lot of the entrances that they had GPSed. Now it was time to survey all this. Despite the fact that one can get turned around easily because of the many entrances and the maze-like, open nature of a cave, we were able to find our way without using a compass. Then we returned to Jaguar Paw, and Gil headed out while Peter, Monica, and I surveyed for the rest of the day.

The next day, after our *taquería* rendezvous, we rode out to the same roadhead with a new addition to our crew, George Sanders, who flew in after a failed attempt to drive his motorcycle down from Houston. He had an incident with a truck that ended up with him in the ditch. That, combined with some issues with navigation, convinced him to drive back to Houston and fly down. René took Gill and Bill and surveyed in Jaguar Paw, and Peter, George, and I went to Jaguar Maw, the first big cave along the collapse, and surveyed there. So far Maw and Paw are separate caves, though they are on the same side of the collapse and next to each other, so there is hope that they will connect at some time. Our usual routine after caving was to go out and eat in the Puerto Aventuras pueblo, where the price is right and food is good. While we were waiting for food we would get started on loading data on the computer.

Tuesday the twenty-fifth was going to be a little different. After tacos in the morning, we headed down to Zero Gravity Dive Center, a dive shop and guide service, as there was someone who was going to take us into some wet caves back in the jungle from there. Small world stuff, when we got to Zero Gravity: one of the guides, Sam, had on a shirt from the National Outdoor Leadership School in Lander and turned out he had taken a course in Africa with a couple of instructors I knew. The person that was going to take us to the caves didn't show. We re-booted, so to speak, and went back to the Jaguar complex. René, George, and Bill surveyed as a team, and Peter, Liliana, Melissa, and I surveyed together till the two ladies had to leave at midday. We were now surveying in Jaguar Jaw, having had to go into the jungle from Jaguar Paw when the collapse intervened. Soon it looked like we would be pushed into the jungle again, but after pushing a small lead, I found a connection to the next part of the cave. I have a reputation for getting into small cave, a curse for some teams, but in this case it was a blessing. After Melissa and Liliana left, Peter and I surveyed together as a two-person team and filled in some blanks in the survey. Up until then I had been setting stations and the ladies had been shooting instruments. Sometimes surveys go faster with just two than with four. Peter had loaded several smart-phones with PDF files of the previous surveys to give to the sketchers so that they could get around a bit better and tie to existing surveys. We used one of those to find some of our tie-ins.

While we were caving, Big Gill was out on the trail chopping out a highway and removing a lot of the punji stakes. At the end of the day our half-hour walk out was cut by about five or ten minutes, and for half of it we didn't have to risk becoming served, freshly skewered, at the next BBQ.

We went back to Zero Gravity on the twenty-sixth, and after we spent some time checking out the operation, our guides arrived and we took the vehicles back down an "acceptable" back road. That meant that it wouldn't trash the rental car. Several kilometers in, we came to a camp in the jungle, where we left the rental car and took Peter's Jeep Cherokee and Liliana's SUV. Another kilometer or so and we arrived at a construction site where

Piper Belski in an entrance to Jaguar Claw. *Andy Belski.*

David Mayor, Monica Torre, and Michel Vázquez in Sistema Jaguar Jaw. *Peter Sprouse.*

we parked. Before we left there trail, we had to change a tire. Peter had a hole you could put two fingers through in the sidewall of his front tire—probably one of those pesky punji stakes. Jacking up the Jeep, I broke the cheap replacement jack, but fortunately Liliana had one that worked, and we were able to change the tire. After a short walk we came to the first of two collapse entrances, Xibalba, which had a tree house in two of the large trees growing out of the entrance.

René, George, and I made a team that went to push a swimming lead in the downstream part of Xibalba, and I actually had to do a little diving with just a mask to check some sumps. Peter, Gill, Bill, and Liliana went to the north to Cueva Imix, a cave that may connect, though it might be a diving connection (see August 2014 article on this connection). Gill forgot his helmet and so caved the day liberated from it. They were able to map a short way north from the entrance to Imix before it ended, so they decided to hike overland across a collapse to see if they could find more cave heading north. Sure enough, they quickly reached a spacious entrance that narrowed down to an obscure opening leading into a wet passage. Ventana Secreto did not continue father, however.

That night we got a new infusion of cavers at Casa Mot Mot, when Andy Belski, Piper Belski, Talon Belski, Andrea Corlett, Dan Green, Jared Habiak, and Vince Massey flew in from Canada, and Chris Schillios from Utah. Now we had plenty of sketchers. The next day, March 27, I missed caving because I had to go to the dentist. The rest of the crew headed back out to Jaguar Jaw, along with Czech and Spanish cavers František Srnec, Daniel Hutňan, Lenka Doleželova, Mario Zabaleta, and Cecilio López. With three survey teams working their way side-by-side into the ever-widening maze of the Jaguar Jaw, considerable progress was made.

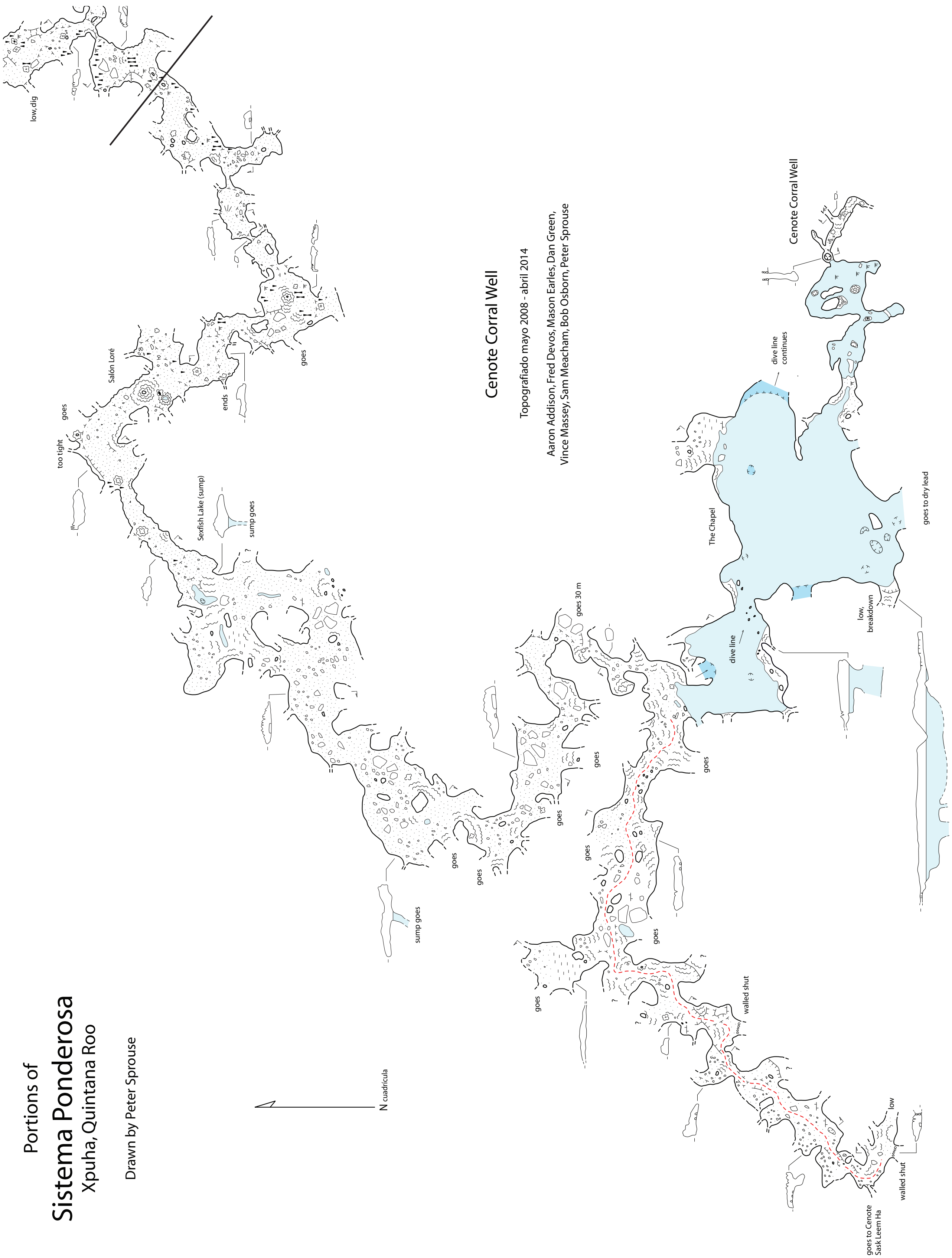
Jaguar scat in Jaguar Jaw. *Juan Laden.*

March 28 was downtime for some of the crew, as Peter was taking the day off to pick up Terri at the airport and René, Bill, and George were taking a tourist day to Cobá and the beach. I stayed at Casa Mot Mot with Gil and finished reading *The Lost World of Quintana Roo* while we waited to meet up with a caver that lived down there, Nick Banks. Turns out that Nick is an old-time NSS caver and has some caves on his property. Some of these, including Cueva Pica Piedra, had been mapped by French cavers in the 1990s. Gil and I ended up getting a tour of his caves, though we didn't survey them this trip. Nick was really interested in caving with us. That night René and Gill went over to Nick's and got the tour.

Saturday the twenty-ninth saw the Jaguar Jaw survey crews increase to four. René worked with me and Jared, Andrea had George, Chris, and Bill, and Andy had Gill, Talon, and Piper. One characteristic of surveying in these caves is that you can have several crews in the same area, and because of the lack of walls, columns everywhere, and the openness of the caves, you never got far from your starting point for the day. We could leave our cave packs in one place, survey all day, and not be farther than a hundred meters from them at the end of the day. The whole day we would tie into the stations of the party next to us. It was like a relay, as each survey team coordinated on stations and where we would tie to each other. Doing profiles was pretty much out of the question, and just deciding where to do a cross section usually had to wait till the end of the day, when you could find the boundaries of the section you were in.

Addy Alcocer and Elsi Lara drove over from Mérida for the weekend. They accompanied Peter to check out a reported dry cave adjacent to the Chac Mol underwater cave system. Cueva Seca proved to be rather short. Then they met up with cave-diver David Mayor to look at some caves just to the south in the Lu'um Balam nature park, where a number of cenotes are known. David


Cech Chen
Topografiado agosto 2013 - diciembre 2014
Stan Allison, Gosia Allison-Kosior, Frank Binney, Kirsten Fawcett, Aida Ferreira, Andrea Futrell, Nico Hauwert,
Tara Hauwert, Devra Heyer, Andy Koch, Barbara Luke, Gabriela Martinez, Kayleen McMonigal, Ben Schwartz,
Cori Schwartz, Zach Schwartz, Peter Sprouse, Terri Sprouse, Jacinto Vela, Susan Wall,
Mario Zabaleta, Matthew Zappitello, Saj Zappitello
Entrada Cech Chen
low
small
The Digging Channel
The Bat Channel
Momentum Crawl
formation choke
Aukwardlandia
goes
goes, low
Jehovah's Crawl
Salón David Balam
low, dig
metros
0
10
20
30
40
50


Portions of
Sistema Ponderosa
Xpuha, Quintana Roo
Drawn by Peter Sprouse
N cuadrícula
Cenote Corral Well
Topografiado mayo 2008 - abril 2014
Aaron Addison, Fred Devos, Mason Earles, Dan Green,
Vince Massey, Sam Meacham, Bob Osborn, Peter Sprouse
Cenote Corral Well
dive line continues
The Chapel
goes to dry lead
low, breakdown
dive line
goes 30 m
goes
walled shut
low
goes to Cenote Sask Leem Ha
sump goes
Sexfish Lake (sump)
too tight
Salón Loré
ends
low, dig

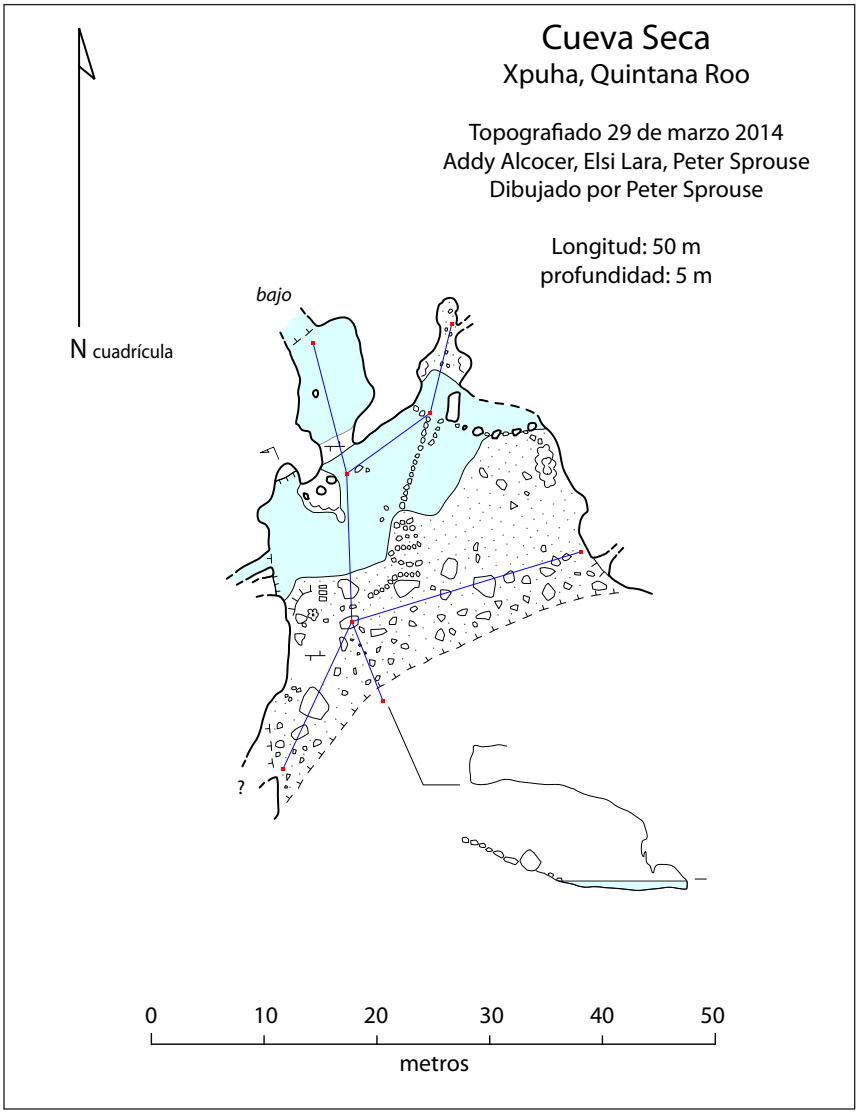
Rene Ohms and George Sanders at entrances to Jaguar Jaw. *René Ohms.*

took them to a dry cave called Cueva de Alux. They only had time to survey 89 meters in this, but it looked interesting. David returned later and mapped another 400 meters.

March 30 was a big yet relaxed day in the caves. Gil and his wife Pat came. Peter had George, Nick, and Elsi with him; they mapped west and south in Jaguar Jaw in the area where the big collapse ends. René worked with me and Addy. Andrea's team was Piper, Terri, and Chris, and Andy had the boys team, Talon, Josh, and Jared. Josh was Vickie's son, and he was really interested in what we were doing and got to spend time with all of the crews in the cave. Big Gill stayed on the surface to continue lopping the dreaded punji stakes on the trail. Enough cannot be said about the benefit it was to the whole effort to have those like Gil, Alan, and Gill make trails for us. In that heat and humidity, it was really a challenge to do trail work.

Every evening we would enter data into Walls, the cave-mapping program. We would start at a restaurant and finish at Casa Mot Mot. Every night it was exciting to see what we had done and where the cave was going in relation to the surface features. We were averaging pretty well a kilometer a day of surveyed passage.

On April 1 Peter, Dan, and Vince went to Sistema Ponderosa, a 15-kilometers-long underwater system that had recently been connected to a dry cave, Cech Chen. They planned to meet up with cave divers Fred Devos and Sam Meacham in order to tie together the underwater and dry surveys. They entered by rappelling into an entrance called the Corral Well, while the divers scootered in from Cenote Eden. Using inner tubes, non-divers swam out into the large lake known as the Chapel, and soon they could hear the whine of the scooters below them. After the tie-in work, the divers proceeded farther into the underwater passages, while the dry cavers connected the surveys from Cech Chen to Corral Well. After that they mapped a dry passage extending to the southeast toward Kantun Chi. René and I surveyed together on her last day. Jared was cut loose with a sketch book. and he took Chris with him. Big Gill and Allen did trail work again, trying to go from the north end of the system to connect some of the known entrances in the jungle. Those of us who were surveying were working in what was



Back row: Jaren Habiak. Gill Ediger, Nick Banks, Bill Koerschner, Talon Belski, Christopher Schillos, Andy Belski, Piper Belski, Elsi Lara, Peter Sprouse, Andrea Corlett, Addy Alcocer, René Ohms. Front: George Sanders, Juan Laden, Terri Sprouse, Pat Harmon, Chance the caving golden retreiver, Gil Harmon, Josh Beal. *Andy Belski.*

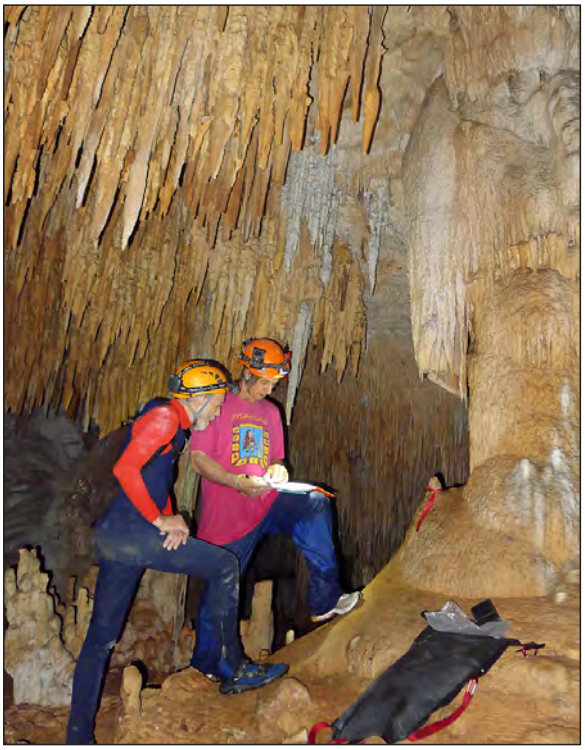
now called Jaguar Claw, separated from Jaguar Jaw by a collapse. We were heading towards the Litter Box Entrance, the farthest north that Peter, Monica, and I had gone the second day with Gill. Where we jumped out into the jungle to go to the Jaguar Claw section there was an old pile of Jaguar scat, all hair and giant compared to anything any dog has left behind.

After a good day in the caves, we went over to Nick's place in Puerto Aventuras and had a BBQ. We ate chicken and bonito and mahi-mahi that Nick had caught, with plenty of beer and margaritas. Talon and Piper had a fine time in the swimming pool. After camping out, it was like being in a different world to enjoy Nick's house and food and drink.

On April 2, Peter took Terri and Liliana to Jaguar Maw, since it was the closest in the system and Liliana had to take off early again. They headed to the the south side of it to try to bypass the collapse and possibly tie it into Jaguar Paw via a circuitous route around the far side of the collapse. The connection remained elusive. Jared led Vince and George surveying out of the Knee Tree Entrance, while Dan and I mopped up what René and I had started the day before and heading out towards Metateville, an entrance that was occupied by indigenous peoples and was a sort of hub of the cave in its development towards the north and west.

April 3 saw us back to five survey teams. Peter stayed with Chris in Jaguar Jaw, and Andrea had Mario and Nick heading out to the south into some wet areas from Jaguar Jaw. The rest of us, Dan, Vince, and me and Jared, George, and Geraldine went out to Jaguar Claw. Jared's team mopped up leads out of the Knee Entrance, and our team jumped on through and started adding on to the room that we had surveyed out of Metateville. Andy, the kids, and Big Gill went even farther north. The next day the teams continued in more or less the same areas, but I had to go back to the dentist and get a crown installed and so missed

George Sanders and Juan Laden in Xibalba. *René Ohms.*



Vince Massey entering the Corral Well. *Peter Sprouse.*

March 2014 Quintana Roo expedition survey totals

Cave name	*Mar 2014 survey (m)**	*Total cave length with previous surveys (m)*	*notes*
Jaguar Jaw	7327		
Jaguar Claw	3635		
Jaguar Paw (formerly Ox Balam)	1020	2488	
Jaguar Maw (formerly Chi Balam)	831	1809	
Sistema Ponderosa (Cech Chen, Corral Well)	367	16619	Connections of Cech Chen and Corral Well added about 1.6 km to this system
Sistema Gavilán	269	930	
Cueva Media Vida	250		
Xibalbá	211	724	
Ventana Secreto	133		
Cueva Pecarí	106		
Cueva de Alux	89		
Imix	88	582	
Cueva Seca	86		
total	**14412**		

another day of caving. That evening we headed into Playa del Carmen for the first anniversary party of a local caving group, the Círculo Espeleológico del Mayab. It was at Mario Zabaleta's house, a cozy place hidden behind a wall and hemmed in by tall concrete commercial buildings. The entry was dominated by a magnificent strangler fig with its hanging roots trimmed to create a natural tapestry. A small veranda in the back had a small pool, and the whole place was packed with cavers. While there, we ended up recruiting lots of folks to come caving with us on our last day.

So the next day we had a real crowd at the roadhead, ready to survey before we headed home. We had the whole family of Alan and Liliana, as well as Vickie's son Josh. Andy and I started the day out with Talon, Piper, and Josh and ended up getting into a nice water section of the cave with fruit bats and left an area that would take at least a whole day more to survey. After we all met for lunch in an entrance, the kids went off with Liliana and did some mapping on their own. Josh came back at the end of the day with his own map that he had sketched. For a final hurrah, we went out to Nick's place for another BBQ evening. There was lots of food, drink, and swimming by the young and not so young. Gil and Pat came over, and so we had a real fine gathering. We were able to say all of our goodbyes and then head back to camp to prepare for leaving in the morning. We had done another two weeks of surveying and added another almost 14 kilometers of surveyed passage. So much done and so much more to do. This is a giant project, and it is good to be a small part of it, and besides that, it is just plain fun.

El Rey Jaguar

En marzo de 2014, cueveros topografiaron alrededor de 14 kilómetros de cueva no sumergida en Quintana Roo, en su mayoría en el Sistema Jaguar. Se topografiaron las cuevas secas Cenote Pozo Corral y Cech Chen, parte del sistema sumergido Ponderosa en Xpuha.

Mario Zabaleta died of a heart attack on February 20, 2015. I love the story of how Mario ended up in Mexico. A native of Madrid, he had travelled the world some 25 years ago, visiting among other places Playa del Carmen in Quintana Roo. One night after he returned home he had a dream that he was to become a diving guide in Mexico, so he promptly moved there. Mario worked out of the Paamul dive shop for years and introduced many people to cenote diving. I got to know him about three years ago when he came dry caving with us, which he enthusiastically embraced. Soon he was a founding member of the Círculo Espeleológico del Mayab AC and dedicated himself to raising awareness about caves and caving. Fighting to preserve the many caves under threat in Playa del Carmen was never an easy task, but Mario stepped up to the plate like no one else I know. Though his work was cut short, he pursued a number of campaigns to successful outcomes, and will remain a model for the rest of us to follow.—Peter Sprouse

SUMMER WITH THE JAGUARS

Peter Sprouse

Once again in 2014 the steamy month of August proved to be a productive time for cave mapping in Quintana Roo. A large gathering of old and new caver friends continued surveying the massive caves in the Jaguar complex in Paamul, adding 8.5 kilometers to Jaguar Claw, the largest segment of disconnected cave. Also near Paamul, a cave called Carretera Perdida (Lost Highway) that had been explored years before by Paamul Grotto members was mapped. Two caves near Xpuha, Xibalbá and Imix, were connected via sump diving [see maps in *AMCS Activities Newsletter* 37, pages 158 and 159]. Surveys continued in Cueva de Cámaras, Sistema Trono, and the Cech Chen area of Sistema Ponderosa.

In Jaguar Maw, several hundred meters of maze passages were surveyed in the Perforation Hall area.

Considerable surveying was done in the western branch of Jaguar Jaw beyond the end of a collapse. Several thousand meters were mapped in extensive mazes with lakes. This area ended in another collapse. The southeast area of Jaguar Jaw, along the south side of the collapse, was mapped farther to the southeast and continued in some crawlways. Some survey was done in the northeast part of Jaguar Jaw, as well, in an attempt to find a way around a collapse to connect to Jaguar Claw, without success.

The largest amount of survey on the trip occurred in Jaguar Claw, where massive maze areas had been explored earlier in the year by Paamul Grotto members. Mapping proceeded to the west, and we succeeded in tying into a survey line coming south from Cueva de Los Vencejos that had been done earlier by Alan Formstone. There was a vast amount of walking maze passages on either side of this AGD Line survey that would occupy several more expeditions. Another cave, dubbed Jaguar Craw, was found across a collapse to the west and continued westward.

On the Rancho Dos Amores we had previously mapped two caves, Imix and Xibalbá, that trended towards each other but were seemingly separated by a sump over 100 meters long. Fred Devos and Osama Gobara joined us one day to dive this. They were able to make the connection and map and sketch it as well. Meanwhile Hainer Brooks, Aubri Jenson, Chad Pedigo, Owen Pedigo and I finished mapping the dry sections at the south end of this system, Sistema Dos Amores.

Cech Chen, also known as Dennis's Cave, is a dry crawlway maze just south of Puerto Aventuras that had previously been connected to Sistema Ponderosa. Aida Ferreira, Andy Koch, and I spent half a day mapping toward the north in this cave,; there is plenty left to do.

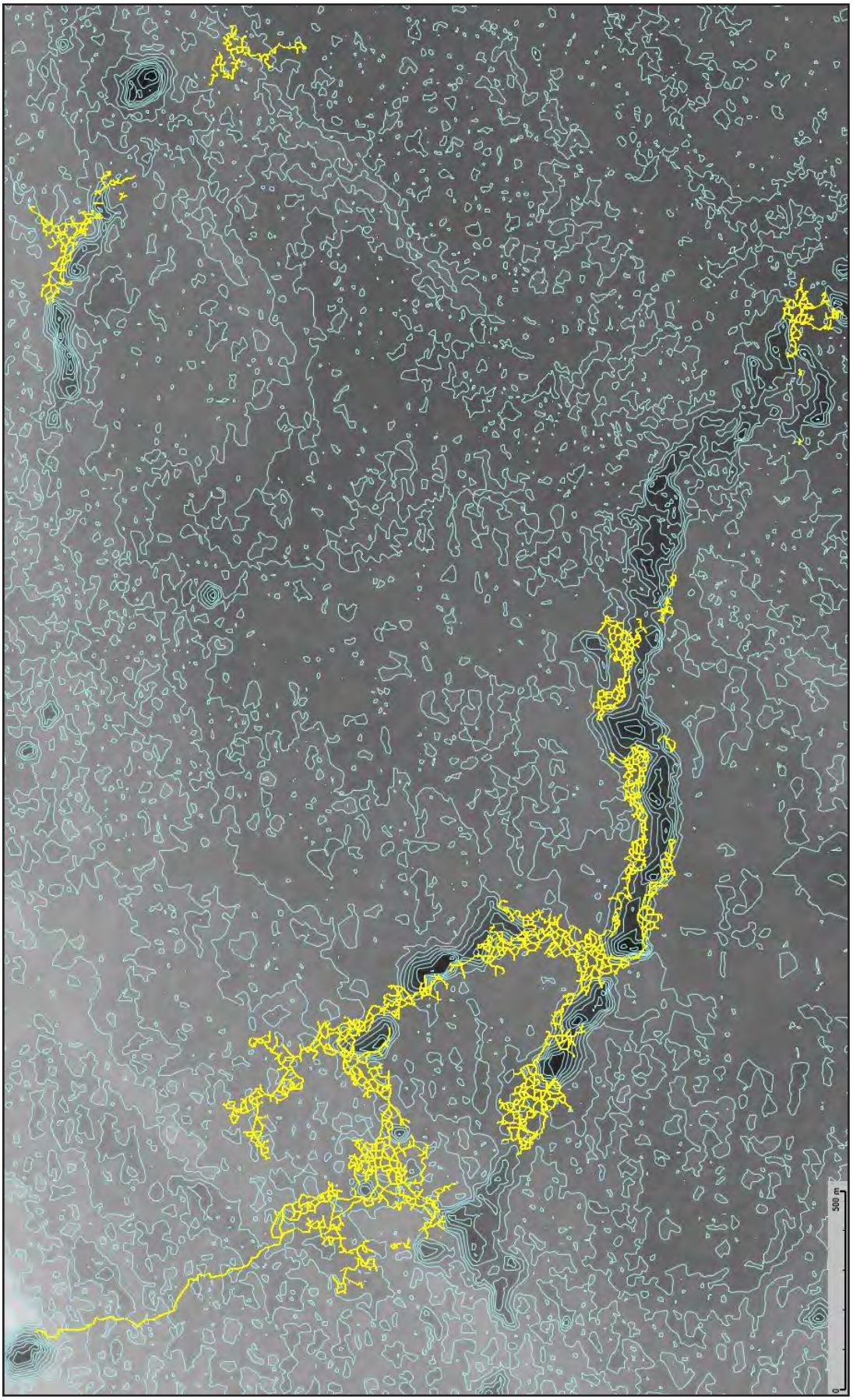
Aaron Addison continued with his long-running survey in Cueva de Cámaras in Akumal. A couple more entrances were found at the north end of the cave and 683 meters were added to the survey, making it 3811 meters long. As usual there is a lot left to map in this cave.

An initial attempt failed to locate Cueva Carretera Perdida, which was located out a long trail, the Lost Highway. Gil Harmon guided the group on the second trip, and with a large number of teams 1834 meters were surveyed in one day, but the survey was not completed.

Sistema Trono was visited primarily so that Ben Hutchins and Jean Krejca could photograph aquatic fauna in the lake. They were successful in shooting pictures of several crustaceans and a blind fish, but the

petersprouse@yahoo.com

Kristina Hagar in one of the entrances to Jaguar Claw. *Jean Krejca.*

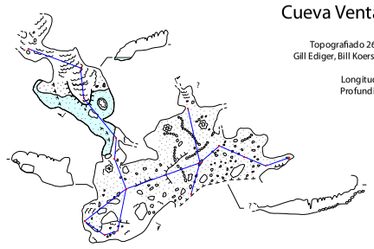


Area map showing system of Jaguar caves along the depression, as well as some other caves in the area. The line running off to the sinkhole to the north (top) is the AGD survey.

Cueva Ventana Secreto

Topografiado 26 de Marzo 2014
Gill Ediger, Bill Koerschner, Peter Sprouse

Longitud: 133 m
Profundidad 8 m



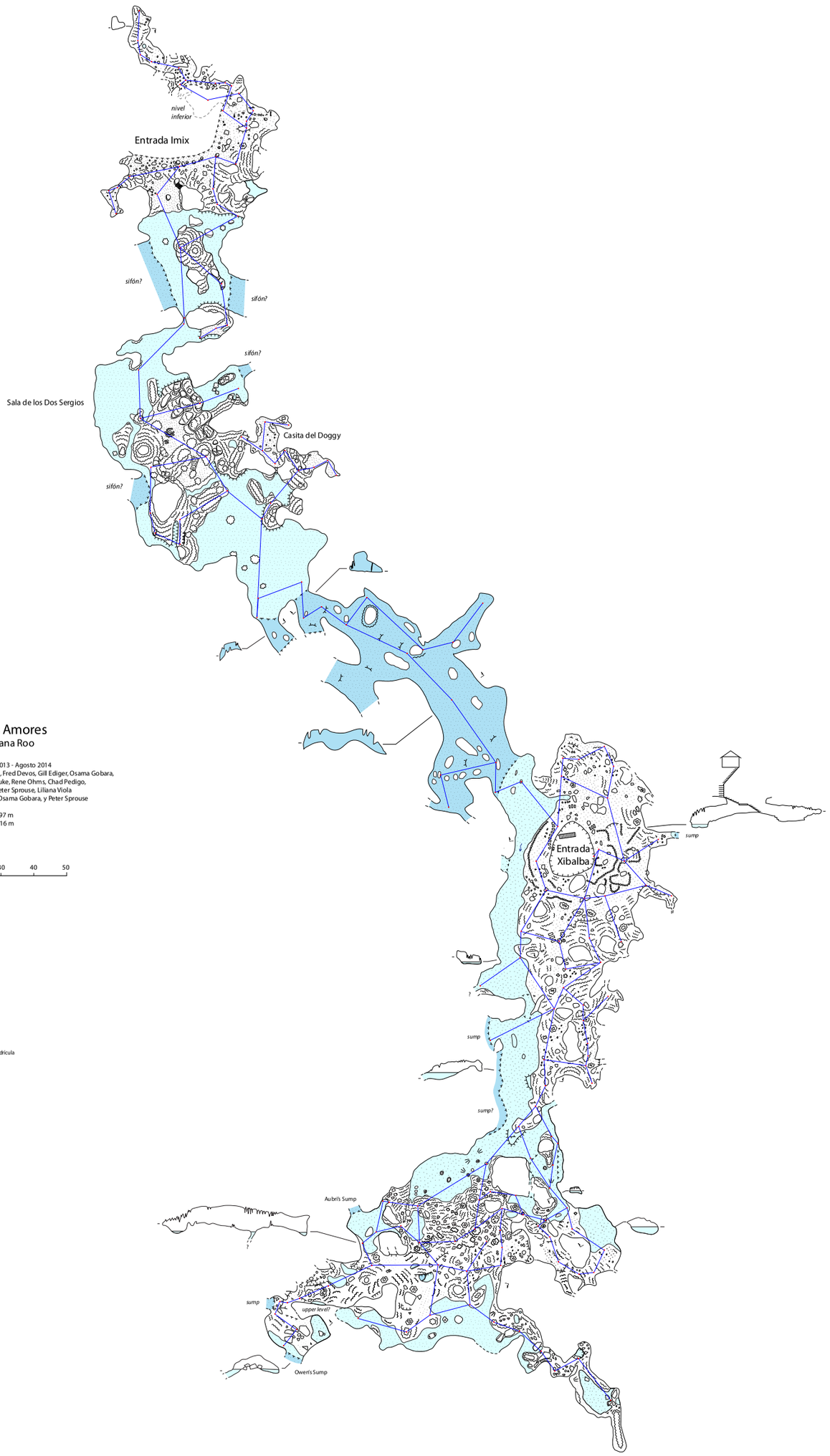
Sistema Dos Amores
Xpuha, Quintana Roo

Topografiado Diciembre 2013 - Agosto 2014
Gosia Allison-Kosior, Stan Allison, Hainer Brooks, Fred Devos, Gill Ediger, Osama Gobara,
Bill Koerschner, Juan Laden, Barbara Luke, Rene Ohms, Chad Pedigo,
Owen Pedigo, George Sanders, Peter Sprouse, Liliana Viola
Dibujado por Stan Allison, Fred Devos, Osama Gobara, y Peter Sprouse

Longitud: 1897 m
Profundidad 16 m

0 10 20 30 40 50
metros

N cuadricula



Cave life in Sistema Trono. Photographs by Jean Krejca. Ben Hutchins helped identify the animals. Clockwise from upper left:

Dama blanca (white lady) fish *Typhliasina pearsei*.

Large cave shrimp, possibly *Creaseria morleyi*.

Isopod, probably *Creaseriella anops*.

Schizomid on rock.

Medium-size cave shrimp.

Ben Hutchins.

Nick Banks in Jaguar Claw. *Jean Krejca.*

blind eels were too wily to capture. Meanwhile Justin Camp, Kristina Hager, and I mapped another 178 meters of crawlways, making the cave over 1500 meters long.

Altogether it was a very successful trip, with the seemingly endless Jaguar caves contributing the most to our combined total of 14,969 meters mapped.

Participants: Aaron Addison, Nick Banks, Hainer Brooks, Jill Brooks, John Brooks, Justin Camp, Alan Chuc, Fred Devos, Pam Duncan, Gill Ediger, Osama Gobara, Andy Edwards, Aida Ferreira, Melissa Galván, Kristina Hager, Gil Harmon, Jasmina Hirschl, Ben Hutchins, Aubri Jenson, Pat Kambesis, Larry Keele, Andy Koch, Howard Kalnitz, Ivo Kalushev, Jean Krejca, Barbara Luke, Scott Linn, Kevin McPeak, Tania Ocampo, Kathleen O'Connor, Chad Pedigo, Owen Pedigo, Ambar Plascencia, Bev Shade, Maria Shagina, Andrew Staniskevski, Peter Sprouse, Terri Sprouse, Monica Torre, Deysi Uc Puc, Michel Vázquez, Jacinto Vela, Liliana Viola, Ollie Wilson, German Yañez.

Cave name	*Aug 2014 survey (m)*	*Total cave length with previous surveys (m)*	*notes*
Sistema Jaguar Claw	8519	14184	Includes Cueva de los Vencejos connection
Sistema Jaguar Jaw	2552	9874	167 entrances
Cueva Carretera Perdida	1834		
Cueva de Cámaras	683	3811	
Sistema Dos Amores	591	1306	Created by connection of Imix and Xibalbá
Sistema Jaguar Maw	241	2051	
Sistema Trono	178	1508	Includes underwater survey by Camilo García
Sistema Ponderosa	137	16756	
Sistema Jaguar Craw	130		
Aktun Mux	47		
Cueva Polia Ojos Rojos	31		
Cueva Ben's Depression	26		
total	**14969**		

Verano con los Jaguares

La expedición de agosto de 2014 a las cuevas no sumergidas de Quintana Roo exploró casi 15 kilómetros, en su mayoría en el Sistema Jaguar, una serie de cuevas laberínticas en la selva separadas por colapsos. Dos cuevas en el rancho Dos Amores, Imix y Xibalba, fueron conectadas mediante buceo.

THE LAST CAVE EXPLORATION IN VILLA LAS ROSAS, CHIAPAS

Kaleb Zárate Gálvez, Cecilio López Tercero, and Omar R. Ortega Chavarría

The *municipio* of Las Rosa, formerly known as Villa Las Rosas, is located near Comitán, in the center of Chiapas in southern Mexico. This area has high mountains, up to 2000 meters above sea level, in the northeast, but also, in the southwest, plains and semi-flat terraces around 1000 to 1300 meters with springs with high flow, the most important of these being El Vertedor. These springs nourish the reeds that support the economy of Venustiano Carranza and Socoltenango, other important municipalities located within Chiapas.

Unfortunately, speleological exploration of the area around Las Rosas is poorly documented. We know that some explorations have been carried out by Grupo GALES, a local team of cavers from Comitán, which is currently inactive. In talks with Grupo GALES, we were told that very few caves had been surveyed and that none of this information has been published. Also Italian cavers, sometimes in company with members of GALES, have explored other caves in the area, almost all of them are between Comitán and the boundaries of Las Rosas.

In 2006 the Grupo Espeleológico Jaguar A.C. began a significant caving project in this area, initially as part of studies promoted by the municipal council and the Comisión Nacional de Areas Naturales Protegidas to declare a natural protected area Pueblo Viejo, named for the most important archeological site in Las Rosas. So far the protected area has not been established due to opposition from some villagers. During 2006–2007 about twenty caves were explored and documented; some of these results were published in *Mundos Subterráneos* (Merino et al., number 20, August 2009, pages 50–56). In subsequent years we set aside this project until 2013, when we reactivated it. All the explorations were supported in large part by the *municipio* of Las Rosas and others in the surrounding area. The final explorations of 2013 and 2014 are described below.

grupojaguar@yahoo.com.mx

EXPEDITION 2013

This expedition occurred November 23–30, with the participation of eleven cavers (nine Mexicans, an Italian, and a Spaniard), as well as some local people. The reception by the locals was pleasing, especially by the municipal council. The team was divided into two groups; one explored the highlands from a base camp in the town of El Cabildo, and the second group remained in the municipal seat, exploring the nearby caves. Both groups were in radio communication each night, with the help of the Municipal Civil Protection agency. On the mountain around ten pits and sinks were explored, while in the lowlands fifteen caves were visited. In addition, some previously known caves were revisited and resurveyed. In all, twenty-five new caves were discovered; the most important ones are described here.

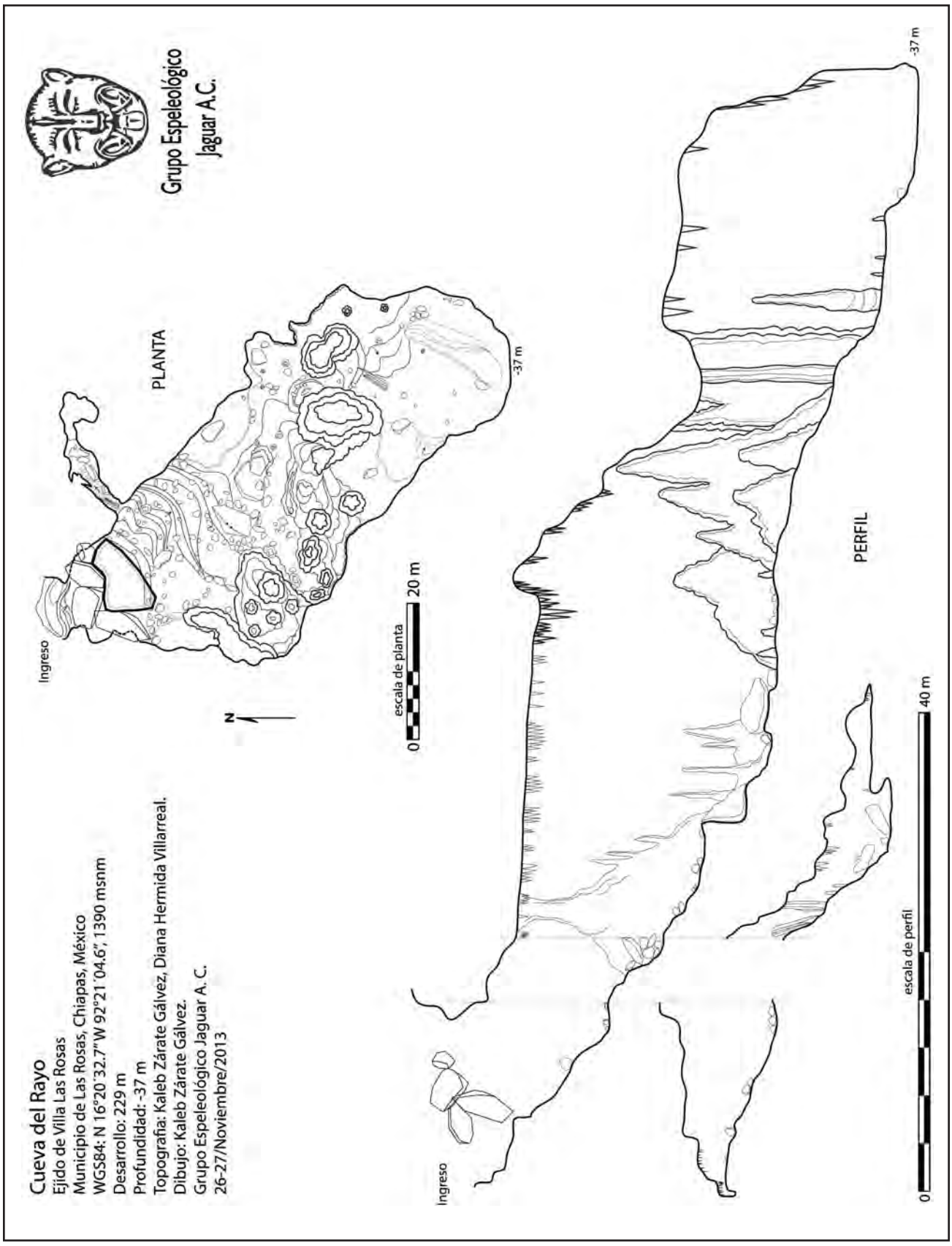
Sumidero de la Cascada. This is a huge hole where a thin surface stream enters in a 30-meter-high waterfall. The local people say that during the rainy season the amount of water is surprising. The bottom is completely muddy, including a high mound of mud in the center, except at the bottom of the waterfall. Located on the wall in front of waterfall there is a small and narrow impenetrable hollow where only water goes. We thought this could be the entry into a great subterranean world.

Sótano del Golondrino. This fossil cave opens to the surface in a hole that is 3 meter in diameter. The initial 5-meter shaft leads to a ledge, from which you can see a large room below, entered by a 20-meter shaft, with a large number of formations. From the bottom of the drop, a ramp descends to a hole between a group of blocks. There are many cave pearls and other formations in this cave.

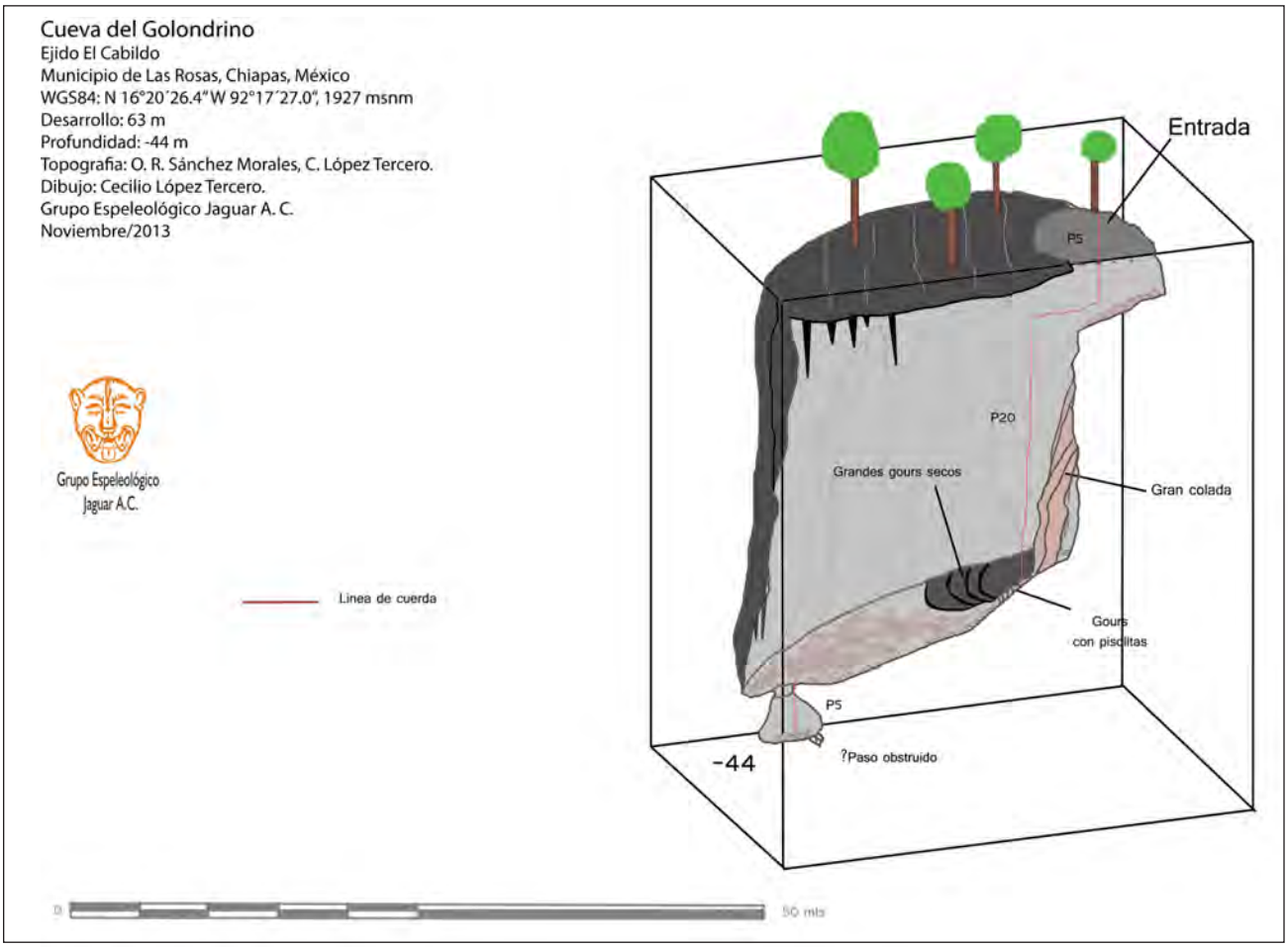
Sumidero de Jesús. This sink is at one end of a surface stream, and the entrance is of medium size and leads to a wide room. Beyond, there is a 5-meter hole and then a 15-meter shaft that leads to a meander. Towards the end, this narrow passage opens up into a 9-meter shaft that near the bottom is divided by a big rock. Beyond a little room and a short 3-meter shaft the cave dimensions become too small.

Cavidad CB7. This is a predominantly horizontal cave that can be accessed by down-climbing a 3-meter shaft. At the bottom, there is a little room where ceramic fragments and what appears to be an ancient man-made wall are seen. Some meters away there is an impenetrable second opening to the surface.

Cueva de Santa Helena. This cave begins with a ramp that leads into a big room. Down to the right is a smaller room and another ramp that is approximately 3 meters in length and more secure with a rope handline. This leads to a short meander that ends at a group of blocks that we found to be impenetrable. Upon returning to the first room, we noticed that to the left there was another


Cueva del Rayo
Ejido de Villa Las Rosas
Municipio de Las Rosas, Chiapas, México
WGS84: N 16°20´32.7" W 92°21´04.6", 1390 msnm
Desarrollo: 229 m
Profundidad: -37 m
Topografía: Kaleb Zárate Gálvez, Diana Hermida Villarreal.
Dibujo: Kaleb Zárate Gálvez.
Grupo Espeleológico Jaguar A. C.
26-27/Noviembre/2013
Grupo Espeleológico
Jaguar A.C.
PLANTA
Ingreso
N
escala de planta
0
20 m
-37 m
PERFIL
Ingreso
escala de perfil
0
40 m
-37 m

The big room in Cueva del Rayo. *Mattia Cannatà.*

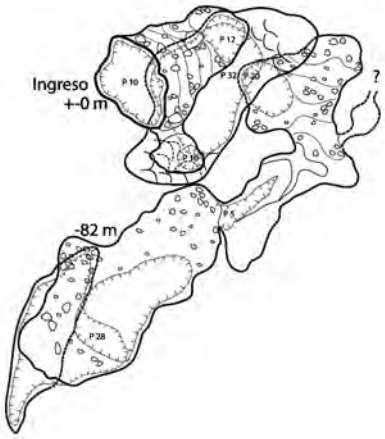


Sima de Jacob

Colonia Las Guayabitas
Municipio de Las Rosas, Chiapas, México
WGS84: N 16°20´24.5" W 92°19´31.5", 1770 msnm
Desarrollo: 20 m
Profundidad: -82 m
Topografia: K. Zárate Gálvez, H. Montaño Moreno.
Dibujo: Kaleb Zárate Gálvez
Grupo Espeleológico Jaguar A. C.
28-29/Noviembre/2013

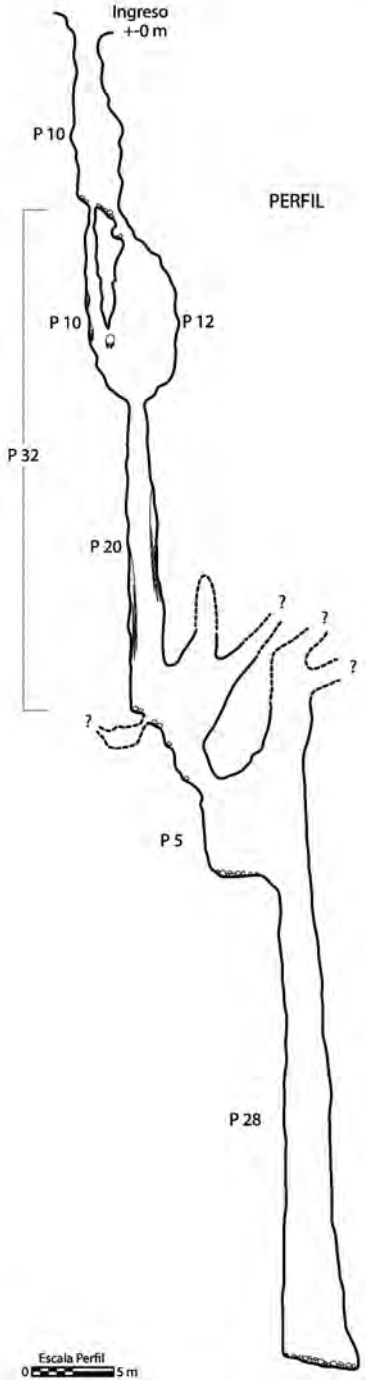
Grupo Espeleológico
Jaguar A.C.

PLANTA



Escala Planta
0 2 m

PERFIL



Escala Perfil
0 5 m

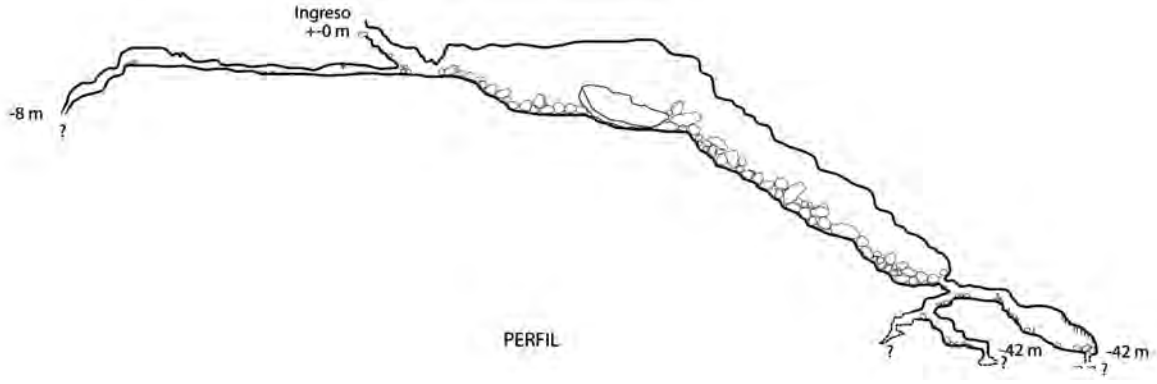
Cueva del Río Escondido

Colonia Ixtapilla
Municipio de Las Rosas, Chiapas, México
WGS84: N 16°22´09.6" W 92°26´05.7", 1054 msnm
Desarrollo: 169 m
Profundidad: -42 m
Topografia: K. Zárate Gálvez, H. Montaño Moreno, J. B. Guerrero Alegría.
Dibujo: Kaleb Zárate Gálvez
Grupo Espeleológico Jaguar A. C.
25/Noviembre/2013

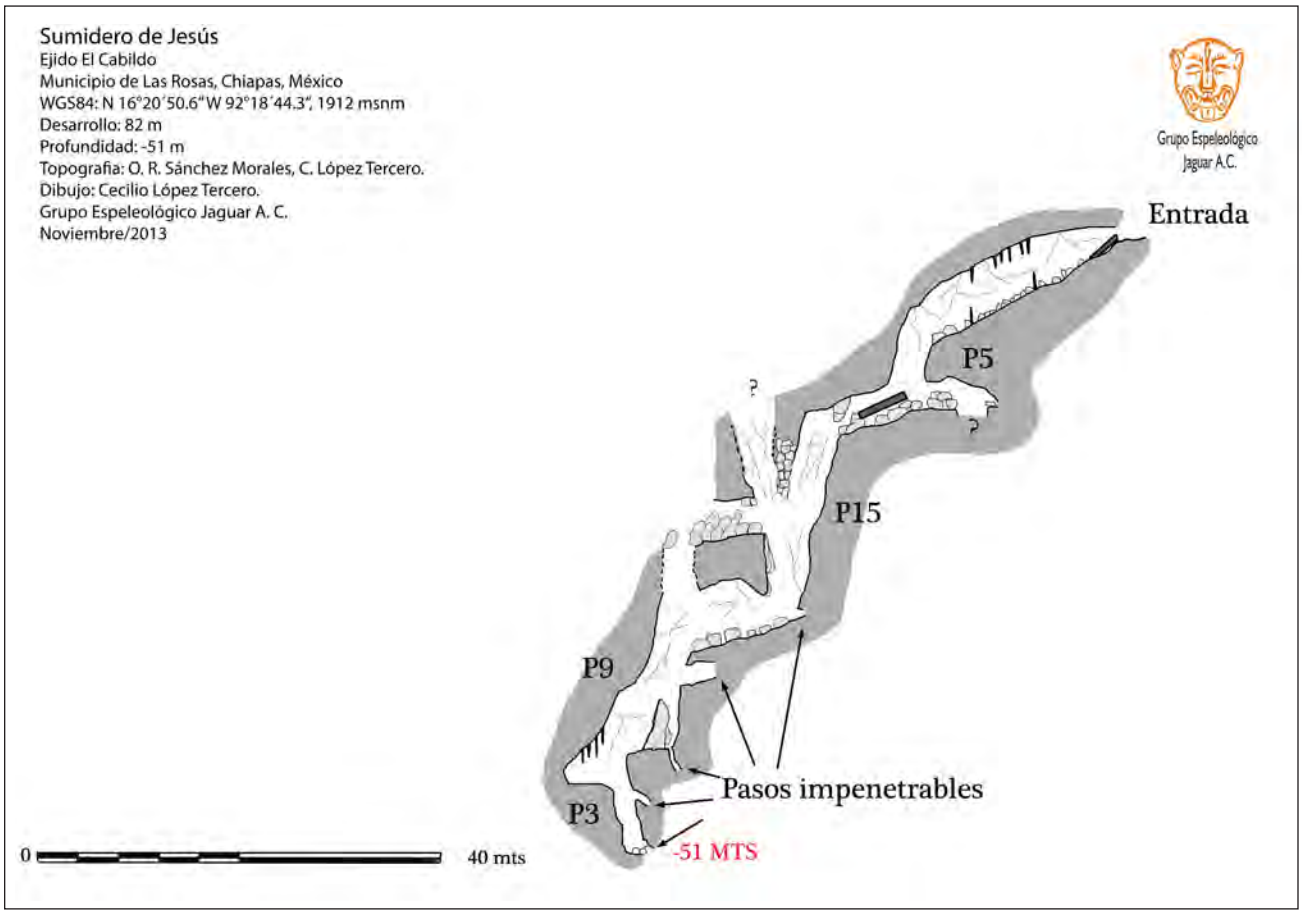
Grupo Espeleológico Jaguar A.C.

PLANTA

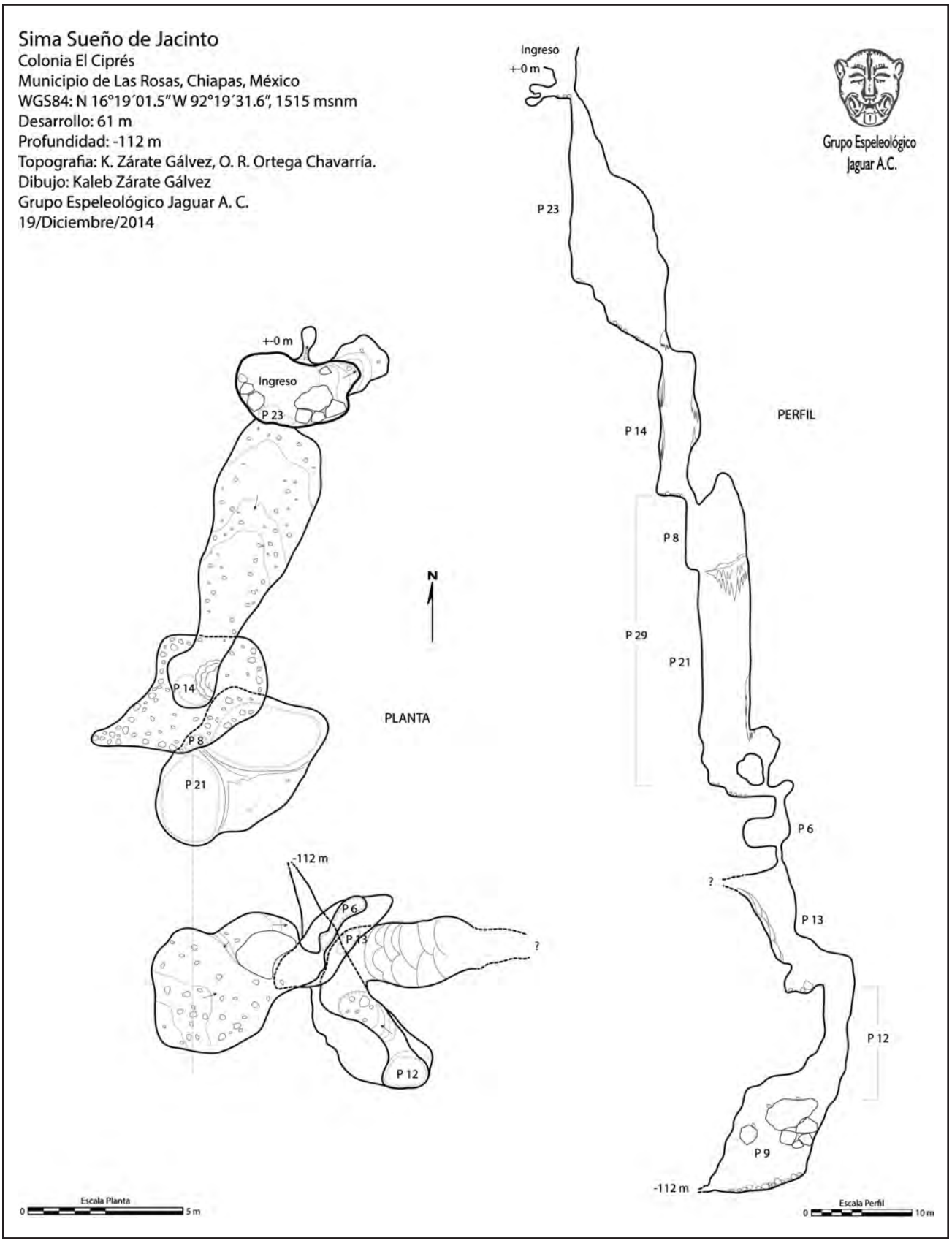
Escala planta y perfil
0 20 m

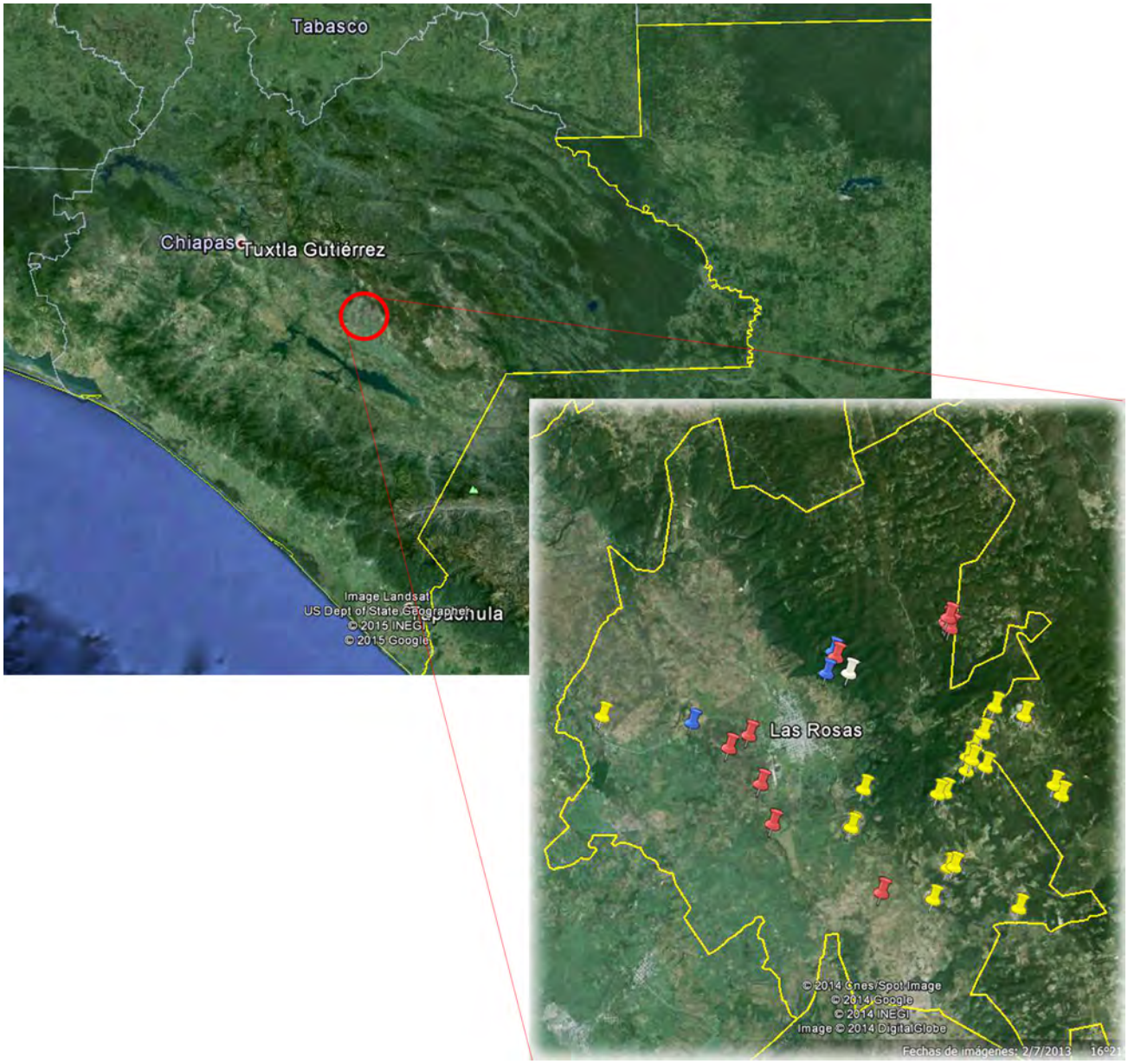


PERFIL



Kaleb Zárate in the entrances to Sima Profunda (left) and Sima del Jacob. *Oscar Sánchez, Mattia Cannatà.*


Sima Sueño de Jacinto
Colonia El Ciprés
Municipio de Las Rosas, Chiapas, México
WGS84: N 16°19´01.5"W 92°19´31.6", 1515 msnm
Desarrollo: 61 m
Profundidad: -112 m
Topografia: K. Zárate Gálvez, O. R. Ortega Chavarría.
Dibujo: Kaleb Zárate Gálvez
Grupo Espeleológico Jaguar A. C.
19/Diciembre/2014
Grupo Espeleológico Jaguar A.C.
PERFIL
Ingreso
+-0 m
P 23
P 14
P 8
P 29
P 21
P 6
?
P 13
P 12
P 9
-112 m
Escala Perfil
0
10 m
PLANTA
N
+-0 m
Ingreso
P 23
P 14
P 8
P 21
-112 m
P 6
P 13
?
P 12
Escala Planta
0
5 m



Troglobitic crab in Cueva del Ciprés. *Mattia Cannatà.*

passage that connects beyond the meander. There were footprints of previous visitors, quite possibly some local villagers.

Cueva del Río Escondido. This fossil cave opens at the surface and has a medium-sized entryway. Immediately upon entering, we found a large, open room, both wide and high, with much breakdown from collapse of the roof. The route continues above and between big rocks. At the end of the big room there is a narrow passage between blocks that leads to the left and arrives at a smaller room. The final passage was closed off with blocks, but after moving some of these blocks it was possible see downward to a thin stream. At this point, the cave is impenetrable. As we returned to the entrance, we noticed a narrow meander to the north that ends in a tight spot.

Cueva del Rayo. This is a huge fossil grotto where the entrance was formed by the collapse of its roof. It currently lacks an active watercourse, but it is remarkable that some runoff and drips have formed large stalactites, stalagmites, and thick columns throughout the entire cave. The access is easy, between large blocks, and it quickly opens up into the main gallery 30 meters wide by 15 to 20 meters high. Large columns and flowstone nearly block the way into a second room. Twenty meters from the entrance, on the left side, another narrow gallery was found, but it closed within a few meters. This is a beautiful cave that is well known and visited by locals.

Sima de Jacob. From an exploration perspective, this was perhaps the most interesting cave found during the expedition because of its vertical nature. The entry, of modest dimensions, is a 10meter drop, and right away it opens up into a 30-meter pit. At the bottom a ramp gives access to a 5-meter drop. After a 28 meter pit the cave ends abruptly at the bottom. This cave has an overall depth of 82 meters.

In general the 2013 expedition proceeded well, but in a town called Guadalupe Buenavista, belonging to the municipality of Comitán, the people were negative about exploration and upset by our presence. Apparently somebody had invented a lie that we had tried to assault one of them, and others were saying that we were kidnappers, and so the entire town immediately turned against us. We had gone to this town because in 2010 an official letter had been sent to us asking us to explore one cave as a possible source of water. In this area there are no surface streams present, and most of the water used by the population comes from the collection of rainwater. Unfortunately, the letter took two years to reach us. Eventually the misunderstandings were cleared up with the help of the letter, and the local people turned out to be very important for finding caves, because several of them were shown to us, especially as we earned their trust. Near the end of the expedition, as almost always happens, we found several news pits that we didn't have time to explore. This expedition was given accomodations and food by the municipal council and also sponsored by KarstKari caving equipment.

EXPEDITION 2014

Animated by the results of our last expedition, we organized another one for December 13–21, 2014. Once again, eleven Mexican cavers participated, but this time the explorations were around the towns of El Ciprés and Villa Las Rosas. Fifteen new caves were explored and surveyed. The most interesting are described below.

Sima de las Lajas. A sink near to the road quickly closed at the bottom of an 18-meter shaft. Fortunately, we discovered that there is a narrow window halfway down the shaft that gave us access to a new 30-meter shaft. Beyond, the cave continues, but it was not possible to return to do a complete exploration and survey.

Sima Profunda. A 65-meter-deep pit that opens in the middle of a corn field. The entryway is quite narrow and divided by a large rock. It is closed at the bottom.

Sumidero del Vecino. A 39-meter-deep blind pit of modest dimensions opens at the end of a surface stream, but the bottom is clogged. Other small caves were explored nearby: Cueva de la Ardilla Loca, Sima Bonita, Sima de los Opiliones, and La Fisura.

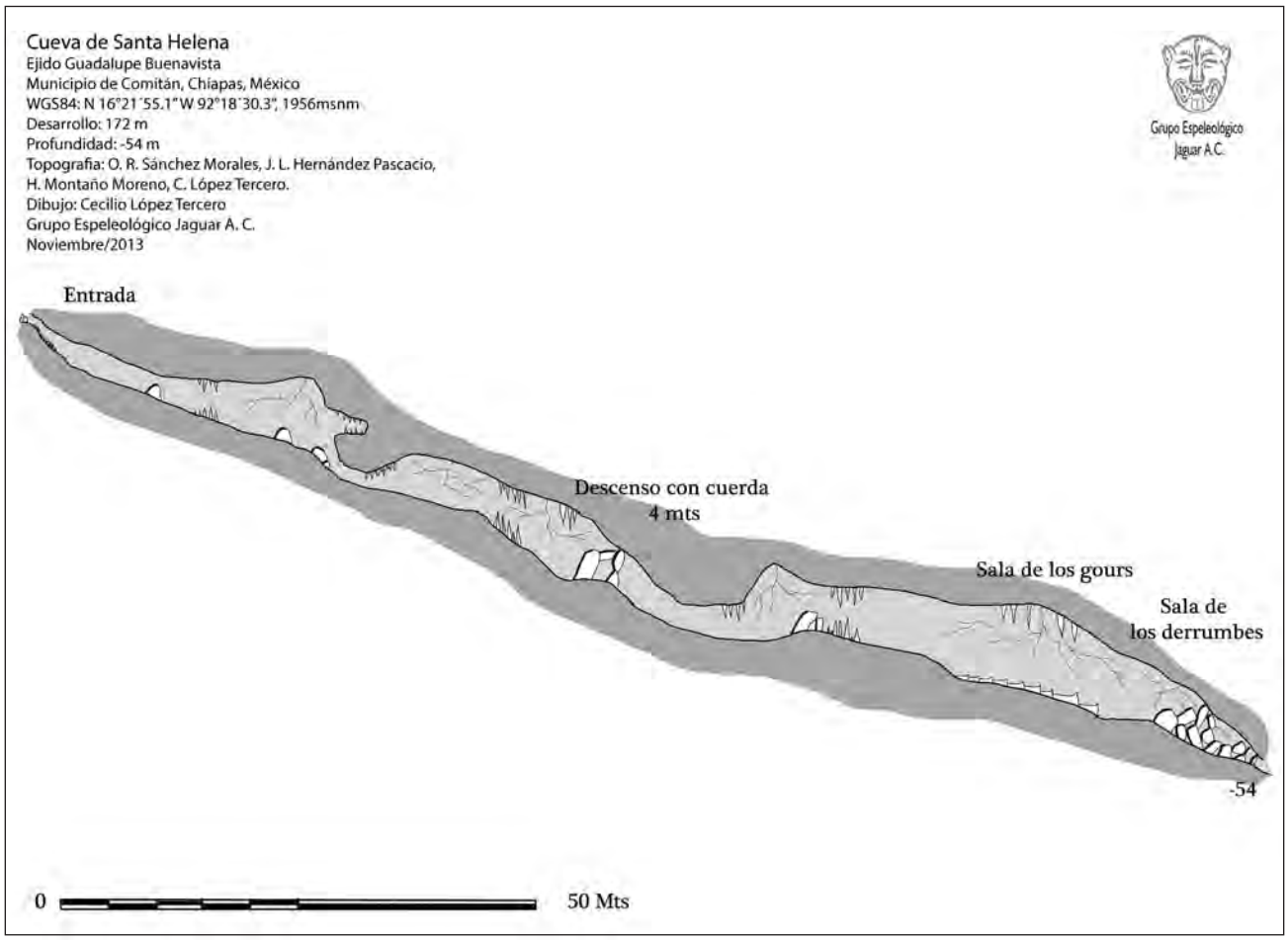
Sima Sueño de Jacinto. This cave is the deepest known in the area of Las Rosas, at –112 meters. The entry is not large and not easy to find. It is a narrow gap in the rock, partly obstructed by tree roots. Immediately the cave opens to a 23-meter drop to a stone-covered ramp to a 14-meter drop, followed by a 29-meter pit. After this the cave continues through a short meander with a pair of narrow and contiguous drops, and then a few other small and muddy drops take you to the bottom of the cave, a narrow meander with collapsed blocks.

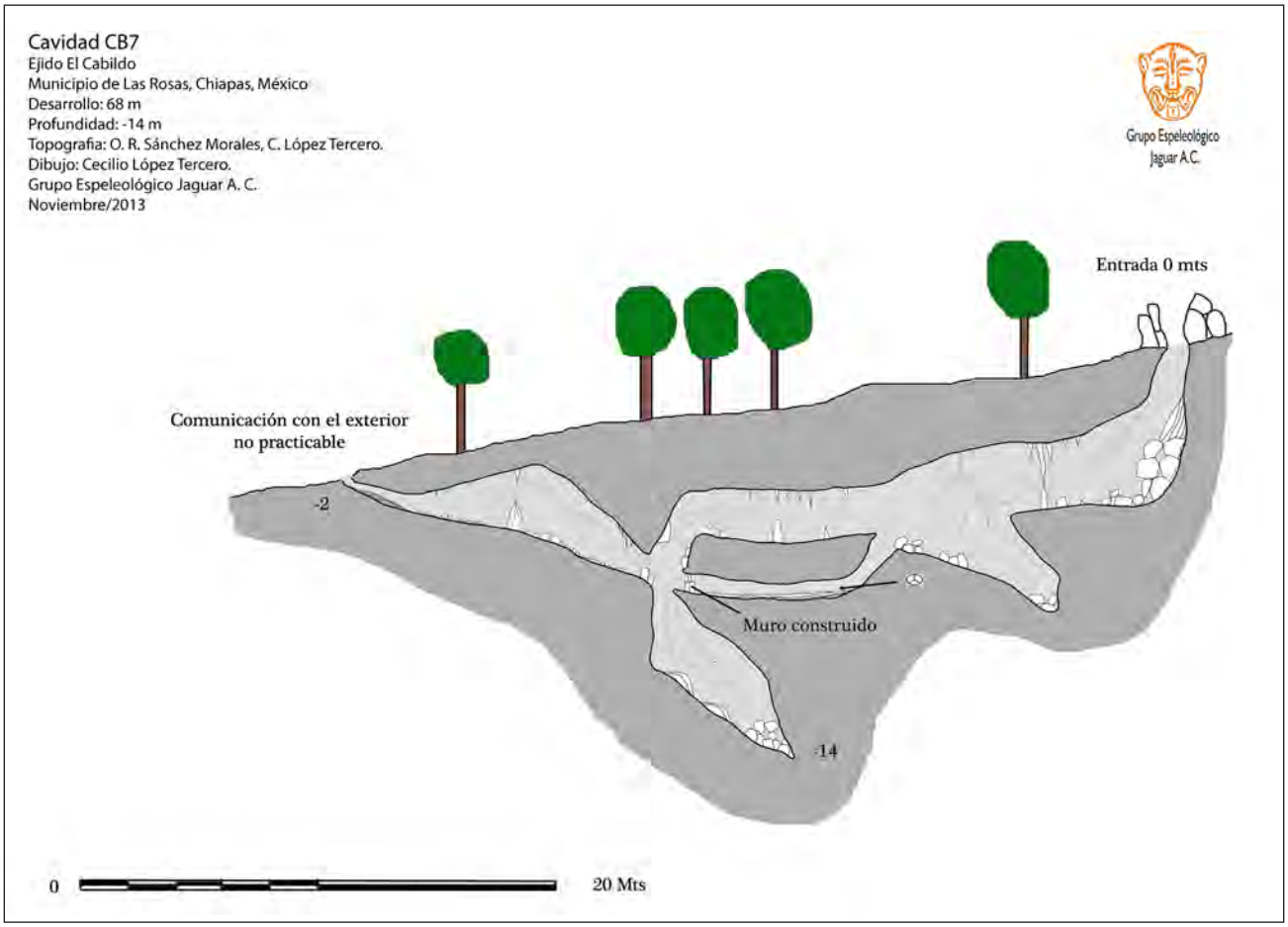
At the beginning of the 2014 expedition, we first arrived at the villages of Canjob and La Fortuna. In the latter we spent the night. Some of us went to El Cabildo, a village located higher in the mountains, because we had become good friends, or so we thought, with the locals the previous year. We thought we would be able to further explore this area, but it wasn´t possible because there was some tension with the local people. We explored around Canjob and La Fortuna, but some people told us not to come inside their properties and we respected this agreement. On the second night of our stay, a group of about thirty villagers, men, women and children, approached our camp in the *casa ejidal* at La Fortuna to tell us that we should leave this village because they did not want us to be there or to explore any caves. They said we were from the government. The next morning the *ejido* representative apologized to us for what had happened, but as not to create problems among them, we packed up our things and went to the municipal seat. The group that disagreed with our presence in the area was calling themselves the Organización de resistencia civil: luz y fuerza del pueblo, or the Organization for Civil Resistance: Light and Power of the Village.

The following days of the expedition passed normally, and we explored and documented caves. But on the next to the last day, on December 19, 2014, something unexpected

Omar Ortega at the entrance to Sumidero del Vecino. *Kaleb Zárate.*

Cave pearls and rimstone in Sótano del Golondrino. *Óscar Sánchez.*





Cueva del Rayo. *Mattia Cannatà.*

happened. Omar, Kari, and Kaleb were exploring Sima Sueño de Jacinto, and we had an enormous amount of gear because we thought that the cave continued down quite a ways, and that other cavers were going to have to join us later on. At around 3 p.m., Omar left because of a family commitment, planning to send other members of the other group to help us. Kari and Kaleb continued exploring and surveying until 7 p.m., at which time we went outside. Nobody was there to help us, so part of our gear was left in the cave for a return the next day. Down the mountain toward the village of El Ciprés, two boys came to tell us that a large group of angry people from the organization mentioned above had captured our friend Omar when he had left the village on the way from the cave. We waited for three hours in the mountains, with our lights off and with the temperature dropping as the hours passed, in order to not be caught. Then Jacinto, the owner of the land who had given us permission to explore it, helped us and gave us shelter at his home. He also led us out of town because the police did not dare to enter. We will always be grateful to him and his family for the help he gave us that night. The other cavers were waiting for us in Villa Las Rosas, as were the police.

On next day, December 20, Omar was released in a suburb, Ranchería Río Grande, of Comitán, but not before having been beaten and threatened; the kidnappers had demanded a ransom of twenty-five thousand Mexican pesos. The police and other government departments were ineffective and apathetic in helping to resolve this problem, particularly the municipal president of Las Rosas, Jaime de Jesús Sánchez Arévalo, and the municipal council, who ignored us and turned their backs on us, after discussing the matter among themselves. In the state of Chiapas, and throughout the country of México, political struggle takes place at several levels. On the one hand, many civil society organizations fight for their own interests instead of justice, and on the other hand the government always focuses on its own interests, and in the midst of this struggle are civilians. This time we were impacted by this uncomfortable truth. Our continued work on the speleological project in this area is currently uncertain because of the approaching elections and social conflicts in Chiapas.

Today we known around sixty caves and karst features in this area, principally in the center and southwest of the municipality. The north and northwest need more exploration. Caves in the highland are principally sinks and pits, and in the plains there are more horizontal caves. The principal underground water system that feeds the springs remains unknown.

We would like to give our thanks to all of the good people that selflessly helped us in this project, especially in the towns of El Ciprés, La Fortuna, El Cabildo, and Villa Las Rosas, as well as the Protección Civil Municipal. Special thanks to Zenaido Ortega Chavarria and all his family. We give many thanks to Calvin Smith and José Zárate Gálvez for the revision and English editing of the article.

These individuals have participated in these expeditions: Omar René Ortega Chavarría, José Benjamín Guerrero Alegría (Kari), Héctor Montaño Moreno, Mattia Cannatà, Diana Hermida Villarreal, Cecilio López Tercero, Óscar Raúl Sánchez Morales, Juan de Dios Rendón González, Víctor Hugo González Rangel, José Luis Hernández Pascacio, Ismael Aguilar Pérez, Ronak Suárez Nakamura, Jaime Eduardo Gómez Rodríguez, José de Jesús Hernández Cruz, Aura Alejandra Tinoco Martínez, and Kaleb Zárate Gálvez.

La Última Exploración en Villa Las Rosas, Chiapas

El Grupo Espeleológico Jaguar regresó para continuar la exploración de las cuevas en el municipio de Las Rosas, cerca de Comitdán, Chiapas, en 2013 y 2014. Los descubrimientos anteriores fueron publicados en Mundos Subterráneos en 2009. Se conocen alrededor de sesenta cuevas en el área, en su mayoría pozos en las alturas y cuevas horizontales en la planicie. A pesar de que el proyecto recibe el apoyo de las autoridades municipales algunos de los lugareños mostraron hostilidad hacia los cueveros, y uno de ellos fue secuestrado y golpeado por un grupo rebelde, por lo cual no se planearán más visitas a la zona.

HISTORY

ACCIDENT IN SÓTANO DE SAN AGUSTÍN

Etienne Degrave

This is the first of three articles on the rescue of an injured Polish caver from Sótano de San Agustín in 1980. See also Mike Boon's article in AMCS Activities Newsletter *37. The French original is at https://sites.google.com/site/speleogsab/home/expes-anterieures. It has been translated for the AMCS by Yvonne Droms.*

On February 16, 1980, within 24 hours, two Polish cavers are seriously injured in Sótano de San Agustín, part of Sistema Huautla in Oaxaca. This article relates the sequence of events of the rescue. Those of us involved hope that it will show the workings of a rescue at great depth in a geographically remote area, in a country where an organization for cave rescues is nonexistent [at that time], and to learn from it. It is for those reasons that we decided to recount the events in detail.

FEBRUARY 17

During an expedition of the Groupe Spéléo Alpin Belge, Doug [Wilson], Jean-Pierre [Braun], and I come out of the Chichicasapan system. None of us has a watch, and we have no idea how long our exploration has lasted. In fact, we had stayed more than 20 hours underground, but at these latitudes you don't feel it so much. We still need to return to the field house, a one-hour walk away. Fortunately, the sun is not scorching.

Along the way, we run into Bill [Liebman], who is driving toward the village. He was notified by messenger of an "accident." A messenger is the most practical information system in Mexico. If you need to reach someone near a village, along a road, you call the village post office and they send a messenger to notify the person you're trying to reach. We assume the French expedition must have had a car accident.

We're already back at the field house when Bill returns, this time with dramatic news. There are two injured Polish cavers at –600 meters in the Sótano de San Agustín. There is talk of fractures of the spinal cord, the skull, or the femur. It's the Mexican cavers who alerted us, since they knew that we were caving in Cuetzalan, Puebla. It is important to remember that at no time did the Red Cross, which is

the official organizer of the rescue, deem it necessary to request the help of foreign expeditions.

The news hits us like a ton of bricks. Thus far in all of European caving history, I know of no accident of this magnitude and at such a depth, except perhaps in the Gouffre Berger or in Cappa. But here in Mexico, caving is still in its infancy, and there is talk of two injured cavers.

Our decision is clear. In all of Mexico, there is certainly no other doctor capable of descending to –600 meters. Two hours later, we are driving towards Zacapoaxtla. Actually, our information is quite sketchy; we don't know when the accident occurred or what injuries were sustained. Perhaps it's even a false rumor. In Zacapoaxtla, we spend several hours trying to call Mexico City to seek additional information and to assess the situation.

We also get in touch with the Americans in Texas, 2,500 kilometers away. Their expedition to San Agustín is expected to start in about ten days [see *AMCS Activities Newsletter* 11.]. We ask them to stand by. A plane is ready to transport them to the site.

The Polish Embassy promises us a helicopter for the next day at 8 a.m. to take us from Tehuacán to the Polish camp. It's only 100 kilometers, but it takes 12 hours to travel by road. At 10 p.m., we start off for Tehuacán, where we arrive shortly before dawn. I spend the rest of the night finalizing my medical kit at the Tehuacán hospital: infusions, urinary catheter, oxygen. The reception is very friendly.

FEBRUARY 18

The helicopter arrives at 8:00 a.m. At 8:20 a.m., a DC-4 on a special flight from Mexico City lands, an armada of Mexican cavers and members of the Red Cross aboard. Immediately we sense difficulties. Lorenzo [García] introduces himself as in command of the rescue and asks us to put ourselves under him. He starts by insisting on loading onto the helicopter large surface lights and inappropriate caving gear, such as 13- to 14-mm-diameter ropes and a rigid stretcher weighing thirty kilograms. Moreover, there is no possibility of taking aboard the foreigners before the Mexicans. After using some diplomacy, we reach a compromise: since the helicopter can take four passengers, we'll take two Mexicans and two foreigners. But as for the gear, nothing can be done, for they are so certain that they have the right equipment.

etienne.degrave@skynet.be

On the first flight, at 9:45 a.m., I'm aboard with Lorenzo, Bill [Liebman], and a Mexican Red Cross doctor. Twenty minutes should be enough to reach Huautla. The weather is gorgeous, and the scenery magnificent. Unfortunately, a band of clouds surrounds Huautla, making a landing impossible. The pilot circles around for a long time, hoping for the clouds to dissipate. This allows us to observe the limestone massifs dotted with huge dolines that will probably not be explored by cavers for a long time. The pilot decides to land elsewhere. We are still 50 kilometers from the Polish camp. The helicopter takes off again to pick up the next group. Transporting the gear to the road under the midday sun is exhausting. Lorenzo commandeers one of the rare passing trucks. Meanwhile a new flight delivers Guy [Meauxsoone], Jean-Claude [Hans], and one Mexican. At 6 p.m., we reach the Polish camp, but not without one further incident. Close to the Polish camp, we meet a Mexican jeep that has come to find us. Lorenzo suggests that we ride in the jeep, in order to arrive on site more quickly, or so he says. In fact, the jeep proceeds to get us lost for an hour and a half in the boondocks, so that the Red Cross and its chief can be the first on the scene, having hustled to Huautla in the truck. Lorenzo asks the truck to stop 500 meters short of the camp, quickly gears up, then rushes to the entrance of the cave. A Pole at the entrance manages to make him understand that it is useless to go down without an organized plan. A bit later, at 9 p.m., Jean-Pierre, Dany [Le-Roy], and two Mexicans arrive, then at 11 p.m., Blake [Harrison] shows up in his truck, together with Doug, Steve [Pitts], Philippe [Dhilly], and six Mexicans. They have driven from Tehuacán.

At the Polish camp, finally some good news. One of the two injured cavers, Jerzy Musioł, has already come out. He has a broken leg. His teammates had put together a makeshift splint, and his ascent was not too difficult, because he was able to help himself. I examine him before he leaves for Mexico City, where he'll be operated on later.

More alarming is the condition of the other Polish caver, Józef Cuber. In fact, we learn that for the past two days there has been no news of his condition. He is tended by three people, but any information the Poles can give us dates from half an hour after the accident. He is paralyzed in both legs and has lost a lot of blood, from the anus according to the Poles. We can't understand this lack of information for two days. How is it possible to survive without care for so long with such injuries? Is he even still alive? We're puzzled by the state of mind of the Polish cavers. They don't seem to realize the situation and appear to take refuge in a resigned fatalism. Around us, we hear the buzz of Polish cameras filming us. Great, so now sensationalism enters the fray.

A briefing with Maciej [Kuczyński], the Pole, Bill, the American, and Lorenzo, the Mexican, allows us to take stock of the situation and to work out a rescue strategy. The facts are clear. There is an injured caver at –570 meters, of whom we have no news; a two-person Polish team is rigging a phone line; the other Polish cavers are exhausted by the first rescue and out of action for now. Of all the Mexicans present, four or five have used ascenders and can venture into the cave. As to our group, there are seven of us, plus two Americans, but we haven't slept for two days.

An initial-response team must reach the patient to provide emergency care and prepare him for the ascent. Subsequent teams will descend a few hours apart; they'll be tasked with rerigging the drops, then taking charge of the patient. As for me, being a doctor I'll stay at the patient's side throughout the ascent. The Mexican doctor, at the sight of the entrance pit, refused to go down there. Given the shortage of operational personnel, rotations will be figured out during the ascent.

I decide to take a couple hours of sleep, after all; we are all exhausted.

FEBRUARY 19

Together with Jean-Claude, Dany, and a Polish caver, Paweł, I start down at 12:15 p.m. We're carrying with us the stretcher and a duffel filled with medical supplies. With a bit of trepidation, we rappel drop after drop on the same type of rope that caused Cuber's fall, ropes made of rubber, as the Poles describe it. The next team will replace them. We're obsessed by these thoughts: Is Cuber still alive after three days, and if so, what state is he in? The entire way down, we have the opportunity to assess the challenges ahead for the ascent. We pass the guys who are installing the phone line. Misunderstanding the expression and a gesture of one of the Poles, Jean-Claude interprets that Cuber died and tells me to leave the stretcher. But once the misunderstanding is cleared up, the descent continues.

We reach the base of the shafts. One kilometer of passage separates us from the victim. As we pass through Camp II, a Pole is bivouacking there. He must have thought we were some kind of apparition, because the moment he sees us he starts running all around us, then suddenly he bolts away screaming, "Marek, Józef!" He is so fast that we can't keep up with him. Finally, we come to the top of the fateful drop, and soon we arrive at the side of the injured caver. Józef is flanked by two Poles, Bernardo [Koisar] and Marek [Sygowski], who have not left his side for three days. He is lying on a flat rock, bundled up in a sleeping bag. I expected to find a nearly dead patient, but at first sight, he looks better than I feared. He must have a particularly strong constitution to have hung on all this time. As soon as he sees us, his face lights up. I utter some of the few words of Polish I know, "*Niema problemi.*" I don't know if he understands me. In any case, he gives me a huge smile. As I take his pulse, I observe how weak and fast it is.

I know Marek from having been on several expeditions with him in Austria. We're able to understand each other in German; with Bernardo, Spanish works better. Marek explains the details of the accident and the patient's progression since. After falling 20 meters, Józef suffered immediate paralysis of the lower limbs and bled profusely from the lower back or, apparently, from the anus. A long, dark streak on a sloping

breakdown slab attests to it. His companions moved him to a flat spot. His condition has been stable since; he has remained conscious, drinking a little, vomiting sometimes. He stays very calm. From time to time, he complains of pain, or expresses concern about the rescue. What's more worrisome is that he has not urinated for 70 hours.

My examination of the patient enables me to evaluate his condition. Paralysis and anesthesia of the lower limbs and of the pelvis are obvious. The spinal fracture appears to be located fairly high. Paralysis of the bladder has caused significant urinary retention. His blood pressure is extremely low, and his pulse very weak. There don't seem to be any other fractures, but he has a head wound, apparently without fracture. Some signs point to internal abdominal injuries.

For the next few hours, I perform a series of medical procedures meant to fortify the patient. What is simple in a hospital with suitable equipment, trained personnel, and infection prevention is much more complicated underground. Preventing infection, above all, is particularly challenging.

Józef's blood pressure is rising gradually. I drain his bladder, and Józef says he feels better. I had requested a delay before starting the evacuation, so that the patient could recuperate as much as possible before transport. However, I am not feeling great about this. What worries me most is the probability of internal injuries. All seems well now, but being transported in the stretcher risks causing serious injury for which I could do nothing. On the other hand, waiting would not improve the situation. Anyway, we have no choice.

Above us, things are beginning to happen. We are told that the phone line has reached Camp II. I ask for it to be extended so that I can communicate with the surface to request new medical supplies. I also insist, as we have from the start, on involving the French cavers. We already knew that the bulk of the rescue would rest on our shoulders, but my plea is never retransmitted. In Mexico City, where the French were at a

TIMELINE

February 16

0415. While climbing in breakdown at –600 meters, Jerzy Musioł falls. He suffers from multiple fractures to his right leg. A rescue is immediately organized.

1450. (T = 0). Accident of Józef Cuber at –530 meters, fall of 20 meters due to rope breaking at a rub point. Cuber suffers from a spinal fracture with paralysis of the lower limbs. He also loses a lot of blood.

February 17 (T + 9h)

0930. The surface is notified of the second accident.

1130. The head of the Polish expedition calls Mexico City to request outside help. He contacts the Polish Embassy, then the Mexican Red Cross. The Red Cross announces that it is able to handle the rescue.

1200. Mexico City cavers are alerted.

1400. Mexico City cavers notify th GSAB expedition in Cuetzalan by means of a messenger system.

1615. Departure from Cuetzalan.

2000. Telephone calls from Zacapoaxtla. In Austin, Texas, American cavers, notified by the Belgians, are ready to respond if necessary.

February 18 (T + 33h)

0330. GSAB arrives in Tehuacán.

0730. Jerzy Musioł exits San Agustín.

0830. The Mexican rescue team, aboard a DC-6 from Mexico City, lands in Tehuacán.

0945. Departure of the first helicopter shuttle to San Agustín. Weather conditions force the chopper to land 30 kilometers away from Huautla.

1415. The team continues to Huautla by truck.

1430. Four Polish cavers descend into San Agustín to install the telephone line.

2000. At a cave symposium in Mexico City, attended by a caving expedition from Languedoc in France, the accident is announced. Administrators declare they have the situation under control and that there are enough people. Mike Boon, also present at the symposium, is not fooled and leaves at once for Huautla.

1800 to 2300. Successive arrivals of the teams in the Polish camp.

February 19 (T + 57h)

0130. The first team, medical, goes down with the stretcher (Etienne Degrave, Jean-Claude Hans, Dany Le-Roy, and one Polish caver).

0730. Arrival at the victim's side.

0900. A second team goes down, rerigging.

1000. Arrival of Mike Boon in Huautla. Patient treated in San Agustín. Rerigging of shaft and rigging tyroleans.

2200. Mike Boon and a Mexican caver descend.

February 20 (T + 81h)

0200. First departure of the stretcher.

0630. Second departure of the stretcher.

1030. The patient arrives at Camp II (–556 meters).

1500. Departure from Camp II.

1630. Arrival at the bottom of the shafts.

2130. The wet 70-meter pit is ascended.

February 21 (T + 105h)

1200. The AMCS (eight Americans) arrive in Huautla.

1400. The AMCS descends into Sótano de San Agustín to Camp I.

1700. The patient arrives at Camp I, –260m.

1800. The winch is rigged in the entrance doline, a 70-meter pit.

2100. Departure of the stretcher from Camp I.

February 22 (T + 129h)

0600. Arrival in the Sala Grande at –120 meters.

0700. Arrival at the bottom of the doline.

1000. Józef Cuber is at the surface (T + 139h).

1100. Departure of the helicopter for Mexico City.

Eduardo Villegas

caving symposium, serenity reigns. "The situation is under control; we have enough people," say the officials. Not even their own assertions are under control—have they ever even been underground? And the others, the French cavers from the Languedoc and the deep pits, lulled by these soothing declarations, do they know just what an accident at –600 meters entails? Only Mike Boon, a British-Canadian caver attending the symposium, understands the situation and leaves immediately for Huautla.

In the cave, Meauxsoone's team of [Robert] Levêque, Lorenzo, and Carlos [Lazcano] has just arrived. They rerigged the 90-meter pit and the 70-meter pit, and are now rigging traverses in the upper passages. From what I understand, there were serious issues with Lorenzo, the rescue chief, who needed help in every drop.

For our part, we allow ourselves some rest before the ascent. Jean-Claude, although just as exhausted as I am, insists that I take the only sleeping bag. Since I will not leave the patient until reaching the surface, I accept, which allows me to doze off a little. From time to time, Marek calls me because Józef has a problem, or because the IV infusion doesn't flow well enough. We feel that things are dragging up there. As far as we're concerned, the patient will soon be ready, but since the same teams that will transport the victim are also doing the rerigging, a delay seems inevitable.

FEBRUARY 20

Finally, around midnight, everything is ready for the ascent of the 25-meter pit. There are a lot of people, too many, in fact: Mexicans, Poles, Belgians, Americans. Lots of different languages, and it's a wonder how we can understand each other. There is a huge crowd, but, as will be the case until the end, few people are capable of handling a stretcher. Every maneuver, every movement of the stretcher must be explained and explained again in several languages, in order to be successful. We must constantly position ourselves at each level to provide instructions. The lack of initiative in many of the helpers, throughout the ascent, is what feels the most disheartening.

Cuber is packaged on the stretcher. As it turns out, this type of stretcher is ideal for a spine fracture. It immobilizes the patient and keeps him relatively comfortable. Everything seems ready and the signal for departure is given. The stretcher, positioned horizontally, slowly begins to rise, but suddenly disaster strikes.

A side rail just broke, and the stretcher threatens to break in half. For a moment, we remain dumbfounded. Without a stretcher, what are we to do? There is of course the one from the Red Cross, but it is intended for transport by ambulance, rather than for underground maneuvers. I ask Bill [Liebman], who designed the stretcher, to come down from Camp II. The best option, we figure, is to tie Józef on his board and transport him vertically. Fortunately, the straps do a good job of immobilizing the patient. Now it won't be possible to use the proposed tyroleans, since they require a stretcher to be supported in the middle.

At 6:30 a.m., the ascent begins again, this time without a hitch. At each level, we need to position one of us to explain the maneuvers to the Americans and Poles. I'm on my own now. Guy and Robert are recuperating at Camp II.

Above the 20-meter pit, there is a ledge, followed by another 10-meter pitch, then comes the passage that leads to Camp II, strewn with boulders and requiring some traverses. What touches me is the perfect harmony that exists within the group. It is in such a dramatic moment that I realize how well our group has bonded, and that its cohesion has been achieved. Everyone finds his place spontaneously. The maneuvers succeed each other perfectly, without anyone having to direct each person. The Poles and the Mexicans are just as worthy of admiration: they do all they can and, without complaint, obey the orders we give them, often bluntly when we are fed up because things are not going fast enough for our taste. At 10:30 a.m., the patient is at Camp II. He tolerated the trip rather well, but he needs to recuperate, as do most of us. At Camp II, we find Mike [Boon], who arrived from the surface. He is one of the most renowned cavers in North America and his help will be valuable. Guy and Robert, who have just gotten some rest, leave to go rig a few of the difficult sections before the pits.

At 2 p.m. the camp stirs again. A first team composed of the most rested members is about to start, among them Dany, Mike, Guy, and Robert. Another team will take over above the 90-meter pit. I again take care of Józef. Bill deals with the straps on the stretcher, and at 3 p.m. the caravan takes off. I decide to sleep an extra hour or two, until the stretcher arrives at the bottom

of the 70-meter pit and starts to go up the drop. Anyway, if there is a problem, I won't be far.

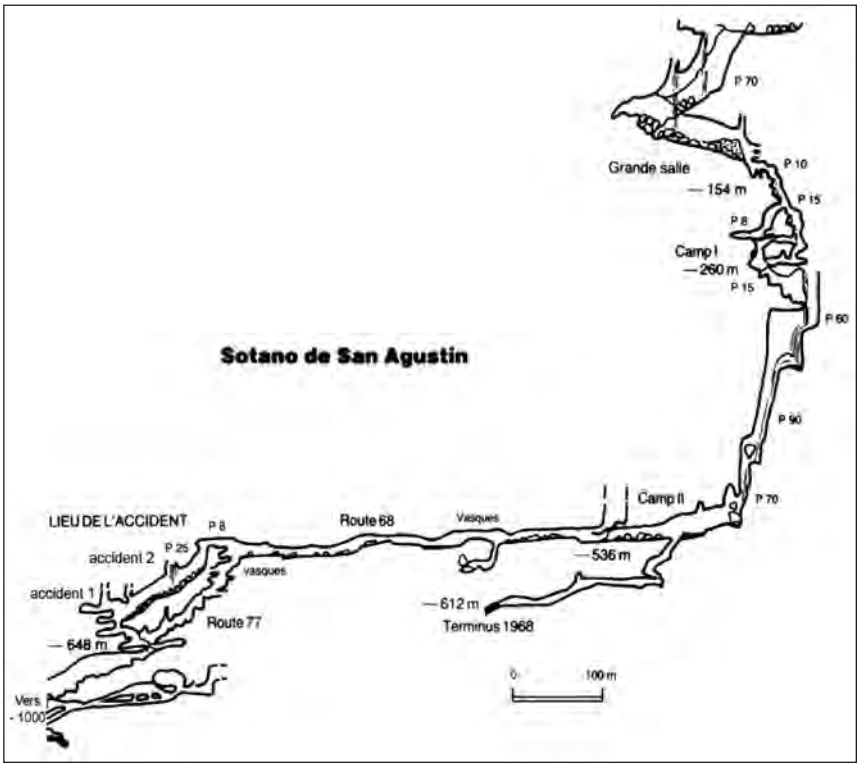
At 5 p.m. I catch up with the others at the bottom of the 70-meter pit. There, things have not progressed much. Ascending the pit is painfully slow. Sometimes it takes an hour for a Mexican to reach the top of the drop. In the end, hauling the stretcher up this pit will have taken less time than for the guys to climb it. Robert is tending the stretcher and directs the maneuvers by whistle. At each rebelay, a Pole helps the stretcher get past the bolt. There is also the problem of having to avoid water, which affects every pit from Camp II to –300 meters. Finally, the 70-meter pit is surmounted. We take this opportunity to have the Mexicans start up the 90-meter pit and continue onwards towards the surface. Robert, drained by the maneuvers in the pit, goes back down to Camp II to get some sleep.

Going up the 90-meter pit is faster. Rebelays were removed. Dany will direct the operations from the top of the pit. Jean-Pierre is responsible for keeping Cuber out of the waterfall. Philippe and I will accompany the stretcher, while Guy directs a tricky maneuver that will require the stretcher to pendulum over a large pool. Mike and Doug are at the bottom of the drop. The preparations go well, and the hauling in the 90-meter pit begins. Philippe is clipped onto the stretcher. Pulling a double weight is compensated by a 3:1 haul system that Dany rigged at the top of the pit. This way, they don't have too much weight to pull from above. The system works well, but causes much loss of time. Finally, Philippe finds it best to unclip himself from the stretcher. I join him, and from both sides we escort Józef, to help get him past projections and avoid the waterfall. Józef mumbles some Polish words I don't understand. He is holding up well, but he's obviously very tired. For him, this is the fourth day.

FEBRUARY 21

After the 90-meter pit, there are no more big drops. Dany and Guy leave to go recuperate at Camp I. We are down to four Belgians, plus Mike and three Poles. For the past few hours, we've been hearing rumors that the Americans have arrived in Huautla to assist in the rescue, but we haven't seen anyone arrive.

Another rebelay is passed. We must be close to –300 meters.



Józef requests another break. A Pole prepares some tea. We all doze off right where we are. An hour goes by, and nobody notices, as everybody is dozing or asleep. Then someone shouts that we must go on, we cannot stay. We must shake off our lethargy and return to this nightmare. Our stop lasted more than an hour without anyone having noticed it. We work on automatic pilot, but fatigue makes our movements less precise. We now need to ascend the wettest pit of the cave, without being able to avoid the waterfall. Jean-Claude, preceded by two Poles, climbs up the 40-meter drop, carrying one end of the haul line. He asks for us to ensure that the rope follows properly. I follow him up. Philippe positions himself at a bend to help the stretcher go by. Józef is carefully bundled up as much as possible to avoid getting wet. First mistake, we neglected to bring the whistle. In the roar of the waterfall, communication is impossible, and two protrusions prevent us from seeing the stretcher from above. In spite of that, the maneuver goes quite well until the moment when the rope gets caught without our understanding why. Philippe, near the stretcher, also notices that it stopped. But the shouts from both sides are lost in the roar of the waterfall. The reason for the sudden stop is finally found. Tired as we all are, the guys at the bottom forgot to check for knots on the haul rope. A knot has gotten lodged in the pulley. Jean-Claude, who finally realizes this, is forced to hold the entire weight of the stretcher on his tether to make the knot pass through. The ascent continues. As it turns out, there is even a second knot, which I help with. Finally, Józef appears; he has not withstood this session well. Drenched in spite of the protection and Jean-Pierre's efforts to keep him more or less out of the waterfall, he is in sad shape, exhausted, chilled to the bone and shivering. Two pits still separate us from Camp I. Realizing this, we feel a moment of panic. A shouting match ensues. We all lose patience, shout orders in all directions. Only Mike remains phlegmatic.

Then everything quiets down. Everyone spontaneously takes up

his position, and the maneuvers continue. We need to get to Camp I as quickly as possible so that Józef can recover there.

A message from the surface comforts us. The Americans of the AMCS are on site now. They drove for three days non-stop from Austin to get to Huautla. Having gone immediately underground, they are in the process of rigging an easier way between the surface and Camp I.

The last pit is finally climbed, and we are at Camp I at –200 meters. Józef can finally rest a bit.

We meet again all the Americans we had met a few weeks earlier in Austin: Jerry Atkinson, Bill Stone, Steve Zeman, and many others, including two women. The Sótano de San Agustín is their cave. For the past five years, they've been coming here every year for three months. The previous year they got very close to making an important discovery that they had been working on for years, connecting three deep caves in the area that are only separated by a few meters [see *AMCS Activities Newsletter* 11]. Therefore their hopes are great for this 1980 expedition. The Poles thought they would be the ones to make this connection. In spite of this, the Americans come, but not without a bitter aftertaste, to the aid of an expedition that had come to scoop them. They also knew that they would not be superfluous in the rescue, contrary to the Mexican claims.

Seeing us arrive at Camp I, they offer to relieve those of us who are tired. The fact of not being alone has given us our strength back. It's a curious phenomenon, and we all feel it despite our obvious lack of sleep. Apart from a few sudden spells of exhaustion, we don't feel tired. Personally, in the past five days, I've only slept for seven or eight hours, a little here and there. It's the nervous tension that enables us to cope. Therefore, we decide to continue with the Americans, and we send the Poles and the few Mexicans from Camp I up to the surface. Only Marek wishes to stay with the victim, as his interpreter. He has hardly left his side since the accident.

Henry Schneiker

Józef's state is becoming worrisome. Despite the antibiotics he is taking, his temperature is at 39 degrees C. I attribute this fever to the bedsores he must be suffering after four days of remaining immobile. But it's too difficult to treat them here. Mainly, it's time to get out.

With this fresh team, we finally feel capable of continuing the rescue in more normal conditions. The process starts up again, step by step. Józef is occasionally delirious, and insists on wanting to drink. His urine catheter is now blocked, and I have no way to unplug it.

As we get close to the Sala Grande, we run into a Polish movie team. Their lights are blinding us. Unceremoniously, we push our way through. As we pass by, a Mexican from the Red Cross, engaged by the movie team, is requisitioned for a moment, much to the displeasure of the Poles.

FEBRUARY 22

Finally, we reach the beginning of the Sala Grande. A thin ray of sunlight filters through the huge pile of breakdown. Only this 200-meter-long breakdown room and the entrance drop separate us from the surface. Somewhat naively, we expect that the numerous Mexicans on site will now take over handling the stretcher. We suddenly feel utterly exhausted. The Americans, who've had virtually no sleep since leaving the U.S., collapse too. Gathering our strength, we proceed, wondering why it's still up to us to haul the patient through the pile of breakdown, when there are so many people outside.

Ten hours after leaving Camp I, we reach the bottom of the doline. The Mexicans have installed a winch to hoist the stretcher through the trees and the vegetation that line the walls of this sloping drop.

Finally, on February 22 at 10 a.m., the patient reaches the top of the drop, escorted on either side by three people. As the Polish movie cameras hum, Józef gives a hint of a smile. The Poles all hug each other. The helicopter is also there, waiting. Józef is carried to it, to be flown to a Mexico City hospital where he will undergo surgery. One last time, I accompany him on this trip.

The helicopter takes off. Józef is smiling softly now. Above the vast karst, flying over the large dolines, I fall asleep, oblivious to the beautiful landscape and to my privileged perspective.

One last ordeal awaits us. Although everything is arranged to admit the patient to a specialized hospital, the Red Cross decides to get him processed through one of its centers. Mexico is a huge city. The outcome is a few extra hours lost.

In total, Józef will have spent nearly six days underground since the accident. He spent two and a half days in the cave awaiting rescue. The rescue itself lasted 81 hours, 52 hours of which involved hauling the stretcher.

The patient did not receive medical assistance until three days after the accident. The fact that he was able to endure relatively well for so long in spite of the seriousness of his injuries is due in large part to the warm temperature (16 degrees C) in the cave. The situation would have been quite different in Europe. Furthermore, although Cuber's injuries fortunately were not life-threatening prior to the rescue, he was nevertheless not transportable when reached.

The medical problems were fracture of the spine with paraplegia, various complications due to paraplegia, a state of semi-shock due to hemorrhage at the time of the accident, various wounds, and suspected internal abdominal injuries.

The medical intervention consisted essentially of treating shock by IV infusion, using a catheter, combating infection, combating pain, monitoring immobilization, and monitoring the patient during the ascent. It should be noted that since the patient's blood type was not known, the infusion consisted of administering artificial plasma derivatives.

The presence of a caver-doctor in Mexico who was participating in another expedition was a coincidence. Many expeditions do not have this option. It might be possible in such circumstances and in case of an accident to bring in a caver-doctor from the United States or from Europe, but having to improvise such a strategy would probably have had tragic consequences here.

In light of the accident in the Sótano de San Agustín, it is possible to draw some lessons about remote expeditions and deep exploration. Every expedition, before departure, should anticipate a potential accident, assess its own technical competence, and plan ahead, to the extent possible, for contacts with other expeditions working in the country for mutual assistance or with competent local rescue personnel when available, for access to rescue gear and a stretcher (the only cave-rescue stretcher in all of Mexico was the one we brought from Cuetzalan), and for the assistance of a doctor who is a caver.

The accident in San Agustín proved that in warmer caves, notwithstanding vital trauma, the victim can survive for several days awaiting medical help and competent assistance. If unable to find these resources on site, sending a rescue team and a doctor can be considered. This option had already been used by the U.S. National Cave Rescue Commission in its intervention after the accident in Sistema Purificación [see *AMCS Activities Newsletter* 9]. In order to be effective, these procedures must be planned before the expedition. Collaborating with an insurance company such as Europ Assistance is highly desirable.

Finally, in foreign countries, more than ever, speleological solidarity is not an empty word. Willingness to sacrifice part of one's expedition to rescue a wounded caver is not just a service. Anyone can at any time end up in a situation like the Polish team's and hope for outside help.

If an accident happens and outside help is deemed necessary, it is essential to call upon skilled specialists instead of government services that serve different purposes. The example here of the Mexican Red Cross, which determined for national prestige reasons that the Mexicans could handle a rescue of this scale on their own, is particularly telling. It is also necessary to have sufficient common sense while on expedition not to be lulled by the reassuring words of the local authorities.

Participants in the GSAB Mexico 1980 expedition:

Jean-Pierre Braun
Etienne Degrave
Philippe Dhilly
Jean-Claude Hans
Guy Meauxsoone
Dany Le-Roy
Robert Levêque

Accidente en el Sótano de San Agustín

Este es el reporte, no publicado anteriormente, escrito por el doctor belga después del rescate del espeleólogo polaco del Sótano de San Agustín en 1980. La víctima fue extraída de la cueva desde una profundidad de 600 metros por equipos de Bélgica, que afortunadamente se encontraban cueveando en Puebla en esos días, los Estados Unidos y México.

HISTORY

DRAMA IN SÓTANO DE SAN AGUSTÍN

Carlos Lazcano

On February 17, 1980, at 9:30 a.m., we—three Poles and two Mexicans—had finished derigging the entire route in Cueva de San Agustín and returned to base camp. As we were eating breakfast, two Poles who had just come out of Sótano de San Agustín arrived with some bad news: two accidents had occurred in that cave. On February 16, one group had been successful in bottoming the cave and was coming back through the last section of Route 68, so named because it was discovered in 1968. Jerzy Musioł was in the middle of a climb when a handhold broke. He fell 8 meters and suffered multiple fractures in one leg. Józef Cuber went to the aid of his comrade and was rappelling down a drop when the rope broke due to rubbing against the rock. He fell 23 meters down a dangerous slope. Apparently his fall had resulted in a spinal fracture, since he had lost all feeling below the waist. The accident happened at 3 p.m. His partners immobilized him, and from that point on, they did not leave his side for an instant.

Once we heard the news, we immediately headed to Huautla and, by phone, notified rescue groups as well as other caving groups, in order to initiate rescue operations. From that day on, groups started going down to take supplies to the cave camps.

Early on the eighteenth, two Poles came out of the cave with Jerzy; his leg had been splinted, and he was able to get out mostly under his own power over a period of more than fifteen hours. Later various Mexican groups started arriving. However, there was a serious problem; few, very few, were proficient with vertical techniques. On that day, a group of three Poles and two Mexicans, Roberto Curiel and Ricardo Gómez from the SEGEV, started down to rig a telephone line in the cave. Around the same time, several groups of foreign cavers from Belgium, the United States, and France were on expeditions in other parts of Mexico. The first two immediately answered the call for help. Not only were they highly qualified in cave-rescue techniques, but the Belgian group also included an accomplished caver-doctor, Dr. Etienne Degrave.

That afternoon the rescue teams that would be working in the cave started getting organized under the direction of the American Bill Liebman, who would personally take part in the operation. Compared to about twenty foreigners (Poles, Belgians, Americans, one Frenchman, and one Brit), only four Mexicans, José Montiel (AME), Alejandro Villagómez (AME), Lorenzo García (Cruz Roja), and I, could participate in these operations, because we were proficient in vertical techniques. The first phase of the rescue consisted of moving Józef from the site of the accident to Camp I. Three groups of four would take on that task, the most difficult and dangerous section, under the direction of the Belgians; later other teams would relieve those who got tired. The groups were arranged so that they could communicate among themselves, because there was a serious language problem, with Polish, Spanish, English, and French being spoken.

The first team entered the cave at 2 a.m. on the nineteenth. The doctor was part of this group. They descended to Józef's location, placed him on a special stretcher, gave him a transfusion of plasma, and gave him some painkillers.

I participated in the second team, whose mission was to rig the cave for Józef's transport from the site of the accident to the –360-meter level. To reach Józef required descending about twenty drops, the deepest of which were the 70-meter entrance drop, then 60 meters, 90 meters, and 60 meters, passing through two waterfalls, negotiating countless short climbs and traverses, and doing a long crawlway.

Our group, consisting of two Mexicans and two Belgians, entered the cave on the nineteenth at 8 a.m. We rigged a new route with bolts and several hundred meters of new rope. We finished the job at 3 p.m. and rested at Camp II.

Later we continued on to Józef's location, and at 2 a.m. on February 20 we started moving the patient. There were approximately fifteen of us, and it took us one hour to get him up the 20-meter pit. We had to work gently in order to affect Józef as little as possible. A long horizontal passage, Route 68, followed, where we navigated through piles of boulders until we reached Camp II. After resting for two hours, we continued the transport through a wet passage that included several pools and small climbs, until we reached the bottom of the first of the big drops, a 60-meter waterfall. By the time we got there, about twelve hours had elapsed and ten of us remained. The Belgians continued to direct our operations. To prevent Józef from getting wet, he was wrapped in plastic, and all along the 60-meter ascent pulleys were placed to divert the path of the stretcher away from the waterfall as

wenceslaolinck@yahoo.com.mx
Translation by Yvonne Droms of an article in *México Desconocido*, October 1980, pages 31–33.

Józef Cuber ascending one of many drops. *Eduardo Villegas.*

much as possible. I was in charge of some of the pulleys, the highest ones, and there I hung for several hours, about 50 meters above the floor of the pit, directing the rope. When we finally managed to get Józef up this drop, he had become dehydrated due to sweating under the plastic. It was distressing how he pleaded for water; we calmed him down and cheered him on.

Immediately after the 60-meter pit came a 90-meter one, the deepest of all. This drop was not too wet; moreover, it was spacious, and the walls were completely smooth, so it was not too much of a problem to haul Józef up this pit. Yet in spite of that, the operation went very slowly, and it took many hours to bring him up.

After that came another pit, 60 meters deep, and this one had the largest volume of water. The waterfall was unavoidable, and communication was difficult due to the noise of the water hitting the rock. Another problem was that the drop was a narrow fissure, which made the ascent difficult; this was undoubtedly the most difficult section of the rescue. We checked the time, and it was four in the morning of the twenty-first. We had been working hard continuously for more than a day. We were very tired and were falling asleep on our feet, so we decided to stop and rest.

At our current location, according to the plan, we should have been replaced by a third team. Since no one had shown up, four of us went out of the cave to ask if fresh cavers could be sent it. Our second team had achieved its objective. Józef was at the –360-meter level; he was halfway out, and the hardest part had been surmounted.

We arrived at the surface at 9 a.m. on February 21 and reported on the situation. At noon, a group of Americans of the AMCS started down, led by Bill Stone. It took them nearly another day to bring Józef out of the cave. On the morning of the twenty-second I went down to the first drop, along with several members of Socorro Alpino, to help with that last section. Józef finally left the cave at 10 a.m. and was immediately taken to Mexico City by air.

That night there was a party in San Agustín. Poles, Mexicans, Belgians, and Americans, we toasted the success of the rescue. Joy and friendship abounded. There was good cause for celebration, as it was the first time in the history of caving that a caver injured at a depth of more than 500 meters had come out of the cave alive.

Józef's fortitude was incredible. He spent six days immobile in the cave, he endured being transported with infinite patience, and he remained conscious the entire time. Sometimes we talked with him, trying to encourage him, and he in turn encouraged us when we showed signs of fatigue.

Sixty-three people participated in the rescue operations, both inside the cave and at the surface; forty-two of them worked underground at different times. Groups from four countries were united for the single goal of bringing Józef out of the cave alive. The groups that participated were:

Polish Speleological Expedition
Grupo de Espeleología de la UNAM (Mexico)
Escuela de Montaña Cruz Roja Naucalpan (Mexico)
Sociedad de Exploraciones Geográficas "Eduardo Villarreal" (Mexico) SEGEV
Agrupación Espeleo Campista (Mexico)
Groupe Spéléo Alpin Belge (Belgium)
Association for Mexican Cave Studies (United States) AMCS
Asociación Mexicana de Espeleología (Mexico) AME
Socorro Alpino de México

Mexico has aroused great interest internationally in the caving world due to the discovery in recent years of a large number of deep caves. The most impressive discoveries were made by Americans and Canadians, and every year numerous foreign groups explore in our country. In Mexico caving is still largely unknown, mainly due to not being well publicized and having virtually no official support.

Being one of the countries with the largest number of caves in the world, Mexico should pay more attention to caving, for both sport and science, because the study and exploration of caves would benefit Mexico, mainly through the hydrological studies they entail. The largest caves conduct enormous volumes of water year after year, in areas where the drainage is completely underground. Archaeological discoveries within the caves are also of great interest. Biological studies, conducted in the caves by Americans and Europeans, have yielded spectacular results, with some forty new animal species having been discovered within Mexican caves.

Drama en el Sótano de San Agustín

Este artículo es acerca del rescate de un cuevero polaco herido en las profundidades del Sótano de San Agustín, Oaxaca, y fue publicado originalmente en México Desconocido en octubre de 1980.

HISTORY

THE GSAB IN MEXICO, 1980

Jean-Pierre Braun

"The stretcher . . . . Can't forget, must recover the ropes for the next pits. . . . Must hurry to get out of the cave, it's daytime. . . ." It is nine o'clock in the morning, and I was just talking in my sleep, with my eyes wide open. What a nightmare! I can't believe it, or rather, I do, and feel even more stunned by it. Etienne Degrave, our doctor, also had a nightmare in Mexico City. He was sleeping in a very dark room and woke up with a start, believing that he was still underground, at –600 meters in cave camp. No matter how hard he tried to convince himself that he was out, it was not until he tapped around behind him that he felt reassured: his hand had touched a metal cabinet.

Two weeks earlier, on Saturday, February 16, our expedition, composed of seven cavers of the Groupe Spéléo Alpin Belge, was exploring the Cueva del Chichicasapan. This expedition, sponsored by ADEPS [Administration de l'Éducation physique, de Sport et de la Vie en Plein Air, in Wallonie-Bruxelles] and with the support of the bank Bruxelles Lambert, was the first of its kind from Belgium to make it to the American continent. After having discovered one kilometer of new cave, we intended to go to another cave, the Sumidero of Atepolihuit, located deeper in the Cuetzalan massif. A connection would have resulted in the largest cave in Mexico.

On that day, a new push is being attempted: Doug Wilson, an American from Colorado, Etienne Degrave, and I would leave on an exploration trip to the bottom of the system, five kilometers in. Another group would go shoot a movie at two kilometers from the entrance. This team, comprising Guy Meauxsoone, Robert Levêque, Jean-Claude Hans, Dany LeRoy and Philippe Dhilly, is assisted by two Americans, Steve Pitts and Blake Harrison. Lighting, framing; in these wet caves, we usually wear wetsuits. But we planned to use colorful coveralls for the movies and photos. Cavers stand out better in a blue Spéléogliss, a yellow Styx, or an orange Texair. That team came out late at night, after repeatedly shooting scenes, while Dany worked on a photo documentary.

Our exploration team encounters one constriction after another. Waist-deep in water, we follow the stream. We're wearing wetsuits: the water is relatively warm at 13 to 14 degrees C. We encounter numerous squeezes, and, ahead, the meanders become even more constricted: we have to swim in passages barely one meter wide. We stop when we reach the top of a raging waterfall. The best way to continue is to go rig the wall farther along, to avoid the furious waves of this huge waterfall. While belayed by a rope, I rig a bolt in the wall. After falling for eight meters, the rushing waters disappear into a room. The continuation is behind a wall of water. We go around a sump and find large passages that slope down gently. After 500 meters of virgin exploration, we again stumble upon a pile of breakdown.

After twelve hours underground, we start to feel tired. It is warmer than in European caves, and for half an hour we fall into a deep sleep. On the way back, Doug leads the way, flagging the confusing, mazy sections, while we survey our discoveries. We hurry our ascent because on Sunday morning it's market day in Cuetzalan, so pretty with all its colorful fabrics. While on a resupply trip, we had visited the village and its town square. A loudspeaker was playing a Polish waltz. Poland! It reminded me of a rainy day in October in Krakow's main square, with its long lines of people waiting in front of the stores; there also, a speaker had been blaring forlornly in the gray Polish sky. It struck me: Why this Polish waltz here in Mexico? Yet traditional costumes were plentiful in front of this massive church. Bright and warm colors, dancing in the sun. . . .

Just thinking of the sun lifts our spirits How nice if it was sunny when we come out. Of course, it's rain that welcomes us, a light, warm, tropical rain. What time can it be? Ten o'clock, says Etienne. My guess is nine in the morning. On the way to Cuetzalan, we meet a farmer. He greets us with a friendly "*¡buenas tardes!*" Tardes? So it's afternoon? We groan. After being gone for twenty-two hours, we recount our trip to the rest of the team:

"We got 500 meters!"

"If you fell on your butt, you'd be carried away?"

"Hell, yes."

"Awesome, and you can't touch bottom?"

"No, we can't touch bottom, and what's worse, the current carries you away fast. And to go back upstream, better believe that you'll need your ascender. . . ."

"Hey, we saw Robert and Bill [Liebman] coming down toward Cuetzalan in a truck."

"Some Mexican cavers came to find us; they were telling us of two accidents. We thought it was you guys. Then they said . . . French, car

jpb1@alinto.com

From *La Montagne & Alpinisme*, third quarter 1981, pages 150–155, original title "Découvertes au Mexique." Translated from French by Yvonne Droms.

Wet passage in Chichicasapan. *Dany LeRoy.*

. . . . We then thought that the French cavers had had a car accident."

In the fog, we strip off our wetsuits. It's very cold, and to think that Robert had advised us not to bring a warm jacket. Etienne and Jean-Claude, for their part, had picked up some of those new Hollofil sleeping bags in the United States; they're great in wet weather. But here comes Bill Liebman, our Californian, together with Robert. "What's new, Bill?"

"Well, two fell in the Sótano de San Agustín."

The news literally terrifies us. We're barely out from an exploration trip, just to learn of an accident. "It's the Polish expedition to Huautla. Two of them are injured at –550 meters, that's all we know, and it happened on Saturday afternoon." Twenty-four hours since the accident. It must be very serious, and the Poles must be super worried to have rallied the other expeditions, including the Mexicans, who are not very experienced. The French cavers have gone to Mexico City for a caving congress. Mike Boon, an English Canadian who had told us about Chichicasapan, has also left with some young Mexicans to attend this symposium.

"So the Poles are still in Mexico." We had seen traces of their presence at Sótano de las Golondrinas, their flags, but also the trash they had left behind. The gravity of the situation shows on our haggard faces, marked by our recent descents. Our decision was quickly made. We have to go to their aid—Etienne is a doctor and our technical experience will be very useful. How can these accidents have happened? Two injured cavers—they must have fallen when their rope broke. They use Polish ropes that don't have a core.

Etienne thinks compound fractures are to be expected, but it's been 24 hours, and we are 300 kilometers from the Huautla massif where the Sótano de San Agustín is located. Bill tells us that a plane or a helicopter can take us there. But due to the bad weather that has affected the region, we'll contact the Mexican authorities while on the way.

It's mobilization time, to the sound of clicking carabiners and bottles getting knocked over. We also double-check our rigging gear.

"Philippe, you take care of the basic first-aid kit, and Robert, the food; we're taking one bag per person."

"Did anyone see my pliers?"

"Here, Philippe, on the floor."

"Are we taking our ropes, Jean-Pierre?"

"A bag with 400 meters, and the 120 from the Club Redan . . . ."

Slumped in a hammock, Etienne, imperturbable, makes a list of all the needed medications to complete his emergency rescue kit.

"Can I take your waterproof pack, Jean-Claude?"

"Yes, you can take it; first fill out a request in triplicate, then follow the chain of command. . . ."

The pack is flung through the field house while laughter erupts. In the fever of preparations, we take a moment to fix a meal.

"Anyone that steals my bowl of Quaker gets punched. That's already the third bottle of beer that I've opened that has disappeared."

"Having come from so far to rescue some Poles."

"Two injured cavers! If one of them was already dead, it would simplify our work for the other. . . ."

Selfish and cynical thoughts. We're joking among ourselves to keep up our morale. God only knows in what state we'll find those Poles.

Zacapoaxtla, six o'clock in the evening: we call Texas to notify the Austin cavers to be on the alert. We try in vain to get in touch with the Polish Embassy. A group of Mexicans shows us the steps to take. We complete the medical kit, but we still need morphine and plasma.

At 7 a.m. we're anxiously awaiting news in a small restaurant that doubles as headquarters. Jean-Claude and Robert left to place a call. The food we're served does not go down well; we're all anxious, tense. We hear footsteps running in the street. The others arrive all out of breath, their faces grave. They were able to reach the Embassy.

"We have information about the victims: one has a broken leg, and the other a fractured spin, his legs are paralyzed." The news hits us like a brick. It's as if time just stopped; dead silence hangs in the air for a moment. I feel my legs failing me under the table, like everything is going to fall apart. A lump forms in my throat; it's the first time I've experienced this feeling of being grabbed by the throat. As I look at Philippe, I understand by seeing his expression that he realizes as well as we all do what awaits us. Some fall silent, shocked at the magnitude of the news, while others curse this bad luck.

"Well guys, we have our work cut out for us. We're the only ones poised to help for the moment. Will the

Americans show up? What about the others, the ones from Arizona and Kansas? Our friends from Austin are getting ready for their expedition to the Huautla plateau, in San Agustín. In the entire history of caving, there has never been anyone injured this badly at such depth."

Tehuacán, eight o'clock Monday morning: we've only slept for four hours last night. We're 70 kilometers away from Huautla as the crow flies, but it would take us more than ten hours by road. Yesterday, we were able to reach the Polish Embassy, and a secretary in tears gave us the latest details of the accident. We were also told we'd have a helicopter in Tehuacán.

A plane lands. It's a DC-6 that came from Mexico City with some members of the Mexican cave rescue on board. They are clearly out of their depth, but full of goodwill. The pilots put themselves at our disposal. Etienne proposes a plan of action. "What is essential for a fracture of the spine is to keep it in alignment and to avoid bumps during transport so as not to compress the spinal cord."

"I'm telling you, we need six people to move him."

"Ideally, we should lift him up, and slide the stretcher under him."

"We saw that in a course, and believe me, it was not fun."

"And we've never had a case like this."

Well, whatever happens, we'll manage. We hear a chopping noise in the sky; the helicopter is arriving. After much debate on what gear to take, we leave for the Huautla plateau in three successive flights. There is a lot of turbulence in the mountains, and fog blankets Huautla. The pilot manages to drop us in the middle of the jungle. We hike to a road that winds its way through the mountains. It takes us another three hours on a commandeered truck before we get to San Agustín.

Jerzy Musioł fell while climbing up a breakdown slope at around –600 meters. His teammates immediately went to assist him, and one of them, Józef Cuber, went back up a 20-meter drop using only a belay rope, which broke. He was found at the bottom, on breakdown, with paralyzed legs. The Polish caver with the broken leg was helped out of the cave by his teammates. They don't look desperate, just a little overwhelmed, not knowing what to do.

Etienne and Robert take care of Jerzy Musioł's cast. He suffered a triple fracture. The Poles have already installed two bivouacs and a telephone line to Camp II at –525 meters. We'll need to be really careful, especially in a cave we don't know. We get set up for our descent amid the humming of Polish cameras. They haven't stopped filming since we got here.

A first team, who have had very little sleep, starts down on Tuesday around two in the morning: Etienne (the doctor), Jean-Claude, and Dany go directly down to the patient at –550 meters. At eight a.m., Guy and Robert, escorting two Mexicans, will go rig from –300 to –500 meters; Jean-Pierre, Philippe, and Doug will rerig from the surface down to –300 meters. We leave around 1 p.m. while Bill organizes the food supplies with the Polish expedition leader Maciej Kuczyński. We hike through the jungle, into the gigantic doline.

The first team descends very cautiously until they reach the injured caver, still in a state of shock. They administer first aid, inject morphine, place a catheter, set up a backboard. Jean-Claude secures the straps of the stretcher. Dany is already rigging pulleys. Etienne and Jean-Claude catch a little sleep on site. The second team has its hands full supervising the descent of the two Mexicans. Guy and Robert rig a series of long drops. The third team quickly gets split up; Doug has to go down by himself to deliver additional medical supplies, while Philippe is forced to go back up to base camp, because at the top of the entrance drop, he realizes that someone had stepped on his helmet, destroying the lighting mechanism. Again, Polish cameras surround us. I continue alone, loaded like a mule, my harness buckling under the weight of carabiners, hangers, bolts, and hammer. I can't wait to get rid of these two hundred meters of rope. We are overloaded with assorted gear: stretcher, ropes, medical kits. I rerig a series of drops down to –200 meters.

Camp II, at –525 meters. We find three or four Poles asleep in the hammocks. I meet Carlos, a Mexican geologist who accompanied the Poles; finally someone who speaks English! It's eight o'clock in the evening. Jean-Claude and Doug are sleeping; Guy and Robert went to rig some traverses. I use the phone to contact the surface. Mike Boon has just arrived. This excellent caver, well known in the US, came straight from Mexico City, where he had learned of the accident. He borrowed a car and drove all night to come join us. Philippe and Bill Liebman will come down with him. The injured caver has received first aid, he is conscious, but his legs show no reaction. Etienne summarized the situation: "He is not transportable, but we have to get him out as quickly as possible." He is alive, at least that's something. I try to get some sleep. I mull the fact that we'll have to use English with the Americans, a Mexican, and a Pole, Spanish with other Mexicans, and German with another Pole. What a language soup that will be.

"It's your turn to go, Jean-Pierre." Guy comes to take my place. I tried to sleep for a few hours, but with two people in one sleeping bag, that didn't work very well. I struggle to put on my suit, after only three hours of restless sleep. "They'll be leaving soon." I take a moment to eat while Guy recounts his descent and gives his first impressions on what we can expect: he has already rigged over twenty bolts by himself. Robert describes the rig points placed above the pools. There are four delicate traverses where the stretcher will have to be maneuvered as if it were a cable car. Slowly, we start up the pits, with the help of some Poles, some Mexicans, and Doug. Józef Cuber, 34, is securely fastened to the stretcher, and is surrounded by his teammates, who are cheering him up. And I can see that a bond has formed between Etienne and a smiling and trusting Józef; the doctor and the patient are getting along famously. Etienne will never leave his side. And when the doc tells him he's not allowed to drink, he obeys without complaint.

Despite not having slept in many hours, we are in great shape.

"Jean-Pierre, what's your strategy for this traverse?"

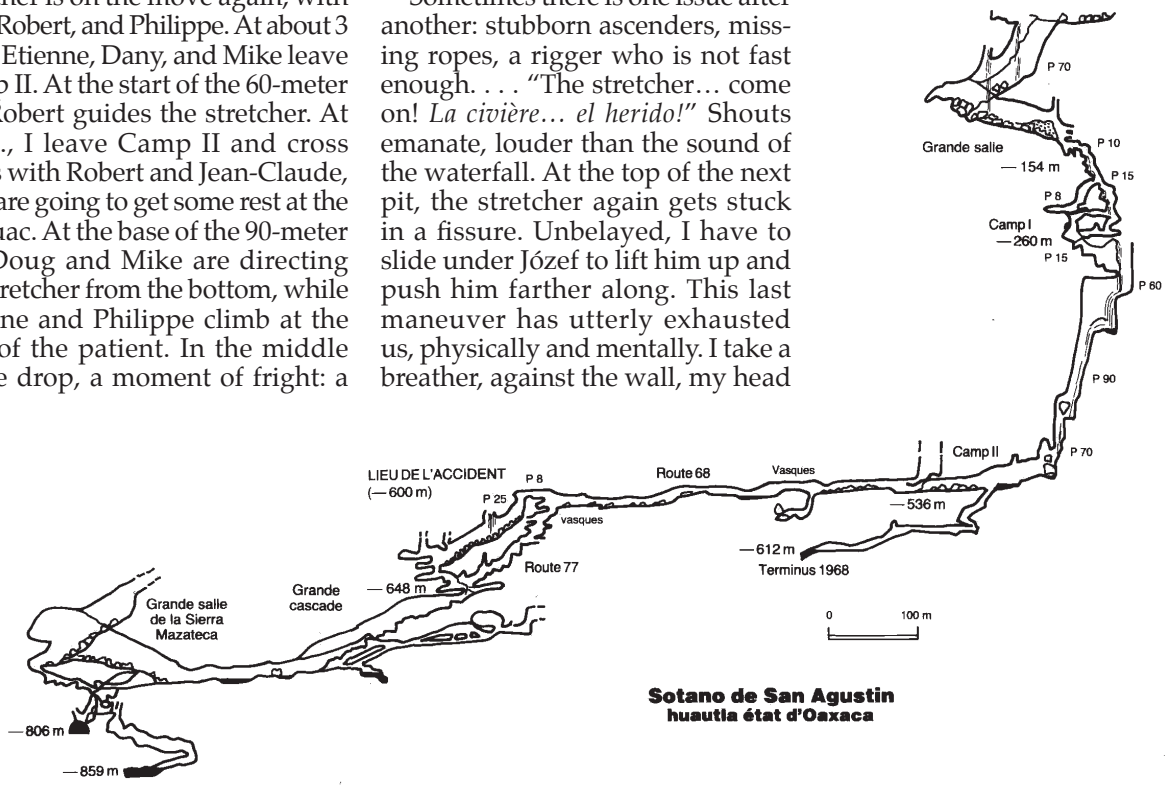
"Well, we let him slide on pulleys, while holding him back from above. From both sides, we make sure he stays level."

The stretcher is winding its way through breakdown blocks. Everyone spontaneously finds his position; we are directing the maneuvers, and the Mexicans, the Poles, and the Americans follow our instructions without objection. After the first pool, Doug and Dany return to Camp II to get some rest. Directing maneuvers in so many different languages quickly becomes a problem. It's like banging your head against a wall. "Easy, take it easy . . . *ich glaube, das ist möglich . . . par ici . . . aquí, aquí . . . más lento, doucement . . . tirez lentement* . . . slowly . . . come on . . . OK . . . ." As soon as one traverse has been crossed, two cavers derig that section.

Camp II, Wednesday, six o'clock in the morning. The backboard is still in place, and the patient is resting. Mike Boon, Bill Liebman, and Philippe are here. Around 1 p.m., the stretcher is on the move again, with Guy, Robert, and Philippe. At about 3 p.m., Etienne, Dany, and Mike leave Camp II. At the start of the 60-meter pit, Robert guides the stretcher. At 5p.m., I leave Camp II and cross paths with Robert and Jean-Claude, who are going to get some rest at the bivouac. At the base of the 90-meter pit, Doug and Mike are directing the stretcher from the bottom, while Etienne and Philippe climb at the side of the patient. In the middle of the drop, a moment of fright: a tether breaks under all the weight, and I lose a few carabiners. Missing everyone, they fall into the pit and disappear into a deep pool. Dany is directing the landing at the top of the pit. There I find the Mexican and Polish cavers, who look very tired; some are already asleep, slumped in the passage. Jean-Claude rejoined us, but Doug is out of commission. He hit his knee; Bill also hurt his legs. A final challenge looms, a wet 70-meter-deep pit. Dany goes up to Camp I to rest; Jean-Claude and Philippe rig the drop. It's my turn to accompany the stretcher, since I'm wearing a wetsuit. The others are in Texair suits, which are lighter and more flexible, but in a wet pit, I have the advantage. I can easily push the stretcher away from the cascade that comes crashing down on me. Mike had the great idea of covering Józef with plastic. There is a moment of panic at the top of the pit, after a knot appeared on the rope. Jean-Claude manages to figure out the jumbled mess of the ropes. Facing Józef, whose only concern is to keep his mouth open in order to capture some drops of water, I calmly climb. Showing his trust in us, he docilely lets himself be guided.

Sometimes there is one issue after another: stubborn ascenders, missing ropes, a rigger who is not fast enough. . . . "The stretcher… come on! *La civière… el herido!*" Shouts emanate, louder than the sound of the waterfall. At the top of the next pit, the stretcher again gets stuck in a fissure. Unbelayed, I have to slide under Józef to lift him up and push him farther along. This last maneuver has utterly exhausted us, physically and mentally. I take a breather, against the wall, my head resting on my arms, and suddenly there is that lump in my throat again. For a second I feel like shouting and screaming, then I breathe deeply. Jean-Claude glances at me, a dejected look on his face: "Let's just hope Józef does not fall apart on us." I reply, "At this rate, I'm the one who's going to fall apart."

Water and cold can lower the resistance of a wounded person. Józef's hands are trembling, and his face is livid. Hypothermia is not far off. His compatriots huddle around him, warming him, talking to him. One of his teammates was constantly at his side. We force Józef to put his hands under the covers, to conserve heat. Despite the sheet of plastic that protects him, his sleeping bag is drenched, and it's high time to reach Camp I. Another two small pits to go. I suddenly feel utterly drained. I struggle to rig a pulley system. Jean-Claude adeptly helps me out, and while we're working on it, I see Steve Pitts arrive. He yells that the American cavers are coming. But his words are soon drowned out by shouts and whistling coming from the pit. "Silence. . . . Pull, push back. . . . All together . . . " And soon,



Józef is raised up into a small, dry passage. The Americans, finally! It's a great relief, because we feel wiped out.

On Thursday at 8 p.m., we find Dany at Camp I. Cups of tea are passed around. Józef can finally get some sleep and nourishment. Etienne had feared internal injuries. Guy and Robert arrive from Camp II with some ropes.

"The AMCS guys are here. The ones from the Association for Mexican Caves Studies." They have hurried their preparations for their expedition and driven 39 hours nonstop from Texas. We meet again our Austin friends; there are eight of them, including two women. They are fresher than we are, but tired from the trip, and also have been worried ever since the accidents were announced. What a beautiful reunion. A month ago, they had wished us great discoveries. In the meantime, we had found 2 kilometers of passage in Cuetzalan, and now, here we meet again, 250 meters underground in the Sótano de San Agustín, more than 3,000 kilometers from Austin.

A shiver runs down my spine, as happens in such moments.When we arrived at the Polish base camp, we were the ones no one expected, the rescuers who fell from the sky, a homogeneous group, which even included a caver doctor. At Camp II, where no one had been informed, we must have struck the Polish cavers as some kind of apparition. The face of the victim had lit up, and we uttered the only Polish words we knew: "*Nie ma problemu!*" This magical sentence, in Józef's own language, must have felt like hope.

At 10 p.m., Bill Stone, in charge of the American expedition, is sitting on a mound of flowstone. San Agustín, it's the Americans who explored it, along with other Huautla caves. The Poles had hoped to make a connection, and had not notified them of their expedition. On his mound, Bill looks like a Roman general contemplating the battlefield, his elbow resting on his helmet. It's adorned with a tiny British-style carbide lamp. We, on the other hand, use modern techniques: a big light with a generator clipped to our side. Lightness and efficacy, versus the large lamp I just adopted, which gives us greater autonomy.

Bill Stone does not hide his disappointment to see this cave defiled by so much trash, both at the entrance as well as underground. We were surprised to see how concerned the Americans were about the cleanliness of the cave sites; all caves are kept spotless, and not a can is seen outdoors.

The Americans go rig a faster route that reconnects to the large entrance room. The Poles and the Mexicans are sent back to the surface. We change Józef's sleeping bag. Six Belgians under the doctor's directions perform this delicate replacement. In retrospect, I would have used a Hollofil bag, certainly bulkier, but rot-proof. Mike and Philippe are tired and leave the cave, as well as Bill Liebman and Doug, who are both injured. A Mexican caver who is a reporter takes pictures. We send Dany out to fetch his cameras, to document our exit, but he falls asleep in his tent and is prevented from coming back down. At midnight, our packs on our backs, we start again, Belgians and Americans together.

Only three more pitches. . . . In the last pit, the Polish television crew is filming again, to our amazement. We are blinded by their lights. I climb up last and, removing my ascenders from the rope, I come out into a small, dry room where I find the Americans and the Belgians fast asleep. They have not progressed. The stretcher is in the center of a circular room, and all around silence reigns. There they are, slumped, collapsed on top of each other. Etienne is standing by Józef. The catheter is clogged and he has nothing to clear the blockage. On top of that, Józef is becoming delirious. It is high time to get him out—he tried to hit the doctor. "Come on, guys, it is urgent we get him out." Some cursing ensues. Etienne, a little disillusioned, makes a plea. "We did not go through all this to let him die here." Dazed, at the end of their rope, Robert and Jean-Claude are wiped out.

Some get up. This however is not the time to slacken our focus. We are all exhausted, for sure, the Americans from their journey and we from our last ascents and four days underground. But the entrance is close, 200 meters at the most, and the patient knows it. Finally, Etienne, Guy, and I take the stretcher with Steve Zeman, Bill Stone, and Marek, a Pole. The others follow far behind. We're now in the breakdown of the large entrance room, with its sandy and loose slopes, where we slip and stumble.

"Bill, you know this room well, which is the shortest way?" Gesturing with his arm, he traces the route. Guy tells me to ask the others to help. His imploring tone makes me turn around. He has also just collapsed, dazed, overcome by accumulated fatigue.

We are still surprised to see no one arriving from the surface. I decide to climb up to the entrance ramp where Jerry [Atkinson] and Mark [Minton] are taking care of the rigging. Robert and Jean-Claude ascend to seek fresh cavers. Some Mexicans of the Red Cross accompany me back to the stretcher. On the way down, I run into Etienne, who is going out to change. He'll escort his patient in the helicopter. Józef glimpses some daylight coming from the doline. I lean over him, show him the light of the dawn, the sun—heat, and life! He looks delighted and hugs me by surrounding my neck with his strong arms. He hasn't lost his strength, for sure. We slip around on the wet limestone, running into each other, and we push upwards, supporting the stretcher with one hand, hoisting ourselves with the other.

The stretcher is set down and reinforced for the last ascent. The other American cavers are arriving now, on their last legs. Bill Stone proposes that I accompany him to guide the stretcher with Zeman and Guy Meauxsoone. The last pit, together, why not? Some Mexicans give us nuts and raisins—words are not needed, a look, a smile are sufficient. It's cold. The stress slowly releases. I'm high, floating on air. It feels like a big void, a slide into the absolute. And yet, we have not taken any of those excellent hallucinogenic mushrooms. I feel like I'm carried away into outer space, where meteorites rain down and

are whistling toward me. A flurry of rocks scatters around us. I must have fainted because Guy brings me back, while the rocks explode against the wall, and I finally decide to leave this dangerous place. The stretcher is already halfway up the pit, engulfed by the jungle, guided by the two Americans and some Mexicans. The Poles are overjoyed. We wanted peace and calm for the exit.

In the deep blue sky, the helicopter is already flying away toward Mexico City, with Józef and Etienne on board. The Mazatec children run along the road shouting after this beautiful metallic bird. We come out into a warm breeze. We see Blake Harrison again. A few years ago, he had an accident at –400 meters in San Agustín and broke some bones. He has no great desire to go down again, and we understand. The Belgians are by the river, some of them asleep; we are not pretty to look at after an eighty-two-hour rescue with a few hours of sleep for the lucky ones. We have our camera again; the Poles will lend us their lights for a few shots. We partake in one last international evening; the Poles thank the rescuers, and the Mexicans give thanks for the training they received during this rescue.

On Sunday, the Americans will begin their exploration on the Huautla plateau. Mike Boon has already returned to Mexico City. As for us, we'll go back to Cuetzalan, without forgetting Etienne.

Józef Cuber, despite several operations in Mexico City and Canada, remains paralyzed below the waist.

Only two weeks of expedition are left for most of us. We still need to recuperate from the exhaustion of the rescue, as well as from our little wounds that got infected to the extent that many of us were unable to walk for several days. We manage one final trip into Chichicasapan. There was no connection made in Cuetzalan, but we returned home having explored and mapped five caves over 500 meters deep. We also discovered more than that: international cooperation, which united cavers from Poland, Mexico, the US, England, and Belgium. We have never regretted this rescue and the time spent bringing out a caver none of us knew. We must now leave, but we take along in our thoughts these intense moments and everything that Mexico made us discover.

El GSAB en México, 1980

Este artículo, publicado originalmente en una revista francesa de montañismo, describe la expedición del Grupo Spéléo Alpin Belge a México en 1980. La mayor parte de la expedición fue utilizada en la organización y ejecución del rescate del espeleólogo polaco herido en el Sótano de San Agustín.

HISTORY

MEXICO 1978

Jim Eyre

It had taken me three years to come to the unavoidable conclusion that I would never be able to afford to go to Mexico, and once I accepted that fact it was easy to say, "Sod it, I'm going." Once that decision was made and the ticket bought there was no going back, and Golandrinas began to feature prominently in many of my dreams.

Wil Howie and Gareth Davies, a wild globe-trotting Welshman, and I drove to Lafayette, Louisiana, to pick up John Sevenair and then moved on by various stages to Mexico. Near the small town of Linares, Wil turned the van up into a picturesque gorge to a high plateau and our first pit, Pozo de Gavilán, which is used by the Americans as a warm-up drop. I had seen Wil's slides, which portrayed the hole in a pretty way with the sun shining on the clear water 260 feet below. Today it was different; the day was overcast, and the large hole gave me the impression of an abandoned quarry, with its sandstone-like walls overhanging in huge, unstable flakes. Wil quickly abseiled down into the lake and swam to the edge and pulled the rope over, enabling the rest of us to enjoy a dry descent and sort our gear out. The swing back over the lake was quite exhilarating, and I did the drop twice, trying to get familiar with the idea of hanging about in tandem on the rope.

Tom and Louise Strong arrived in their Toyota after having driven almost non-stop from L.A. to bring the 1,500 foot rope down, and, after more speleo-bopping, we all drove down to Ciudad Valles, which is a sort of Mexican Ingleton.

On the journey down I had been informed that our first real objective would be El Sótano, the biggest drop in the world at 1,345 feet, and was also informed that it would be good for me, as it was not as "head hanging" as Golandrinas and would break me in gently.

Camping down by the Río Santa María, when we unloaded the rope and began coiling it into three sections for the trek in, we discovered that it was damaged. This was a blow, and after a lengthy discussion it was decided to take other ropes and tie them together. I was too inexperienced to pass a knot on this sort of drop, but Wil in his infinite wisdom tried to convince me that I would be alright, and the following morning he gave me an intensive course on passing knots, hanging from the road bridge.

We parked the vehicles at a small village and, loaded with sixty to seventy pounds each, we began the long trek to El Sótano. The heat and humidity soon had us flagging and I felt grim, wondering if I was taking on too much. When my second wind arrived, however, I felt fit and stayed this way for all the trip. Steadily climbing and taking turns with the rope, we crossed the first small ridge, and by nightfall we were halfway up the second when we made our first camp. Louise Strong, by this time, was making quite an impression and proving as strong as most of us and even stronger than some. Louise also proved to be quite a female and gave fantastic back massages that she assured me "aren't meant to be erotic—and take that silly smirk off your face."

The trek into El Sótano was reputed to be twenty-nine miles with a total vertical gain of nine thousand feet. In reality it seemed much less in distance, but when we reached the crest of the main ridge the following day and looked out across the wide river valley, we realized all our hard-won altitude would soon be lost. Slightly above our own level on the opposite mountain ridge we saw a huge hole framed in white limestone that gashed into the dark-green foliage of the forest; El Sótano de El Barro was indeed an impressive sight. Cursing the fact that we had to lose about four thousand feet in elevation, we began the long trek down to the dried-out rivercourse and then up again to Rancho El Barro.

Camp was established just beyond the village, and the following day we wandered about in the forest until two local lads relieved us of some pesos and put us on the right track for the hole. As luck would have it the day turned out dull and cold, with a mist shrouding the bare limestone edge of El Sótano. Looking down, nothing could be seen, but we sensed the vastness below.

The pit was rigged from a tree with 500 feet of abrasion-resistant PMI at the top and the longer 900 feet of BlueWater below. By the time this was done the mist was dispersing and the dimensions of Sótano were being uncovered. Wil Howie made the first descent, and we waited almost half an hour before we heard the faint shout that told us that he was down.

I rigged into the rope and double checked everything before I eased

---

Reprinted, lightly edited, from the *NPC Journal*, magazine of the Northern Pennine Club, volume 3, number 2, 1979. Another version of this material appears in *The Game Goes On*, the second volume of Jim Eyre's autobiography. It was published in the UK. Unfortunately, due to the relatively high price of this book, it is not available in the U.S. See www.wildplaces.co.uk.

myself down the few feet of sloping rock and over the edge, where I had to look down to clear a piece of carpet rope protection. Between my feet the rope went straight down and melted away into space in the biggest hole anyone could ever imagine. My mind blew a fuse as I stopped on the lip of the overhang and tried to take in the vast dimensions. El Sótano is on the slope of a mountain; to my left the high side was overhung with large grey slabs, and to my right, 1,500 feet away, the lower rim ran into a huge overgrown gully. Beyond the rim a panorama of distant hills spread out into a blue horizon. Behind me, a thousand feet away, the opposite wall dropped sheer into the depths to join in oval symmetry as the shaft narrowed in to a darker-greenish, circular hole. It was like looking down a gigantic cliff into an even more gigantic well, and as I swung clear away from the wall I concentrated on moving slowly to keep the rack cool and took in the strange swallow-type nests and plants on the facing wall, which gradually got farther away as I descended.

The exposure was so great as to be unreal, and I was quite surprised at my calmness, which was almost fatalistic as, looking down into infinity, I could gradually make out the knot slowly moving up towards me. The sense of illusion was heightened as I realized the knot was only at 500 feet, with 900 feet to go, yet seemed almost on the floor of the shaft.

Here it comes. Slow down. Stop a foot from the knot. Get the Jumar on—damn these bloody gloves. Missed the trigger. Blast, the rope's still moving. Quick! Get the Jumar on. . . . Hell, too late! These were my thoughts as I acted out the instructions given me by Wil. Alas, the thick gloves I was wearing made me fumble, and I was slow getting the Jumar on. My other mistake was trying to lock the rack by lifting the rope; 900 feet of rope doesn't lift easily, and I lost the few vital inches that made the difference.

I quickly poured some water on the rack and reviewed the situation. The sling on the Jumar I had borrowed from Gareth was a bit on the short side, and the knot on this, together with the knot on the main rope, had eased into a position between the two prongs in my rack. The two main crabs on my Whillans harness had also got in there, and somehow my camera strap and cord had gotten twisted around the Jumar sling. Altogether it was a bit of a balls up. I unfastened my camera strap and then cut free the safety cord, taking care to keep my knife clear of the rope. With the camera out of the way I fixed a knee cam to the rope and tried several times to get the Lewis rope-walker on my left foot onto the rope. I soon became very tired as I struggled to hold 900 feet of rope up whist trying to fasten the rope in the rope-walker. Gradually I began to realize that my system was not designed for this sort of maneuver and, using the knee cam and a spare Petzl, I tried to prusik up the rope, but was held back each time by the weight of rope pulling me back at my waist. I tried to unscrew my crabs, but again these were locked solid on a twist with the weight and I could not free either of them. After more struggling I realized that I was not going to get anywhere without cutting the main rope below me, but I didn't want to upset Wil, especially as he was down below. I sat for a while weighing up every alternative, looked down at a very faint blue dot that was Wil's helmet, watched two curious white dots fluttering down and down, and slowly realized that I had dropped my gloves. "Wil," I shouted.

"Yes, Jim?" he replied.

"I have a bit of a problem," I answered.

"Hang about, I'll come up", came the answering shout, and then a word of warning, "The rope is going to bounce."

Suspended almost in the center of El Sótano could be the ultimate experience, yet when the rope began to bounce up and down and gyrate I experienced even more sensations, so I started taking photographs to take my mind off things—like how long will it take for me to hit the deck when the rope breaks.

Eventually the "Howie bring 'em back alive service" popped into view between my legs and Wil's homely face seemed a thing of beauty (I must have been freaking out). The face studied the conglomeration of metal and rope and smiled a weak sort of "Christ, what a bloody mess" smile. I waited for words of wisdom. "Yes, you seem to be all of a tangle, but don't worry, Jim lad, we'll soon have you out of all that," said Wil, and we then proceeded to do a sort of "daring young man on the flying trapeze" act as Wil handed me various Jumars and Gibbs which I clipped on for him as, gradually, he moved up the rope and over me, taking care to stand on my balls in the process. We had one nasty moment when some safety string on his Gibbs popped with a loud report and I threw my legs around him, as I didn't want to lose him at this stage, but all was well. We did have a slight argument when he told me to take my knee cam off. "No," I said, "I like that on, but I'll take this off."

"No!" shouted Wil, "Not that, the knee cam."

So the knee cam came off and I suffered agony while Wil climbed over me. Once in position the maestro was able to organize things. I pulled up some of the rope from below and handed it to Wil, who held it while I prusiked higher until, with the tension off the rack, I was eventually able to free the various jams and get the rack off. It felt good to be free again, yet we still had difficulty getting the Lewis foot rope-walker on again, and without the rope being held from above it would have been impossible. Once it was on I relaxed as I slowly lowered the rope, only to tense up again when the rope-walker turned out to be on upside down. We had to repeat the whole process and put the rope-walker on upside initially down to compensate for the change in rope direction. By the time I was organized and rigged in for the ascent I was feeling tired and both hands were knotting with cramp.

Moving up the rope I began to warm up, but with only a hundred feet to go my foot cam suddenly felt odd and, looking down, I saw the sheath splaying open. The pin was being pulled through as the wire safety split-ring straightened out and was forced through the sheath.

Once again the Petzl came into action, and I was thankful I had spent some time rigging this with a tape that had some loops for either feet or harness; this is what got me out. [For article about the failure of the Lewis ascender, see http://www.pennine.demon.co.uk/NPC/1979/LEWIS.HTM.]

I was informed by the others that I had spent three hours on the rope, and Tom Strong made the wise decision not to go down. However, Gareth and Louise made the drop and then did the climb in one and a half hours, which is fast—too fast as it turned out, for they had left some loose rope at the bottom under a log, and when we tried to de-rig, the rope was held from below.

After two hours struggling, with Gareth perched over the fierce drop on another short rope, we found it impossible to free the 1,400 feet of rope. It was getting dark and the camp was along way down the mountain, so we had to retreat. The walk down through the forest was rough, with three lights between five and constantly losing direction, but eventually we smelled wood smoke and heard John Sevenair, our camp guardian, shouting.

Later that evening we discovered that we were short of water, so Gareth and I volunteered to go down the mountain to Rancho El Barro to the well. "We will be back by midnight," I said, but the others persuaded us to take sleeping bags just in case we got lost. "Rubbish, us Brits never get lost," said I. Two hours later we were lost.

By now we were very tired, hot, and thirsty, and with but a mouthful of water left we staggered down the spur of the mountain and slowly came to the conclusion that we were on the wrong spur. We hadn't a clue which way to go, then I remembered that there were lots of dogs at at the ranch, so we began barking, and a chorus of dog barks answered us from another spur higher up. Wearily we trampled back up to the tree line and cut across to the other spur, barking (or, by this time, yelping occasionally) and being answered by dogs that sounded quite vicious. We approached a hut and suddenly we were surrounded by snarling dogs that snapped hungrily at us as we made a rapid retreat. "Hmm, wrong dogs", said Gareth.

An hour later saw us creeping round another isolated dwelling wondering how to wake up the inhabitants without alarming them. "What's the Spanish for knackered, dying of thirst, and lost," I was asking Gareth when an old peasant appeared and took us partly on our way to El Barro. Thankfully we filled the water containers, and then Gareth made the discovery that we had left the chlorine tablets at the camp. I tried to say, "You Welsh twit," but by this time I was so thirsty that I could only croak. We were faced with a choice of drinking the water and getting amoebic dysentery or spending a rough night suffering from thirst. We settled for the latter, but with our feet in a bucket of water. The next day we found that Louise had descended to free the rope.

We met Mike Boon in Mexico City on Christmas Eve and had a wild party before moving on to Cuetzalan.

We arrived in Cuetzalan in fog and left in fog. However this is one of Mexico's most promising caving areas. The place is like a giant pepper-pot, with huge caves swallowing up rivers and, as yet, no risings discovered. Mike Boon and Pete Lord have turned into a pair of Mexican Eli Simpsons and are revered by the visiting American cavers, who call them sir and touch their forelocks frequently when addressing them. There was some talk of putting up a statue to Mike Boon, but it was considered indecent by the local council and was dropped.

The Association for Mexican Cave Studies rents a small dwelling just outside the town. This was to be our headquarters, and I was soon introduced to the various inhabitants: Rick Rigg, who is Desperate Dan Smith's right-hand man (if you don't know or have never heard of Dan Smith don't worry), Joseph Lieberz, Bill Liebman, who has a thing about psychedelic mushrooms, and Lew [Williams], who doesn't say anything (America's Talking Pete). This was how things started, nice and cosy, but suddenly we were descended upon by two truckloads of Texas cavers.

American Mexican cavers are the most intense I have yet met. Bulgarians, for instance, are really keen because they have to be—one word from their shop steward and it's back to the salt mines—but Americans seem to do it voluntarily. They spend all night talking about caving, even when the pubs are open, and all day getting together their gear, which includes a kind of mini-drugstore (medicinal except in Liebman's case), complete first-aid kit, needle and thread, compass, barometer, clinometer, pedometer, tape, spare carbide lights, six electrics, inflatable boats, night lights, rucksack with spare clothing, thermometers, candles, matches, cameras, underground bird-watchers kit, bug bottles, waterproof pad and pencil, SRT gear, pocket calculators and . . . the list is endless. So all trips started about teatime and, together with Rick, Bill, Wil, and Gareth and one Mexican caver, Alejandro [Villagómez], I found myself on a trip to investigate a 100-meter pit that Rick had discovered in Piloztoc.

The caves in this area are extremely humid, with a temperature averaging 60 degrees Fahrenheit, so caving in wetsuits is a really sweaty experience and water bottles are a necessity. Even though most of the caves contain water, it is highly polluted from the villages above.

After about a quarter of a mile into the cave, down two small pitches, we came to a large passage where a shale band had been washed out and left a hanging slag heap overlooking a largish pitch that Rick reckoned was 300 feet deep. I flung a rock and it didn't sound that far, then someone else reckoned it was 400 feet, and we had an argument when I said it was 250 feet. I watched in amazement as Rick brought out a stop-watch and a pocket calculator. Someone was stationed above the drop with an aerodynamically suitable rock, 5 by 5 inches, and on the count 1, 2, 3 dropped it. Rick did this three times to eliminate errors and then computerized everything, allowing for wind speed and humidity etc., etc. After several minutes of intense mental activity he stated that the

pit was 245 feet deep. Wow! I was impressed. After another even more complicated maneuver, where Bill Liebman discovered that his rope was 100 feet longer than he thought, the pit was found to be 230 feet deep. After half-a-mile of new exploration we broke into the huge, 200-foot-wide river passage of Zoquiapan. [A report on this trip by Bill Liebman is in *AMCS Activities Newsletter* 11, pages 40–41.]

This account could go on at length so I will curtail it. After a glorious New Years Eve, when several of the worst inebriates (myself, Boon, etc., etc.) climbed the 70-foot maypole in the churchyard at Cuetzalan, we all split up and headed for different caving areas. There must be enough cave exploration in this area to keep British and American cavers occupied for twenty years.

Returning to Ciudad Valles, Wil, Gareth, John, and I, together with Martin Cannon, headed straight for the Condesa to find a message informing us that Louise, in the best women drivers' tradition, had turned the Toyota upside down, which had removed the roof and upset Tom. But the vehicle was still mobile and it didn't deter them from joining us, so six keen types and a not-so-keen type (me) loaded up our rucksacks and set off for the magical '"hole of the white-collared swifts." Being a potholer and a big-pitch man I had been fascinated by the stories about the huge shaft of Sótano de las Golondrinas ever since it was discovered by American cavers. Trying to imagine a free drop of 1,100 feet became a permanent pastime, and I used to spend hours on top of Lakeland crags, quarries, cliffs, and tall trees, in fact I even went up Blackpool Tower, but still couldn't conjure up the right atmosphere—soon I would find out. The walk in was a totally pleasant experience, mainly because our three hard Americans were doing their *macho* bit by insisting on carrying the rope. John was doing his own thing, thus leaving the three normal boozy-type Brits to stop at every little *refresco* stand on the trail and have a beer. For Martin there was an added attraction, for everywhere he goes the locals insist on buying him drinks.

We sauntered up the thousand-year-old trail, taking care not to get too near Wil, Louise, and Tom in case one of them wanted a lift with the rope. Unfair really; we did ask them, once. Eventually, the magical mystery tour ended when, after a hard slog to beat fast-approaching night, the three of us arrived at a plowed field that Gareth assured us was the camp site and then made me, much against my better judgement, come and look at the hole.

In deepening dusk we thrashed through the jungle for a short distance and stood on some bare limestone blocks taking in a large oval hole, 200 feet by 180 feet. It seemed ominous and awe inspiring, and when Gareth, the Welsh gnome, heaved a bloody great rock in and began timing it, the deep sonorous boom that came from the depths struck terror in my soul. Gareth looked at me and grinned an evil Welsh grin. "What do you think, Jim boyo?" he said. "I'll bet you don't sleep tonight."

The following day we reunited, rigged the pit, and Wil, our gallant leader, vanished over the edge, while I got ready, fastening various devices on my person.

Much later, under Louise's expert advice, I rigged on and forced myself over the lip on five bars and hung suspended in a bush—my life is full of anticlimaxes. I heaved my way down the rope and looked at seven acres spread out between my feet. Golandrinas is not a hole, it's an experience. As I pulled my way down the first hundred feet or so I gazed in wonder, since after the first 15 feet the walls belled farther and farther away until I was suspended in a giant dome, with thousands of birds circling in small groups near the vague backcloth of the far-away walls, grey, green, and soft with illusion. The distances became so unrelated as to appear unreal, and the small flocks of green and yellow parakeets wheeling and turning like multicolored dots only seemed to heighten this feeling of floating in space in a vast pleasure dome. My fifth bar was proving so difficult to get off that I left it and continued heaving up the rope until I began to move easily and really experienced pleasure. Down below the seven acres began to spread out, taking on contours and looking less like a map. The lower walls took on angles, and sharp lines appeared as I gathered speed.

I saw a dot move among the boulders below and heard a shout. It was Wil, still a long way off, and I scarcely seemed to be moving. I glanced at the rope, whistling through my rack, slowed down, and became aware that I was descending into a huge pothole with steep slopes of rock debris, a semi-twilight musty world of moss, soil, and isolation. The bottom of Golandrinas suddenly rushed up towards me. "Keep the rope moving through your rack," said Wil, as I staggered back and sat down, quickly unzipping my warm bars. I wandered about at the bottom of this great shaft, taking pictures of the others as they appeared dot-like on the skyline and watching Tom's cautious descent. Then followed Gareth's and Louise's blasé flying, for this was their second time. Gareth gave us some Welsh singing as he came down, and I must admit it sounded rather fine.

At long last the moment of truth. Wil rigged in and climbed up past the damaged section of rope, and I followed, fiddling about with my borrowed gear for a long time, as I didn't trust anything after my El Sótano experience. Wil soon established a good rhythm, twenty steps and wait for me, then twenty steps and wait again; one climbed while the other waited. This suited me, and after five or six cycles we could sit back and rest. The Howie SRT system was perfect for this. I felt completely at ease once I was far enough up to kill myself if the rope broke. I mean, there's no point in worrying about it then, so I enjoyed the view and the generally enthusiastic chat that Wil was giving me from above.

The parakeets were getting ready for their evening flight, and we watched the increased activity as we climbed. Slowly I became aware of a pain in my right side where the continued pressure of a carabiner was making itself felt. I was blowing a bit, so Wil dropped the pacing to fifteen steps, and by the time we

were nearing the white limestone I was beginning to feel tired. Wil decided to lean down at this time and shake me by the hand. "Been great climbing with you Jim," he said, sounding like he was going to cut the rope, "only 100 feet to go and you're making good time, you old sod".

After looking up at the white rock and the reflected sunlight I glanced down at the vastness below and received the odd impression that the shaft was filled with a lake and that the walls were reflected in the still water just below me. I shook my head and focussed my eyes and the illusion was dispelled. I think it must have been the contrast between the light rock and the sharp delineation where the grey-brown rock takes over. Another few moves and we were fighting through the bushes and out.

México 1978

Esta entretenida historia de un viaje a México fue publicada en una revista de espeleología británica. Jim Eyre visitó el Sótano del Barro en Querétaro, Pilozotoc y Zoquiapan en Puebla, y el Sótano de las Golondrinas en San Luis Potosí. En el Sótano del Barro no pudo llegar al fondo por haber tenido problemas al cruzar un nudo en la cuerda.

NSS VISITS MEXICO IN 1946

The society's first Mexican expedition returned July 7 after exploring ten Mexican caves and four in Texas and Missouri. Mohr, Dearolf, Ackerly, Nixon, Drysdale, and Hay, who made the long trip in two cars, were joined by two of the world's leading speleologists, Dr. C. Bolivar Pieltain and Dr. F. Bonet of the National Polytechnic Institute, both of whom signed their applications for membership in the NSS in Cacahuamilpa Cave.

This vast cavern, a Mexican national park, "surpasses even Carlsbad in the size and number of its huge stalagmites," Mohr reports. The cavern differed from Carlsbad in most other respects, however, and is almost wholly devoid of stalactites. The party saw the exits of the two underground rivers that pass through the mountains far beneath Cacahuamilpa, one for six miles, the other for four, but high water barred access to them.

A three-day bus trip with the institute professors and a student party was climaxed by an all-night exploration of marvelous Juxtlahuaca Cave, which Mohr describes as "one of the greatest experiences of my life."

At the awe-inspiring Cueva Saltans de Arroyo, near Valles, the party used Ackerly's new parachute harness for the final 60-foot sheer drop into the bottom of the 200-foot-deep sinkhole. The rig worked perfectly.

The onset of the rainy season failed to prevent the party from collecting all three kinds of blind fishes that occur north of Yucatan, as well as other rare forms of cave life. Vampires unexpectedly were among the five species of cave bats collected. Mohr and Dearolf made a photographic record of the trip that many eastern members of the NSS are hoping to see before long.

—*NSS News*, August 1946, page 2.

Charles Mohr, Director of Education at Philadelphia's Academy of the Natural Sciences and rapidly becoming one of our most traveled cave explorers, has returned from his second Mexican trip of the season. On this trip Mohr collected fauna for the Academy and took pictures to be used in his institution's educational program. He reports visiting four exceedingly interesting caves near Monterrey and dubs this spot as ideal for a speleological meeting. He also got into three more "blind fish caves" around Valles and six caves in the state of Guerrero. Once more Cacahuamilpa and Juxtlahuaca were visited.

We no longer have to depend on hearsay to inform us about the almost legendary Boca del Diablo, notorious "bottomless" shaft near Taxco, for this time Mohr saw it for himself. It is reported that many people have taken one-way trips down this shaft, but so far none has come back to tell his experiences. This is supposed to have been a favorite spot to dispose of the bodies on one's political enemies in Mexico. A local mining expert estimates this shaft to be about 1000 feet deep. This man blew shut the entrance with dynamite and placed heavy timbers across it a few years ago, but it is open once more. Mohr says that dropping a stone down it convinced him it was indeed a very deep pit, but he doesn't say anything about trying to become the first to make a return trip into its depths.

—*NSS News*, October 1946, page 5.

QUINTANA ROO NOVEMBER 2014

Peter Sprouse

This week-long survey effort concentrated almost entirely on the Jaguar cave complex in Paamul. This is a series of formerly connected caves that are now disjunct due to passage collapses. Of the four major components, Jaguar Jaw was the only one that did not get any surveying.

Jaguar Maw. A day's surveying was done extending the cave map toward the east, through typical dry mazes. This included the Gingerbread Entrance, and a number of leads were left going.

Jaguar Paw. A 100 m gap existed between Jaguar Paw and Jaguar Jaw along the north side of the main collapse. Some surveying in this potential connection area from the Jaguar Paw side was done, as well as surface scouting which resulted in the discovery of another cave, which looked likely to be part of Paw. In fact, it was connected in during the December 2014 trip, but the gap between Paw and Maw remains.

Jaguar Claw. Most of the survey on this trip took place in Jaguar Claw. The north branch of the cave was tied over to the AGD Line coming down from the Vencejos entrance, and a large amount of maze passage was mapped along the southern part of the AGD Line.

Puerto Aventuras Area. Three caves were mapped along the southwest edge of the Puerto Aventuras pueblo. Cueva de los Círculos was a very short cave by the tree nursery. Two other caves were bigger, and had been located by cavers from Playa del Carmen with the Círculo Espeleológico del Mayab. Cueva del Vivero and Cueva del Templo

petersprouse@yahoo.com

November 2014 Quintana Roo expedition survey totals

Cave name	*Nov 2014 survey (m)*	*Total cave length with previous surveys (m)*
Jaguar Claw	3350	17534
Cueva del Vivero	634	634
Jaguar Maw	379	2430
Cueva del Templo	162	162
Jaguar Paw	117	2605
Cueva de los Circulos	17	17
total	**4659**	

Fofo González in Jaguar Claw. *Jennifer Hopper.*

Hiking through Jaguar Claw is easier than hiking through the jungle. *Jennifer Hopper.*

nearly connected, and in fact did on a subsequent trip.

Participants: Andy Belski, Piper Belski, Talon Belski, Alan Chuc, Allan Cobb, Osama Gobara, Fofo González, Jennifer Hopper, Pat Kambesis, Larry Keele, Joe Leiper, David Mayor, Linda Palit, Rodrigo Pimienta, Dave Radatti, Peter Sprouse, Terri Sprouse, Carol Vesely.

Quintana Roo, Noviembre de 2014

La expedición a las cuevas no sumergidas de Quintana Roo de noviembre de 2014 exploró en su mayoría cuevas en el Sistema Jaguar, principalmente en Garra de Jaguar.

PROOF THAT THE CIA WAS RUNNING DRUGS?

Back in the '70s (and even today) there were persistent rumors that the CIA was secretly running drugs to finance its operations. I think cavers may have played into that perception, at least in the eyes of a couple of American tourists. Here's how.

In 1978 Tennessee caver Chris Kerr broke his leg in Cueva del Brinco, part of Sistema Purificación in the mountains northwest of Ciudad Victoria, Tamaulipas. The relatively small crew on site was not sufficient to mount a rescue, so cavers were called in from the US. Austin got the call, and within twenty-four hours Terry Sayther's truck and eight cavers were ready to go. The team consisted of Jerry Atkinson, Gill Ediger, Tracy Johnson, Mark Minton, Terry Sayther, Bill Steele, Bill Stone, and Terri Treacy. As anyone around in those times could attest, we were a pretty hairy and wild-looking bunch. Air transport had been arranged through the National Cave Rescue Commission and US Air Force, so we set out for Bergstrom Air Force Base, now the Austin-Bergstrom International Airport. At the gate they wanted to know who was in charge, and they seemed both amused and concerned when we looked at each other blankly and then said nobody. We all felt equally competent and didn't need a leader.

After some unavoidable delays, Sayther's truck was loaded into a C-130 military transport plane, along with all of us and our supplies. We flew to Brownsville and, after a brief delay spent in a holding pattern, received clearance from Mexico to enter their airspace. There was apparently an agreement concerning how many US military aircraft could be in Mexican airspace at one time, and that number were already there, so we had to wait while one cleared out. We then flew to the Victoria airport, which at the time did not have commercial flights. The runway was somewhat short and potholed. We made a pass or two so that the pilot could assess the situation, after which he said he thought we could make it. Gulp!

After a successful landing, the plane rolled to a stop and the back hatch went down. Terry drove his truck down the ramp and the rest of us got in. We pulled up to the small airport office, where a Mexican government representative handed us a sheaf of papers and assured us that all of the immigration paperwork had been taken care of and that we were good to go. We signed nothing, but thanked him and headed off on our quest. The C-130 took off and returned to Texas; we would have to drive back.

Observing all of this was a couple of Americans who had apparently recently arrived in a private plane. They watched agape as a civilian Chevy Suburban full of hippies that had just come off of a U. S. military plane exchanged pleasantries with a Mexican official and roared off into the sunset. No doubt they were sure they had just witnessed first-hand that the US was involved in some highly suspicious activities in Mexico.

—Mark Minton, *Texas Caver*, fourth quarter 2009.

LA GRIETA CRACKED

Gilly Elor, Corey Hackley, and John Harman

Photography by Kasia Biernacka/kasiabiernacka.com

After the successful but disappointing 2013 expedition to Sistema J2 in northern Oaxaca, Mexico, a small group of J2 participants began laying plans to return to the Aguacate valley to push Cueva Palomora and conduct surface reconnaissance in the area. Cueva Palomora has the potential to connect with Sistema J2, possibly bypassing the major sumps and connecting into the fabled Cheve trunk. All involved realized the chances of such a connection are slim, and braced themselves for the possibility of walking away empty-handed. Because of its very short three-week duration, success of the expedition hinged on getting advance permission, a feat that is almost unheard of in southern Mexico. However, the team, working through local pro-caver contacts, came very close to securing permission in the *municipio* of San Miguel Santa Flor. During the course of negotiations it became clear that San Miguel Santa Flor and the neighboring *municipio* of San Francisco Chapulapa were engaged in a territorial dispute, and, as luck would have it, Cueva Palomora was located squarely in the disputed region. If permission was granted by San Miguel Santa Flor, San Francisco Chapulapa could block access. A decision was made to cancel the Palomora expedition and pursue that lead after the dispute had come to a resolution and when more on-site time could be dedicated to securing permission.

This turn of events left the team with a fully funded expedition and no objective. As luck would have it, Bill Steele and Tommy Shifflett had planned to restart yearly exploration in Sistema Huautla. Their project, dubbed Proyecto Espeleológico Sistema Huautla, was slated to be in the field for the month of April 2014 and would put in place the logistics framework for our team to join. Bill Stone, who planned to be part of the Cueva Palomora push, suggested that we consider a lead at the –400-meter level in the La Grieta section of Sistema Huautla. After further discussion it became obvious this was a viable option and worthy objective for our team to pursue.

La Grieta, The Fissure, is an entrance to the Huautla system near the village of Plan Carlota, a relatively short drive from the PESH base in the village of San Agustín Zaragoza. The first documentation of the cave by US explorers was in 1965 by T. R. Evans and others. However, the cave remained unentered until 1968, when David Honea, Meri Fish, and Mike Collins descended to the –100-meter level and turned around after running out of rope. Don Broussard had remained at the entrance shaft to guard the rope. However, he was overrun by local Mazatec villagers, who cut the entrance rope while Meri was ascending. Luckily, she was near a ledge and only fell a few feet. The incident is well documented in caving literature, including the book *Huautla* by Bill Steele. Eventually a new entrance, the Hobbit Hole, was discovered that, while narrow, did not require rope. In 1969, cavers returned to the area in earnest and again descended to –100 meters in La Grieta, but were again hassled by locals. The next major push in La Grieta would not be until December, 1976, when Jeff Horowitz, Alexia Cochrane, Jim Smith, and Bill Stone reached the –401-meter level. Their push was not without trouble, and a similar run-in with the locals landed Stone in a kangaroo court in the village of Plan Carlota. Again, this interesting incident is well documented in the AMCS literature [see *AMCS Activities Newsletter* 6] and Steele's book. Exploration in La Grieta continued, and it was eventually connected to San Agustín on April 24, 1985 [see *AMCS Activities Newsletter* 15]. During the original exploration of La Grieta, Stone and others surveyed an upstream passage between Camps 1 and 2 called the Refresher. The passage carried a significant stream and ended at an obstacle. Some of those explorers remembered an aid-climb, while others seemed to recall a tight squeeze into going passage. The 2014 expedition goal was to establish a camp in the junction room between old Camps 1 and 2 and conduct a proper push of the upstream Refresher lead.

The trip started with the long drive from West Virginia to Oaxaca. Corey Hackley and John Harman were joined in John's truck by Yvonne Droms and Mark Minton. Arriving at Bill Stone's ranch in Austin, Texas, we were met by Gilly Elor, who had flown from Boston. There, underground food was prepared, gear was assembled, and the crew rested before striking out on the long trip south. The drive to Oaxaca was quite uneventful, and after two days the team arrived safely in San Agustín to a bustling field house full of excited cavers who had already mapped several small new caves and blind pits.

The next day was spent packing enough gear for a ten-day push into

gelor84@gmail.com
chackley07@simons-rock.edu
jharman2@gmail.com
Reprinted, with some editing and different photos, from *NSS News*, February 2015.

Corey Hackley and John Harman in Camp 1.5 in La Grieta.

Nalgene bottles, Curtec drums, and Santi drybags. About fifteen bags were required to hold all the gear required to support a team of five people rigging, climbing, and surveying for ten days. After the gear was consolidated, the team drove to the entrance of the cave to begin staging gear at the bottom of the entrance shaft. Bill Steele had secured permission from Plan Carlota to work in the area, and several crews had been caving in the area in the days prior to our arrival. At the entrance Gilly used the Hobbit Hole to free-climb to the base of the entrance shaft. John rigged a rope down the entrance shaft and positioned himself at the famous ledge that had saved Meri Fish's life back in 1968. Corey, with help from Mark and Yvonne, lowered bags to John, who in turn lowered them to Gilly. The operation went smoothly, and before long all the gear was staged.

The next day saw Corey come down with the terrible sickness that had been running rampant through the Huautla cavers. With Corey unable to go caving, Gilly and John descended on the cave to begin the job of rigging. Passing through Plan Carlota in John's truck, the group was stopped by a drunk, angry local with a machete on his side. His eyes were bloodshot and he was speaking loudly in Mazatec. Despite the language barrier, his intent was quite clear—to keep the cavers from passing through. A decision was quickly made to retreat to the nearby store and enlist one of the friendly locals to reason with the man. Upon return the man again appeared, speaking at maximum volume in Mazatec. Our liaison from the store, a teenage boy named Uriel, spoke back to him with a firm tone, and the man retreated from the side of the truck, but only after Uriel had said *policía*, was the only Spanish word in the conversation. The crew continued to the cave and spent an uneventful day rigging. While John and Gilly were in the cave rigging, Uriel showed Mark, Yvonne, and Zeb Lilly a nearby cave that they started exploring and would later name Sótano de Uriel. In La Grieta the rigging went quickly. John set off with a 200 meters rope, drill, and rigging hardware and began rigging short pitch after short pitch while Gilly followed behind hauling bags progressively deeper into the cave. The duo stopped at the top of the split between the Canadian Tubes and the long, sloping drop down to Camp 1. John and Gilly made a rapid exit, linking up with the others and heading back to San Agustín via the upper road, which goes through San Andrés, thereby bypassing the angry man in Plan Carlota.

The next day Corey was feeling better, so Corey, Gilly, and John headed back into La Grieta to continue rigging and hauling gear. Gilly and Corey took point and began rigging down to Camp 1, while John hauled bags down drop after drop to catch up with them. After some time the trio completed rigging and hauling gear to Camp 1. John, Gilly, and Corey then left the cave, planning to enter for a three-day camp on the next trip.

Early the next morning, Kasia Biernacka arrived from Poland. Being quite tired from traveling, Kasia opted not to participate in the initial camp in La Grieta. Gilly, Corey, and John went to Camp 1, and John rigged down the next pitch, called The 200 because it was approximately 200 feet deep. At the bottom John rigged down two short pitches to the start of a passage dubbed the Torture Chamber. However, at this point, John reported feeling quite sick, and, having seen the trajectory of Corey's sickness, decided it would be better to be sick on the surface. Gilly made a rapid exit ahead of John and Corey to tell the other crews, who were surveying in the nearby Sótano de Uriel, not to leave. John and Corey had an uneventful but slow exit. Ultimately, John's sickness did not take the same trajectory as Corey's; it was much less severe and didn't involve a protracted period of vomiting and diarrhea.

On the drive back to San Agustín the cavers learned why the villager in Plan Carlota had been so upset the day before. He was actually the owner of a small store that lacked both a refrigerator and, more importantly, a sign. He was upset that cavers had been patronizing the other store in Plan Carlota, which had both a refrigerator and a sign. He had tried to communicate his displeasure to cavers visiting the other store in drunken Mazatec, but no one in the truck understood what he was saying or even knew another store existed. To deal with the situation young Uriel, the son of the competing store's owner, had been enlisted to speak to the man. Likely, this coupled with the threat of

police action, further fueled the store owner's anger. As a result, the owner of the unmarked store lodged a formal complaint against cavers with the local politicians. That evening a large contingent of cavers stopped at the unmarked store and bought a variety of items. However, damage had been done, and the expedition leadership received notice that caving in Plan Carlota was suspended until cavers met with the villagers and a vote was taken.

For the La Grieta crew, this meant a lost day waiting for permission. This wasn't a huge problem, as John spent the day nursing an upset stomach, luckily avoiding the symptoms other Huautla cavers had experienced. The next day, April 10, was quite busy. Cavers had been summoned to Plan Carlota to meet with the locals and resolve the permission situation. Also, Bill Stone was scheduled to arrive expecting to head directly into La Grieta for a ten-day camp. John, Corey, Gilly, Kasia, Mark, and Yvonne headed into the village of Huautla de Jiménez to pick up Bill, while the other cavers went to Plan Carlota to have the meeting. After picking up Bill everyone headed to Plan Carlota to find that the much-anticipated meeting had never occurred, and everything had simply blown over. Permission was restored and all was well.

With good news in hand, the La Grieta crew of Bill, Corey, Gilly, John, and Kasia wasted no time going directly to the cave and heading in, entering the cave around 5 p.m.. The team made rapid progress to the base of The 200, carrying only light packs. Once at the bottom of The 200, progress slowed as the team of five began shuttling a total of fifteen packs through the Torture Chamber. The Torture Chamber is a long, slowly descending stream passage that is generally comfortable but is sometimes confining. The team planned to camp at the entrance to the Refresher in the aptly named Junction Room. This spot was approximately halfway between old Camp 1 and Camp 2. Therefore the camp would be dubbed Camp 1.5. The team spent several hours rigging drops and shuttling bags. A quick consultation of the map revealed that only about one-third of the distance between the start of the Torture Chamber and the proposed site of Camp 1.5 had been traversed. A decision was made to establish a bivvy that would ultimately be dubbed Camp 1.25. Camp 1.25 was a fairly miserable place, with the only flat area for cooking being squarely in the middle of the stream. Despite the lack of amenities, it afforded a place to get some sleep and attack the task of shuttling gear to Camp 1.5 with fresh minds and bodies.

After a long, restful sleep, the team rallied and broke Camp 1.25, forging ahead toward the site of the intended Camp 1.5. Aside from a few nuisance drops and traverses, the next obstacle was a tight spot labeled the Bottleneck on the old map. Previous teams had to unpack duffel bags and pass gear through. However, they had been using large military duffels. The current team found that modern cave duffels slid through the flowstone constriction with little problem. The constriction was short and was the last real obstacle before an otherwise smooth trip to Camp 1.5.

Upon arrival at Camp 1.5, the team found a sandy hill with ample room for sleeping pads and a cooking area. After having lunch everyone headed back to Camp 1.25 to retrieve another load of gear before making a quick recon up the Refresher. Back at camp a jovial atmosphere gave way to another restful night's sleep before the first push up the Refresher.

After two days in La Grieta, three days of rigging and hauling from the surface, three days of driving, and countless hours of packing and planning, the team was finally ready to set out on the morning of April 16 to discover what lay upstream in the Refresher. Given the loose description of the lead from 1977, it was not clear what to expect,

Corey Hackley admires formations in the Refresher passage.

Gilly Elor avoiding deep water in the Refresher.

and so the team left Camp 1.5 with climbing, rigging, and survey gear in hand. The initial route upstream in the Refresher consisted of a series of calm, deep, turquoise pools. In some cases it was necessary to swim in chest-deep water, carrying our packs above our heads in order to keep them dry. Other times we stemmed the mud-coated walls above deep pools to avoid swimming in the water below.

It was not too long until the 1977 limit of exploration was reached. The Refresher's water flowed out of a narrow fissure and into a small pool. With no obvious bypass in sight, Gilly and Corey waded into the chest-deep water, entered the fissure, and squeezed through. On the other side they climbed out of the water into a tall but not that much wider canyon. They continued upstream for a while, climbing waterfalls and stemming the canyon walls. It was beautiful, but it was no borehole. The thought of bringing climbing gear to this place seemed less than appealing; in addition there was a real possibility that not all the team members could fit through the initial crack. It seemed possible that all the work to get to this point had been for naught. Reluctantly Kasia, Corey, and Gilly started to survey the upstream passage beyond the crack; meanwhile Bill and John continued to look for a bypass. Not too long after the survey began, John returned and excitedly told the others that Bill had found a spot to free-climb up into a steep fissure that opened up into larger going passage. With high spirits the group split up. John and Corey took rigging gear and set out ahead to flag, recon, and possibly climb the route onwards. Meanwhile Kasia, Gilly, and Bill began the survey (which they humorously designated KGB) from the 1977 tie-in location.

The route through the new passage began as a modestly sized, dry tunnel that gently sloped uphill. The passage soon narrowed and became nicely decorated, requiring the team members to squeeze by columns and flowstone-lined walls and gently step across shallow pools lined with delicate calcite formations. After a couple dozen or so meters the passage opened up into a larger room about 10 meters in diameter. This borehole, however, only lasted about 20 meters before narrowing and rejoining the stream of the Refresher. Carrying the stream again, the passage became an ever-constricting canyon where survey shots ranged from 2 to 4 meters. Eventually the canyon became too wet and narrow to stay near the stream at the bottom. Climbing 3 to 5 meters up to stem above the canyon floor allowed more practical, if hazardous, progress. The walls of the canyon, while beautiful, were covered in fragile flake-and-spike features sharp enough to impale a sturdy wellington boot. A single slip or breaking a spike would expose the human flesh to similar forces, presumably with similar results. Footholds and handholds frequently broke, requiring us to catch our balance or risk falling onto sharp rocks below.

After about 40 meters the canyon opened up into a larger room where the water flowed into a fissure in the floor. Above the fissure, after a short climb-up, was a sizable and extremely well decorated room. The room was filled with formations, the star of which was a 4-meter-diameter column in the center. Bill remarked that such a highly concentrated area of large formations was indeed unique in the Huautla system. The room itself was also very comfortable and had plenty of flat, dry, sandy places to sit—a welcome, albeit temporary, change from the previous somewhat hostile passage characteristics.

Beyond, the passage curved around the column to take a 270-degree turn from the initial trajectory. Beyond the Formation Room, the nature of the passage changed drastically from meandering canyon to a mazy and hazardous area of natural booby traps, the cave became strewn with much unstable breakdown, and the option of traveling safely above these delicately poised boulders was intermittent, a precarious situation

Gilly, Bill, and John at deep water in the Refresher.

John Harman aims the DistoX while Bill Stone takes notes

indeed, particularly in such a remote location. It had been a long day of survey and route finding, and facing a long commute back, the team decided to call it a day and return to camp for a festive celebratory dinner.

The following morning the team awoke rested and eager to continue pushing upstream. The commute time over treacherous terrain to the frontier was by now already a couple hours. Having seen an abundance of uphill-trending horizontal passage, we made the call to leave behind the climbing and rigging gear for ease of travel. Preparing for a long day, we took cooking supplies so that we could have warm meals, and Kasia brought her photography gear to document the new discoveries. Having reconned the route on the first push, John and Corey took the DistoX and leapfrogged ahead to begin a two-man survey in the breakdown maze beyond the Formation Room. Meanwhile Kasia, Gilly, and Bill picked up where they had left off.

The KGB survey proceeded uneventfully. Kasia, Gilly, and Bill picked up the survey from the start of the narrow canyon, taking it past the Formation Room and into the breakdown and tying into John and Corey's new survey, designated EJC. Once tied in, Kasia, Gilly and Bill followed the EJC survey stations to catch up with the lead team. Along the way, they free-climbed into some leads that ultimately connected back to the main room.

The two teams regrouped in the Formation Room to have a hot meal before traversing the spike canyon and swimming through the pools back to camp. That evening the situation was assessed. The first two pushes had been highly successful, carrying the team through a broad variety of passage types with many leads. These successes, however, had pushed the limit of exploration a significant distance beyond the camp, through a passage riddled with a greater than average number of hazards. With time becoming a crunch and the commute to the limit of exploration hazardous and becoming ever longer, it became evident that a long, potentially 24-hour push would be most efficient.

The following day was designated as a rest day to recover from the first four days in the cave and to build strength for the final push. Additionally, food supplies had run low, so Gilly and Kasia made a short trip back to Camp 1.25 to pick up extra food that had been stashed there during the trip in. Meanwhile Bill and Corey stayed behind in camp to tidy up their sketches from the previous two days. John hung around in camp and made a "string toy" out of some dive line that had been brought in.

The previous survey had ended just beyond a major infeeder issuing from a too-tight slot in the wall, and the passage ahead was a narrowing fissure. Arriving at the frontier, Bill, Gilly, and Kasia scooped ahead to begin survey some distance beyond, while John and Corey remained behind to survey the intervening gap. The DistoX made two-person survey barely inconvenient, allowing for the division into two teams. Before starting the survey, Corey was able to reach the major infeeder via a climb several stations back, but found that the passage, while quite beautiful, was less appealing due to closer quarters and less airflow.

To the team's surprise, the main passage, still designated ECJ, improved immediately. The fissure, representing a joint that was capturing the water, terminated in a blind chimney, while the water emerged from a beautiful and open series of cascades to the right. Above the cascades, the passage continued as a series of up-trending breakdown rooms. It was in one of these rooms that Corey and John caught up with Kasia, Bill, and Gilly, and a lunch break was taken. Unfortunately, the ad hoc kitchen accommodated four comfortably, leaving one of the team acrobatically compressed in some hole in the boulders. The arrangement was nonetheless suitable, and hot food and going passage kept morale high.

Above the Lunch Room, a dry walking passage with great air departed from the main stream route. A short distance in, an apparently separate stream entered this passage and left just as quickly. That passage was left going well for future

Photographer's selfie.

GEOLOGY AND HYDROLOGY

While quite successful from an exploration point of view, the trip also provided significant insight into the geology of this portion of Sistema Huautla. The Refresher displayed an incredibly diverse range of passage morphologies, yet all bore the clear signs of structural and stratigraphic control. Bill noted that our survey frequently exhibited orientations consistent with two major joint sets, intersecting at 60-degree angles. These changes in direction make general trends hard to detect while in the passages, though the entirety of the data showed a very clear northward trend.

While jointing exhibits strong control on passage orientation locally, the primary factor in regional passage orientation is stratigraphic. In its first 300 or 400 meters of depth, La Grieta plummets along joints through a thick sequence of marbleized, conglomeratic limestones, with very little horizontal passage development. Then, beyond The 200, the waters from this shaft complex converge and travel down a gently sloping stream passage, the Torture Chamber. This passage is floored by a light-colored, resistant limestone or dolomite that seems to be the bed most conducive to the formation of the dreaded spikes. The Torture Chamber ends at the Junction Room, where a series of passages gives access to the Refresher. Upstream, the Refresher begins to climb, quite gently, updip along the same resistant bed. Beyond the first 600 meters, other strata begin to appear, including a distinctive black rock with ample calcite veins and a sequence of shales. The last of these beds produces passages with an inverted keyhole cross-section—broad and low at the bottom with a canyon in the ceiling. At any rate, this sequence of distinctive rocks appears to constitute the stratigraphic base of La Grieta, and hence the passage trend, in profile, is dip-controlled. In plan, the passage alternates between strike-oriented and downdip trends, rising and falling through the same thin strata many times. In roughly 2 kilometers, the Refresher climbs about 200 meters, with only one obligatory rope—and its necessity is mere happenstance.

There is much evidence of faulting within the Refresher, in the form of slickensides and visible displacement. It also seems that a distinctive red material, such as that around the prospective Camp 3 site, accompanies faulting, but the mechanism underlying this linkage was unclear to us, as amateur geologists. Kasia's photographs of the borehole at the end of the push capture multiple fault blocks displaying significant displacement, and it seems possible that the sudden enlargement of the passage in this area is related to structural weakness induced by faulting. Whether faulting exerts significant control, other than local passage morphology, in La Grieta is not immediately evident.

Hydrologically, the Refresher's origins are becoming clearer. Only two significant infeeders join the main stream; another stream's relationship to the Refresher's drainage is unclear. The first of these infeeders is quite near the beginning of the Refresher, in passage surveyed on an earlier expedition. It emerges from a low, water-filled opening, and ample rimstone adorns its mouth. It is worthy of note that downstream of this infeeder, the Refresher is littered with trash from the villages above, while upstream, the watercourse remains pristine. We suspect that this infeeder represents the outlet of the Mexican Tubes, an extension of a high lead in La Grieta surveyed by another team on the 2014 expedition.

The next infeeder is not encountered until EJS 67, about a kilometer from the infeeder previously described. It accounts for about one-third of the Refresher's volume, and while too tight at its confluence, can be accessed via a complex route through breakdown. This stream's origins are unknown.

The mystery stream is encountered in the dry passage above the Lunch Room. It was merely heard and not investigated, but it does not as of yet appear to exhibit any visible relationship to the main Refresher.

—Corey Hackley

survey.

The route now became more complex. It was becoming clear that we were gradually entering a much larger, breakdown-filled passage, but the optimal route forward was difficult to identify. With Bill, Gilly, and Kasia still surveying in the lead, John and Corey surveyed 100 meters or so, and then began following survey flags through the lead team's convoluted route. Armed with the DistoX, Corey and John had surveyed considerably faster than the lead team, who were still condescending to use analog instruments. So it was not long before the two teams met again, this time in rapidly improving passage. The survey had been alternating between low, wide contact cave, with the stream entrenched into a shaley limestone, and higher breakdown rooms, with the stream audible but not visible below. Now, the lead team stood before Corey and John atop a climb, surveying into large, dry passage stretching off into the distance.

Drawing the lucky straw, Corey and John leapfrogged ahead to begin surveying a reasonable distance beyond the others. The passage continued its upward trend, and as it climbed, widened. In awe, John and Corey set a station and began surveying into blackness. Shortly behind were Kasia, Gilly and Bill. Before long, all five cavers were climbing breakdown mountains in a magnificent borehole, fully 20 meters in diameter. Accompanying the increase in size was a wonderful display of color; the passage was floored by soft, shaley materials of a beautiful red hue. The source of the material was clearly displayed in the ceiling, alongside striking blue and white marbled limestone. Kasia was able to capture both the color and size of the passage in a series of photographs, for which we paused the survey. While taking a break in this area, we decided that it would make an excellent area for a future camp, which would indeed, at this point, be necessary

The colorful borehole at the end of 2014 exploration in La Grieta.

Bill Stone sketching.

for further exploration.

The easy forward progress was not to continue unimpeded. After several long shots, the trunk, which had been continually ascending, dropped abruptly by about 12 meters. As we had left our rigging supplies and rope far behind, an effort was made to bypass the drop by weaving down through cavities in the breakdown. The bypass involved some exposed moves, and the group's foray through this bypass and into the passage beyond the drop was brief and primarily to get water; the stream was audible below, and water supplies were short all around. While not entered, the continuation appeared to be multi-leveled. The lowest level, a canyon with the main stream, continues below and slightly offset from the middle level, a dry canyon. High above, the passage appears to continue as a borehole.

While tempted to continue, the team agreed that it would be ill-advised. The trip back to camp was now about 2 kilometers over very hazardous terrain, and having already made the trip once, fatigue would begin to make its effects

apparent on the return. Given that the last leg of the trip on the way back was the most dangerous and required the highest degree of alertness, the group would be seriously endangered by such over-extension. The decision was made to leave the newly found borehole and return to camp.

Though uneventful, the trip back down the Refresher proved that the right decision had been made. Rubbery legs and drowsy minds made travel through spikeland harrowing. The crew returned safely to Camp 1.5 after seventeen hours of non-stop, highly demanding caving.

That final push on April 19 ended the 2014 exploration of La Grieta. Plans for a return expedition were hatched almost immediately. A minimal derig was conducted, leaving all non-perishable supplies and gear stashed in the cave. As it is no longer feasible to operate out of Camp 1.5, our first task in 2015 will be to establish a new Camp 3. This will be non-trivial. The over 2 kilometers of treacherous route from Camp 1.5 to the limit of exploration will have to be rigged and cleaned to make it safe for hauling large quantities of heavy gear. Operating out of Camp 3, a major push up the Refresher will be possible. The exploration of Sistema Huautla continues.

We are thankful for support from the following cavers: Yvonne Droms, Mark Minton and Bill Steele helped lower gear into La Grieta during the rig. Yvonne, Mark, Zeb Lilly and Scott Walquist assisted in shuttling between La Grieta and the village of San Agustín. Andreas Klocker assisted during the de-rig. Tommy Shifflett and Bill Steele organized surface support, secured permissions in Plan Carlota, and coordinated negotiations when permissions was in jeopardy. This expedition was supported by grants from the National Speleological Society and the US Deep Caving Team. It would also not have been possible without the support of the Proyecto Espeleológico Sistema Huautla and their many sponsors.

La Grieta Rebasada: Expedición al Sistema Huautla 2014

Durante la expedición de 2014 del Proyecto Espeleológico Sistema Huautla en Oaxaca, un equipo acampó en la sección La Grieta del sistema para explorar el pasaje Refresher corriente arriba hacia una zona bastante promisoria que no se había visitado desde 1977. La exploración final terminó a 2 kilómetros del campamento subterráneo, con pasaje de buen tamaño pendiente de explorar. Otro campamento subterráneo será necesario para poder continuar.

BOOK REVIEW

Journey into the Giant Selenite Crystal Caves of Mexico. Leela Hutchison. CreateSpace; 2014. ISBN 978-1496145680. 6 by 9 inches, softbound, 102 pages. $19.95.

This little book was self-published by the author using CreateSpace and is sold by Amazon. There is also a Kindle version. One might expect a book with such a high price per page to contain a lot of nice color photos of the spectacular giant crystals, but in fact the book contains only a few small, mostly poor-quality black-and-white ones. The text isn't much either, the type being large, and isn't much to brag about. It could have used a good going over by a middle-school English teacher. After some background on the author's interest in crystals, it tells the story of the author's 2001 visit to the recently discovered Ojo de la Reina and Cave of the Crystals in the Naica mine in Chihuahua. She was one of the first two women to visit the caves, apparently on the same trip when Carlos Lazcano took the first photographs of the crystals to be published in caving literature, in *AMCS Activities Newsletter* 25, 2002. The visit, without benefit of the cooling gear used on later explorations, was grueling, but very exciting to the author, who is into healing by crystal energy and that sort of thing.—Bill Mixon

IN PURSUIT OF THE JAGUAR

Benjamin Schwartz

This article is written more as a personal log in terms of the small details and observations, but is also a more general account of the expedition in terms of the larger accomplishments. There were two or three teams out mapping most days, though there were also a couple days with at least five teams. Some days were much more productive than others, especially those when multiple teams were mapping in the huge maze of Sistema Garra de Jaguar (Jaguar Claw). But even the less productive days were full of fun discoveries. As has been the case on all the expeditions to Quintana Roo, there were many leads generated. These range in level of return-appeal from "we need to come back here, I guess," to "I can't wait to buy another plane ticket and continue mapping."

December 16. The trip began for Zachary, Matt Zappitello, Saj Zappitello, and me when Cori dropped us off at the Austin airport. The four of us flew on the same direct Southwest Airlines flight to Cancun. We had an interesting visit with some customs officers when Matt learned that his visa, which he had obtained at the northern border where Mexican officials assured him he did not have to turn it back in if he was planning to return to Mexico in a few weeks, was invalid. This caused a bit of a cluster, but eventually he was allowed to fill out a new visa application form and enter the country. On the other hand, I learned that flying with game cameras in your luggage will guarantee that you get the red light at the random-search point and a very detailed inspection. Agents questioned me carefully and were confused by the cameras that had no viewfinder and were in camouflage colors. One of the officers took one of them away for further investigation and returned fifteen minutes later to declare that they were worth $38 each. I explained that I was borrowing them from another faculty member at Texas State University, and didn't know how much they cost (but it was certainly a lot more than $38 each). After a stern lecture about not bringing more than two cameras into the country for personal use, our luggage was repacked, and Zachary and I joined Matt and Saj in Mexico on the other side of security in Terminal 2. As a side note for future reference, travelers are not allowed to bring in more than one personal typewriter, either. Keep that in mind next time you are traveling, and read the details on the customs and immigration form.

Outside the terminal area, we met Nathaniel Schwartz, my brother and Zach's uncle. We picked up our rental cars from Easyway and drove to Akumal, where we checked into rooms at the Centro Ecológico Akumal (CEA), where a group of us based operations for the next three weeks. Dinner was at the Poncho Villa restaurant, where we met up with Patricia Beddows and Ed Mallon, who were already in Akumal and joined us after a long day of diving and installing instruments. Poncho Villa definitely does not have great food, but it was close to home and we were hungry. According to the crazy waiter serving us, all guacamole is made *con queso*. Saj was not pleased, and we all agreed that this was straight up BS for tourists, none of us ever having seen guacamole con queso.

December 17. Nathaniel decided to spend the day hanging out at CEA while the rest of us geared up for the first survey trip to Cech Chen, a dry section of Sistema Ponderosa just south of Puerto Aventuras. This cave is a little beauty that we had started surveying in August 2013. And by *beauty*, I mean hot, humid, stuffy, muddy, and low: definitely not the suck-in cave for getting folks to join an expedition. To the south, passages extend quite some distance and through a couple tight squeezes to where the cave eventually intersects some water-floored passages and then pops out in a tourist cenote in Kantun Chi ecopark. So even though the dry portion of the cave is only a couple kilometers of mostly crawling, it is also connected to a large underwater system; further proof that all the caves in the region are liable to connect. One interesting feature of the cave is that it appears to be formed entirely in a paleo beach ridge and has only one known entrance until it reaches the cenote area to the south. This may also explain why the cave is so stuffy and humid compared to other caves in the area.

We spent most of the day mapping a couple hundred meters of low, crawly maze in an area to the east of the Bat Channel, the main route leading north from the entrance area. As has been the case on all previous trips, we left plenty of unremarkable low, crawly leads for the next trip, and the next, and the next. The cave shows no sign of changing character anytime soon, and we decided that it most likely continues as a narrow strip of maze for the entire length of the beach ridge. It is a both exciting and depressing thought to realize that it may continue all the way to Playa del Carmen. This was definitely the muddiest trip of the expedition, mainly because we were sweating so much and rolling around in dirty, low crawls.

benandcori@hotmail.com

December 18. Before the expedition officially began, we all decided to take a day off and go snorkeling and touristing. Snorkeling in Akumal Bay turned out to be quite the circus. Unfortunately, there are now literally thousands of tourists who are guided out into the bay on snorkel tours each day so they can see the turtles. We were told that four to five thousand people visited per day on the weekends while we were there. This number has increased tremendously over the past few years. We were also told that the number of sea turtles in the bay has continued to decline, and that there were around 160 earlier in the season, but only 65 in December. It seems that the turtles are moving out of the bay because of all the harassment. Sadly, both trends show no signs of reversing. We did not see any turtles, and because of the crowds decided not to snorkel during the day here again.

After a quick lunch, Zach and I led the way to visit the Xel Ha ruins, which were absolutely deserted. I love these ruins because of this, even though they may not be the most spectacular. They are right next to the road and are never crowded, there is a lot of cool geology exposed, and the entry fee is only 43 pesos. We wandered around on some quasi-trails behind the cenote and eventually found ourselves at a newly built tower for a zipline across another cenote. A nice crushed-limestone trail led right to it from where we walked out of the jungle. Obviously one of the nearby cenote tourism operations has been spending some time and efforts on developing the area, though we didn't see a soul. Bird-watching from the top of the tower was fun, and we observed how birds would find the null points to sit on when we caused oscillations of different frequencies in the cable. Back near the cars Zach's and my urban foraging instincts kicked in, and we collected about sixty-five fresh lemons from a tree near the ruins. They were quite tasty during the next week as lemonade, and delicious with tequila.

Later in the evening Aubri Jenson arrived in Quintana Roo with Peter and Terri Sprouse, and we had dinner together in Akumal Pueblo before making plans for the next day. Barbara Luke was also supposed to have arrived, but airline delays prevented that. She planned to arrive the next day instead.

December 19. Because one of the objectives of this trip was for Aubri and I to meet local divers, scientists, and cavers and to scout research ideas and opportunities for Aubri's Ph.D. dissertation work on speleogenesis in the Yucatan Peninsula, she and I spent some or all of several days geeking out, meeting people, and tagging along with Trish and Ed as they finished up some of their work.

Aubri, Trish, and I went down to Tulum in the morning to meet some divers there and return some gear that Trish and Ed had been borrowing, while Zachary and Nathaniel hung out in Akumal with Ed to fix some of his Cave Pearl instruments that were either malfunctioning or needed to be set up for deployment during the trip. I was quite impressed by the Cave Pearl instrument platform, and really encourage anyone interested in building their own cheap instrumentation to look up Ed's blog site, https://edwardmallon.wordpress.com.

After the three of us returned from our Tour de Tulum, we all regrouped and everyone except Ed headed out for a short day of caving. Matt and Saj had joined Peter and the others in the morning for trips into Jaguar Claw and were already gone for the day. Because none of the rest of us knew how to find our way through Jaguar Claw yet, we had talked with Peter and decided that we would look for new caves between the parking area for Jaguar Claw and the beginning of the Jaguar caves—there are several major Jaguar caves in the system: Jaw, Paw, Claw, Maw, Craw. We hiked into the jungle for a ways until we came to an obvious small entrance next to the trail that had no station label. However, once we entered we found some marked stations and, thanks to the line-plot of the caves that many of us carried on our smartphones, we quickly determined that we were in surveyed passage in Cueva Pecarí. We turned back at this point and started checking other entrances near the trail and looking for new entrances off the trail. An hour or so of jungle-bashing didn't produce anything interesting until I checked out the edge of a small rise to the south of the trail. There, at the foot of a small outcrop, was a small entrance typical for the area. Ducking inside, I found myself in a reasonable-size walking passage heading south-southwest. The passage soon lowered to a crawlway, but then opened into a room with a large pool and several obvious leads taking off, so I reported to the others that we had a decent cave with going passage and we should break out the GPS and survey gear.

Aubri sketched for the day, which gave me my first chance in a loooong time to do something else, and we all geeked out on geology. This was Nathaniel's first time to find and explore virgin cave, so he and I "pulled tape" (Disto, actually) for much of the trip while Trish and Zachary ran instruments. We surveyed a bit over 200 meters for the day before turning around with plenty of good leads. We also found and photographed several very nice ridged-mud animal trails and set up one of the game cameras near the entrance to the

---

December–January Quintana Roo Expedition 2014/2015
participants in no particular order

Benjamin Schwartz, Zachary Schwartz, Cori Schwartz, Nathaniel Schwartz, Aubri Jenson, Saj Zappitello, Matt Zappitello, Peter Sprouse, Terri Sprouse, Barbara Luke, Benjamin Hutchins, Carrie Hutchins, Krzysztof Starnawski, Marcin Gala, Jason Ballensky, Tamara Ballensky, Ann Hall, Ian MacDiarmid, Gil Harmon, Steve Tatreau, Ellen Whittle, Roberto (Chibebo) Rojo, Stephen Rehbein, German Yañez, Nick Banks, Jacinto Vela, Patricia (Trish) Beddows, Ed Mallon, Osama Gobara, Rob Spangler, Andrea Marassich, Owen Pedigo, Deysi Uc Puc, David Mayor, Coryne Nadeau, Jean-Francois Grégoire, Mario Zabaleta, and likely a few other folks that I missed.

cave looking in along one of the game trails. Because we mistakenly thought that it was the solstice, we called the cave Solstice Cave, or Chichan Kin Belai in Mayan.

The other teams had been just a bit farther out the trail in a cave called Sistema Chu'úuy, which had seen a little survey done in it a year prior by Alan Formstone, Gil Harmon, and Liliana Viola. Peter, Terri, Matt, and Saj split into two teams and mapped 637 meters in this extensive maze cave, leaving continuing passage heading west.

December 20. While the rest of the group gathered and went to Jaguar Claw again, Zachary, Aubri, and I joined Trish and Ed for a day of fun in Río Secreto to help them install the drip and temperature/relative-humidity sensors that Ed had built. We had a great time wandering through the huge passages and talking science all day, and we were treated to a very nice dinner in the tourist area at the end of the day. The Jaguar Claw crew had been productive. Barbara and Terri continued mapping where they had worked the day before, including a spot they named the Lisa Simpson Room. Matt, Saj, and Peter mapped large maze to the west off of the AGD Line that they called Borehole Unlimited.

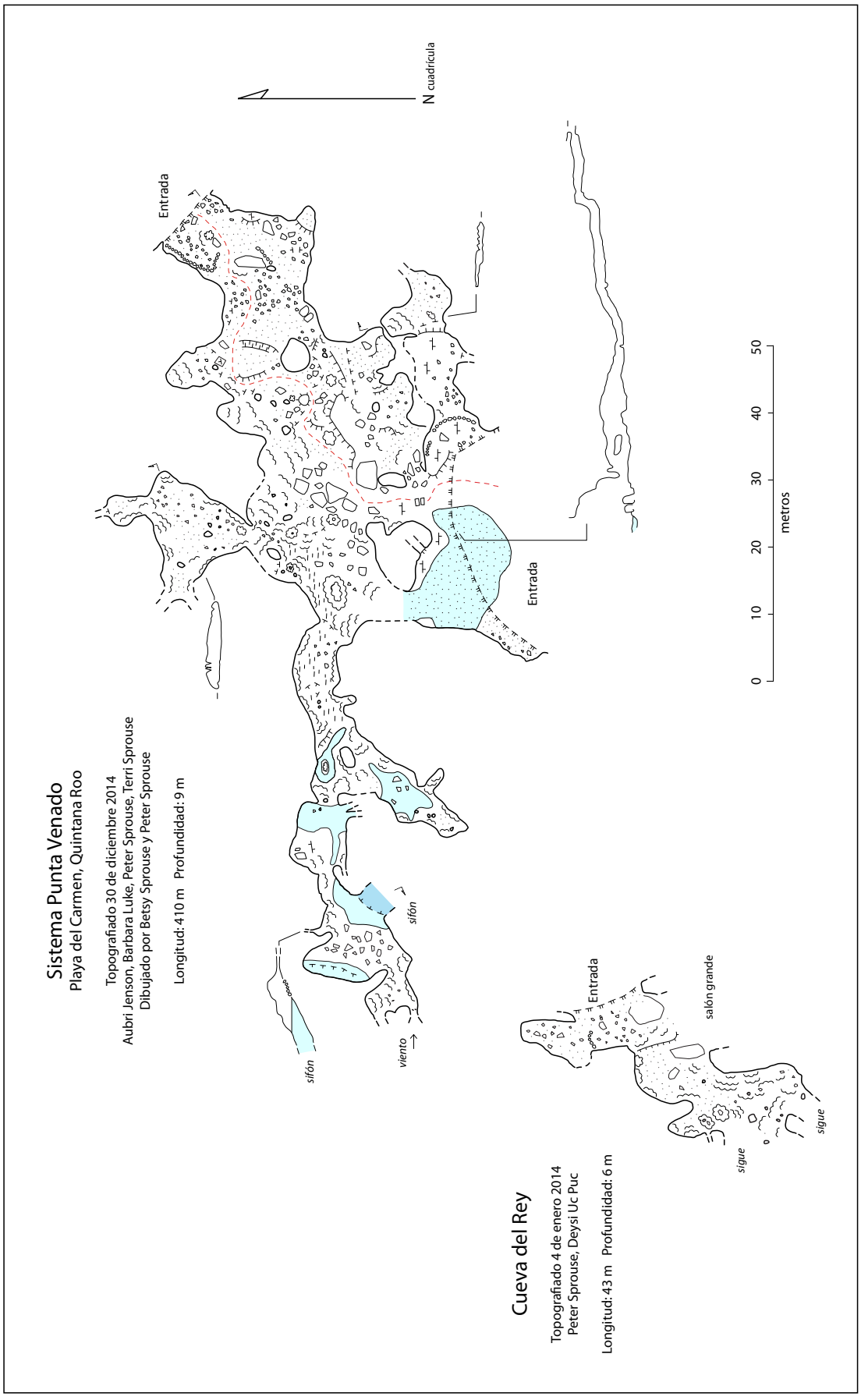
December 21. I was really excited about this day, my first trip to Jaguar Claw. One of my reasons for being excited was that we had been searching for "the big one" in August 2013 when we found several other caves out the Chain Road a couple kilometers to the north. We knew the big caves were out there somewhere, but we had never made it out to them. Later in the year, around December 2013, if I remember, the Jaguar system was first discovered, and since that time crews have mapped over 30 kilometers of large passages in the area in only a few expeditions. Today would be my first trip into these caves. [An article on the December 2013 expedition is on pages 156–160 in *AMCS Activities Newsletter* 37.]

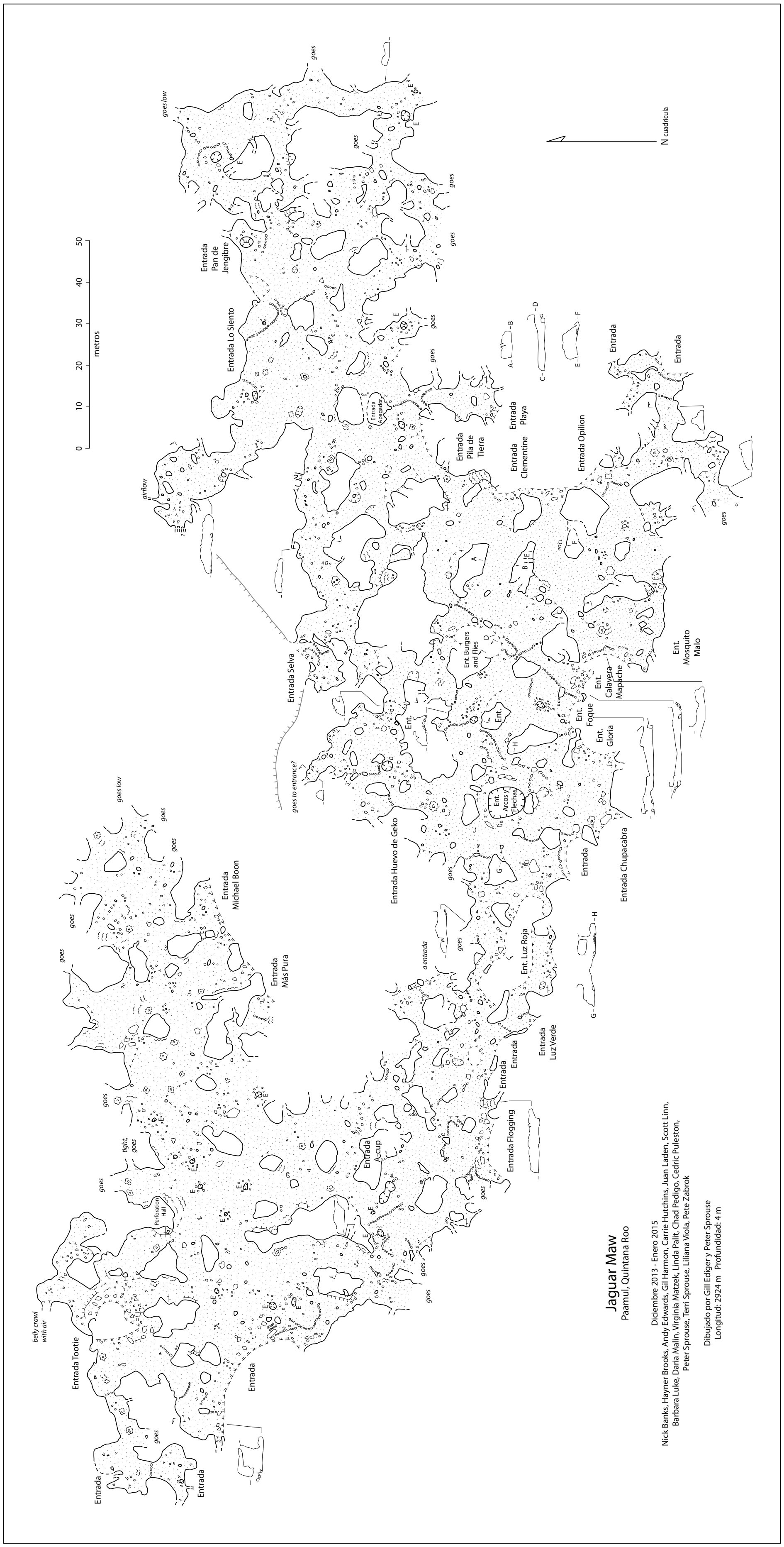
We had breakfast at the Taquería El Arbolito in Puerto Aventuras. This is, hands down, some of the best breakfast food I have ever eaten. Wow! With full bellies, Zachary, Matt, Barbara Luke, Terri Sprouse, Chibebo, Peter Sprouse, and I headed out the road to the parking area. The hike to the entrance to the Jaguar system is about thirty minutes by trail through the jungle from the cars, depending on how fast you walk, and then the hike through three caves is another thirty to forty-five minutes to reach the central portion of Jaguar Claw, which is the farthest of the three large caves that we travel through. Although Jaguar Jaw, Jaguar Paw, and Jaguar Claw are separated by a few meters, they were obviously all part of the same large system at one time; and they may yet be again with some work to connect them near collapses at driplines or undiscovered routes. In general, the cave starts out as a low walking-height column-maze with dozens of entrances and skylights, but as you move farther inland the land surface rises gradually, the passage height increases, the ceiling gets thicker, and the number of entrances decreases. Walking through the cave is unbelievably easy and consists mostly of walking across nearly perfectly flat packed dirt floors. It is truly inconceivable that a more comfortable cave passage could exist anywhere in the world.

Once we reached station AGD37, we split into three survey teams and agreed that we would meet back there at 3:30 p.m. to regroup for the hike out of the cave. The cave is so vast and confusing that without marked stations and the line-plot loaded on my iPhone, I seriously doubt I could have found the route back out on this first trip. Matt Zappitello, Zachary, and I formed one team and started mapping to the west of where Matt and Saj had been mapping the day before. Barbara Luke and Terri Sprouse formed a second team that mapped to the west, and Peter and Chibebo mapped to the southwest, finding a new entrance that they named Ayotzinapa.

Essentially, the cave in this area consists of 5- to 8-meter-tall borehole maze in every direction for as far as the eye can see. The easiest way to map it is to start in a general direction and then make decisions on where to go based on filling out a page in

Cori Schwartz looks into unsurveyed passage near Entrada Vencejos. *Benjamin Schwartz.*


Sistema Punta Venado
Playa del Carmen, Quintana Roo
Topografiado 30 de diciembre 2014
Aubri Jenson, Barbara Luke, Peter Sprouse, Terri Sprouse
Dibujado por Betsy Sprouse y Peter Sprouse
Longitud: 410 m Profundidad: 9 m
N cuadrícula
Entrada
Entrada
sifón
viento
sifón
sifón
Cueva del Rey
Topografiado 4 de enero 2014
Peter Sprouse, Deysi Uc Puc
Longitud: 43 m Profundidad: 6 m
Entrada
salón grande
sigue
sigue
0
10
20
30
40
50
metros


Jaguar Maw
Paamul, Quintana Roo
Diciembre 2013 - Enero 2015
Nick Banks, Hayner Brooks, Andy Edwards, Gil Harmon, Carrie Hutchins, Juan Laden, Scott Linn,
Barbara Luke, Daria Malin, Virginia Matzek, Linda Palit, Chad Pedigo, Cedric Puleston,
Peter Sprouse, Terri Sprouse, Liliana Viola, Pete Zabrok
Dibujado por Gill Ediger y Peter Sprouse
Longitud: 2924 m Profundidad: 4 m
N cuadrícula
0 10 20 30 40 50
metros
Entrada Pan de Jengibre
Entrada Lo Siento
Entrada Apagador
Entrada Playa
Entrada Pila de Tierra
Entrada Clementine
Entrada Opilion
Entrada Selva
Ent. Burgers and Flies
Ent. Mosquito Malo
Ent. Calavera Mapache
Ent. Foque
Ent. Gloria
Ent. Arcos y Flechas
Entrada Huevo de Geko
Entrada Chupacabra
Ent. Luz Roja
Entrada Luz Verde
Entrada Flogging
Entrada A-cup
Entrada Michael Boon
Entrada Más Pura
Perforation Hall
Entrada Tootie
belly crawl with air
airflow
goes to entrance?
a entrada
goes
goes low
tight, goes

Jaguar tracks near Entrada Vencejos. *Benjamin Schwartz.*

the sketch book, and then matching it to the next page to the north, south, east, or west, whichever direction in the cave seems most interesting. By the end of the expedition, I had a series of nine matched sketch pages for this area alone.

By the end of the day, we had mapped around 450 meters, and the other teams had similarly productive days. No one reached what they thought was an edge to the cave, and we all left massive cave going off into blank areas on the map.

Aubri and Saj spent the day with Trish Beddows and drove south to see geology, hydrogeology, and freshwater stromatolites.

In the evening we all met in Akumal and cooked a large group dinner at CEA. Chibebo gave us a very nice presentation about snakes in the Yucatan and another presentation about the recent rescue of the Spanish caver from a deep cave in Peru. Chibebo had been a part of that expedition and arrived on-site only a day after the accident.

December 22. Matt, Saj, Zachary, Nathaniel, and I decided to take a lazy day off from caving and instead snorkel and hang out at Peter and Terri's place in Paamul. After El Arbolito tacos for breakfast, we dropped Aubri off at Dos Ojos, where she went diving with some folks from Zero Gravity Dive Center. Later in the day, Peter, Barbara, and Gil went to an area across the road from Paamul and just north of it to see if they could find a new cave. They did, they named it Tso'ok Kin (End of The Day Cave), and they left some good leads in it that were heading inland and had water in them.

It was Aubri's birthday so we got a cake and surprised her with it after a very tasty dinner at El Ultimo Maya in Akumal Pueblo.

December 23. This was another big day of survey in Jaguar Claw. We had enough folks for five survey teams, and some Quebec cave divers followed Peter around for most of the day filming. Once again, most of us split up at AGD37 and planned to meet up at 3:30 for the trip out. The reason for leaving so early is to avoid hiking through the jungle in the dark when the risk of fer-de-lance snakes is higher.

Nathaniel and I formed one team and continued surveying in the maze I had left on the previous trip, Matt, Saj, and Zachary mapped an area adjacent to our area, and Terri and Barbara continued mapping the area they had left on the last trip. The cave continued to astound me and, once again, we never found anything resembling an edge to the borehole maze. Between our three teams, we mapped well over 1 kilometer for the day.

The other teams returned to an area on the west side of Jaguar Claw and then left the system to cross a jungle collapse into what is apparently a separate system, now called Jaguar Craw in keeping with the theme. Aubri, Mario, and Chibebo continued west from the initial Craw survey, while Peter and German mapped another cave on the south side of the same collapse that soon connected with the other team. Jaguar Craw is now 600 meters long and continues trending toward the west with great promise.

By the end of the day, after we had entered all the data over dinner, Jaguar Claw was officially over 20 kilometers in length.

December 24. Matt and Saj had to leave to head back home, and our group was reduced to only two teams. Zachary, Aubri, and I returned to Chichan Kin Belai and mapped another 293 meters of nice passage, pushing the total length to just over 500 meters. We left a number of nice leads and made a loop that connected back to a crawlway near the entrance. So far there is only one entrance to the cave. I saw a blind fish in one of the wet leads that we left, so perhaps it will lead someplace exciting. Zachary practiced taking notes and started learning to sketch, as Aubri ran the official book and I set stations and read the Disto and back-sights. Zachary is turning into a real surveyor. He is already as good as anyone else at running instruments, and with some more practice at running the book, he will be ready to start that, as well, in a smaller cave. We saw quite a bit of biology in the cave, including a tarantula, a scorpion, and what was probably a Sartori's snail sucker (*Tropidodipsas sartorii sartotii*) snake in a small ceiling nook.

Peter and Barbara continued mapping to the west in Sistema Chu'úuy, adding another 565 meters. It continues west toward a possible connection to Jaguar Jaw some 95 meters away, but it looks like it will be all crawlways at best.

December 25. Zach, Aubri, Barbara, and I returned to End of the Day Cave and mapped 385 meters of mostly crawly passages. We left several relatively uninspiring leads, but we did find a large boa skeleton in the cave. On the hike down the power line right-of-way to reach the cave, we saw four Yucatan turkeys and a pair of flying toucans. These were the first toucans I've ever seen in the wild, and I was surprised at how small they were. Somehow I envisioned them as large birds. The bad part of this trip, aside from the fact that all the leads turned into crawls, was that all four of us got horrible cases of purple-spot 'chigger' mites over much of our bodies. As I finish this report two months later, I have only recently lost the last scabs and will wear a set of polka-dot scar shorts for a few more months, I'm sure.

We had a vigorous debate over

whether we picked up these pestiferous creatures in the tall grass and weeds under the power line or if they were in the crawlways. But the bottom line is that the four of us were pretty much miserable for most of a month afterwards. Bug spray didn't seem to make any difference, as a couple of us had plenty on and a couple had none. We were all equally afflicted.

December 26. We decided to all take another day off and see some local ruins with Peter and family, so we had a slow morning and met in Paamul. But first, we hiked along the dune road to the north of Paamul and visited a small cenote with a 1.2-meter crocodile in it. Of course, we swam in the cenote and looked up at the belly of the crocodile as it sat suspended in mangrove roots. Eventually, it tired of us invading its privacy and swam off into the swamp connected to the clear cenote waters. We also tried snorkeling in the ocean near the cenote, but it was too windy and the visibility was poor.

Next we all piled into vehicles and followed Peter up to the gate at the Calica quarry, where we talked to the guard, who called someone. When an official-looking man arrived, he gave us a personal tour of a nice but small Maya ruins, which are closed to the general public. We were allowed to climb to the top of the pyramid, and this was my first ever pyramid. The view was quite spectacular, and I am sure the ancient Maya priests must have enjoyed the view and breezes, along with the relative absence of mosquitos. After the visit, we drove to Puerto Aventuras and eventually found our way down to the *caleta*, where there is a beautiful inlet and a small Maya structure right over the springs. By this point, we were all getting a bit hungry, so we went into the main Puerto Aventuras area and had ice cream and talked about dolphins.

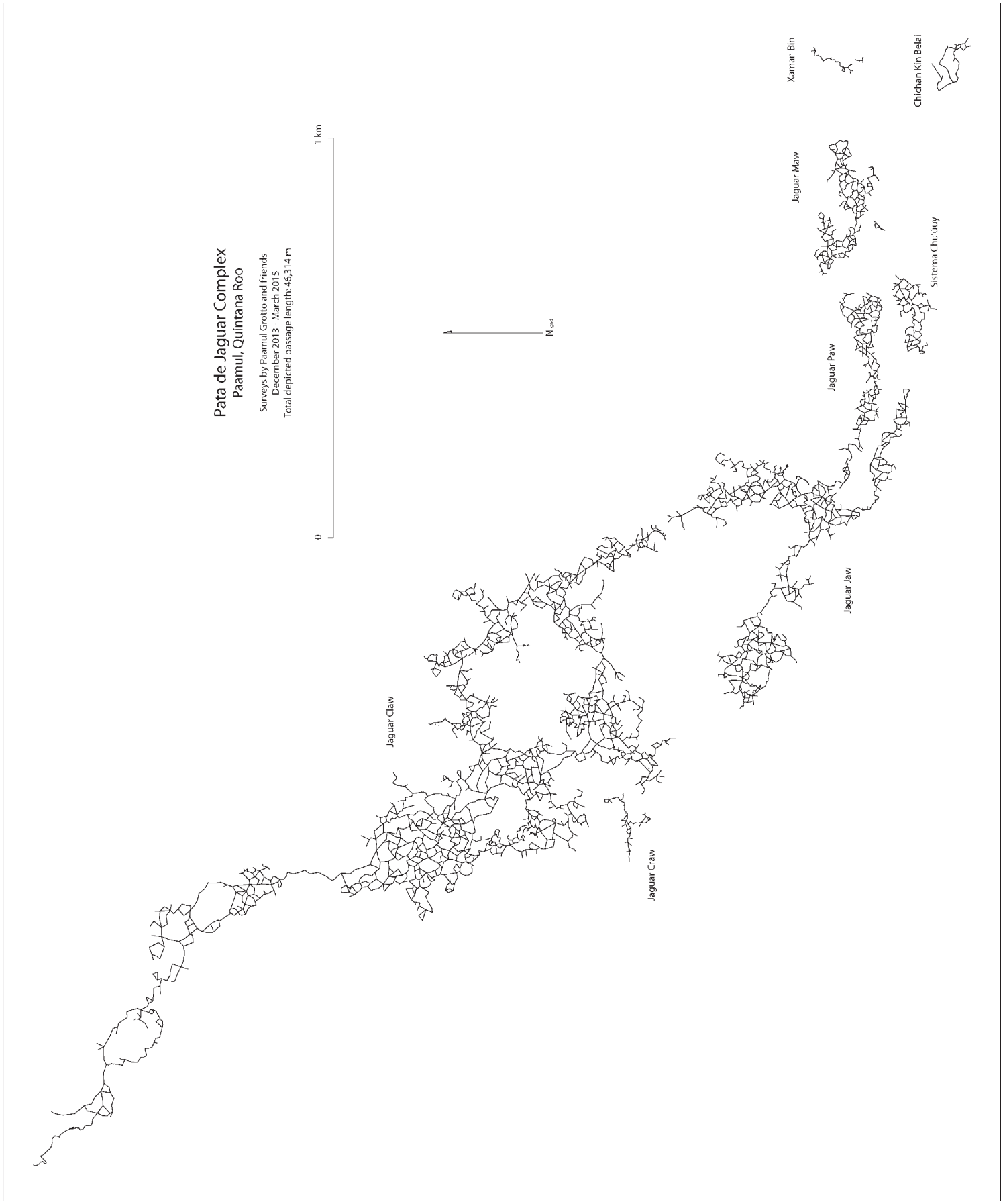
December 27. After a day off, most of us were ready to go back underground again, and the huge passages in Jaguar Claw were calling loudly. Zachary decided to hang out in Akumal with Uncle Nathaniel for the day, and Aubri and I met the group at El Arbolito for a breakfast of tacos and huge cups of fresh orange juice. Two Polish cavers, Krzysztof Starnawski and Marcin Gala, joined us for the day, along with Terri and Barbara. When we got to the heart of the cave, we split into three teams, with Terri and Barbara continuing in their area, Krzysztof and I continuing in the area I had been working in, and Marcin and Aubri working in a new area in a blank spot between two known passages. The cave just kept going and going. The one time I thought that maybe we were reaching something resembling a real edge to the cave, it turned out that we found more leads heading off in a direction that wrapped around my "wall." By the time we regrouped at the end of the day our three teams had added another roughly 1.2 kilometers of borehole maze. The passage density in this part of the cave is truly mind-boggling. And because it is not a rectilinear maze, it is very easy to get turned around in the passages. I generally just used my sketchbook and sketching compass as a map to find the quickest way back to our starting point, which was never more than five or ten minutes away.

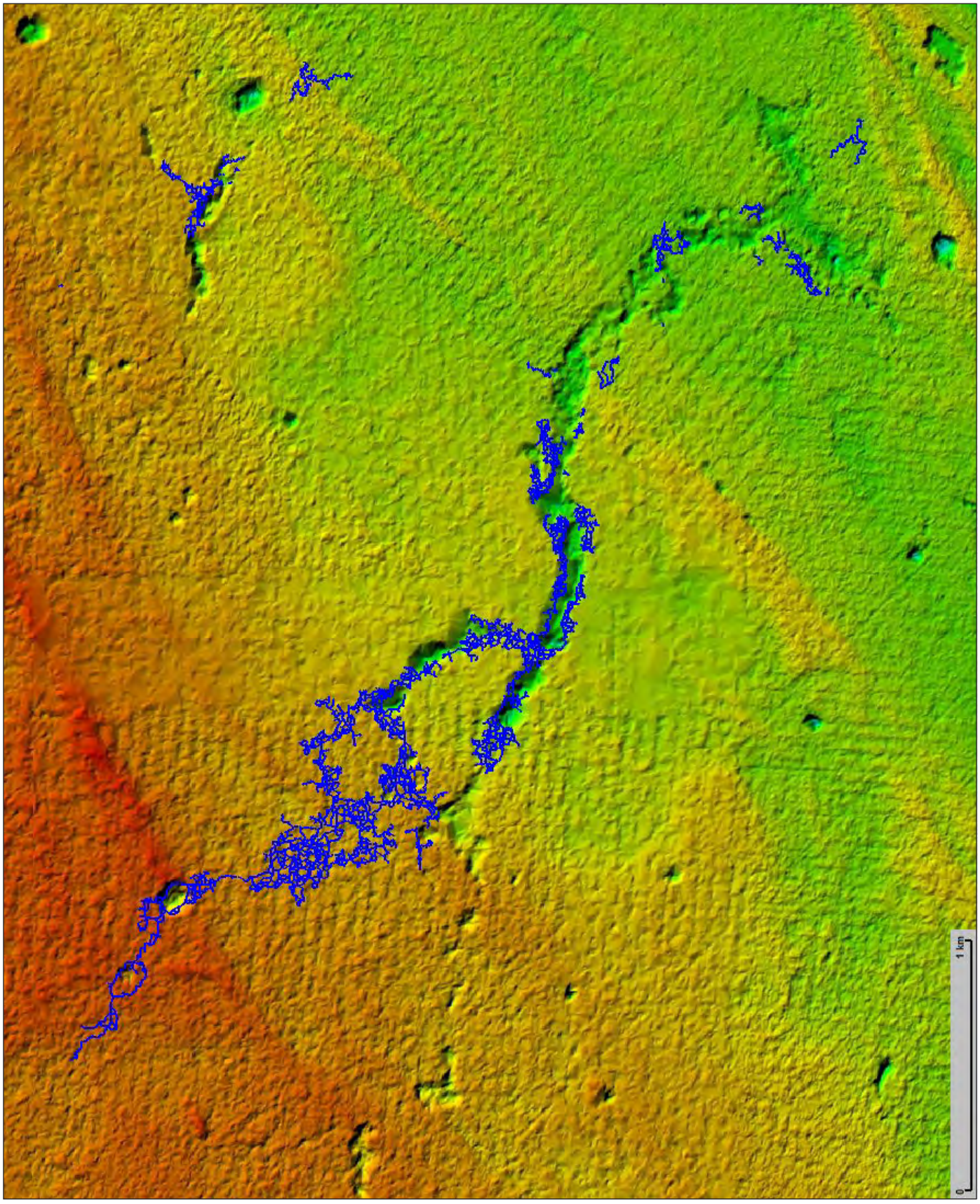
Zachary Schwartz in typical passage near Karin Ha and Lara Ha. *Benjamin Schwartz.*

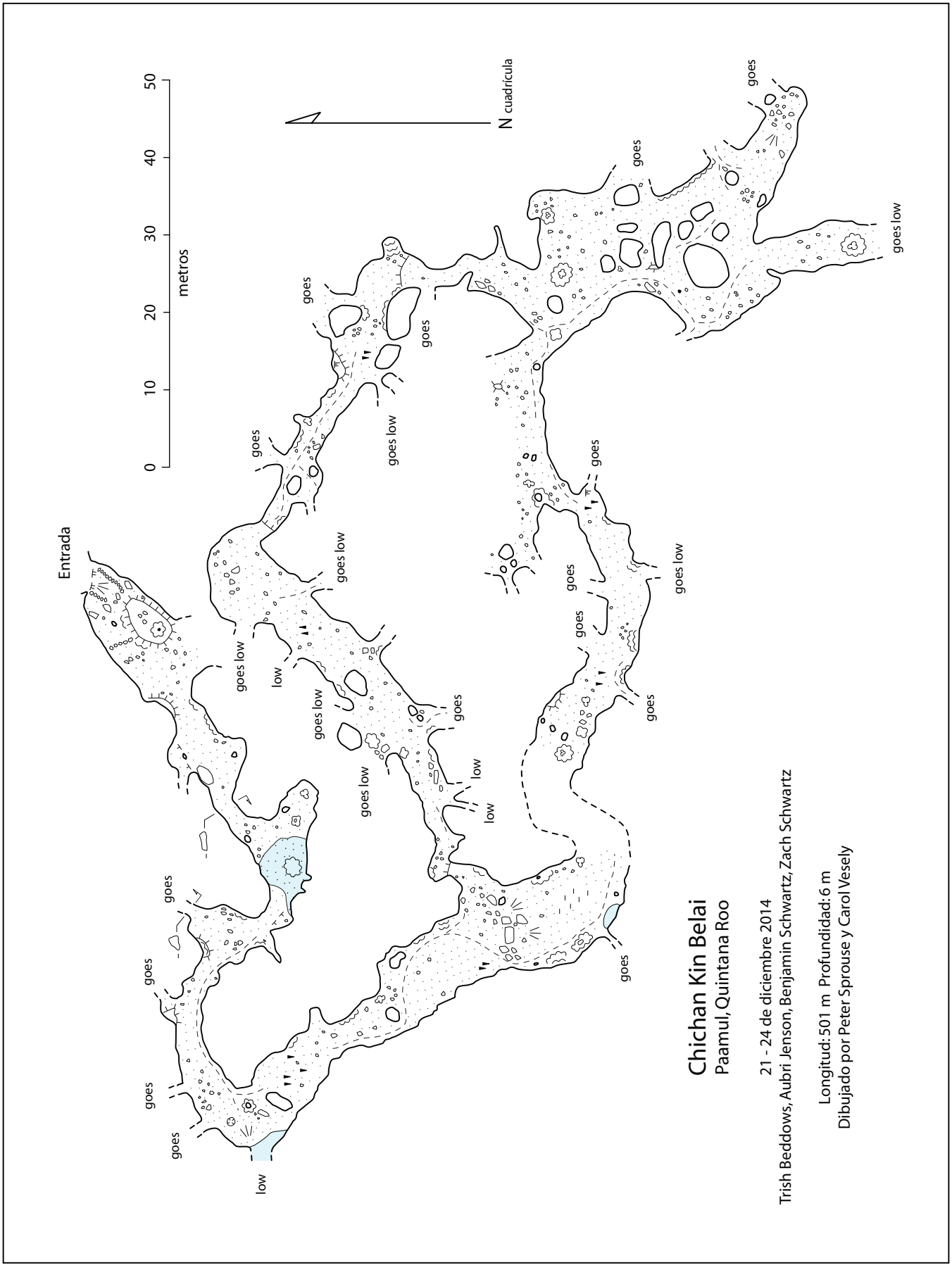
When Aubri and I returned to CEA, Nathaniel and Zachary had cooked up a delicious meal for us in the kitchen facilities there. The only issues we had with the kitchen during our stay were the microwave that would shock you if you didn't push the one working button with a wooden spoon-handle, a refrigerator whose contents would launch a full frontal attack if it was opened, and a monstrous pile of rotting food just outside the kitchen window for the raccoons, coatis, pacas, opossums, and agoutis to enjoy. Otherwise, the accommodations were sparse but all we needed, including a dribble of warm water for showers.

December 28. We dropped Aubri off at Peter and Terri's place to meet with a diver, and Zachary and I picked up Barbara and hiked out toward the Jaguar caves to find a new cave that Alan Formstone had reported to Peter with a GPS point. There were actually three entrances that had been GPSed, and we followed a side trail that headed north towards them from the vicinity of Solstice Cave. Soon the trail ran out, and I continued, hacking toward the points. We soon found them and broke out the survey gear. Two of them connected via a small passage and a small room; there were no leads in this Rubber Root Cave. The third cave, Xamin Bin (Going North Cave) headed nearly due north from a small entrance and a room just inside. We soon arrived at a squeeze in a fissure a meter off the floor and, breaking the only rule of Yucatan Caving— if it gets small, turn around—, we surveyed into it and through. If not for the fact that there was a good breeze and Zachary had eagerly scouted ahead, we would have turned back. On the other side, the passage opened a little bit but then turned into a wide hands-and-knees crawlway continuing north.

But first, we had to deal with a tick. This was a tick unlike any other I've ever seen. Zachary found it on his hand where it had attached, in apparently a very short time, in the small crease at the base of his pinky finger. It was about 1.5 millimeters in


Pata de Jaguar Complex
Paamul, Quintana Roo
Surveys by Paamul Grotto and friends
December 2013 - March 2015
Total depicted passage length: 46,314 m
0
1 km
N grid
Jaguar Claw
Jaguar Craw
Jaguar Jaw
Jaguar Paw
Jaguar Maw
Xaman Bin
Sistema Chu'Uuy
Chichan Kin Belai


1 km
0



Chichan Kin Belai

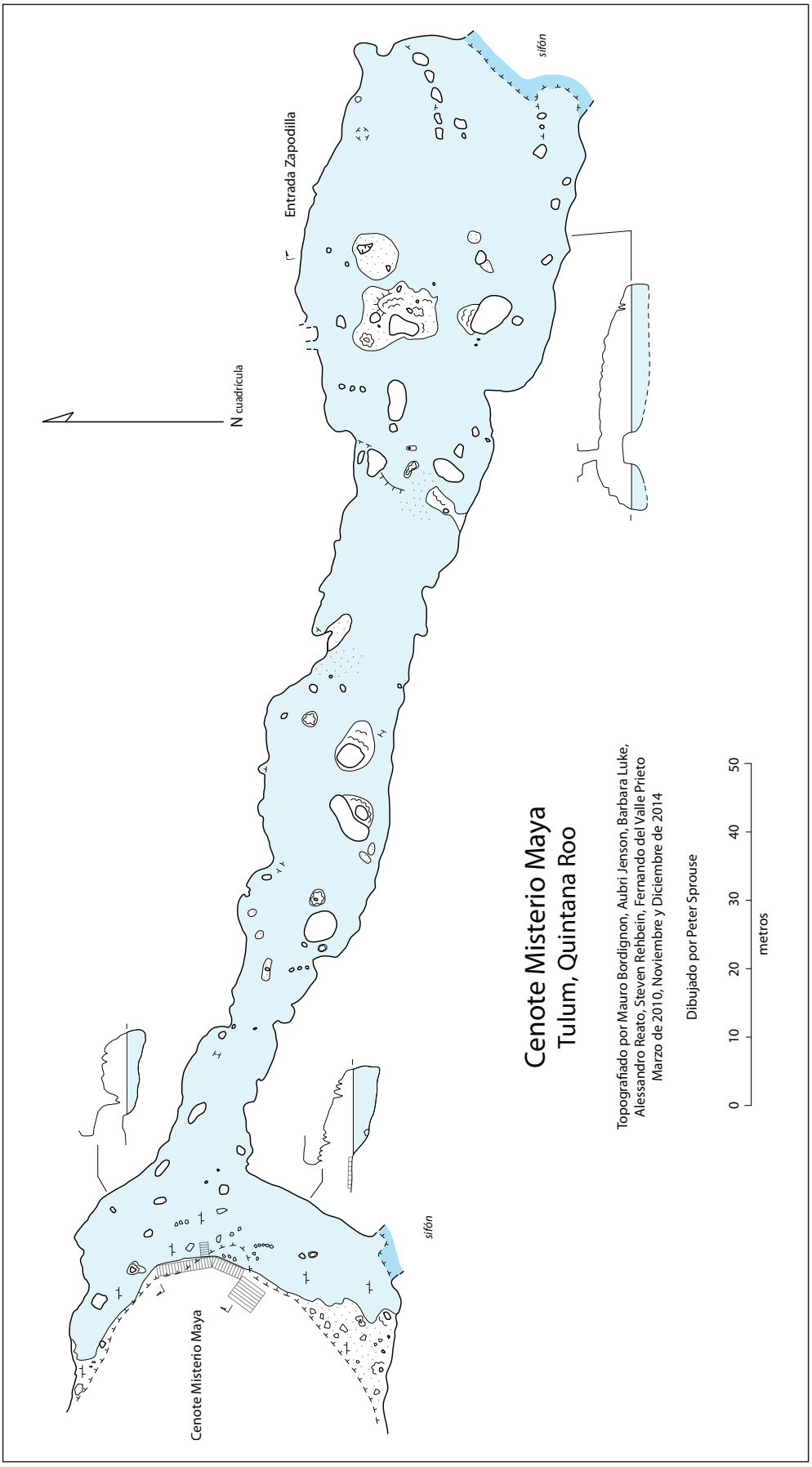
Paamul, Quintana Roo

21 - 24 de diciembre 2014

Trish Beddows, Aubri Jenson, Benjamin Schwartz, Zach Schwartz

Longitud: 501 m Profundidad: 6 m

Dibujado por Peter Sprouse y Carol Vesely


Cenote Misterio Maya
Tulum, Quintana Roo
Topografiado por Mauro Bordignon, Aubri Jenson, Barbara Luke, Alessandro Reato, Steven Rehbein, Fernando del Valle Prieto
Marzo de 2010, Noviembre y Diciembre de 2014
Dibujado por Peter Sprouse
0 10 20 30 40 50
metros
N cuadricula
Entrada Zapodilla
sifón
sifón
Cenote Misterio Maya

Carrie Hutchins in one of the many entrances to the Jaguar Maw system. *Peter Sprouse.*

diameter, nearly completely circular, and solid black. I've never seen a tick attach in a place like this, essentially on someone's palm. It appeared to be firmly attached. Zachary had left his pack and his first-aid kit with the tick-key in it on the other side of the squeeze, so I made the trip two more times and returned with the pack. With the proper tool, the tick was easily removed, and we were off to the races again. The passage soon intersected a couple entrances. One was a small climb-down entrance that had a literal waterfall of ants pouring out of the jungle and down over every surface in the entrance. None of us had ever seen anything like it before, and I assume that these ants must have been some sort of army ants moving from one place to another. They were all gone when we passed by later in the day.

In a fit of cleverness, we named this entrance the Ant Waterfall, and a small room beyond it the Anty-Chamber. Beyond where we decided to turn around for the day after 220 meters, the cave continues as more of the same hands-and-knees crawl. The cave still goes and is in a very interesting location.

Later that evening, Ben and Carrie Hutchins arrived in Akumal and joined our merry band of explorers.

December 29. This day saw our biggest group yet, with about fifteen people and several teams in Jaguar Claw and a bunch of new folks, including Jason Ballensky and family and Ellen Whittle. I think we had four teams that worked in the central part of the borehole maze. Zachary and I, Ellen, and Terri formed one crew, with Barbara, Jason, and Ben Hutchins leading other crews. Barbara, Osama, and Krzysztof mapped toward the west at the Nictoperz Skylight. Ben, Carrie, and Rob mapped in an area east of the AGD Line that they named the Nest. Jason, Tamara, Steve, Ann, and Ian progressed mapping of the mazes northward on the west side of the AGD Line. Again, I continued adding to the ever-expanding continuous sketch in the area I had been mapping. We connected into some of the passages that Barbara and Terri had worked on during a previous trip, as well as some stations that Matt and Saj had set on their first day into the cave. Interestingly, in this area we mapped to or near three small skylight entrances; the first we had seen in a long time. In this area of the cave, the land surface has climbed to more than 15 meters above sea level, which allows larger passage to form with thicker ceilings less prone to collapse. This also means there are fewer entrances. We did see some interesting biology around them and spotted a tarantula and a bunch of tarantula sheds. On the way out of the cave, someone spotted a huge orb-weaver spider near one of the entrances. I also found a black tick on my hand when I started sketching. I'm not sure where they come from or why they like palms, but my tick had latched on in one of the creases in my left palm.

By the end of the day, my team had mapped around 500 meters in the area known as Big Ursa. Combined with the other crews, I think we added approximately another 2 kilometers to the cave. And it just keeps on going. After several days of sketching in this type of passage, my brain finally acclimated to the complexity, and it became easier to keep track of everything while flipping from page to page. And with my new Disto-X, it was really easy to do splay shots just for sketching and to make sure walls and pillars were drawn in the correct locations. It was very satisfying to make a loop and tie back into a station we had set a couple trips ago and find that my sketch matched nearly perfectly and the line plot closed well on the page. Of course, working in nearly horizontal passages helps with that.

Later in the evening we finally located Stephen Rehbein, who had arrived in Akumal very late the night before. Through some miscommunications, namely me telling him that we were in room 8, but there is no room 8 at CEA, we had missed connecting in the morning. That wound up being fine, because he had arrived well after midnight, found another room, and slept in until long after we had left in the morning.

December 30. This was another off-day for me, Zachary, and Nathaniel. We had to drive to Cancun to pick up Cori and drop Ellen off so she could catch a flight home. We hung out on the beach in Paamul for a couple hours before going to the airport. On the way home, the four Schwartzii stopped at Super Chedraui in Puerto Aventuras and stocked up on food supplies for a camp trip that Cori, Zachary, Ben Hutchins, and I had decided to do in the far reaches of Jaguar Claw. We met up with everyone for dinner at Tequilaville in Akumal for nightly data entry and to and make plans

for the next day.

Peter, Terri, Barbara, and Aubri had gone over to the Punta Venado area, where Peter and Aubri had made arrangements to map caves. Both teams mapped in Sistema Punta Venado, which is used as a tour cave in an adventure park. This was 409 meters long and had a promising-looking sump in it.

December 31. Peter, Stephen, Aubri, and Barbara met up with diver Alex Reato, who showed them a dry-cave survey project near Dos Ojos in Tulum. This was Sistema Misterio Maya and associated caves. They mapped dry and swimming passages, tying into dive lines in various passages to connect to the underwater surveys. They occasionally moved out of the way of tourist groups in life jackets swimming by.

This day was the start of an amazing trip for four of us, Cori, Zachary, Ben Hutchins, and me. The night before we had prepared and packed for a first-ever camp trip in the farthest mapped reaches of Jaguar Claw. The reason for the camp trip was the relatively short surveying time during day trips from the beach. Even though it is not far to the end of the cave by most standards, we were still spending three or four hours, one third of each day's productive time, traveling to and from leads. Our goals were only about fifteen or twenty minutes from the end of the mapped cave, but almost none of us had been that far yet. The solution: camp at the farthest survey station and start working from there. This was also Zach's first camp trip in a cave, which was pretty exciting for him. It is hard to imagine a more comfortable cave for learning about cave camping.

The four of us had larger than normal packs when we left the parking area at around 9:00 a.m., and we reached the end of the survey at what is called the Vencejos Entrance after about three and a half hours of travel. The entrance is certainly one of the most spectacular entrances I've seen in the Yucatan, and it is approached via a passage that is around 60 meters wide and 10 to 12 meters tall. The entrance resulted from the collapse of a giant chamber or passage that must have been two to three times as large as any of the single passages leading into or out of it.

After we spent a few minutes running around and exclaiming about how pretty the entrance is, we got down to prepping for the task at hand, mapping booty. But before we could really get started, we needed to locate suitable sites for our tents and eat a quick lunch. Casa Schwartz and Casa Hutchins were soon established. It turned out that the area near the entrance is quite breezy and cool relative to the interior of the cave because of wind-driven airflow and evaporative cooling. Some of the game cameras I had set up near entrances closer to the cars recorded temperatures around 17 degrees C, not cold by most standards, but definitely chilly for Yucatan caves. As a result, we tried to set up our tents in areas away from the main airflow.

Once camp had been established, we hung gear and food from the ceiling and grabbed survey gear. Cori and I started mapping around the right, northeastern side of the entrance, while Zach and Ben started mapping around the southwestern side. Several hours later we met up at the opposite side of the collapse, before splitting up again and turning our attention to large passages we had passed. I also took a number of photos, though most were of mediocre quality because we just didn't have the needed flash power and I didn't want to take a lot of time away from sketching. Cori and I started into a side passage that began as a 60-meters-wide by 15-meters-tall opening from the drip line and roared off into darkness to the northeast. In an hour or so we reached water and mapped around it in dry passage, roughly defining one of the first real walls or edges we had seen in the cave up to this point. We called this area the Alux's Dungeon, referencing a recent local news story. This story recounted how the Alux, legendary Maya elves, had kidnapped two human children in the forest and that they were later found tied up in a cave, entranced.

We had all agreed to meet back at camp around 7:00 p.m., and both crews arrived at the same time. Ben and Zach had left a number of nice leads, and both their crew and ours could see light from another entrance that is farther to the northwest from where we had turned around. Combined, we had mapped 800 meters of very nice cave, much of it consisting of drip-line survey to define the edges of the entrance. Combined with what Alan Formstone had already mapped, I would estimate that the survey line around the entrance must be close to 1000 meters. Impressive.

After a quick dinner consisting of box cream-of-corn soup, tortillas with bagged refried beans, and cheese, we all turned in for the night with visions of booty filling our heads. Cori, Zachary, and I shared a screen tent and slept in light silk sleeping-bag liners. This turned out to be just a little cooler than we would have liked, especially for Cori, and we all decided that bringing a set of light fleece would be appropriate for camping near an entrance.

Several times during the day we found areas with large cat tracks in soft sediments near the entrance. Later on, a mammalogist friend of Ben Hutchins at the Texas Parks and Wildlife Department definitively identified them as being jaguar tracks. We were all very excited about seeing these.

January 1. A breakfast of cheese and refried bean tacos, dried fruit and nuts, and cold instant coffee got us all up and running at 7:00 a.m. on the first day of the New Year.

We were all excited to continue pushing the cave past our stopping points from the day before, and to see if we could reach the other two spectacular collapse entrances to the northwest that Alan had reported finding. As we had on the previous day, Cori and I were on one team and began surveying the water passage where we had turned around, and Ben and Zachary continued surveying the passages they had turned around in. After an hour or so, we connected our surveys at the second entrance, which Alan had named Karin Ha. This entrance collapse is just as spectacular as the Vencejos Entrance, but not as big, perhaps

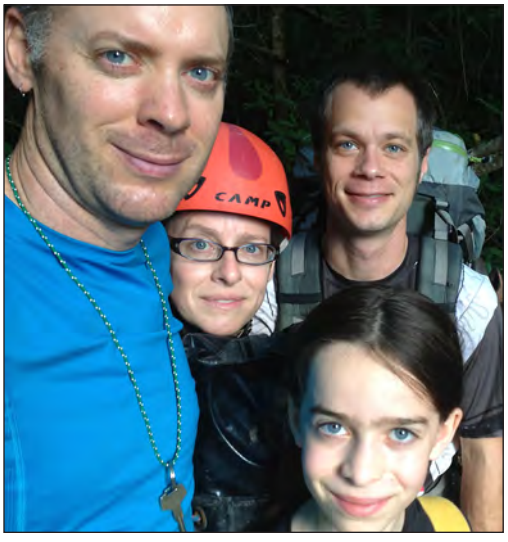
50 by 70 meters across. Although we tried to map completely around the entrance to define it, bees in the entrance became increasingly aggressive as we quietly surveyed, and we decided to turn out our lights and slowly move back into the dark zone.

At this point, Cori and I leapfrogged ahead a few stations and started surveying in a northwest direction toward the light of a third entrance that we could see reflecting off the water-covered floor. This next section of the cave was completely water-floored, and it is one of the most beautiful passages I have had the pleasure of mapping. Because there is quite a bit of airflow between these three entrances, much of the water-floored passage is entirely covered with a hard crystal coating that is a very pale yellow. Large "pillows" of this coating protrude from the bases of all columns and bedrock pillars, and the water in these areas is about knee-deep. Away from the pillars, the floor drops off and is about 1.5 meters deep, but still covered in a crystalline crust. There is almost no dirt on the bottom except near the entrances, and orange-eyed catfish prowl the depths of many of the deeper pools. Zachary discovered that they really are *cat* fish when he made the interesting observation that the fish will aggressively chase the Disto laser dot on the floor and walls of the pools, just like a cat chases a laser in your house.

With light from the third entrance visible in the distance ahead, Cori and I continued mapping through huge passage as we wound our way through a maze of underwater pillows to avoid swimming. In one place near here, the passage was over 80 meters wide. When we reached the third entrance, named Lara Ha, we began mapping around the dripline, but were again thwarted by aggressive bees. A set of stone steps built by the Maya led down to the water from the floor of the collapse. This entrance is larger than the second, but not as large as Vencejos, and has a relatively thick jungle in it, complete with a large citrus tree with fruits like grapefruit.

By this time, Zachary and Ben had caught up with us, and we agreed that they would continue around the southeast and southwest sides of the entrance while Cori and I worked our way around to the northeast and northwest, with the plan that we would meet on the far side somewhere. Cori and I followed more water-floored passage around to the right, until we were forced to work our way back out under the dripline area again. We followed this for a few shots before we reached our turn-around time at a nice place to turn around for the day, looking into continuing water-floored borehole with blackness as far as we could see.

Benjamin Hutchins (rear) and Cori, Benjamin, and Zachary Schwartz ready to head into Jaguar Claw for a three-day cave camp. *Benjamin Schwartz.*



We regrouped back at the stairs and decided that we just had to go for a quick swim in one of the giant bathtubs before going back to camp. It was amazing! We relaxed in the cool water for a bit and then took our time on the way back so that we could get some decent photos of some of the things we had discovered.

In camp again, we had a dinner of, well, you probably guessed: cream-of-corn soup, refried beans from a bag on tortillas, cheese, dried fruits and nuts, and olives from a bag. Mmmmm! We were finished with dinner by 8:00, so Zachary, Ben, and I decided to continue surveying for a bit and mapped another 100 meters or so right through and out of camp. This brought our total for the day up to 1200 meters, not bad for a day of surveying with two teams in incredibly huge and complex cave passage.

Meanwhile other cavers continued mapping activities elsewhere. Carrie and Peter resumed work in some caves farther back along the trail from the parking area. They started in Jaguar Paw, trying to close the gap between it and Jaguar Maw to the east, a distance of about 100 meters. They started in Jaguar Paw, mapping a few loops and a new entrance that narrowed the gap by 15 meters, but could go no farther in that direction. So then they hiked on the surface through the jungle to the west end of Jaguar Maw and worked leads from that side. They pushed some leads heading west, narrowing the gap to only 63 meters, but a connection remains elusive. So they went eastward into the main part of Jaguar Maw, where nice walking mazes allowed them to reach 600 meters total survey for the day.

Aubri, Stephen, and Nathaniel continued mapping in the central portion of Jaguar Claw to the south of the Vencejos camp, filling in more of the massive maze along the original survey line out of Vencejos that has become known as the AGD Line. They worked along the west side of the AGD Line, mapping across Scorpion Lake to find themselves in the Garden of Crazy. Barbara, Marcin, and Krzysztof continued with mapping in the area just to the south, around the Champagne and Sleeping Bear entrances.

January 2. On the second morning at the Vencejos camp, we again woke up early, ate, and packed up camp except for our caving gear. Then it was off to the big leads we had all left going the day before. We are not certain, but at this point we believed we would be surveying into cave that Alan had not seen yet. However, we continued to find two sets of very old and brittle flagging tape marking some earlier explorer's path.

Cori and I returned to the huge

water-floored lead heading away from the Lara Ha entrance to the northwest, and Ben and Zach continued mapping wide and complex passages on the northwest side of the same entrance. After a couple of hours, they connected into our survey in an area where my Disto read 43 meters to the right wall and and 96 meters to the left. I'm sure these were not actually walls, but just pillars that got in the way of my laser. The cave averages 8 meters in height here, with a number of chambers reaching 10 or 11 meters without obvious breakdown modification to the ceiling. As we moved away from the third entrance, the cave became warmer and more humid, and the hard calcite crust under the water disappeared and was replaced by deep deposits of both compact and loose calcite rafts. Calcite rafts also began to cover the water in many areas. It was quite pleasant in the passages farther from an entrance because the effects of evaporative cooling were greatly reduced. Near the entrances, I actually got a little chilly standing in the water as I was sketching. This may be the reason that we saw catfish, but no cave fish in these areas.

Cori and I continued mapping northwest in what had become a somewhat well-defined passage averaging 60 to 80 meters wide, while Zach and Ben returned to a maze area after they tied into our survey. Our passage continued to the northwest for a couple hundred meters before it appeared to get more complex and turn to the north. We set our last stations near a flat island we named Amblypigid Island. At this point we had reached our 2:15 turn-around time and needed to head back to camp. We did so, but not before looking longingly into the continuing borehole with a beautiful blue-water floor.

On our way back, we joined up with Ben and Zachary and tallied up the day's booty, which was an additional 660 meters. This brought our total for the camp trip up to 2660 meters, not bad for a three-day trip with two two-person teams. By 2:45 we were all back in camp, and by 3:00 we were walking out of Camp Vencejos. By 5:15 we had reached the car at the trailhead and the first Jaguar Claw camp was over. Our conclusion was that this is a very productive way to push the current edge of the cave, and it was a huge amount of fun. Zachary had a blast and loved the trip, even though he declared that he wanted a break from caving for a couple of days.

Back on the coast, Peter, Stephen, Barbara, and Aubri spent the morning mapping caves on Nick's property near Sistema Pica Piedra. Then they met up with Marcin and Osama Gobara for a cave-mapping workshop at Zero Gravity that was well attended.

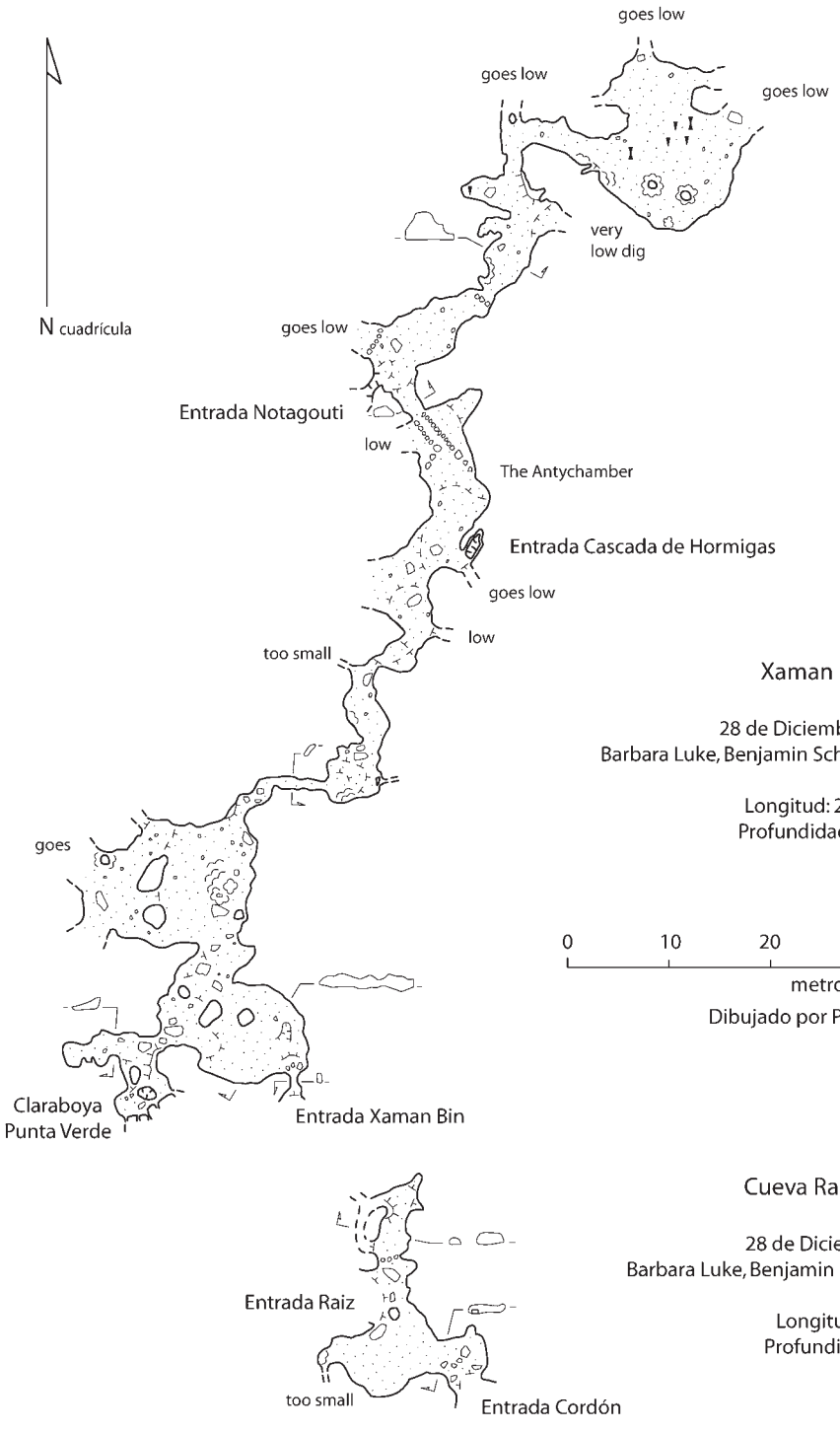
Saj Zappitello takes a break from sketching in one of the large sections of Cech Chen. *Benjamin Schwartz.*

January 3. All of us staying in Akumal took a rest day today, and team Hutchins, Aubri, and Schwartz spent a day visiting ruins in Muyil and walking the short trail from there into the Sian Ka'an Biosphere Reserve. This was a great trip, and the ruins were quite impressive. At an observation tower we got to look down on *chechen* trees for the first time (muahahaha!). Team Schwartz did some more urban foraging at the entrance booth and picked up a bunch of oranges that were otherwise going to waste. On the way back to Akumal we stopped in at the Xel Ha ruins again so that Aubri could see them and check out the interesting geology at the cenote. There really is a lot of old coral reef exposed there. We also picked up another batch of lemons. Perhaps Zach, Nathaniel, and I should just be called Team Urban Scroungers.

But some cavers did get underground. Osama and Jacinto continued with the work of mapping the mazes along the AGD Line in the vicinity of AGD25. Barbara and Deysi continued southwest of there in the mazes north of the Ayotzinapa entrance. Peter and Andrea mapped several maze areas along the southern arc of the Vencejos entrance.

January 4. Some folks either prepared to leave the next day or, like Cori, Nathaniel, and Zachary, wanted to hang out and relax, so the caving crews were small.

Ben and Carrie, Jacinto, and Owen decided to go out to some leads in Lost Highway. Nick Banks and Terri really wanted to see some of the new passage we had mapped during our camp, and I agreed to lead a trip out there on the condition that we continue surveying beyond where Cori and I had turned around. This was not a hard sell with Terri. We made decent time out to the end and spent some time looking at all three entrances before moving on to the lead. The passage continued for about 150 meters before deep water started slowing progress, and then eventually the entire passage became floored with very deep water 10 meters or more deep. Terri and I set a station on a small island as far as we could go without swimming, but Nick had already gone for a swim. I wanted to check out the roughly 200 meters of passage that he reported continued to the north then northwest, but without a waterproof book there was no good way to continue surveying. And because we already knew that it continued at least another 200 meters and as far as Nick could see beyond that, all with deep blue water and 5- to 8-meter ceilings above the water, there was not much sense in my wasting valuable time


goes low
goes low
goes low
very
low dig
N cuadrícula
goes low
Entrada Notagouti
low
The Antychamber
Entrada Cascada de Hormigas
goes low
low
too small
goes
Claraboya
Punta Verde
Entrada Xaman Bin
Xaman Bin
28 de Diciembre 2014
Barbara Luke, Benjamin Schwartz, Zach Schwartz
Longitud: 220 m
Profundidad: 4 m
0 10 20 30 40 50
metros
Dibujado por Peter Sprouse
Entrada Raiz
too small
Entrada Cordón
Cueva Raiz de Hule
28 de Diciembre 2014
Barbara Luke, Benjamin Schwartz, Zach Schwartz
Longitud: 38 m
Profundidad: 3 m

swimming and scooping if we could turn back and start mapping nearby side-leads.

We headed into the closest side-lead in my book, and soon connected back to the main passage just before Amblypigid Island. Nick had done some scouting at that point and had come back excitedly reporting that he found another giant borehole heading off into the unknown. We picked a nearby station and began surveying into it. After a couple shots, I started to wonder why Nick had wanted to start the survey so far from the lead when there must have been obvious stations closer to the lead, wherever it was. In fact, we had passed a couple stations "on the way to the lead." On the next shot, I asked Nick where the lead was. He replied that we were in it. I had to start laughing at this point, because he was standing only 3 meters from a station we had set 45 minutes earlier. It turned out that Nick had gotten disoriented by about 90 degrees and he had rediscovered the same large passage that we had just finished surveying. Once we realized what had happened, we all had a good laugh. In his defense, he was using a carbide lamp and couldn't see nearly as well as Terri and I could.

With this navigational mishap sorted out, we turned to my sketchbook to help us decide where to survey next. I knew there was a loop that needed to be finished up, so we did this by surveying up and over some massive formation mounds to connect with a station Cori and I had left two days earlier.

At this point it was time to turn back and head for the entrance, even though I really wanted to keep on mapping. Our total survey for the day was about 250 meters, but we turned back and left one of the most spectacular leads I've ever turned around in. On the way out, I recovered the five game cameras I had deployed in various caves between the car and Jaguar Claw.

Ben and Carrie and crew had a good trip to Cueva Carretera Perdida (Lost Highway), a cave out the chain road to the northeast of the Jaguar caves. They wrapped up a few leads in the cave, but there are still several good ones left, according to Ben's report. This area is definitely nowhere close to being finished; it is just that attention was diverted by the giant passage going everywhere in the Jaguar complex.

Deysi and Peter did some morning caving before she had to catch the bus back to Chetumal. First they went back to Punta Venado to look at a cave near Sistema Venado called Cueva del Rey. This consisted of formation and breakdown mazes, and they did not have time to map it all. Then they returned to Puerto Aventuras and did some jungle chopping to the west of the Hard Rock Hotel. They found a few small caves and cenotes, but nothing too notable.

Aubri, Peter, and Barbara made a quick trip into Tso'ok Kin to recover two of my game cameras, an act for which I am very grateful. Thanks again!

January 5. Today was a rest day for everyone and departure day for Peter and Aubri; Terri stayed in Paamul. Ben and Carrie and the Team Schwartz went to Cenote Eden, part of Sistema Ponderosa, for a day of relaxing swimming and snorkeling. We also spent some time hiking around the trails and visiting some other cenotes and caves close by on the property, as well as some unrestored ruins.

On one of the trails, Ben spotted a turquoise-browed motmot perched on a vine hanging over the trail. I had heard these birds several times on this trip and on the last, but this was my first time to see one up close, and it was only 15 meters away. What a

December 2014 Quintana Roo survey totals

Cave name	*Dec 2014 survey (m)*	*Total cave length with previous surveys (m)*
Sistema Garra de Jaguar (Jaguar Claw)	10189	27723
Sistema Chu'úuy	1202	1323
Sistema Misterio Maya	466	2013
Chichan Kin Belai	501	
Jaguar Maw	495	2925
Jaguar Craw	471	601
Tso'ok Kin	421	
Sistema Punta Venado	410	
Cueva Carretera Perdida	292	2126
Xaman Bin	220	
Sistema Ponderosa	182	16938
Jaguar Paw	112	2717
Aktun Kuxum	70	
Cueva Día Perezosa	66	
Cueva Hacha Mala	56	
Cueva del Rey	43	
Cueva Tánico	41	
Cueva Noche Vieja	41	
Cueva Ocho Columnas	40	
Cueva Raíz de Hule	38	
Sistema Pica Piedra	36	
Um Peh Muuch	21	
Cenote Fuente de Agua 1	17	
Cenote Fuente de Agua 3	16	
Cenote Fuente de Agua 2	8	
total	**15689**	

Survey team with inner tubes at the main entrance to Sistema Misterio Maya. *Peter Sprouse.*

stunning bird. We also spent some time watching a band of coatis romp through the forest, and we tried to identify some of the butterflies we saw.

Later in the day, Ben and Carrie left for a hotel close to the Cancun airport because they had a really early flight to catch the next morning. Zachary, Cori, Nathaniel, and I spent our last evening in Mexico walking on the Akumal beach at night, where we saw an amazing diversity of sea creatures, including several rays that appeared to be either feeding or laying eggs in the surf zone and an octopus that leapt out of the water and attacked Nathaniel's hand as he was pointing to a large snail.

January 6. After one last early-morning beach walk, we finished packing up, bought some local crafts and art, and drove northward. Our first stop was Paamul, where we gave Terri our remaining food items. After that and a short visit, we continued on our way to the car rental place in Cancun, and then it was off to the airport. The trip home was uneventful. It was nice to be back home again and take a hot shower with more than a dribble of water, but it was also difficult knowing that we would not be returning the next morning to any of the wonderful things we left in Mexico: the group breakfasts with tacos and fresh juice at El Arbolito, the hike through the jungle and the cave, and mapping beautiful borehole with good friends.

Peter Sprouse is an amazing facilitator and coordinator of these trips to Quintana Roo. Let's just start off with that. All told, this expedition mapped 15.7 kilometers of new passages in at least twenty-five different caves. However, more than 10 kilometers of that was in Jaguar Claw alone, which brings the total for that cave up to 27.7 kilometers, and the total for all the related caves in the area to somewhere over 46 kilometers. This complex, in particular, is only just being scratched. I'm sure tens of kilometers will be surveyed on future expeditions. I only hope that I can be there for some of them.

Of the seven game cameras that I deployed in various caves, most of them captured at least one image of an animal, including paca, agouti, opossum, fox, and a couple mystery animals that might be small peccary.

Aside from four of us getting chiggers and a couple scrapes or touches of intestinal discomfort, we all had a wonderful, friendly, and extremely productive trip. I can't wait to return.

En Busca del Jaguar

En diciembre de 2014, cueveros exploraron y topografiaron alrededor de 15 kilómetros de cuevas no sumergidas en Quintana Roo. La mayoría de la exploración fue en una de las secciones del Sistema Jaguar, Garra de Jaguar, donde, a pesar de todo el esfuerzo, los límites del laberinto fueron difíciles de encontrar.

GROUPE SPÉLÉO ALPIN BELGE 2015 EXPEDITION TO PUEBLA

PHOTOGRAPHY BY GUSTAVO VELA

Ramses Miranda in the first pit in Cueva Roseta.

Sandra Vázquez in the first pit in Cueva Roseta.

Barnabé Fourgous in Sótano del Pantin.

Fossils in Cueva Roseta.

Roland Gillet in the jungle.

Old and new.

Sandra Vásquez in Cueva Roseta.

Richard Grebeude in Cueva Roseta

CONSERVATION OF THE CAVES OF CUETZALAN

Mike Boon

John Michael Boon, who died in December 2014, was well known as one of the explorers of the caves in the vicinity of Cuetzalan, Puebla, during its peak period. He also lived in the area for a number of years and was very concerned about the degradation of the caves. In 2006, he prepared some proposals for their preservation. Thanks to Oscar Alvarado Machorro for supplying us with copies of these documents and to Miriam Alexander from translating them from Spanish.

I have been a witness to the systematic destruction of the caves of Cuetzalan over the past thirty years. There are many patterns of destruction, such as simple vandalism, destruction for the fun of it, but this is not what I wish to tackle. The destruction I wish to address is that caused voluntarily or involuntarily by the tourist guides of Cuetzalan. How does this happen? The ability to turn a profit from showing around tourists has led to groups of young men called *chavos* who seek to earn money by conducting their own cave tours. This is generally done with nothing more than a flashlight in hand and without any regard to conservation or care inside the caves. To further supplement their income, they offer "souvenirs" to the tourists—fragments of stalactites.

Take note of the violence that Octimaxal Sur has suffered, which I have personally witnessed. It began as these things tend to. After the initial explorers came the first guides leading dozens of tourists, and not far behind came the *chavos*, intent on making money without stopping to consider the destruction they leave behind as they break off stalactites and stalagmites to offer to the tourists.

And this example has been repeated cave after cave, such as Coyoxochico, Atepolihuit, Tasalolpan—each one a victim to irreparable destruction.

In one way or another, voluntary of involuntary, it's an irrefutable fact that the worst enemy of caves is the tourist guide. A known cave is a destroyed cave. The case of Alpazat is no exception; there exist plans to make this an attraction for groups of tourists, much to our dismay. It remains to be seen what effects our commentary has in its defense.

CONCERNING THE CONSERVATION OF THE CAVES OF CUETZALAN

General History of Conservation

It appears as if preindustrial and nonindustrial people do not have a specific idea of conservation. Or, to be more precise, their whole lives are lived in harmony with the environment, and thus their whole life is conservation. For example, before killing a deer, the Indians of the United States would pray to the animal's spirit to forgive them for their actions. Also, when they used banana leaves to cover their food, they could simply throw it on the ground after eating. There is no trash in a preindustrial world.

Where does the idea of conservation come from? I am no expert on the history of ideas. But in England, I think the first conservationist was the poet William Wordsworth. Wordsworth lived at the dawn of the Industrial Revolution, when large factories opened, James Watt invented steam engines, and cities expanded into the surrounding countryside. If Wordsworth knew of a tree that was to be cut down, he would go out to ask that the life of the tree be spared. And his sentiments resonated with the Englishmen, who had maintained a great love for nature throughout their history. But the precise idea of conservation didn't form until the threat of industrialization arose.

In the United States there was a man named John Muir. He traveled in the west of the country and was one of the first white men to visit the waterfalls and cliffs of Yosemite. I believe it was partially thanks to his efforts that this region was named a National Park.

What is the attitude of the indigenous of Cuetzalan towards nature? And what is that of the mestizo farmers? And the landowners? And the citizens of Cuetzalan?

The manner in which the indigenous peoples treat their environment has traditionally been a result of respect for their theistic religious ideology, in which the gods are in control of nature and its elements. I believe this was very useful in maintaining the environment's equilibrium, as it allowed them to exploit their resources in a reasonable manner without destroying or depleting them. Since becoming involved in the forms of economic dependency that have developed from colonial times until the present day, they have had to adapt their model of respecting the Earth as a mother figure, in order to become competitive in the markets that now sustain them. Recovering and spreading this notion, which is in accordance with the urgency of conservation, and restoring natural resources poses a great challenge of information and education. Negotiating with representatives of the most intensive exploiters, who drive the economic market, is also of great importance.

Commentary in Nahuatl: Keniuj kita in to masehualikniuj in totalpan? In totalpan de in masehualme kipia miak tekitilis por in tekitils tein mo chiva in sej italpan. In ompaj mo chiva in tekitijkemej in tauetekilis de in talmej tein mas konemililis in kipia kitejteki in koujmej kemej ompaj moj kistia mesajmej.

The Relationship between Conservation and Industrialization

Above we mentioned that the idea of conservation likely arises during industrialization. Preindustrial peoples possess a love of nature, or at least religious sentiments for nature, but have no need for a conservationist movement.

Certainly, industrialization has many aspects that affect nature. For example, explosives have the power to destroy tons of rock in a fraction of a second. Working by hand, two men can go through tons of rock in a week. A bulldozer can create 500 meters of road in a day. And with roads and cars, many more people can access places that were previously largely unknown.

The hose is a simple and common tool. However, it has completely changed rural living, because now it's possible to live far away from rivers or springs. Hoses make W.C.s possible, and also allow for the resulting waste to reach back to rivers and contaminate water that could be used to drink, wash, or swim in.

Many products of industrialization harm nature. Is conservation therefore a lost cause? No, because we are intelligent beings. One benefit of wealth is the opportunity for communication. We can communicate with each other to diminish or eliminate some of the adverse effects of industrialization. We also have the experience of the natives. They are hesitant to involve themselves in industrialization. Also, we must examine some of the overlooked byproducts of civilization. For example, in the United States there is a movement to use human excrement as a fertilizer. All you need is one bucket's worth, a material such as mulch or soil to eliminate the smell, and a place to compost it. This yields a rich fertilizer that doesn't contaminate the water.

We have to live with industrialization, but we cannot be slaves to it.

In what ways can we live with less electricity, gasoline, and water? Can we use rain water? Can we replace W.C.'s with composting toilets? What of horses? Or walking? Using busses instead of cars? Can we use fresh vegetables instead of canned? What else?

Commentary in Nahuatl: Keniuj mo pataj in tonemilis de in masehualikniuj in ejkokej in koyotakamej? Mo pataj in to nemilis remej yejuan kualkuikej miak taman de sej tekitis uan yejuan kualkuikej miaj taman sej kikuas uan sej ki tokas uan sen taman de sej tekitis.

The Delicate Matter of Caves

If the matter is delicate, so too are the caves.

Without a doubt, the fascinating environment that exists within caves is very delicate. Fascinating, resplendent, delicate as glass or ice but, unlike glass or ice, irreplaceable. The environment of the caves is the most delicate on the planet. It can contain stalactites that sway at the exhalation of a breath and break when touched. Or it can contain a floor of stalagmites that requires the removal of one's boots in order to be traversed without yielding any damage. Once broken, stalactites cease to grow, or grow only over the course of thousands of years. And it is very difficult to clean the stalagmites once they are covered in mud from boots. On the surface, the actions of the sun, the wind, and the rain serve to modify or eliminate the impact of humans. But inside the caves these agents don't exist. That which is damaged remains damaged. Caves are an archive of the actions of every person who enters them. They contain the karma, the results of the incomplete actions, of their visitors, their marks and stains.

Because of this, cave conservation poses an enormous challenge. Mountains, rivers, and forests are a thousand times less delicate than caves. How can we conserve these natural marvels, more beautiful than the stars and more delicate than a baby?

There is also the matter of the animals that live in caves. There are animals from the world of light that live in the entrances, plus animals that have adapted to live in total darkness. Usually these are white, since colors hold no advantage in the dark. There are bats that sleep in caves during the day, and swallows that sleep in them at night. In Cohuatichan, the bats leave while the swallows enter. Recently, there have been mass killings of the swallows around Cohuatichan and Atepolihuit, apparently with permission from the government. How can we prevent this type of gratuitous slaughter? Surely there can't be enough meat on a swallow to make it worth the effort.

What commentary is there on this matter? Can we examine the caves and inventory the wildlife? What provisions must be made to protect the animals in the caves?

The Unfortunate Destiny of Easily Explored Caves

By "easy" we mean a cave without pits, technically unchallenging. When people hear of such a cave, they go visit it, since the public holds a casual interest in caves. There is something romantic or daring about a cave. In adventure movies, there is always a scene in a cave. Thus not only speleologists are interested in caves; they are universally fascinating.

However, this is problematic, because the public is usually ignorant of cave ethics. We can express these ethics with the saying, "Take only pictures and leave only footprints." That is to say, never touch or break any formation, stalactite, or stalagmite, or paint on the walls, or disturb any cave animal. As the Buddhists say, "Do no harm." Do not damage the cave or its contents or its inhabitants. Treat it as sacred. Prehistoric people treated caves as sacred, much like many of the indigenous peoples of Mexico and other parts of the world.

But some of the public is ignorant of this ethic, and do not feel any religious associations. They go paint their names on the walls. Defecate in the entrances. Take stalactites as

souvenirs. They are not bad people—it's simply a lack of consideration. There are others, however, who are bad. They go destroy the caves, breaking stalactites because such destruction gives them pleasure.

This is not a theory. It's a fact, supported by my observations during forty years of caving experience. This problem is also not specific to Mexico; it applies in Guatemala, Canada, the United States, England, Ireland, France, Slovenia. It's a global problem. It's a problem well known to all speleologists.

It is a law, like the force of gravity. If a cave is easy and known to the public, this same public will go destroy it. Always. Constantly and without exceptions. It's sad but true, and we cannot ignore it. This is the way it is, and it's a reality we must accept.

How should the problem of education be addressed? What is the role of speleologists? I'm in favor of teaching and discussing conservation in schools. It is the most important topic in life. How can we live with a population that grows up with ever-decreasing resources, while preserving some of the world's beauty? This is the dilemma of the modern human.

But discussing caves in schools raises other problems, because it may spark a desire in the students to visit the caves, thus beginning a cycle of destruction. Not to mention the potential danger of falling into a chasm or pit, such as what occurred the other day towards San Andrés.

In my opinion, the way to spread information about caves is through a speleological association. They have a responsibility to the caves and a sincere obligation to cave conservation. They can also mine the experience of speleologists in general, by way of publications, personal contacts, or the internet. There is 150 years' worth of experience in the areas of exploration and conservation, and this experience is no secret—it's accessible by all. But the distribution of this information is usually through speleological clubs, societies, and associations. This is a form of control and shows their responsibility.

How to Conserve the Caves

How can we conserve caves if people go to destroy them once known?

First, conserving caves is not exploiting caves, that is to say, using caves to make money. We cannot confuse conservation with exploitation. With conservation, we accept a loss in revenue. We won't cut down a tree, because we know that the tree has value in and of itself, outside our desire to consume. It should not be valued for the planks it can yield, but as a thing of beauty. We don't want to take advantage of the tree for its financial potential, for we prefer its psychological value. This manner of treating the world is related to the aforementioned ethics. Nature has value in itself, and not as an object to be consumed. As the bible says, "man lives not by bread alone." Man and woman are also not the center of the universe. The world existed before we did, and will exist afterwards. Animals, plants, rivers, mountains, and caves have a right to exist independent of our own. Again, the bible counsels us to be good samaritans of the earth. That is to say, to take care of the earth, the plants, and the animals.

What can we say in regards to practicing cave conservation? First is the need for discretion, silence, and secrecy. We don't talk about the caves, we don't write about the caves, we don't publish tourist maps of the caves. Yes, speleologists map caves. This work is scientific, but they distribute these maps to inform the public of their work. It's not their intention to aid the destruction of the caves. Speleologists should be more cautious with the distribution of the cave maps. The destruction of the caves of Cuetzalan is something new for the speleologists. They haven't considered that their work might be dangerous for the caves.

In the United States there exists the National Speleological Society. This society does not want guides to caves to be publicized. If the public doesn't know where the cave entrances are, then they can't damage the caves. In Canada, we have publications for speleologists, but we are cautious in regards to publishing the locations of cave entrances. Because once an entrance's location is known, first one person can come, then two, then four, then eight, etc. And among these people there will be vandals, who go paint their names on the walls and destroy stalactites and stalagmites.

This is why the first rule of cave conservation is silence with respect to the existence of the caves, especially the location of entrances. The Buddhists say do no harm. In this context, however, it should be say no harm. Speaking about caves does them harm.

One cannot improve a cave. It is perfect as is. We could say that the perfect speleologist is one who stays in the sun. Discretion is a cave's first, second, third, and last line of defense. This, together with the decision to not use caves for monetary gain, is a solid base for cave conservation.

But when we have a cave that is suffering from vandals, but still has plenty of stalactites to protect, what should we do? In this case, can we bar the entrance with a door or gate? There are a few conditions that affect the situation. First, who will build the gate? What moral authority do they have? Is their authority accepted by those affected by their plans? What is their motive? What is their historical connection with the cave? What is their relation to the owner of the cave? What is their relation to the historical use of the cave? What is the legal state of their actions? Are their actions respectable?

It's ideal when there's agreement on these circumstances. If there is disagreement, the gate may be damaged. In Canada, we have a gate that the people destroy almost every weekend. We must be in agreement with all the people who hold an interest in the cave before construction of a gate can begin, and the purpose of the gate, as well as how the cave may be accessed, must be explained to the public. Such an action cannot be arbitrary.

Ideally, a speleological association or local group could choose to install and maintain a gate to protect the cave.

Another possibility would be to

turn the cave into a tourist attraction. The same reservations apply here as they do to a gate, especially with regard to the cave's historical use. The process of developing the cave will damage it, however. It is necessary to destroy much of the cave to build trails, stairs, etc. A certain amount of the cave's natural beauty is lost, as well as the pleasure of traversing difficult passage. A cave doesn't contain concrete and stairs in its natural state. Certainly, a gate and responsible guides in a tourist cave can offer some protection. But if vandalism persists, the cave can be gated without developing it as a tourist attraction. For example, there is a magnificent cave some kilometers from San Cristóbal de Las Casas. It contains a magnificent concrete pathway, too magnificent. The pleasure of entering the cave is lost because of the cement road. One doesn't feel any connection to the cave.

A PROPOSITION FOR A MUNICIPAL LAW FOR THE PROTECTION OF THE CAVES, CAVERNS, CHASMS AND SUMPS OF THE MUNICIPALITY OF CUETZALAN DEL PROGRESO, PUEBLA, MEXICO.

Preamble

1. The caves and caverns of Cuetzalan have many stalactites, stalagmites, and columns made up of a crystalline substance, calcium carbonate. The people here know these formations as "rocks," but these rocks are sometimes very beautiful. Now there is a type of war against the rocks, or shall we say, against the stalactites. Guides, vandals, and tourists act to destroy the stalactites of Cuetzalan. It's a shame that these stalactites need thousands or dozens of thousands of years to grow, plus a source of water in the exact location of their growth. This source changes a stalactite's point of origin. Once broken, it will never grow again, not even in all of eternity. The caves, without a doubt, are the most delicate environment in the world.

2. The caves also house many animals such as opossums, swallows, bats, and spiders. Some of these animals have adapted to the darkness, and are colorless. The swallows that live in the caves are precious and, like the bats, eat insects that bother humans.

3. Subterranean water is often contaminated with black water. Sometimes people use cave entrances as garbage dumps. This is not a matter for the law, but is worth noting for the study of hydrology and in consideration of helping the people.

4. Where does the destruction of stalactites come from? The majority comes from tourism. From 1977 to 1983, the destruction of cave formations was minimal. But today there is a lot of tourism in Cuetzalan, and thus the caves are often used for financial gain. The publicity that derives from the tourism industry reveals the cave entrances to vandals. Many of the official guides also steal or destroy the formations, or are unable to prevent their clients from doing so.

5. There are four types of adult guides and two types of child guides. Not all types of guides directly harm caves. In fact, in the future guides can be of great help in protecting the caves. But there's a problem; one type of guide has created the publicity that increases the use of the caves, and this publicity is exploited by the guides who harm the caves.

6. So we can say that the experience of conserving caves for 150 years has taught us to use discretion with respect to their existence, that is to say, not to advertise the caves. If the existence of a cave with beautiful formations begins to become known, a gate should be added to the entrance to protect it. The conclusion is clear. We should limit the publicity of the caves of Cuetzalan, or we will have dozens of problems with their destruction. Now is the time to act on the issue, since only two caves with stalactites are currently well known by the guides. But if this method of earning money, regardless of the consequences, gains force, Cuetzalan will become known as the center of speleological destruction in this hemisphere. But now there is time to end, or limit, the publicity and take other measures to protect the caves that are suffering damage.

7. We can still allow tourists to visit the caves in the hands of responsible and conscientious guides. The idea isn't to deny access to tourists or speleologists, but to give access without harming the caves. That is to say, allow access with responsibility through responsible guides.

8. Now there exists the practice of destroying stalactites in order to sell them for ridiculous prices—two pesos apiece. If the stalactite has an unusual shape, such as that of a machine gun, it can be sold for more. This is often excused because the stalactite was reportedly "found on the ground." But the stalactites didn't fall of their own volition. The stalactites are broken with rocks and fall to the ground only after they've been broken.

9. Thus the caves are turned into stalactite mines, or the broken stalactites are abandoned in the cave like some kind of crystalline trash.

10. Some guides regret this process. But those who take care of the caves, that is, the speleologists, conservationists, and the people of the communities, need to do more than regret, they must act. For that, they must undertake the arduous process of examining the caves, making analyses, consulting with the people, writing, discussing, making laws, building gates, and entering into the political arena. Yes, they will assume this responsibility, but they also ask that the entrepeneurs and the guides act responsibly.

11. Therein lies a great irony. The income from tourist caves is minimal. One of the caves in question generates some thousands of pesos during the week of Easter, and sometimes fifty or one hundred pesos on Sunday. In the other cave, the more sophisticated guides earn a useful supplement to their regular jobs, but it isn't enough to live off of. Sometimes other guides earn ten or twenty pesos, and they can sell stalactites for two pesos each. In the end, how much is a tourist cave business's yearly worth? Ten thousand pesos?

12. The real money is in speleology. Every year, speleological expeditions come to Cuetzalan to continue the work of the first Mexican speleologist in Cuetzalan, Jorge Ibarra. Hundreds

of speleologists have come from Belgium, the United States, England, and Mexico City, and other parts of Mexico. Sometimes, groups of thirty or forty people come to explore the caves. These people may stay here for two months, and each one spends six thousand pesos. The businesses of Cuetzalan can earn two hundred thousand pesos from the speleologists yearly. The value of the revenue generated by speleology is twice as large as the value of the tourism to the caves.

13. There are other projects that affect the situation. There is, for example, adventure tourism, that is to say, the guide and his/her clients use the caves for their adventures. These groups also use the cliffs to rappel off of. The immediate problem is the competence of the instructors. A few years ago there was an accident in one of Cuetzalan's deep chasms as a result of this type of usage. There are currently no measures in place to deal with rescues in Cutzalan. Worst of all, these groups, which are organized outside of Cuetzalan, also publicize the caves without regard to the detrimental effects of their actions.

14. We must also carefully examine any tourism projects that involve the use of the caves, rivers, and the land in general. Such project may use words like "eco" or "ecology" or "conservation" or "alternative." But what are these projects really doing? For example, projects under the name "eco-tourism" have been the cause of great harm to the Himalayas. We may speak, without exaggeration, of "eco-destruction."

15. To protect the caves, the law must: (a) Restrict the advertising of the four caves designated for tourist use. (b) Deny cave access to vandals. (c) Deny cave access to guides who do not stop the vandals. (d) Deny cave access to guides who act as vandals.

16. The four caves designated for use in tourism should be: (a) Las Grutas de Cuetzalan, near the Hotel Campestre. They do not need protection because they don't contain stalactites. (b) La Sima de Cruz Verde, in the town of Cuetzalan. It doesn't need protection because it is vertical. (c) Las Grutas de Octimaxal Sur. These require urgent protection because they are very easy to access, contain many formations, and are suffering many damages. (d) La Cueva del Elefante. This cave is difficult to access, but this fact doesn't hinder vandals, and its formations still require urgent protection.

17. Thus, it is only currently necessary to physically protect two caves. The protection should be with a gate, or with a guard.

18. In practice, it is physically impossible to protect all caves. That is why we must restrict tourism to the four caves previously mentioned in section 16.

19. The guides must have a work license authorized by the municipality of Cuetzalan. They must be at least eighteen years of age.

20. It must be illegal to break or loot any stalactite or calcite formation in a cave, or to harm the cave in any way. It must be illegal to buy or sell stalactites.

21. It must be illegal to harm any gates securing caves, or to establish alternative routes to circumvent gates.

22. It must be illegal to damage or disturb any insect, bat, bird, or other animal that lives in or visits any cave.

23. The proposition seeks a favorable middle-ground between an ethical model of conservation and the use of caves for tourism.

Proposed law

Definition: The term "cave" in this text refers to any subterranean features, that is to say, grottos, chasms, sumps, etc.

Penalties: Penalties are not defined below.

A. Damages to the caves and their contents.

A1. No person may damage any cave in the municipality of Cuetzalan.

A2. No person may break any stalactite, stalagmite, column, or other crystalline formation in any cave in the municipality of Cuetzalan.

A3. No person may remove any stalactite, stalagmite, column, or other crystalline formation from any cave in the municipality of Cuetzalan, even if that formation was found broken or on the ground.

A4. No person may sell or buy any stalactite or stalagmite or other crystalline formation from any cave in the municipality of Cuetzalan.

A5. No person may remove any archaeological or religious artifact from any cave in the municipality of Cuetzalan, that is to say, pots, statues, bones, etc., or any object made of clay, metal, rock, bone, etc.

A6. No person may sell or buy any archaeological or religious artifact from any cave in the municipality of Cuetzalan, that is to say, pots, statues, bones, etc., or any object made of clay, metal, rock, bone, etc.

A7. No person may remove rocks from a cave or use the entrance to a cave as a quarry in the municipality of Cuetzalan.

A8. No person may paint or write on the rocks of the cave, or etch something into the rocks of the cave, or in the entrance to any cave in the municipality of Cuetzalan.

B: Illegal entry into a protected cave.

B1. No person may attempt to force, tamper with, damage, destroy, or circumvent any gate or wall built to protect a cave in the municipality of Cuetzalan.

C: Causing damage to the plants and animals of the caves.

C1. No person may destroy or damage any plant or fungus, mammal, bird, insect or crustacean, or other animal that lives in, sleeps in, or is found in a cave in the municipality of Cuetzalan. All activities that result in the damage or death of the plants and animals in the caves are prohibited.

C2. No person may hunt mammals, birds, crustaceans, etc., in the caves of the municipality of Cuetzalan, using whatever method, including the use of dogs, firearms, rocks, knives, nets, poison, machetes, etc.

C3. Notwithstanding the protection granted to mammals and birds in C1 and C2, above, no person may hunt, poison, destroy, or damage, with whatever method, any bat or swallow in any part of the municipality of Cuetzalan.

D: Limiting the caves' publicity.

D1. No person may advertise, verbally or with writing, any cave of Cuetzalan, with the exception of La Sima de Cruz Verde, Las Grutas de Cuetzalan, La Cueva del Elefante, and Las Grustas de Octimaxal Sur, which are the caves designated by the municipality of Cuetzalan for tourism.

E: Limit the caves that can be used for tourism.

E1. No person may carry out commercial or tourist activities in any cave aside from La Sima de Cruz Verde, Las Grutas de Cuetzalan, La Cueva del Elefante, and Las Grutas de Octimaxal Sur, which are the caves designated for tourism by the municipality of Cuetzalan.

F: Guide restrictions.

F1. No person may act as a guide in a cave in the municipality of Cuetzalan without written permission from the city hall. The municipality will consult speleologists, conservationists, and the communities of Cuetzalan, with respect to the capacity and licensing of the guides.

F2. Guides must be at least eirhteen years of age.

F3. Restrictions F1 and F2, above, do not apply to Las Grutas de Cuetzalan, which is appropriated for use by young guides.

F4. Any person may file a complaint with respect to any cave guide. The municipal presidency will investigate every complaint and, if it's confirmed, has the right to revoke the guide's license.

RECOMMENDATIONS FOR THE CONSERVATION OF LAS GRUTAS DE OCTIMAXAL SUR

The entrance. The entrance is complicated. There are at least six different ways to enter the cave. Currently, it's covered with trees, branches, and leaves. It's a good camouflage, but doesn't deny access to those who are determined to enter. The official entrance is covered with planks. At least this is better than nothing, but it also doesn't stop the determined.

Don Pedro, brother of Doña Carmen, the owner, says that the INI believes the entrance possesses an intrinsic value, and should therefore not be changed or damaged. Mike agrees with this opinion, as the rocks around the entrance are attractive and the entrance is overall quite interesting.

Besides, it would be difficult to seal the entrance. It would require some kind of roof. To support the roof, the irregularities in the rocks around the entrance would have to be eliminated, which would destroy said rocks in the process. Furthermore, we will lose the light of day, which is the most interesting aspect of the entrance, not to mention the cave itself. At three in the afternoon, the sun's rays enter the cave, creating a magnificent spectacle.

It may be possible to make unofficial access less attractive through slight modifications to the entrance, such as removing rocks from the bottom of drops to enlarge them, planting nettles, building barbed wire fences around the area to allow for the natural growth of vegetation, blocking some tunnels, etc. It's important not to create traps, such as covering drops with branches, since this can lead to accidents.

We must also build a smaller and stronger gate located approximately one meter north of the location of the planks that serve as the current gate.

The gate. Certainly, we can improve the defenses at the entrance, but we must admit that they remain inadequate. We need a gate, a definite obstruction that can only be traversed with a key.

After much study, reflection, and consulting with speleologists, over the course of close to a year, I believe the best location is at the bottom of the decline from the entrance, approximately 80 meters into the cave. At this point, there is a kind of natural entrance, approximately 3 or 4 meters wide and 5 meters high. It would be possible to seal this opening with rocks and concrete and add a gate. I suggest we do so.

Yes, this might not be the end of the problem. It's possible that some people may see this gate as imposing on their right to free access of the earth, or something similar, and will seek to damage the gate. If this occurs, the gate will simply have to be repaired in due time. At the moment, it's a matter of installing the gate and seeing the results. The reasoning behind the addition of the gate can then be explained to the public, that is to say, that it was added to protect the cave. The people will thus know that it was not arbitrarily built, but is for the cave's protection.

A guard. The owners can also hire a guard to watch the cave during off-hours, for example on Friday or Saturday nights, when the young people come with their bottles.

The path inside the cave. Don Pedro has asked about the cave's trail: should it be improved, or can it be left as is? This is an interesting question because it's intimately related to the policy that we have within the cave. Should we pursue extensive development of the cave or leave it relatively natural?

Admittedly, older visitors tend to have difficulties with the current path. The entrance is very steep, and will always cause difficulties for seniors. In my conversations with these people I have discovered that they took the cave's difficulties in good stride, and I believe that they would uphold the preservation of the cave's natural beauty above their personal convenience. Seniors are our leaders when it comes to ethics.

It is certain that for the majority of people, the current trail is one of the cave's main attractors, a minimal trail that offers them an adventure. Sometimes it poses slight difficulties or causes fear, but at the same time it creates the pleasure of triumphing over difficulties. And it's not that difficult. Doña Aurora was able to pass through the cave with confidence and speed. I believe the current trail is an important part of the experience of the cave, and can be left as is. But the guides can agree with the people to show them the route. Child guides often do not know the route or wander off trail without regard to the people that accompany them.

My recommendation is to leave the trail as it currently exists.

Should electric lights be installed? This is another question from Don Pedro. With flashlights there is a

much greater sense of adventure, while with electric lights people can observe much more of the cave.

Certainly flashlights provide a sense of adventure, which would be lost if electric lights are installed. So, if we wish to continue conserving the adventurous and natural aspects of the cave, we must continue using flashlights.

How would electric lights affect the theft of formations? Would they make it easier, since the vandals can see their targets, or harder, since the guides can see the vandals?

Two types of guides. As far as guides are concerned, we can identify two types: the first are residential guides, and the second are tourist guides that independently bring people to the caves. Now, there are kids who act as residential guides, and also bring people to the cave and enter the cave as tourist guides.

Don Pedro and I agree that the guides should be responsible individuals, and that they should be at least eighteen years of age.

Currently, child guides are allowed to enter the cave. As was noted, they do not have sufficient maturity to adequately watch over their people. Also, there is evidence that kilos of stalactites have been stolen from the cave by kids. This observation applies to the kids of Cuetzalan as well as the young people from the indigenous regions. I believe the temptation is too strong when a tourist offers a kid ten or twenty pesos for a stalactite. Plus, the kids don't have the authority or the physical strength to keep a tourist from taking a stalactite. The guides must defend the stalactites with their lives. It's because of this that they need to be mature and irreproachable.

This can be put into practice in such a way similar to the following. There must be enough adult guides to take people who arrive independently, as well as people who are brought by child guides. We must pay the children five pesos for each person that they bring, since these people could not have gotten to the cave without the kids' help, and the kids deserve the money for this work. The intention is to give the kids work, and to this end we give them maps to alternative attractions such as waterfalls, scenic overlooks, and churches.

For this we need two guides, both adults, at the cave during open hours (probably Saturday and Sunday, Easter week, and other holidays). Obviously, management cannot afford to pay two salaries every day of the week, hence the need to limit the days when the cave is open. Even so, Don Abraham is currently working to improve parking and act as a guide for the people who arrive during the week.

The cave's finances in relation to its conservation. The finances of the cave require consideration, because they affect the salaries of the guides and the recommendation to use adult residential guides and adult tourist guides. In short, these provisions will likely cost management around eighty to one hundred pesos, assuming they pay the guides forty to fifty pesos for each day the cave is open, that is mostly Saturday and Sunday and certain holidays. The average income easily covers these salaries.

Management will still earn around five pesos from each tourist the kids bring, which is about the same, give or take, what they currently make.

It's reasonable to pay responsible guides a modest salary, since their job requires much care, honesty, and dedication. Dishonest guides will supplement their incomes by selling stalactites. There is a saying in English: "Honesty is its own reward." However, we can also reward honesty with a decent salary.

We must also trust that there are honorable and competent tourist guides, because they would have the opportunity to steal and sell stalactites without supervision. Many of these guides are known, for example, Hector Leal Cabrera is competent and careful in the cave. And there are others. But there are others unknown who could become guides after an orientation, after considering their personality, etc. The process of choosing guides should be just and open, with ample explanation of the decisions that are made. Obviously, because the cave is inside the jurisdiction of the Municipality of Cuetzalan, the guides can discuss any specific situations with the municipality. All in all, the two principles that govern the operation of the cave, and that should always prevail, are conservation and justice.

In this case, we remember the saying from the Green Book of Caves: "Conservation necessitates maximizing resources." Caves have been treated as gold mines until now, a source of money without giving thought to consequences. We can change this attitude.

The fact is that topmost three meters of ground are federal property, and form part of our national heritage. (Speleologists will say it's a global heritage, though they'll stop short of intergalactic). This is why we are managing this cave for the well-being of all Mexicans, and people in general.

A guest log. It would be of great value to have a book that visitors can sign, and give their names and address. This would curb vandalism, help in keeping track of the number of visitors and when they were there, provide the municipality with information for determining licensing and taxes of the business, etc.

An oversight committee. It's evident that we need an oversight committee, comprised of good-natured people, to oversee the operation of the cave and all aspects of its tourist use, including the use of the cave by independent tour guides. The members of the committee need to be good-natured and must not have any financial stakes in the cave. The committee can also oversee other caves in Cuetzalan. There can also be representation of national and international speleologists, municipal, state, or federal officials, and the people of Octimaxal Sur.

A legal contract. The relationship between tourists, residential guides, tourist guides, management, the oversight committee, and the municipality of Cuetzalan must be written in legal form. It can also form part of A Proposition for a Municipal Law for the Caves . . . .

The difficulties of fulfilling contracts in Mexico. One of the differences between Mexico and Europe is the matter of fulfilling contracts. In Europe, contracts are enforced by

rigorous laws. In Mexico, there is a tendency to create laws or contracts that are comprehensive, intelligent, and elegantly written, but then fail to enforce them.

In regards to the caves, we do not want this to happen, that is to say, create pages worth of writing that is forgotten within a month or five years. Because stalactites don't grow once broken, we are fighting to conserve the cave for an eternity, or at least until the end of the human race. It's a formidable challenge, possibly the most formidable out of all challenges in conservation. But it's possible. It's a simple matter of keeping visitors to the cave from destroying stalactites. Babies are just as delicate as stalactites, but it's rare that we let them fall on their heads.

If the management doesn't possess the capacity to manage the cave. Managing the cave is a project that requires much care. If the management is unable to do so at the requisite level, it may be best to hand management off to a group of speleologists and conservationists, or to the Municipality of Cuetzalan to manage in accordance to the two principles of conservation and justice. That said, speleologists, conservationists, and the people of the municipality intend to help the current management conserve the cave.

Tourist guides and the caves of Cuetzalan. This section is not directly related to the Grutas de Octimaxal Sur, but is perhaps my most important observation with respect to the conservation of the caves and caverns of Cuetzalan, so it bears repeating: We ask, once again, that the tourist guides of the region refrain from conducting tours in caves other than the four designated for tourist use, that is the say, Las Grutas de Cuetzalan, near the Hotel Campestre, La Sima de Cruz Verde, Las Grutas de Octimaxal Sur, and La Cueva del Elefante. If the guides take people to other caves, they will certainly begin a cycle of destruction, as vandals learn of the entrances thanks to their guides. Experience with Las Grutas de Octimaxal Sur and La Cueva del Elefante have taught is that it's very labor-intensive to protect a cave with a gate. After almost a year, we only have minimal protection in Octimaxal Sur, although the work has been continuous. The damage a guide causes in one afternoon can take two or three years to fix, and that only partially, because vandals destroy caves very quickly.

Simply put, we cannot gate every cave in Cuetzalan. We ask the guides to elevate these marvelous gifts from God, the caves and caverns, above their wishes to earn money.

REGULATION OF THE AUXILIARY MUNICIPALITY OF SAN MIGUEL TZINACAPAN FOR THE CONSERVATION AND PROTECTION OF CAVES

Definition: "Cave" can refer to a "sump," a "resurgence," a "grotto" or any natural underground cavity. "Adviser" refers to a good-willed speleologist committed to maintaining the wellbeing of caves.

1. The Auxiliary Board of San Miguel Tzinacapan will designate a committee for the Conservation and Protection of Caves, which will be elected through a general assembly put together for this purpose.

2. The members of the committee for the Conservation and Protection of Caves will be elected by (a) a general assembly, (b) the advisors, and (c) the Auxiliary Board of San Miguel Tzinacapan. of San Miguel Tzinacapan

3. The advisers must be speleologists committed to the conservation and protection of caves.

4. No person may have access to the cave of Tasalolpan without the presence of a guide of San Miguel Tzinacapan, with the exception of advisers and persons accompanied by them.

5. There will be two keys for access to the cave of Tasalolpan, one in the possession of the advisers and the other in the hands of the president of the Auxiliary Board of San Miguel Tzinacapan for use by local guides.

6. The guides must be appointed by the same Committee for the Conservation and Protection of Caves, the advisers, and representatives of the Auxiliary Board of San Miguel Tzinacapan.

7. The chosen guides will commit themselves to the responsibility of locking the gates on every occasion, in order to prevent the entrance by unauthorized persons.

CONCERNING THE PROTECTION OF A CAVE OF EXCEPTIONAL BEAUTY WITHIN THE JURISDICTION OF THE AUXILIARY BOARD OF SAN ANDRES TZICUILAN

This cave is truly of exceptional beauty, full of stalactites and stalagmites of various forms and colors, comparable in its wealth of formations to those in France and Slovenia. The cave is a precious gem, and remains intact, for vandals have yet to reach it, but they will, with rocks in hand to lay waste to the formations as they have in other caves, such as Coyocochico, Tasalopan, and Octimaxal Sur.

There exists a rule that never fails: "a known cave is a destroyed cave." The destruction of this one is imminent, unless we take measures to avoid it. What measures?

All that would be necessary would be to close the lower entrance with a wall. The higher entrance can be left open for use by speleologists. Since the higher entrance is a drop, inaccessible by vandals, this cave of superlative beauty will stay intact. Let us take this measure now.

I (Mike Boon) will pay all costs of construction.
Cuetzalan del Progreso, 28 December, 2006

Propuesta para la Protección de las Cuevas en Cuetzalan, Puebla

El espeleólogo británico y canadiense Mike Boon, quien murió en diciembre de 2014, escribió esta propuesta para la protección de las cuevas en los alrededores de Cuetzalan, Puebla, en 2006.

John Michael Boon
1940–2014

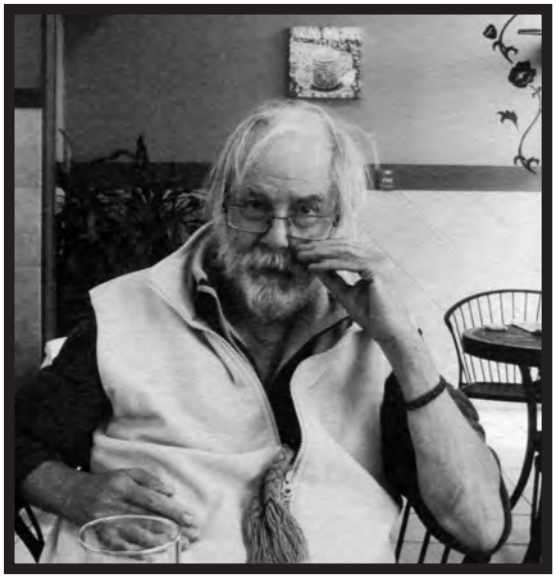
When I learned that Mike had died I was filled with a deep personal sadness. The two of us had become close friends during his time in Yorkshire, often in the company of Pete Livesey and Bill Frakes. When he first moved to Yorkshire sometime in 1963, Mike lodged with Bob Leaky for a number of months, during which time he introduced Bob´s children to caving, especially his son Julian. It was around this time that Mike joined the Bradford Pothole Club and became acquainted with Livesey. A strong partnership quickly formed between them, and being like-minded, they formed a formidable team that pushed back the boundaries of the possible, culminating in the early descent of Mossdale Caverns.

It wasn't long before Pete suggested to Mike that he should move to Huddersfield. As a result, he stayed in Lindley with the Livesey family for a month, during which time he wrote himself a reference for a job at a local school. This application also included his version of Mrs Livesey's signature, as she was a well known head teacher. He got the job and held it for three months.

Pete knew that I had a spare room in Golcar, Huddersfield, so he came round one night to see if I would take a lodger. I agreed to meet Mike and discuss arrangements. He stayed for more than three years. It turned out to be one long roller-coaster ride from start to finish, climbing, caving, and endless parties with female students from the Oastler Teacher Training College.

This was about the time arrangements were being made for the 1965 Jamaica expedition with Pete, Tich Morris, and Ray Stoyles. The house would often be full of expedition chatter, especially when Tich was there to discuss progress as the departure date drew close and also to deal with the sponsorship materials that were stored in Livesey´s barn.

When the team returned from Jamaica, Mike had to find work. He tried a number of jobs, the longest of which was a spell with Huddersfield Corporation as a bus conductor, not that they would make much money from Mike, as he granted free passage to the elderly, anyone looking poor, and pretty young ladies.



Mike Boon in December 2013. Photograph by John Donovan.

Mike was always thinking of ways to earn a crust that would also give him the freedom to do the things he most wanted to do. His next move was to enroll as a student teacher in General Studies at a Technical Teacher Training College in Huddersfield. During that time, I already had a steady job. But, in the days following his acceptance on the course, Mike convinced me to pack my job in and enroll on a course at the same college, which I did.

Somehow we both ended up having teaching practice at Wakefield Technical College, and Mike found out that Leakey´s daughter Benita worked at Wakefield central Library, so we went round one day and took her out for a surprise lunch; needless to say, we met again.

Down to a Sunless Sea was written around this time after spending countless hours in the library. There also was a resurgence in his poetry, with one poem relating to a "Walnut-Faced College Principal."

It was while at college that Mike consolidated his reputation as one of the leading cavers of his generation with an exploration of an extension to Marble Arch Cave in Northern Ireland. This was some years after his now-famous dive in Swildens Seven.

During the Christmas-New Year 1966/67 he and I stayed on for another week or two after all the other group members had returned home. It was then we discovered and explored extensions to the Screen Hill Passage of Marble Arch Cave that included the largest section of cave passage in the system.

One day in between our caving trips to Screen Hill, Mike suggested that we should visit a farmer friend on the Marlbank Road. Mike has had a long association with the McGovern family, and this related to his stay a few years earlier after problems with his tent. When the door opened, Mike was welcomed as a long-lost member of the family by Mrs McGovern, who ordered us to stay for lunch and promptly set

about making a fresh loaf of bread for our forthcoming meal.

The following Easter a diving trip to Marble Arch Cave would be the last time we would be away from Yorkshire, caving with our three friends Bill Frakes, Colin Vickers , and John Ogden. All three were to perish in Mossdale, a tragedy that left Mike visibly shaken, and as far as I can remember, for some reason, he didn't go underground on the rescue, but there again, I could be mistaken.

A short time later Mike investigated the possibility of taking a degree at McMaster University in Canada. He could then combine his studies with his literary and caving ambitions. At that time there was a fairly strong caving club at the university that included Charlie Brown, whom Mike had caved with in Jamaica.

After Mike left for Canada we had very little contact. Occasionally my farming neighbor would knock on the door and tell my wife that a strange man had been hanging around the house. Of course that was Mike, who had come over to see his mother but was also searching out old friends. Interestingly, on that first occasion Mike hitchhiked from Canada. He managed to attach himself to a large party of children, and by helping out with the administration, like collecting all of the tickets to hand in for processing, he became included in the group. As a result he got a free flight to France. Search as they might, the flight attendants could not find that extra passenger. He then hitchhiked to the French coast, where after a lot of enquires with the owners of the moored yachts in the harbor, got a lift across the channel to England. Boon was the only person I knew who had the persuasive personality to get away with that kind of maneuver.

In the mid-seventies, Sue and I made our first visit to the States. But first we visited Calgary, where we stayed with Mike. The accommodation was a dark, dingy boiler room in the basement of a small block of flats, very basic as one could imagine. It was typical for Mike in his later years. We lost contact when he went to live in Mexico.

Mike was a very talented individual. Although he lived many miles away in Calgary and though neither of us was in contact with each other recently, I will be miss him, left with memories that took place only yesterday.

To be a person who knew Mike was a privilege.

To be someone who caved with Mike was a privilege.

To be one of a group that included Boon, Livesey, and Bill Frakes, sharing all of the good times we had together, was a privilege.

—Dave Cobley

Wetsuit? Check. Boots? Check. Air mattress? Check. Kayak? Check. All was ready for the Great Maligne River Race of July 1967 between a ragtag bunch of cavers using air mattresses and Mike Boon in his beloved wood-and-canvass collapsible kayak. This adventure was conceived the night before after many beers in Jasper's Athabasca Hotel.

Because it still seemed like a good idea the following day, we flung ourselves in the river, heedless of the dangers of a swollen, freezing, glacier-fed white-water river. Now classed as a Grade VI river ("Cannot be attempted without some risk to life, even by a team of experts. Nearly impossible and very dangerous."), we considered it a lark to relieve the tedium of tramping up and down mountains searching for caves as part of Derek Ford's two-month field camp at Medicine Lake.

As with most memories of a nearly fifty-year-old event, I recall it as a series of fragmented images rather than as a video: an image of a plunge over a huge rock into a hole followed by a near-vertical ascent up a standing wave, an image of a frantic maneuver to avoid a sweeper that threatened to puncture the mattress, an image of bouncing through churning rapids while desperately trying to breath and hold on to the mattress.

By sheer luck the floaters arrived intact at Medicine Lake, the outlet of the river. The luckless Boon was less fortunate. First, a paddle floated into sight, quickly followed by shreds of canvas attached to splintered wood. Sometime later Boon squelched into camp, having fought his way to the river bank. He later admitted that he stayed upright for about thirty seconds after launching. It was the end of Boon's white-water kayaking career, but the beginning of over thirty years of adventures—and misadventures—in Canada, the U.S., Mexico, and Guatemala.

—Peter Thompson

We arrived in Cuetzalan in fog and left in fog. However this is one of Mexico's most promising caving areas. The place is like a giant pepper-pot, with huge caves swallowing up rivers and, as yet, no risings discovered. Mike Boon and Pete Lord have turned into a pair of Mexican Eli Simpsons and are revered by the visiting American cavers, who call them sir and touch their forelocks frequently when addressing them. There was some talk of putting up a statue to Mike Boon, but it was considered indecent by the local council and was dropped.—Jim Eyre

Down To a Sunless Sea. J.M. Boon. Stalactite Press, Edmonton; 1977. 105pp., plates. $12.50 (plus $1.50 p and p, from Stalactite Press, Department of Geography, University of Alberta, Edmonton, Alberta T6G 2H4, Canada.)

Mike Boon writes well, but not well enough to make up for the fact that this is a bunch of trip reports, mostly from England and Ireland, written before 1967 and published in 1977 at a 1987 price.

(It was a slim volume, albeit hardbound, selling for what was in 1977 quite a lot. At the next NSS convention, in New Braunfels, Texas, in 1978, Mike Boon had a table set up in the hall to sell his book, under a poster advertising it. Prominent on the poster was the line "Mike Boon writes well. Bill Mixon." Fair enough.)—Bill Mixon

Mike Boon is truly a legend in caving circles, commencing his caving in the UK in the late 1950s and was the first adopter of the "aqualung" for sump diving there. Tales of Boon

will fill volumes. He pioneered techniques for exploring dangerous river caves in Central America. He was the author of a nice self-published volume titled *Down to a Sunless Sea*. There are likely copies around in caver's libraries and occasional used book stores. He made many contributions to Canadian caving, mostly in Rockies explorations. He caused quite a stir in the 1970s with a winter solo exploration to distant reaches of Castleguard Cave. Truly, one of the great personalities in caving history.—Pat Shaw

After the 1980 Polish rescue in San Agustín, the one Boon wrote the booklet about that was reprinted in *AMCS Activities Newsletter* 37, Boon prepared a duffel bag to be sent down the cave for his use when he was slated to go to camp a couple of days later. Whoever was assigned to sherpa the duffel in picked it up and complained at the weight.The caver opened the bag and right on top was a gallon plastic jug of *caña*. He took it out and carried in the rest of the bag. When Boon found out his *caña* had been left behind, he was pissed. "You had no right!" he said.

Boon definitely loved his *caña*. The above was especially ironic because he was constantly berating people for carrying too much stuff. (Here's a quote from his booklet, referring to Bill Liebman: "He was carrying an enormous bag, because wherever Americans go they always carry enormous bags; no one's ever been able to determine what's in 'em yet." (Apparently it wasn't caña. . . .) Boon himself carried so little that he was constantly borrowing things and bumming food and carbide from our enormous bags.—Mark Minton

In the acknowledgements in my book *Yochib: The River Cave* I said, "I dedicate this book to John Michael Boon, who, in the waters of Sumidero Yochib, saved my life." He did. Like is says in the book and I have told many people though the years, that feat of diving into brown, frothing flood waters was about the bravest thing I've ever witnessed. I would have done it for him, and it was a toss-up for an instant over who was going to do it, but he spoke up first and pulled it off. Had he not, four of us would have been swept to certain death over a downstream waterfall.

The flood in Yochib is just one of the tales I could tell. Others cover his general skill as a cave-explorer. From him I learned how to approach strong water in a cave. I could also tell a funny story or two about his wild side. When Mike was present there was never a dull moment. Some were outraged; I laughed.

—Bill Steele

When I heard that Mike Boon was dead, powerful clear, long-buried memories came alive again in my mind. I hadn't see Boon in thirty-five years. Those who had the experience of meeting him in person would probably agree that if you spent ten minutes with Boon he would burn an unforgettable image into your brain for the rest of your life. Poet. Explorer. Pioneer. Leader. Diver. Force of nature. Intellectual. Highly articulate author. Boon was all of those. But perhaps it was his Mr. Hyde side, that of a sometimes ribald, drunken, feisty, salty-languaged curmudgeon who happened to be a very good caver, that left an equally indelible mark on one's psyche.

My first introduction to the illustrious Mike Boon was completely unexpected. For those reading this who have never heard of Mike Boon, read Martyn Farr's book *The Darkness Beckons*. Boon was legendary in his native England in the 1960s. He was likely *the* boldest cave diver of his time, and for at least fifteen years he dominated the UK sump-diving scene. He was one of the first to see the advantages of the then-new open-circuit Cousteau-type scuba gear over the military-surplus oxygen rebreathers then in use by nearly every other member of the British Cave Diving Group. That Boon had survived as long as he had, despite a string of harrowing incidents underwater, underground, was a testimony that he either had a guardian angel looking over him or he knew his stuff.

It was the spring of 1977 and I was living as a grad student/cave bum on the infamous Kirkwood Road in Austin when, on a quiet Saturday morning, there came a knock at the front door of my apartment. And there was this dark, scruffy-bearded, long-oily-haired fellow wearing thick black plastic-framed glasses standing there. He introduced himself and patiently explained that T.R. Evans had been hosting him during his visit in town and that my name had come up, as I had recently taken up sump diving and T.R. was concerned about that. Boon looked me in the eye and began accusingly, "I hear you've taken up cave diving." Then, with his rigid index finger poking me in the chest to accentuate each word he continued, "Dangerous stuff, you know." OK, he had my attention. He spent the next two hours in my living room interrogating me regarding my technique and the equipment I was using. He took this all in and then said casually, "You are going to die if you keep doing this like you've described." Boon then gave me the compressed essence of his substantial knowledge on the subject, everything from how to rig a redundant life-support system using side-mounted tanks to how to plan air use and techniques for laying lines and avoiding silt. Then he left. He undoubtedly saved my life, given that there were no formalized training courses in cave diving at that time and would not be for at least another five years.

Only later that year did I discover how articulate this rough individual could be. He had written and compiled a collection of short stories that were published under the title *Down to a Sunless Sea*. One passage particularly stood out in my mind:

> The light was failing, the first tree frogs were starting to chirrup, and I was staring over the edge of the most spectacular sink hole in Jamaica. To the right a mass of stacked wedges of limestone, grey spattered with black, lurched over the drop, below was 150 feet of gloom to the wriggling surface pattern of the stream. Waterfalls filled the great bowl with soft sound, yellow leaves fluttered down and were lost in the gathering dusk. The place was the sink of

the Quashies River and three others were there besides myself: "Tich" Morris, Pete Livesey, and Ray "Farmer" Stoyles. It was October 1965, the start for us of seven months expeditionary caving in the mountains of Jamaica.

Seven months of expeditionary caving! Now here was a man who had taken the sport I thought I knew to levels that seemed unimaginable.

At the time his book came out, Boon was living in Calgary with other ex-pat British cavers, and he frequently came through Texas on his way to Mexico. He had been involved with some of the most notable exploits of the past ten years in southern Mexico, including the 1968 push on the Sótano de San Agustín as well as, later, the extraordinary river-cave saga at Sumidero Yochib with Bill Steele and others. It was in December of 1977 that I again ran into Boon, this time in Huautla. We Texans had organized a return to La Grieta, and among the crew was an attractive female caver to whom Boon had taken a shining. Hearing that this woman would be on the expedition, he had arrived in the village of San Agustín a week ahead of our team and begun living in the walk-in entrance to the large river sink of Cueva del Río Iglesia in hopes of catching sight of her while she bathed in the river. Boon, as well as many other hopeful male members of the team, had been found wanting in the eyes of this flirtatious vixen. Also on the expedition were three Australians, led by Julia James. Being a mutual subject of the Queen, Boon went complaining to her about this state of affairs one afternoon. James smiled, took a young Al Warild in one arm and a younger still Neil Hickson in the other and replied, "Michael, I don't understand the problem."

I last ran into Boon in 1979, but this time on a dirt road near the entrance to Friar's Hole Cave in West Virginia on a sultry July weekend. It was going to be a cold, wet, vertical caving trip. Everyone there had full wetsuits on. Even as a relatively poor grad student I had a good wetsuit. But Boon, who had been practicing economy to the limit that summer by living cheaply in caving huts, had no funds to spare, and his wetsuit was a collection of torn elements and ruptured zippers held together in numerous places with baling twine that he had salvaged from a nearby cow pasture. The result had the appearance of a bare-skinned knight with rubber platelets for armor. Poets are seldom rich when they are alive.

Boon was eccentric, but he was an original, and at one time one of the world's finest and boldest cave explorers. The world will be a lesser place without him.—Bill Stone

Mike Boon died peacefully in his sleep while taking an afternoon nap on December 20, 2014.

The evening of May 16, some of Mike's old friends gathered in one of his favorite bars in Jasper, Alberta. The next day tales were shared on the banks of the Maligne River, and Mike's ashes were placed in the water. Bill Steele recorded some of the stories and has put them at https:vimeo.com/128752622 (Peter Thompson), /128756114 (Ian Drummond), /128754207 (Daryl Donovan), and /128757686 (John Donovan).

Gustavo Vela Turcott