



AMCS ACTIVITIES NEWSLETTER

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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, Rodolfo "Fofo" Gonzalez, Mark Minton, and Laura Rosales.

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.

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Front cover

The 150-meter TAG Shaft in Nita N'Tau, taken during the PESH 2017 expedition. Photo by Chris Higgins.

Back cover

"Maikel" and Marta Candel derigging Sótano Marcelino in Puebla during the 2017 Tzontzecuiculi expedition. Photo by Gustavo Vela.



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NEWS

Part of the floor of Salon la Muñeca in Cueva Tlamanictli, Puebla, the fourthlargest cave room by volume in the world. Photo by Gustavo Vela Turcott.

MEXICO NEWS

Compiled by Bill Mixon

BAJA CALIFORNIA SUR

A new genus and species of spider was discovered in a cave in the Sierra Cacachilas near La Paz. The photo by Jim Berrian of the San Diego Natural History Museum is from a press release at http://enewspaper. sandiegouniontribune.com. Another press release about the spider is at http://www.livescience.com/58644big-furry-spider-discovered-in-cave. html.

Abstract: Description of *Califorctenus* (Cteninae, Ctenidae, Araneae), a new spider genus from Mexico, by M. L. Jimenez, J. E. Berrian, and C. Palacios-Cardiel.

Califorctenus gen. nov. (Araneae: Ctenidae) a new genus and a new species (*Califorctenus cacachilensis* sp. nov.) from the Baja California Peninsula in Mexico are described and illustrated. *Califorctenus* gen. nov. can be diagnosed by the morphology of the male palp, with embolus cylindrical and elongated, locking lobes of embolus positioned retrolaterally and the cup-shaped and elongated median apophysis.

Source: Zootaxa 4238.1.7, March 2, 2017.

CHIAPAS

Abstract: Primeras Exploraciones Espeleo-Subacuáticas en la Cueva

Jim Berrian / San Diego Natural History Museum



Cuauhtémoc, San Ferando, Chiapas, Mexico, by Kakeb Zárate Gálvez, Germán Yáñez Mendoza, and Bruno Espinosa de Alba.

În mid-April 2012 the Grupo Espeleológico Jaguar A. C. planned and organized the first cave-diving exploration in San Fernando, Chiapas, Mexico. In collaboration with caving divers belonging to the Comisión Nacional de Buceo Subterráneo y Espeleología FMAS, they entered into two caves for exploring flooded sections. Due to logistics problems, diving was done only in one cave, Cueva Cuauhtémoc, down to -46 meters inside one siphon. Casa del Aguila was the other visited cave, in the Cañón del Sumidero's walls. One year after, we returned to Cuauhtémoc, reaching deeper and doing one full exploration.

Source Mundos Subterráneos 27, English abstract to article on pages 28–37, September 2016.

CHIHUAHUA

Abstract: The Caves of Naica: a Decade of Research, by F. Gázquez, J. M. Calaforra, P. Forti, and G. Badino.

The caves of the Naica Mine have been the subject of study by scientists from up to seven counties over the past decade. Up to fifty research works have been published to date, most relating to the origin

of the giant selenite crystals of the Cueva de los Cristales. Nevertheless, a great deal of knowledge has been generated about other relevant aspects of the Naica system. This paper puts together the vast information available about the Naica caves, from the discovery of the Cueva de los Cristales in 2000 to the more recent investigations addressing mineralogy, microclimatology, and the use of gypsum speleothems as a paleo-environmental proxy. Special attention has been paid to novel research lines that have started to use the speleothems of Naica as a study case, particularly in fields such as astrobiology and planetary geology. Moreover, the conservation challenges that these caves will face in the near future as consequence of the end of mining activities have also been addressed in this article.

Source: Boletín Geológico y Minero, v. 127, no. 1, pp. 147–163. This important review paper may be downloaded from www.igme.es/ boletin/2016/127_1/BG_127-1_Art-10.pdf. (This item appeared in "Mexico News" in number 38, with a different source URL. It is repeated because of the importance of the paper. Three other Mexico papers in the same journal are mention under Quintana Roo in this issue.)

NASA researcher Penelope Boston reports that viable bacteria have been found in liquid inclusions in the giant crystals in the Cave of the Crystals in the Naica mine that may have been trapped there for up to 50,000 years. The find is controversial because of the great age and the difficulty of proving that the bacteria are not a contaminant introduced during the research. However, DNA sequencing has shown that the bacteria, while similar to known species, are not identical. Source: National Geographic press release February 17, 2017, by Victoria Jaggard, http://news.nationalgeographic. com/2017/02/crystal-caves-minemicrobes-mexico-boston-aaas-aliensscience/.

In a cave located in the municipality of San Francisco de Borja, Chihuahua, where there was no previous record of the existence of archaeological evidence, a mummified macaque was discovered deposited, apparently complete, in a possible funeral context. The finding proves that the Sierra Madre Occidental was a cultural corridor between the coast and the desert since before Paquimé times.

The Instituto Nacional de Antropología e Historia (INAH), through the Escuela de Antropología e Historia del Norte de México (EAHNM), is preparing an archaeological research project to conduct a study in the various caves of that region of southwestern Chihuahua, in the foothills of the Sierra Madre Occidental where there may be traces of cultural exchange between pre-Hispanic human groups in Chihuahua and the shores of the Gulf of California.

Archaeologist Emiliano Gallaga Murrieta, director of EAHNM, along with his staff, visited Mr. Manuel Rodríguez and his son, settlers of the Avendaños ejido, in San Francisco de Borja, who said that they found archaeological materials when they did work to level the soil of a cave of their property.

The vestiges had been collected by the settlers and were given to the archaeologists. The materials are fragmented,

but by the type of objects, the specialists have concluded that in the cave there must have been a tomb or burial bundles of at least two individuals. They identified two adult skulls, several long bones, a basket, a potting-basket base, a textile, cotton cord, and human hair, a possible deerskin bag or loincloth, a snail, and the naturally mummified head of a *guacamaya bandera* (scarlet macaw), which is distinguished by the great color of its feathers.

Due to their state of conservation, these materials stand out: the textile, which could be part of the wrapping of bundles, basketry materials, and, in particular, the head of the macaw. "According to the people of San Francisco de Borja, the bird was complete, in the dirt there were other pieces of his body, but they only



collected the head. Unfortunately we can not confirm if it was part of a funeral accommodation, because we know it was there but we do not know how. "

The archaeologist explains that the great majority of references refer to the ritual use of the macaw in the Middle period of Paquimé (AD 1,060 to 1,340). Some fragments of skeletons and feathers of the bird have been found in ceremonial and funeral contexts, and also as part of bags and earrings. But this is the first time that this bird was located, presumably complete, in an archaeological context. So this would be the first evidence of a macaw that was possibly buried complete next to a human being who by the environmental conditions of the cave naturally mummified.

"Because of its rarity, it was a bird much noted in the north of Mexico, because it did not exist in the region. The birds were imported from other latitudes, and when Paquimé settled down, they began to use his feathers for ritual and commercial purposes. The guacamaya became an important animal in the collective imagination of the peoples of northern Mexico and the southwest of the United States, it represented a solar bird, it was also associated with the rain due to its blue and green colors, which for the ancient Indians suggested water. '

Realizing the importance of the objects, the team of archaeologists decided to carry out explorations in the cave in the hope of finding more information in a strip of 25 meters long by 1 wide, where evidence



was found of a housing structure of *bajareque* with a dirt floor, on which points of the Early-Middle Archaic period were identified.

In another section of that strip, the archaeologists discovered a sui generis burial: only half of a human body was buried: pelvis and tethered lower extremities. The legs are of an adult of considerable stature. Archaeologist Gallaga said it may be a secondary burial, meaning that he was originally buried somewhere else from which he was taken for a second burial. On the pre-Hispanic floor were also discovered fragments of coal, corn, burned olotes, and arrowheads.

At the end of the rescue excavation, carried out on two weekends, a total of 30 arrowheads were found, most of the Archaic Medium/Late or Early Agriculture period (2500/1000 BC–AD 700). The archaeologist stressed that it is not yet possible to establish to what culture the materials belong, although it is clear that they are prior to Paquimé (AD 700 and 1450), between the Late Archaic and Early Agriculture periods.

The director of EAHNM explained that all objects are local, except for the snail, which originated in the Gulf of California in the region of Sinaloa, and the macaw. "It has long been known that there was a relationship between the coastal groups and Chihuahua, because there has been archaeological research in other parts of the sierra, but not in San Francisco de Borja. This is the first archaeological site registered in this municipality."

Source: http://www.inah.gob

.mx/images/boletines/pdf//art icle/5391/20160710_boletin_180.pdf, edited from a Google translation.

COAHUILA

An extremely rare eyeless catfish species previously known to exist only in Mexico has been discovered in a National Recreation Area in Texas.

Dean Hendrickson, curator of ichthyology at The University of Texas at Austin, identified the live fish, discovered in a deep limestone cave at Amistad National Recreation Area near Del Rio, Texas, as the endangered Mexican blindcat (*Prietella phreatophila*). The pair of small catfish, collected by a team in May, have been relocated to the San Antonio Zoo.

The Mexican blindcat, a species

that grows to no more than 3 inches in length, is known to dwell only in areas supported by the Edwards-Trinity Aquifer that underlies the Rio Grande basin in Texas and Coahuila. The new blindcat finding lends additional weight to a theory that water-filled caves below the Rio Grande may connect the Texas and Mexico portions of the aquifer.

"Since the 1960s there have been rumors of sightings of blind, white catfishes in that area, but this is the first confirmation," Hendrickson said. "I've seen more of these things than anybody, and these specimens look just like the ones from Mexico."

Jack Johnson, a caver and National Park Service resource manager at Amistad, first spotted some of the slow-moving, pinkish-white fish with no eyes in April 2015. After several attempts to relocate the species, Johnson and biologist Peter Sprouse of Zara Environmental LLC led the team that found the fish again last month. Mexican blindcats are a pale pink color because their blood can be seen through the translucent skin, and they dwell exclusively in groundwater.

"Cave-dwelling animals are fascinating in that they have lost many of the characteristics we are familiar with in surface animals, such as eyes, pigmentation for camouflage, and speed," Sprouse said. "They have found an ecological niche where none of those things are needed, and in there they have evolved extrasensory abilities to succeed in total darkness."

The Mexican blindcat was originally described in 1954 when found in wells and springs near Melchor Múzquiz in the northern Mexican state of Coahuila. It was subsequently listed as an endangered species by the Mexican government and as a foreign endangered species by the U.S. Fish and Wildlife Service. Hendrickson led efforts to locate additional blindcat sites in Mexico and Texas for years, but only located them in Mexico on previous expeditions.

"Aquifer systems like the one that supports this rare fish are also the lifeblood of human populations and face threats from contamination and over-pumping of groundwater," Johnson said. "The health of rare and endangered species like this fish at Amistad can help indicate the overall health of the aquifer and water resources upon which many people depend."

The fish are not yet on public display. They will be maintained alive in a special facility designed to accommodate cave and aquifer species at the San Antonio Zoo's Department of Conservation and Research.

"The San Antonio Zoo has a series of labs specially designed to keep subterranean wildlife safe and healthy," said Danté Fenolio, vice president of conservation and research at the San Antonio Zoo. "The fact that the zoo can participate now and house these very special catfish demonstrates the zoo's commitment to the conservation of creatures that live in groundwater."

Others involved in the discovery were Andy Gluesenkamp and Ben Hutchins of Texas Parks and Wildlife, Gary Garrett and Adam Cohen of UT Austin, and Jean Krejca of Zara Environmental.

The finding brings the number of blind catfish species within the U.S. to three, all found only in Texas. The two other species of blind catfish in Texas, the toothless blindcat (*Trogloglanis pattersoni*) and the widemouth blindcat (*Satan eurystomus*), live in part of the Edwards Aquifer complex, the deep Edwards pool below the city of San Antonio.

Source: Press release by Christine Sinatra at https://cns.utexas.edu/ news/rare-blind-catfish-neverbefore-found-in-us-discovered-intexas.

MORELOS

Abstract: Morphological and Mineralogical Characterization of Speleothems from the Chimalacatepec Lave Tube System, Central Mexico, by Rafael López-Martínez, et al.

Siliceous, opal-A speleothems of the Chimalacatepec lava tube system in central Mexico are characterized here for the first time. Morphologically, they can be classified into cylindrical and planar, and display a wide array of shapes, inner textures, and locations within the lava tube. All speleothems analyzed here are composed of opal-A, and their pores are filled with calcite and monohydrocalcite. Microscopic examination reveals a variety of microbial-looking, silicified filaments and cell casts embedded within the micro lamination of the structures. The abundance of biofilms in the Chimalacatepec lava tube may share similarities with other volcanic caves elsewhere. The direct presence of such biomorphs in the microstructure of the speleothems suggests the biological mediation of these structures. Potential mechanisms include nucleation and sorption of silica on extracellular polymeric substances in the biofilms that, along with the SiO₂ saturation in the water film and evaporative effects, result in the formation of a speleothem. That said, the presence of microbes in these and other cave systems, or their inevitable interactions with the mineral phase of the speleothems, should not be surprising. In view of this, these structures can be most accurately described as biospeleothems. This study contributes to our understanding of the diversity of such structures in these types of cave systems and our ability to recognize the presence of microbes in these.

Source: International Journal of Speleology, vol. 45, no. 2, pp. 111–122, 2016.

NUEVO LEÓN

Progress has slowed at the Laguna de Sanchez area in the Parque Nacional de Cumbres de Monterrey, with only two trips combined from 2014 through 2017. But new caves keep turning up, the latest being Pozo del Primos, a nice-looking but unentered pit found by the local boys. In November 2014 Jim Kennedy, Matt Zappitello, and Stephanie Davlantes mapped the upper levels of surprisingly large Cueva de la Guía at Llano Grande. Kennedy, Bryce Smith, Rebecca Pokluda, and Kayla Weirich completed the survey through some pits this past March. The 2017 team also tried to finish the survey of Cueva No Se Grande at La Camotera down an unplumbed pit, but was thwarted by high carbon dioxide levels. So far, over 140 caves have been recorded in the area, with over 80 surveyed to completion. More details can be found on the Proyecto Laguna de Sanchez Facebook page and website (www.garot.com/LdeS). *Source*: Jim Kennedy.

After a couple of decades of inactivity, the revitalized Proyecto Minas Viejas has led three annual expeditions to Rancho Minas Viejas. Efforts have focused on the almost 500-meter-deep Pozo de Montemayor, pushing unmapped leads and dome climbing. The entire front of the cave before the Rebirth Canal, a seasonal sump, has been rerigged with rebelays and remapped, since the original survey notes were unfortunately lost. A planned five-night in-cave camp this past November was cut a bit short by water in the sump, which had been dry the previous year. Nevertheless, a successful climb above the sump discovered a possible bypass that still needs some enlargement and another revealed extensive walking passage in the Almond Butter Borehole. Besides the usual tourist trips into Cueva de Cuchillo and the namesake abandoned mines, surface teams also documented 105 previously-unreported caves and karst features, mapping a half-dozen of them. They also captured the first drone footage inside Cuchillo and some aerial video from a powered paraglider. The next expedition will be over the Thanksgiving week this year. Source: Jim Kennedy.

OAXACA

Proyecto Espeleológico Sistema Huautla's PESH 2017 Expedition ran the month of April near Huautla de Jiménez, Oaxaca, Mexico. Underground camps were used two times each in La Grieta, Camp 3 upstream in the Refresher and Camp 4, 600 meters deep, an area not visited in 40 years. Doo Dah Dome was climbed by Mike Green, Brian Gindling, Elliot Stahl, and Damien Lebrun-Grandié from Camp 4 up 30 meters, where passages pinched down, and a new dome, Hoo Hah Dome, was climbed

Andreas Klocker looking at the most upstream end of the Huautla resurgence, with the flow coming out of a small flowstone restriction. *Chris Jewell*. by Stephen Gladieux and Johanna Kovarik over 40 meters high and still goes.Also, 600 meters of cave was surveyed from Camp 4 by Kyle Lassiter, Adam McLeod, Matt Tomlinson, and Lee White, with leads remaining.

Exploration and mapping from Camp 3 in the Upstream Refresher resulted in up-trending passages, which suggested the surface was near in more than one place. Over the course of two 10- to 12-day camp pushes, cavers Gilly Elor, Derek Bristol, Fernando Hernandez, Zeb Lilly, Katie Graham, Andreas Klocker, Adrian Miguel-Nieto, Geraldo Morrill, and Galen Falgout climbed and surveyed 1.8 kilometers north from the 2016 limit of exploration. Exploration terminated when the upward-trending passage ended in what appeared to be the inside of a collapsed sinkhole showing signs that the surface was near, such as leaves, roots, and surface insects. While no new entrances where discovered, the 2017 push up the Refresher increased the depth of the La Grieta section of Sistema Huautla to 958 meters, and continued to extend the northern limit of the entire system.

Exploration and mapping were also done in Nita N'tau and Nita Tienzo (Goat Cave). The former has more work to do in it, with hopes of connecting it to Sistema Huautla, which lies only 200 meters beneath it, whereas the latter is nearly finished and did not go much deeper. Survey also continued in Big Wind Cave, and it still has possibilities; a connection with Nita Nanta would add depth to Sistema Huautla.

Precise locations for Sótano de Agua de Carrizo and Cueva de Agua Carlota were taken with sophisticated GPS instruments.

Much community awareness outreach was done again, with presentations given to community groups, schools, and an invitation-only event put on by the local government to celebrate 50 years of caving in the Huautla area. New karst areas were visited with entrances seen and contacts made.

Sistema Huautla is now 78.3 kilometers (49.6 miles) in length and remains 1560 meters in depth, the deepest cave in the Western Hemisphere, eighth deepest cave in the world, and the longest of the 17 deepest caves in the world. *Source*: Bill Steele.

In 2016, an international team of cavers returned to the Huautla resurgence with the goal to work towards linking the resurgence with the farthest downstream sump, sump 9, known as The Mother of all Sumps, in Sistema Huautla (see the article elsewhere in this issue). On this trip the team found their way on beyond where Jason Mallinson and Rick Stanton had reached in 2001 and found large dry-cave passage, but could not locate the way









PESH 2017 EXPEDITION

Clockwise from upper left:

Josh Hydeman and Lee White in Camp 1.5 in the La Grieta section of Sistema Huautla. Photo by Adam Haydock.

The village of Plan Carlota. Drone shot by Chris Higgins.

Easter Sunday community event in Huautla honoring fifty years of area caving. Photo by Diana Tomchick.

150-meter TAG Shaft in Nita N'Tau. Photo by Chris Higgins.



on underwater. [The 2001 diving is described on page 63 of *Activities Newsletter* 25.]

In 2017, Andreas Klocker (AUS/ AUT), Zeb Lilly (USA), Matt Vinzant (USA), Gilly Elor (USA), Chris Jewell (UK), Connor Roe (UK), and Maxwell Fisher (UK), supported by Alejandra Mendoza (Mex.) and Ernie Garza (USA), returned to continue exploration. On this trip they explored and mapped approximately 1.5 kilometers of fossil dry cave, some of this decorated with the most amazing formations ever found in Sistema Huautla. These passages were located at the northernmost end of exploration, and hence it was hoped that these passages could open the way towards Sistema Huautla, but sadly all passages finished in small muddy holes at their northern ends.

Much effort was also put towards exploring several sumps found throughout the dry cave passage. After last year's exploration, it seemed like most of the water flow came through a small flowstone restriction, and it was hoped that these additional sumps might bypass this restriction. Nevertheless, the farthest upstream sump, which might be an overflow to this restriction, ended in a very tight bedding plane, too small for a diver to continue. So while amazing cave was explored on this trip, a passable way north toward Sistema Huautla was not found. Source: Andreas Klocker.

The three large maps, nicely drafted by Derek Bristol, illustrate the northern portions of the La Grieta part of Sistema Huautla that were described in the PESH 2016 article on pages 25–43 of *AMCS Activities Newsletter* 39. They were not available when that issue was prepared. They appear here in the order north to south. *Source*: www .peshcaving.org.

Abstract: A New Genus and Species of Blind Sleeper (Teleostei: Eleotridae) from Oaxaca, Mexico: First Obligate Cave Gobiiform in the Western Hemisphere, by Stephen Walsh and Prosanta Chakrabarty.

Caecieleotris morrisi, new genus and species of sleeper (family

Eleotridae), is described from a submerged freshwater cave in a karst region of the northern portion of the State of Oaxaca, Mexico, Río Papaloapan drainage, Gulf of Mexico basin. The new species represents the first cave-adapted sleeper known from the Western Hemisphere and is one of only thirteen stygobitic gobiiforms known worldwide, with all others limited in distribution to the Indo-Pacific region. The new taxon represents a third independent evolution of a hypogean lifestyle in sleepers, the others being two species of Oxyeleotris (O. caeca and O. colasi) from New Guinea and a single species, Bostrychus microphthalmus, from Sulawesi. Caecieleotris morrisi, new species, is distinguished from epigean eleotrids of the Western Atlantic in lacking functional eyes and body pigmentation, as well as having other troglomorphic features. It shares convergent aspects of morphology with cave-dwelling species of Oxyeleotris and B. microphthalmus, but differs from those taxa in lacking cephalic pores and head squamation, among other characters. Description of C. morrisi, new species, brings the total number of eleotrid species known from Mexico to twelve. Seven of these, including the new species, occur on the Atlantic Slope.

Source: Copeia, vol. 104, no. 2, pp. 506–517, 2016, http://www.bioone. org/doi/10.1643/CI-15-275. The full article is available only by subscription, but technical descriptions of the new genus and species are at http:// plazi.cs.umb.edu/GgServer/html/ 038B8795EF2DFF90794722E1D76CF EC0 and http://plazi.cs.umb.edu/ GgServer/html/038B8795EF2DFF9 B7A142350D115FEFD (It sure would be nice if people didn't name files that way. Some links can't just be clicked.) The species was described from specimens collected in April 1995; the cave has been submerged by Presa Miguel Alemán.

A press-release version of the above entry:

Researchers have described a new genus and species of cavefish from Mexico—the Oaxaca Cave Sleeper. It has not been collected or seen in more than twenty years and lives in a cave system threatened by damming. Less than 0.5 percent of all fish species are cave-adapted, and most of them are endangered because their cave habitats are limited and vulnerable to environmental threats.

This new species, *Caecieleotris morrisi*, is a sleeper goby in the family Eleotridae and is the first cave-adapted member of this group to be found in the Western Hemisphere. All previous cave-adapted members of this family are from the Indian Ocean.

There are only thirteen known individuals of this new species, which were all taken during one collecting event. The researchers examined and compared them to other known species and ultimately created a new genus for the species, because it does not resemble other known sleeper gobies. The Oaxaca Cave Sleeper is morphologically adapted to the cave environment. It does not have eyes or pigment, but it has a shovel-shaped head and well-developed sensory papillae, which contain its taste buds. Curator of Fishes at the LSU Museum of Natural Science Prosanta Chakrabarty and U.S. Geological Survey Research Fish Biologist Stephen Walsh discovered and described the Oaxaca Cave Sleeper. Their research was published in *Copeia* this month. Chakrabarty presented a TED talk on this research recently.

Individuals of this new species have been kept preserved in natural history collections for more than twenty years, waiting to be described. Despite being potentially extinct, natural history museums saved this new species from being completely unknown. This new species calls attention to the importance of natural history museums like the LSU Museum of Natural Science.

Source: http://m.phys.org/ news/2016-06-sleeper-goby-cavefish-western-hemisphere.html, called to our attention by Jerry Atkinson.

Abstract: Challenges of Cave Access and Conducting Speleology in Huautla de Jiménez, Oaxaca, Mexico, by Bill Steele.

The discovery of and the first rappel into an entrance of what is now called Sistema Huautla occurred 50 years ago this year. Since that time







and through much work the cave has 20 entrances, is the deepest cave in the Western Hemisphere, the eighth deepest in the world, and the longest of the seventeen deepest caves in the world. Following the 2016 expedition, it is 1560 meters (5117 feet) deep and 75.5 kilometers (46.9 miles) long. Proyecto Espeleológico Sistema Huautla was organized in 2013 as the restarted project to conduct annual month-long expeditions to this area for ten years. The 2016 expedition was the third of these.

One of PESH's goals is to gain access to all the entrances in the Sistema Huautla karst drainage system. This is difficult in some areas due to the local residents being Mazatec indians with ancient beliefs about cave spirits residing in the caves and a historic mistrust of outsiders. Another of PESH's goals is to support the work of Mexican cave scientists. PESH is making progress with community relations through the strategies of good localgovernment relations, brochures about the project in Spanish and Mazateco, presentations about the caves in schools and to community groups, and by consulting a curandero, who conducted a ceremony with the cavers to get things right with the cave spirits. The ceremony involved copal incense, beeswax candles, cacao beans, prayers in Mazatec, and the sacrifice of a turkey that was dropping into a 200-foot-deep pit.

Source: 2016 NSS Convention Program Guide, pp. 76–77.

Bill Steele has recorded video talks about the 2016 expedition of Proyecto Espeleológico Sistema Huautla for sponsor Whole Earth Provision Company. The talks are mostly just speeches, but Steele is a good speaker, and there are a few photos shown briefly. The talks are on vimeo at

https://vimeo.com/159258215 (pre-expedition)

https://vimeo.com/168219582 (post-expedition part 1)

https://vimeo.com/170531116 (post-expedition part 2)

https://vimeo.com/171951021 (post-expedition part 3).

There is also a single talk on the 2015 PESH expedition at

https://vimeo.com/135992593.

British caver Andy Chapman recorded interviews with several cavers during the Huautla expedition in 2016. They are on his YouTube channel at https://youtube.com/ channel/UCmefyvr6AVX5xECD8S vHZUg.

Abstract: Proyecto Espeleológico Sistema Huautla Update, by Tommy Shifflett and Bill Steele.

Proyecto Espeleológico Sistema Huautla is an NSS Project. The PESH 2016 expedition was the third expedition of a planned ten with goals to explore and map Sistema Huautla to over 100 kilometers of passage, extend the depth to a vertical mile, plus explore and map all caves within the drainage basin and support Mexican cave scientists in studying the geology, paleontology, biology, and other speleological disciplines.

The presentation will cover focused exploration in the La Grieta section of Sistema Huautla to push the northern limits of the system. We used the EOS Arrow 100 GPS receiver and Laser Tech's TruePulse 360R for locating cave entrances to much better accuracy than what previous efforts had been able to achieve. The 50-year history of cave exploration in Huautla will be covered, as well as the comprehensive community-outreach program, the discovery of the first complete intact skull of the Pleistocene sloth Megalonyx jeffersonii found in Mexico, the discovery of 3.5 kilometers of new cave passages, bringing the length of Sistema Huautla to 75.4 kilometers (46.9 miles), increasing the depth of 1,560 meters, and the dynamics of forty-six people from five countries operating in a remote and isolated Indian village in southern Mexico.

Source: 2016 NSS Convention Program Book, p. 92. Extensive material on this expedition appeared in AMCS Activities Newsletter 39.

Abstract: Expedition Cerro Caballero, San José Tenango, Oaxaca, Mexico, by Ron Adams and Tony Akers.

The purposes of the Proyecto Sierra Mazateca Corporation are to protect, explore, and study the karst ecosystem and promote water conservation and Mazatec culture preservation within the Sierra Mazateca in the state of Oaxaca, Mexico. After last year's expedition to Rancho Arco Iris, we switched a little farther to the northeast and began our hike in the small town of Cerro Caballero. Two weeks spent up in the cloud forest were fruitful and fun, complete with a jungle-camping experience and an enthusiastic group of cavers. We explored areas at several elevations, established a new trail system, and laid the groundwork for continued exploration. A total of 650 meters of vertical depth was both documented and photographed, utilizing experiences riggers and four different sketchers for the surveys. A new members, Thomas Hawkins, a botanist and horticulturalist, documented the area's botanical treasures. The expedition was possible due to our friendship and the support of Sergio, Jorge, and the family in Cerro Caballero, providing water and protection.

Source: 2016 NSS Convention Program Book, pp. 92–93.

Abstract: Huautla Resurgence Cave 2016 Expedition, by Zeb Lilly.

Huautla Resurgence Cave, located in the Río Santo Domingo canyon, Oaxaca, Mexico, is the proven water resurgence for Sistema Huautla, located high in the mountains above. Sistema Huautla is currently the deepest cave in the Western Hemisphere at 1560 meters. A connection between Sistema Huautla and Huautla Resurgence Cave would make the system more than 1750 meters deep and cover yetundiscovered 8 kilometers of cave passage. With nearly all known passage located underwater, the cave was previously explored in 1994,, 1995, and 2001 [see AMCS Activities Newsletter 25, pages 57 (map) and 63]. This left the cave at 1.05 kilometers long and required dives to 65 meters of water depth to reach the end of exploration.

In March and April of 2016 an international expedition with cave divers from Australian, England, and the U.S. established a base camp in Santa Anna Cuauhtémoc and spent a month continuing exploration of the cave using closed-circuit rebreathers. Through a series of dives, the cave was relined and pushed to over 2.2 kilometers with significant underwater and above-water discoveries. The above-water discoveries include 800 meters of passage, including some highly decorated formation areas. Both air-filled and underwater leads remain.

Source: 2016 NSS Convention Program Guide, p. 93.

Abstract: Proyecto Espeleológico Sierra Mixteca, by Adrián Miguel-Nieto and Lourdes Gómez Estrada. Between 2011 and 2015 the Speleology Section of the Asociación de Excursionismo y Montañismo de Instituto Politécnico Nacional (AEMIPN) has made four explorations in the center of the district of Tlaxiaco, Oaxaca. Eighteen caves were located and 50 percent have





been surveyed. Four mayor caves are Sistema Mixteco, Cueva del Laberinto, Sótano del Sonadero and Resurgencia de San Pedro Molinos. The study area has karst potential, so that we will continue the Proyecto Espeleológico Sierra Mixteca with the main objective to explore caves.

Source: Mundos Subterráneos 27, English abstract to article on pages 39–46, September 2016.

Jè xá xi chjònangiyai jin

• Je nkjìn chj<u>o</u>t<u>a</u> tjiófa'as'en jin

xi n'ión nda mal<u>e</u> fásjaiya, 11 n<u>axi</u>nandá y'ai k<u>ao</u> chj<u>ota</u> chj<u>ine</u> xi Mèjik<u>o</u> ts'<u>e</u>, jè xi tjiókàť a jin k'<u>ui</u> k'<u>ui</u> jme xi chon k<u>ao</u> jme xi tjín y<u>a</u> ya ng<u>ajao</u>.

- Je xá xi kjima kui ní nga kàta'yale jokji nanga tix'a kao jokji ndo kijna je ndiá nitjan xi tix'a ngi 'nde, tís'esjai sa ngajao kao jña tix'angi xi tiya majngokjao ni.
- Jè chj<u>ota</u> xí kj<u>oa</u>bijnachon kòt'ayà jin k<u>ao</u> xi kòt'ayà jin nindal<u>e</u> ch<u>o</u> xi kis'e ngas'<u>a</u>, kjoan tejaò jk<u>o</u>ya tondsò'o kisokole xi t<u>o</u>

s'<u>a</u> tsa'yaxkonl<u>e</u> xi y<u>a</u> tjín y<u>a</u> ya n<u>i</u>tj<u>a</u>n, k'<u>oa</u> t<u>i</u> jngo ch<u>o</u> na'yá xi kjie 'ya xi bexkon sa'nda nd'<u>ai</u>. K'<u>oa</u> t<u>i</u> koansjai nindal<u>e</u> jngo ch<u>o</u> xi ño ma nds<u>oko</u>, xi ya ts'<u>oa</u> n<u>ale</u> majcháya, jngo ch<u>o</u> xi kis'e n<u>i</u>txjin jcháa, n'ión n<u>i</u>txjin kjoatse.

 Je chj<u>ota</u> xi kòť ayà jin jos'ìn nìjchá yaoná xi chj<u>ota</u>á k<u>ao</u> xi kòť ayà jin jos'ìn b'anjtaìya jo kjimachon so'nde, tjiósíxá k<u>ao</u> chj<u>ota</u> xi <u>i</u> ts'<u>e</u>, tjiókjònangiya kj<u>oa</u>makjaín xi tjín nd'<u>ai</u> k<u>ao</u> kj<u>oa</u>makjaín xi kis'e ngas'<u>a</u> tats'<u>e</u> n<u>itja</u>n Ni'yá.

	CAVIDAD	DESNIVEL (m)	DESARROLLO (m)		
1.	Tunchi Cuates	-135	400	-٦	Sistema Mixteco
2.	Tunchi Yucha Lúli	-116	291	F	-152 m, 773 m
3.	Tunchi Nduà Yunu	-46	82		
4.	Tunchi Tini Ichi	-120	533		
5.	Resurgencia de San Pedro Molinos	+10	148		
6.	Sócó Sau	-33	104		
7.	Tunchi Nu'ijni	-13	14		
8.	Tunchi Yunu Tichi	-3.7	3.7		
9.	Tunchi Kava Janù	0	30		
10.	Sócó Vaja				
11.	Tunchi Cama I				
12.	Tunchi Cama II				
13.	Sócó Yi'i				
14.	Tunchi Pacheco	Pendiente topografia			
15.	Tunchi Yuú Yaxi				
16.	Tunchi Ve'e Vau				
17.	Tunchi de las Escalas				
18.	Tunchi de Benito Juárez				

- Jè chj<u>ota</u> xi kòťajin y<u>a</u> jin nangi, tjiókjònangiya k'<u>oa</u> tjiób'éťax<u>on</u> jos'ìn t<u>ix'a</u> ngitxj<u>oa</u> so'nde k<u>ao</u> jos'ìn tífa'a nandá xi y<u>a</u> kijnaya nindo, kui ní nga sk<u>ue</u> sa jña sa t<u>ix'a</u> ngitxj<u>oa</u> k<u>ao</u> jña tsaokjaol<u>e</u> xínkjín nd<u>i</u>á n<u>itja</u>n.
- Jè chjota xi b'ètsomaya nitjan tjiókòť ayàkao tsojmì xi s'a chjotse jokjoan xi síchjén, k'oa ti tjiófásjaile kjoamàña jos'în nga ngìsa nda kjoasjaiya.

Source: Part of the Mazateclanguage version of the 2016 PESH expedition brochure translated into Mazatec by Javier García Martínez. The English original follows.

- Our multinational research team
 is staffed with accomplished explorers and respected scientists from 11 countries to carry out the highly technical expedition field work.
- is documenting each season's discoveries of new caves and linked passages that continue to extend the known length of the cave system.
- has biologists and paleontologists that have discovered 12 new species of cave spiders, a previously unknown troglobitic scorpion, and



a treasure tove of ancient bones, including Pleistcene mammals.

- has anthropologists and archaeologists who are working with the local villages to research both past and present Mazatecan beliefs about the Huautla caves.
- has geologists surveying and mapping the complex geology and hydrology of the area, using their discoveries in the search for new passages and connections between caves.
- continues to test innovative equipment and develop new techniques that assure the continued success of the project.

A model that combines the whole aquifer and conduit-based approaches might lead to important new understanding about heat transport within karst massifs. Intriguing clues are provided by a water-temperature time-series from Sistema J2, Oaxaca, Mexico. The data were recorded near a depth of 1100 meters, which is well below the zone of thermal variability, and the system is recharged autogenically. Nevertheless, during the wet season (June-October) the cave stream exhibits relatively complex temperature dynamics with a total amplitude of about 1°C. There is a gradual warming pattern associated with the wet-season recharge, which occurs during the local summer. Most storm events produce short, cold temperature pulses that precede a larger warm pulse with a relatively linear recession. These patterns may indicate an interplay between vertical thermal profiles and the introduction of warm-rechargeevent water. As an event begins, cold high-elevation water is brought more quickly to depth; however, the warm-event water ultimately warms the conduits sufficiently for the heat to penetrate to great depths. The gradual warming pattern may indicate aquifer warming over the wet season that results from the frequent warm recharge. Source: Extract from article Consider a Cylindrical Cave:

Temperature time-series from near Camp 3 in Sistema J2 at a depth of approximately 1100 meters demonstrates a complex varibility with time throughout the wet season.





a Physicist's View of Cave and Karst Science, by Matt Covington and Matija Perne, *Acta Carsologica*, vol. 44, no. 3, pp. 363–380, 2015.

The only report so far from the spring 2017 expedition to Sistema Cheve is that it has gotten slightly deeper due to a promising dig that warrants a return. Also, a new cave in the area, CL6, is now 435 meters deep and was left going in 50-meter-diameter passage. *Source*: Corey Hackley.

PUEBLA

Abstract: Sistema Tepetaxtli, Nuevos Descubrimientos, by Adrián Miguel-Nieto, et al. In April 2015, members of the Speleology Section of the Asociación de Excursionismo y Montañismo de Instituto Politécnico Nacional (AEMIPN) surveyed the Sótano Tepetlaxtli 3, which has a depth of 269 meters and 809 meters of development. The connection with Sótano Tepetlaxtli 1 and 2 has not been located yet. However, the Sótano Tepetlaxtli 3 is an important input to the local karst-water system. The complete exploration of Sistema Tepetlaxtli is not finished.

Source: Mundos Subterráneos 27, English abstract to article on pages 47–52. The issue is online at http:// www.mexicancaves.org/other/ mundos27.pdf. Entrance to OZ20, 3430 meters long and 270 meters deep, explored by the GSAB during the Poblanus 2014 expedition. *Gaëtan Rochez*.

Abstract: Timing of speleogenesis of Las Karmidas Cave (Mexico): first description of pseudokarst developed in ignimbrite, by María del Pilar Allaga-Campuzano, et al.

Las Karmidas Cave (Puebla State, Mexico) is an unusual type of pseudokarstic cavity generated by piping and erosive processes within the contact of a diamicton and an overlying Quaternary ignimbrite. Morphological evidence suggests that the cave was developed in two stages: a phreatic stage and a vadose stage. The latter was characterized by the formation of carbonate speleothems. The absolute upper-age limit for the cave (168 + 7.1/-7.5 ka)was established by U-Th dating of zircons grains extracted from the overlying ignimbrite, while a minimum age for the transition from a phreatic to vadose regime (95.6 ± 2.1) ka) was constrained by U-Th dating of carbonate speleothems within the cave. The geochronological results indicate a very rapid evolution of this pseudokarstic system, and suggest that similar systems might evolve and degrade at a very fast pace, consequently making them hard to be preserved. Despite this, and considering the rather common geological context in which this system was developed, it is likely that similar pseudokarstic systems are yet to be detected worldwide.

Source: International Journal of Speleology, volume 46, number 3, 2016. Full article is at http://scholarcommons.usf.edu/cgi/viewcontent. cgi?article=2097&context=ijs.

There is a slide show on the Ancho 2016 expedition of the Groupe Spéléo Alpin Belge to Oztopulco, Zoquitlán Puebla, at http://www. leshorizonscaches.be/galerie/Ancho2016/album/index.html#. All of the photos are surface shots. *Source*: Mark Minton.

A web page of the Groupe Spéléo Alpin Belge at https://sites.google .com/site/speleogsab/speleometrie





Chronology of the Exploration

- 1965 First US cavers arrive in Huautla. Surprised at the presence of American hippies there for magic mushrooms. The road to Huautla has just been completed.
- **1966** The discovery of the first two entrances of what is now Sistema Huautla. The first entry into one of them, Sótano de San Agustín, is made by cavers from Austin, Texas.
- 1967 Sótano del Río Iglesia is explored to be the deepest cave in the Western Hemisphere by Canadian cavers using an underground camp.
- 1968 Sótano de San Agustín surpasses Río Iglesia in depth and becomes the deepest known cave in the Western Hemisphere. This exploration was done by a joint Canadian/US team camping at a depth of 300 meters.
- 1971 The Mexican army deports the hippies from Huautla and sets up a road block to not allow foreigners access.
- 1976 The road block is now an army checkpoint and access is allowed with the proper documents. An underground camp is used 500 meters deep in Sótano de San Agustín to check to see if there is more to explore. A major discovery is made and a roaring water gorge is discovered leading to a depth of over 700 meters.
- 1977 Three expeditions occurred this year with many discoveries and the exploration of La Grieta. The Lower Gorge in Sótano de San Agustín is discovered and explored/mapped to a deep water, water-filled tunnel at -861 meters below the entrance.
- 1978–79 Major expeditions annually, discovering the immense Anthodite Hall, half again the size of a US domed stadium, and many kilometers of new passages.
 - 1980 A historic expedition and the first time the flag of The Explorers Club is carried. A cave found in late 1979 becomes the 7th and the first cave outside Europe to be explored over 1,000 meters deep. Mazatec names are given to new caves. Li Nita is connected to Sótano de San Agustín and a new name is given to the now inter-connected system of deep caves: Sistema Huautla.

- 1981–85 Annual expeditions continue, adding descending routes and integrating more deep caves to Sistema Huautla.
 - 1987 The highest entrance found to date, Nita Nanta, which was pushed for seven years, is connected to Sistema Huautla from the Sótano de San Agustín section by a cave dive. The resulting additional depth ties Sistema Huautla with the second deepest cave in the world. An amazing discovery is made not far inside Sótano de San Agustín's entrance of a main route to the Upper Gorge of the lower part of the cave system.
- 1988-89 Expeditions carry the flag of The Explorers Club and a 16 mm movie is shot. The movie is available on the Internet by the name "Huautla: The Mexican Cave".
 - 1990 New discoveries in and resurvey of Sótano de Agua Carlota make it the latest 500-m deep cave in Huautla.
 - **1994** A major expedition which results in the deep "sump", or water-filled tunnel discovered in 1977 at the lowest point in Sistema Huautla, being explored and air-filled passages discovered on the other side. A fatality occurs with a British cave diver drowning during a dive. Bill Stone and Barbara am Ende camp beyond the sump and explore and map ahead until they reach Sump 9, which they also call "The Mother of All Sumps". The book "Beyond the Deep" is about this expedition.
 - 2001 Climbs made in Sótano del Río Iglesia and Cueva de San Agustín searching (unsuccessfully) for the active underground Río Iglesia water.
 - The Sótano del Río Iglesia Expedition succeeds in connecting Iglesia to Sistema Huautla, adding three more entrances for a total of twenty.
 - 2013 A major British-led expedition goes to Sump 9 and using mixed gases two divers dive 80 meters deep, reestablishing Sistema Huautla as the deepest cave in the Western Hemisphere. US cavers and Huautla caving veterans since the 70s Tommy Shifflett and Bill Steele join the Brits and decide to organize Proyecto Espeleológico Sistema Huautla (PESH).
- 2014-16 Three of a planned ten PESH annual expeditions take place. PESH expeditions support Mexican cave scientists and biologists and paleontologists make important discoveries. The La Grieta section of Sistema Huautla sees renewed attention and the cave system is extended to the north for the first time in 35 years.

contains a list of the caves explored by that group in their area in Puebla and Veracruz through December 2016. The deepest caves, all in Puebla, are Akemati, 1226 meters, Sistema Akemabis-Santito, 1182 meters, and Sistema Ocotempa, 1070 meters. *Source*: Mark Minton.

There are PDF files of articles in French from *Regards* numbers 79 and 81 at https://sites.google. com/site/speleogsab/home on the Groupe Spéléo Alpin Belge's expeditions in 2014 and 2015. The first article, by Richard Grebeude with photographs by Gaëtan Rochez, covers the Groupe Spéléo Alpin Belge expedition Poblanos 2014, and the second covers Pasilla 2015, also by Grebeude but with photos by Gustavo Vela. The 2015 map of Sistema Tepetzala and nearby caves is from the Pasilla article. There is an article on the GSAB Chile Ancho 2016 expedition in AMCS Activities Newsletter 39, and number 38 contains a short summary of the 2015 trip in "Mexico News" and a collections of photographs from that trip, all by Gustavo Vela.

Prosecutors say a couple and their son were killed during an Easterweek visit to a cave in central-east Mexico that is popular with tourists. The Puebla State Attorney General's Office said in a statement yesterday that prosecutors believe robbery was the motive for the killings in the picturesque mountain region. The statement did not reveal the names or nationalities of the victims who were killed in the Chivostoc cave in Cuetzalan municipality by unknown assailants who shot them and took their belongings. It also did not specify the date the crime occurred. Also known as the devil's cave, the spot is the subject of many legends and is a popular tourist attraction in the mountainous zone of Puebla state near the border with the state of Veracruz. Source: April 16 post at http://www.outlookindia.com/ newsscroll/family-killed-duringvisit-to-cave-in-centraleast-mexico/1029634, called to our attention by Jerry Atkinson.

From February 13 to March 13,

2016, the Groupe Spéléo Alpin Belge had its annual expedition to the Sierra Negra. There were twelve participants from Belgium, three from France, and two from Mexico. Despite several days of hard rain and flooding in the caves, exploration went well, along with much good fellowship. They explored more than 5 kilometers of new passages, mostly in Cueva Piedra Rosetta, which had been explored the previous year to -300 meters. A new higher entrance, named Anabel Flores Salazar, dropped into Rosetta by a 70-meter shaft. This made Cueva Piedra Rosetta 672 meters deep and over 6 kilometers long. They decided to set up a bivouac at -300 meters to facilitate exploration.

In addition, there were several trips to Cueva Mosquito Belga, which reached -250 meters and continues toward the Tepetzala system.

They found a cave near the base camp, Cueva Aperitivo, that went to –100 meters and continues toward the Evalhuastle system.

In the last days of the expedition, a connection was found between Rosetta and Tepetzala. Now the Tepetzala system is 849 meters deep and nearly 29 kilometers long. Good leads remain for 2017. *Source*: Gustavo Vela.

The Tzontzecuiculi Expedition 2017 took place in the Sierra Negra from April 10 to 25 with the participation of eleven people: six Mexicans, four Spanish, and one Australian.

The first two weeks were devoted to finding new cave entrances in the upper part of this karst massif from a base camp at 2,300 meters elevation, as well as an advance camp at 2,700 meters, a three-hour hike along a terribly bad path. This bivouac was set up with the objective of continuing to look for caves in one of the most remote and steepest sections of the mountain. Because there is no water source, we improvised two ways



Marta Candel descending Sótano Marcelino during the 2017 Tzontzecuiculi expedition. *Gustavo Vela.*

of capturing water, one by using a tarp to collect vital raindrops and the other by collecting drips in a small cave. This problem having been solved, three groups went up to continue with prospecting left over from 2014. We hiked through numerous dolines and valleys, and we almost reached the top of Tzontzecuiculi, but unfortunately no cave was found.

Meanwhile, other groups set out from base camp to look for new caves in the eastern part of the mountain, also about a three-hour hike along a path made exceedingly difficult due to overgrown bushes, tall grass, and rocks that move or break when you step on them. At 2,500 meters elevation, the team reached another very remote point on the mountain, where no human had probably ever set foot. Three little pits were checked, 8 meters, 12 meters, and 45 meters deep, unfortunately none went.

On some days, we hiked to nearby places to check out interesting features, with the same result: no new cave. We also had bad weather, thereby losing a couple of days of work.

The only interesting discovery was a pit we were shown at an elevation of 1,900 meters. We descended about 80 meters and turned around at a small window with some air. It is worth mentioning that the pit is located above the extensive Tepetzala and Coyolatl systems, which means that with some luck it could connect with those caves, but let's see what happens in the future.

This expedition marks the seventh season searching for caves on Tzontzecuiculi mountain. Even though we've found some rather large caves, the norm has been to find nothing. For some reason we don't understand, most of the sinkholes are choked, and the caves or pits that we enter are full of rocks and plugged. The whole massif is karst, but we believe that there must be some impermeable rock below that thwarts downward progress.

Here are the project's most important caves that have been explored and that no longer continue: Paisano, -638 meters, Tío Chueco, – 587 meters, Ventanas, – 439 meters, Sótano de los Picos, –382 meters, Galán, –257 meters, and Doncella, –188 meters. We'll be back. *Source*: Gustavo Vela Turcott, translated from Spanish by Yvonne Droms.

QUINTANA ROO

The Water Planning Laboratory at the University of British Columbia is preparing a research proposal regarding the cenotes of Quintana Roo. The proposal will create a community monitoring program in the cenotes of Quintana Roo by strengthening current monitoring activities and by providing training for citizens to allow them to collect data for bacteriological monitoring. Our aims are to build capacity in the community regarding water-quality monitoring, to create new data on water quality in the studied cenotes, and to evaluate the impact of community monitoring in watershed management. Approximately one to two hundred accessible cenotes at risk will be divided into "treatment" and control cenotes, and the effectiveness of community monitoring by citizen groups will be evaluated.

This project will be a collaboration

between CONAGUA, Global Water Watch, OMCA (Organización Mexicana de Conservacion del Medio Ambiente Alternativa), and UBC. The project group speaks both in English and Spanish.

Source: March e-mails from Claudio Pareja and Jordi Honey-Rosés at water.planning@ubc.ca.

In February 2015, members of the Czech and Slovak Speleological Society continued their project of exploration and documentation of underwater cave systems on the Yucatan Peninsula. The project has been running since 2003. They focused on the exploration of new cenotes discovered in 2014 located about 4 kilometers north of the K'oox Baal cave system. In two weeks, they discovered 4 kilometers of new corridors and connected four cenotes, Cenote Tu, Cenote Nauatilostotl, Cenote Paachil Nah, and Cenote Beh et Óax Ha, into a single system named Paachil Nah, now 5, 271 meters long. Two more cenotes were explored in the area. The first one, Ash Puk, is now 650 meters long, and the second, named Carita, is 350 meters long. Source: English abstract to paper "Xibalba 2015—Beyond the Gate of Dreams," by Zdeněk Motyčka and Daniel Hutňan, Speleofórum 35 (2016), pp. 70–72, 140–142.

Abstract: An Optical Laser Device for Mapping 3D Geometry of Underwater Karst Structures: First Tests in the Ox Bel Ha System, Yucatan, Mexico, by A. Schiller and P. Renard.

In the course of extended hydrological studies in the coastal Karst plain of Yucatan, near the town of Tulum amongst others, a novel laser scanning device was developed and applied for the acquisition of the 3D-geometry of ground water conduits. The method is derived from similar industrial systems and for the first time adapted to the specific measurement conditions in underwater cave systems. The device projects a laser line over the whole perimeter at a certain position. This line represents the intersection of a plane with the cave walls. The line is imaged with a wide-angle camera system. Through proper design and calibration of the device it is possible to derive the true scale geometry of the perimeter via special image processing techniques. By acquiring regularly spaced images it is possible to reconstruct the true scale and 3D shape of a tunnel through the incorporation of location and attitude data. In a first test in the Ox Bel Ha underwater cave system, about 800 meters of tunnels have been scanned down to water depths of 20 meters. The raw data is further interpolated using the ODSIM-algorithm in order to delineate the 3D geometry of the cave system. The method provides easy, operable acquisition of the 3-D geometry of caves in clear water with superior resolution and speed and significantly facilitates the measurement in underwater tunnels as well as in dry tunnels. The data gathered represents crucial input to the study of the state, dynamics and genesis of the complex karst water regime.

Source: Boletín Geológico y Minero, v. 127, no. 1, pp. 99–110 (2016). Free PDF of article is at www.igme.es/ boletin/2016/127_1/BG_127-1_Art-7.pdf.

Abstract: The Sac Actun System, Quintana Roo, Mexico, by P. N. Kambesis and J. G. Coke IV.

The Sac Actun system, located in northeast Quintana Roo, Mexico, is among the most extensive underwater cave systems located along the Caribbean coast of the Yucatan Peninsula. The cave is composed of linear phreatic conduits that have two forms. The coastal sections of the Sac Actun system are characterized by low horizontal tunnels that form mazes paralleling the coast and rudimentary conduits broken by fracturecontrolled rooms. Inland passages are fault/fracture controlled, have a linear, anastomotic configuration, and align perpendicular to the coast. Access to the cave system is gained through cenotes that are the portals into the Yucatan underwater cave systems. The occurrence of drowned speleothems in many parts of the cave system and sections of air-filled upper level passages are indicative of major fluctuations in sea level. The Sac Actun system is part of one of the most extensive and significant eogenetic karst aquifers in the world. The development of the Sac Actun





system, as well as the many other caves systems along the Yucatan Caribbean Coast, is controlled by the coastal hydrologic regime, driven by glacio-eustatics, and influenced by stratigraphic and structural controls. The karstic permeability of the aquifer makes it and the Sac Actun system vulnerable to the anthropogenic impacts of increased population growth, quarries, and infrastructure development associated with the burgeoning tourist industry that dominates land use in the region.

Source: *Boletín Geológico y Minero*, v. 127, no. 1, pp. 177–192 (2016). Free PDF of article is at www.igme.es/boletin/2016/127_1/BG_127-1_Art -12.pdf.

An extremely nerdy paper on processing data from airborne electromagnetic surveys for underwater passage in the Sian Ka'an biosphere reserve appears in *Boletín Geológico y Minero*, v. 127, no. 1, pp. 7-19 (2016). Free PDF of article is at www.igme.es/boletin/2016/127_1/ BG_127-1_Art-1.pdf. We'll spare you the abstract.

Abstract: Fractal Dimension, Walk Dimension and Conductivity Exponent of Karst Networks around Tulum, by Martin Hendrick and Philippe Renard.

Understanding the complex structure of karst networks is a challenge. In this work, we characterize the fractal properties of some of the largest coastal karst network systems in the world. They are located near the town of Tulum (Quintana Roo, Mexico). Their fractal dimension d_{a} conductivity exponent ũ and walk dimension d_m are estimated using real space renormalization and numerical simulations. We obtain the following values for these exponents: $d_f \approx 1.5, d_m \approx 2.4, \tilde{u} \approx 0.9$. We observe that the Einstein relation holds for these structures $\tilde{u} \approx -d_{\ell} + d_{w}$. These results indicate that coastal karst networks can be considered as critical systems, and this provides some foundations to model them within this framework.

Source: Frontiers in Physics, volume 4, article 27, 8 pages, 2016. Full paper available at http://journal

.frontiersin.org/article/10.3389/ fphy.2016.00027/full. (Another nerdy paper, but at least this one has a fairly short abstract.)

Abstract: Regional response of the coastal aquifer to Hurricane Ingrid and sedimentation flux in the Yax Chen cave system (Ox Bel Ha) Yucatan, Mexico, by S. V. Collins, et al.

Coastal karst aquifers are an important source of potable water that can be affected by external forcing on various temporal and spatial scales (e.g., sea-level), but there is a lack of long-term data to understand their response. Sediment cores and their proxy records have been used in lakes and oceans to assess past environmental change, but haven't been extensively applied to anchialine caves, where there is less known about the physical, biological, and chemical processes affecting sedimentation. Over fifty sediment traps were placed in Yax Chen, which is part of the Ox Bel Ha cave system near Tulum, Mexico, and four water-level sensors were placed in two additional cave systems (Ponderosa, Sac Actun) for comparative water-table fluctuations. Data collected over the past three years (2011–2013) captured seasonal and spatial sediment flux, including the effect of an intense rainfall associated with Hurricane Ingrid (September 18, 2013). The data indicate that sediment deposition was controlled by cenote size and the presence of mangrove. Areas upstream of Cenote Gemini had negligible sediment accumulation, as there were few cenotes and the terrain is dominated by lowland tropical forest, while areas downstream from Cenote Gemini were dominated by mangrove forests and larger cenotes, which resulted in higher sediment accumulation rates (0.014 vs. 0.22 mg/cm²/day). Bi-annual sedimentation rates in 2013–2014 were higher in the months after the rainy season $(0.2 \text{ vs. } 0.5 \text{ mg/cm}^2/\text{day})$, indicating that cenote productivity was likely controlling sedimentation. Mangrove areas with their peat accumulations occlude the porous karst, causing funneling of nutrientrich rainwater into the sunlit cenotes and enhancing primary productivity and sedimentation in downstream areas. Hurricane Ingrid had little effect on the yearly sediment rate, even though water-table fluctuations were high (0.7 m) compared to the yearly values (0.3 m). This likely is due to water bypassing the cenotes with little residence time to enhance productivity and sedimentation in downstream areas.

Source: Palaeogeography, Palaeoclimatology, Palaeoecology, volume 438, pages 226–238, 2015.

Abstract: The Exploration of Sistema Zumpango, Quitana Roo, Mexico, by Angela Morgan.

Sistema Zumpango is a 12.7-kilometer-long cave system located near the Caribbean Sea in Puerto Aventuras, Quintana Roo. Some above- and underwater sections were explored starting in 2009, but most exploration took place in 2015–2016. Initially four separate caves, they were all connected together in December 2015. Other than a short sump, the cave is above water, although unexplored sump leads remain. The cave trends from the continent toward the sea, and caves upstream and downstream are clearly related and could connect to it i the future.

Source: 2016 NSS Convention Program Guide, p. 91.

Abstract: Sistema Ponderosa: New Discoveries and Caver/Diver Collaboration, by Peter Sprouse.

Sistema Ponderosa, located in Puerto Aventuras, Quintana Roo, is a well-known underwater cave system that had a length of approximately 15 kilometers up until 2014. A dry maze cave known as Cech Chen was surveyed to 1.6 kilometers in length and connected to Ponderosa at a large lake known as the Chapel. Dry cavers proceeded to collaborate with cave divers to kick off the creation of a detailed map of the entire system. Additional dry and underwater connections are underway, and regional karst morphology suggests that this system may connect to other cave systems along the Caribbean coast.

Source: 2016 NSS Convention Program Guide, p. 92.

Abstract: Surveying the Far Reaches of the Jaguar Claw System, Quintana Roo, Mexico, by Benjamin Schwartz.

Sistema Garra de Jaguar (Jaguar Claw) is an extensive, complex, and largely above-water cave system near Playa del Carmen, Quintana Roo, Mexico. Survey efforts from 2013 through April 2015 resulted in a mapped length of 31.5 kilometers, at which point swimming was required in order to continue pushing the cave inland. Underground camps were used to push the far reaches of the cave in 2014–2016. Inflatable rafts and inner tubes were used to survey nearly 5 kilometers of passages that were up to 80 meters wide, and the cave was extended over 1 kilometer farther into the jungle. Much of this new passage was wall-to-wall water between 2 and 10 meters in depth, and the cave appears to be a major flow-path for groundwater in the Paamul area. A number of underwater side passage could be seen leading off, and several above-water leads remained to be explored. In March 2016, another 3 kilometers of large and mostly watery passage was mapped, and the farthest known entrance to the system (Far Cry) was reached. The cave passed 43 kilometers in length by the end of the March 2016 expedition, and virgin passage was discovered and left continuing beyond Far Cry. This passage awaits the next camp trip.

Source: 2016 NSS Convention Program Guide, p. 93. Articles on pushes inJaguar Claw start on page 97 of *Activities Newsletter* 38 and page 115 of number 39.

Abstract: The presence of troglomorphic species in Sistema Muévelo Rico, a large cave with limited dark zones in Quintana Roo, México, by Luis Mejia-Ortiz, et al.

Sistema Muevelo Rico is a large cave, with 1152 m of passage and at least ten entrances and skylights. Few places in the cave reach a zone of complete darkness. Nevertheless, there is a stygobiotic and troglobiont fauna present in the non-dark zones. Stygobionts include the caridean shrimps *Typhlatya mitchelli* and *T. pearsei* and the mysid *Antromysis cenoticola*. Troglomorphic species (and likely troglobionts) include members of the Amblypigi, Araneae, Hemiptera, Opilionida, Orthoptera, Scorpiones, and Scutigeromorpha. The presence of stygobionts is not surprising, since the cave provides, via several pools, access to the regional groundwater and its fauna. The presence of troglomorphic terrestrial species indicates that they can survive in a photic environment, albeit one with low light intensity. Some eyed predatory species are also present, including Hymenoptera (Formicidae), Scorpiones, and Scutigeromorpha. Extensive data on temperature and light intensity indicates a daily and seasonal cycle for each.

Source: Program booklet for 2016 International Conference on Subterranean Biology, p. 15.

Abstract: Niche bacterial and archaeal community compositions as indicators of ecosystem processes and health in Bahamian and Mexican anchialine caves, by Audrey Paterson et al.

Karstic anchialine systems require conservation attention, as diverse, often endemic, macrofaunal species assemblages have been described. Improvements to conservation efforts can be done with the inclusions of microbial and macrofaunal community identification and characterization of ecological drivers impacting community structure and function. For instance, although chemolithoautotrophic microbial taxa are known to be responsible for nutrient availability in many anchialine systems, overall community assemblages and structures are relatively understudied, particularly with respect to niche partitioning across the marked morphological, hydrological, and geochemical gradients. Here, we describe the bacterial and archaeal mat communities from vents on the floor of Cenote Crustacea, cave walls of Cenote Bacteria in the Yucatan Peninsula, Mexico, and the cave wall below the halocline in Magical Blue Hole, Abaco, The Bahamas. When compared to previously studied sulfidic subsurface systems, these new anchialine communities showed similarity to other cenotes and deep sulfidic karst aquifers. Magical Blue Hole consisted predominantly of Chlorobi (45-56%

relative abundances), Chloroflexi (13-14%), and Deltaproteobacteria (~8%), all of which are taxa associated with sulfur metabolism. Proteobacteria that are putative sulfur-oxidizers (e.g., Gammaproteobacteria and Epsilonproteobacteria) were less abundant in Magical Blue Hole, but were present in Cenote Crustacea and Cenote Bacteria. These data indicate niche specificity for some microbial groups and demonstrate the need for systematic characterization of anchialine cave systems, including zonation and environmental gradients that may be linked to system health. These results can be used for predictive ecosystem modeling of macrofaunal and microbial communities, which can improve conservation efforts of these ecosystems through time.

Source: Program booklet for 2016 International Conference on Subterranean Biology, p. 73.

Abstract: Life in the Underworld: Anchialine Cave Biology in the Era of Speleogenomics, by Jorge Pérez-Moreno, Thomas Iliffe, and Heather Bracken-Grissom.

Anchialine caves contain haline bodies of water with underground connections to the ocean and limited exposure to open air. Despite being found on islands and peninsular coastlines around the world, the isolation of anchialine systems has facilitated the evolution of high levels of endemism among their inhabitants. The unique characteristics of anchialine caves and of their predominantly crustacean biodiversity nominate them as particularly interesting study subjects for evolutionary biology. However, there is presently a distinct scarcity of modern molecular methods being employed in the study of anchialine cave ecosystems. The use of current and emerging molecular techniques, e.g., next-generation sequencing (NGS), bestows an exceptional opportunity to answer a variety of longstanding questions pertaining to the realms of speciation, biogeography, population genetics, and evolution, as well as the emergence of extraordinary morphological and physiological adaptations to these unique environments. The integration of NGS methodologies with traditional taxonomic and ecological methods will help elucidate the unique characteristics and evolutionary history of anchialine cave fauna, and thus the significance of their conservation in face of current and future anthropogenic threats. Here we review previous contributions to our understanding of anchialine biodiversity and evolution, and discuss the potential of "speleogenomic" methods for future research in these threatened systems.

Source: International Journal of Speleology, vol. 45, No. 2, pp. 149–170, 2016.

SAN LUIS POTOSÍ

The abstracts booklet for the 2016 International Conference on Subterranean Biology held in Fayetteville, Arkansas, in June contains thirteen abstracts of talks and posters on the *Astyanax mexicanus* cave fish. A PDF file of the booklet is at www. speleobiology.com/icsb2016/wpcontent/uploads/bsk-pdf-manager/ ICSB_2016_Abstracts_2.pdf. We'll spare you all the abstracts, but the titles are:

Evolution of melanin pigment regression in cave animals, by Helena Bilandžija, p. 6.

Adaptive differences between dopamine-related locomotor activity in cave and surface dwelling *Astyanax mexicanus*, by Ezra Shoen, William Jeffery, and Helena Bilandžija, p. 7.

The unusual suspects: Genetic analysis reveals candidate genes potentially underlying altered activity profiles in the blind Mexican tetra, *Astyanax mexicanus*, by Brian Carlson and Joshua Gross, p. 11.

Genetic analysis of craniofacial changes in blind Mexican Cavefish, *Astyanax mexicanus*, by Joshua Gross, p. 33.

Understanding the colonization of caves: Effects of constant darkness on the surface form of *Astyanax mexicanus*, by Breanna Hollifield, Helena Bilandžija, and William Jeffery, p. 40.

Homocystinuria in Cavefish: Molecular analysis of an *Astyanax* eye QTL reveals the role of cystathionine β -synthase in eye degeneration, by William Jeffery, p. 46.

Two to three genes control scleral ossification in blind *Astyanax* *mexicanus* cavefish, by Anastasia Lyon, et al., p. 57.

Molecular analysis of melanophore lineage genes in cavefish depigmentation, by Li Ma, et al., p. 58.

The relationship between differential anesthesia tolerance and melanin pigment development in cave-adapted and surface *Astyanax mexicanus*, by Lindsay Martin, et al., p. 60.

The evolution of scleral ossification in the Mexican Cavefish (*Astyanax mexicanus*), by Kelly O'Quin, et al., p. 70.

The evolution of craniofacial shape change in the blind Mexican Cavefish, by Amanda Powers, et al., p. 83.

Astyanax mexicanus as a natural model for metabolic adaptation, by Ariel Aspiras, Cliff Tabin, and Nicolas Rohner, p. 92.

Adaptation through changes of behavioral and morphological traits in Mexican Cavefish, by Masato Yoshizawa, et al., p. 115.

The web site http://research. stowers.org/cavefin/ is an entry point to a lot of information about the blind cave fish *Astyanax mexicanus*. Among the links there is http:// research.stowers.org/cavefin// astyanax_biblio.pdf, a 552-item bibliography of relevant papers compiled by William Elliot. *Source*: Bill Elliott.

There is a discussion of various theories about why cave fish become blind at https://whyevolutionis-true.wordpress.com/2017/04/23/why-do-cave-fish-evolve-to-become-blind/. *Source*: Lee Skinner.

TABASCO

There is a collection of photos by Robbie Shone from Cueva de Villa Luz at http://www.shonephotography.com/gallery/mexicospoisonous-cave/. It includes some nice close-up photos of the *sardinas*, the fish that live in the cave.

VERACRUZ

Since 1998 a mixed group of Italian cavers have led expeditions to Veracruz and Puebla states. During 2016, the Tláloc Project carried out a new project in the Sierra Modelo, close to the karst area of Zongolica. On this occasion sixty-five new caves were located, and twenty-one were partially explored. Among these Albastle Pozolote and Sótano de la Vibora are both 150 meters deep, and Albastle Comolillo is 210 meters deep. *Source*: English abstract for article "Spedizione Tláloc 2016," by Giuseppe Spitaleri, *Speleologia* 75, December 2016, page 14.

Two rivers in the mountains of the Mexican Gulf state of Veracruz have started to dry up following the appearance of sinkholes, bringing to three the number of rivers in the region that have drained into the subsoil in less than two months, officials said. Residents and officials said the flow of the Tliapa and Tlacuapa rivers has been reduced by half, with the water streaming into sinkholes. The rivers start in the mountain cities of Chocaman and Calcahualco and flow into the Seco River in Cordoba , a city in central Veracruz. Residents of the community of Tecolotla told officials that the first sinkhole formed in a place called Puente de Piedra, where water from one of the rivers began draining into the subsoil. A second sinkhole appeared about one kilometer downriver, beyond where the two rivers join, residents said. "The Tliapa and Tlacuapa rivers have now reduced their flow by up to 50 percent," Tomatlan emergency management chief Tobias Carrillo Morales said. Source: Latin American Herald Tribune, April 22, 2016, http://www.laht.com/article.asp ?Articleld=2410406&Category ld=14091.

YUCATÁN

Abstract: Density of Karst Depressions in Yucatán State, Mexico, by Yameli Aguilar, Francisco Bautista, Manuel Mendoza, Oscar Frausto, and Thomas Ihl.

The abundance of karst depressions in Yucatán has been widely recognized, but they have not been classified or quantified despite their importance in land-use planning. Our objective was to study the types and areas of the sinkholes, uvalas, and poljes and identify their patterns of spatial distribution. We used 58 topographic maps (1:50,000) from INEGI, from which we extracted the depressions and bodies of water. For typology, we used a circularity index and the shape and area of the depressions. For single-density analysis, we extracted the centroids and added an inventory of karst features (cenotes, caves). We counted 6717 depressions with a total area of 454 km² and 750 karst features. We identified 4620 dolines (34 km2), mainly in plateaus below 30 masl. In number, they are followed by uvalas (2021) and poljes (76), occupying together a similar area (210 km²) and dominating in elevations higher than 30 masl. Eighty percent of the dolines were automatically labeled. The density of depressions allowed us to identify the "ring of cenotes" and the "field of dolines" according to two main types of factors, structural and climatic. The typology and density

of the depressions could be used as geomorphological differentiation criteria in the vast plateaus of central and eastern parts of the state.

Source: Journal of Cave and Karst Studies, vol. 78, no. 2, pp. 51–60, August 2016.

GENERAL

Abstract: Distribución Ácaros Cunáxidos Troglófilos (Trombidiformes: Bdelloidea: Cunaxidae) en Cuevas de México, by Blanca Mejía-Recamier and José Palacios-Vargas.

Mites of the family Cunaxidae from 29 caves and other underground environments from ten states of Mexico were studied. Distribution maps are given, as well as identification keys and graphs of abundance. A total of nine genera and forty-one species, of which thirty-seven are

new records, were found. The species of the genera Dactyloscirus and Pulaeus were the most frequent, found in seven of the states, and in the caves they were members of Pulaeus and Cunaxa. The most common species were Coleoscirus breslauensis and Pulaeus myrtaceus, as they were found in seven of the collected caves. Other species had a much smaller distribution. According to the Cunaxidae morphological characteristics they can be considered troglophile animals, because they are often in caves thanks to the adequate environment and presence of prey for food, without morphological modifications to the cave life.

Source: Mundos Subterráneos 27, English abstract to article on pages 1–27, September 2016.



LONG CAVES OF MEXICO

Mark Minton May 2017 Length in meters

1	Sistema Sac Actun (+Dos Ojos)	Quintana Roo	349017
2	Sistema Ox Bel Há	Quintana Roo	270174
3	Sistema Purificación	Tamaulipas	94889
4	Sistema K'oox Baal (+Tux Kupaxa)	Quintana Roo	93618
5	Sistema Huautla	Ōaxaca	78300
6	Sistema Xunaan-Há (María Isabella, 3B) - Tixik K'una - Templo	Ouintana Roo	60445
7	Sistema Toh Há	Õuintana Roo	47072
8	Sistema Garra de Jaguar (Jaguar Claw)	Ouintana Roo	43853
9	Cueva del Tecolote	Tamaulipas	40475
10	Sistema Yok Ha' Hanil (Río Cristal, Pool Tunich, Río Secreto)	Ouintana Roo	40335
11	Sistema Cuetzalan (Chichicasapan+San Miguel)	Puebla	37676
12	Kijahe Xontioa	Oaxaca	31373
13	Sistema Tepepa (Ehécatl+Niebla+Xalltégoxtli+Pozo 4)	Puebla	29401
14	Sistema Tepetzala	Puebla	28995
15	Sistema Soconusco - Aire Fresco	Chiapas	27793
16	Sistema Sand Crack	Ouintana Roo	26746
17	Sistema Cheve	Qaxaca	26194
18	Sistema Nohoch Pek	Ouintana Roo	25161
19	Sistema Covolatl-Esperanza	Puebla	22221
20	Sistema PonDeRosa (Pondazul Edén)	Quintana Roo	20076
20	Chine Xio (Xine Xao, Chine Xao)	Quintana 1000	19515
21	Sistema Aerolito	Ouintana Roo	18288
21	Entrada Caapechen (Cenote Manatí)	Quintana Roo	15638
20	Cueva de Alpazat	Puebla	15200
24	Sistema I2 (Ozto I2 (Equating Barbia) + Last Bash (Hija Puta))	Ω	1/8/0
20	Sistema Murana Aak Kimin (Val Ku Lagoon)	Ouintana Roo	14040
20	Sistema Dos Pisos (Ka'n'ol Nah)	Quintana Roo	14209
27	Sistema Sac Muul	Quintana Roo	13674
20	Sistema Catornillar	Quintana Roo	12452
29	Sistema Camila	Quintana Roo	124/2
21	Sistema Zumpanga (+ Sistema Tayanga)	Quintana Roo	10442
22	Sistema Dagoi	Quintana Roo	12/03
32	Sistema Changa Miatian	Quintana Roo	12030
33	Sistema Chango Misuco	Quintana Koo	11076
34	Sistema Atepetaco (Miquizco + Viento + Mama Mia)	Puebla	118/0
35	Cueva Quebrada - Sistema Dos Coronas	Quintana Roo	11555
36	Sistema Sac Kai (Paachii Ivan)	Quintana Roo	11429
37	Entrada Boca Palla	Quintana Roo	11402
38	Sistema Cupul Ha	Quintana Roo	11153
39	Atlixicaya	Puebla	11120
40	Sistema Rio La Venta	Chiapas	11020
41	Sistema San Andrés	Puebla	10988
41	Cueva de la Mano	Oaxaca	10841
43	Sistema Quijada de Jaguar (Jaguar Jaw)	Quintana Roo	10781
44	Sistema El Puente	Quintana Roo	10474
45	Actun Káua	Yucatán	10360
46	Sistema Zapote (Toucha-Há - Vaca Há)	Quintana Roo	10320
47	Grutas de Rancho Nuevo (San Cristóbal)	Chiapas	10218
48	Cueva del Arroyo Grande	Chiapas	10207
49	Sistema Muul Three	Quintana Roo	10053
50	Sistema Ek Be	Quintana Roo	9905

Updates and corrections: Mark Minton, mminton@illinoisalumni.org

Mark Minton May 2017 Depth in meters

DEEP PITS OF MEXICO

1	El Sótano (de El Barro)	Entrance drop	Querétaro	410.00
2	Sótano de las Golondrinas	Entrance drop	San Luis Potosí	376.00
3	Sótano de la Culebra	Entrance drop	Querétaro	336.00
4	Fl Zacatón (mostly underwater)	Entrance drop	Tamaulinas	335.00
5	Sótano de Tomasa Kiabua (Quiabua)	Entrance drop	Veracruz	330.00
6	Sótano de Albuastlo	P'tit Ouéboc	Puobla	329.00
7	Nita Yonga	Psycho Killor	Ω	310.00
0	Sotanita da Abuacatlán	and drop	Outorátoro	288.00
0	Pozo Posoidon	Entrança dran	Coshuils	200.00
10	L'étana del Arreva Cranda	Entrance drop	Chianas	200.00
10	Solalio del Alloyo Glalide	Entrance drop	Chiapas	203.00
11	Sima Don Juan	Entrance drop	Chiapas	278.00
12	Hallto de Oztoli	Entrance drop	Classica	250.00
14	Sima Dos Puentes	La ventana	Chiapas	250.00
14	Cueva Santo Cavernario	El Santo Tiro (Pozo Fabian)	Puebla	245.00
15	Resumidero del Pozo Blanco	Entrance drop	Jalisco	233.00
15	Sotano del Aire	Entrance drop	San Luis Potosi	233.00
17	Sistema Ocotempa (OC3)	Pozo Verde	Puebla	221.00
18	Live in Busch	Entrance drop	Oaxaca	220.00
18	Sótano de Eladio Martínez (S-CHIC 1)	Entrance drop	Veracruz	220.00
18	Sistema Soconusco	Sima de la Pedrada	Chiapas	220.00
18	Sótano de los Planos	Puits Tannant	Puebla	220.00
22	Sótano de los Coatimundis	Entrance drop	San Luis Potosí	219.00
23	Pozo del Cerro Grande	Entrance drop	Jalisco	218.00
24	Sótano de Sendero	Entrance drop	San Luis Potosí	217.00
24	Resumidero el Borbollón	Tiro Grande	San Luis Potosí	217.00
26	Sima del Chikinibal	Entrance drop	Chiapas	214.00
27	Sistema H3-H4 (HU3-HU4)	_	Puebla	210.00
27	Unnamed Pit	Entrance drop	Chiapas	210.00
29	Kijahe Xontjoa	So On Jan	Oaxaca	209.00
30	Nacimiento del Río Mante (underwater)	Macho Pit	Tamaulipas	206.00
31	Hoya de las Guaguas	Entrance drop	San Luis Potosí	202.00
32	La Hoyanca	Entrance drop	Tlaxcala	201.00
33	Nita Gatziguin	Entrance drop	Oaxaca	200.00
33	Fundillo de El Ocote	Entrance drop	Chiapas	200.00
33	Akemati-Akemasup	Gran Salto Acuatico v Barbaro	Puebla	200.00
33	Sistema de la Lucha	Entrance drop	Chiapas	200.00
33	Hueholvastempa	Entrance drop	Puebla	200.00
33	Hard Rock Cave	r	Oaxaca	200.00
39	Kijahe Xontioa	Laiao Se	Oaxaca	199.00
40	Cueva de la Funda	Entrance drop	Chiapas	198.00
41	Sótano de Sovate	Entrance drop	San Luis Potosí	195.00
42	Sótano de Alpupuluca	Entrance drop	Veracruz	190.00
42	Cueva de los Murmullos (Cueva del Tízar)	Tiro de los Murmullos	San Luis Potosí	190.00
42	Sótano de Tenetlavtli No. 1	Entrance drop	Puebla	190.00
45	Sótano de Puerto de los Lobos (Sótano Hondo)	Entrance drop	San Luis Potosí	189.00
16	Hova do la Luz	Entrance drop	San Luis Potosí	188.00
40	Cuaubtompa	Pozo con Corno	Buobla	100.00
40 19	Sátano do Hormanos Poligrosos	Orgasmatron	Vorocruz	186.00
40 40	Atlalaguía (Sótana) do Abuibuitzoana	Entrança dran	Voracruz	180.00
47 40	Analaquia (Solano) de Anumunzcapa	Entrance drop	Chianas	100.00
49 40	Sinia de veinte Casas	Entrance drop	Chiapas	100.00
49 40	CIUZ Z	Entrance drop	r uebla	100.00
49	Solaho Cirque Cuauxipetstii	Entrance drop	ruepia	100.00
49	Sistema Ocotempa (OCII)	Puits Analogue	ruebla	190.00

DEEP CAVES OF MEXICO

Mark Minton May 2017 Depth in meters

1	Sistema Huautla	Oaxaca	1560.00
2	Sistema Cheve	Oaxaca	1484.00
3	Cueva Charco	Oaxaca	1278.00
4	Sistema J2 (Ozto J2 (Faustino, Barbie) + Last Bash (Hija Puta))	Oaxaca	1229.00
5	Akemati - Akemasup	Puebla	1226.00
6	Kijahe Xontjoa	Oaxaca	1223.00
7	Sistema Nogochl (Olbastl Akemabis - El Santito)	Puebla	1182.00
8	Sistema Ocotempa (OC3 + OC11)	Puebla	1070.00
9	Soncongá	Oaxaca	1014.00
10	Sistema Tepepa (Ehécatl+Niebla+Xalltégoxtli+Pozo 4)	Puebla	968.00
11	Sistema Purificación	Tamaulipas	957.00
12	Guixani N'dia Kijao (Guinjao)	Oaxaca	955.00
13	Sistema Perrito (Nia Quien Nita + Nia Nga'co Nita)	Oaxaca	906.00
14	Resumidero de la Iova Ionda (Hova Honda)	San Luis Potosí	895.00
15	Nita Chó	Oaxaca	894.00
16	Sistema Tepetzala	Puebla	849.00
17	Sótano de Agua de Carrizo	Oaxaca	843.00
18	Sótano de El Berro	Veracruz	838.00
19	Sótano de Trinidad	San Luis Potosí	834.00
20	Hard Rock Cave	Oaxaca	830.00
21	Resumidero El Borbollón	San Luis Potosí	821.00
22	Las Tres Ouimeras	Puebla	815.00
23	X'ov Tixa Nita	Oaxaca	813.00
24	Nita Ka	Oaxaca	760.00
25	Sistema H31-H32-H35	Puebla	753.00
26	Sonvance	Oaxaca	740.00
27	Nita Xongá	Oaxaca	739.00
28	Yuá Nita	Oaxaca	705.00
29	Aztotempa	Puebla	700.00
30	Sótano de los Planos	Puebla	694.00
31	Sótano de Alfredo	Ouerétaro	673.00
32	Cueva Santo Cavernario+Tototzil Chichiltic	Puebla	667.00
33	Sistema de los Tres Amigos (Te Chan Xki)	Oaxaca	659.00
34	Sistema Cuetzalan (Chichicasanan+San Miguel)	Puebla	658.00
35	Cueva Tipitcli (Tipitli)	Puebla	653.00
36	Sótano de Tilaco	Querétaro	649.00
37	Nita Nashi	Oaxaca	641.00
38	Cuaubtempa Superior	Puebla	640.00
39	Oztotl Altepetlacac (Cueva Paisano)	Puebla	638.00
40	Sistema Soconusco - Aire Fresco	Chiapas	633.00
41	Sistema Atlalaguía	Veracruz	623.00
42	Cueva de Diamante	Tamaulipas	621.00
43	Sistema Covolatl-Esperanza	Puebla	620.00
44	R'ia Man Kijao (Nita)	Oaxaca	611.00
45	Nita He	Oaxaca	594.00
46	Meandro Que Cruce (Meandre Qui Traverse, H54)	Puebla	588.00
47	Olbastl Koltik (Sótano Chueco)	Puebla	587.00
48	Yometa	Puebla	582.00
49	Sótano de las Covotas	Guanajuato	581.00
50	Sistema Los Toros	Nuevo León	576.00
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ARTICLES

Base camp for the 2017 Tzontzecuiculi expedition to Puebla. Photo by Gustavo Vela Turcott.

THE HUAUTLA RESURGENCE PROJECT 2016 EXPEDITION

Andreas Klocker

nd off I was to Mexico again- \swarrow the third year in a row. The previous two years I had joined the Proyecto Espeleológico Sistema Huautla (PESH), American-led expeditions with the goal of continuing exploration of Sistema Huautla, currently 1560 meters deep and about 75 kilometers long and located in the Mexican state of Oaxaca [see article in this issue on the Redball Canyon trip in 2015]. The farthest-explored downstream part of this cave system is a huge sump known as Sump 9 or "The Mother of all Sumps" that had been discovered on an expedition led by Bill Stone in 1994 (Stone and am Ende, 1995; Stone et al., 2002). It was only in 2013 that cavers returned to Sump 9 on a British expedition organized by Chris Jewell. On that trip Jason Mallinson and Chris Jewell pushed Sump 9 to a depth of 81 meters at 440 meters penetration, with the underwater tunnel barreling off to greater depths (Jewell, 2013).

One of the great mysteries of Sistema Huautla is its connection to the active resurgence in the Santo Domingo canyon some 10 kilometers away. This resurgence has been confirmed by dye trace and has been the subject of several expeditions, each of which has increased the known length of the cave there and reduced the gap from the end of the line in Sistema Huautla's Sump 9. In 2001, Brits Jason Mallinson and Rick Stanton explored and surveyed the underwater resurgence for just over 1 kilometer to an airbell where a passage was seen heading off 10 meters above water level, but the upstream continuation of the underwater river remained a mystery

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(Shade and Stone, 2002). That was fifteen years ago, with nobody having returned since.

Have a look at the schematic to get an idea of Sistema Huautla relative to its resurgence; only the most convenient route to Sump 9 via the Fools Day Extension in San Agustín is shown on the left; the resurgence is shown on the right, ending at its most upstream end in an airbell found by Jason Mallinson in 2001. The Cueva de la Peña Colorada is a fossil overflow resurgence still pumping loads of water in winter and is assumed to be part of the drainage system of Sistema Huautla, even though it has never been successfully dye-traced. All of Sump 9 in San Águstín, Sump 7 in the Peña Colorada, and the upstream end of the resurgence are going leads with large tunnels heading into the unknown. Having read about all these previous expeditions, and with the potential of a 15-kilometer-long and over 1750-meter-deep through-trip in the back of my mind, I felt the urge to close this gap and started to plan an expedition to the active resurgence cave.

 \mathbb{Q} o the idea was there—to continue \bigcirc at the current end of exploration in the Huautla Resurgence and work toward Sump 9. Now it was time to put together a team and figure out how to deal with some of the logistical hurdles, such as transporting large amounts of dive gear to the remote Santo Domingo Canyon and getting permission from the locals to access the cave. Luckily, even though cavers with good skills at both dry caving and rebreather diving are about as abundant as the Yeti, we quickly had a great team together. This included Zeb Lilly, with whom I have been caving since my first trip to Mexico, Dave Bardi and Sandy Varin, who both had been caving with PESH the previous year, and Craig Howell, who has been spending the last decade or two pushing the cutting edge of rebreather diving and over the last couple of years had become addicted to dry caving. And then on one of my annual work trips to the UK I talked to Chris Jewell and Jason Mallinson about my plans, and luckily it didn't take much convincing to get them to agree to join us. Unfortunately, work-related issues stopped Jason from coming along, and Craig managed to fall over with a twin rebreather on his back, injuring his shoulder, and so we were down to a team of five.

We were also lucky to have great non-diving support with us. Ernie Garza, a Texas-based caver with decades of Mexican caving experience and fluent Spanish skills, traveled to Santa Ana Cuauhtémoc, the town that we were planning to use as our base, two months prior to the expedition to organize accommodation, ask about permission to access the cave, and have a look at the newly built road into the Santo Domingo Canyon. And then Ernie planned to drive with us from the US to Mexico to help us set up the expedition. An absolute champion! Our other amazing support was Alejandra, or Alex as we called her, a student from Mexico City who joined us as a cook, translator, and expert in diplomacy, the key for our building a great relationship with the locals. Leading up to the expedition we also had great support from Bill Stone, who had led many trips into the Santo Domingo Canyon before and hence was an invaluable source of information.

After a year of planning it was time to head off, and the whole thing worked out a bit like this. Zeb drove his humongous truck, a Ford F-350, aka the battleship, filled with an amount of dive gear which would put any dive shop to shame, from Virginia to Dallas, where he picked me up from the airport; we then continued on to Bill Stone's place in Austin, Texas, where we drank beer and picked up Ernie and additional dive gear that the US Deep Caving Team was generous enough to lend us. The next day we crossed the border, where Ernie explained to the officials the purpose of our trip and the gear in the truck, and Zeb did the paperwork to get permission to drive the vehicle in Mexico, which had to be done by the vehicle's owner. Zeb then walked back over the border to the US, where he had to work another fortnight before joining us, and Ernie and I drove for two days to Santa Ana Cuauhtémoc on the south side of the Santo Domingo Canyon.

Thanks to Ernie's previous visit to Santa Ana it only took us about twenty minutes to organize accommodation with three rooms for gear, cooking, and sleeping. Luckily we even had a little food store selling cold beer a stone's throw across the road and owned by our landlord. Within minutes we had a team of strong locals help us carry all the gear from the back of the truck into our accommodation, freeing up enough space in the truck to be able to pick up the others. In the afternoon we drove back down the mountain to Tehuacán, where we met up with Dave, Sandy, Chris, and Alex, who had come from Mexico City by bus. Tehuacán is located approximately 3.5 hours from Santa Ana and is the closest town with big supermarkets. There we spent one night in the Hotelitto Inn, a nice hotel where they are used to dirty cavers. The following morning we did some shopping and then drove back up the hill to Santa Ana, where we set up our home for the next month.

Now it was finally time to go caving. Our plan was to first find our way down the canyon, locate the cave, and figure out a plan for the next few days once we knew a bit better what the resurgence and the hike through the canyon were like. So we filled the battleship with gear and drove down the steep slopes into the canyon, about 1300 meters vertically, which turned out to be quite a challenge, with steep drop-offs next to the road and sharp corners that were obviously not built for the length of vehicle we were driving. Nevertheless, after numerous scarv moments looking down steep drops too close to the tires of the truck, we



David Bardi, Alejandra Mendoza, and Sandy Varin on the way to the Huautla Resurgence entrance. *Chris Jewell*.

reached the riverbed and happily left the truck behind. From there it was only about forty minutes of easy hiking with three shallow river crossings until we found the resurgence, which we easily recognized thanks to photos from the 2001 expedition that Bill Stone had sent us.

After climbing over some boulders in the entrance we finally saw what we were here for—an amazing-looking sump pool. On a rock we noticed a bolt and some remnants of old dive line from one of the previous expeditions. The cave entrance provided enough space sheltered



from weather and out of sight of visitors to store diving equipment, with enough space left for two people to gear up at a time. After the recon we headed back, looking forward to the upcoming dives and enjoyed one of many great dinners cooked by Alex. This trip from Santa Ana to the cave entrance took us about three hours that day, but after practicing highspeed three-point turns in the battleship we subsequently reduced this to two hours door-to-cave. Luckily, due to amazing scenery in the canyon this daily slog never became too boring, apart from a few misty evenings when the visibility was so bad that the cold beer seemed a damn long time away. Only one slight worry remained for our daily commute: driving up 1300 meters of elevation is probably not what a diving doctor would recommend after a big dive, but with an emergency oxygen tank that we kept in the battleship and some magic medicine known as beer waiting our arrival at home, what could possibly go wrong?

nce set up at the cave we were very keen to finally get into the water. The general plan was to have two divers in the water every day, with the others helping to porter the gear, and to re-line the sump to the point Jason had gotten to in 2001. The first dive was done by Chris and me, with me running the reel and Chris following in close proximity to improve or add tie-offs. I had never laid line as a two-person team, but due to the cave's size and complexity, combined with only 5 to 7 meters visibility and hence me swimming into lots of dead ends before finding the way on, this technique was a treat. We soon reached the end of Sump 1, some 400 meters into the cave, where it ends in a pool with the character of a bubble bath caused by a 1-meter waterfall hitting its surface, as described in the trip report from the 1995 expedition (Stone, 1997). In 2001 Jason and Rick were lucky enough not to have encountered this waterfall due to higher water levels, and we were hoping that this would be the case again, but bad luck for us. Even though a vertical meter is not much, it did cause us some trouble due to the need for climbing sharp

rocks in a drysuit and hauling tanks, all against a very substantial flow. The waterfall also forced us to leave the 45-kilogram scooters we planned to use in the second sump and enjoy long swims and decompression stops instead.

The next day we planned to carry Dave and Sandy's rebreathers to the sump so they could start to re-line Sump 2. But as it frequently happens to everyone diving rebreathers, gear does not work as it should, leading to a lot of gear fiddling and the use of inappropriate language. In this case, attaching the slightly oddly shaped carbon tanks onto Dave and Sandy's rebreathers led to a leak into the scrubber, and so they had to experiment with different gear configurations to solve the problem. Once the gear was ready to go it was already quite late in the day, and hence we decided to stay in town and spend time properly setting up our fill station, including the compressor, two boosters, several large storage tanks of oxygen and helium, and a whole lot of transfer whips.

After the successful gear modifications the next dive was done by Dave and Sandy, who rigged several ropes over the waterfall to both attach gear and act as a handline. This made the transition over the waterfall much easier on the next dive. They then continued into Sump 2 and started re-lining it. During this dive they stayed on the right side of the tunnel, since remaining bits of old diveline from the previous expeditions made navigation easier. On the way out they left two cylinders of deep mix at the beginning

of Sump 2 and returned on a single tank of bailout each, filled with air, and from then on we always only brought back cylinders with deep mix if they were in need of a top-up.

While Dave and Sandy were busy in the cave, Chris and I hiked up to the main entrance of the Cueva de la Peña Colorada, which took us about one hour of scrambling, swimming, and climbing while keeping an eye out for some poisonous

snakes that apparently like to hang out in the pools of the canyon. It was easy to find the entrance due to the huge dry river bed leading up to it. What really impressed me about this cave entrance, which we could only follow for about 100 meters to the first sump, were signs of extremely high flow during winter floods. The dark limestone was polished like I had only seen in the Upper Gorge in San Agustín the year before, and the gravel we walked over was shaped wave-like as you see on the bottom of a high-flow sump. And all the signs of previous explorers had been washed away.

Once we got back to Santa Ana the work for the day was not quite over. On arrival Alex told us that the big wigs of the local farmers association wanted to talk to us. So, not knowing what to expect, Alex, Chris, and I headed over into the center of town to meet them. Apparently we hadn't asked all the necessary people for permission to dive the cave, or more accurately to use the road into the canyon, which apparently belongs to the local farmers association. This resulted in a long discussion between Alex and the locals, while Chris and I sat there trying to pick up a few words of Spanish to try and find out what's going on. Luckily an hour or so later, after Alex used all her diplomacy skills and our agreeing to chip in for some beer for the farmer association's annual party,

Sandy Varin ready to dive. Chris Jewell.





everything turned out well and we had all the permissions we needed.

The next day Chris and I hoped Ito continue laying line through Sump 2, but Chris woke up with an upset stomach and decided not to dive. Hence I made the decision to go for a solo dive and spend some time checking for possible leads in Sump 1. Due to the average visibility in the cave and its large size and complex structure we found many locations where we could have missed possible leads. Nevertheless, after lots of searching I was convinced that we actually had found the one and only way on. From there on Sump 1 turned into a regular commute, and we fully concentrated on pushing Sump 2.

On the next dive Dave and Sandy continued laying line in Sump 2 until they rose to a depth of 55 meters beyond the 65-meter-deep point of the sump. At this point they made the decision to turn due to the oxygen in their rebreather tank becoming low as a consequence of the cave's changing depth repeatedly, especially in Sump 1. While Chris and I carry two oxygen tanks on our rebreathers as standard configuration, after this dive Dave and Sandy started carrying a second oxygen tank as well to avoid this problem on upcoming dives.

While those guys were gone, Chris and I continued our surface exploration and hiked upstream through the Narrows of the Santo Domingo Canyon, named appropriately since the canyon walls come very close together and the river deepens, occasionally turning the walk into a swim. On the other side of the Narrows we had a look at both the HR Resurgence and the Cheve Resurgence. The HR Resurgence has an entrance a little similar to the Huautla Resurgence, but smaller, and it was possible to follow the stream for several hundred meters before we got stopped by a sump some 1 by 1.5 meters large, similar to what is described in the old trip report (Stone, 1988). Even though this sump is not that large and in the old trip report is considered as not diveable, I think it is definitely worth returning to with some open-circuit sidemount gear. We then continued on to the Cheve Resurgence, where we poked around in many of its dry entrances and admired the very clear, but very cold water coming out of the resurgence.

When Dave and Sandy returned, they mentioned several places in Sump 2 where they had lost visual contact with the left side of the sump, leading to the possibility of a junction and hence other ways on. This also agreed with a possible junction some 400 meters into Sump 2 that Bill Stone had mentioned previously. Hence Chris and I planned to dive Sump 2 and run a line across to the left side of the tunnel at several places, checking every possible lead. We did this to a depth of 45 meters, and after a few dead ends and some siltouts away from the main

David Bardy and Sandy Varin in Sump 1. *Chris Jewell*.

flow, we decided that none of these possible-looking junctions went and returned. On the way out I managed to puncture the wrist seal of my dry suit while jumping over the waterfall into Sump 1, something Sandy had already managed to do a couple days earlier. Dave and Sandy continued the next day from the point where Chris and I turned with the same goal, but also couldn't find any other possible ways on.

As things happen on an expedition, we then had to take a day off to find diesel for the battleship and repair a slow leak in one of its tires. So Alex and I headed to Chiquihuitlán de Benito Juárez. No one but Alex could pronounce that name, and so we simplified its name to ChiChi Monkey, and once we found out what ChiChi means, to Cheeky Monkey. It was a twenty-five-minute drive away and had a guy who could fix tires and another guy who siphoned diesel from several jerry cans into the 140-liter tank. In the meantime the others did what we always ended up doing in any spare minute: fix and service gear and enjoy Alex's great cooking.

A fter multiple days spent searching and laying line, knowing that we were getting close to the airbell Jason had found in 2001, Chris

Chris Jewell.





and I set out to hopefully finally reach the surface beyond Sump 2. Sadly, in Sump 2 my Scurion headtorch flooded due to 100 percent user error; this light is probably the best gear investment I ever made. I turned the dive after dropping a stage tank of 50 percent nitrox, and Chris continued on himself with three bailout tanks. On this solo dive he managed to find a way on beyond where Jason had surfaced in 2001 and decompressed in the new tunnel until he reached a depth of 12 meters. At that point he decided to return and leave the lead to Dave and Sandy, who would be able to get to that point with less decompression obligation.

Dave and Sandy continued on from Chris's farthest point and surfaced into dry passage. This point was over 1 kilometer into Sump 2 beyond a deep elbow in the passage at 65 meters, so is a substantial commute. Without surveying or laying line, the dive in Sump 2 took about 1.5 hours each way, half of which was spent decompressing. Still dressed in their drysuits, they spent two hours bagging dry passage, exploring everything they could safely reach with their drysuits on, before starting the long dive back. Most of this dry passage was large walking tunnel, with a mix of gravel banks that looked just like the underwater portion of the tunnel, clean dark-gray limestone, cracked mud, and beautiful decoration. About 150 meters into the passage they found to the side a deep-looking sump pool, now named the Distraction Sump, which Dave checked out with a mask but no dive gear. This must have been one of Dave and Sandy's most amazing days of caving, with so much dry passage beyond a sump being a big dream of most cavers. They named it the Passage of the Cheeky Monkey.

Chris had to head back to the UK for work before we finished up with the expedition, so the next day, on his second-to-last dive, Chris and I Andreas Klocker in the dry passage. *Chris Jewell.*

dove to the new dry passage. After having spent so much time searching for the way on underwater and listening to Dave and Sandy's stories, we were both very excited about seeing the new tunnel. On the way in Chris first surveyed in Sump 2 from 20 meters depth to the sump exit into the new passage. After dekitting on the amazing beach in the dry tunnel, we then continued on, still in our drysuits, and surveyed about 600 meters of dry passage. On the way out Chris took photos of the passage to make sure we have some documentation of this amazing place. All this made for a very late exit out of the cave, but who cares if you have had such an amazing day in virgin cave and with a cold beer waiting at home.

The next day Zeb was meant to L arrive in Teotitlán together with Mark Minton and Yvonne Droms, who were continuing on to the PESH expedition to push the La Grieta section of Sistema Huautla. So we headed down the mountain in the morning to spend a day in civilization, go shopping, eat in a restaurant, and just relax. But on the way down we ended up with a flat tire, and taking a closer look at all the other tires, decided that fixing it wouldn't get us far. They all needed replacement, since they all looked like they were going to give up in a very short time. Hence, after Sandy showed us her tire-changing skills, we aimed directly at the nearest dealer, a guy who calls himself Mr. Fast, and who after some phone calls promised us a set of new tires in the afternoon. This worked out well. We continued on to town, met Zeb at the bus station, had some food, and returned to Mr. Fast and his dog Tyson, who were already waiting with the new tires. Quite some time later we then returned to Santa Ana.

With all of Zeb's gear still in pieces, we decided to have Dave and Sandy dive into Sump 2 to continue surveying from the 65-meter-deep point to the point at -20 meters from which Chris previously had surveyed to the new dry passage,

while Zeb was going to finish setting up his gear and go for a familiarization dive into Sump 1. I guess we hadn't told him in enough detail about what to expect at the far end of Sump 1, so when he got close to the surface on the far side he thought that a tank had blown off gas, while it was really only the waterfall causing havoc. That's definitely not something you experience on your average cave dive.

Now with Zeb, who was also our survey expert, ready to dive, the plan the following day was for Zeb and me to dive to the Passage of the Cheeky Monkey to finish off the surveying and find a way on, while Chris was going to join us in Sump 1 to take some underwater photos and then head back to disassemble and pack his gear. But as things go, it took Zeb a bit to get used to our funky setup of the bailout tanks, the sort of rigging you end up with if you patch together all the bits of gear you borrowed from different people, and so he decided to abort the dive, and we finished the day early with some nice underwater photos from Sump 1.

Dave and Sandy's plan for the next dive was to look at a lead they had seen beyond the 65-meter-deep point, at about -38 meters, to hopefully find the way on upstream. After getting through Sump 1 quickly, they noticed while getting ready to descend at the beginning of Sump 2 that Sandy's brand new first stage of the regulator started blowing off through the over-pressure relief valve. This would have drained one of the two oxygen tanks she was carrying in no time, and even though this good lead was stuck in Dave and Sandy's heads, the only sensible option was to abort and head home. So we got back home early, where we met up again with Chris, who had stayed in town that day to pack his gear for a departure the next morning and



drink as many beers as any British caver would when not underground.

With Zeb having adapted to our gear setup, he and I both headed to the Passage of the Cheeky Monkey the next day to finish off the surveying. This dry passage is mainly made up of one major tunnel, with two little junctions toward the end where it is possible to climb into a lower level with a stream. This time we learned from our previous experience and changed out of our drysuits in the dry passage, and we also took a bicycle repair kit to fix any drysuit seals that we might rip on the far side of the Sump. I even took a set of Teva sandals along, since the cave allowed for easy progress. On the previous trip to the dry passage, Chris and I had surveyed most of the main tunnel, so this time we connected into this survey and continued into the lower level. Both junctions led into the same stream, but with a short sump in between. On the farthest upstream end the water squirted out of a tiny hole, and sadly there was no way to follow the water farther upstream into the northeast direction. On the downstream end the water flowed into a sump that looked deep, with no floor in sight. After searching for any possible continuation of the dry cave with no success, we returned to our dive gear. Right above the sump we could see a passage continuing on toward the south, about 10 to 15 vertical meters of slippery, loose climbing above water level. I briefly attempted this climb, but decided it was just too dodgy, and so we returned. It is likely that this would lead to the airbell Jason Mallinson discovered in 2001. One of the things that really surprised me in the dry passage was that part of the cave looks like it never floods; some of the calcite features would break off as soon as water hits them.

On their second try Dave and Sandy finally made it to their lead at -38 meters, but to their frustration they just laid line around a large room and reconnected to the main line. We knew that the cave had to continue somewhere underwater, since there was no flow where we surfaced in the Passage of the Cheeky Monkey, but in such a large, complex



David Bardy and Sandy Varin.

cave with average visibility it was no easy task to find. Since we were running out of time on this trip, on their way back Dave and Sandy brought the stage tanks from Sump 2 back to the waterfall so Zeb and I could finish cleaning up the next day.

n the way up the canyon our hopes for being close to cold beer were destroyed when we saw large amounts of white smoke suddenly coming out of the battleship's hood. After we let it cool off a bit the problem quickly became clear: we had cracked the radiator. Since we had no tools to do any repairs of that kind we started a long walk out of the canyon. Luckily, once we reached the main road, the presidente of Chiquihuitlán de Benito Juárez and some of his buddies drove past and were happy to give us a lift back home, where we finally enjoyed our well-earned beer.

The next day we had to find a way to get the broken-down truck out of the canyon. After some phone calls to some mechanics (it was Sunday and most of them were enjoying their day off) we finally found someone who came into the canyon with us and did some temporary repair so we could drive the battleship out of the canyon. The mechanic then ordered a new radiator, and, after Alex sweet-talked the *presidente* of Santa Ana into lending us his

Andreas Klocker in the dry passage. Chris Jewell. truck, we left the battleship at the mechanic's place, where we were also offered some very special booze. God knows what that was; it would have definitely been strong enough to power the battleship. In the afternoon we enjoyed a great spicy meal cooked by some locals who invited us over, and then in the evening we joined the locals in their annual party organized by the local farmers association, where everyone showed their dancing skills or lack thereof.

Following a day of fixing cars and drinking booze, Zeb's and my task the next day in the cave was easy. We planned to dive to the waterfall and bring back the stage tanks, and Zeb was going to resurvey and sketch Sump 1, which had never been sketched, with only line data existing from previous trips. So while Zeb was busy surveying, I used the time to clean out much of the old line from previous trips that was still hanging in bits trying to catch a diver. In the meantime Dave and Sandy ran laps through the canyon to get as much gear as possible from the cave entrance to the truck. The rest of the day we all then spent doing several more hikes to clean all the remaining gear out of the canyon. And luckily, against all odds, the *presidente's* old truck made it out of the canyon with all the gear in the back.

With all the gear out of the canyon, the following day was spent packing everything into Zeb's truck, which now had a shiny new radiator. Surprisingly, all five of us and an insane amount of gear fit into the truck, at least after we made use of the roof rack. It was time to say goodbyes and head home. So we enjoyed one more scenic drive off the mountain to Teotilán, where Dave, Sandy, Alex, and I jumped on the bus to Mexico City and Zeb continued on to join the PESH expedition in Plan Carlota on the north side of the Santo Domingo Canyon. [Articles on the 2016 PESH trip appear in AMCS Activities Newsletter 39.]

In summary, after a year of many nerve-wracking moments planning this trip, everything worked out much better than I had ever imagined. In total we found 1232 meters of new cave passage, 358 meters of which is underwater and 874 meters of which is dry cave. The Huautla Resurgence is now 2.33 kilometers long. There are two undived sump pools in the dry passage that are both located north of where we lost the water flow. The logical objectives for a return are to dive those sumps, reconnect them with the underwater tunnel farther downstream to avoid having to drag dive gear through dry passage, and then continue to push the cave farther upstream. If the hypothesis that the Peña Colorada overflow resurgence is connected to the main resurgence is correct, and knowing that the water level of the most upstream sump in the Peña Colorada is at least 110 meters higher in elevation than the resurgence, this would mean that we should find



plenty of dry cave on the way. In short, we can't wait to return and push on.

As with any expedition like this, we would not have been nearly as successful as we were without the great support of several individuals who spent a lot of time and effort helping us out as much as they could. On the trip we had Alex Mendoza Contreras and Ernie Garza to help out with language barriers, local politics, and great cooking. After a month in Santa Ana we had built a great relationship with most locals, which I see as much of a success of this expedition as the actual exploration. This success would definitely not have been possible without those two. Leading up to the trip, Bill Stone put great effort into helping us out with any bit of information he had from previous trips, which went way beyond what one would find in any written report. Thanks guys!

We also had great support in

getting together the gear necessary for this trip. We were able to use a large supply of gear from Bill Stone and the US Deep Caving Team (http://www.usdct.org), the latest and greatest in dive-computer technology thanks to Damien Grigg from DKG drysuits (http://www.drysuit. com.au) and Shearwater Research (https://www.shearwater.com), and many custom-made tools produced by Stephen Fordyce from TFM Engineering (http://www.tfmengineering.com.au). And the fancy mixed gases we used, the absorbent for the rebreather, and the lead were funded by the National Speleological Society's Ron Simmons Grant. This sort of exploration definitely pushes gear to its limits, but thanks to such great help putting together the best gear possible we had no major gear issues and could focus on pushing the end of the cave.

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Expedición 2016 del Proyecto Resurgencia de Huautla

Espeleobuzos regresaron en 2016 a la resurgencia del Sistema Huautla. Después de bucear alrededor de un kilómetro en el Sifón 2, con una profundidad máxima de 65 metros, encontraron pasajes no inundados. En total encontraron 1232 metros de pasajes nuevos. De ellos, 358 metros fueron bajo el agua y 874 metros en galerías no inundadas. La Resurgencia de Huautla tiene ahora una longitud de 2.33 kilómetros.

MARCH 2017 CAVING IN QUINTANA ROO: ADDING KILOMETERS OF CAVE PASSAGE

Gretchen Baker

I stepped out of the Cancun airport, the warm air washing over me, the salty ocean scent in the air, the humidity making my hair curl. I was excited; this was my first time to the Yucatan peninsula, and I would be down here for the next nine days, helping to find and survey caves. My traveling companion, Carol Vesely, called my name, as we had gotten separated in the airport, and I gladly joined her. We found Peter Sprouse just outside, ready to pick us up and begin our adventure.

After a few errands, we arrived in Paamul, what some call the biggest RV park in Mexico. It certainly didn't look like any RV park I had ever seen, with the thatched roofs over the RVs, making a village of palapas. Peter's was one of the deluxe ones, and we settled in, explored the nearby tide pools, and ate dinner, meeting Frank Bogle, a Tennessee caver down for the week. Peter gave me an orientation on sketching standards for the Quintana Roo cave project. I had done some sketching before, but didn't consider myself very experienced. That would change over the next week, as I sketched a variety of caves for seven days straight.

The next morning, we woke up to the beautiful view of ocean waves rolling against the beach. We had an early breakfast because we had a long hike ahead of us. Roberto Ghisolfi, a Paamul resident, and two campers, Mike and Jen Kroeker, joined us, as well as local diver Geraldine Solignac. We headed across Highway 307 to the trailhead for the Howling Monkey trail. Workers were busy putting fill on the trail to make it smoother and working on a bathroom structure. Río Secreto will be leading tourist trips to the Jaguar Complex in the near future.

We hiked at a good pace through the jungle, over a well-traveled trail that still had a few tripping hazards. Then we arrived at the entrance of the first cave in the complex, Jaguar Paw, and I had the delightful experience of traveling through beautiful walking cave passage because it was much easier than traveling through the jungle. My caver's eyes were delighted with the numerous tree roots creeping over formations and dangling from the ceiling, the multiple cave entrances, and the Maya walls near them. Peter explained that the Maya held off the Spaniards longer than any other group, and the caves had played a large part in that.

After passing various landmarks in the cave, like the Twisted Sisters entrance in Jaguar Jaw, where two trees are entwined, Turtle Lake, with a turtle shell on the shore, and the teeth of the jaguar in Jaguar Claw, where we actually had to squeeze a little with our packs, we emerged from the Jaguar System at the Ugly Tree Entrance and were back in the jungle. This time the trail was not so well defined. We hiked a bit more and then reached the entrance of Kitty Leap Cave.

Cave divers had done some surveys in there, but they hadn't sketched the cave, so our first task was to sketch it on the line plot that Peter provided. We divided into three teams and set to work. My partner was Roberto, who had helped chop the trail out to Kitty Leap and beyond. He was wearing shorts and no kneepads, but that didn't stop him from checking out every crawling lead that we encountered. When we finished sketching the lineplot, we added one of those crawling leads on to the survey, and it kept going far enough that we didn't have time to finish. We turned around in a very warm passage, so when we got back to Carol and she said they had some really wet leads they hadn't wanted to check out, we were happy to help her out and get totally wet. The leads didn't go far, but she at least got a little extra distance on her lineplot, and we had a nice cool-down before the two-hour hike back to the vehicle.

When we got back to Peter's palapa, I couldn't resist a snorkel in the ocean. Coming from the high desert of Nevada, my being next to the ocean was a real treat, and I went snorkeling several times that week, visiting the nearby reef and seeing the variety of sea life that lives there.

For dinner we went to Mr. Trompo's in the pueblo part of Puerto Aventuras, which would become a frequent dinner spot due to their fast service and good food and quiet-enough atmosphere for entering cave data. You can imagine the jokes that ensued due to the name and orange logo.

The next morning, we met at 8:30 a.m. at Taqueria el Arbolito, just off the side of the road in Puerto Aventuras. Geraldine was joining us again, this time as a diver, and also Jeff, from the Carmen Beer Company. After a delicious breakfast of tacos (it was so fun to choose different taco fillings from the taco buffet each morning) and *licuados*, we set off for nearby Cenote Eden. This beautiful cenote is open to the public for diving and snorkeling. After climbing the small pyramid, we split into several groups, with two starting at Cueva de los Piramides, which was basically going right under the

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pyramid. Bill Koerschner was my partner this day, and before long we found ourselves in the room that never ends. It seemed like the pillars continued forever, and we struggled to find walls—and dry spots. The ceiling was about three feet high, and we were in water that varied from a couple inches to a couple feet deep, so most of the time we were stooping. I was very glad for a wetbook for sketching, as I often had to sit in the water and prop the book up on my knees to be somewhat out of the water. We took good care to keep the DistoX dry.

Carol Vesely and Jeff were in another part of the cave and popped



out in cenotes at Kantunchi, another nearby business with snorkeling and diving. They were told they couldn't go into the cave, to which Carol responded, "We're not going in, we're coming out." And then they quickly popped back into the cave and disappeared.

Nick Socky's group connected the nearby Entrada Adventure Baby to Cueva de los Piramides, and Peter's group added passage. Geraldine made the hoped-for dive connection to add Piramides to Sistema Ponderosa, so it turned out to be a productive day. We celebrated by going to the Carmen Beer Company in Playa, which Jeff started less than a year ago. He gave us a tour of the brewery, and we enjoyed good food and drinks.

Deter was great about keeping things interesting, and the next day we headed to Sistema Santuario. Tourists are led through multiple caves, and again we split into multiple groups surveying multiple caves. Frank Bogle and I wanted to do wet caves, so we went to Cueva Olchun, a cave that is used for snorkeling tours. Part of it had been surveyed, so we worked on a miserable section that was quite muddy and warm and tight and made a loop that tied into

other survey points. Then came the fun, with surveying in inner tubes in the wet section. We learned that it can be a bit challenging to stay still to get shots and sketch from one perspective. It was so much fun being in the water, though. Alex Buess joined us to do some diving and was able to confirm survey connections to Sistema Dos Amores (see separate article by Bill Mason in this issue) and Cueva Craneo de Chivo (see AMCS Activities Newsletter 35). The other teams made good progress in their cave to the south, Sistema Ruta de los Guerreros, with going leads still at the end of the day.

So the next day we returned and continued on our leads. Frank and I finished Cueva Olchun. During our lunch break, we met Juan, one of the groundskeepers on the property. He said he was from Chiapas, and told us about staying in caves for two weeks during fighting there. He said they took large amounts of food into the cave and didn't want to come out because government helicopters were circling above. Eventually his group left the cave via another exit, although some people stayed in the cave for four weeks.

Juan took us to a cave entrance that Peter had wanted us to survey. Peter had given us a cable ladder to get down into it, but Juan showed us that it was possible to climb down and back up just using the tree roots. He was about 1.5 m (4.5 feet) tall and maybe weighed 40 kilograms (90 pounds). So he looked at us and warned us that we would need a soga (rope). He repeated that a few times, saying he weighed nothing, so he could use the tree roots. When it was time to survey that cave, we used a handline, and found that quite sufficient. We named the cave Ĉueva Ligero como Pluma (Light as a Feather Cave) in honor of Juan's light weight that had him scampering into and out of the cave so easily. The cave quickly sumped, but we tied into the dive line that was present in the far part of the passage.

That night at Mr. Trompo's we had a big crowd, as nine cavers from Colorado had arrived. They joined us the next day, Wednesday, as we went out in the jungle beyond Kitty Leap. Bill Koerschner and Cheryl Jones worked on sketching Cueva Tepezcuintle Tímido, another cave we hiked through. I took the next cave we stopped at, Cueva Tarantula Hawk, with Dennis Hoburg and Chris Hayes. But before we started, we went with the rest of the group

The Cenote Concha entrance to Sistema Sac Actun. *Frank Bogle*.





Carol Vesley sketching in Kitty Leap. *Frank Bogle.*

to a nearby pyramid and climbed to the top. We then took a look at the impressive entrance to Cueva Basura, which goes right under the pyramid. The pyramid had been discovered only a few months before. A few others went even farther into the jungle to the next two caves, Uts Kalkal and Cueva del Horno.

Back at Cueva Tarantula Hawk, Dennis and Chris pointed out the next stations as I sketched the line plot. This was another cave that had been surveyed by cave divers, but not sketched. It became apparent that it was easy to find the stations, so Dennis and Chris looked around for leads. As they were checking some out to the west, I found a crawling lead to the north. When they came back, we started surveying it, and we made a very efficient survey team, moving quickly until we came to a very tight squeeze. Chris said he loved tight squeezes and made it through, reporting that the passage kept going. Dennis wasn't too sure he could make it, so I squeezed through to see if it was worth it. It turned out there was an easier way around, and the passage did keep going. And kept going and going. We saw more formations and a variety of passage from 3 meters high to 0.5-meter crawls. It felt like virgin cave, and we wanted to keep



going. Eventually we got to our turn-around time, but none of us wanted to leave this cave that was going big and beautiful. We all had such a good time.

The other teams made good progress in their caves, and we all made the hot hike back through the jungle. The landowner invited us for some delicious ceviche and beer, which really hit the spot. After cleaning up, we ate at the marina on the touristy side of Puerto Aventuras, which definitely has a different vibe than the pueblo side.

For Thursday, following a long day hiking, Peter had planned an easier day for us. While the Coloradans, led by Chad Pedigo, were backpacking out into the jungle to retrieve equipment that had been left behind from a previous trip, the rest of us were going to go to caves that tied into the Sistema Sac Actun, the second longest cave in the world. Most of it is underwater. We split into different groups to map cenote entrances that led into the system. It turns out that there was quite a bit of dry passage around each cenote. For Cenote Fenomeno, there was even 360 degrees of passage, all around the cenote, with some nice dark passages. We finished a little earlier, and several of us took

Alexander Buess entering the sump in Cueva Olchun. *Peter Sprouse.*



the opportunity to swim in Cenote Fenomeno, checking out the catfish, bats, and underwater formations. It was a great end to the survey. Bern and Sandy Szulakski arrived that night, and we ate at a different place in the touristy part of Puerto Aventuras. I had developed some rashes from jungle plants, despite wearing long pants each day, so I took a quick trip to a pharmacy and was happy to find Barmicil, a topical cream that treats a variety of different ailments and seemed to help my rashes.

The following day we went back to Sistema Ponderosa at Cenote Eden. I was not too thrilled about going back to the room that never ended, but Bill took the lead with that part of the survey. I went with Sandy to nearby Entrada Adventure Baby, and we started surveying a lead to the southwest. It quickly turned into another

room that never ended. But then we found a wall and followed it and eventually got to a passage that ended. I was so happy. It was funny to be happy about a passage that ended, but not too worry, we

had plenty of leads, and we left the survey at a spot with three large watery leads. This survey was very wet, but again with low ceilings. I think we found one dry spot all day. We even ate our lunch sitting in the water. Fortunately, the water was plenty warm, so we were fine with just t-shirts and pants.

Saturday was my departure day. I was sad to leave, as I had had so much fun sketching these beautiful Mexican caves. My sketching skills had improved quite a bit, and I was delighted to have been thrown so many problems and solve them. The caves in Quintana Roo were varied and delightful.



Bill Koershner and Peter Sprouse in the Kisim Nah entrance to Sistema Sac Actun. *Frank Bogle.*

Before I flew out, I walked out to the highway and flagged down a *colectivo* and went south to Tulum. I visited the ruins, which were worth the visit. I was glad I had gone first thing in the morning, as it is true that it gets crowded. By about 9:30 a.m. there were large tour groups coming through. I took a *colectivo* back to Paamul, finished packing, and then enjoyed just looking out at the ocean. Frank had a flight at about the same time and graciously gave me a ride to the airport.

Other cavers were still arriving for the few days of caving left. There is still lots more caving left to do. I kept looking at the Facebook posts, wishing I could still be down helping. I saw the line plot for Cueva Tarantula Hawk grow, with those delicious leads being pushed. More kilometers were added to several systems.

I was so impressed with the Quintana Roo expedition. Peter has it very well organized. He is welcoming to all cavers, and also great at recruiting new cavers and teaching them how to survey. We had at least five non-cavers help during the week, and it was amazing how quickly they caught on. It was great to get data entered each evening and see line plots immediately and work out any problems. Best of all, there is so much more cave to survey and find. I hope to go back.



The entrance to Uts Kalkal. Nick Socky.

Tammy Otten's article elsewhere in this issue covers the second half of this trip.

March 2017 survey totals

name	March 2017 survey (m)	Total cave length with previous surveys (m)	notes
			Surveys from Cueva de los Pirámides and Cueva Restringida, now both connected to Sistema Ponderosa. Length of system is now based completely on
Sistema Ponderosa	1860	19635	new surveys
Sistema Kantenah	1472		
Uts Kalkal	941		
Sistema Ruta de los Guerreros (Cueva Rancho Santuario 2)	907	2684	
Sistema Sac Actun	812	347552	Dry surveys of the entrance areas of Fenomeno, Concha, Crater, and Kusam Nah cenotes
Sistema Santuario de los Guerreros	732	6563	Ochum and Shango area surveys, system length now includes confirmation of connection to Sistema Dos Amores
K'in Pixan	721		
Cueva del Horno	442		
Cueva Tarantula Hawk	314	517	
Am Ch'uupal	254		
Cueva Kitty Leap	215	1053	
Cueva Tepescuintle Timido	96	464	
Cueva Aleo	78		
Barking Spider Cave	61		
Deer Leg Cave	32		

Marzo 2017, Cueveando en Quintana Roo: Añadiendo Kilómetros de Pasajes de Cuevas

Un reporte de las primeras dos semanas de la expedición de marzo de 2017 de el proyecto de exploración de cuevas no inundadas en Quintana Roo. La topografía incluyó pasajes no inundados conectados a las extensas cuevas subacuáticas Sistema Sac Actún y Sistema Ponderosa.

SISTEMA POOL TUNICH AREA NOVEMBER 2015

Text and photos by Chris Lloyd

This year's return to the Cleoxxo 🎚 campsite over the Sistema Pool Tunich cave system was a smaller affair than past trips [see December 2012 in AMCS Activities Newsletter 36 and November 2013 in number 37], with only seven dry cavers plus two cave divers, but continued to produce kilometers of great cave and more than 6 kilometers of new survey. The first wave arrived on Friday, November 20, with Peter Sprouse, the project organizer, Jennifer Foote, Stan Allision, Malgorzata "Gosia" Allison-Kosior, and I settling into our jungle camp. The first order of business on Saturday morning was calibrating three cave-adapted DistoXs, which required reading through a list of instructions, the first of which entailed a wander around the camping area looking for a spot away from any visible metal. Once that was achieved, Peter assembled a set of PVC tubing to create a square that had perpendicular support legs and facilitated orienting the DistoX during the fifty-six sequential calibration shots. While that was a bit tedious, it was wonderful during the rest of the week to just be able to press one button and get all your survey data in one go. No more worrying about whether someone knew how to read a compass properly; all he needed now was steady hands to point the laser at the survey target, which was a white circular piece of corrugated plastic 10 centimeters in diameter.

With the gear organized and machetes sharpened, all five of us headed north out along the road that runs right by camp to head up

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to the north end of the Pool Tunich system. The good part of the road now only goes as far as the Vasija Entrance, which we had surveyed on the December 2012 trip and is now being offered as part of the cave tours in the Rio Secreto tourist operation. From there onward we had to reopen the old road, cutting our way north with machetes and loppers. With four people cutting this went fairly quickly and would provide access for the rest of the week. The first destination was the Altar Entrance of Pool Tunich, which had some previously surveyed but not sketched passages that Peter wanted to tidy up. While he and Gosia started in the main part of that, Jen and I went back along the wall of the same sink and surveyed in what turned out to be the farthest edge of the same Altar Entrance, leaving Stan to check farther along the host doline for other entrances.

Once Jen and I finished off our bit and had seen the namesake altar, we went in search of Stan, who had chopped his way 100 meters or so to the southwest and found another

large, new entrance, which he left for us to start surveying. This would provide our first of many encounters with biting ants, which we hadn't noticed while meeting Stan, but who noticed us and let us know just as we got into the entrance. Before we realized what was happening, they were all up our pants biting away until we squished them. Jen performed quite the dance, as it had apparently brought back childhood memories of her first experience with an anthill. The cave was essentially a large west-facing shelter cave, with a few smaller slots that went east into a much larger north-facing entrance chamber. We finished surveying the west entrance before having to head back to meet Peter and company at our pre-arranged time for the hike back to camp. Once we were back in camp and relaxing in the swimming pool, Daniel "Matakanes" Nuño showed up, having hitched a ride in from the highway.

Sunday morning saw three teams heading out in different directions. Peter headed off with local





Box Chich Tan Cheé.

cave diver Osama Gobara to try and cut a trail into a skylight over a large sump in Sistema Chango Místico that they had found back in the summer. The route turned out to be more overgrown than Peter had hoped and full of chechen, a local tree with poison-ivy qualities, so they never made it to their destination. Meanwhile Stan and Gosia set off to chop their way over to a couple of promising-looking dolines in the lidar dataset located to the west of the Altar Entrance area. Not far off one of the local property-survey lines they quickly found a pit entrance, which they left for later, and then checked out their target dolines, which had nothing of interest. On their back they found a way to downclimb their pit entrance and found big going passage with water, which they had to leave for the next day.

I headed back to finish the cave we had started Saturday, and with Jen and Daniel fairly quickly wrapped up what we called Booger Convergence Cave, basically just two large entrances with a short through-trip between them. We then started a jungle chop heading northwest to follow the northern wall of the doline to the west of the Altar Entrance, and quickly found another shelter cave, Cueva Guante Perdida, which turned out to be just below the survey line we had come in on. After a quick two-shot survey, we continued northwest along the doline's edge and eventually ran into a very large entrance that turned out to be Cueva Chicleros. It had another Maya alter in one alcove of the entrance, though, unlike the intact one in the Altar Entrance, this one had been dug into by treasure hunters. From there we decided to head straight north toward a couple of doline-like features that turned out to be within an area of corrupted lidar data, so did not actually exist. Once we established that, we looped back around south to get back onto one

of the survey lines and finally came across a nice steeply descending entrance, some 8 by 8 meters and over 12 meters deep. Having a bit of time left, we started surveying in and found a left branch going to a large lake with a small sump in one corner and a right branch that was dry and nicely decorated, but that did not continue very far. The skull of a small goat-like animal complete with short pointy horns gave the name of Horny Goat Cave, though the horns turned out to belong to a local species of Yucatan deer. Once plotted up in the evening, it turned out that this new cave was almost right above part of the underwater Weeping Angels section of Pool Tunich, so was another bit for the cave divers to connect into the system.

n Monday Stan and Gosia returned to their pit entrance, which they decided to call Laughing Grackle Cave (or Cueva Zanate Riendo in Spanish or Box Chich Tan Cheé in Mayan). They spent the entire day surveying without finishing the cave, including some very nice water passage, and they found one section of exposed bedrock that did not have its normal coating of calcite, so they could see the large shells that this reef limestone is composed of. The rest of us headed southwest of camp so that Peter could go with Jen to tidy up some surveying in the Tree Frog Entrance area of Sistema Sac Mul and continue with some new exploration that located two more sumps. Daniel and I headed a bit north of Peter to return to Lord of the Rings Cave, which I had helped survey in November 2013, and follow-up on some leads there. We went in almost to the end of the cave and climbed up a steep wall we had not climbed previously. We went around the corner to find where it came back into known passage. A little farther on, two other leads were followed and found to connect right back to each other, forming a short





loop. So no big breakouts there. We then worked our way back toward the entrance checking off most of the other leads, again with no going passage, but we did confirm there is indeed a passable sump in Gollum's Lake. We then wandered our way back toward the road and managed to relocate the 60- by 80-centimeterwide entrance to a cave about which we only had a note saying there was a line in it. With a bit of time to kill, we started the survey there and crawled down into what turned out to be a very low-roofed but very wide cave passage, likely the lowside remnant of what used to be the bigger passage that collapsed into the doline outside. Daniel scooped along the old line for about 150 meters, then came back so we could start surveying, but we didn't get very

far before our meeting time came up. For the low height we called this one Cueva Bajita, which looks like it will have considerable, though low, sandy-floored passage in it. Since our ride was late, having woken late from his siesta, we ended up walking most of the way back to camp, and Peter was able to give us a lesson in what *chechen* looks like—a little too late, as it turned out, for me.

On Tuesday Daniel and I accompanied Stan and Gosia back to Box Chich Tan Cheé, where they headed northwest in big water passage while we went east in some small stuff. Our first passage turned out to be a loop, as we missed the low crawl onward that Gosia had checked the day before. We then finished off what turned out to be an alcove off the entrance pit, before starting in on a large water passage at the place where Stan and Gosia had headed north. This was much more pleasant, being an 8-meters-wide, knee-deep wading passage that popped into bigger and deeper stuff that looked like it should connect back into the main passage where the others had gone north. But we still had another side passage that headed west. It opened up into another large, going passage that would also require swimming. Our not having a waterproof survey book and it being late afternoon, we called a halt to our work for the day.

Peter and Jen meanwhile had taken Osama out to Cueva Chicleros to have a look at the sumps there, and Peter and Jen continued surveying to the west after Osama



found a breakout that ended up at yet another sump. Our last arrival finally showed up in camp, Jesus (Chuy) Casteñeda, and cave divers David Turner and Laura Battle had their first day following up David's dive line from two years before in the Pool Tunich entrance area of the system. Though we seldom saw them, they were out every day sketching passages previously line-surveyed, as well as laying 440 meters of new line in side passages.

On Wednesday I awoke to a left eye swollen almost shut, likely puffed up by exposure to *chechen*, possibly by my wiping my arm against my face, as my arms both had patches of red rash. At least I could still see, so we had two teams back into Box Chich Tan Cheé, with Stan and Gosia continuing north in their large water passage and Daniel and Chuy accompanying me into the western wet lead. We stopped to tie up a short side passage in the start of the water, and in the space of 5 meters I managed to lose my protractor. A thorough look in the





Jennifer Foote in the entrance to Horny Goat Cave.

water and my survey bag failed to produce it or another one, so I ended up having to hike back to camp for another before the survey could continue. Later I discovered that these protractors—the 10-centimetersquare plastic ones designed by Dan Green—could float if they happened to hit the water flat on. Since there was a bit of current where I likely dropped it, I was probably looking in the wrong place. Nice to know for next time.

Our western wet lead started off in passage 12 meters wide, 2 to 5 meters high, and swimming in 3- to 5-meter-deep water. This is where steady hands for the DistoX come in handy; at over 15-meter lengths it can be tricky to hit the 10-centimeter target twice to make sure your reading is correct. Fortunately there were some shelves of shallower water where we could stand to facilitate drawing and DistoX shooting. After 50 meters the lake finished, unfortunately, in a large dry chamber full of stal, with leads going off to the right, left, and onward. Working our way up through the forest of stal on the right side, we dropped down to the right after 30 meters into another wide swimming passage. Leaving the dry room behind, we swam off in the 12-meter-wide passage, which had a lower roof than the earlier

swim. And again after 50 meters or so it ended, this time in a blank wall in deep water. As we turned around, Stan caught up to us, having finished his leads, and we sent him off to take the right branch out of the big chamber with the stal. We tidied up a side passage that required swimming between stals with about 20 centimeters of airspace with deep water below, but it was just an alcove. Once back in the big dry room, we weaved our way between stals until we dropped down to another lake on the far west side. It appeared to have at least one sump going down under the wall, but no dry way on. So we came full-circle, finishing off the room and all the leads,

leaving just enough time for some photos before hiking back to camp.

Meanwhile Peter had returned with Terri Sprouse and Jen to Chicleros to continue in swimming passage, which proved an adventure for Jen, as she feels she does not really know how to swim. They ended up farther west at another sump,

which when plotted up was straight north from the end of our water passage, with only 150 meters or so separating the two caves. Yet another great lead for the cave divers.

hursday saw the arrival \bot of a few local cavers, so Stan, Gosia, and Daniel took Otto and Tania, the general managers of Rio Secreto, out to do a swimming tour of Box Chich Tan Cheé, during which, with dive masks and underwater lights, they confirmed that the end of our last wet passage was in fact a huge 20-meter-wide by 4-meter-deep sump heading off northward straight towards Chicleros. After the tourists left, Stan led the others chopping to the north, where they eventually found a couple of pit entrances that

could be down-climbed and had big going passage. But they had to leave that cave, previously christened Dios Bendiga Esta Cueva according to the writing on the wall, until the next day so they could get back to camp in daylight.

I took Chuy out to the end of the road, and we chopped our way out to a GPS point above the northwest end of Box Chich Tan Cheé and then followed a northwest trend, which is basically the trend of the overall Pool Tunich system. Beyond a couple of small holes, Pozo Angeles Azules and Pozito Lagartija, Chuy stumbled onto a nice vertical-walled collapse entrance that went underground both to the northwest and southeast. We headed into the northwest side and spent the afternoon surveying nice-size dry passage that ended in a pretty lake, Laguna Apagón, where Chuy decided to take a dip to cool off and managed to short out his primary light. Unfortunately there was no further continuation to the northwest, but we did confirm that the southeastern side dropped into big passage as well, so we had something to come back to the next day.

Peter meanwhile had taken Jen and a visiting local caver named PakoLoa out to Pako's ranch, way

Swimming in Box Chich Tan Cheé.





past SacMul, and surveyed a cave there named Cueva Azomali. As seems to be typical of caves farther away from the coast, it had more relief, with a pit entrance and a floor with a lot of ups and downs. They mapped 564 meters in this, leaving no leads.

n Friday Peter set off with Terri to go finish sketching previously surveyed passages in Weeping Angels, and then they found 20 Minutes Cave a bit south of Horny Goat Cave and surveyed about 100 meters there. Stan went with Gosia and Jen back to Dios Bendiga Esta Cueva and spent half the day surveying there in three main branches, leaving various leads unfinished, as Gosia slipped and fell and badly bruised her ribs and walked herself back to camp. Stan then took Jen back to finish off some small leads in Box Chich Tan Cheé, finding two other pits along the way.

I took Chuy and Daniel back

to Aimless Wandering Cave and went into the southeastern side, continuing along under the drip line from the previous day's survey and completing an almost complete circular entrance. The way to the southeast dropped into a nice large chamber with a lake at the end that looked very promising but ended up being all there was. So we then started chopping-again. Rather than continue the aimless wander, I picked out a big doline that was about 600 meters southwest of our current position from the lidar dataset loaded on the GPS. After about 100 meters or so, we came across one of the property survey lines— mensuras as they are called here—and were able to follow that, which eased the burden of cutting tremendously. And as it turned out the mensura went right past our objective doline and had been pretty much all cleared by someone else for the last 250 meters. Our target doline

was about 15 meters southeast of the mensura and turned out to have a 12-meter vertical wall dropping down into a large lake. Large passage could be seen headed off under the east wall, while trees obscured the view to the south and west. We decided to cut our way around to the east, but after 20 meters Chuy was stopped in his tracks by a buzzing bee. We couldn't figure out where it came from, but figured we had best move back from the pit and continue around farther out. Eventually the bee left us alone, and some 50 meters farther along we found a place where there was a break in the wall and we could climb down to the floor of the doline. The lake did not fill the floor here, so we could walk around, seeing that the lake was some 25 meters across and did indeed head in under the east wall. but it did not seem to continue past 15 meters or so. While we had gotten closer to see that, the location of the beehive became apparent up on the head wall. I took a walk around the other way and found a few small shelter caves before getting under the north wall and reaching the lake again. Nothing going, except another bee scouting me out, just after Chuy shouted out for me not to go any closer to the water due to the bees. I tried standing still for a while, and when that did not discourage the bee, took a run for it, taking, as it turned out, the bee with me. I ended up getting stung in the chest, but I was at least a good ways away from the hive now. After I circled back around the Brown Lagoon to where we had downclimbed and met back up with Chuy and Daniel, another bee buzzed out and this time just went straight for me, stinging me in my left eyebrow. That was all I needed to prompt a run for the far end of the doline and up the inclined side where there was no cliff. Fortunately there was no pursuit by the bees, and we just sweated our way back to camp.

Saturday morning I woke up again shut, this time from the bee sting, but some more pink pills from Jen kept the swelling at a manageable level so that I could still survey on our last day. With Stan and Gosia heading out to tourist a bit in Tulum, we were now down to two teams. I took Daniel and Jen back to Dios Bendiga Esta Cueva to knock off the leads that had been left there. One started with a nice large entrance, keyhole-shaped in plan view, that



dropped vertically into large walking passage. We decided to take the closest lead to the north, which got small very quickly, so much so that Jen astutely realized it was unlikely that I would follow her through the small crawl. But she smartly took a stroll in the bigger passage beyond, and before long she came up behind me from the main passage, having completed a loop that was much easier to enter from the other direction. So we went around the easy way and continued to the southwest in nice red passage that ended just as it was starting to look like it was going big. Completing the loop in the other direction took care of two of the best-looking leads that Stan had left for us, so we headed for another lead to the southeast. It started off well and continued well for a short while before hitting the back wall. That left one decent lead, off the southeastern side of the main entrance pit, that went two shots to another dead end. Leaving a couple small, unappealing leads for the next generation, we called it a day.

Meanwhile Peter had taken Chuy to the south of camp down near the power line to work on Naj Woolis (Round Room Cave). The Paamul Grotto had initially explored this cave years before, and it was strategically positioned between Sistema Río Escondido (2.1 kilometers long) and Sistema Dos Arboles(7920 meters long). All of these caves are in the same alignment as Sistema Pool Tunich, and if connected would extend it nearly to the sea. They mapped 217 meters of passage heading east toward Dos Arboles, still following Gil Harmon's old string, to where they turned around.

Alrededor del Sistema Pool Tunich, Noviembre 2015

Varias cuevas en los alrededores del Sistema Pool Tunich fueron exploradas y topografiadas a finales de 2015.

THE 3D CAVES PROJECT IN MEXICO

Tim Allen

The 3D Caves Project arrived in I Mexico in March 2017 and joined forces with the Groupe Spéléo Alpin Belge's Canica 2017 Expedition. With the assistance of the Belgian group our intention was to laser-scan the La Muñeca chamber in Cueva Tlamanictli. Our group of four, Andy Eavis, Pete Ward, David Rose, and I travelled independently to meet up with the expedition at their mountain camp. We spent four fabulous days in diverse company with Belgian, French, Iranian, and Mexican cavers. We were all enthralled by the success stories from thirty-five years of cave exploration in the area and impressed by the quietly modest approach and integration with the rural community. The chamber had not been revisited since its discovery in 1999. At that time all lighting was by carbide lamps and surveys were made with topofil. It was hard to predict what our state-of-the-art approach would find.

Our project began back in 2011 when we made a laser-scan survey of the Sarawak Chamber in Borneo. It took considerable effort to move forward from this point due to the expense and logistics required to visit the world's largest underground chambers. Not to mention the small matter of finding the right laser scanner for the job and someone who would allow us to take the hightech equipment to remote places underground. National Geographic supported a trip to three chambers in China, and after that we bought our own scanner to continue the project.

A "water-tight" exterior view of La Muñeca created by a program that smoothed a subset of the point-cloud data into a solid surface. The room is 396 meters long, 242 meters wide, and 225 meters high.

The project is headed by Tim Allen, Andy Eavis, and Roo Walters, but hundreds of other cavers from all over the world have been a part of the project too. With the exception of the National Geographic grant for China, our project has been selffunded. It was very unfortunate that Roo was unable to make the Mexico trip, as he has become the most important member of the team. Collecting the data can be accomplished by several of us; processing the data to something meaningful is the hard part and Roo is our expert in this field.

Land final chamber we will visit. Our aim has been to visit the top-ten largest chambers in the world and we have already visited China (five chambers), Borneo (two), France, Spain, Oman, Iran, USA, and Belize. Perhaps more large chambers will be discovered in the future. Our results so far have caused some upsets. Sarawak Chamber was thought to be the largest in the world, but our scanning has proven the Miaos Room in China to be significantly bigger. In Europe we also reversed the top positions, where we showed the Salle Verna to be more than twice the volume of the Carlista. How would things lie in the western hemisphere between Belize Chamber, Carlsbad's Big Room, and La Muñeca?

Prior to our arrival in the sierra the expedition had already rigged the cave. It was a hot walk up to the entrance with all the gear and a relief to get underground out of the sun. The cave drops steeply, following the thinly bedded limestone to over 400 meters deep. There are many short pitches and handline climbs, but none exceed 20 meters. For this trip we had packed the scanner in a special bag that was much more compact than usual for underground transportation. This was because a point on the original survey was marked étroiture soufflante or





A portion of the point cloud from the scanning of La Muñeca. The resolution of the full dataset can be seen in the dots on the flowstone mound at upper left. Fifty-two scans from various points were required because portions of the room were always shadowed from the scanner due to the room's irregular shape or breakdown. For example, details on some of the breakdown blocks are invisible in this subset of the data.

Hugo Salgado and Cedric Clary on the floor of Salon la Muñeca. Gustavo Vela.





blowhole, and nobody knew just how narrow this might be. In the event, it was small but no problem for our slimline padded sack.

The small passage enters the chamber just by chance and has had no part in its formation. At the lower end there is a large crescentshaped area of cracked mud floor. Farther round, a steep boulder slope descends to a pitch, and the deepest point in the cave, -450 meters, is just beyond. The rest of the chamber is occupied by an enormous breakdown slope over 100 meters high. From the top, far-away cavers look ant-like and the sheer scale of the chamber is revealed. Several waterfalls descend from unknown passages in the roof. Pete and I take charge of the scanning while the others explore. Over two trips we cover every aspect of the chamber in

fifty-two scan stations. A GSAB team camps for several nights to make a thorough search in the boulders for a way on, but none is found in the chamber. They also make a new survey with DistoX technology and take photographs. Perhaps the most surprising discovery by that team is a new passage closer to the entrance that heads away from the chamber—it continues.

Our fifty-two individual scans have now been stitched together by Roo. They amount to over 1.1 billion points and over 10 GB of compressed data. To create the overall model, only 10 million of these are used, as normal computers will struggle to handle more. La Muñeca has a volume of 5.9 million cubic meters, which places it fourth-largest underground cave Gustavo Vela.

chamber in the world. This is behind the Miaos Room in China (first), the Sarawak Chamber in Borneo (second) and Cloud Ladder Hall, also in China (third). The maximum dimensions of the chamber are 396 by 242 meters, with a vertical range of 225 meters. These figures await final confirmation and independent verification but are not expected to change significantly. Both Carlsbad's Big Room and the Belize chambers have volumes less than one million cubic meters, so La Muñeca is more of the big daddy than the baby doll as a translation of the name would suggest.

The 3D Caves Project is indebted to the Canica 2017 expedition. The scanning of La Muñeca was only a very small part of another successful GSAB expedition.

El Proyecto de Cuevas en 3D en México

Como parte de la Expedición Canica 2017 del Groupe Spéléo Alpin Belge, espeleólogos británicos escanearon La Muñeca, una galería bastante amplia descubierta en 1999 y que no había sido visitada desde entonces. Fue parte de su proyecto de escanear con lídar los salones en cuevas más grandes del mundo. La Muñeca, en la Cueva Tlamanictli, Puebla, es el cuarto a nivel m.

SIMA CUESTA CHICA

Text and photographs by Eladio Terreros

This chasm is located at Ejido La Pila, Tacotalpa Municipality, Tabasco, Mexico. The property rights are being disputed between two ejidos. The sima's entrance is located at about 150 meters above the road connecting the towns of Tapijulapa and Oxolotán, near the town of Arroyo Chispa (INEGI topographic map E15D31). Sima Cuesta Chica is located in the west slope of the Sierra Tapijulapa above an escarpment. The sima is 12 meters deep and 25 meters long, based on the 2016 survey. The entrance has a rectangular shape 1.10 meters high by 0.90 meters wide oriented at 280 degrees. The cave developed in Upper Cretaceous carbonates. These rocks are middle-size to thick beds of fine-grained, light-grey, dark-grey, and beige compact limestone. The beds are folded to form anticlines and show karst development (Cruz Zavala, et al., 2011:24). The sima can be reached by hiking a rugged, difficult trail between fallow land and a relict of high perennial forest. Vertical gear is needed to rappel the 8-meterdeep cylindrical pit located directly beyond the entrance. A ledge in the middle of the pit eases the descent. At the bottom of the pit, a restricted horizontal space 4 meters long by 1.5 meters wide opens up. Toward the southwest there is a tight fissure that goes down and through which you can see sunlight. In the cave floor there are fragments of limestone, plant litter, thin roots, vines, and dark brown clay-rich dirt brought in by water.

Archaeological material was graphically and photographically documented in the sima's lowest level, and it is described based on its

yayador@yahoo.com Translated from Spanish by Laura Rosales Lagarde. location. In the south-center a burial with bones possibly from two individuals was found. This is a secondary indirect multiple burial (Romano 1974:109). Associated with this burial there are animal bones, *shutis*, a fragment from a metate, an artifact of polished rock, and pot rims of type Sierra Rojo. (Shuti [snails] are very abundant in the cold-water creeks of the Tabasco Range Region. The name of the species is dedicated to the naturalist D. José N. Rovirosa, who collected the first specimens. Different ethnical groups use shutis as food and attribute medicinal properties to them.) Possibly these cultural materials have been moved by animals, water infiltration, and the growth of roots. Irregular limestone fragments were



View of the entrance to the Sima Cuesta Chica.





Above: View from the bottom of the pit, Sima Cuesta Chica.

Below: Panoramic view of the secondary indirect multiple burial and elements associated with it.

Right: Concentration of pottery type Sierra Rojo.





Proyecto "Reconocimiento Arqueológico en Sitios Zoques de los Municipios de Tacotalpa y Tespa, Tabasco y Chapultenango, Chiepas" 5 to : 5 ma Cuesta C n.c. Wunicipio de lacotalpa, Tabasco Planta con la ubiceció nel las exidencias culturales Coundenadas (Des) estabel Coordenadas (Des) estabel Coordenadas (Des) estabel Disujúcit adio increas Lapinosa 183 - Agosto - 2015 Digito (Ed) Englis Lato





apparently set intentionally to hold the cultural materials.

In the north-center another fragment of a metate, two artifacts of polished rock, and a big chip off a round boulder with possible signs of use were found. To the northeast, there is a concentration of pottery type Sierra Rojo, several shutis, a long bone, and a round boulder.

Finally, several cultural relics were collected to be studied in the lab. The lateral incisor from the bestpreserved human jaw was removed and dated at the Mass Spectrometer Lab, Physics Institute, Universidad Detail of a human jaw, rim of pot type Sierra Rojo, and shutis.

Nacional Autónoma de México. The date of the incisor is 1404 ± 40 years B.P.

The reconnaissance trip was supported by Amelia Escobar, teacher from the Universidad Intercultural de Tabasco. Mateo Gómez, from the Arroyo Chispa Ejido, Tacotalpa Municipality, provided some vertical gear: helmets, harnesses, ropes, and descenders.

- Cruz, Zavala, et al. "Degradación y conservación de suelos en la cuenca del río Grijalva, Tabasco", *Colección bicentenario: José Narciso Rovirosa*, 2011, vol. 333, no. C6/9.
- Romano, Arturo. "Sistema de enterramientos", *Antropología física época prehispánica*, México panorama histórico y cultural, 1974.

Sima Cuesta Chica

Sima de Cuesta Chica se localiza en el Ejido La Pila, Tacotalpa, Tabasco, México. La sima mide 12 m de profundidad y 25 m de largo y se formó en calizas cretácicas. Se documentaron dentro de esta sima al menos tres conjuntos con material arqueológico. Est material incluye un entierro secundario indirecto multiple. El entierro incluyen huesos posiblemente de dos individuos. Uno de los dientes fue fechado en 1404±40 años antes del presente. Adicionalmente al entierro se encontraron huesos de animales, caracóles, cerámic tipo Sierra Rojo y cantos rodados, entre otros restos arqueológicos.

SISTEMA PURIFICACIÓN IN FLOOD

Louise D. Hose

1979

URR-CHUNK, KURR-CHUNK, KURR-CHUNK, KURR-CHUNK, KURR-CHUNK. The sound grew louder, resembling an off-center washing machine about to tip over. Joseph and I stared at one another, each hoping the other would explain what was happening. We were in the process of backpacking into Camp I in Cueva de Infiernillo when we were stopped by large sumped passages to the south and west.

Not sure of our exact whereabouts, we had been looking around for a few minutes when a low rumble started. It was easily ignored. But soon the whole passage, 12 meters wide and 10 meters high, was filled with the rhythmic sound. KURR-CHUNK, KURR-CHUNK. The floor seemed to vibrate. There was a pause in our activity as we stared at one another, hoping for a calming explanation. None came.

We said nothing, but both of us were experiencing the same fear. The noise seemed to come from the far wall of the west passage. Could a wall of water possibly be moving up from that passage? Would we soon see a flash flood surge through the cave? There had been 19 centimeters of rain during a recent fifty-hour period. The rain had stopped two days ago, but all the springs were flowing. Could the cave possibly be preparing for a delayed surge?

Rationally it seemed we were safe, but still our minds prepared for such an event. We would abandon our backpacks and sprint for the entrance. If the flood was not too great, we might take refuge on high ground along the way.

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The surge never came and the noise subsided. The cave was quiet again. Drops of water continued to splash in the pools. An occasional gurgling emanated from various places. A soft buzzing sound, like a telephone line on a damp morning, permeated the passage.

Comforted by the relative quiet of the cave, we removed our backpacks and set out determining where we were.

KURR-CHUNK. KURR-CHUNK. Within a couple of minutes, the roar started again. We rushed over to the shore of the west-trending lake as the noise grew louder. Calmed by our previous safe experience with the roar, we tried to observe what was happening. There were no bubbles on the lake, but the water seemed to vibrate slightly. The subterranean lake appeared to be dropping at a noticeable rate, so I placed a markerstone at water level to monitor its regression.

The rumbling stopped after only two minutes, and we were left with the gentler sounds of dripping water, a buzz, and an occasional gurgling. The water level had dropped almost 2 centimeters during those two minutes. We watched the water level drop for another thirty minutes, but the roar did not return. During that time, we determined that we were at the 4-Way Junction and that the Main Passage and the Main Sump passage were underwater. Since Camp I was under 24 meters of water, we took our backpacks up the now-dry east passage.

We found the high-water line along the way. The flood had reached -830 meters below the system's highest point, a rise of 64 meters above the surveyed level of the sumps. The passage we camped in, which is also the main throughway into the system, had been closed before our arrival.

I returned to the lakes in the evening and once again the passage roared. The sound was rhythmic, but different from what we had heard before. It was a low-pitched noise similar to water being drained from a sink. Nonetheless, the sound roared through the huge passage. I sat at the edge of the lake and watched the shoreline. Small waves with an amplitude of 5 millimeters were on the lake. They pulsed in the same rhythm as the sound. I was mesmerized by the sights and sounds around me. The cave was alive, yet gentle and hospitable. The water level was dropping so rapidly that I could observe the change. The water level had dropped 60 centimeters in the previous 80 minutes.

The roar, the buzzing, and the gurgling we heard were apparently the results of rooms and domes opening up to the cave's barometric system. Air was rushing into previously isolated irregularities in the ceiling.

The rain had started on December L 2, 1979. Joseph Lieberz and I were the only cavers in the mountains, and our original plan was to enter the cave on the first. We were delayed and, by a one-to-one decision, chose to sit the rains out in the field house, making daily trips to check stream-flows in the upper part of the system, Cueva del Brinco. The stream activity had been high. The normal trickle of First Stream had a flow of 1.5 to 2 liters per second. Another stream of similar size flowed near the Bat Room, where normally there is no stream. The streams in the cave had been very low before the rain, and the Chute had not been flowing. During the rains, we observed an 18- to 20-litersper-second flow.

We walked around on the surface,

noting the increased flow from surface springs. The night before entering Infiernillo, I had spent several hours in the Tin Can Alley portion of the upper cave [Brinco]. Water was entering the passage from upper feeders in numerous places. The flowstone falls at the end of Tin Can Alley had a flow of 15 liters per second. The cave had a vitality I had never before experienced.

Our hike to Infiernillo had been difficult. A large river flowed through the normally dry arroyo. We found a way to cross on boulders, passing our backpacks three times before reaching the other side. Two springs cascaded down the walls downstream from the Infiernillo entrance. Each spring had a flow of approximately 10 to 12 liters per second. At the base of the cliff below the entrance, two springs gushed about 40 liters per second of water. A large pool below the cave required our carrying our backpacks across the ledge 15 meters above the pool. We shuddered each time we heard a rock fall. The rain had loosened the rocks in the canyon, and there was almost a constant barrage of rocks up to 25 centimeters in diameter

tumbling down the slopes and falling from the cliffs around us.

After climbing into the entrance, we each gave a sigh of relief, believing our difficulties were over. However we soon found the normally dry boulders in the entrance passage to be wet and slippery. Pools of water just beyond daylight required wading. In addition, our camp was cold due to a terrific wind into the cave.

On the morning after our arrival Joseph was not feeling well, so I worked alone checking water levels in the front part of the cave. The Camp I passage sump had dropped 6.6 meters in 18.5 hours. The Main Passage was then open, with only occasional small pools of water remaining. The entrance passage had dried remarkably, and the lake we had crossed was gone. The springs below the entrance were noticeably down.

The following morning we headed farther into the cave. Below the Bucket was a 10-to 12-liter-persecond stream. As we climbed into the large passage ahead, we often heard the stream tumbling through the breakdown on the west side. In



the large passage north of the Breakdown Maze we saw no footprints in the sandy stretches, and a boulder had a distinct, fresh high-water mark 3 meters above the floor.

On the southwest side of the Breakdown Maze, a stream flowed and a froth of bubbles locally covered the floor, walls, and ceiling. I had observed the same phenomena in the Main Passage, noting that it always takes place on one side of small faults but not the other.

To the south, the Isopod River was flowing at least 225 liters per second, much higher than estimates from previous trips. Camp II was nearly completely covered by water. Foggy Mountain Breakdown had no fog. There were various pools in the Wind Tunnels. I checked on the Electronic Sump, which was about 10 meters above its surveyed level. There was no electrical buzzing, but it was making occasional gurgling sounds similar to the retreating Main Sump.

Our venture stopped at the Nile River. The flow in the Nile seemed to be up only a little. A small stream trickled into the Nile a short distance south of the horseshoe bend.

Our hike out during the next day went miserably, hampered by a dense fog. The stream crossing, however, was easier. During the following two days we found water flows in the area to be almost back to normal for December. All springs were dry except the perennial ones used as water supplies. The Chute and Tin Can Alley were both down but still flowing. Below the system, however, large rivers were flowing in the normally dry Cañones El Infiernillo and Hervores.

Joseph and I returned to the lower portion of the system eleven days after the rain had stopped. We were once again startled while approaching the entrance by several unprovoked rockfalls. Inside the cave, the Main Sump had dropped 24 meters since our first visit six days earlier. Camp I formed the shores of the Main Sump. The sounds of the cave were still present, but gentler, and most of the front portion of Infiernillo had dried out, leaving no evidence of the very recent flood. Two weeks later, I returned to the upper part of the system. The Chute was once again almost dry, and the water flow in the Río Verde was only slightly higher than prior to the flood. I stopped at the Canal. Although the water level was at its standard elevation, the Canal had flooded to the ceiling since my trip one month earlier.

The flood in Sistema Purificación was a fascinating experience in observing a small part of the life process of the cave. The rapid, dramatic rise and fall of the base-level sumps provided intriguing clues about the catchment basin and the phreatic system. The experience also gave us some clues to our vulnerability while exploring the system. Although December is thought to be within the dry season and rainfall records back this notion up, Sistema Purificación had definitely been sumped off at both ends in December 1979.

1994

Several cavers in Denver asked me to lead a trip to Mexico before the NSS convention in June 1994, so I organized one to Sistema Purificación. Ultimately the group consisted of Dave Lester, Steve Lester, and Pete Squires. We all knew we were running some risk of being trapped in the cave between the upper and lower sumps during this time of year, but we each decided that the risk was acceptable.

On our trip up the mountain, we found the springs that sometimes emerge from high on the cliff downstream from the Infiernillo entrance and the spring at the base of the cliff at the Infiernillo entrance were flowing, but the volume in the surface stream was less than during my visit in December 1979, so I trusted that sumps were not closing off the lower route.

As we traveled from the Brinco entrance, through the Crack of Doom, and down the Río Verde, I was pleased to note that the airflow was good and the water level was not as high as I had occasionally seen it in the springtime. I noted no differences in the World Beyond. In the middle part of the cave, near the Titan Chamber, we had difficulty with route-finding. I was the only person in the group who had been in the cave before, and my only experience in that part of the cave was a camp thirteen years earlier. During our search, I noted that the airflow had been lost, but thought little of it. After spending many hours searching, we finally napped for several hours and then headed back out of the cave.

When we reached the World Beyond, we were surprised and concerned to find the waterfall at the Hall of Angels double or triple the size it had been sixteen hours earlier. We immediately agreed to move as rapidly as possible to the Brinco entrance. Our earlier thoughts of picture-taking, unfortunately, were abandoned.

The World Beyond was very different than I had seen it before. Places where a drizzle of water had dropped from the ceiling when we had entered were significant waterfalls. Sheets of water flowed over most of the flowstone at the Throne of Oztotl. Volumes of water nearly fire-hydrant size squirted out of the ceiling in several places that are usually dry. I felt a slight current as I swam in the long canal.

When we entered the smaller passage leading from the World Beyond to the Canal, my heart sank as I realized that there was absolutely no airflow. I was certain that the Canal was closed. I swam out alone and found the water and ceiling meeting. I was even uncertain of the depth of the subtle bathtub rim of calcite that marks the low-water level. As I left the water, we hung a piece of flagging tape to the water's surface to monitor its fluctuation. It was about 8 p.m. on Friday, June 17.

We returned to the sandy area where the old route and bypass route to the World Beyond split. We stripped off our wetsuits and laid them out as ground pads. We had several trash bags that we used to cover the wetsuits and protect us from their dampness. We donned the dry clothes we had carried to leave through the Infiernillo entrance. Unfortunately, they were little more than T-shirts and jeans. We checked our rations and found food and especially carbide lower than desirable. We ate about one-third of the remaining food and conserved our light. We then settled down for a night of sleep under our only rescue blanket. The four of us cuddled tightly together, occasionally rotating the center person depending on who was the most chilled. During the night, I slept very little, but about 2 or 3 a.m. I noted with pleasure that there was once again a faint breeze in the passage.

Around 7 a.m. on Saturday June 18, eleven hours after we had first reached the Canal, I checked the flagging tape and found that the Canal had dropped 42 centimeters and was then only 4 centimeters higher than the low-water mark. We returned to our bivouac site, packed for the trip out, and put the wetsuits back on. I swam into the Canal first, and when I was certain that it was open, I called to the others to follow.

The trip up the Río Verde was challenging, and we didn't really relax until we were past Flowstone Falls. The water was still high, and, especially with no belay, we were not able to climb up the usual route in the middle of Flowstone Falls. We stayed far to the left and had to literally feel our way, as it was impossible to look up into the cascading water. I was tempted to leave my duff to be retrieved at a later time, but we knew that we were already going to be overdue at convention and that we had to leave the mountain immediately. We all continued to carry our packs.

The water in the Crack of Doom was only slightly up, and the only change in the Historic Section was that First Stream could be heard from the usual route above. We emerged from the cave to daylight and learned from the local residents that there had been a heavy rain from about 9 a.m. to 9 p.m. on Friday. Thus the rain had stopped soon after we reached the Canal.

The Infiernillo entrance was clearly visible as we drove down the mountain near dusk that night. With my telescope, we saw a small cascade of water emerging from the entrance. Clearly, the lower sump was still closed, and we had been very lucky not to have found our way through the middle cave and into Infiernillo. Soon after we packed the telescope away, a heavy rain accompanied us down the mountain, and we had to wonder how long our window of escape from the flooded Sistema Purificación had lasted.

Sistema Purificación Inundado

Reseñas de testigos presenciales de la peligrosa inundación en el Sistema Purificación, Tamaulipas, en 1979 en la entrada Infiernillo en la zona inferior y en 1994 cerca de la entrada Brinco en la zona superior.



Scorpion from the La Grieta section of Sistema Huautla, Oaxaca. Nikki Fox.

EXPLORATION BEYOND THE SUMPS OF REDBALL CANYON

Andreas Klocker

I had the chance of joining an expe-dition with the aim of extending Sistema Huautla, situated in the Mexican state of Oaxaca. Sistema Huautla is one of the largest and deepest cave systems in the world, and probably one of the most beautiful. Apart from a British expedition in 2013 to dive the most-downstream known sump, Sump 9, also known as the Mother of all Sumps, many years had passed without any significant exploration taking place. This was in 2014, the beginning of a ten-year project called the Proyecto Espeleológico Sistema Huautla (PESH, www.peshcaving.org), whose aim it is to restart exploration of this cave system and extend it from the approximately 64-kilometer length and 1545-meter depth to over 100 kilometers in length and a vertical mile in depth. Before the successful expedition in 2014 was over I knew I wanted to come back the following year, but this time with a particular project in mind.

For me, one of the most exciting challenges in caving is to push virgin cave behind sumps. Many sumps tend to remain unpushed due to the lack of cave divers who have the drycaving skills required to explore beyond. So there is still lots to be done with potentially big rewards. In that respect Sistema Huautla has more of this kind of potential to offer than most other caves I have heard of. The big projects I have been thinking about for some time are the Huautla Resurgence [see article in this issue] and the Cueva de la Peña Colorada, the active and fossil resurgences of Sistema Huautla, with the long-term

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goal of connecting them to Sump 9, thereby substantially extending the depth and length of Sistema Huautla. Both have major leads but had not been visited for decades, mainly due to the remote locations and the lack of cavers with the right skills. I also knew that my personal diving skills, especially on the rebreather, needed some more polishing, so I opted to leave the resurgence end of Huautla resting for another year and instead find a project that involved slightly less challenging sumps higher up in the cave system. So on one of the final days of the 2014 expedition I talked to PESH expedition co-leader Bill Steele about some possible projects, and he mentioned an undived upstream sump that had been found in 1979 in the western branch of Redball Canyon in the Sótano de San Agustín part of Sistema Huautla. That sump discharged large amounts of water and was close to the one in the eastern branch of Redball Canyon through which San Agustín had been connected to Li Nita, making Sistema Huautla one of the deepest caves in the world at that time. It gave the impression that there was a good chance to find lots of amazing cave passage beyond.

Hence right after the 2014 expedition American cave diver Zeb Lilly, who was one of my main caving buddies during my first expedition to Huautla, and I started to plan a push in Redball Canyon in 2015. The plan involved heading into San Agustín via the Fools Day Extension, which had been discovered on April 1, 1987 by Mark Minton, Doug Powell, and Bill Steele and which presents the shortest route to Camp 3 from the surface, and working out of Camp 3 to push the sump. On the

map the sump we wanted to dive is the upper sump in Redball Canyon; the lower sump, the -1030 sump complex, is the sump connecting into Li Nita. Luckily expedition leaders Bill Steele and Tommy Shifflett organized all the gear necessary to rig the cave, camp in the cave, and aid-climb up into Redball Canyon and, if necessary, beyond the sump. The other lucky coincidence was that the route down the Fools Day Extension had been fully re-bolted by the British expedition in 2013. This left Zeb and me with planning the dive gear, which was enough of a challenge, since we had no idea how long or deep the sump would be and what the cave would do beyond the sump. The only thing we knew was that the sump connecting San Agustín to Li Nita was about 50 meters long and very shallow, so we were hoping for similar conditions in this sump, but every caver knows that caves can do unexpected things, and we wanted to be prepared. We therefore talked to Bill Stone and the US Deep Caving Team (USDCT, www.usdct.org), who generously lent us both open-circuit sidemount gear, including carbon-fiber tanks, and Poseidon MK VI rebreathers in case the sump turned out to be long and deep. Lamar Hires from Dive Rite (www.diverite.com) also helped out by generously donating several sidemount harnesses, reels, and lights. Leading up to this trip, we accumulated eight cave divers who were prepared to join this project, half from Australia (Sandy Varin, David Bardi, Liz Rogers, and me), three from the US (Zeb Lilly, James Brown, and Jean Krejca), and one from Romania (Victor Ursu). Since the expedition would have almost



fifty cavers participating over a period of five weeks, we were hoping to have enough help to rig the cave and ferry gear.

 $\ensuremath{\mathbb{S}}\xspace^{0}$ a differ a year of planning and a very long journey on planes, buses, and taxis, I arrived in the fieldhouse in the village of San Agustín Zaragoza forty-eight hours after leaving my home in Tassie. To my surprise, I was told upon my arrival that Corey Hackley, Stephen Eginoire, and Steph Davlantes had already rigged the cave down the Fools Day Extension, a series of about twenty-three short pitches, to the top of the Bowl Hole Series. We decided that this same team would continue to rig down the cave while I, at the time the only diver present who knew what dive gear needed to go into the cave, started organizing people to haul packs towards Camp 3. This was when I first noticed that some expedition members obviously hadn't done that much SRT,

looking at pitch heads and rebelays as though some cave alien was staring them in the face. Nevertheless, with a bit of patience we managed to get a fair amount of gear staged at the end of the Fools Day Extension and partway down the Bowl Hole Series. At the same time, the rigging team continued down the Bowl Hole Series until they ran out of rope just before they touched ground at the bottom of the amazing Space Drop, an 80-meter free hang. Due to low energy levels, they then decided to bivvy in the Bowl Hole Series, where they also managed to find a stash of rope that must have been left there by the Brits in 2013, and so the next morning they used that rope to continue making progress toward Camp 3.

After two day-trips hauling gear down the first part of the cave, Matt Tomlinson, Chris Higgins, Mike Green, and I planned on a camping trip to move gear all the way to Camp 3 and do a recon into Redball

Canyon. The descent went smoothly apart from some terrifying moments on the Space Drop, which was rigged with the old rope found in the Bowl Hole Series. On descent it sizzled like bacon in a frying pan, with the descender becoming covered in the orange color of the rope by the time people reached the bottom. On ascent it turned out to have enough sheath slippage to make most cavers' spines shiver. Nevertheless, once our nerves had cooled down, we planned to exchange this rope on the next trip and continued down the Upper Gorge. This part of the cave was by far the most amazing cave passage I have ever seen, with a huge stream cascading down a canyon with perfectly polished limestone walls-very sporty with lots of short pitches, climbs, and swims, especially if your pack is loaded with a hammer drill and lots of hardware. Soon we arrived at Camp 3 in the Sala Grande de la Sierra Mazateca. This camp sits
about 70 meters above stream level in a huge chamber with a soft floor and some boulders, making it an extremely comfortable cave camp. In years past cavers put a lot of effort into moving flat rocks together to form a circle of seats and stone towers—a place known as Stonehenge. This is where we set up our kitchen, with the holy percolator at its center to keep caffeine levels from dropping dangerously low.

A fter we set up camp, we did a quick tourist and photo trip into Anthodite Hall, which is the largest chamber known in Sistema Huautla and only a fifteen-minute trip up one pitch from Camp 3. What can I say—it's big, beautiful, and has some nice formations, but the canyons with active streamways such as the Upper Gorge are what really get me excited.

I didn't have to wait long for more streamway action—the next day we started into Redball to rediscover parts of the cave first seen in 1979. The entrance to Redball is a roughly 15-meter pitch next to an impressive waterfall, and from this point on there are very few occasions where it is possible to avoid water. Once in Redball Canyon we noticed that this part of the cave is more complicated

than we assumed, which shouldn't be much of a surprise since the original sketches of Redball Canyon are hibernating in some dusty survey pile in someone's filing cabinet and the only map we had was an artistic version drawn by Barbara am Ende for the book she wrote with Bill Stone on the 1994 expedition into San Agustín. Nevertheless after a while we got our bearings, found the sump connecting San Agustín to Li Nita, and were stopped by an aid climb heading toward the sump we planned on diving. On the way out of the cave the next day I bumped into Andy Chapman, a good friend of mine from the UK—I actually heard his unmistakable Yorkshire accent long before I saw him-who was taking my Aussie caving buddies Sandy Varin and David Bardi, who had arrived the day before, for a warm-up trip down the Fools Day Extension. While I was enjoying a cold beer in the fieldhouse after several days underground, Dave and Sandy had some exciting moments ascending the Jungle Drop, a very scenic entrance pitch, but due to its low angle, loose rocks, and copious amounts of mud probably the most challenging pitch in the cave. While David ascended, he dislodged a rock that damaged the rope without



anyone realizing it. When Sandy then followed, her heartbeat must have slightly accelerated when she saw that the rope was now held together by only a few strands of the rope core. Luckily she doesn't weigh anything.

€ adly our next push trip got de-Dlayed since a proper rainstorm hit the region, making the Upper Gorge impassable. Two days after the rain we tried to get through, but in the Bowl Hole Series we bumped into Chris Higgins and Mike Green, who had tried to get to Camp 3 themselves for some photography. They told us that water levels were still three times normal and thus way beyond what anyone would try to pass through in the Gorge. At the same time we were told that a Mexican team was stuck in nearby Li Nita due to high water levels, but luckily they managed to leave after several days, after the water level dropped and before running out of food.

After a couple of extra rest days enjoying food at Rosita's restaurant in Huautla, tasting the local mescal, and sucking up all the sunshine we could find, it was time to head to Camp 3 for the next push. This time it was Andy, David, Sandy, and I heading down as a team. The trip down went well until the Upper Gorge, where Sandy did some of her caving magic and somehow managed to get her gumboot stuck in one of the water pools with her head not too far above water level. With the help of both David and me, she somehow got extracted and also managed to save the gumboot, but by this point Sandy's energy levels were slightly below ideal; this was Sandy and David's deepest cave trip so far. Nevertheless, after the use of some colorful language and Sandy's trying to convince me that a 200-meter dive was easier than "this dry-caving thing," we made it to Camp 3. The next day, while David and Sandy were recovering and touristing the bottom of San Agustín, Andy and I started aid-climbing up Redball Canyon. The thirty-year-old

The San Agustín entrance from the Fools Day Extension. *Dave Bunnell*.

memories of the previous explorers told that we might need a bolt here or there, but nothing serious. I would now say they either lost their minds, had much bigger balls than I do, or some combination thereof. After the first climb, ten bolts or so, we continued up the stream and found a waterfall pitch with a large pool below. Luckily I could free-climb this and put some bolts in from above. We then called it a day and went back to camp, where we were soon joined by Gilly Elor, Kasia Biernacka, and Adam Byrd. They arrived with some more gear, including some real food (salami!) and mescal. After a very social evening and a late start in the morning, David, Sandy, and I headed back to continue where Andy and I had stopped the day before. After another free-climb up a waterfall that I subsequently bolted and after some more exciting canyon passage, we popped out into a larger room where the continuation went up a steep ramp. After putting in some handlines, we were suddenly stopped by both the drill battery going flat and running out of rope about 10 meters of exposed traverse and three bolts from where we could see the passage continuing. Trying not to be too frustrated, we turned around, and we headed for the surface the following day, leaving the

Derek Bristol and Adam Byrd climbing in Redball Canyon. Kasia Biernacka.



continuation to Zeb Lilly, Katelyn Mahoney, Derek Bristol, and Victor Ursu, who had arrived at Camp 3 in the meantime to take over.

wo rest days followed with the now standard activities-head to Huautla, have real food such as delicious chicken rather than the freeze-dried stuff at Camp 3, and then enjoy evenings with a *cerveza* and some (or a lot of) mescal on the roof of the gear store with an amazing view of the San Agustín doline with its clouds above. Then it was time to head back in with David, Sandy, Andy, and Liz Rogers, who had just arrived. Since we had no communication with Camp 3, we had no clue what had happened down there the last few days, but hoped that Zeb and his team had found and cracked the sump. Once in camp we got mixed news. Zeb had cracked the sump, which was approximately 30 meters long and less than 5 meters deep, only to find a second sump immediately beyond. We were also told that the point where we had stopped on our last push, running out of battery and rope, was the last bit of aid climbing before the sump. Maybe our sacrifices to the cave gods hadn't been sufficient. Nevertheless, the next day we headed to the sump,

> and I got ready to dive. And what a dive site it was! Most sumps I had dived previously started in a cold, muddy, tight, unpleasantlooking pool, but here the water looked clear, the gearing-up spot was a beach with clean gravel, and the sump was surrounded by conveniently placed limestone shelves that we used to store gear-definitely a sump-diver's dream and more like a cave-diving entry found in North Florida. The sump then continued in a very pleasant way, and a few minutes later I surfaced on a gravel slope with Sump 2 continuing just a few meters on over a little gravel island. So I tied off my reel and pushed into no-man'sland with the adrenaline

pumping. As in most parts of this cave progress was easy. The second sump stayed shallow, was spacious, and was almost like someone had formed the rock to make tie-offs for my guideline as trivial as possible. The second sump ended up being about the same length as the first, but even more scenic. I surfaced in a rift with again a conveniently placed shelf to store my gear; I could get used to this. Nevertheless, even though the exit from the sump was pretty damn good, at this point I was very aware of being there alone. Dropping any part of my gear into the sump would have been slightly less than ideal. Anyhow, I de-kitted and pushed on . . . at least a few meters until the expected happened when pushing upstream: the cave went up, in a pitch sort of way, with lots of water flying over the pitchhead. This marked the end of this solo push, and so I returned.

he next day David, Sandy and I decided to return with a full set of aid-climbing gear to tackle the climb. Despite having large packs full of hardware, including a drill in a dry bag, two sets of dive gear between the three of us, and using a diving technique comparable to Michael Jackson's moonwalk, we all made it to the other side without major epics. Challenge one ticked off, we then turned our attention toward the aid climb, when we noticed that the dry bag with the drill had flooded. Luckily it was a good German Bosh drill, not a Chinese copy, and after we shook the water out of it, it fired up again. Not that the next part of the game was less challenging for either the drill or me—needless to say the aid climb was very wet. But somehow, with my diving mask on, some freeclimbing moves, some bolts, and several useless attempts to keep the drill dry, I made it to the top and rigged a pitch with several rebelays to keep us out of the main waterfall. Sandy and David quickly followed, and we all ran up the streamway full of virgin-cave fever until we got stopped by Sump 3-shit! We knew that to carry the dive gear up here from Sump 2, do this dive, return, and then carry everything



back to the previous sump and do the return dive would be tedious, so David used his big balls (virgin-cave fever : common sense = 1 : 0) to try and free-dive it, with Sandy using her Scurion to mark his way back. Luckily the sump was short, and David made it to the other side and back. Scraping together our leftover bits of common sense, we then put rope through this sump, both as a guideline and to make hauling packs while free-diving a bit easier. The best way turned out to be to get a diver through first, weight the packs so they were negative, and then use the rope as a tyrolean to pull the packs through. The other side of the sump was a big lake, in most parts just a slight bit too deep to walk in and hence an interesting swim with heavy packs and survey gear that needed to stay dry in our hands. Once we got out of the lake, it was time to enjoy what was probably the nicest cave section I've ever explored. We were in a big room with lots of calcified floors and waterfalls coming down balconies built with flowstone. Immediately we started to follow the water upstream, where I did several interesting free climbs I wouldn't recommend anyone to repeat (virgin-cave fever : common sense = 2:0, until we came to a section that definitely needed to be rigged.

With more aid-climbing gear and ropes in our packs, Liz and I returned the following day to

survey the part of the cave we had found the previous day and continue following the water upstream. Going upstream in a vertical cave, needless to say we climbed and climbed and climbed over endless slippery flowstone balconies. I rigged two ropes at the drops I had free-climbed the previous day, which looked much scarier once the virgin-cave fever had dropped off, then bolted a very exposed traverse and climbed up more flowstone until reaching an approximately 12-meter climb that definitely was not free-climbable. With me running low on energy, we then returned to Camp 3, where I enjoyed a rest day while David and Sandy returned beyond the sump to get some footage with their GoPro. The day after that we headed out for sunshine.

t this point we knew time was Arunning low and the cave was getting big, so Zeb and I planned to do two more large push-trips, with helpers David, Sandy, Paul Winter, Gilly Elor, Adrian Miguel Nieto, and Scott Wahlquist heading into the cave a bit later to help us ferry gear toward the surface. The first day we descended from the surface to Camp 3, had a quick snack, headed through the now very familiar Redball Canyon to the sumps, dived the sumps, and continued to the place behind the lake where we had left some gear the previous trip. Plan A was to first survey from this point to the current end of exploration, but sadly Corey Hackley dropping into the Upper Gorge. *Stephen Eginoire*.

the DistoX disagreed and went on strike. Hence we went with plan B and headed to the current end, where Zeb did the aid climb. Zeb being an aid-climbing speed machine, we soon continued farther upstream, rigging some small pitches and handlines along the way. The cave was getting more and more spectacular with insane amounts of flowstone, waterfalls, lakes, and flowstone slides into clear blue Jacuzzis. I don't think cave exploration can be much more exciting than this—maybe with cave mermaids in the pools? Sadly the turning point was again set by the amount of drill power we had, though the cave looked like it was flattening out above. By the time we got back to Camp 3, both Zeb and I felt slightly more than worn out—absolutely wasted might be a better description. Nevertheless, we somehow managed to get some food into ourselves before crashing, hoping that we'd have enough energy for what was going to be our last day of pushing behind the sump.

Knowing that we really needed a good survey, we returned with a second DistoX and backup old-school survey gear, which turned out to be a good decision. Apparently Leica does not make their tethers caveproof, which resulted in the DistoX taking an untethered way down the pitch that Zeb had bolted the day before. Needless to say this resulted in the DistoX's immediate death. So we got out the tape measure (what an awful piece of gear), and while Zeb was sketching I swam and climbed up the cave with the tape measure between my teeth. Just before the point where we had turned around the previous day, we rigged two shortish drops into a dry offshoot of the main passage, where at the end we looked down onto an amazing flowstone river. Since we felt like this place was just too beautiful to damage, we left it untouched and built a permanent survey station at the beginning of this dry offshoot. Nevertheless, above the final pitch onto the flowstone river was a dry space that could be used as a camp or staging place. After leaving this dry





Derek Bristol on the waterfall pitch into Redball Canyon. Kasia Biernacka.

offshoot, we reached the sad point of the trip where both the time and energy levels told us it was time to turn around and leave the rest of this amazing cave for a future trip; I hope I will be back to continue at some point.

Now it was time for a good night of sleep before the hard days of dragging gear out of the cave. The next morning we all ran up Redball Canyon one last time to carry all the

gear toward Camp 3. We then dropped all the dive weights and some stainless bolts and hangers next to Bill Stone's hydrogenerator, a leftover from the '94 expedition, where they can easily be found again for a future trip, followed by three runs up and down the Upper Gorge between Camp 3 and the –620 Depot until all bags were at the 620 and the ropes had been removedthanks Paul Winter and Adrian Miguel Nieto. After a very rudimentary camp at the -620 Depot, we all took as much as we could carry and headed for the surface, where we bumped into Scott Wahlquist and Tommy Shifflett, who came down for a day-trip to help us with the bags.

The next few days were then spent doing several

day-trips down to the -620 Depot to get the remaining bags and derig the cave. Luckily there were lots of people helping, and all the gear made it out of the cave, including several ancient 11-millimeter ropes from previous expeditions, super heavy and so stiff you needed a hammer to remove the knots. We also used the last few days to enter the survey data to see how what had been found fitted into Sistema Huautla and where the new parts of

cave behind the Redball sumps were leading. To everyone's surprise the cave didn't head toward the north as most people had expected, but cut back to head south. Overall, though, the horizontal distance of 580 meters of new survey was quite short considering the vertical distance of almost 200 meters that we climbed. At the point where we turned around, the cave seemed to be becoming more level, and we were still following the full amount of water that goes through the sumps farther down, so the prospects for pushing this lead toward the surface are insanely good.

Then it was the sad time in this expedition to pack up and head home. We'll be back.

All this exploration behind the three Redball sumps would have never happened without the help of many cavers. So thank you to (in no particular order) Sandy Varin, David Bardi (two of my best caving buddies in Oz, now die-hard deep cavers), Gilly "Gillymonster" Elor (who wants to challenge her in a pack-carrying competition?), Andy Chapman (with special thanks to him for his patience in improving lots of rigging while using his very colorful Yorkshire accent), Zeb Lilly (a damn good caving buddy and great surveyor, which also meant I didn't have to make my dreadful sketches) and all the others mentioned above.

Exploración Más Allá de las Resurgencias del Redball Canyon

Buzos penetraron en 2015 tres resurgencias río arriba en el Redball Canyon en el Sótano de San Agustín, parte del Sistema Huautla, Oaxaca. Una vez cruzados no fue posible continuar la exploración y al final de la expedición permanecieron como incógnitas.

THE CURSE OF THE MAZATEC CRYPT?

Text and photos by Ron DeLano

was resting comfortably in my Lhospital bed when a bright young medical student entered my room and sidled up to my bedside. He was donning full face mask, gown, and gloves, and his face showed real concern. "I've just read your case history and must tell you that it sounds a lot like a medical-board question. 'A 61-year-old white male returns from a cave-exploring trip to Mexico with the following symptoms ' " This was my third day in full-code isolation at St. Charles Hospital in Bend, Oregon, and the doctors still had no firm diagnosis. And until they did, they weren't taking any chances.

Of course this story begins a period of time before, and specifically about three weeks before. But before starting, I want to state the fact that I have been cave exploring with friends in Mexico, specifically in the state of Oaxaca, for fifteen years and have made it a point to be secretive about our endeavors. While reports of difficulty gaining permission to explore in this region are widely publicized, our experience has been quite the opposite. And as a dear friend of mine likes to say, "if you don't have permission, you don't have anything". We've learned that this primary directive takes time, patience, mutual respect, and cultivation of these local communities. These relationships can be delicate, but they flourish when the rest of the caving community respects our desire to enjoy quiet non-interference. With that said, I respectfully ask that this wish be honored by the caving community. You'll also surely understand that I'm leaving out many of the important details from our expedition report for this reason.

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The goal of this year's expedition was to follow up on last year's recon trip to a small village in our study area. We had been shown about thirty caves on our previous trip, and five of these appeared to have good potential for continuation. The *pueblicito* is situated in a hilly, mountainous area, is sustained by ranching and farming, and is actually nestled right in a sink valley. This difficult terrain requires most farming to be done by hand labor.

As we were settling in to our quarters, I suggested to our rookie cave explorer, "Justin," that we take a quick tour of the big cave some fifteen minutes away. But as we opened the gate at the edge of town to access the pastureland, a young woman began beseeching us with a story having something to do with a pregnant dog and *perritos*. I didn't quite catch her full story but asked her to show us what she was talking about. Some twenty minutes later,

we had been led to a small pit maybe 7 meters deep. Along with some trash in the sinkhole, we could see a medium-sized, shorthaired brown dog. Ah ha! She claimed that the dog had been in this hole for one to two months and they have been throwing food down the hole to feed her. I sent Justin back for a rope and vertical gear (one of the perks of being a project leader), and within an hour he had descended into the sinkhole and placed the dog in his extra-wide cave pack. I hauled the dog up, and she promptly shot into the bushes as soon as I opened the pack. Fortunately, the young lady and her family members quickly gathered her up. The second load was a pack full of four newly born, blind puppies. They all survived the ordeal, and all were reunited successfully. Becoming local heroes for our good work wasn't a bad way to start our trip.

The fun thing about this kind of caving is that there's a lot of variety. Over the next two weeks, we explored several pits and explored a beautiful water cave with swimming and low duck-unders, and we mapped a spacious insurgence cave with a few short climbdowns and lovely scoured passage. We followed a stream to a cave entrance that led to some sporting caving (does the wet suit you?), and we were shown some new caves. Of course, many of these leads turned out to be disappointing, but we always appreciate the help of the locals none the less, because you never know when they'll show you the Big One. Overall, this was another successful trip, with



good-enough prospects for a return.

Two days before my flight home, I started having sneezing fits, and my sinuses were draining full force on my flight. I had a rest day before going back to work, but this didn't seem to help. I started to develop severe muscle and joint pain, complete lack of energy and appetite, and extreme thirst. But the worse symptom by far was the inability to maintain body warmth. Even getting out of a hot shower in a sun-lamped bathroom would cause immediate shivers. The symptoms climaxed five days later. Superimposed on these symptoms, I spent a sleepless night with an extreme headache and a shooting earache that hit every 30 seconds or so. I was so thirsty that I would drink water, have to pee every fifteen minutes, and return to bed shivering to warm up again. But sometime in the predawn hours, I experienced an abrupt change in symptoms. I fell into a deep, cold sweat that soaked the sheets and drenched my tee-shirt. Just moving my head would send sweat splashing about. This cold sweat turned out to be a true blessing in disguise, however. I'm not a churchy sort of person, but this night sweat truly felt like the healing touch of God. Essentially all my symptoms disappeared after this two-hour sweat. I was weak, of course, but I felt otherwise





pretty normal and pain free for many hours. Symptoms returned again that evening, although the joint and muscle pain never did return. The next morning I visited my doctor, explained my history and symptoms. She was baffled and ordered some blood tests. I specifically asked for a zika test, given my exposure history. She called the next day to report liver and kidney failure and recommended immediate hospitalization, which I immediately consented to.

At age 61, I'd been fortunate to have never spent a night in a hospital, and for me it was a most interesting experience, especially in

full-code isolation. Except for Tylenol for night headaches (they didn't make a dent) and an IV to hydrate me, I received no actual treatment. Instead, endless tests were run, including a dozen blood tests, vital signs, long swabs down the nose, and chest X-rays. And still no diagnosis. I was asked whether I was bite by a dog (no), did I engage in HIV-risky behavior (again no), was I exposed to ticks (most probably), and every other sort of health question. I heard many possibilities bantered about, including rabies, malaria, auto-immune disease, exotic flu strains, leishmaniasis, and a host of other diseases. I didn't actually meet the

head of infectious disease for the hospital until day two. Dr. Carmen Sherer was most pleasant and the first to hint at any real answers. She was leaning toward a tropical mosquito-borne virus such as zika, dengue, or malaria. She also mentioned chikunga as a possibility. On day three, they decided I didn't have the profile for malaria, which actually has a treatment, and probably didn't have dengue because my platelets were normal. Dr. Sherer made a special request to the CDC and received approval to do advanced molecular testing for zika, dengue, and chikunga. According to her, the CDC is considerably more accurate than a commercial lab. Unfortunately, testing takes one to three weeks. It was determined that I was not a contagious risk and that further hospital care was not providing anything of value for actual treatment. It was decided that I was safe to be released from the hospital.

My symptoms, specifically headaches, difficulty staying warm, and extreme thirst, were always worse at night and were always followed by a night sweat that brought nearly instant relief. Upon returning home, however, the headaches vanished, only to be replaced by unbearable lower-back pain. After two agonizing nights, I went to the ER, where I was readmitted for the night. This time they ran more tests, including a back MRI and a CAT scan for kidney stones. I was given morphine and needed a second dose around



3:00 a.m. Again, the morning night sweat worked its magic. After this second stay in the hospital, these acute symptoms gradually lessened over the next week, becoming nearly undetectable at this point. Liver and kidney functioning are gradually improving, and I should expect a full recovery. However, I am presently at about fifty percent physical strength, so that a couple hours of yard work wipes me out. Mentally, I'm not as sharp as I am normally, losing maybe twenty points of IQ function, but this too is improving daily.

The final diagnosis will be important to determine. Zika is usually mild and self-limiting, but if

I were starting a family, this would be a real problem. If it is dengue, a second exposure could be worse than the first, and a third exposure could be fatal. If it really is dengue, my Mexican caving career is probably over. And if it is chikunga, I'll actually have some immunity to future exposure. I'll keep you posted.

At least this is what science knows. The one detail of our expedition I have deliberately postponed is the fact that we came upon an undisturbed ancient human ossuary essentially a crypt. We encountered eight human skeletons, including one child. All of them were placed in repose intact and with legs and arms splayed apart. All but one. One skeleton was placed in a small niche at the edge of the room. Every skull was broken, either from decomposition or perhaps human sacrifice, a possibility especially suspicious given the tool left behind. The room also contained several types of artifacts. But I'm not an academically trained archeologist, just a caver looking for answers to a mystery. Is my affliction just a tropical virus? My sense is that science doesn't have all the answers. Who am I to say that this isn't actually the curse of the Mazatec crypt?

There is a seventeen-minute video by Ron DeLano from this trip on YouTube at https://youtu. be/4KuIGLFqXqc. There is a short report on his group's 2015 trip in "Mexico News" in AMCS Activities Newsletter 38, page 8.

DeLano is the principal author of the Lechuguilla Trilogy of books about his and his friends' explorations in that cave. Privately published as e-books, they are available from the usual sources.

¿La maldición de la cripta mazateca?

Al final de una expedición exitosa en la zona norte de Oaxaca en 2017 el autor cayó gravemente enfermo y la causa nunca fue determinada, pero ya recuperó la salud. Durante la expedición se encontraron esqueletos humanos en una cueva.

CUEVA KANTENAH AND OTHER ADVENTURES

Tammy C. Otten

\avers came and went throughout ✓ the spring expedition to Quintana Roo, but the caving continued. On March 26, 2017, we all met at the taco stand as usual for some delicious fresh juice and tacos. Peter had met another person in the area who had "holes with water" on his property and wanted them checked out. We met the landowner at a gas station and followed him to his property, which was near Xpuha. When we arrived we found two separate vertical entrances. The first entrance had a hand-built ladder in it that was reached by a small downclimb and step-across. To some of the cavers, this ladder seemed a little suspect, while others shot straight down it without a second thought. We decided to put two teams of two into each hole, so four cavers headed to the second hole. The second entrance was also vertical, but much more straightforward with clear hand and foot holds. So began the day of caving and survey for Peter Sprouse, L.P. O'Sullivan, Carol Vesely, Dennis Hoburg, Bern and Sandy Szukalski, Tammy Otten, and Joaquin Rivera. As it turned out, the second-to-last rung of the ladder came loose as L.P. descended to the bottom of the pit.

It was quickly determined that the two entrances were in fact connected. Each team of surveyors headed in different directions, hugging walls until eventually crossing back into the path of another survey team. In this way, we connected all the surveys and defined all of the rooms. When we caught up with Carol's team later in the day, they reported having been passed by a couple of people obviously there for a recreational swim, making the cavers seem a mite over dressed in

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their helmets, headlamps, caving clothes, and boots, when all one clearly needed was a bikini and cell-phone light.

The cave yielded a lot of vertical relief, with multiple pools of water. Bern and Sandy ended their survey in a large room that continued with water. Tammy's team hand-completed a loop survey with a water sump and connected back to the original survey line near the entrance of the cave, connecting to Bern and Peter's survey lines. Tammy and Joaquin put in an additional survey line that ended in what Joaquin described as a hideous crawl that would connect to Bern and Sandy's survey. Peter and Carol's teams mapped two large, well-decorated rooms, the second ending in going passage. Bern ended the day by photographing the big room. There was clearly more work to be done here.

That night as usual, the team met for dinner and crunched data. The day had yielded 966 meters of survey in Cueva Kantenah, with going passages. Kantenah plotted out between two previously known caves, Cueva Tumba Poco Profundo (Shallow Grave) and Cenote Jerry, so there are possibilities for connections. Shallow Grave, mapped in August 2015, terminated at the southeast end in a collapse, but to the northwest there were two possible sump leads. Cenote Jerry has some underwater line survey and some dry passage not yet mapped. With going leads in the cave and possible connections, the team decided it would require another day of survey.

Nother survey day began at the taco stand with Peter saying, "We are going to see a new cave." He was pretty sure he had seen this entrance before, but it had not been

surveyed. More cavers came and went On March 27 the survey teams included Peter, Tammy, Dennis, Joaquin, Carla Palmira, and Christopher Hayes. The team quickly ate their breakfasts and went to meet Federico, who would take us to the entrances. As we hiked, we passed a cave I recognized. Pam Duncan, Howard Kalnitz, Peter, and I had begun the survey of Aktun T'uyul in the spring of 2015. It is located at the east end of a large collapse, with another cave called Nohoc Aktun located across the sink. Both of these caves have recently been extended by diving. When we arrived at the new cave, Peter verified that he had in fact seen the entrance before and had named it K'in Pixan (Lucky Day). This cave was of great interest because of its position, 1.3 kilometers from upstream Sistema Ponderosa and about 50 meters from Aktun T'uyul. Aktun T'uyul is a mostly dry cave, but it had been reported that a dive in T'uyul ended in a dry passage that appeared to be close to K'in Pixan. With connections on the horizon the team was excited to start the survey. The two teams of three started the drip-line survey, while the guide cleared a path to another cave entrance in the area. Once the path was clear, Peter took his team of Karla and Chris to survey that entrance, which became known as Spider Girl Cave (aka Am Ch'uupal), while Tammy, Joaquin, and Dennis continued in K'in Pixan.

The cave provided more than one surprise that day. A small crawl leading to the northwest was abandoned due to a scorpion claiming ownership of the passage. After defining the drip line, our team in K'in Pixan made its way through a formation maze to connect to the other team's survey in a large room. We could



have walked out through the jungle, but what fun would that have been when you could crawl? On surveying this large room we found a pool in the back where the wall appeared to be undercut—could this be the dive that connects the caves? That is a question for divers. Above the pool was a small 3-by-2-meter skylight that projects light into the pool, creating a dazzling array of reflections changing throughout the day with the angle of the sun. Heading generally in a southeast direction, we encountered three more skylights very close together. It was about this time that Peter and his crew returned, the original report being that they ran out of flagging tape to

mark stations. However, it turned out that Spider Girl Cave ended in a very small crawl that appeared to be headed back toward K'in Pixan; the crawl had been abandoned in the hope of a connection shot that would be more caver-friendly from the K'in Pixan side. After a filling lunch provided by Joaquin, Peter's team continued the drip-line survey, while my team continued to the southeast. The survey for the day ended between the second and third skylight, with Peter determining we were coming back the next day.

On Tuesday, we did indeed return to K'in Pixan again with a slight caver switch. This time we had picked up a diver from Canada, Christopher Hayes and Karla Palmira in K'in Pixan. *Peter Sprouse.*

Rory O'Keefe. The teams were Peter, Dennis, and Rory and Tammy, Chris, and Joaquin. The teams set out to make some connections, but this was not to be. Peter, Dennis, and Rory continued the drip-line survey and cleaned up some leads, including a cave entrance blowing air that became known as Barking Spider. Tammy, Chris, and Joaquin headed in the direction of the survey from the previous day. Beyond a small crawl that opened up into a large room with nice formation, K'in Pixan continued in a belly crawl that led to two more skylights and the home of one geco. Despite a valiant effort and much crawling, K'in Pixan and Am Ch'uupal continue to be independent caves, with no connection to each other or Aktun T'uyul. The day ended early, as there were cavers to pick up at the airport and beer runs to make.

Deter prepared us for a big day on March 29, when we would hike out through the Jaguar Complex and beyond to a series of caves discovered through the jungle beyond Jaguar. Members of the expedition, some still complaining about the hike, had gone out this route earlier in the week, and there was more work to do out there. We had





packed our gear when we got back from dinner and prepared ourselves with lots of water for a three-hour hike through Jaguar and into the jungle beyond.

The team had decided to meet in Paamul and skip the taco stand to save time, so in the morning we all descended on Peter's place with what we had to contribute to breakfast. It turned out quite nice, with eggs, tortillas, fresh fruit, and of course coffee. Once Bern and Sandy arrived the whole crew was there, and we jumped in the cars and headed toward the cave.

The parking area and hike to Jaguar looked different than I remembered from the spring of 2016; a lot changes in a year. The parking is now in a different place, and the trail has been improved, apparently to at some point permit it to be used

as a tour cave. As we moved through Jaguar out into the jungle and beyond, Peter pointed out all the other entrances we passed, including Kitty Leap and Geco caves that teams had surveyed earlier in the week. Peter's plan was to drop teams in various entrances as we hiked. The first team to get dropped at its survey destination for the day was Osama Gobara and Dennis, who would work on Cueva Tepezcuintle Timido, Bern, Sandy, and Chris were dropped off next at Cueva Tarantula Hawk. Finally the last three teams, Rebecca McNabb, Tammy, Ryan McNabb, Joaquin, and Peter and Carla and Roberto Ghisolfi continued on to Horno.

The drip line of Horno had been surveyed a week earlier by Nick Socky, Chad Pedigo, and others, but it was so wide that they had not advanced into the cave. Horno has a very large entrance and a drip-line that is dry, but quickly the bank drops away into water covered with calcite rafts. Kevin McPeak and others from the Paamul Grotto had set up a camp here in order to explore it. The beautiful entrance provided a perfect place to have lunch while we looked at the picturesque formations hanging above and into the water. After a brief lunch, Carla and Roberto took off to push water passage to determine what the cave did, Peter and Rebecca went to survey a dry passage that looped from one drip line to the other, while Ryan, Joaquin, and I waded into the water passage.

Based on the amount of time it had taken to hike in and the need to hike out, we were only able to spend about three hours surveying that day. Peter's team put a large dent in the dry passage, while Tammy's team was able to loop around the water and connect back to the drip-line survey. Carla and Roberto reported lots of going water passage to be explored and surveyed. Having spent the day in the water or in large passage surveying, all the teams showed up at the meeting point looking like they were getting ready to go caving, not leaving a trip. That is, they were all clean, except one. When Bern and his crew showed up, he and Sandy were nice and clean, but following along with them was one dirty boy. Apparently, Bern's team had encountered a large room that would take him most of the day to sketch, so he sent Chris on a mission. Chris was to go push passage until he connected Tarantula Hawk to Cueva Geco. Chris, doing what he was told, pushed every small, squirmy, dirty hole he could find. Chris estimated that he had pushed into a passage, trending in the correct direction for about 15 meters. Later, the data showed that the connection was about 8 meters away. Had he missed something above his head? Could he be under the connection? Only the next expedition will be able to answer that question, but they will need someone who is not afraid to get dirty. Tammy spent the hike out trying to convince Peter that the next trip to this area needed to be a cave camp; three hours is just not enough time to survey. Peter is convinced.







Rebecca Hope McNabb in the largest chamber in Cueva Kantenah. *Peter Sprouse.*

arch 30 was to be the last day of survey for the spring expedition. The team opted to return to Cueva Kantenah. Tammy and Joaquin had left a small passage that connected to Bern and Sandy's survey on the previous trip, and that needed to be completed. Bern reported a large room at the end of his survey that appeared to continue, and Peter had left walking passage at the end of the second room to explore. So off to Kantenah we went, with Peter, Michel Vazquez, Rebecca, and Dennis heading to the large room. Jennifer Kroeker and Mike Kroeker went with Bern and Sandy to their end of survey from the previous trip. Meanwhile, Tammy had specifically requested Chris, the dirty boy, because of the description

Joaquin had given of the connection passage: small, catchy, and a relative pain. Tammy, Joaquin, and Chris headed to the connection. It's funny how what a caver sees at the end of a long day of survey changes before the next trip. What seems like big booming borehole becomes a large room without any going passage and completed in four shots. A difficult, grabbing crawl ends up connecting in one shot about 5 meters long. To be fair, Bern's room was pretty, and everyone was glad for the opportunity to see it. Some of us were glad to have been able to swim in it as well. We discussed having a picnic lunch on the bank, but decided we should head back toward the

big room to look for the other team. As we moved in that direction we cleaned up hanging short passages and connected surveys. When we were pretty sure we had completed everything, Sandy reminded Bern of a low room that they thought they would connect into but never had. Despite his disclaimer that he was unimpressed with the passage, Bern agreed to survey the passage. Of course, since it was low, squirmy, and dirty, Chris agreed to stay and help finish the survey. They surveyed the passage, which they decided afterward was just gnarly holes underneath breakdown without going passage, but it was completed.

Meanwhile, the other team went to try to find Peter and his team, slowed down only a little by wanting to take

pictures in the large beautiful rooms they encountered. Tammy, Joaquin, Jennifer, and Mike found where the others had dropped their packs and headed into a water passage that was clearly blowing air. Joaquin, Jennifer, and Mike looked around for an unsurveyed passage that the team could pick up and found what looked like a small water passage running along the wall, then turning toward the passage Peter's team was surveying. It did not have any survey markers, so they began to survey the passage. Unfortunately, the passage turned the wrong direction (funny how caves will do that) and ended up connecting back to the large room. By this time Bern, Sandy, and Chris had caught up. The two teams decided that if they were to head down the passage where Peter's team was, they would just catch up in time to turn around, so they busied themselves with looking around the room, taking pictures, sharing lunch, and chatting.

Soon Peter's team returned with stories of great discoveries, going passage, and water. However, there had been no connection made, nor was there anything discovered that looked extremely promising.

The expedition ended successfully, with Kantenah being nearly complete, K'in Pixan completed, and a nice start on Horno. Don't worry, cavers, there is always more for next time.

Gretchen Baker's article elsewhere in this issue covers the first half of this expedition. It also includes a table of survey totals for the entire trip.

Cueva Kantenah y Otras Aventuras

Un reporte de la segunda mitad de la expedición de marzo de 2017 del proyecto de exploración de cuevas no inundadas en Quintana Roo. Varias cuevas fueron exploradas y topografiadas, con un enfoque especial en la Cueva Kantenah, cuya topografía fue completada.

DIVING IN QUINTANA ROO

group of cavers traveled to Quintana Roo in November and December 2016 to explore and map caves in support of Peter Sprouse's surveying efforts near Río Secreto. Though most people camped at Cleoxxo, I stayed in town to manage dive logistics.

After a warm-up dive in Cenote Angelita, I began work in the Vajisa entrance to Sistema Pool Tunich, at the northwest limit of where Río Secreto takes its cave tours. I was accompanied by Henrik Nikander, and our goal was to sketch around Alan Formstone's line plot. A restriction early in the passage halted work from that side. Bonny and Andy Armstrong cut trail and helped haul tanks to a cenote near an abandoned house behind the Calica quarry. It had going passage, but it had already been explored, as evidenced by cave line and arrows.

The next objective was at the Maravillas entrance to Sistema Río Escondido, where an upstream sump held prospects for connecting to Sistema Pool Tunich. Previous attempts to make this connection from the Pool Tunich side by Alex Alvarez and Danny Riordan had been unsuccessful, although they did discover a lot of passage heading toward the coast. Permission to explore in Maravillas has always been difficult to obtain, but we were allowed to go in one evening. Helped by Juan Laden and Peter Sprouse, Henrik Nikander and I surveyed 126 meters toward the west, the perfect direction. We halved the gap between the systems, but time limitations

Dinnertime at Cleoxxo camp. Clockwise from left: Chris Lloyd, Juan Laden, Geraldine Solignac, Henrik Nikander, Daniel Matacanes, Cyndie Walck, Carol Vesely. *Peter Sprouse*.

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prevented further exploration.

Returning to the upstream portions of Pool Tunich, we attempted to map Alan's line upstream from Vasija from the opposite direction by going in the Coati entrance, but were halted downstream by an early restriction from the Coati side as well. Henrik and I gained familiarity with the system and checked side sumps with some minor gains over a few days.

Following this, I turned south to ' meet with friends and explore a few potential cenotes near Felipe Carillo Puerto. I drove into the jungle east of Highway 307 a few kilometers south of Felipe Carillo, and then hiked past a small *milpa* to the edge of a large pond in the company of two guides. I entered the pond through cattails and finned towards the center of the pond to check out a juvenile caiman. I closed the distance and then drifted while watching it slowly approach to within about 6 meters and then submerge, not to be seen again. Visibility throughout was low due to algae and fine debris, but went to zero at a dense smoky layer, probably hydrogen sulfide, similar to that in Cenote Angelita. Below the smoky layer the visibility improved to 3 meters. The bottom was composed of a reticular network of small ridges a few centimeters high with a dark-green tinge against the dark grey of the surrounding bottom muck. From a maximum depth of 9 meters I finned until the bottom started sloping up, then turned and followed a parallel course back to my entry point in search of going passage. By all indications there was none. The center of this pond is at N19°28'16", W088°01'36".

The next pond was similar but slightly deeper, at 15 meters observed depth, with a fallen tree providing an easy tie-off in the water at the entry point. This pond had the same smoky layer, reticular network along the bottom, and no sign of going passage. The center of this pond is at N19°28'08", W088°00'55".

The last pond was a few meters east of Highway 307. It reached 12 meters maximum observed depth, with a near-vertical drop from the roadside edge to the bottom, which also displayed the reticular network and smoky layer. The guides claimed that a car had fallen into the pond, but a few passes along the roadside edge showed no evidence of a vehicle. As in all of the ponds, maximum visibility was about 3









The Xibalba entrance to Sistema Dos Amores. Peter Sprouse.

meters, so these dives were not comprehensive, but I made an honest effort to find the deepest point, look for going passage, and in this one, to find indications of a vehicle. The center of this pond is at N 9°28'14", W088°01'44".

Pollowing a trip to Mérida to visit friends, I returned to Playa del Carmen and began work in Čenote Dos Amores, supported by Peter Sprouse and Chris Lloyd, with intent to connect Dos Amores with Santuario to the south. Initial attempts were frustrated by another restriction, but a no-mount configuration led to wide going passage. In time I found an alternate route that allowed full sidemount. Soon a new sidemount rig allowed a cleaner profile and less weight for dry caving. After several false leads and hauling tanks through a dry crawlway, I connected



Dos Amores to Sistema Santuario by intersecting an unsurveyed line at Santuario's northern limit. A survey of that line is needed before a length for the united system can be calculated. The passage is highly decorated and shallow with several air bells, one of them a large chamber with an island. Except for the crawlway near the end, the dive is aesthetic. With luck I will return to clean up the lines and more carefully survey the connection.

Many thanks to Peter, Henrik, Juan, Bonny, Andy, and Chris for their hard work and good spirits. Thanks also to the larger team for dynamic conversation and good fun in camp.

Buceando en Quintana Roo

Varios proyectos de buceo fueron llevados a cabo por el autor a finales de 2016. El intento de realizar una conexión a partir de la entrada Vasija del Sistema Pool Tunich fue fallido debido a una restricción. La distancia entre el Sistema Río Escondido y el Sistema Pool Tunich fue reducida a la mitad antes de que se agotara el tiempo. Tres pozas en un campo cercano a la autopista fueron buceadas pero no se encontró pasaje alguno. Se encontró una conexión entre el Sistema Dos Amores y el Sistema Santuario.

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Complied by Mark Minton

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Artículos de la AMCS sobre Huautla, 1965-2016

Un listado en orden cronológico de los artículos publicados en la AMCS sobre cuevas y cueveo en la zona de Huautla, Oaxaca.

HISTORY

THE EXPLORATION OF SÓTANO DE LA JOYA DE SALAS

A fter making final preparations on the evening of May 26, 1965, David McKenzie, Orion Knox, and John Fish left Austin for Mexico. The sole purpose of the trip was to explore and map the very promising Sótano de La Joya de Salas [Tamaulipas]. We crossed the border Wednesday with little delay and continued on to Sabinas Hidalgo, where we slept by the road just south of town.

Thursday morning we awoke to a beautiful sunrise scene with mountains and a small ranch immediately to the west. After a quick breakfast we drove to Ciudad. Victoria, where the road leading southwest to Jaumave was taken. The winding mountain road furnished many spectacular views en route. Several small caves by the road were checked.

On arriving at Jaumave our intention of hiking the thirty-five kilometers across the mountains to La Joya was explained to the natives, who were astonished at the proposal. A man named Raoul proved invaluable in making arrangements for renting burros for our equipment and hiring a guide. We were fortunate to have Orion along because he speaks Spanish fluently. Plans were made to leave early Friday morning, the twentyeighth, on a seven-day trip to La Joya.

The next morning we were up at 4:30 and ready to leave at six. The cool morning made the five-mile hike

David McKenzie towers over guide loading burros in Jaumave. *Orion Knox*.

John Fish

across the desert pass with ease. We began joking that the trip might not be as hard as had been expected. We were to soon change our minds as we climbed the mountain and followed the ridge up several thousand feet. This side of the Sierra Madre Oriental is very dry and hot. The fauna is also very different from the eastern side of the range. A karst area was found on the way up the mountain. Also several Indian middens were crossed by the trail. Along the highest part of the ridge a Spanishmoss forest was encountered. Orion was becoming sick from the heat, altitude, and drinking too much water. Finally, after hiking all day at the awkward pace of the burros we arrived about seven o'clock at the village of La Joya de Salas. The beautiful enclosed valley has been described in a previous newsletter [AMCS Newsletter, vol. 1, no. 3, pp. 24-27]. It was now a lush green, and the fields were being worked. After briefly inspecting the sótano, everyone quickly went to bed, each with his own idea of what the cave would do.

Saturday morning we were awakened at seven by a light sprinkle

that fortunately did not develop into a rain. It was time for the rainy season to begin, and the hundred villagers were in desperate need of rain, since the lake was nearly dry. As soon as the shower ended it was decided to immediately prepare to enter the sótano. We had spent the night by the schoolyard only a hundred yards from the sótano. While Orion was driving a bolt at the entrance, David, John, our guide, and a friendly villager carried our equipment to the edge of the cave. We were greatly impressed by the dimensions of the entrance and the sound of rocks striking the bottom. A 295-foot rope was unbraided and secured to a hanger, and the equipment was lowered to a ledge 87 feet below. The mapping equipment was then taken out and the entrance surveyed. Orion sketched, David manned the Brunton, and John the steel tape. The entrance is a rectangular slot with a short fissure extension at each end. The entrance dimensions are 115 feet and 25 feet. A natural bridge separates the entrance into two parts, one part 70 feet long and dropping 258 feet, the other dropping to the ledge



Text reprinted from *Association for Mexican Cave Studies Newsletter*, volume 1, number 6, pages 54–58, June 1965.

previously mentioned, where the rope was retied for the next descent. Finally at 11:50 we entered the cave to stay. Lunch was eaten on the ledge before continuing onward. All of our activities until the time we disappeared from view were closely observed by more than thirty villagers. Two natives even went down to the ledge hand-over-hand on one of our ropes (they did not trust the bolt) and were pulled up by several men.

After lunch Orion rappelled first to the bottom of the entrance to take photographs and receive equipment, John lowered the equipment from a belay position, and then he and David followed Orion down. The floor was strewn with rocks and dead birds and animals. Two short solution cavities contain fill, an unpromising fissure at one end remains unchecked, and two passages roughly 20 feet in diameter join on the other side of a partition. This was obviously the path the water took. Intensive fauna collecting was done at the entrance that resulted in the second recorded finding of the beetle tribe Sphodrini in the New

David McKenzie ascends out of Sóano de la Joya de Salas. *Orion Knox*.



World. This species is being described by Dr. Tom Barr.

The passage leading to the next drop was found to be an even 100 feet. About halfway down the passage a pool of water was encountered across which the gear was relayed. Here also the passage began to take the shape of a fissure about 25 feet high. The passage entered the side of an estimated 280-foot fluted domepit that had red flowstone walls. A 200-foot rope was tied off around a large boulder 20 feet from the drop, and Orion began rappelling. Orion reached a ledge about 40 feet down, and, thinking he saw the bottom, continued his rappel. However, what he had seen was only another ledge, and, furthermore, a white

handkerchief tied to the rope's end swung freely in space. We then decided to drive a bolt at the edge of the drop to gain additional rope. The equipment was lowered to the ledge

and finally to the bottom of the drop, which totaled 170 feet. The room was a fissure about 15 feet wide at the bottom that widened at the passage level and continued up out of sight.

After 40 feet the fissure narrowed and dropped 8 feet to two pools of water and a short passage to the next drop. The edge was difficult to negotiate because it was undercut and the rope frequently slipped into a narrow slot. Measurement showed the drop to be 57 feet to what was christened the Cathedral Room because the walls of the fissure resembled a gothic arch where the rope was hung. This, the only dry room in the cave, became our base camp. An evening meal was prepared, and then we sacked out, eager for more exploration the next day.

Since we were very tired, we slept much later than had been planned. The temperature throughout the cave varied from 57 to 61°F, so we were



John Fish rappelling into Sima Terrible. Orion Knox.

quite comfortable. Out of the far end of the 70-foot-high Cathedral Room was an 11-foot chimney to a 50-foot-deep drop into a beautiful red-flowstone-covered fissure room about 130 feet high. Two small, unimportant passages about 3 feet in diameter led out of this room. David, being the first down, quickly eliminated these passages and found a slightly larger passage across the length of the room. It was observed that in some places the walls were chipped and beaten as if the cave had been flooded violently at times.

The chosen tubular passage extended nearly a hundred feet but ended in a dirt fill. The slots in the floor led to the only formation room in the cave. It was decided that Orion should go first on the basis that he had better luck than David. The rope hung over a flowstone formation and fell free for 54 feet to a flowstone bank 25 feet above a deep lake. At first appearance the lake offered the only route. Orion waded and swam through the water, only to have David find an upper route through the formations. A roughly elliptical-shaped room with a crevice and numerous holes in the floor was encountered. However straight ahead David found a domepit in which rocks seemed to fall forever.

Following the initial excitement, John returned to camp for a 350-foot length of rope. After several minutes' consideration, David dubiously decided to explore the pit as Orion and John heckled him about the rope being too short. David rappelled to a ledge 60 feet below, where the rope lay in a huge pile. He then talked Orion into coming down to help. Loose rocks were cleared, the rope untangled, a bolt driven to aid in clearing the ledge, and David was on his way again. In the excitement of the moment, David described the pitch as the "most fantastic thing" he had ever seen. As usual, the room was a tremendous fissure that widened nearly out of sight at the top. When David reached bottom, he reported that the room looked like a blind pit. There seemed to be no promising passage out of the room. We then returned to camp, our hopes greatly dimmed, but determined to check every possible lead the next day.

 \bigwedge γ e spent some time the next morning taking pictures and surveying, but we quickly got on to the business of checking all possible passages. Nothing was found at the top, but two passages were explored at the bottom. One small water passage led to a connecting dome that had a passage up on the wall that drained into the dome. The other passage was at the lower end of the room and contained a tiny stream that ran toward the room. Exploration upstream yielded nothing good. The only possible lead left was an elliptical 2-by-3-foot hole in the floor near the big room into which water





ran. John rappelled 15 feet through a small waterfall to a mud and gravel floor. John followed the fill slope around a formation to the deepest point in the cave, 892 feet below the surface. The depth makes the sótano the second-deepest in Mexico and the fourth-deepest known in the Western Hemisphere. Somewhat disappointed that we could not go deeper, we returned to camp to eat

David McKenzie and Orion Knox at the bottom of Sima Terrible. *Orion Knox*.

and sleep.

The next day, our fourth in the cave, we returned to the surface. The only major difficulty encountered was lifting the rope and other equipment up the pitches. With the aid of the Mexicans who pulled our gear out the entrance, we were able to leave the cave seventy-six hours after entry. When the ropes were measured, the last big drop was found to be 231 feet, making the domepit about 280 feet. After obtaining *refrescos* from the store and eating a good meal, we sacked

out for some much-needed rest. It was exhilarating to breathe good mountain air again.

We awoke the next day stiff and sore, but we decided to hike around the valley for awhile. A large karst area was found and two caves checked. We also had an interesting conversation with the schoolteacher about his students and how the school was operated.

The next morning we were on our way back to Jaumave by six-thirty. We reached the halfway mark and the top of the mountain with no difficulty. After lunch it was decided to walk on ahead because of the burros' slow pace. The long slope down the mountain seemed never-ending, and the desert had to be crossed at two o'clock in the afternoon. It was with the last of our energy that we reached Jaumave and collapsed in the Río Guayalejo. After a quart of water and four Cokes apiece, we began to feel better. When the burros arrived two hours later, we packed our things in Orion's car and left for Austin.

La exploración del Sótano de La Joya de Salas

Reimpresión de un artículo sobre la exploración inicial del Sótano de La Joya de Salas, Tamaulipas, en 1965. Los cueveros caminaron a Joya de Salas desde Jaumave y acamparon en la cueva.

HISTORY

THE SEARCH FOR SÓTANO DEL GRUNGE: EXPLORATION OF SÓTANO DEL MALPAÍS

This previously unpublished article was typeset by James Reddell on an IBM compositor that had no memory, so any corrections had to be cut in with a razor *blade*—*the good old days of publishing.* It has been edited further for this use. It was probably intended to go in an issue of the old Association for Mexican Cave Studies Newsletter that had not come out when the magazine died partway through volume 5. All issues of that publication are on the AMCS web site at www.mexicancaves.org/nl/ oldNL.html. Thanks to Jerry Atkinson for passing this on to the AMCS archives from material collected by Bill Elliott.

¶n January of 1969 I was engaged Lby Professor Robert W. Mitchell of Texas Tech University to assist on one of a continuing series of expeditions to the Sierra de El Abra of Mexico to study the caves of the area. Specifically my job was as pilot of a small four-place plane, a Cessna 172, the N46021. On favorable days we searched the Sierra de El Abra and also some adjacent mountain areas and were thus able to discover a number of new sótanos. We also engaged in aerial photography, map-making, study of the drainage systems, and so on. All this was very beneficial to Mitchell's studies, and the plane proved to be of great use to us.

On January 27, 1969, I was flying around with Dr. Mitchell, Bill Russell, and Francis Rose. We went over the Sierra de El Abra all the way to opposite Ciudad Mante, and then went on up beyond that to where that mountain ridge joined the mass of the Sierra de Guatemala. We flew over Sótano de las Abejas, which was already known, just north of the town of Chamal and northwest of the little volcanic peak called El

Richard O.Albert

Chamalito. Then we went approximately east-northeast from there and found an area of extremely rough cross-hatched limestone that appeared to be impassable on foot and that Bill called the grunge because it looked so grungy. In this area we found a black hole that went down for an unknown depth and we thought would be worth investigating. We spoke of it as the Sótano del Grunge and hoped to reach it someday to explore it.

In June of that year I was again engaged as pilot for that group, and we again flew over this sótano, noting that it had around it some white flowers indicating *mala mujer*. In fact, Tom Albert and Don Broussard and I had flown over this sótano just minutes before we crashed the N46021 into the cloud forest. It took us three days to chop our way back out to Chamal.

In the three years after this sótano was first discovered, I made five attempts to go down to explore it, but each time was thwarted by floods, forest fires, equine encephalitis, or other misadventures. Finally, in February of 1972, just three years after the first overflight, I again arrived in the area, accompanied by friends John and Marjorie Hopkins from Dallas. On one of the previous reconnaissance trips I had asked the natives in the area about any sótano up in that locale, and they knew of none. They knew of Sótano de las Abejas, but this Sótano del Grunge was unknown to them.

Now the problem arose as to how to approach it. From the plane we had searched for a way in, but we could not find any. Finally, I noted some cattle grazing in a grassy area not too far from it, so I theorized that they must have been able to get there some way, and I had then followed a cow trail through the forest. This had gone straight south, paralleling the ridge on the east that was the north end of the Sierra de El Abra, and after crossing a saddle it went down to a house that we later determined belonged to Seymour Taylor, one of a group of gringos named Taylor living in that area.

John and Marjorie and I now drove up to Seymour Taylor's house from Chamal, parked the car there, and got our packs ready for the trail. We specifically questioned the people living here, who must be the closest natives in the area, and they knew absolutely nothing of any sótano in the area we wished to explore. We walked along directly towards the north, expecting a rather rough cow trail, but it wasn't very bad after all. It was a rough cow trail, all right, but it followed what had been an ancient jeep trail or logging road. Hence the going was relatively easy. We made camp up somewhere northeast of El Chamalito for the night.

The next day was Monday, February 7. We continued on walking through rather dense forest alive with a great many birds and the everpresent *pinolillos*, which were very hungry. After a time we reached a small, relatively clear, and somewhat grassy area that I remembered as being almost exactly east of the sótano. We had no map of any kind, and I was relying only on my memory of the overflights of three and two and a half years before. The ridge directly to the east of us was the Sierra de la Cuchara, the continuation of the Sierra de El Abra coming up from Ciudad Valles. This ridge is cut by an old, dead water gap known as Puerto Chamalito, and we were now

several hundred yards south of this gap, which fit in very well with my memory of the geography. Yes, this must be about the right place.

So we stashed most of our stuff under some bushes rather close to the jeep trail and headed toward the west. At first we wandered through forest where much of the ground was covered with the viciously hooked thigh-high bromeliad known as huapilla, Bromelia pinguin. Then abruptly we came to the grunge, and it was certainly the grungiest grunge I had ever seen, looking even worse than it had from the air. Technically it is known as karren and consists of limestone that has been cross-hatched or checker-boarded by fissures running in two different directions, essentially at right angles to each other, so that the surface consisted of squares of limestone with deep fissures between. The squares of limestone measured from about 2 to 5 feet in size and were not smooth on the top, but had a high, very sharp, jagged saw-toothed pinnacle or ridge, thus making walking exceedingly difficult.

On this extremely rough karren grew a lot of soft, brittle shrubs of Bombax or juanjilón, which now had some flowers with bunches of long stamens that looked very much like shaving brushes. But these were not bad because they did not have thorns; most everything else there did have thorns. There was much of another kind of bromeliad growing here, much resembling the *huapilla* of the forest, but somewhat smaller and known as huapilla china. This was a *Hechtia*, just as vicious as the huapilla, with many very sharp hooks along both edges of the long leaves. There were also numerous plants of the cycad *Dioon edule*, which has very sharp points to the leaflets of the little palm-like leaves that stabbed very nicely. There were also several kinds of cactus, all very spiny, and also two species of agave that had very good spear tips on the leaves, as well as viciously hooked edges.

We at first wondered if we would be able to cross this terrain, as it seemed so completely forbidding. However, we discovered that if we gritted our teeth and went forward, we didn't get hurt too badly, and we were actually able to make fair progress. We learned that if we stepped directly in the center of the plants of *Hechtia* we could do reasonably well, but we had to be careful, as a fall on the sharp, saw-toothed edges of the limestone could have gutted us.

We crossed about a third of a mile of this truly fascinating but also most unfriendly grunge. Beyond that was a narrow north-south strip of forest, and then beyond that was more forbidding grunge, rising as it went up to the hill that would go back down to Sótano de las Abejas some distance beyond.

The sótano we were seeking was, I was sure, somewhere along this line of trees, but was it north or south of where we had hit? I didn't know. I remembered a tree with many green leaves growing at the north edge of the sótano, and as I looked at this line of trees, I saw several that could fit that description. I searched my memory, and, though I couldn't be sure, it seemed to me I should look somewhat toward the south. This little strip of forest appeared to be the drainage channel for the grunge, but it sure looked as though it must have to rain an awful lot before sufficient water could possibly collect to run in this area. I found a really huge soyate tree with a butt 18 feet in diameter.

Then, even though I couldn't see it yet, I knew I had found the sótano. I was in a rather narrow, low place that went off toward the east from the main north-south area, with grunge rather high up on each side of me. Sure enough, just a few yards farther along, a black hole became visible, and there I found myself looking down into the yawning mouth of the sótano. I was right at the edge where water flowed into the opening in times of flood. I was looking through the branches of a large tree, a tree that apparently was growing in the bottom of the sótano itself. I was on the west side of the opening, but since I couldn't see into it very well from there, I climbed up onto the grunge and went to the south side, where I found I was able to look into the pit quite well.

"Urethra! I have found it!" I hollered, and after a time John and Marjorie came up. We didn't have our caving gear along, so Marjorie and I went down over the edge from the south side of the opening to see what we could do. We found that without really too much difficulty we were able to climb down the wall of the sótano, which we now explored as much as possible. We found that it had apparently started as a fissure, and it went toward the north and also toward the south. The south side seemed to be the larger, but we couldn't go very far into it since we had no light along. We climbed back out, and I just about met my Waterloo. I stepped on a perfectly solid section of the grunge, and a 4-foot, 1300-pound section of it turned over and I broke three of my favorite ribs. That kinda put a crimp in my style, but didn't completely incapacitate me.

We returned to the jeep trail near which we had our gear stashed. I was all for taking our stuff right then and going back to explore the sótano, but my companions rather strongly suggested we make camp here now to rest and wait until morning, so that is what we did.

good norther with high wind and rain came up during the night, soaking most of our things. John and Marjorie hinted that we should go on back home and come back some other day, but I just couldn't quite do that. Here was my sixth attempt to find the sótano, and now that I had found it, I certainly wanted to go down into it.

So we took our caving gear and some food and water and made our way back across the grunge. But where was the sótano? We couldn't find it, even though we had just been there the evening before. We searched for a time, and then I found a *Bombax* seed-pod that I had sliced open yesterday, so we knew we were close. Actually we were within 30 feet of the edge of the sótano and did not know it, so rough was the grunge around there.

Once we located it, I tied the rope off on a rock on the south side and went down. Since everything was wet and slippery, neither John nor Marjorie came down with me that day. It was a 75-foot rope, and this just almost reached the top of a talus hill, which was approximately halfway to the actual bottom of the sótano, so it was very close to 160 feet deep. It was a rather beautiful drop, with a fine network of strangler-fig roots growing down several of the walls. The north end of the fissure had a considerable overhang from the west, and this would be a nice clean rappel, not touching any wall at all. On the southeast side there was also an overhang that roofed over the deeper portions of the cave. There were also some strangler-fig roots here, some snaking straight down along the wall looking like iron rods, very rigid, going some 50 feet or so through the air without touching anything.

I explored the northern passage of the cave and scared out a pair of little owls, which flew south into the other portion of the cave. This passage went down somewhat and then turned toward the west, where there was a fairly good room with a rather high ceiling with a spot where vampire bats had been. It went in a northwesterly direction and then somewhat more westerly for perhaps 200 feet. Here the passage began to get quite narrow and went upward at a rather steep angle, about 45 degrees. It narrowed down to about 4 to 6 feet, but with a still quite high ceiling, to end rather blindly, probably about 50 feet or so beyond the lowest spot. Reaching this blind end, I could see that another small passage came in from the north for perhaps another 40 feet to where it went up at about a 60-degree angle. I would have been able to crawl along this for that distance, but then it appeared to get too narrow. I wondered if this might perhaps go up to a fissure that I had seen on the edge of the west grunge yesterday.

I now retraced my steps and went back to the bottom of the sótano, where I climbed across the base of the talus hill and made ready to enter the south passage. This passage went due south, and then a branch of it went off to the east. This east branch went up some 10 or 15 feet for a distance of perhaps 50 feet, and then ended in a room with no outlet, though the ceiling was still rather high. I went back to the main passage and started south again. This went on for about another 100 feet or so, going down somewhat, and ended in a small room with a low ceiling only about 5 feet high, where the floor was level and filled with dry mud. Water lines were visible on the ceiling, where water had apparently stood up to that level for a period of time. However, there was no outlet here.

About 30 feet or so back I had noticed another opening off to the east, which I now explored. This obviously was the main passage, because while it started relatively small, it went on and shortly widened to an extensive series of passages and chambers. In some areas the walls were all smooth limestone with rolling hills, while in other areas there were very good cave formations. There were many stalactites and stalagmites, some of which had met in the middle and formed pillars or columns. The walls in some places were covered with flowstone, some of it in the sort of lumps that reminded me of box seats in the opera. In some places the flowstone had formed draperies and curtains, and a lot of it was very sparkly from crystals all through it. Some of these stalagmites were pure white and some were black; some were very smooth, while others had many sharp projections on their tops, making them extremely rough, rather like the head of a mace, but of course smaller.

The floor and some low ledges along the sides were covered with many little pools, although they were dry. Even so, these little pools were beautiful, with innumerable little terraces at different levels, perhaps only half an inch or perhaps a foot or two apart, going in the most wavy lines imaginable. And most of these pools had little rocks or concretions in them that I call cave eggs, very rough little things up to three inches or so in greatest diameter, though most of them measured about an inch or less. It was all extremely beautiful.

These passages were quite large and extensive, going apparently in a generally southeasterly and southerly direction but winding around and interconnecting. The ceiling was very high in places, certainly 50 feet or more, and nowhere was it low enough for a man to stoop. The passages were certainly wide enough, and only once did I have to squeeze through sideways. In one spot I found a patch of vampire-bat guano on the floor, and directly overhead was a little kettlebottom, as the coal miners call it, a round depression in the ceiling just like the bottom of a kettle, stained by vampire-bat guano and indicating where they had been roosting in times past. They were gone now, but it was the sort of spot they would like.

There was one passage going off to the left that went down at about a 45-degree angle or so and continued on beyond that for an unknown distance, but I couldn't tell how far, as I did not go down to that point. In another direction I saw passages that went on ahead for an unknown distance, not diminishing in size. At about this point there was also a vertical drop of perhaps 60 feet, with one or perhaps two levels of passages down below, that would require vertical gear to explore. This obviously was a very extensive cave that certainly warranted further exploration. But I did not have sufficient equipment to do a great deal more, and anyway I was alone, which is certainly not the best way to do caving.

I went back to the entrance and hollered up for my camera and equipment. Marjorie took up the rope and moved it over to another place where she let down my gear in my backpack, right under the undercut lip on the south side along the strangler-fig roots. I returned to the passages from whence I had come and began to take some pictures. There were many formations and pools to photograph, as well as areas on the walls, ceiling, and floor. Everything was very dry, and I saw only a few teaspoons of water in the entire cave. Most of this was in the form of drops hanging on the tips of a few of the stalactites. The only life I saw in the cave was a long-legged brown spider on the wall not too far from the entrance and a dark spot high up on the wall that probably was a solitary bat. Later, after the pictures were developed, I found I had a perfect picture of a scorpion

directly in the center of a view of the formations on a wall.

I took a number of pictures, and then I noticed that I had breathed on the viewfinder, since the view was now very cloudy. However, since I could still see what I wanted to take a picture of, I went ahead and snapped two pictures that way, thinking that the lens itself was clear. Then I wiped off the viewfinder, and the view was still cloudy. A look at the lens showed it also had markedly fogged over, and I knew I hadn't breathed on it. Then I realized why it was that way. When I had come into this particular chamber, I had noticed right away a definite rise in temperature and, apparently, humidity also, since it felt quite muggy. That must have been the case, because this was now making my camera glass fog over. So I got out my trusty little red handkerchief and wiped rapidly and madly while I continued taking pictures, managing to take the pictures in the second or two before the lens fogged over again. I retook two of the pictures that I knew I had taken with a fogged lens, including one that I especially wanted of a narrow 4-foot stalagmite that was interesting because it was so crooked. As soon as I left this section of the cave, the lens stopped fogging over.

Back at the entrance of the cave, I made ready to ascend. I put all my gear in my pack, tied it onto the line, and had Marjorie pull it up. It got hung in the roots and under the lip or the ledge a couple of times, and she had to let it back down slightly, but then she pulled it out all right.

I climbed back out, partly up the rope and partly up the strangler-fig roots on the south side. This was climbable, but was not really very safe, and it probably would be better to go up and down the rope instead.

We now left the sótano, going sort of toward the east. Even when we were only a few yards away from it, we could not see it and could see no indication that it was nearby. It occurred to me that I would not be able to tell anyone how to find the sótano, so I decided to take some compass bearings from this point. After all, the purpose of this expedition was to gain scientific knowledge of the study of speleology in this section of Mexico, and other people would have to be able to find the sótano too, in order to make more extensive explorations. There were distant landmarks, but there were certainly no landmarks in the immediate vicinity at all.

So I got out my compass and started making some notes. The highest point of the main mass of the Sierra de Guatemala was sort of northwest of us, on the magnetic compass bearing of 315°. Only 10 miles or so away in that direction lay the pieces of the ill-fated N46021. Slightly to the right of that was a somewhat lower but very distinct sharp peak, the most clearly defined pinnacle in the whole mountain, which was on a bearing of 325°. Puerto Chamalito, the water gap in the ridge east of us, was visible from here, identifiable though we couldn't see through it, on a bearing of 045°. The ridge to the east was pretty smooth on top all along there, but there happened to be a very slight notch in the treeline—not in the ridge but in the trees themselves—directly opposite the two sabal palms between which the jeep trail went and where we had camped, and this notch was 060° from here. Looking farther around now, the lowest point in the saddle between the ridge on the east and the mountain mass on the west, north of El Chamalito, was 135°. West of that there was another notch, in the horizon at 180°, due magnetic south. El Chamalito itself was not visible from here, which seemed somewhat surprising. Farther to the right was another distinct notch in the horizon at 235°. I realized that this last notch was almost exactly 180° from our campsite, so theoretically if one were to leave our campsite on a heading of 235° or 240°, traveling in a beeline either by compass or by sight heading directly for the notch, he should fall into the sótano. A group of brilliantly colored large parrots, military macaws, flew over.

Back on the jeep trail, I made some additional notes as to just how to find the sótano. There were two sabal palms about 15 feet apart between which the jeep trail went, the west palm being about 10 feet high and the east palm about 13 feet high. About 20 feet south from these two palms

there was visible at that time a small machete trail that went directly to the west, but on all probability this trail would be obscured before very long due to rapid growth of vegetation. This was right in an area of grassy patches, whereas everything else around here was forest or grunge. About 150 yards to the north was a washed-out area directly in the jeep trail, where some very lightyellowish soil was exposed, the only such area around here. About 300 yards or so to the south the jeep trail went directly by the east side of a large free-standing rock measuring about 5 by 8 by 10 feet in size and filled with fossilized mollusks. This was the only such rock anywhere along this jeep trail, though there were some few scattered smaller ones up to perhaps 2 or maybe 3 feet in diameter. With these landmarks and bearings and with the aid of a compass, someone might be able to find the sótano.

We figured we were some 7 miles north of Seymour Taylor's ranch house. We had also found that there was a trail going through the old, dead water gap, so that would be another way to approach it from the east side of the ridge, but we did not know how to get to the east side by car. However, this should not be too difficult and might possibly be 2 or 3 miles closer, so the hike wouldn't be so long.

How to get to Seymour Taylor's house? In approaching Chamal from the east, there is a place where the highway to the west curves to the south, about a mile or two before reaching Chamal. Right at this curve on the north side of this road there is some sort of highway department camp where equipment and supplies are stored. Follow the jeep trail directly to the north through this camp, and after some 5 miles, there is Seymour's house. He is usually not there, but some Mexicans are, and they are reluctant to let anyone in without permission from Seymour. Try to find Seymour in Chamal, where he lives somewhere nearby. Failing that, go directly north out of Chamal some 5 or 6 miles to the village of Rancho Nuevo, and within about a mile or so to the northeast there are about five Taylors living, mostly brothers, and get permission from them. There is then a trail right over to Seymour's house.

Thus this new virgin sótano was found and entered. It appears to be a rather major cave, and certainly would bear exploring. As I said, we had sort of in jest called this the Sótano del Grunge, which of course would be a lousy name for it. I had also heard the name Sótano de la Mala Mujer suggested, but this would be sort of nonspecific and not very distinctive, since mala mujer is so prevalent over such a large area of Mexico. I then thought of calling it Sótano de la Huapilla China, since this vicious little *Ĥechtia* is so very common around it and very pointedly intrudes itself into one's consciousness, but then I discarded that name, since it was somewhat difficult and very few people know what huapilla china is anyway. I also considered Sótano del Juanjilón (Bombax) since that was rather characteristic of the area, but it too was somewhat difficult and nobody would know what it was either.

I then returned to the original name of the Sótano del Grunge, and translated into Spanish this is Sótano del Malpaís, or bad country or badlands. I think this fits it admirably, as it is indeed in the badlands, and such truly astonishing badlands I have not seen anywhere else in the world. It is something very distinctive about this particular sótano, and everyone will be able to see very clearly the reason for the name of Sótano del Malpaís.

Sótano del Malpaís was visited again on June 16, 1974, accompanied by Margaret Ann Land. The old jeep trail or logging road is still completely impassable to any sort of vehicle at all. The machete trail at the north end of the road leading off to the west from the clearing by the two sabal palms had been completely obliterated now by the growth of vegetation. Since this was June, we saw the many white flowers that had been observed on the overflights of June 1969. At that time they had been presumed to be the white flowers of *mala mujer*; now it was seen that,

The ill-fated N46021. Robert Mitchell.

while there were some *mala mujer* flowers, the white flowers that were so conspicuous were actually *Plume-ria* or frangipani. It was more difficult to cross the grunge in the summer, since there was some increase in vegetation. The sótano was found and looked into, but was not entered, since it was late in the evening and there was a blinding rainstorm, so conditions did not seem favorable for entry, and anyway, this was a botanical expedition for the collection of *Hechtia*.

Postscript: The following note, "High Adventure in the Sierra de Guatemala" by Tom Albert, appeared in the UTG News of the University of Texas Grotto in January 1970. It describes the plane crash mentioned in the main article above. A very long article by Richard Albert on a flying and caving trip to the Sierra de El Abra in January of 1969 appears in AMCS Activities Newsletter 29, pages 132–142.

n June 2, 1969, an aerial inspection of the El Abra range and surrounding area having been completed, the rented Cessna 172 was ready to depart. Dr. Richard Albert, pilot, his son Tom Albert, and Don Broussard bid goodbye to their friends and got on board, anticipating a pleasant five-hour trip back to Kingsville, Texas. The plane then took off for the last time from the airstrip of the Hotel Covadonga, south of Ciudad Valles, San Luis Potosí. The passengers enjoyed a close aerial view of a number of familiar caves on their trip north, old favorites such as Los Sabinos, Tigre, and Arroyo, as well as the more recently discovered Yerbaniz, Matepalma, and Japonés, along with the then-new trio of Jos,

Palma Seca, and Piedra. Cruising above the El Abra as far north as Mante, they thrilled to the sight of the flat jungle-covered surface of the old reef, pock-marked by large sinks and seemingly bottomless pits. Near Ciudad Mante, they turned northwest, flying over Bee Cave [Sótano de las Abejas] and what has since been found to be Sótano del Caballo Moro. Continuing northwest into the Sierra de Guatemala, they left behind all sign of civilization and saw below them only vast stretches of cloud forest, broken only by intermittent patches of bamboo, their feathered tops waving in the breeze.

The plane was climbing more steeply than anyone realized, and when it became necessary to increase the angle of climb still further to remain above the smallish mountains that were beginning to surround them, the plane could do no more. Angled southward to avoid direct impact with the mountain that lay ahead, the plane almost cleared a saddle that connected two peaks. But the tricycle landing gear dragged through the treetops at the top of the ridge, causing the plane to lose airspeed and begin falling. The plane fell roughly paralleling the downward slope of the ridge until it went to pieces in the trees.

Remarkably, the passengers emerged unscathed, except for Tomás. He received a slight scalp wound and a cut under the left eye, probably from being hit by windshield fragments. Upon his return to Alice four days later, he received fourteen stitches in the cut under his eye. After photographing the wreckage and each other, the survivors began the long trek out. The machete that Don happened to have



bought before takeoff soon became their most cherished possession. In places the undergrowth was so thick it was necessary to crawl on hands and knees. Navigation was by compass.

Late in the afternoon of June 3 they began to notice old machete cuts on the trees. These began to become more frequent as well as more recent, and they found themselves on an old overgrown trail. Following this, they arrived at the Ejido de la Joya de Manantiales, 12 miles by jeep trail from Chamal, Tamaulipas. Here they were well-received by the people, who gave generously of the best that they had, tortillas with hot sauce. Don considered this to be the first real food encountered after the

crash.

On June 4 they walked from Joya de Manantiales to Chamal. From Chamal they went by bus to Matamoros, where they were detained about an hour by Matamoros police. After being escorted to the border, they hitchhiked to Alice, arriving at the home of Dr. Albert around noon, June 5.

En Busca del Sótano del Grunge: Exploración del Sótano del Malpaís

Reporte nunca antes publicado de la búsqueda en 1969 de una cueva en el "grunge", como se le llamó a un tipo de roca caliza en la superficie sumamente filosa. La cueva, en la Sierra de Guatemala, finalmente fue encontrada y topografiada por una sola persona.



Roger and Luis climbing up from the Salom la Muñeca, Cueva Tlamanictli, Puebla, after the photo trip. *Gustavo Vela*.

DAVID MCKENZIE 1943–2016

It is with great sadness that I report the passing of David McKenzie, best known as the author of the Walls cave mapping program. David began exploring caves with the University of Texas Speleological Society in the early 1960s. This quickly developed into his primary focus, and as mathematics was his field of study, be began to work on computer programs for plotting cave survey data. Cave archives contain many finely drawn maps by David from Texas and Mexico. The most notable among these are from the many expeditions that he made along with James Reddell to the Yucatan Peninsula starting in the early 1970's, to such places as the Grutas de Balankanche. David drove his Blazer across Mexico, exploring caves such as Sistema Purificación in Tamaulipas, which became the longest known cave in Mexico. During that time, David had developed a computer program that he named Ellipse, which ran only on the mainframe computer at the University of Texas. This benefited many cave exploration projects that were ongoing in Texas and Mexico. By the 1990s he was hard at work on a personal-computer version of his program, which he named Walls. This was the pinnacle of his life's work, and has been of tremendous benefit to hundreds. Over the past

twenty years he has constantly maintained and improved Walls, never with any financial benefit whatsoever.

David long had an interest in supporting the Texas Speleological Survey, which maintains state cave data. In doing so, he saw the need to develop additional software to support their data gathering mission. So he created WallsMap, a simple and effective GIS program for cavers. David put an enormous amount of his time into gathering and organizing Texas cave data using WallsMap. David always made himself available to assist his user base in answering questions and solving problems. He worked nearly every day serving the caving community, spending way too much time in front of a computer no doubt. We were so fortunate to have him with us, in so many ways. He will be missed. —Peter Sprouse

AMCS has an undated map by Terry Raines and David McKenzie, of Sótano de Oztoatlicholoa, Tequila, Veracruz. This may have been as early as 1963. I have gleaned a few other maps by David from the AMCS website.

Since I'm working on an AMCS Bulletin on the fish caves of the El Abra Region (including the Sierra de Guatemala), I compiled a database of 207 cavers and scientists going back

to the 1930s. David was among the first to accomplish things in these Sierra de El Abra caves: Co-discoverer of Sotanito de Montecillos with John Risinger, 1963. Co-discoverer of Sótano de Pichijumo with John Risinger, 1963. First cavefish collection in Bee Cave with Ed Alexander, Ross Felton, and John Fish, 1966. Co-discoverer of Cueva de Otates with Bill Russell, 1971. David mapped the huge Sótano de la Tinaja with many others in 1965–1966, and drafted the large map for the AMCS. David mapped Sótano de Jos in 1971 with John Fish and Don Broussard. David mapped Cueva del Ojo de Agua de Tlilapan, Veracruz, with Stuart Murphy and James Reddell on March 4, 1973.

On a whirlwind trip to Veracruz, Puebla, and Oaxaca in December 1973 and January 1974 David McKenzie, James Reddell, Roy Jameson, and Bill Elliott mapped and biologized many caves. David mapped Cueva del Volcancillo, Veracruz, an interesting lava tube, on January 8, 1974, with the others. We had to shoot front and back sights to compensate for the magnetism in the cave, using turned angles for the plot.

On December 24–25, 1973, David, Bill, Roy, James, and Bob Harr mapped Sima Estéban, Puebla, in the new Cuetzalan area.

In January 1974 McKenzie,

David in his natural habitat. Peter Sprouse.





Reddell, Jameson, and Elliott visited Cueva del Nacimiento del Río San Antonio, Oaxaca, for cave biology. I'm fairly sure that McKenzie and Reddell had mapped most of this extensive cave, but I did not find their map on the AMCS website.

On December 23, 1976, David mapped Cueva de Tasalolpan, Cuetzalan, Puebla, with Andy Grubbs, James Reddell, and Carmen Soileau. David helped others process their survey data using Ellipse on the UT mainframe computer. Maps from Puebla and many places continued to appear.

David studied many caves in Yucatán with James Reddell and many others starting in the early 1970s. His maps of the extreme maze cave, Actun Kaua, from 2003 have been posted on the AMCS website, but I believe there are later versions that have not been posted. The mapping project continued for many years and involved many cavers.

David mapped Cueva de Ojo de Agua de Manantiales in the Śierra de Guatemala with Bill Elliott, Frank Endres, and Craig Rudolph in 1978–1979. We located some caves and nacimientos too. I am pretty sure that David drew a pencil draft of Manantiales based on an Ellipse plot, but it may be misplaced in his house. I never finished the Sierra de Guatemala bulletin it was meant for, so that's why it was not inked. I recently rediscovered the original survey notes in scans of my survey books, so I hope to draft this map myself on a computer, but I would prefer to base it on a scan of David's pencil map to capture his unique drawing style.

David was such a good friend to me since meeting him in the early 1970s. We had some great caving trips in Texas and Mexico, doing biology, mapping caves, and locating caves with road logs and the few topo maps we had at the time. He helped me on a Speodesmus millipede trip about 1974 for my dissertation. David programmed Ellipse in FOR-TRAN in the mid-1970s. I remember using Ellipse on the UT mainframe in the 1980s, and making big plots on the drum plotter there. He programmed NET3 in Pascal for CP/M in 1982. Later I used SMAPS, but

when I mapped the entrance maze of Powell's Cave in 1988-89 it took the NET3 program to show me where the blunders were, and I went and fixed them. It was great to plot the whole survey and see where it went. NET4 (MSDOS) followed in 1990 as part of John Fogarty's Caveview program.

When David introduced Walls for Windows in 1994 it was a godsend for serious cave cartographers. I am still using it. WallsMap is a wonderful GIS program, and some of my area and regional maps for the Sierra de El Abra region were published in the 2015 book Biology and Evolution of the Mexican Cavefish from Academic Press (Elsevier), in my chapter, "Cave Exploration and Mapping in the Sierra de El Abra Region." Here's what I said in the acknowledgments: "Thanks to . . . David McKenzie, who for many years has supported cavers with excellent programs such as Walls and WallsMap for cave cartography."

David drafted many beautiful, accurate cave maps over the years. I am impressed with his style, which is like an imaginary scanner in the cave, tracing the walls straight to a plotter. We had many friendly discussions over the years, and he even tutored me over the phone in Walls, WallsMap, Adobe Illustrator, and QGIS. Although I had extensive ArcGIS experience, I would not have been able to do the big papers I have done in the last few years without his mentoring. —*William Elliott*

YUCATAN PENINSULA CAVE MAPS

*incomplete survey

Campeche Grutas de San Antonio Grutas de Xkalumkin *Grutas de Xtacumbilxunm Quintana Roo Cueva de Abispa Cueva de Tancah Yucatán Cenote Aka Chen Grutas de Balankanche Cenote Calchum Actun Chac Cenote de Chac Sikiin (Norte) Cenote Chen Mul Actun Chukum Cenote de Hoctun *Actun Isban Cenote Kabahchen *Actun Kaua *Actun Loltun Actun Pom Cenote de San Isidro Cenote de Sihunchen Actun Silil Cenote de Telchaquillo Actun Tucil *Grutas de Tzab Nah Cenote Xtoptiel Actun Xpukil Cenote **X**tacabiha

BIOLOGICAL WORK Patronyms

Tricladida: Dugesiidae: *Dugesia mckenziei* Mitchell and Kawakatsu – Cueva de los Llanos, Oaxaca, Mexico.

Amphipoda: Crangonyctidae: Sygobromus mackenziei Holsinger -Empire Cave, Santa Cruz County, California.

Araneae: Dictynidae: *Cicurina* (*Cicurella*) *mckenzie* –Fog Fissure, Bandera County, Texas.

Araneae: Tetrablemmidae: *Matta mckenziei* Shear – Grutas de San Ignacio, Campeche, Mexico.

Coleoptera:Carabidae: *Rhadine tenebrosa mckenziei* Barr –Skeleton Cave, Real County, Texas.

Coleoptera: Leiodidae: *Ptomapha*gus (*Adelops*) mckenziei Peck – Cueva de California, Nuevo León, Mexico.

First biological collections in areas in Mexico

*first collections in state
*probable first caver-visit to areas
*Campeche
Nuevo León
*Galeana
NuevoLeón-Tamaulipas
Rancho Nuevo
*Oaxaca

- **Acatlan
- Apoala
- Orizaba
- **San Sebastian de las Grutas
- **Valle Nacional
- *Puebla

Zacapoaxtla-Cuetzalan Querétaro

**Pinal de Amoles
*Quintana Roo
San Luis Potosí
**Matehuala
**Micos
**San Nicolas de los Montes
**Valle de los Fantasmas
Tamaulipas
**Sierra de Guatemala
**Sierra de Tamaulipas
Veracruz
**Cofre de Perote
**Cuitlahac
**Jalapa
**Soledad Atzompa
**Tezonapa
—James Reddell

I started using Walls in my early twenties and never looked back. Over the years I have spent many, many hours converting our old Canadian survey data over to Walls, and many hours converting old Canadian cavers over to Walls, too. For many years now, Canada's longest and deepest cave projects have been managed in Walls, and it has also been adopted by Parks Canada, where it plays a central role for cave management. On behalf of project cavers from your neighbors to the north, a big thank you to David for giving us this amazing tool and kindly supporting us along the way. —Dan Green I didn't know David well; we only conversed over email. His willingness to share his time and effort by producing and supporting cave survey software at no cost to the caving community showed how selfless he was, and every time I sent an e-mail, even when it was something I should have gleaned from the manual, David always had a positive and helpful response and was a pleasure to interact with. I wish I had had the opportunity to meet him in person to thank him for his gift to the caving community.

—Jason Richards

