



limestone conglomerate, which they mapped to a terminal sump at 960 meters from the entrance. They also discovered and partially explored Pozo del Portillo, a multidrop cave in conglomerate which they mapped to a depth of -232 meters and a length of 650m, with going cave left unexplored. A third conglomerate cave, an active sumidero named Sima Dolina Norte-1 was explored to a depth of 70 meters. This cave is situated in a doline reached only after three days of trail cutting by machete. The 70-meter depth is to the bottom of the entrance shaft, with cave beyond left unexplored due to lack of time.

The following September, a second Catalan expedition, consisting of 11 explorers, returned to Pozo del Portillo, to continue the work started in 1997. At a depth of -346 meters, the small cave stream they had been following was joined by another major stream of perhaps three times the volume of the entrance stream. Beyond this they entered a boulder-choked hall where they reached the top of a 10 to 15-meter drop, at which point exploration was halted some 100 to 200 meters beyond the last survey station. According to their published report, they mapped the cave to a length of 1400 meters (with an additional 600 meters explored), and down to a depth of -384 meters, making Pozo del Portillo the deepest known cave in the world developed in conglomerate, and the ninth longest. Unfortunately, the 1998 group felt obliged to call off exploration before bottoming the cave. Leaving the cave fully rigged, they abandoned their camp abruptly. The cause of this hasty retreat was a violent local happening involving gunplay, with members of the expedition group caught up in the scene. Also unfortunate is the fact that no finished map was produced by this expedition, only a line plot.

In addition to the three caves mentioned above, the Catalan cavers report having found 28 other caves, mostly short, but two

were noteworthy as sites with pre-Columbian ceramics. Both Catalan expeditions took place in September and rain was significant.

In 2008, a small contingent of Tennessee and Ohio cavers, led by Ric Finch, made a brief recon into the El Rosario area. Having learned of the Catalans' discoveries, this group wanted to check out the situation for a possible future attempt to bottom Pozo del Portillo. Ric relocated the entrance to Pozo del Portillo and the group explored a resurgence cave with a location that made it an obvious possible resurgence for the deep Pozo del Portillo. Having, at this time, no location information for the Catalans' Cueva del Resumidero, this group assumed that their resurgence cave was the Catalans' cave. The fact that this cave had no swimming section near the entrance as described by the Catalans was attributed to their having made their explorations during the rainy season, whereas the 2008 group made their recon during April, one of the two driest months of the year. Planning commenced for a return trip the following year. One of the first steps was to ascertain whether or not the Catalans had any plans to return to Pozo del Portillo. Ric managed to contact three of the Catalan expedition members and was informed that they definitively did not plan to return. Josep Guarro, a member of the 1998 expedition, was extremely generous, providing survey data, and sharing much valuable information not available in the published articles on Pozo del Portillo.

#### THE 2009 EXPEDITION TO POZO DEL PORTILLO

In late March, the cavers convened in Honduras, at the height of the dry season. The group, sponsored in part by the National Speleological Society through the Speleosphere Project, included Ric Finch, Matt Oliphant, Nancy Pistole, Pete Shifflett, Mary Gratsch, Pete Miller, Gary

Dunkley and Costa Rican caver Andrés Ulloa. Unfortunately, several other invited cavers were not able to join us, so our group never achieved the strength we had wanted for the planned undertaking. In addition to finishing off Pozo del Portillo, our group intended to dye trace the deep cave stream to its presumed resurgence cave located in 2008.

**March 26:** We arrived at the town of El Rosario, armed with a *constancia*, i.e., official letter of introduction, a very useful document to have in order to avoid problems with local officials. Our *constancia* was from the Director of the Honduran Institute of Anthropology and History in the capital, Tegucigalpa. We took lodging in the small, but adequate, Hotel El Costeño, which we had reserved in advance, as our group needed all but one of their rooms.

**March 27:** Ric visited with the local *alcalde* (mayor) and chief of police to inform them of our plans. While this "politicking" was being done, part of our group went with Dagoberto Juárez ("Dago" for short), our local guide and "man Friday", to set bugs (activated charcoal dye receptors) in the presumed resurgence for Pozo del Portillo, explored by the 2008 group.

**March 28:** We drove out to the village of El Ocotal, where Dago was awaiting us with the six mules and muleteers necessary to take our gear up to Pozo del Portillo. Unfortunately, we were accompanied to El Ocotal by a large police escort, which we neither requested nor wanted. Ostensibly for our protection, the heavily armed contingent seemed mainly to be out for a noisy lark. At one point the police chief had said he would send two officers up to the cave with us, "to protect us from bandits", but to our relief none of the uniformed men actually came with us (far too much work!). It should be noted that while it is necessary to maintain good relationships with local authorities, we



Nancy Pistole

The hike up to Pozo del Portillo



Andrés Ulloa

Camp in the jungle



Mary Gratech

**Ric examining well-rounded conglomerate bedrock**



Mary Gratech

**Pete S. emerging from the "semi-siphon"**

had no control over the police actions, but were well aware that being accompanied into a small village by an armed posse is not the best way to inspire confidence with the local people. It is fortunate that we had Dago, a well-known and respected local, working with us.

Pozo del Portillo ("Pit of the Pass") is reached by a two hour walk from El Ocotol, starting at an elevation of 800 meters at El Ocotol and climbing up to around 1350 meters. The cave is located in a sink in the immediate vicinity of a trail that goes through the pass identified on the map as Portillo del Pozo ("Pass of the Pit"). It is close to the hilariously named Montaña Rompeculo, literally, "Break-Ass Mountain". There is an excellent campsite in the entrance sink, just off the major trail that passes through the *portillo*. While convenient for accessing the cave, this popular trail makes it mandatory that someone remain in camp at all times to prevent pilferage; we rotated the duty of camp guard. The small (in the dry season) stream flowing into the cave is apparently permanent, and is a good source of water for the camp.

Entry into Pozo del Portillo is through a chaos of large boulders of limestone conglomerate prior to actually entering cave in solid bedrock. Once into bedrock, the cave becomes sinuous and very narrow (commonly 0.5 to 1 meters wide) as it passes through a section dubbed "the meanders" by the Catalans. Walls of smoothly eroded conglomerate present a fascinating, gorgeous and very photogenic mosaic. The meanders section drops rapidly through a series of small nuisance drops, some of which are climbable, and some of which must be rigged. We noted that where we found remnants of the Catalan rigging, it was placed higher than our rigging, apparently indicating the greater water flow they encountered in their September explorations. Due to its tightly

cemented nature, the limestone conglomerate is very solid and takes bolts well, with little tendency for individual clasts to pull out. This is fortunate, because the smooth nature of the water-solutioned walls makes natural anchors scarce. By the end of the day we were settled in camp and Matt had already rigged the entrance drop and a couple of drops beyond.

One hazard future explorers must be on the lookout for is venomous snakes. Our group found one pit viper (how appropriate!) in the entrance to Pozo del Portillo, saw a large *barbamarilla* (fer de lance) beside the main trail the first night in camp, and later saw two other unidentified snakes. The owner of the Pozo property had a child badly injured by a *barbamarilla* in this vicinity.

**March 29:** On the first full day working in the cave, at a depth of about 85 to 90 meters, the first major pitch (the Catalan's 41-meter drop designated "P-41" for "pozo 41 meters") was reached and descended. Here the cave stream forms a waterfall tumbling down into the pit, which bells out to perhaps 10 meters in diameter. Matt rigged this drop with a rebelay and a re-direct, to keep the rope free from contact with sharp edges, but part of the rappel was in the waterfall.

A short distance beyond the P-41 the ceiling abruptly lowers and the Catalan's "semi-siphon" is reached. Apparently it was a genuine sump, length unknown, when first explored by the Catalans—we marveled at their audacity at pushing through it...which of them had the *cojones* to make the first attempt? At the time our group arrived it was again completely sumped, and even knowing it was only two meters long you still had to gather up your courage to push through. Pete S. was the first to take the plunge. We were able to create a few centimeters of air space by spending an hour digging a trench through the gravel on the downstream side

to lower the water level in the sump.

**March 30:** Five of us entered the cave and spent a second hour trenching beyond the "semi-siphon" and managed to lower the water until it was merely an ear-dipper. A short distance further in we came to the largest room in the cave, the "Sala Catalunya", measured by the Catalans at 55 X 65 meters, with a ceiling height reported as 25 meters. What appears on their map to be a gigantic breakdown block in the center of the room is actually an immense mass of flowstone. The cave stream disappears amid the various large blocks in this room, and the way on was not immediately obvious. After a bit of searching, we found the way on, and reached the second major drop, the "P-48". We descended about half way down this broken pitch, where we decided to call it a day. We dropped the fluorescein dye in the stream at the top of the P-48, approximately 175 meters below the entrance, then headed back to camp.

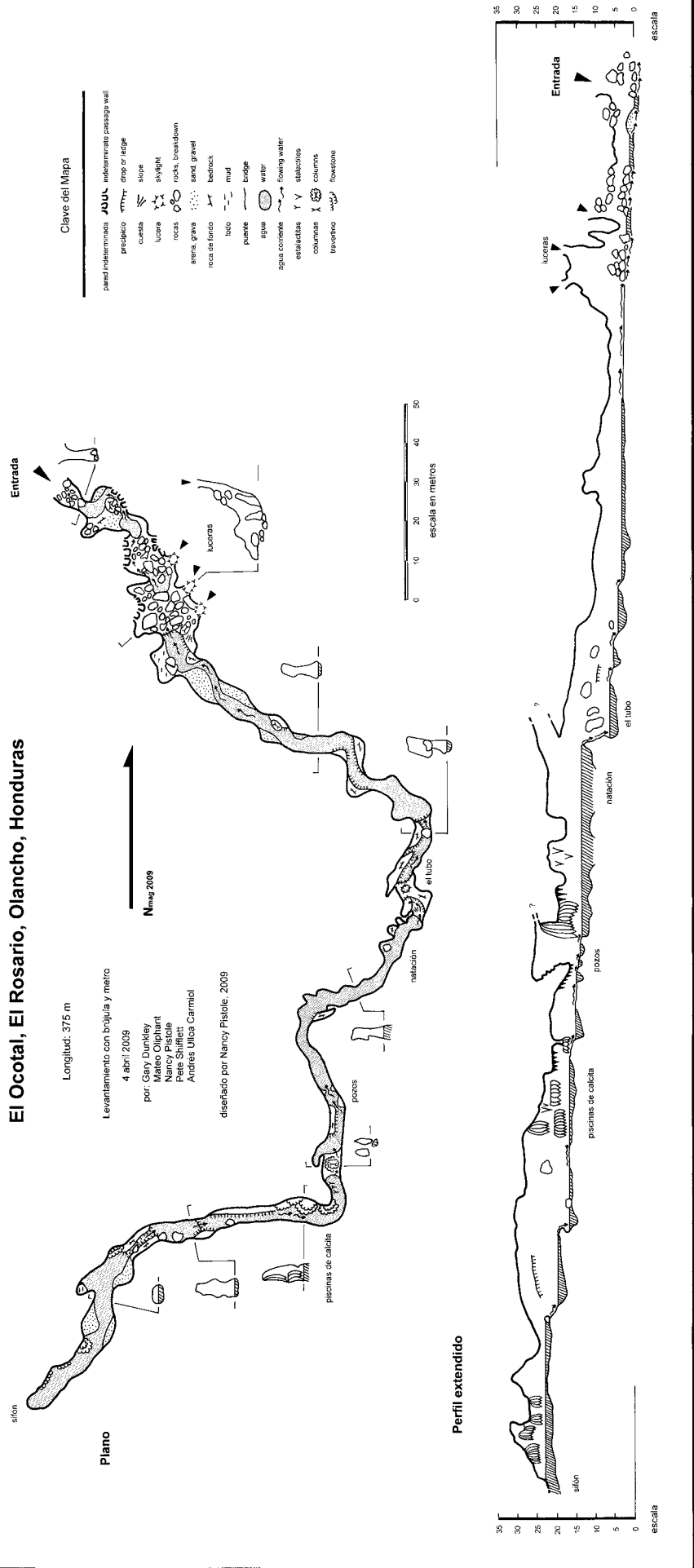
**March 31:** Matt and Nancy hiked back to El Ocotol and on in to El Rosario to recharge drill batteries, while Pete M., Mary, and Ric photographed the upper part of the cave.

**April 1:** Six cavers entered the cave and split into two teams. The plan was for the second team to bypass the first and continue finding the way in and rigging it, while the first team came along mapping. Gary was assigned camp guard duties, while Ric went to look for the entrance to the Catalans' Cueva del Resumidero, using a GPS unit and the Catalans' coordinates.

Ric's eight hour hike took him by the entrance to the presumed resurgence for the Pozo del Portillo cave stream and wow! did we have a positive dye trace! The water was a bright green. No need for lab analysis of any charcoal receptor! But a potential undesirable consequence of this wildly colored water was what effect it might have on any locals

# Cueva Resumidero del Pozo

El Ocotal, El Rosario, Olancho, Honduras



who saw it...a matter that would soon be made abundantly clear.

Ric followed the resurgence stream to where it joined the "main" streambed shown on the map, but this was bone dry upstream from the resurgence stream. He followed this dry stream west, upstream towards the Catalans' Cueva del Resumidero, but the Catalans' coordinates for El Resumidero put him in the middle of a corn field. No cave here! A possible wet weather resurgence was located near the base of the mountain flank nearby, but no obvious candidate for Cueva del Resumidero. A mystery remained, but the hour required that Ric head back to camp.

En route back up the mountain, Ric met the owner of the Pozo area who was rather worried about the green water coming out of his spring and what effects it would have on his cattle. Fortunately, he was a reasonable man and accepted Ric's explanation that the dye was harmless and would soon disappear. A donation for his child's hospital bills also helped smooth his upset. In the meantime, back at camp, Gary, who speaks only a little Spanish, was having a much harder time calming down a large group of angry and armed *campesinos* who had come up to camp to demand our immediate departure from the area. By the time Ric arrived at camp Gary had done a good job of making friends and entertaining them, but it had taken several tense hours to do so. Nonetheless, Ric had to go through all the explanations about the dye, its purpose and harmlessness, again for this group, which finally returned to El Ocotal. A lesson to be learned here: try not to use too much dye, and let the locals know what is being done beforehand—just in case!

To top off an event-filled day and a somewhat negative one at that, while Gary and Ric were eating supper in camp, Pete M., Mary, and Andrés unexpectedly returned to the surface with the news that Matt, Nancy, and Pete S. had called off the exploration effort and had begun derigging. The nature of Pozo changes below the P-48 drop. The cave funnels down to a narrow crevice, requiring extensive rigging that would considerably slow down progress. Safety had now become a real concern: our group was too small to safely field two working teams, and in a few days the exploration crew would be reduced to just four cavers. In the event of an accident, rescue would be extremely difficult.

Matt, Nancy, and Pete S. derigged up to the top of the P-41 before exiting, thus ending the effort to push beyond the explorations of the 1998 Catalan group and to finish the mapping. However, we all agreed that safety trumped exploration.

April 2: Gary and Pete S. went in to finish derigging, while Matt and Nancy took photos using Andrés as a model. Ric took



Mary Gratech

**Andrés and Pete M. at the bottom of the entrance boulder chaos drop**

guard duty in camp again, and later in the day walked out to a point where cell phone reception could be had, to call Dago and tell him seven mules would be needed for packing out camp the next day.

**April 3:** Our reliable friend Dago arrived early in the morning, having left his house in El Ocotol at 5 AM, worried that some of the locals upset about the green water might be causing us problems. The mules arrived shortly after he did. By mid-morning everyone and all the muleloads of gear had made it not only back down the mountain to El Ocotol, but moved from there by car back to the Hotel El Costeño in El Rosario, a minor miracle of transportation logistics, but a good thing, because Ric had to drive Pete M. and Mary into the airport in San Pedro Sula—five hours of hard driving—this same day.

**April 4:** Nancy, Matt, Pete S., Andrés, and Gary mapped the resurgence cave, which had been visited earlier in the trip. We decided to name it Cueva Resumidero

del Pozo, in order to distinguish it from the Cueva del Resumidero of the Catalans. The cave mapped out at 374 meters long, gaining 23 meters elevation, to end at a terminal sump. The average direction is almost due south, headed right for Pozo del Portillo. While much shorter than Cueva del Resumidero, Resumidero del Pozo is likewise a sub-horizontal active stream cave developed in conglomerate, and very beautiful.

After mapping Resumidero del Pozo, our group went in search of the Cueva del Resumidero, but, like Ric earlier, did not find it. A dark fissure, a possible wet-weather resurgence was located, but no obvious cave. And so the puzzle remains: where is the Catalans' resurgence cave? Is it strictly a wet-weather resurgence (during the 2009 dry season the main streambed in the valley was dry upstream from the stream issuing from Resumidero del Pozo)? And what feeds Cueva del Resumidero, does it have a high entrance, the equivalent to another Pozo del Portillo, perhaps in one of the sinks on the west side of Montaña Rompeculo?

Another mystery is how the Catalans missed finding Cueva Resumidero del Pozo, since this resurgence is permanent, not seasonal, and well-known to the locals. It is possible that in the wet season the volume of water issuing from it might make it impossible to enter the cave. But the Catalans state in their 1998 article that they had not located any possible resurgences for Pozo, which Resumidero del Pozo clearly is (even without a dye trace). So they must not have found this spring. We hypothesize that they followed the main streambed, which is labeled on the map "Quebrada El Resumidero" and which was flowing in the wet season. By sticking to the main stream they would have by-passed the smaller side stream coming from Resumidero del Pozo, and arrived at a seasonal resurgence that we did not locate in the dry season. What is clear is that much remains to be explored and discovered in this area.

**April 5:** We left the area with some regrets about the failure to bottom Pozo del Portillo. We had originally hoped to finish the map started by the Catalans, push the world's depth record for caves in conglomerate past the -400 meter mark, and perhaps even establish a new depth record for caves in Honduras. Nonetheless, we were pleased to have had the privilege of seeing a portion of a spectacular cave in conglomerate, to have proven where Pozo resurges, and to have mapped a new cave, Cueva Resumidero del Pozo. And we certainly had no regrets about leaving the dusty, unpleasant little town of El Rosario behind. Matt, Nancy, and Andrés headed for Guatemala for more caving, Gary to the Bay Islands for some fun in the sun, and Pete S. and Ric returned to Tegucigalpa to turn in our rental vehicle and book new flights home. And so the 2009 Pozo del Portillo effort ended.

### **THE POTENTIAL FOR FURTHER EXPLORATIONS IN THE POZO DEL PORTILLO SYSTEM AND SURROUNDINGS**

Having demonstrated that Resumidero del Pozo is the resurgence for Pozo del Portillo, it is now possible to estimate the full vertical extent of the Pozo system. To do this accurately, of course, depends on having reliable elevations for the two entrances, simple in theory, but unfortunately difficult in practice. Using 1324 meters as the elevation of the entrance to Pozo del Portillo (the average of various GPS readings), the Catalan survey endpoint at -384 meters should be at about 940 meters elevation. After estimating the extent of the Catalan's further exploration, their deepest penetration should have put them at around 925 meters elevation, with at least another 10-meter drop in sight, suggesting the lowest known point in Pozo to be about 915 meters elevation.

Using 899 meters as the elevation of the entrance to Cueva Resumidero del Pozo (from averaged GPS readings) and adding the surveyed 23-meter gain in elevation, we get



Ric Finch

**Mary in the boulder chaos at the entrance to Pozo del Portillo**



Mary Gratech

**Vertically bedded conglomerate (red knife lies parallel to bedding)**



Matt Oliphant



Matt Oliphant

**Pete S. negotiating a cascade in Cueva Resumidero del Pozo**

**Andrés and one of the nuisance drops in “the meanders”**

an elevation of around 922 meters at the terminal sump, about seven meters above the supposed low point in Pozo, clearly an impossibility!

From these speculative projections we can conclude the following: 1) one or both entrance elevations are probably off by 10 meters or so, as the two projected ending elevations are incompatible; 2) whatever the true differences in elevation, the gradient between the end of Pozo del Portillo and Resumidero del Pozo is almost certainly low, and it is likely that much of the cave remaining unexplored is submerged; 3) although some additional cave is known to remain to be explored and surveyed at the bottom of Pozo del Portillo, the likelihood of adding significant length and depth to the Pozo del Portillo survey by pushing downstream in Pozo seems slight.

The Catalans report that at a depth of -346 meters, the Pozo del Portillo stream is joined by a major side stream, with a volume perhaps three times that of the Pozo stream, coming in from the east. Due to lack of time, they did not explore this stream passage, but the great volume of water suggests very good potential for major extensions to the Pozo del Portillo system by exploring up this larger stream. Nothing is known about the source(s) of the water in this larger stream, however six sinkholes are shown on the topo immedi-

ately south and east of the Pozo del Portillo entrance sink, at elevations somewhat higher than the Pozo entrance sink. Presuming that the nature of the unexplored cave upstream from the junction at -346 meters is similar to that of the explored cave, one would expect to run into vertical drops that would present significant challenges to ascend, however, if this branch could be followed back to the surface sink(s) supplying the water, the vertical extent of the cave might be increased. A more practical approach might be to check the nearby surface sinks for entrances and explore any discovered caves to see if they join the Pozo del Portillo System.

#### **THE SPELEOLOGICAL POTENTIAL OF THE MONTAÑA DE LA FLOR STRUCTURAL BELT**

In addition to the remaining potential in the Pozo del Portillo System proper, there remains the question of what feeds Cueva del Resumidero of the Catalans? Major sinkholes lying some 2.5 and 4 kilometers to the NW of Pozo del Portillo would be possible insurgences for this resurgence cave, and possibly entries to another deep system relatively close to the Pozo system.

Looking at the bigger picture, Pozo del Portillo, Cueva Resumidero del Pozo, Cueva del Resumidero, Sima Dolina Norte-1 and 28 other caves discovered by the Catalans all are found within a relatively small area

around Portillo del Pozo and Montaña Rompeculo, all located within the Montaña de la Flor Structural Belt (MFSB). Several other caves have been found NW of Pozo del Portillo, in the MFSB, namely Cueva del Portillo de la Peña (a fine through trip with a mapped length of 1615 meters and a drop of -84 meters), and Cueva La Mina (a partially-surveyed resurgence cave).

In addition to these additional known caves, karst zones and a few cave entrances are indicated on the 1:50,000 topographic quadrangles crossed by the MFSB. Topographic place names are further evidence of caves: Cueva del Cerrato, Cueva El Tigre, Cueva del Tigre, Montaña de Las Cuevas, Quebrada las Cuevas, Quebrada El Resumidero, Drenaje Subterráneo, and so forth.

#### **ACKNOWLEDGEMENTS**

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