

At the top spring at the Cascada de Roca Salina. Not the cacti dotting the karst in the background.



KARSTING AROUND MEXICO

- Kent Henderson

In September, a friend of mine from Adelaide and I undertook a trip to Peru and Mexico. While Peru has karst, the areas we were in (The High Andes – Cusco, Macchu Picchu, and all that) were volcanic and karstless (at least I didn't see any). Mexico, on the other hand, has a surfeit of karst – indeed it comprises pretty much the bottom half of the country.



The Frozen Waterfall at Cascada de Roca Salina

The main reason for the trip was to indulge our joint interest in ancient civilizations – the Incas in Peru, and the Aztecs/Toltecs/Mayas etc in Mexico. Thus, we visited virtually every archeological site we could get to (which was a lot!). When we got to Mexico we started in Mexico City (as you do), and aside from various in-city tours we went to the wonderful Teotihuacán (the Aztec City of the Gods), just to the north – with its famed *Temple of the Sun* and *Temple of the Moon*. Very speccie stuff! Next we bussed south to Oaxaca, when things started to get a bit exciting. We drove through literally mountains of karst (and I do not mean hills!) over probably 200 kms as we approached the city. Much of it was covered in enormous cacti.

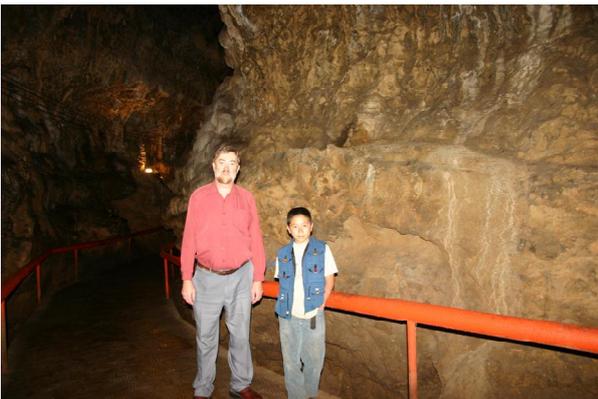
The main archaeological site in the area is the Toltec city of Montealban – a 'karst city', all in limestone. A very interesting site. I then "talked" our guide into a private afternoon tour south-east of Oaxaca to visit a wonderful karst site I just happened to see on a post card, called "Cascada de Roca Salina" (The Salt Rock Waterfalls). We were amongst the first tourists there this year, I was told. I could understand why – the road for the last 10-20 km was appalling – spine surgeon needed, and a least an 8 wheel drive! But we got there in our mini van, somehow... The site is sort of an "outside cave" with calcite running down the hill, over thousands of years, from karst springs. It was reminiscent of Pammukalle in Turkey, if any of you know it (which I visited many years ago), although on a smaller scale. An 'outside cave' is probably an apt description. The key feature is flowstone down rockfaces – a little tufa, but mostly solid calcite.

Cenote Sagrado at Chichen Itza



The other feature is several very large calcite dams, and two water-spouting springs – one of which is almost at the edge of a precipice. As for management, well there isn't much really. The two active springs are sort of fenced, but that is about it. Otherwise, one has unrestricted access to walk over all surfaces. Of course, calcite is being constantly deposited on the rock surfaces, but I did not notice any scarring from human contact. It was a wonderful site, if of appallingly bad access (not necessarily a bad thing?).

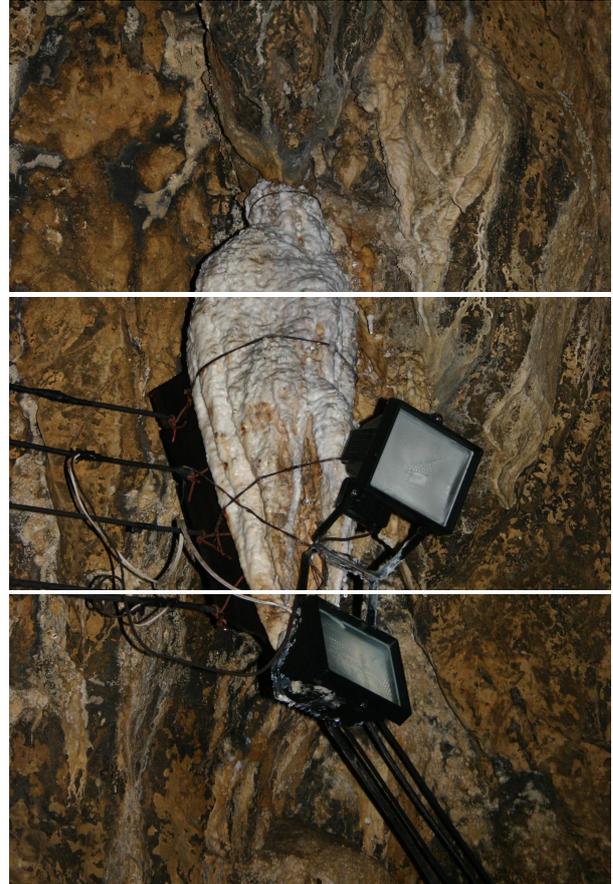
Our next point of karstic interest was the large State of Chiapas, south east of Oaxaca, bordering Guatemala. This State, the fourth largest in Mexico, is about 80% karst. We flew into Tuxtla, the state capital, to be meet by our guide, the wonderful Dawn, who whisked us off towards our base for the next few days, San Cristóbel de las Casas – a most delightful town. En route, I had one of the greatest karst experiences of my life – a visit to the Cañon del Sumidero National Park!



With the "Head Guide" in Rancho Nuevo Cave

This natural wonder is actually a huge geological fault which formed 36 million years ago. The 'canyon' (gorge, we'd call it) is cut through a massive area of karst by the Grijalva River, and would have to be one of the most spectacular in the world. The cliffs tower over 900m high. The length of the canyon varies depending on the departure

point, however the distance from the bridge over the main highway to the massive Manuel Moreno Torres dam at the northern end is thirty-two kilometres. The canyon is between 200 and 400 m wide, and at its highest point is 1,000 meters above sea (and river) level. In order to visit the canyon, one takes a river cruise – not surprisingly an extremely popular tourist attraction!



Conduit wrapped around a speleothem
– Rancho Nuevo Cave

The boat trip was spectacular, to say the least. There must be untold numbers of caves in the karst – I viewed not-a-few likely entrances during the trip. The awe of the trip was, however, somewhat offset by the large amount of flotsam on the river – floating garbage of every description, with plastic containers (which, of course, float) predominating. In the early 1980's a huge hydro-electric power station was constructed up-river, with an equally huge attendant dam. The effect has been to significantly alter the river levels, and I understand many formerly river level cave entrances are now below the water line. Hmmm... But it is the pollution that really disturbed me. I later discovered that a sewerage pumping plant (note: not a treatment plant) was installed next to the river just below the hydro dam about ten years ago. It pumps all the (largely untreated) sewerage from San Cristóbel de las Casas (population: circa 125,000) straight into the waterway! Do not eat fish from this river! Oh dear...

A view of Cañón del Sumidero



The boat trip takes you about halfway up the river to a special feature – *The Christmas Tree Waterfall*. At this point, about three quarters of the way up the cliff face, a karst spring cascades downward to the river. Given the speed of the resultant waterfall, only minimum amounts a deposition have occurred. However the moss and plant growth below is profuse, forming – well – a Christmas Tree effect. It is very beautiful and quite spectacular.



The Christmas Tree waterfall, Cañón del Sumidero.

We stayed a few days in San Cristóbel de las Casas and toured, amongst other points of interest, its 'karst' cathedral – one of a number in southern Mexico constructed of limestone. With some prompting (and suitable remuneration...), I induced our excellent guide, Dawn, to take to a show cave about 20 minutes drive out of town.

The Rancho Nuevo Cave is located in a forest, within what is now a national park. The park is owned (and managed...sort of) by the Mexican Army, which has a large army base adjoining the forest. Rancho Nuevo is a relatively straight stream passage cave, surveyed to 10.2 km, and is 550 metres deep at the lowest point under the mountain it cuts into. The tourist section is one km long from the entrance. It was discovered in 1947, and developed soon after.

A reasonably wide concrete pathway has been constructed through the cave, raised in places. An active streamway runs through the tourist route, largely under the pathway – which hasn't been constructed with too much thought, but it could have been worse. Reasonably good handrails follow the pathway.

The cave itself is far from exciting, with minimum decoration – although with a little bit of good stuff. The lighting is, however, very sub-standard. Basically, it consists of conduit draped halfway up the wall the entire length of the tourist section, with no attempt to hide it. Light globes are dotted at intervals, with virtually no attempt at feature lighting. No switching, but remarkably not much *lampenflora* (although there was some). The conduit is often tied off around convenient speleothems. Not good...

Pool reflections, final chamber - Aktun Chen Cave



What fascinated me most about this cave were the guides. The average age of the guides is ten years old, and the Senior Guide is twelve!!!! One pays the entrance fee, and your guide finds you in the cave (whom one tips at the end...of course!). Not unsurprisingly, the guide's English was not flash, but we had Dawn to translate their 'fairylard' interpretation. Remarkable - primary school age guides!! Now there's a thought for Jenolan, Naracoorte, Waitomo.... Cheap to employ, too!

Upon leaving San Cristóbel de las Casas, en route to the wondrous Mayan ruins of Palenque, we stopped at the Cascades de Agua Azul (Agua Azul Waterfalls). This is a series a waterfalls down a section of the Agua Azul river, all in karst, and features many pools, largely calcified, between the various cascades. A very pretty, if touristy, spot.



Infrastructure in Rancho Nuevo Cave

And thus to the Yucatan, with all its world-famous Mayan sites - Chichen Itza, Uxmal, Tulum.... All wonderful, all constructed in limestone. The Yucatan comprises three Mexican states, and is 100% karst, 95% jungle and 90% flat (the other 10% being a relatively small area of low hills - 120m asl - in the south). It is also totally devoid of surface rivers or waterways. Being karst, this comes as no great surprise to us. What sustained the ancient Mayan (and modern) civilization in the approximately 2000 cenotes that dot the landscape. All fresh water comes from the cenotes, many (probably most) of which are linked underground. Cave divers have surveyed connections running up to a hundred kilometers. As an aside, the word

'cenote' is a Spanish corruption of the Mayan word 'cenot'.

I managed to get to one show cave (there are eight in the Yucatan) and a number of cenotes. My first cenote was at Chichen Itza itself, featured as part of the tour - Cenote Sagrado. It is close to the main ruins and was the ancient water supply for the site. It is an open cenote, and still has plenty of water. It was reminiscent of Goulden's Hole near Mt. Gambier in South Australia, but a bit bigger. Upon leaving Chichen Itza we called in briefly at another, 3 km east - Cenote Ik Kil. This partly open (or partly closed...) cenote is surrounded by a hotel resort. It is the hotel's swimming pool!!

One descends a spiral staircase cut through the limestone surrounding the cenote, with several viewing points, before you eventually wind down to the water level. Water cascades in several places over the cenote rim, which is ringed with hanging vines and greenery. A very beautiful, if slightly contrived, spot! We did not have time for a swim...



A small cave next to the river through Cañón del Sumidero, used as a religious shrine

We moved on to stay at Playa del Carmen, a trendy town about half way down the east coast of the Yucatan, on the Caribbean - the 'Yucatan Riviera' - which runs from Cancun in the north down about 100+ km to Tulum in the south. The coast is pretty much wall-to-wall beach resorts... We did a day tour, firstly to the Maya site at Tulum, and then to cenotes and a show cave. To indulge myself in cenotes, we visited the *Hidden Worlds Cenotes Park*, just off the main highway to the north of Tulum.

This commercial operation runs tours to a fair number of cenotes in the jungle. Its cenotes featured in the IMAX film, *Journey into Amazing Caves*, and the recent Hollywood thriller (so-called...), *The Cave*. One can take three types of tours - full cave diving (you must be an accredited cave diver), snorkeling (very popular), and sightseeing. We did the latter. We were placed on the back of a vehicle-cum truck (it looked like something out of a *Mad Max* movie), where one stands and holds on for dear life as you are driven at intemperate speeds over lengthy (and very bumpy) jungle tracks. An experience in itself!

Snorkelers about to enter a closed cenote
– Hidden Worlds Cenotes Park.



The first port of call was a closed cenote, with a narrow entrance down a flight of steps – very much your typical cave. A petrol generator near the entrance provided some internal lighting. The cave contained some good decoration, plus the expected large-ish lake, with absolutely crystal clear water. A group of snorkelers arrived shortly after us, and we watched them being instructed prior to them wading in. Our next was a smaller open cenote, quite shallow, with a well-constructed boardwalk down its middle just above water level. Plenty of water plants and fish – quite pleasant. Finally, we visited another closed cenote, but we didn't get very far into it as recent rain had raised the water level.

Upon leaving the Cenote Park, we tracked further up the highway to visit the local show cave – Aktun Chen. After my experience with Rancho Nuevo Cave in Chiapas in the previous week, my expectations

were not high, but I was most pleasantly surprised. It was a very interesting cave, reasonably well managed (even by our standards), and well lit. It featured a 90+ minute tour, and over a kilometre of cave. It is basically a series of linked caverns, with daylight collapsed dolines in between – somewhat reminiscent of Royal Arch Cave at Chillagoe, or perhaps Capricorn Caves near Rockhampton (but certainly not in tower karst). The decoration, given the relatively high air flows in the cave, was mostly dry-ish, but it did feature a lot of good stuff. There was no switching in the lighting, and some *lampenflora* as a result, but the feature lights had been placed thoughtfully, and almost always concealed. And the guide was competent.

The tour was in English, and his interpretation more than adequate. He dealt with the geology and science well, and indulged very little in “fairy castles”. I was not unimpressed. During the tour, he regularly expounded on the virtues of the last chamber on the tour – “just wait till you see the last cavern”! Given this hype, I was, of course, quite prepared to be underwhelmed. But no! The last chamber was stunning. It was a very large closed cenote, full of clear water, and surrounded by rich, active decoration....and switching! An excellent boardwalk ran across the lake to one side just above water level. The lighting, frankly, was just about as good as Neil Kell or Pete Bell would have accomplished!! A great deal of thought had clearly gone into it. The guide went through about ten arrays (no coloured lights either...) which featured quite a bit of underwater illumination as well. I was very impressed indeed! Aktun Chen is an excellent cave, well developed, and quite well managed – something I did not expect. Great stuff!



One of the strange vehicles used to transport tourists – Hidden Worlds Cenotes Park.