

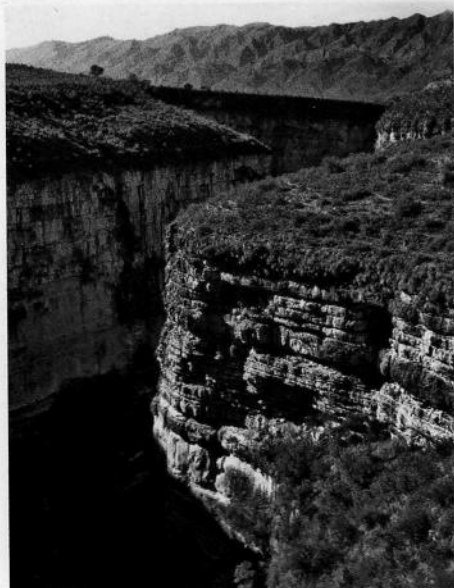
Beneath Bolivia: Caving at High Altitude

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Bolivia in South America is much more than the land of the ancient Incas, the high Andes Mountains, and the place where Butch Cassidy and the Sundance Kid died in a gunfight. It is also a country containing high-altitude caves, many of which are located in rugged, remote, and pristine landscapes unparalleled anywhere else on earth. In fact, Bolivia has proportionally more land above 10,000 feet than any other country. The capital, La Paz, is the highest capital city in the world at 12,000 feet elevation, with its airport at 13,000 feet. Caving in the thin, low-oxygen air of the Bolivian *altiplano* (high plateau) can literally leave you breathless.

Bolivia's caves first came to international attention in 1967 when French cave explorer Jacques Chabert authored "*Les Grottes de Torotoro*" in the French caving publication *Grottes et Gouffres*. In 1973, NSS member Tom Miller visited Bolivia and wrote an account of his exploration of Humajalanta Cave in a 1975 issue of *The Canadian Caver*. Additional articles about Bolivia's caves appeared in 1987 in the French caving journal *Spelunca*.

On the homefront, the Club Andino of Bolivia formed in 1939 and was made up of both local climbers and cavers who were active in all things having to do with high mountains, including exploring caves. The Bolivian Speleological Society (*La Sociedad Boliviana de Espeleología*) formed in 1995, and in 1998 Speleological Society member Rodolfo Becerra de la Roca authored "*La Espeleología en Bolivia*" ("*Speleology in Bolivia*") in *El Guácharo* #43, a Venezuelan caving publication.

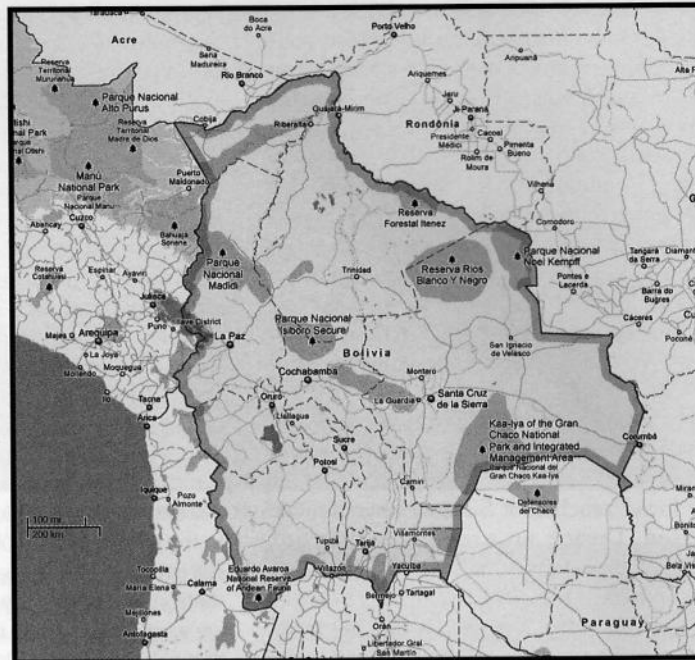


Torotoro—a canyon with caves

The Bolivian Speleological Society also published a 41-page report in 1998 covering a 22-person Italian-Bolivian-Brazilian-Spanish expedition to the caves of Bolivia's scenic but remote Torotoro National Park area several hours by bumpy road south of Cochabamba in the central west side of the Bolivian Andes. In 1998, Italian cavers published a detailed report in the Akakor Geographical Exploring Association's journal about the same 22-person expedition to Torotoro. Information from this report was presented at the 13th International Congress of Speleology in Brazil in 2001. Various other foreign caving expeditions have visited Bolivia over the years, almost all going to the Torotoro region.

Having explored a few caves along the lower elevation border area between Brazil and Bolivia in 2002, I was eager to return to see what the rest of Bolivia had to offer speleologically. Six years later, this time joined by my husband, the goal of returning to Bolivia to work became a reality. For over two years, during our free days, we had the opportunity to explore beneath Bolivia, from frigid plateaus swept by icy winds to high altitude geothermal fields with steaming too-hot-to-enter caves.

Instrumental in pointing us in the right direction was long-time Bolivian caver Jorge Calvo. Jorge took us to one of our first Bolivian caves in the above-mentioned Torotoro National Park. *Torotoro* in the local Quechua Indian language means "extensive plain of mud" and indeed, 65 to 145 million years ago, *Torotoro* was an extensive limestone mud flat. The park is now famous for its deep canyons, dinosaur tracks, fossils, and archaeological sites, including cave paintings over 1,000 years old. Torotoro also has over 40 known limestone caves ranging from 6,600 feet to 12,700 feet in elevation, 20 of which had been explored by the 1998 expedition. Dinosaur tracks are all over including, at over a quarter of a mile



long, the longest set of continuous dinosaur tracks in the world.

Located in the park at about 9,000 feet elevation is Humajalanta Cave, the largest known cave in Bolivia at 3 to 6 miles long (reports vary) and 540 to 600 feet deep. *Humajalanta* translates to "what gets lost in the earth" in the Quechua language and sure enough, a stream disappears at the entrance to this cave, reappears later in the cave. The hike to the cave crisscrossed with dinosaur tracks, and a fi



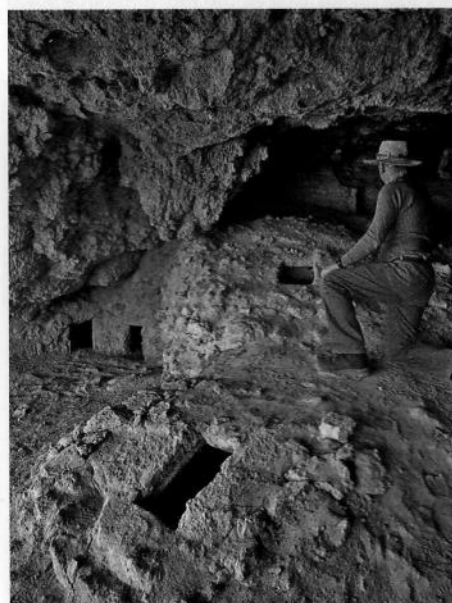
Torotoro—Humajalanta Cave, main entrance passage



Caver pointing to two dinosaur tracks on path to the Humajalanta Cave

for us, dinosaur tracks in a cave entrance. *Humajalanta* is a fun, sporting cave with a stream, slippery footing, waterfalls, and a lake with blind cave fish (*Trichomycterus chaberti*)—the fish being named after French cave explorer Jacques Chabert. We went into the cave with Jorge and the park's required Quechua Indian guide. We did not get to the end of the cave where the stream reportedly resurges as a 70-foot waterfall on a cliff face. As we slid and gulped for oxygen through the wet parts of this high-altitude cave, the nimble Quechua guide effortlessly and sure-footedly scrambled around in his tennis shoes, oblivious to the thin air.

The Quechua people are superbly adapted to living in the high altitudes of Bolivia, with hearts almost 20% larger than lowlander gringos like us, two quarts more



Cueva del Diablo, Uyuni Salt Flat—caver checking tomb entrances

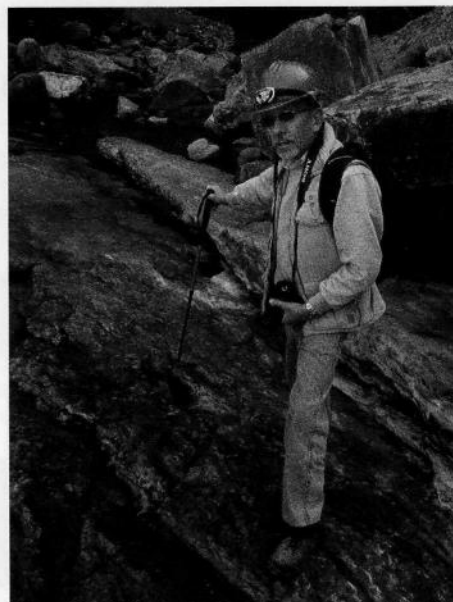
blood, larger red blood corpuscles (which carry oxygen), larger lungs with permanently dilated aveoli (providing maximum surface for oxygen exchange), deep, broad chests, and slower pulses. Quechuas also have short arms and legs as well as small hands and feet that reduce the distance the heart has to pump blood as well as reducing their exposure to cold. But even the Quechua and their fellow Aymara Indians occasionally suffer from *soroche* or altitude sickness, which they combat by drinking a tea made from coca leaves.

We spent half a day in Humajalanta, left Jorge in town to dry off and attend some meetings, and continued on with the Quechua guide to further check out the area. The guide took us to the edge of a deep limestone canyon with a narrow animal trail angling down the side of a cliff with a sheer, unprotected drop of almost a thousand feet. The extremely exposed trail led, according to the guide, to a cave entrance at the bottom of the canyon. We understood that the intrepid 1998 expedition had checked this cave, as well as mapped Humajalanta.

Several months later we made the challenging trip to the Uyuni Salt Flat (*Salar de Uyuni*) at 12,000 feet elevation in the southwestern part of Bolivia. At 7,500 square miles, the Uyuni Salt Flat is the largest salt flat on the planet. The salt flat was actually a large inland basin that had been filled with water twice, last drying out about 7,000 years ago. The brilliantly white salt combined with the blazing sun and high altitude makes strong sunglasses almost obligatory. The ancient Incas solved this brightness problem by smearing charcoal around their eyes before crossing the salt flat, but we stuck with the sunglasses.

Underneath the salt and along the sides of the salt flat is limestone containing small caves and a strange type of cactus (*Trichocereus*). These caves, as well as some caves and rock shelters located on the nearby volcanoes, were sometimes used as burial sites by pre-Inca Indians. Finding mummies, skeletons, various burial items, and broken pottery vessels is common. Many of the mummies and skeletons still receive grave offerings such as coca leaves, cigarettes, and bowls of food.

The salt flat also contains 37 rock "islands" that poke above the salt and often appear to float in the air due to mirages. Some of these islands have small caves and at least one island (Pia Pia) has a large cave entrance seen from afar but has never been explored due to the thick mud surrounding the island. We visited one island in the middle of the salt flat that contained a limestone outcrop with a deep rock shelter named Cueva del Diablo (Devil's Cave). Cueva del Diablo had been avoided



Jorge Calvo showing dinosaur tracks at the Humajalanta entrance

for many years by the locals because of the numerous ancient burial chambers that were constructed along the sides of the cave and under the floor. The Devil reportedly still guards this cave and the local Quechuas maintain that bad luck follows anyone who stays there overnight.

In the same rock outcrop was another cave that had been recently dug open by two poor but enterprising Quechuas who just knew that a cave had to be there, despite the rest of the village calling them idiots. After years of hard digging, the two Quechuas broke into a beautiful little flank margin cave that they promptly turned into an income-producing tourist attraction of sorts for the few tourists that venture that far onto the salt flat.



Cueva del Diablo, Uyuni Salt Flat—offerings to the dead



Cueva del Diablo, pottery vessel

We then travelled east of the salt flat to see if we could find the small cave where Butch Cassidy and the Sundance Kid hid the night before they committed their last robbery in 1908, not far from the small silver mining town of San Vicente. San Vicente was then and still is an isolated, freezing and barren place at 14,900 feet elevation. Two nights after the robbery, Butch and Sundance settled down for the night in a small adobe room there and shortly after died in a shoot-out with several soldiers who came to check on the suspicious gringos. We were close to Butch and Sundance's hideout cave, but it required one more day by foot to reach and we had no more time.

Some of the oddest caves we saw were in the Sol de la Mañana geothermal fields at 16,500 feet elevation in the southwest corner of Bolivia, as well as a smaller geothermal field at the base of the 21,463 foot high Sajama Volcano in western Bolivia near the border with Chile. These caves were intriguing, but most were too small to enter and those that weren't were way too hot and steamy. Unlike in the US, we could drive

right up to steam vents and geysers and walk among bubbling mudpots and pools of boiling water. For safety, you are on your own.

Along the way to the geothermal fields, we passed green and red high-elevation lakes colored by mineral sediments. Some of these lakes contained white islands of borax and were populated with flamingos. We were surprised to see flamingos in such high, windy and freezing places. They would become frozen into the lakes overnight, with temperatures as extreme as 68 degrees below zero, and seemed no worse for the wear the next day. Llamas, alpacas, and vicuñas also thrived at these sparsely-vegetated elevations, although how any living thing that size could survive in the scarce oxygen, high ultraviolet radiation, low temperatures, and almost constant howling winds was beyond us.

Perhaps even odder than the geothermal caves were the caves in clay near the capital city of La Paz. Some of these caves had vertical drops, passages and streams. Locals have gone in them but no one has mapped them. Everybody agrees it is quite dangerous due to the ever-present possibility of collapse. The best examples of clay caves were found at 11,300 feet elevation in the Valle de la Luna only a few miles from town.

Other than the clay caves, the closest caves to La Paz are 90 miles to the north in marble near the town of Sorata. One half-mile long cave, *Gruta San Pedro*, is located at the base of a 130-foot high cliff at 8,500 feet elevation. The cave is semi-commercialized and contains a large lake that can be negotiated by boat. Local legend has it that the conquistadors buried treasure deep in this cave, yet to be found. British caver Andrew Pavey described this cave in a 1976 issue of *The British Caver* ("A Cave in Bolivia").

We also hiked around Isla del Sol (Sun



Uyuni Salt Flat Tunupa Pre-Inca burial site

Island) in Lake Titicaca at 12,625 feet elevation, near the border with Peru, finding only small lakeside shelter caves on the island and some interesting fissures but no real caves. There were similar small shelter caves on other islands in the lake. One of the highlights of this trip was meeting one of the aged Limachi brothers living on the Bolivian side of Lake Titicaca. The Limachi brothers built several of the reed boats used by Norwegian explorer Thor Heyerdahl, such as the *Ra II*, which sailed from Morocco to the Caribbean in 1970.

Bolivia even has oilbird caves. Caverna de la Repechon (Caves of the Nightbird) are a group of caves near Cochabamba that serves as home for these large birds, also known as *guácharos*. The oilbirds navigate through the caves by echolocation with audible clicks, one of the few birds that have this ability. Their small feet are worthless except for clinging during the day to vertical



Galaxy Cave, Uyuni Salt Flat



Galaxy Cave, Uyuni Salt Flat—Main cave from door



Sol de la Mañana geothermal field—cave with boiling mud stream



Cueva del Diablo, Uyuni Salt Flat—four tomb entrances

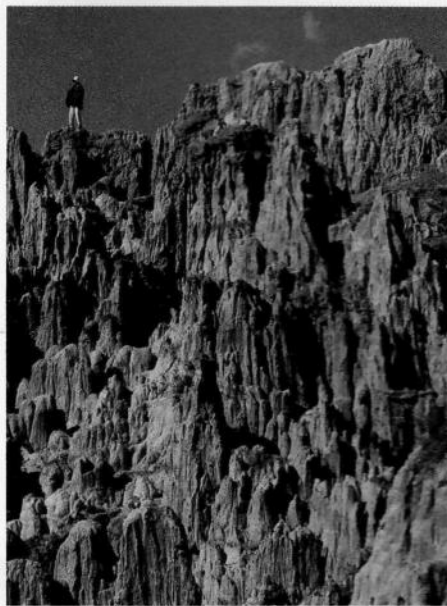
cave walls. At night they fly out of the caves to feed on oil palms and tropical laurels.

We ran out of time to follow many other cave leads such as reported caves with rivers near San Pedro de Quemez in southwestern Bolivia and Bolivia's highest known cave, Cueva de Chacaltaya (Aymara Indian for "cold road"), at nearly 18,000 feet elevation in the Nevada de Chacaltaya mountains. There are also high-altitude caves around Potosí in southern Bolivia, including the small show cave of San Bartolomé. And in the eastern lowlands, the famous Cuban guerilla Che Guevara, killed in Bolivia in 1967, reportedly used caves not far from Santa Cruz to store his arms and supplies.

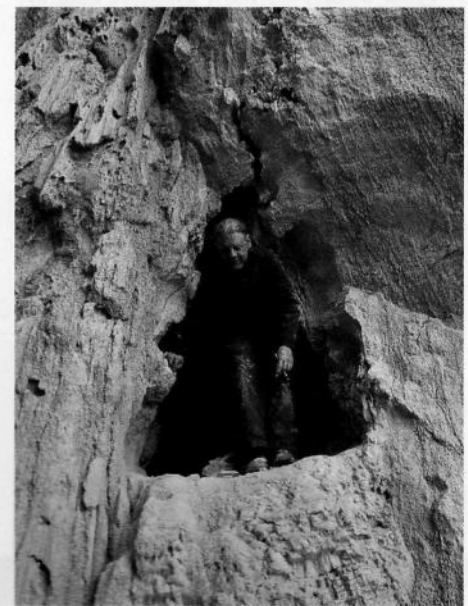
The key to caving in Bolivia is to have a good set of lungs, excellent brakes, and lots of patience. A downside is that the primary form of protest over just about anything, almost to the point of being a national sport, is a *bloqueo* or road blockade. *Bloqueos* are frequent, unpredictable, and can last for days. It is dangerous to try and run them. That said, the caving opportunities far outweigh any hardships and many exciting discoveries await cavers in this fascinating South American country.



Tunupa Pre-Inca burial site on the Uyuni Salt Flat



Landscape in Valle de la Luna



Clay shelter cave in La Paz

View down a vertical shaft in the Valle de la Luna



Small cave near Jekeri

