

# Rocky Mountain Caving

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#### CORRECTION

Concerning the recent publication from the Cave of the Winds: the photos on pages 7, 12 and the inside back page were taken by Denver Museum of Natural History Photographer, Gary Hall. Russ Finley actually owns a business which sends photographers throughout the U.S.A. to photo tourist attractions. He is not associated with the Denver Museum. Pat Jablonsky/Project Coordinator, DMNH

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#### ON THE COVER:

"Paradox," one of several rare formations partly comprised of beaded helictites in the Silent Splendor section of Cave of the Winds near Manitou Springs. Cover design and photography by David Harris.

idea sounds strange at first.

One last thing, if you ever feel like someone is watching you in the dark; if you hear strange sounds in some wet slimy passage way; if a cold wet finger taps you on the shoulder...don't say I didn't warn you.

## Speleological Investigations

### In The Andes Of Peru

by James Miller

The region known as the Sierra of Peru includes the massive Andean ranges and the high plateaus or altiplano which divide the desolate coastal deserts on the west from the rain forest of the Amazon basin on the east. It runs as an unbroken chain for the entire 1400 mile length of Peru and varies in width from 100 to 250 miles. The altiplano is a mid-Tertiary erosion surface uplifted to its present altitude of 9000 to 15000 feet. It is deeply dissected by the headwaters of the Amazon River. Exposed in the walls of the canyons up to 6000 feet deep are granites, schists, and beautifully folded sediments, including thick sequences of limestones. The altiplano is punctuated by the classic glaciated chains of mountains such as the Cordillera Vilcabamba on the south and the Cordillera Blanca to the north. These ranges rise to altitudes over 22000 feet. The Andes of Peru contain the most extensive tropical glaciers in the world.

The Sierra is heavily populated by a race whose civilization was old when the Spanish arrived. The landscape is heavily influenced by these people who call themselves Campesinos. Entire mountainsides have been utilized, no matter how steep. In some areas, every bit of land with the exception of the cliffs has been built over with a series of stone terraces and potato patches with interconnecting webs of sheep and cattle trails. The vast scale of these mountains together with the treelessness and the effects of centuries of use gives the scenery a surrealism that I've seen nowhere else.

In 1982, I spent a month in Peru sight-seeing and doing a bit of climbing and have wanted to return ever since. Last winter I wondered about the possibilities of caves in the Andes and I began to research the geology and known caves. I selected Peru primarily due to the fact that most of the resources available to me dealt with Peru. I located reports from caving expeditions from England and France which described significant caves in central Peru and spoke enthusiastically of the caving potential there. My geological investigations revealed thousands of square miles of unexplored limestone widely distributed on the east slope of the Andes.

The limestone of Peru falls generally into three age groups: Permian, Upper Triassic-Lower Jurassic, and Upper Cretaceous. In southern Peru the Copacabana group of Permian age dominates the limestone. It consists of up to 6000 feet of limestone and shale of which about half is limestone. Individual limestone units of up to 3800 feet are known. The Pucara' group of Triassic-Jurassic age outcrops extensively in the Andes of central Peru east of Lima. The whole group is up to

15000 feet of limestone and shale with minor amounts of sandstone. The good quality limestone makes up the lower 4500 feet of the sequence. The Upper Cretaceous of northern Peru includes six separate limestone formations ranging in thickness from 300 to over 2000 feet. Clearly there is no shortage of limestone in the Sierra of Peru. Only a few areas have received much attention from cavers.

By far the most important is the Polcamayo area east of Lima. Peruvian, Polish, British and French teams have been active here. Three substantial caves and dozens of smaller caves are known. The Polcamayo area is one of steep gorges over 2000 feet deep cut into the large high plain called the Pampa of Junin. Intense northwesterly folding and faulting is prevalent. Although generally the dips of the limestone of the region exceed 70 degrees, locally a monocline dips 15 - 40 degrees southwesterly. The limestone is the lower member of the Pucara' group.

Over an area of at least ten square miles a system of primarily underground drainage is developed on this monocline between the contact with the underlying Permian volcanics on the northeast and the Rio Shaca valley. Superimposed on this monocline across its lower extreme is a small reverse fault which serves as a catchment for the water draining down and directs it out the Cueva Huagapo.

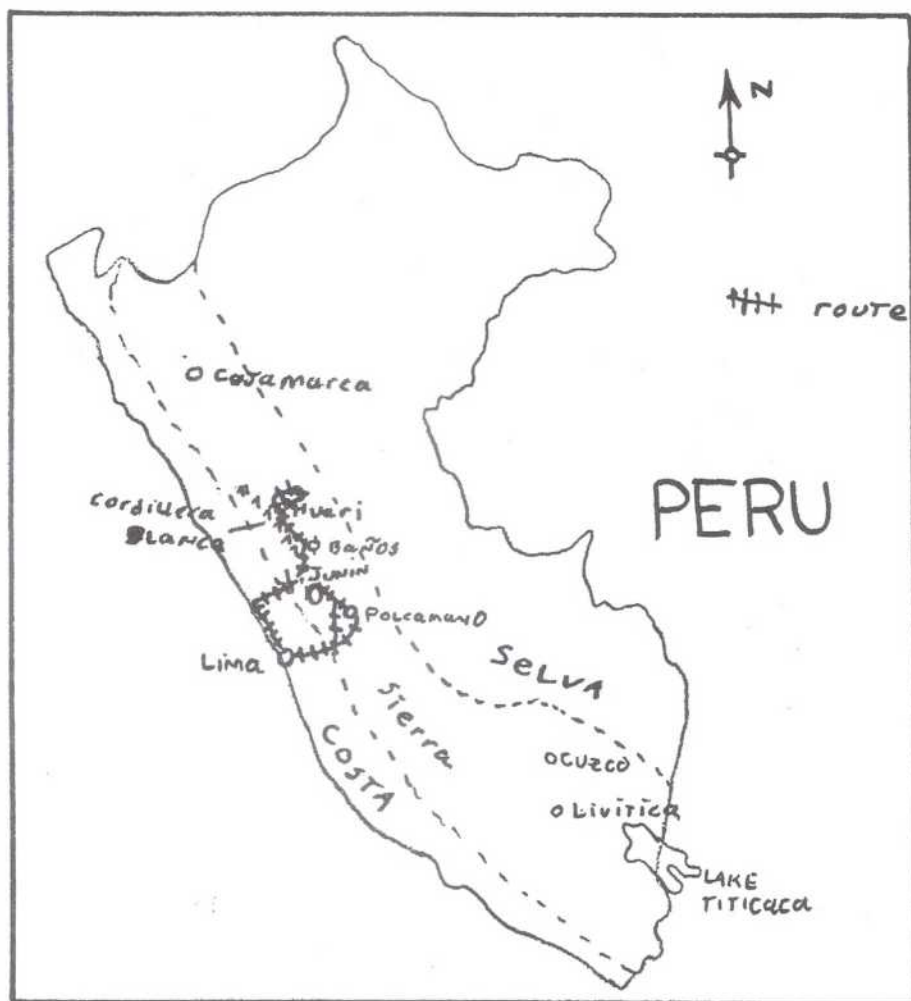
Huagapo is a lovely 5500 foot stream cave controlled by a combination of this fault and what appears to be an old base level, 130 feet above the present valley floor. The passage typically is wading in canyons up to 100 feet high with occasional pools six to eight feet deep. Much of it is splendidly decorated with thick forests of stalactites and numerous helictites.

Also associated with this system is the deepest cave in Peru, La Sima De Milpo. The entrance of Milpo, at an elevation of 12600 feet, takes water from the Ushto Gorge. It is primarily a vadose passage draining straight down dip in a series of short drops. It drops a total of 1332 feet and contains 7026 feet of surveyed passage. The terminal sump is on strike with Huagapo and although it is over 5000 feet away from the terminal sump in Huagapo it is only 20 feet higher.

About a half mile down the Ushto Gorge from Milpo I made my own small discovery. Just off the bottom of the stream bed, I located a small fissure very similar in appearance to the entrance of Milpo through which passes a weak draft. It is plugged with consolidated stratified sand and gravel. I spent about a day digging at this hole and progressed about five feet. Much more work will have to be done here if it is ever to go through. This lead could potentially lead to the currently unknown area between Milpo and Huagapo.

Other caves located in this structure are known as high as 14400 feet giving a depth potential of as much as 2800 feet. Serious passage modification is said to be required for further progress in these caves.

The third largest cave in the area, Pacuy Huagen, is located in a different structure. It is developed within a syncline adjacent on the southwest to the monocline containing Huagapo and Milpo. It lies at an altitude of 12800 feet. The passage appears to be phreatic that has been heavily altered by vadose processes. It contains 1800 feet of passage. A small stream is present in areas. The passage runs generally along strike. The stream resurges against the dip at the entrance. A Campesino who lives at the entrance asks for money when he's around. Of the three caves, it is the best decorated and the most fragile. Several



Sketch Map of Peru,  
Showing Region Visited  
(courtesy, James Miller)

areas contain outstanding helictites, soda straws, rimstone dams, and some interesting draperies that look detached from the wall. The cave is already showing some signs of wear and deserves some special consideration and care.

After leaving the Polcamayo area I headed north to reconnoiter the area east of the Cordilleras Huayhuash and Blanca where the geological maps indicated large exposures of Cretaceous limestone. I traveled by truck and then foot to Cajatambo and then around the southern end of the Cordillera Huayhuash and up the eastern side. On the third day out I was into the limestone formations, more than I'd ever seen. I wandered through fantastic limestone mountains with many summits 14000 to 15000 feet to the east, and to the west were the awesome faces of the Cordillera Huayhuash towering as high as 20000 feet. Unfortunately most of the beds were nearly vertical and the few poor-looking holes were inaccessible.

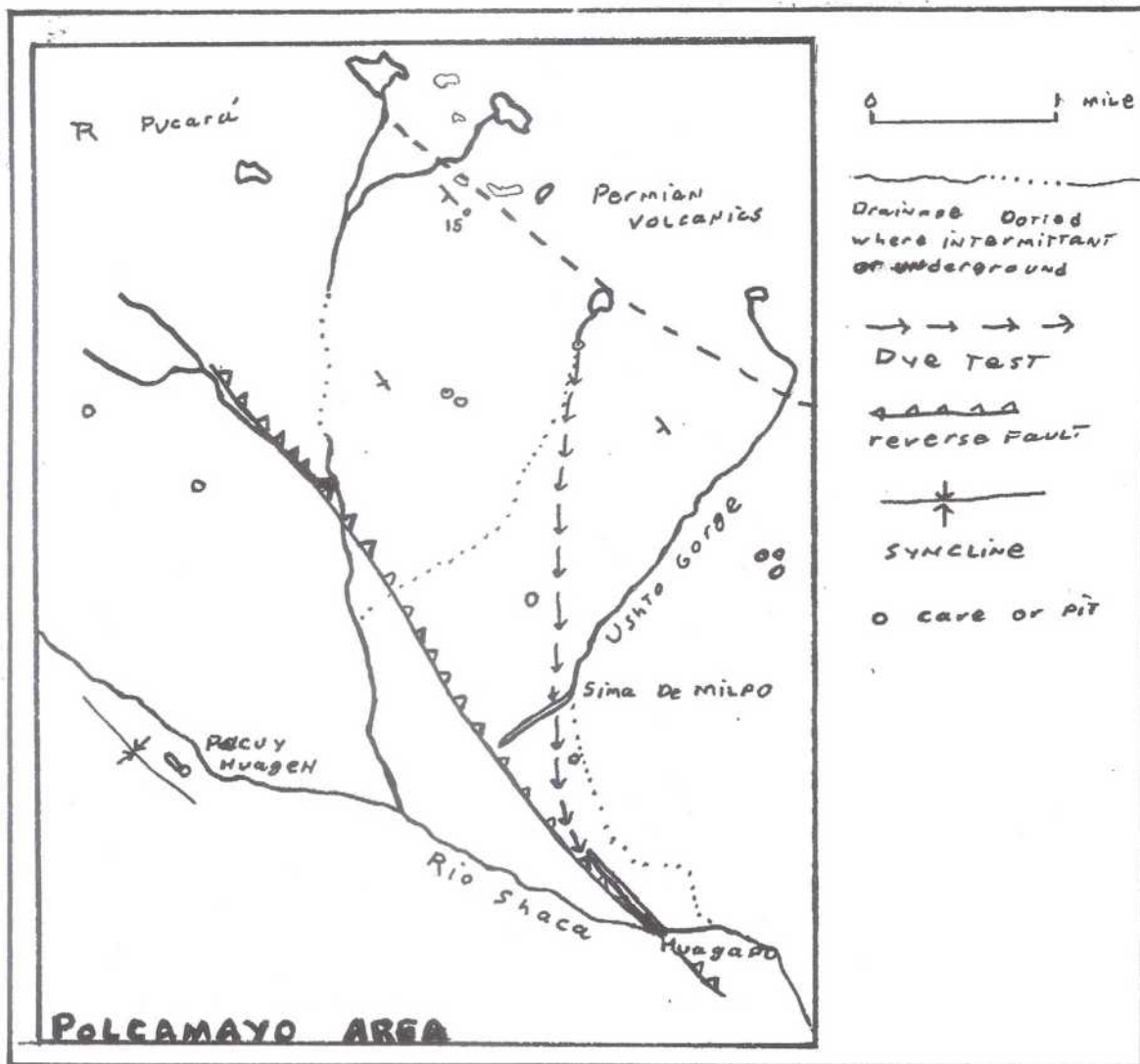
I hiked east to Banos where I looked at a series of sinkholes that were large enough to be picked out on the 1:100000 topographic maps available in Peru. These features are common enough to be able to roughly map the limestone outcrops where geological mapping is unavailable. They are fairly steep-sided sinks that are up to a half mile across and 300 feet deep. There is much rock outcropping

in the sides on which are well-developed grikes and occasional solutional pits a few feet deep. The bottoms are uniformly filled with soil, but with few exceptions seem to drain readily. They are restricted to the bottoms of valleys and are heavily influenced in form by the steep altitude of the rock.

At Banos I began to notice numerous intermediate benches and thick associated gravel deposits telling of a complicated history of uplifts and changing base levels. This type of landform is abundant throughout the area of the Andes that I traveled. These landforms appear to have at least some influence on the karstic features that I observed, but I still have insufficient data for any conclusive statement.

From Banos I crossed and crossed again the belt of limestone and, in spite of investigating several areas of sinkholes, failed to turn up any caves longer than 30 feet. After two weeks out, I finally found an area which showed some promise.

East of the Cordillera Blanca and a day's trip from the town of Huari, I located a plateau at an elevation of 13000 to 14000 feet. Here lies the greatest concentration of monster sinks that I observed in Peru. As a bonus I found most of the limestone to be dipping less than 40 degrees, and an area of approximately 15 square miles drains entirely underground.



Sketch Map of the Geology of the Polcamayo Area, Peru (courtesy, James Miller)

The western slope of the plateau is held up by a dip slope, resulting in 3000 vertical feet of limestone available for cave formation. The limestone here is called the Jumasha Formation. Soon after arriving in the area I began to find abundant small pits five to ten feet deep. On the third day, I discovered a series of pits averaging ten feet deep and among them an 80 foot pit, all aligned on an east-west fault. Unfortunately, I was not equipped for vertical. Also in the same valley, I located a hole choked with calcified gravel that blows a little air and a cave that descends at a steep angle for 50 feet, all walking passage. At this point I was running low on supplies and the consistently rotten weather was wearing me down so I left the area with much work to be done, including checking the lower slopes for resurgences.

I had intended to travel farther north to look at another area which looks as if it is in a similar situation, but upon arriving back in town, I had my passport and a large amount of my cash supply stolen. I had to return to Lima and so ended my cave studies in Peru.

There are other areas in the Sierra where I know of speleological investigations. In the southern mountains, where the Permian formations lie, there is a cave called La Gruta de Huarari. Other than it is near the town of

Livitaca and is said to be very beautiful, I know nothing of this cave or this area. Near Cuzco, in the Vilcanota River valley, the limestone appears favorable on paper and there are rumors of leads high in the canyon overlooking the river.

In the region of Cajamarca in northern Peru, a French team identified several karst areas and located numerous caves. They surveyed a number of them, but I don't have access to this report. The area has abundant limestone. On the topographic maps I have noticed a plateau to the north of Cajamarca which is very rich in karst features including several sinking streams.

I believe my trip to Peru was moderately successful. Even though I discovered little in the way of new caves, I found enough promise in the Sierra to plan another trip. The surface has only been scratched.

It is difficult to know how to proceed. The natives should know of cave locations. My Spanish was not sufficient to get close enough to the locals to discuss caves. The mountain people are suspicious of Gringos, especially of those that go into caves. I am selecting areas for investigation off topographic maps on the basis of density of sinkholes and geographic features named for caves. I plan to use aerial photography in

further narrowing the search area. I tentatively have two specific areas which I wish to investigate in detail and am considering others for reconnaissance.

I am accumulating a collection of references, maps and notes and will be glad to share these and any information that I

have with individuals who are interested in Andean caving. I am hoping to return to Peru next season for several months and am anxious to talk with anyone as soon as possible who might be interested in ridgewalking in the Andes.