



In Search of Caves in Peru

By James D. Miller

PHOTOGRAPHS BY AUTHOR

The region known as the Sierra of Peru includes massive ranges and high plateaus, or *altiplano*, which divide the desolate coastal deserts to the west from the rainforest of the Amazon Basin to the east. It runs in an unbroken chain the entire 2,300 kilometer length of Peru and varies in width from 170km to 420km.

The central plateaus represent a mid-Tertiary erosional surface uplifted to its present altitude of 3,000-4,500 meters. It is deeply dissected by the headwaters of the Amazon River. Exposed in the walls of the canyons up to 2,500m deep are granites, schists and beautifully folded sediments, including thick sequences of limestone. The central plateaus are punctuated by the classic glaciated mountain chains, such as the Cordillera Vilcabamba, on the south, and the Cordillera Blanca of the central Sierra. These ranges soar to altitudes above 7,000m. Here in the Andes of Peru are the most extensive tropical glaciers in the world.

The Sierra is heavily populated by a race whose civilization was old before the Spanish arrived four centuries ago. The landscape is heavily influenced by these people. Entire mountainsides have been cultivated. In many areas, every bit of land, with the exception of cliffs, is interlaced with stone terraces and potato patches crisscrossed by sheep and cattle trails. The immensity of these treeless, barren mountains gives the scenery a surrealism that I've seen nowhere else.

In 1982, I spent a month touring the Cuzco and Cordillera Blanca areas, and I kept my eyes open for signs of caves. I thought I saw a bit of limestone on the flight into Cuzco, but it turned out to be primarily granodiorite, shale and volcanics. I also heard rumors of caves somewhere in central Peru, but gave the matter little thought until the winter of 1985. Then, during a frenzy of geologic study, I deduced that there should be

considerable limestone in the Andes. A small amount of research confirmed this, and from this beginning I started to think about looking for caves there. Through continued research, using the resources of the U.S.G.S. library in Denver, I selected Peru for its abundance of limestone and also because of the references available to me.

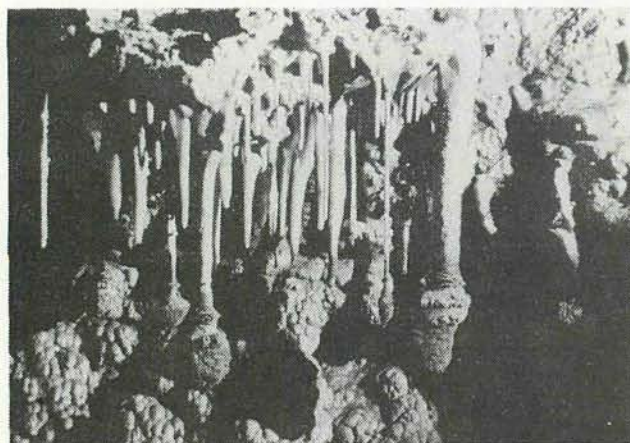
The Andes are a classic example of a mountain range associated with the leading edge of a continent. Beginning in the Pennsylvanian (300 MY -- i.e. million years), thick sediments, ranging from gravels to deep water limes and muds, quietly accumulated off the western coast of South America. Widely deposited limestones during the Permian (280 MY), upper Triassic/lower Jurassic (190-220 MY), and upper Cretaceous times (110-120 MY), reached thicknesses of thousands of meters.

Starting in late Cretaceous (80-90 MY), the situation changed. South America began to break away from Africa. The continent drifted west, overriding the Pacific plate. The sediments deposited on the now leading edge of the continent were heavily folded and overthrust by the new compressive forces and subsequently invaded by rising magma. As magma chambers vented, thick volcanic piles formed.

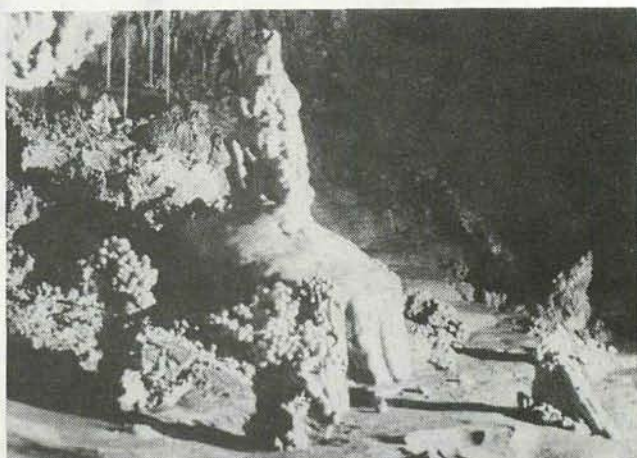
Mid-Tertiary (10-20 MY) was a time of tectonic quiescence, and Peru was eroded towards low relief. The Puna erosional surface formed during this period. Beginning in late Tertiary (10 MY), in an upheaval that continues today, the region was lifted up to its present elevation. The Andes are erosionally etched from all that has gone before.

Only a few areas of the Peruvian Sierra have received much attention from cavers, although there is clearly no shortage of limestone. By far, the greatest attention has concentrated in a few areas with historically known caves -- specifically the Palcamayo district described by Jane Wilson in "Guano Soup" (*South American Explorer*, Issue #13). The small Peruvian caving community has been

CARLOS squints after emerging from cave near Irma Grande.



LEFT: Speleothems in Cueva Pacuy Huagen, Palcamayo, Peru.
BELOW: Stalagmite in Cueva Pacuy Huagen.



active here, as well as teams from Poland, England, France and Italy. Here is the deepest cave known in Peru -- La Sima de Milpo (407m drop in 1,600m) and also the famous Cueva Huagapo (1,698m).

In northern Peru, the caves of the Ninabamba area have been known since last century. The Rfo Chancay is pirated underground for 2km. Within this plumbing system are nine caves with a total of nearly 5km of passage. The system has attracted caving expeditions from Spain and Great Britain. Farther north, Parque Nacional Cutervo includes several major caves, the result of captured surface drainages. French teams have been most active in this area.

In late summer of 1985, I decided to do some cave reconnaissance in Peru. With so little work done and so much limestone, I expected to find a new, significant cave. Based on my homework in the United States and Lima, I identified areas underlaid by limestone and planned an ambitious strategy that I greatly modified as I went along. Upon arriving in the Sierra, the scale of the task I had set for myself became apparent.

I looked out on the east slope of the Andes, across long graceful ridges with limestone folded into fantastic swirls and holes, overlooking deep valleys. It was thrilling. But I had never remained at an altitude of over 4,000m for any extended period, and I found that, at such elevations, it took me a much longer time to recover from any exertion. Also, the topography is much bigger than it looks. The few lovely holes that I had the ambition to check pinched out within sight of daylight. The intensity of folding and faulting far surpassed anything I had expected or had ever seen. Pre-Cenozoic sediments are typically steeply dipping to overturned. The gently dipping limestones favorable for cave development are rare.

The population density surprised me. In the majority of the tiny mountain valleys someone is living, raising livestock and potatoes. I soon came to realize that my Spanish was about half as good as I thought. Still I was able to communicate. The questions were usually the same: "Where are you going, gringo?" "Are you German?" "Why do you look for caves?"

Starting from the Cordillera Huayhuash, I made my

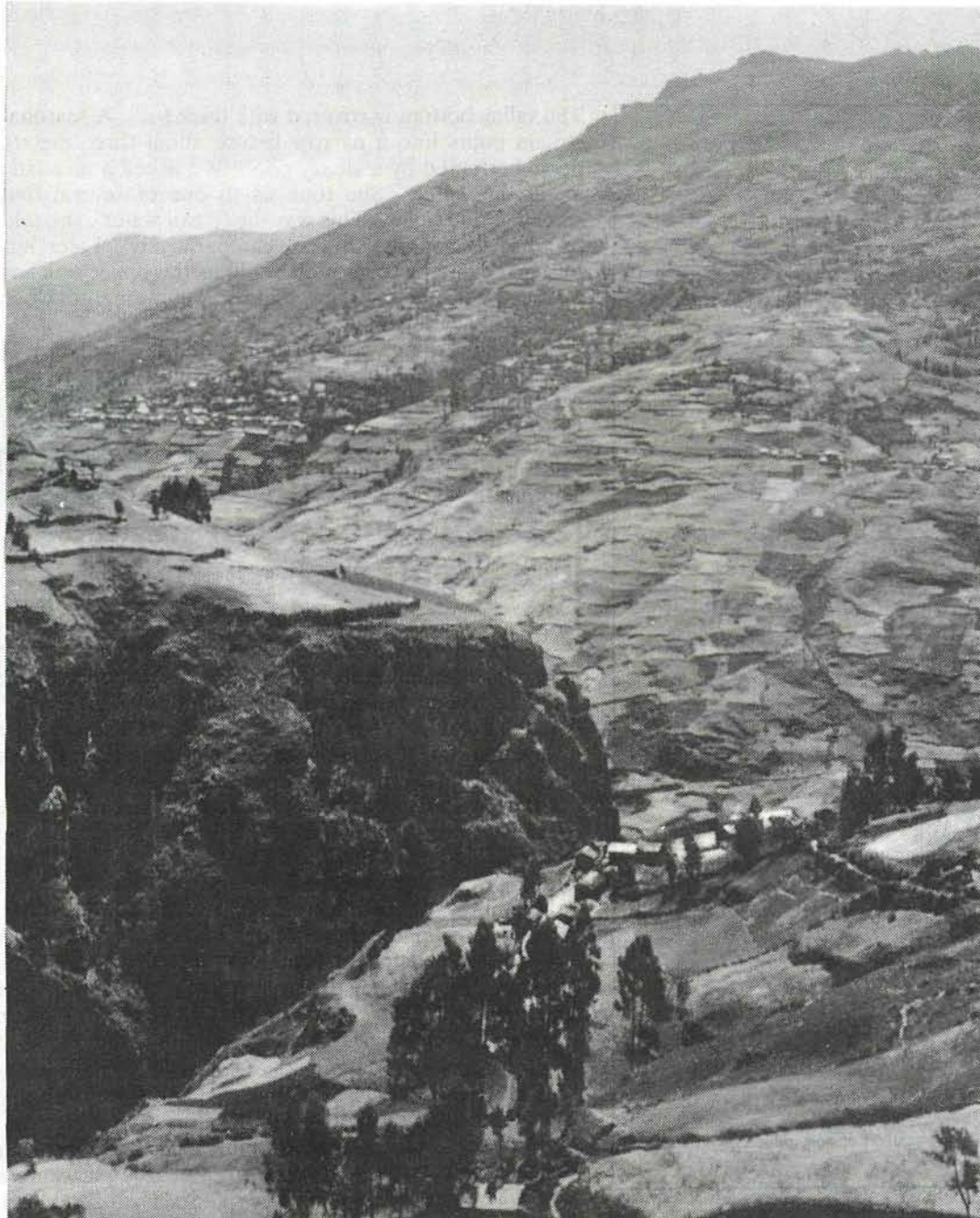
way slowly north, taking notes on the geology and karst features. I came across dozens of large sinks and tiny shafts. West of Huari, I located an area of approximately 40 square kilometers that drains underground. I did not find caves that season. But I accomplished three general traverses across the strike of the upper Cretaceous limestones. As always, I found it difficult to know whether to stop and concentrate on a specific area or to go on in hopes of finding something more obvious.

I returned to Colorado with many maps, geological papers and notes, but at the time, I seemed no closer to finding caves than when I left.

Many evenings during the following winter I spent browsing through the literature, pouring over topographic maps in detail and pondering. I was able to delineate distinct zones of karstic features, and it became possible to relate these to the geology. Then, one night in the deserted office I used, the information I was looking for jumped off the map and hit me. A stream, representing quite a large basin, drains into a sink and reappears about a kilometer away. Then, across the ridge, a second significant stream drains into a sink, reappears 3km away and then disappears forever. Maybe a cave, at last!

I returned to Peru in July of 1986 and while in Lima I became acquainted, by chance, with two gentlemen from Israel -- Marco Goldenberg and Orit Karni. Touring South America by light plane, they were looking for something different to do. At length, we decided to explore the sinking streams. Carlos Morales Bermudez, Lima's most active caver, came along on the trip.

On July 2nd, we took a bus for western Huánuco and arrived in Llata after the usual 23 hour drive over dusty



RIO
Marañon
Gorge
below
Llacta.

twisting roads typical of the Andes. After a meal, we backpacked our stuff three kilometers downstream to the closer of the two sinking streams. After a series of drops through giant boulders that clog the bottom, this stream enters a very deep and narrow gorge. Poking around, I penetrated 50m into the canyon. But it was getting dark.

Early next morning, Marco and I hiked a trail leading along the rim of the gorge to reach a saddle overlooking the insurgenca. We talked to a family living on the ridge. They told us of the very large cave below. No one had ever gone in, they said, because it was infested with demons. The family dog was very nasty and, for some reason, took a strong dislike to Marco.

On the way back, we located three pits on the slopes overlooking the gorge and after breakfast, we set off for the upper entrance. The inner gorge is very green and lovely. Soon all four of us had retraced my steps of the day before. Here we belayed each other across the top of a waterfall and up a short slippery scramble. From there, it is an easy climb down to stream level. We

encountered a stretch of waist-deep water and after another stretch, the stream bends and drops, in a series of short falls, to the impressive entrance. The last three-meter drop forms a deep wall-to-wall pool. We had to take a horrible bypass up a nettle-covered slope. Once on top, we rigged a 100-foot rope down a short series of cliffs to reach the large pool at the entrance. But without wet suits, we could go no further. It was time to turn our attention to the other insurgenca across the ridge at Irma Grande.

The next day, we broke camp slowly and climbed a steep path 400m to a ridge. On the way we met a man who told us of a large cave near Llata and another overlooking the Río Marañon 1,000m below. On the way down to the valley of our sinking stream, a dog bit Carlos. He wanted to take its brain back to Lima, but the dog's owner discouraged him.

When we arrived at the point where the map shows the stream reappearing briefly, it was disappointing.

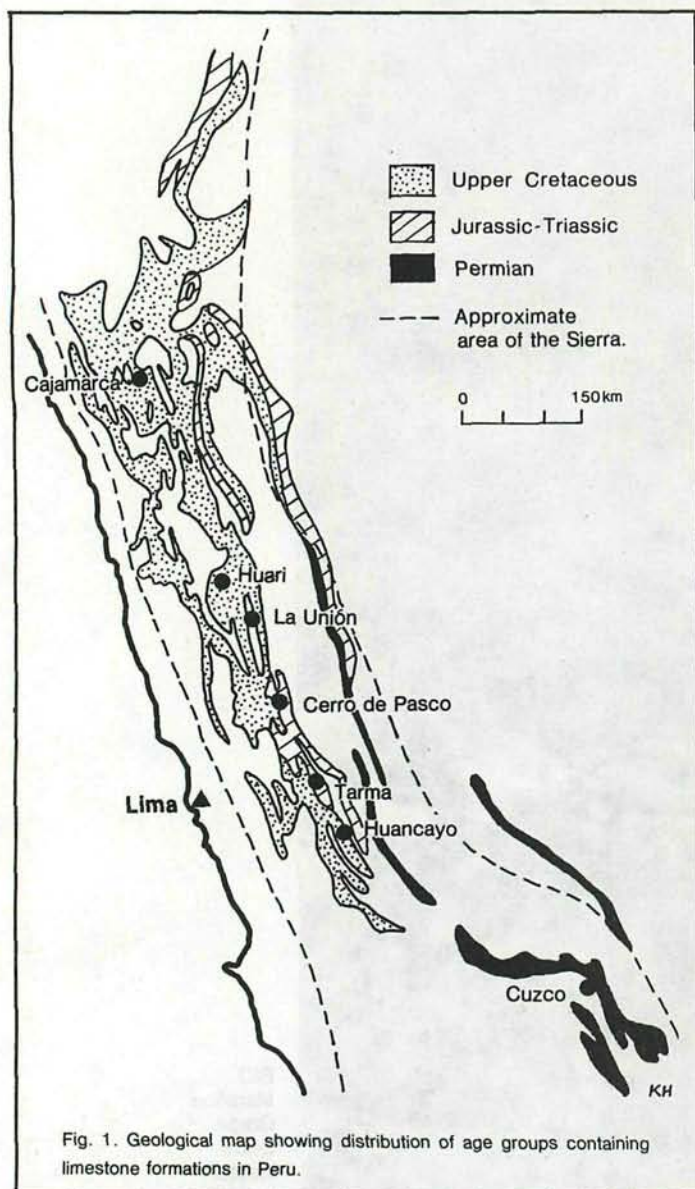
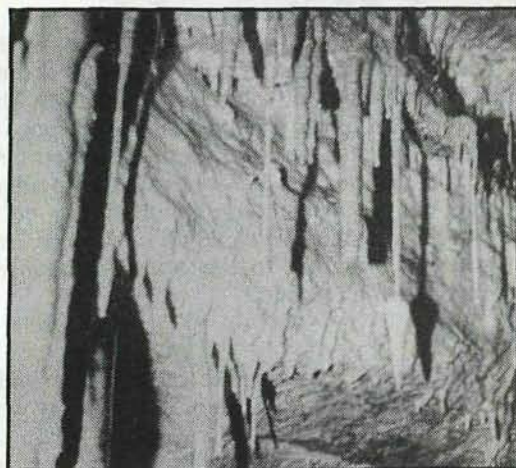


Fig. 1. Geological map showing distribution of age groups containing limestone formations in Peru.



STALACTITES in
Cueva Pacuy
Huasen
Palcamayco, Peru

The valley bottom is covered with thick soil. A seasonal stream pours into a narrow fissure about three meters deep, bottomed by a sleazy pool. We asked a nice lady about the water. She took us to one of several foul smelling mud holes. This was the "clean water", she told us which, I suppose, it was, comparatively. Later her husband came by to chat. He told us the upper sink has a large associated cave and that the water emerges close to the Río Marañón.

In the morning, we got off to a half-hearted start. I did manage to smack a menacing dog hard with a rock, a rare accomplishment. Afterwards, a short hike brought us to the insurgence. Here, a fair-sized stream drains

One can tell immediately by sniffing the air at an entrance whether a cave has size

into a black hole. Above, an upper, dry entrance smells as if it had some volume behind it. (One can tell immediately by sniffing the air at an entrance, whether a cave has size.) In my excitement, I ran around like a little kid, slipped and skinned my knee.

Before long, people came from all around to see what we were up to. Everybody was very friendly and curious. They said there used to be demons in the cave, but a priest had exorcised them. We were the first gringos any of them had seen in the valley.

One lady related a story from when her grandmother was a girl. Seven gringos came to the valley and entered the cave. Inside, they discovered a vast plain with lakes and grazing bulls. In the distance, beautiful women beckoned. Desirous of conversation, they walked towards the women, but as they approached, the women seemed to recede. Then, a door suddenly shut, trapping all but one, who escaped to tell the story.

Another woman told us how she had sent her daughter to retrieve a sheep from a nearby pit where a devil had entered the girl's body and sucked her blood. She died two months later.

I was getting rather impatient to get underground. The locals had fear on their faces as we prepared to enter. First, I checked out the insurgence by dropping down the entrance fissure on a short handline. The passage beyond is very wet, and there is a scary waterfall, so we decided instead to try the upper entrance. Here a large passage slopes down 50m, turns right, and drops another 10m. There is a lot of dried and cracked mud on the floor and walls. Further on, the passage continues to drop. Beyond a second seven-meter rope pitch a neat 50m passage leads to a balcony overlooking the stream. We located a point where we could drop into the stream canyon passage by a 20m pitch. Then, exploring downstream, we encountered a series of rapids and pools in a very classic high stream passage. After about 160m, however, the water slows and deepens, and the passage sumps. Even at this deepest level, perhaps 100m from the surface, we could see plant roots in the ceiling.

Returning to the rope, we next explored upstream. The water is very deep, but it is possible to bypass the

deepest parts with chimney moves and traverses. This passage is smaller, and the stream rushes by in a series of chutes and falls. It is very clean and exciting caving. After 70 meters, we encountered a swift water chute. We tried to climb this a couple of times but had to give up. We didn't see any other main passages and estimated that we had explored about 350m of passage with a total vertical of 90m.

That evening, Morino, a local, came by with boiled potatoes. He wanted to show us some other entrances the next day.

We headed off with Morino in the morning after the sun had dried our clothes. He led us to two sinkholes. One is plugged with a landslide, and the second contains a fissure which takes a seasonal stream. On close inspection we found a good hole, blowing a strong moist breeze but Morino told us of better holes up the hill. We continued on to the rim of another large sink with several interconnecting entrances at the bottom. I pushed into a crawl for about 30m. It seemed to be taking a weak draft. Our guide made it clear, however, that the best hole was yet to come -- a hole so deep you couldn't hear a rock hit bottom. A pit that size can't be passed up!

We crossed the ridge at 4,000m. The pit entrance is about seven meters across and 40m below, bells out to 20m. I wasn't sure that we had enough rope after we rigged an anchor around a large rock. This used up a lot of rope and with all ropes tied together, the line barely reached the floor. Fortunately, the edge was clear of loose rock and, though crossing the knots was a problem for some, it was a fun drop.

On the bottom, Marco located an intact human skeleton with a skull deformed in infancy through the

Demons still inhabit the caves. To enter is dangerous. To come out is suspect.

ancient practice of binding. We came across nine other skeletons, but these had normal skulls.

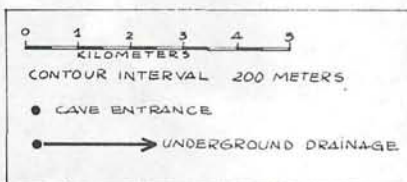
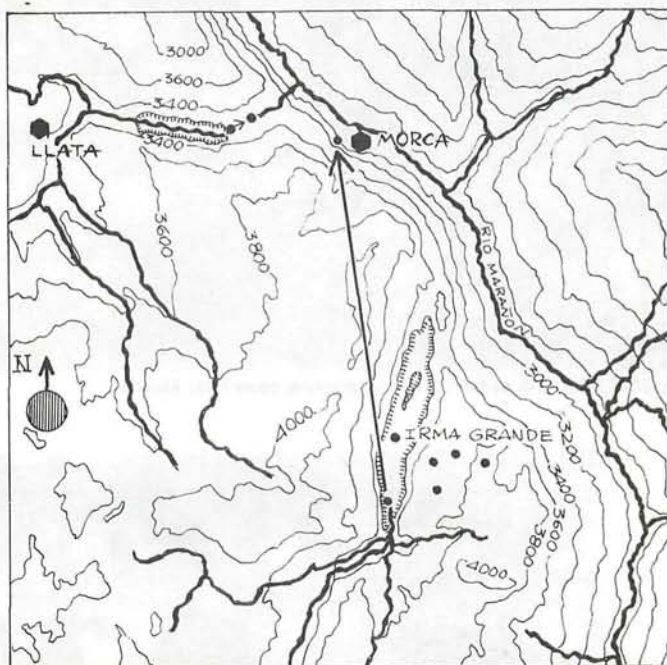
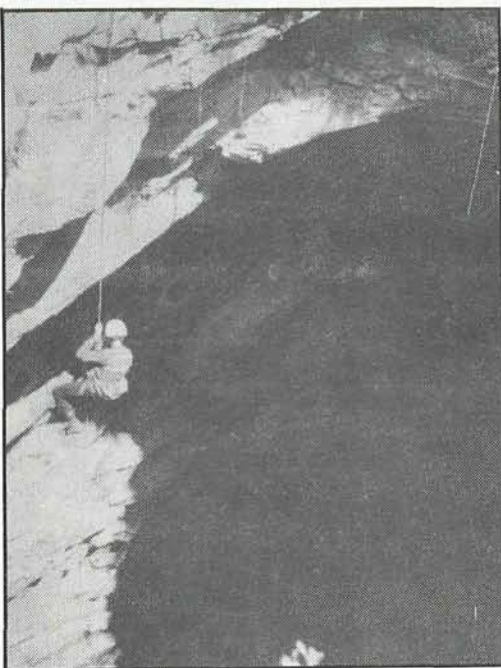
In the center of the floor, a breakdown hill was overgrown with ferns. A lovely canopy of spider webs covered them.

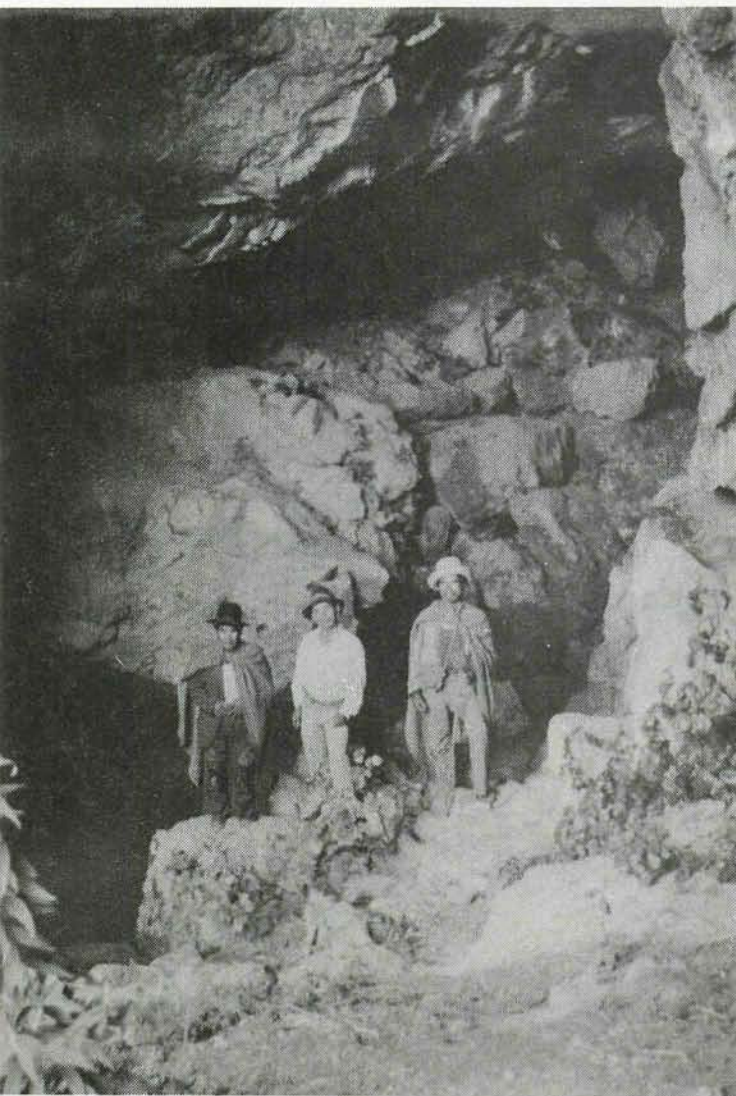
The small crowd gathered around the pit entrance knew nothing of the dead below, except for a cow robber who fell in one night, together with the cow.

There was still daylight and Morino knew of one other entrance. He led us to a small, blind valley draining into a short climbable pit. A fantastic, stream-cut passage took off down dip. We explored for about 150m, then headed back to camp, buying fresh vegetables on the way.

The following day, Marco and Orit decided to stay in camp. Since we had extra equipment, Carlos and I invited Morino to come with us. While waiting for

AUTHOR descending pit near Irma Grande.





CAMPESINOS in entrance of resurgence cave near Morca.



STALAGMITE with lighter on right to indicate size.

Carlos, I took my 50-foot rope back to the pit that Morino had shown us the day before. It's an easy climb down and I explored a further 30m or so and came upon another pit. Here I rigged a rope, then went to see what Carlos and Morino were up to. Carlos was still at the entrance but Morino had run off, leaving his lamp on. It was a little puzzling.

Carlos and I headed into the pit. The cave slopes

The small crowd knew nothing of the dead below, except for a cow robber who fell in one night, together with a cow.

continuously down a high, but very narrow passage. A small stream runs through the lower areas. Only one drop, about three meters deep and very smooth, requires a rope. Moving away from the stream into a wide, low passage we descended straight down toward some big rooms. We looked around briefly, but Carlos was getting tired. We had explored an estimated 400m of passage with 160m of depth.

It was overcast and rather windy when we came out. We ate a little before heading down to a hole located the day before. Carlos didn't want to go in, so I went alone. The entrance pit is a two-level drop of about ten meters, landing in a shallow pool. At the bottom, a nice canyon passage leads to a second pit about seven meters deep. It looks as if it led into a big canyon, but I was also getting tired. I stopped, having explored only 50m of passage.

Carlos had to leave the next day, and Marco and Orit wanted to move on. Since I didn't want to carry the ropes by myself, I, too, left the valley. Regretfully, Morino never showed up again. In fact, we had no more visitors at all.

When we first came to the valley, the people were outgoing and curious. But once we started exploring the caves, a distinct change occurred. The populace became very withdrawn. Leaving now, the area was absolutely deserted.

I feel our visit to the valley was not a casual event for the *campesinos*. We were apparently the first foreigners to the area in a very long time and certainly the first to enter the caves. Regardless of what the priest had said, demons still inhabit the caves. To enter is dangerous. To come out, is suspect. There are few people left in the world with their myths intact. I left the valley feeling we had disturbed something.

My companions headed off. I remained to map the geology and locate the resurgence. I headed down to the Río Marañón and hiked below the spectacular cliffs of limestone overlooking the river. The resurgence comes out above the village of Morca, 7km away and 600m below the resurgence.

I talked awhile to locals who told me that the water enters at Irma Grande. Three men escorted me to the entrance. It is large, about seven meters high and ten

meters across. My three companions decided to enter the cave with me but soon panicked and fled.

A short distance into the cave, the passage narrows radically. A short climb follows a small stoopway; then a second climb leads into a large 20m room. Above, a high fissure runs normal (right angle) to the flow of the stream.

I explored about 50m. When I came out I found my friends waiting at the entrance. They told me that inside the cave, a giant condor lives by a large lake. I said that I hadn't entered that far. I was very brave they told me and after that they addressed me as "engineer."

From Morca, I returned to Llata where there was a persistent rumor of a large cave. I was directed to a hole in the cliffs downstream from town. It is said to be a very large cave and of the many people who went in none came out.

I found a squarish entrance two-meters-high by three-meters-wide. Scattered about I found a lot of human bones and artifact fragments. There was also quite a bit of trash and incredible amounts of graffiti. I fired up my lamp and entered.

The passage descends straight down dip and soon becomes a crawl. But even beyond a fairly tight passage, I found copious graffiti. Small gypsum flowers grow profusely on the ceiling. After the passage turns right, it changes to a fissure with abundant stalactites and flowstone, all covered by a slippery black coating.

As I was about to descend a short climb, I thought I heard a noise below. Then, just as I reached the bottom, I heard it again. Now the sound was very distinct -- a cross between heavy intermittent snoring and the sound of something heavy being dragged about. It came and went irregularly. Timidly I tiptoed forward until I was sure it wasn't my imagination. I listened a minute, then, certain that I wasn't in the mood to deal with it, I left the cave.

Now with hindsight, I think it may have been only a bat that chased me out. But, at that time I did suffer a severe attack of overactive wimp glands.

After two seasons in Peru looking for caves, I am developing a feel for geological settings that favor cave development. Realistically, even with limestone and plenty of vertical relief, the chance of finding a cave with world class depth is remote. It is likely, however, that caves longer and deeper than any now known will be found.

I have detailed data on caves in seven different Peruvian districts. Other than a tendency to be associated with high energy streams (ie. streams with a high gradient), these caves really have nothing in common. Each can be linked to a special combination of geological features, which favor cave formation. But to use one cave as a model to look for another is futile. In an area as geologically complex as the Andes, one can never make predictions.

Still, I can proudly say that I have located an impressive cave system by analyzing my data. With the same data, however, I have also searched for caves in numerous places and found none. So in such an approach, there is a risk of missing major caves. Indeed, if people looked for caves only in areas of obvious karst, the caves of Palcamayo, Ninabamba and Cutervo would



HUMAN bones in cave near Llata.

never have been found. Nonetheless, places with karst and sinking streams are still logical places to look for caves.

Caves are elusive, and in the Andes, they are tucked away in surprising corners. In Peru, there are still thousands of unchecked corners.

Cave hunting in the Sierra entails disappointment, weeks of checking out hot-looking karst, only to find dolines (sink holes) plugged with deep red clay, and streams sinking into marshes. But have faith! Somewhere, waiting and ignored, is the sweet thunder of a river pouring into blackness. []

The author, James Miller, works intermittently as a geologist to support his caving habit. He has been to Peru several times looking for caves and discovered two promising areas. Miller is temporarily distracted by a job in Indonesia, grubstaking for further explorations in Peru.