

Into the HIDDEN

BY JOHAN REINHARD

**Diving to new heights
in a suite of volcanic cones**



CRATER—

An Andean Adventure

While I was at a mining camp in Chile in 1985, I had briefly paused to look at a wall full of maps and photographs. Something in a satellite photo caught my eye. As it was made for geological exploration, the colors were different from their natural hues and at first they had thrown me off. Gradually it dawned on me that I was looking at the image of a crater some five kilometers in diameter with a lake inside it two kilometers long. I had been within a couple of kilometers of the site a few weeks before and never even seen the crater! It was in the midst of a “plateau” some 5,500 meters high, which itself looked to be the remains of an ancient crater. It is surrounded by volcanoes, many of which are more than 6,000 meters high.

I had stood overlooking this plateau while on the summit of Pissis (6,882 meters). Although Pissis borders the crater on its northern side, the lay of the land had kept it hidden from view. As it turns out, the crater is located in the midst of one of the world’s greatest volcanic complexes, with the densest concentration of 6,000-meter peaks outside of Asia. Pissis, Ojos del Salado, Bonete, Tres Cruces, Cazadero, and Incahuasi make up 6 of the 13 mountains more than 6,500 meters in the Americas. Nacimiento, Veladero, and El Muerto are three of the six remaining peaks over 6,400 meters—and there are others more than 6,000 meters that join them within an area extending no more than 150 km in distance. Since the crater is located in one of the most inaccessible regions of western Argentina, it had remained virtually unknown.

At least that was the case until three years ago, when an Argentinean expedition penetrated the plateau and boated on the lake, claiming it to be world’s highest navigable body of water. In 2002, two Argentine men freedived in it and claimed to have made the world’s highest dive. They are currently trying to have this registered in the *Guinness Book of World Records* (see www.larioja.gov.ar/turismo). Unbeknownst to them, I had led an expedition to that very crater nearly two decades ago. In light of the current publicity, it seemed only fitting that I dust off my files and finally write an account of our excellent adventure.

Diving into a newly discovered lake within a volcanic crater offered the prospect of finding new species.

In 1985, I knew that only two of the peaks directly bordering the plateau, Pissis and Bonete, had been climbed in modern times—and both not more than twice, if that. The summit of the more distant volcano to the south, Veladero (6436 m), had also been summited by modern climbers in 1986. However, it was clear that the peak had been climbed by the Inca some 500 years before. Patrick Tierney and I made the second modern-day ascent in 1988. None of these peaks had been reached by crossing the plateau. As for the crater and the lake, they had never been described in the literature.

Thus, it was perhaps inevitable that my climbing partner Louis Glauser and I began to refer to it as the “Hidden Crater.” It has since come to be called the *Caldera del Inca* (Cauldron of the Inca) by some Argentines. The Anglo-American Mining Company agreed to add members to our team in order to conduct a geological survey. They were especially interested in what might lie inside the crater. Thus geology was added to a list of specialties that had grown to include geography, limnology, archaeology, and even scuba diving. We would be able to combine several disciplines in a way rarely found in modern exploration.

On the summit of

Pissis, our altimeters had read higher than they had on nearby Ojos del Salado (6,862 m). In the 1980s Ojos del Salado—still active with fumaroles—was officially listed as being 6,885 meters high, and thus believed to be the second-highest mountain in the Western Hemisphere. The heights of 6,862 meters for Ojos del Salado and 6,882 meters for Pissis were later established by the Military Geographical Institute of Argentina. As altimeters are not known for their precision, then-chief geologist of Anglo-American, Bob Lyall, developed a system accurately measuring the peaks by using two base points and a reflecting device. In this way we hoped to settle the question of Pissis’ elevation.

However, Pissis wasn’t the only mountain with a questionable height. Bonete, a volcano to the southeast of Pissis, had appeared on maps with widely varying heights. If the 6,872-m elevation listed on one map turned out to be correct, Bonete



Previous page, Louis Glauser treks along the rim of the Hidden Crater, its lake in the distance. Glauser, left, and I prepare to dive in Lake Pissis. Traveling on horseback, above, we arrive at our basecamp on a plateau near the Hidden Crater. An aerial photo of the Hidden Crater and its ice-covered lake, facing page, reveals a small peak in the middle. Bonete is in the background. Photograph courtesy Robert Lyall.



would be one of the highest, and least known, peaks in South America. Some maps even listed two Bonetes, further complicating the situation.

I became excited about the archaeological prospects of the expedition, since I had been involved in researching high-elevation Inca ceremonial sites. Indeed, the reason I had been in the Anglo-American mining camp in 1985 was because I had been surveying ruins on mountain summits near it, including those on the summit of Copiapo, not far from Pissis. The possibility existed that we would find ruins on some of the volcanoes bordering the plateau. Finally, limnology and diving became part of our project, since a unique lake in a newly discovered crater offered the possibility of new plankton species, such as we had found in a crater lake on Licancabur in 1982.

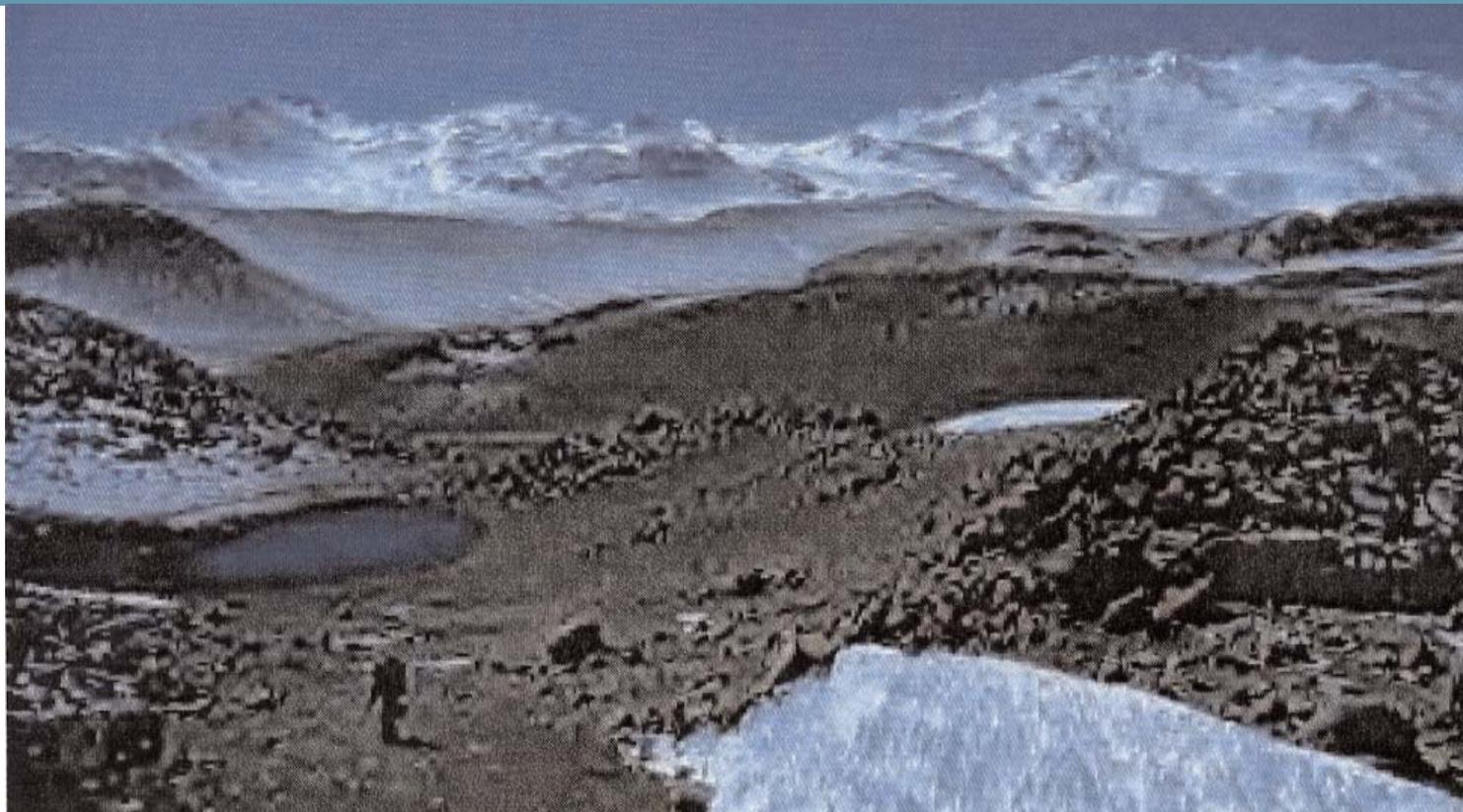
By late January 1986, the Anglo-American team had vehicles, mountaineering equipment, food, and men assembled at the Louis Murray Lodge on the north side of Ojos del Salado. This lodge, named after an Anglo-American Corporation geologist who had died in a helicopter crash on the summit of Ojos del Salado, had in a short time become famous among mountaineers and intrepid motorists. Thanks to it, they now had easier access to an isolated region on the Chile/Argentina border and some of the highest peaks in South America. A fire would destroy the lodge years later.

The Anglo-American team helped to transport our equipment to an abandoned mining camp near Aparejos Lake to the

east of Pissis, where we reached terrain that vehicles could not negotiate—normal vehicles, that is. We were to soon have the use of two Honda all-terrain tricycles. Nonetheless, the bulk of the equipment had to be carried on to the high plateau on the backs of 25 mules and horses. The scarcity of water and pasturage, along with the high altitude, made this a formidable task. Nor were we at all certain how to reach the plateau—maps of the area being of little use in the maze of canyons and gullies before us. The strain on the animals under such conditions began to take its toll.

No sooner had we reached our second campsite at 4,900 meters than a horse was struck with altitude sickness. One of the muleteers had gotten angry at it, striking its rump, with the result that it spooked and scampered about until it collapsed. The muleteers tried to save it by making a cut in the roof of its mouth to release blood and thus, in theory, the pressure on its brain. It is a technique I had read about in a book, *Tschiffely's Ride*, written more than 80 years ago. Unfortunately, in our case the horse died.

The following day, we reached a campsite beside a pond on the edge of the plateau at ca. 5,300 meters. The mules and horses could go no further, and after unpacking the loads we watched as they headed back and disappeared among the boulders. That evening we thought we heard the sound of engines, but shrugged this off as an illusion. Suddenly two Honda tricycles appeared. Two Anglo-American team members, Jorgé Bet-



zhoid and Aldo Muñoz, had driven them 11 hours in order to reach our camp before nightfall, a bone-rattling drive over such difficult terrain.

We assembled in the mess tent to discuss how best to utilize the limited time we had, given the amount of supplies we had brought with us. Louis and I were acclimatized from previous expeditions, so we set out immediately for Bonete's summit. The others remained to conduct geological surveys and acclimatize themselves before attempting Pissis.

The following morning Jorge and Aldo ferried our supplies on the tricycles across a moon-like landscape. They reached a point where penitentes—wind-eroded ice formations resembling stalagmites—blocked their way. This proved just as well, since one of the tricycles ran out of gas on the way back and had to be pushed into camp in the dark.

Louis and I began climbing the next day and set up camp that afternoon at 5,500 m. We awoke the next morning confident that we would have an easy day of it. We felt the summit would be the lower altitude of 6,380 meters that some maps had listed—we were soon to learn otherwise.

First we had to cross half a dozen fields of penitentes, and we decided they were well named. We felt we were indeed paying penance, in this case for not taking Bonete seriously enough. Getting through a maze of icy stalagmites requires a combination of route-finding ability and balance. The latter skill is called into play when one attempts to walk along the top of the icy spikes, after having kicked chunks off to make footholds. It is a sport to please the hearts of chiropractors, but drew a goodly share of groans—along with other expressions—from us.

It was midday by the time we reached Bonete's North

Ridge, and then we had a series of disappointments. Each time we reached the "summit" we saw a yet higher one farther away. I went on ahead and, as darkness approached, I waited for Louis amidst swirling snow, clouds, and electrified air. I threw my ice axe aside, since the metal was causing shocks in my hand. Suddenly a hole cleared in the sky above, and I was bathed in light. To my horror I had been standing only a few feet below the summit, and, if lightning had struck, it could not have missed me. Louis soon scrambled up and both our adjusted altimeter readings were close to 6,800 meters. The summit was later officially established as 6,739 meters. We realized that we were standing on one of South America's highest summits. Now the problem was to get off it.

In bitter cold and a moonless night we scrambled down the mountainside. If the penitentes had presented problems before, they were nothing compared to those we had groping and kicking our way through them with dim headlamps. Finally, an hour before dawn, we reached our tent. We had been moving, almost without stopping, in excess of 20 hours.

During the ascent, the problem of the two Bonetes had been resolved. There is only one massif, but a much lower mountain to the east had somehow been named Bonete as well. To avoid confusion in the future, we decided to call it Cerro de Peñas Azules after a nearby place called Peñas Azules. We also were able to finally see the crater, and we decided to return to basecamp by hiking around it, climbing peaks on the way.

We began by skirting the crater's southern rim on our way to Reclus, a volcano on the western side of the plateau. It was clear that, although there were ways to get down into the crater, it would be difficult climbing back out again. Use of the tricycles was out of the question. Discouraged by our chances of being

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able to explore the crater, we camped at the base of Reclus near a small stream—something of an oddity at over 5,200 m.

While climbing Bonete, we had kept our eyes open for archaeological remains. It is possible that we may have missed some on our way up. We did see a piece of bone at 6,300 m, but that was all. However, on Reclus' summit at ca. 6,320 meters—some maps have 6,335 meters—we discovered an artificial platform and nearby it a crude wall and a layer of ashes.

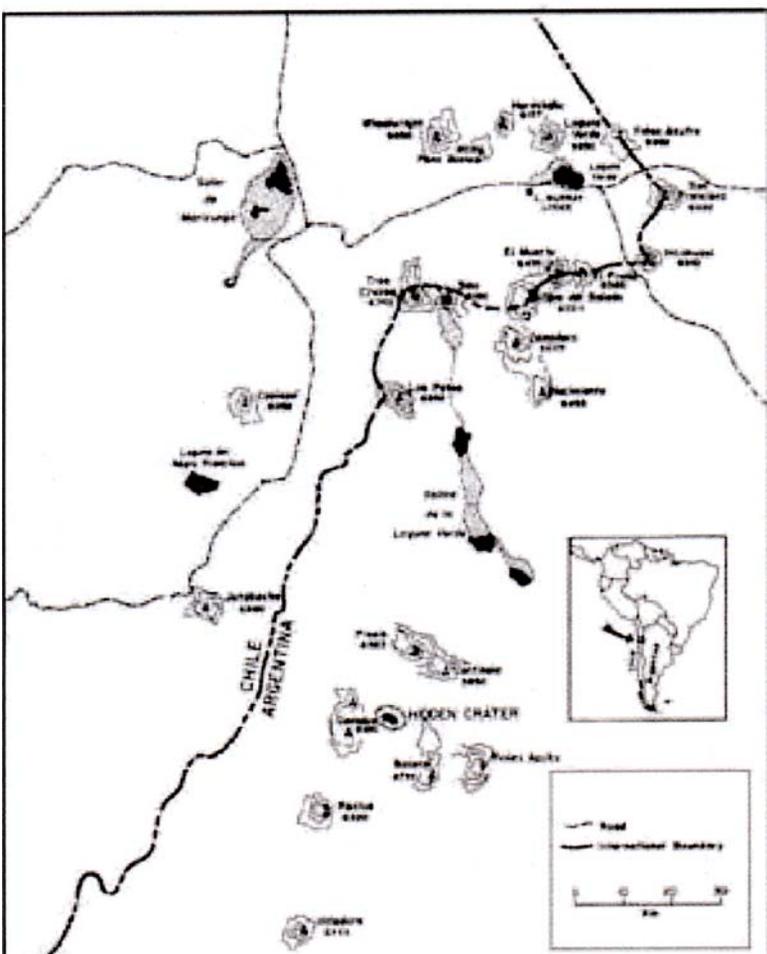
The site was typical of those we had seen elsewhere in the Andes. It is almost certainly of Inca origin, dating back to

around the late fifteenth century. I had seen a similar site at 6,730 meters on Llullaillaco to the north—where in 1999 I led a team that recovered three incredibly preserved frozen Inca mummies. The Inca had been building structures at heights that were not even reached again until nearly 400 years later. But what was such a site doing on Reclus? It is not the highest volcano in the region and it is not near any known trade route or ancient settlement. In fact, it would be hard to find a more desolate and isolated place in South America.

From my previous research I knew that these summit sites served a ritual purpose. While dark clouds formed around us, we quickly examined the ruins. We found woven hair and wool jammed into the wall of the 4.7-by-7-meter platform. These were common offerings placed in walls during Inca times to placate the deities and to ensure that the walls remained solid. The ashes likely marked the place where offerings had been burnt. Such offerings often consisted of foodstuffs, incense, and specially woven textiles. We had neither the time nor the necessary permit to excavate the platform to see if statues, or even a human sacrifice, might have been buried in it, although we have found them in similar ruins elsewhere in the Andes.

These sites are rarely impressive in appearance, but they, and the mountains on which they were built, were extremely important in ancient beliefs. Worship at sites similar to these continues to the present day, one of the few aspects of traditional religion to survive the Spanish conquest of A.D. 1532. Archaeologists are interested in them not just for the rare finds—for the sites and artifacts are among the few to escape destruction by the Spaniards—but also because they enable us to understand Prehispanic religious concepts and the spread of the Inca Empire. Many of these ruins can be related to fertility cults, for the mountain gods were widely believed to control weather, the water supply, and thus the fertility of crops and livestock. However, given the isolation of Reclus, it may well be that the site was built to worship the mountain for minerals. We know that the Inca had actively searched for mineral deposits in this region, thus being ancient forerunners of Anglo-American's own investigations some five centuries later.

We continued on to climb the higher (ca. 6,130 m) of two conical volcanoes, which we named Los Gemelos, "The Twins," to the north of Reclus, and then a triangular peak, which we named La Centinela, "The Sentinel," about 5,850 meters high and due south of Pissis. Neither bore traces of previous ascents,



Left, we make our way toward Bonete, above left, with Pissis in background. A map, above, shows the region in which Hidden Crater is located. Peak elevations are approximate. Plan by Johan Reinhard.



ancient or modern. With time and food running short, we completed our circle of the Hidden Crater and reached basecamp in the evening light of February 5.

The other members of our party had not been idle while we were away, having moved base to a better location near a lake at the foot of Pissis. Four members of the Anglo-American team had left that day to climb Pissis. The renowned Scottish climber, Hamish MacInnes, and his American friend Betsy Brantley had arrived the day before, along with a Chilean, Carlos Perez, and Argentinean, Johnson Reynoso. For the first time we were at full strength. Unfortunately, it was necessary for someone to get a message to the muleteers—who couldn't be reached by radio—as to our planned departure date, and Johnson volunteered to take it to them.

The attention of those of us in basecamp immediately turned to the crater. Jorgé and Aldo had found a route to the crater's edge with the tricycles, and the next day six of us hiked and motored to its north side at approximately 5,530 meters. Hamish reconnoitered a way down, and soon we were on the shore of the lake, nearly 400 meters beneath the crater's rim.

The scale of the scene was such that it confused our senses. A person at the lake in the bottom of the crater was so small he couldn't be seen from its rim, yet the lake appeared only to be a short distance away. There was even a small mountain inside the crater. There was no evidence, however, that life had ever existed in this inhospitable place. Moreover, it was clear that no one, including the Inca, had even visited the place. With the walls of the crater towering around us, we couldn't escape feeling in the backs of our minds that we were somehow trapped. The dark clouds overhead only enhanced our sense of total desolation.

I had carried a lightweight inflatable raft into the crater, and Jorgé rowed it out to collect plankton samples while I photographed him. The Argentinians, who in 2002 noted this as the world's highest navigable lake, were unaware of an equally large and higher lake at the foot of Pissis, which we planned to explore the following day.



Louis Glauser, left, collects plankton samples in Lake Pissis. Above, our snowswept basecamp near the peak. Diving at altitude, into an unnamed lake near the foot of Pissis, right, requires specialized equipment adapted for pure oxygen use.

Before we started back, Jorgé and Aldo went in search of mineral specimens. Although they discovered traces of gold, the area is too difficult to be exploited economically. All of us found the climb out of the crater to be especially tiring. Later, Hamish was told that the high sulphur concentration at the floor of the crater would have affected the oxygen content of the air to such an extent that the equivalent of more than 1,000 meters could be added to our true elevation!

The next day the Anglo-American team reached the southernmost of Pissis' five summits. Louis and I had climbed the westernmost summit in 1985, and it is the one noted on maps as the highest, but only by ten meters. They found a note from a climbing party from Mendoza dated 1983 thereby making the Anglo-American team's climb the second of this summit. Unfortunately, clouds blocked the transmission of signals to the base points, so they weren't able to resolve the altitude question. The team remained camped above 6,500 meters for the second night, planning to return to the summit the following day to try again. However, the weather didn't improve, and they had to descend to basecamp in howling winds.

Meanwhile, Louis and I donned our scuba gear and, supported by Jorgé in the raft, investigated a lake at about 5,300 meters on the southern foot of Pissis. We found it to be full of zooplankton, of which the visible specimens were *Cladocerans* of

Even though we had accomplished a great deal, we left knowing we had only begun to unravel the complex history and geology of this little-known region.

the *Daphnia* genus. They feed on phytoplankton invisible to the naked eye. We did not expect to see anything other than plankton in the water, since fish rarely, if ever, survive in lakes at these altitudes.

It had been a little more than a week since we had established our first camp on the plateau, and we had managed to climb the major peaks on its border, including two of the highest mountains outside of Asia. In addition, we had found Pre-hispanic ruins, collected mineral and plankton samples, explored the Hidden Crater, and carried out an underwater investigation in one of the world's highest lakes. Still, we left knowing that we had only begun to understand the complex history and geology of this little-known region.

It is interesting to note that the Argentines continue to claim the world's highest dive. In 1981, I had freedived in a

crater lake at 5,850 meters on the summit of Licancabur (5,916 m). In late 1982, I returned to that same lake with a dive team led by then Explorers Club president, Charles F. Brush. Using equipment specifically adapted for diving with pure oxygen, we were able to collect numerous plankton samples, one of which represented a new species.

As luck would have it, I just recently received support from Mares, a well-known scuba gear company, so that a team can return to the region and carry out high-altitude underwater surveys using the latest in equipment and technology. n

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