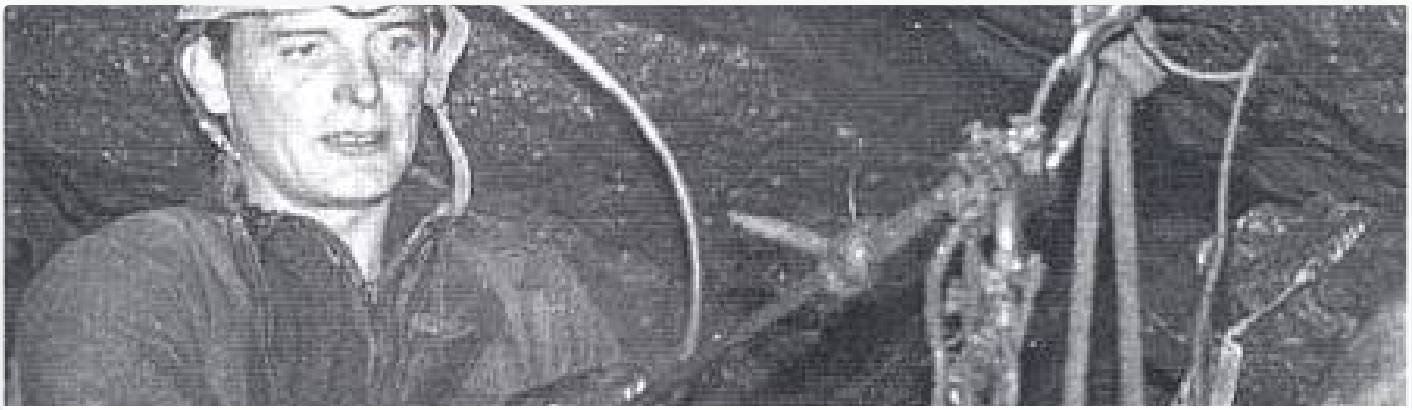
Belfry Bulletin No 513, March 2002



The
Bristol
Exploration Club, The Belfry,

Wells
Road, Priddy, Wells,

Somerset.
Editor: Adrian Hole

Contents [hide]

Back row: Les, Nick,
Mark, Ian, Matt and Rob. Front row:
Juan.

Introduction

In June 200 I six cavers from
Britain,
Canada and
Peru undertook a short reconnaissance expedition
to the Yauyos District of southern

Peru where there is a large area of
karst with numerous cave entrances.

As far as could be ascertained by a review of the available
references none of this area had been examined in detail. Both the geology and topography suggested
that there was considerable potential for both deep and long cave development.

The primary target of this expedition was the large open
shaft taking the waters flowing out of
Lake
Pumacocha which had originally been
noted by Les Oldham a British geologist and caver living and working in

Peru. Subsequently Nick Hawkes had descended the
first part of the entrance shaft and discovered that the cave continued beyond
the daylight zone.

After a few initial promoting sessions by Nick amongst
cavers in his home region (the Mendip Hills in the
UK)
news of an exciting new caving prospect deep in

Peru slowly became public knowledge
among the local caving community. In
early 200 I Rob Harper took the bait and contacted Nick with a view to a
reconnaissance trip. After emailing around their acquaintances an experienced
technical caving team was put together.

Personnel

Mark Hassell	Australian	Canada	None
Nick Hawkes	British	Peru	B.E.C.
Ian McKenzie	Canadian	Canada	A.S.S.
Matt Tuck	British/Canadian	Canada	B.E.C.
Juan Castro	Peruvian	Peru	None
(Les Oldham	British	Peru	None)

Note 1 A.S.S. =

Alberta Speleological Society

Note 2 Due to personal circumstances Les was unable to take a part in the active exploration of the cave.

Location and Topography

Satellite photograph indicating the cave location.

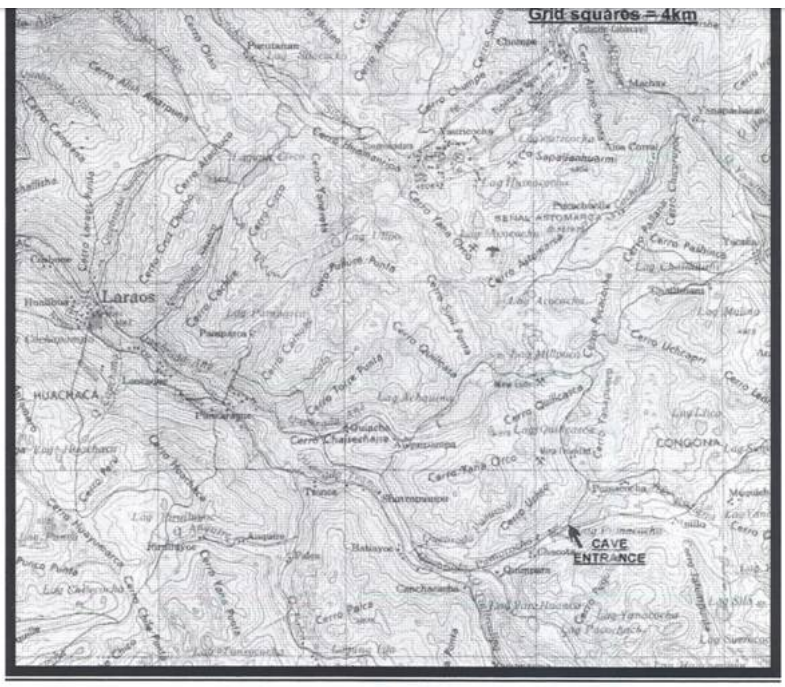
Geology/Geography

The cave is located within the 100,000 scale Yauyos map sheet number 25-L which was mapped in 1996 by the Instituto Geologico Minero y Metalurgico (INGEMMET). The entire mapsheet covers a half degree quadrangle which equates to just over 3000km2. Several areas within the mapsheet including the area directly over the Pumacocha cave have been mapped in detail by Les Oldham while exploring for base and precious metals. During the course of his mapping Les first recognised the potential for major cave development in this area.

no interbedded silts, shales or other non-carbonate dominated lithological horizons. Within the country of

Peru the best limestone for cave development is the Upper Cretaceous Formation known as the Jumasha Limestone.

The Jumasha limestones are dominantly a massive thickly bedded sequence of dolomites and limestones. Within the Yauyos mapsheet approximately 700km2 of Jumasha limestones outcrop, making the area highly attractive for speleological exploration and karstic studies. In the region of study this lithological unit has been estimated at approximately 400m thickness (Megard et al., 1996). Directly overlying the Jumasha. Formation is another limestone unit known as the Celendin Formation which was also deposited in the Upper Cretaceous and has also been estimated as having a thickness of 400m. The Celendin Limestones are not as favourable for cave development due to common interbedded layers of gypsum, red-brown shales and some sandstones. Nevertheless caves can and do occur in this formation. Below the Jumasha limetones lie two further Cretaceous limestone bearing formations, namely the Pariatambo and Chulec formations which together form an estimated 330m of potential cave bearing stratigraphy. Jurassic age limestones also occur to the northeast of the principal area of study yet still within the Yauyos mapsheet. These are the Lower Jurassic Condorsinga unit of approximately 1000m thickness and the middle Jurassic Chaucha Formation of an estimated 300m thickness. In total therefore the region has over 2400m of limestone stratigraphy which has subsequently been thrusted and folded during a sequence of orogenic events. The deformation is likely to be closely associated to a period of intrusive activity during the Paleogene and Neogene epochs, which has left the limestones commonly tightly folded, and in many areas standing near vertical. During this period of deformation it is likely that many of the predominantly limestone hosted mineral deposits for which this area is famous for were formed. The principal mineral deposits of the region all have strong magmatic associations suggesting direct association with the Cenozoic intrusive activity.



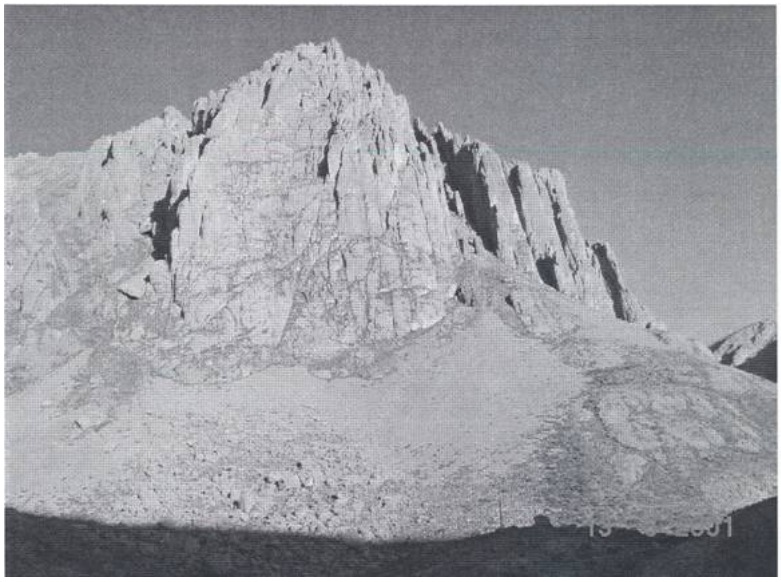
Topographical map of the cave and immediate area.

Geology at Pumacocha.

The Pumacocha cave system lies between two active mining camps. To the south is the San Valentin polymetallic mine and to the north lies the larger mineral district of Yauricocha known for its rich copper bearing limestone and shale hosted deposits.

The cave is located within the Jumasha Limestones adjacent to the contact with a large Miocene granodiorite intrusive. The entrance to the cave is formed very close to the contact between the granodiorite and the limestones. The presence of considerable cherty horizons which were located underground suggest that the mapped cave to date lies close to the lower contact with the underlying Lower Cretaceous Pariatambo Formation.

All limestones where the cave sinks are vertically bedded and this clearly explains the extreme vertical nature of the cave development.



Geomorphological Controls.

Previous speleological expeditions to the
Andes
have commented on the lack of deep and well developed caves and have attributed this in part to an effect of the excessive altitude (Imperial College, 1975). The argument proposed is that rainwater falling at such altitudes is less acidic since less CO2 has been absorbed during the descent. As to whether this argument is valid or not is not here disputed, indeed the presence of acidic waters is clearly a pre-requisite for large scale cave development. It is of particular significance that at the Pumacocha system all water draining into the cave, which drains a catchment area of approximately 30km2 is also draining over the granodiorite intrusive which in turn is rich in small sulphide veinlets and disseminations. Oxidised sulphides are an excellent source of acidic fluids and would therefore enhance considerably any cave development in this area.

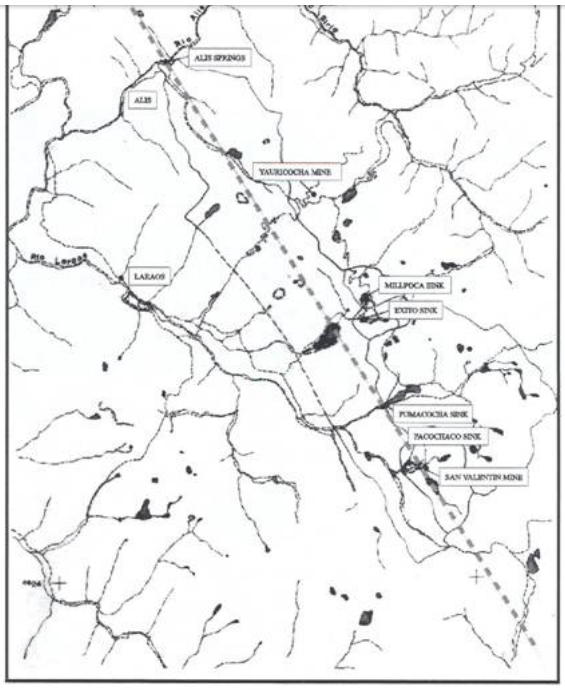
Cave Exploration and Cave Description

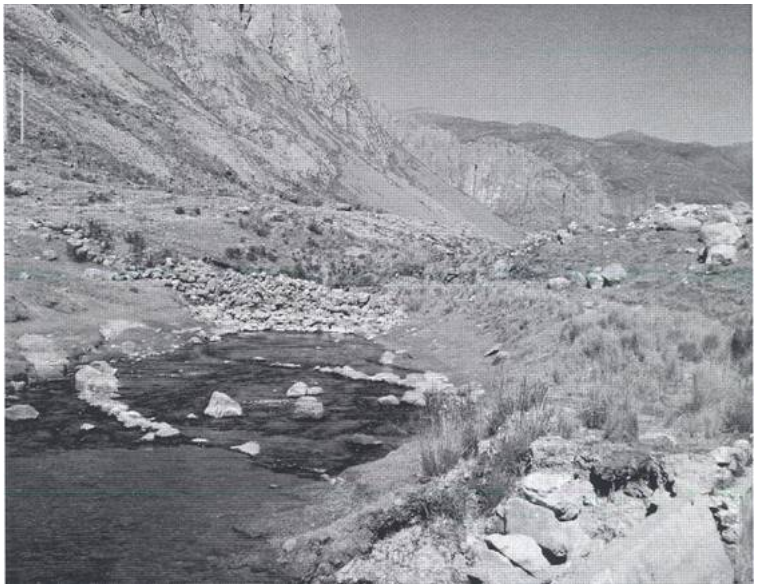
On arrival in the area we examined the main sink and adjacent entrances which appeared to be part of a single cave complex. In the absence of a local name, we designated the system as Sima Pumacocha, (SP), and the active entrance as SPI. Two other dry entrances were noted in the small gorge downstream of the main river sink (SP2 and SP3). Later yet another small entrance was found between SPI and SP2 which was then called SP1.5.

Due to the large volume of water flowing into SP I as well as a large quantity of dumped explosives in the main entrance it was decided to start by exploring SP2 and SP3.

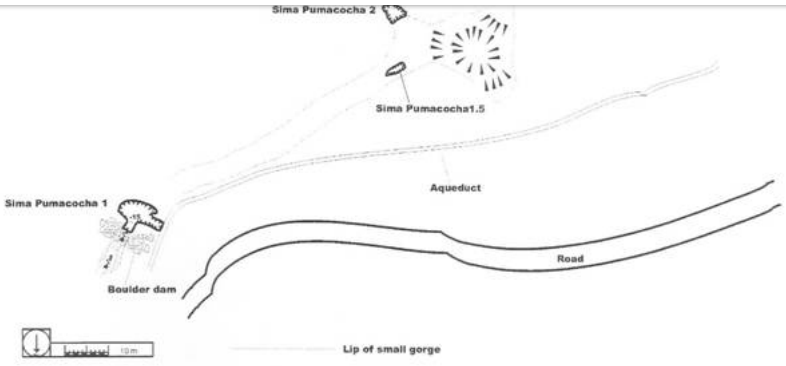
Diagramatic section from Pumacocha to the presumed resurgence at

Alis
Springs





A view of the river – looking toward the entrance.



NB: All left/right descriptions below are “true”,
i.e. from the point of view of someone facing downstream.

Sima Pumacocha 1

Location: –
E424208 N8630500 - local datum PSAD1956.

The first pitch was descended to a ledge at about -15m but not pursued further for the reasons outlined above.

Mark ascends the first pitch of SP1. Note the rolls of explosives on the ledge!

Sima Pumacocha 1.5

Two small passages leading left from the entrance chamber in SP2 were followed to a stage where a connection could be confirmed with an entrance in a small depression about four metres from the entrance of SP2.

Sima Pumacocha 2

Location:-E424208
N8630500 -local datum PSAD1956

A strongly draughting entrance about 30m down valley from SPI in the left wall of a small gorge.

First a steeply descending rift passage led after 11 m to an 8m pitch (40m rope to natural belay at entrance) to the floor of a

natural belay to boulder, deviation, 2 spits, 1 deflection and 1 natural thread belay). This pitch ended at a large ledge/small chamber where a large aven could be seen entering on the far side at about five metres height that was not investigated.

From the floor of the ledge/chamber the next pitch ("Ammonite Shaft" 113m, 1 natural belay, 1 natural rebelay, 6 spits, 2 deviations) dropped down a large (c 20m x8m) rift to land on another ledge, "Blitzkrieg Bridge", so called because of the periodic rain of small stones from above.

To the left at the base of "Ammonite Shaft" a short horizontal rift passage at "Blitzkrieg Bridge" was followed for c 50-60m to an, as yet, undescended pot which will probably just come into the roof of "Huanca Gorge" – see below.

Ian assess the draught while Rob kits up at the entrance of SP2

The next pitch ("Cages on Highway Nine") was a free hanging 20m (2 spits) pitch immediately to the right of the landing point at the bottom of" Ammonite Shaft". This pitch ended at the head of a very large (c 10 x 15m) passage ("The Huanca Gorge") which descended steeply via a series of ramps and short drops passing an intriguing cruciform calcite decoration en route to a boulder blockage after c75m. A short section of crawling and a two metre handline pitch was followed to regain the main passage now smaller in dimension (c 3x3m) still sloping at the same average angle which steepened to become a broken 40m pitch to a very high narrow (c 1m) vertical rift with a small inlet stream. Downstream was blocked by a boulder fall after a few metres but a 2m climb gained a more spacious higher level. Then a short steeply descending passage (handline) led to a ledge about six to seven

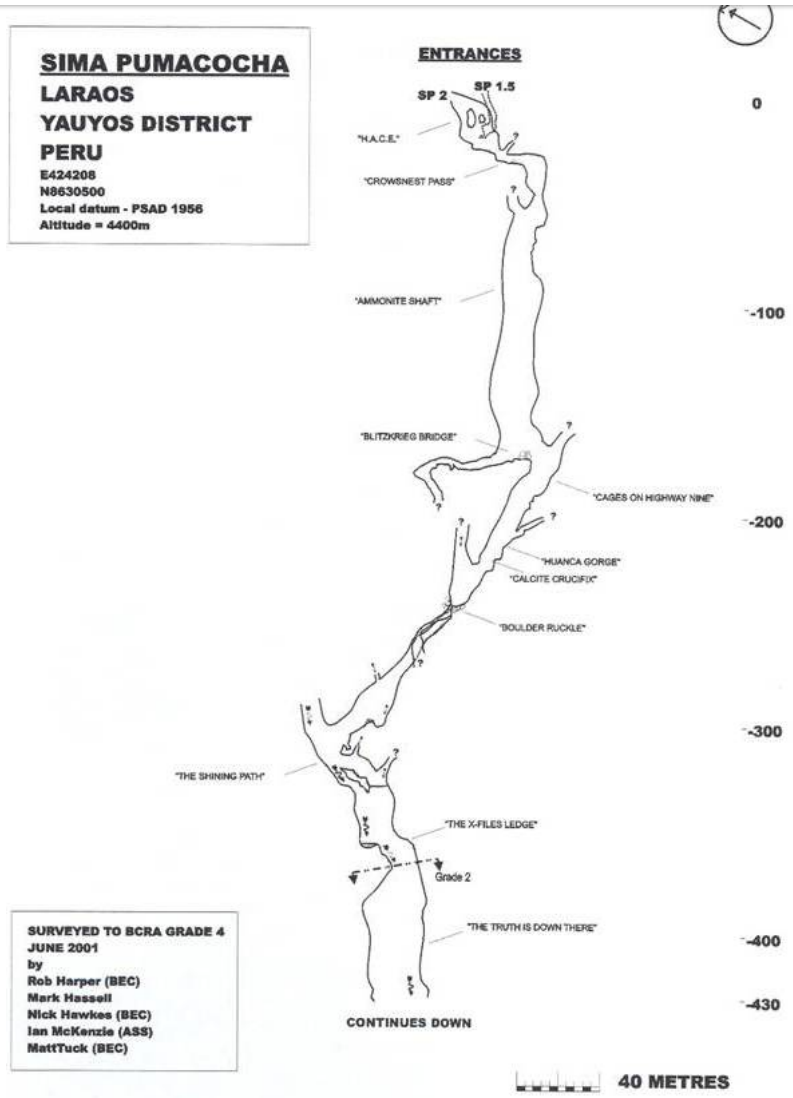
was a window into a parallel stream passage sloping down to the head of a pitch. This was not descended but from the noise almost certainly links back above the Shining Path streamway.

From the ledge above the streamway a short abseil (3m from natural belay) allowed access to a sloping ledge on the left of the passage about 3m above the river. Upstream the water came down a pitch of unknown height and flowed off down a series of steep cascades. The ledge was traversed to gain a short high-level oxbow on the left. Approximately ten metres of passage with two short,(c2m) free-climbable drops led to a small resurgence and pool followed immediately by a 25m wet pitch (2 spits, 2 rebelays) where several small streams entered and at the foot of the pitch the main streamway was regained at a large pool.

Rob surveying with Matt just above the "X-Files" ledge

At the far side of the pool a steep and powerful cascade of about eight metres ended at a large pitch of unknown depth. This cascade was avoided by a sloping abseil on the left side to a large ledge ("The X-files Ledge") but the force of water precluded further progress at this level without a significant amount of upward artificial climbing. However it was found to be possible to cross the cascade at the lip of the pitch and from this point a three to four metre free-climb of the right wall gained good natural belays. Abseiling from these belays to further natural belays it was found to be possible to descend the pitch avoiding the water. A spit was placed; the pitch was descended for 30-40m to the end of the rope.

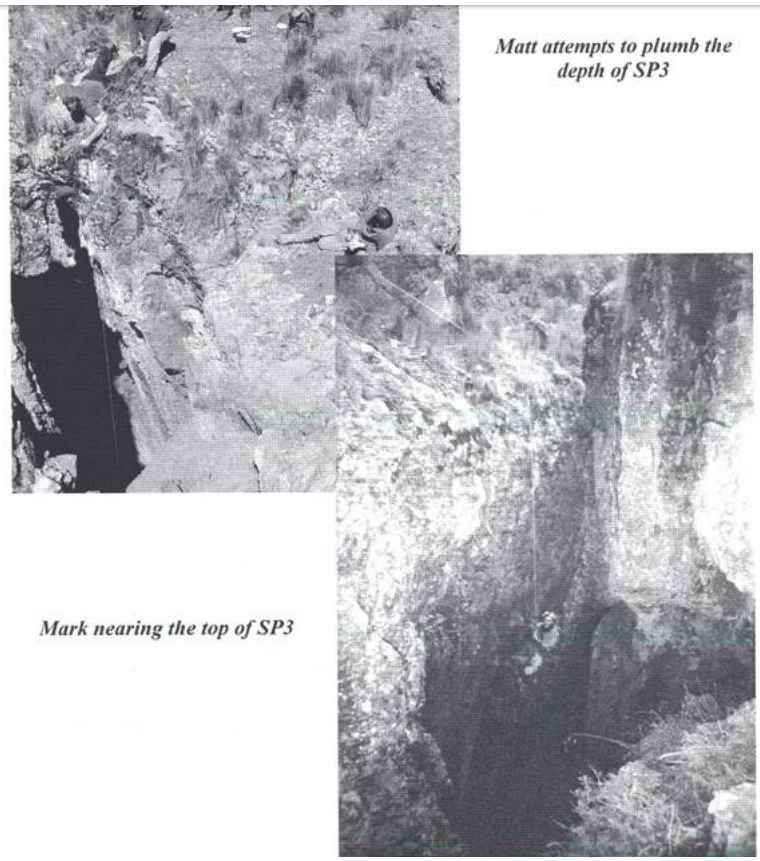
At this point the caver was once again coming under the main water flow. This and the fact that there was no floor in sight for at least



Sima Pumacocha 3

Location:-E4241
07 N8630438 -local datum PSAD 1956

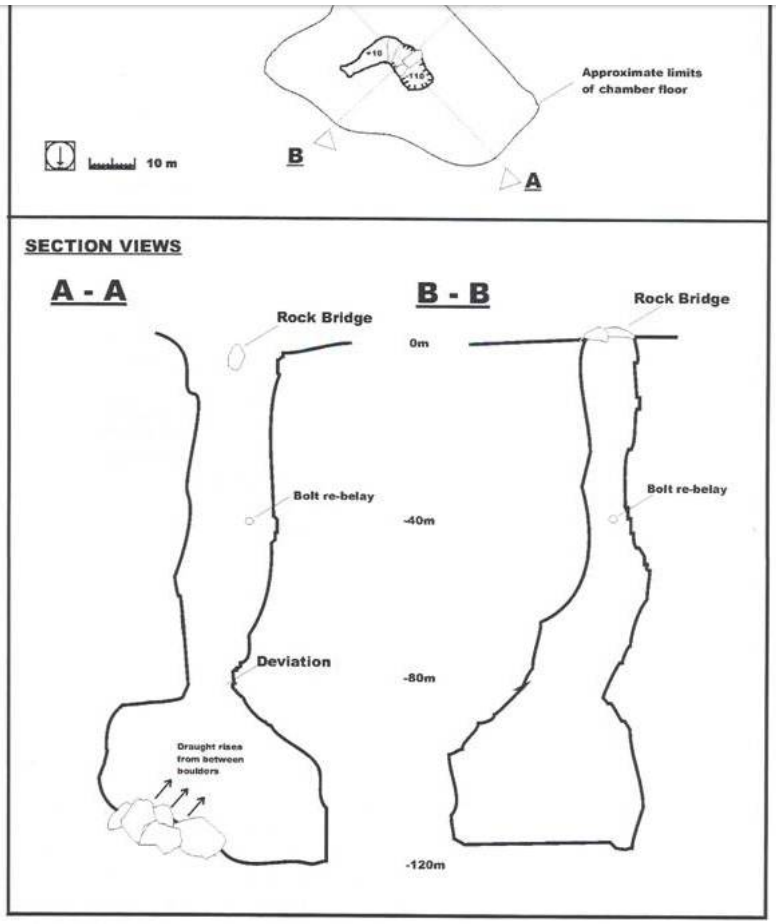
Following the gorge downstream from SP2 across a large depression allows access to a small vadose trench ending in a large (c 20x5m, open rift aligned in a North/South direction with a noticeable outward draught. From the lip of this rift a daylight pitch (c 120m) ends in a large (c 20 x 50m) chamber floored with boulders through which the draught rises.



Matt attempts to plumb the depth of SP3

Mark nearing the top of SP3

SIMA PUMACOCHA 3 (Grade 1 Survey)



Survey Notes

1. For the Grade 4 sections of the survey all measurements were taken using either a 30 or 25m fibron tape read to the nearest centimetre, a Suunto Compass and a Suunto clinometer, both read to approximately half a degree. The resulting data was recorded immediately.

2. For the Grade 2 sections of the survey distances were estimated from rope lengths and angles assumed because of the vertical nature of the passage. This data was recorded immediately after exiting the cave.

3. The raw data was processed on a laptop computer within 24 hours using “COMP ASS” software to produce a centre-line and a computer generated passage outline. This was then imported into CorelDraw and the final survey drawn.

4. GPS readings were taken with a handheld Garmin 12 GPS receiver using local datum PSAD 1956. Unfortunately neither the exact time of the readings or the degree of confidence were recorded.

Equipment

The vertical and steep sections of the cave were traversed using SRT (Single Rope Techniques) and “Alpine Style” rigging (rebelays as needed to avoid rope/rock contact) was used as far as possible. The principal rope used was a 9mm static rope from Sterling Ropes. Initially this was a comfortable rope to use for both abseil and ascent. However

use flattened sections of rope were discovered. Although these sections were probably as strong as the more conventional rounded rope they caused a marked change in the friction characteristics for descenders (both racks and Petzl Stops) and gave rise to some worrying moments.

Wherever possible natural features or rock climbing protection devices – such as nuts and “friends” – were used as belays. When this was not possible either pitons or self-drilling 13mm rock anchors (Petzl) were inserted using a hand held driver. The members of the team provided their own personal equipment for rope work. Everyone used a “Frog” system.

Travel and Accommodation

All team members assembled in

Lima and then travelled to the area of the cave by road. Accommodation was generously provided free of charge at an “executive workman’s” hut belonging to the Llapay hydroelectric station, kindly provided by SIMMSA, approximately 15km from the cave. This was at an altitude of only about 3000m as distinct from the altitude of the cave entrance, (c 4400m), which greatly facilitated altitude acclimatization. The excellent free food, clean beds, warm showers, daily room cleaning and access to electrical power were also much appreciated. By common consensus this was the most comfortable expedition in which any of the team members had participated.

Medical Report

All members of the expedition suffered to a greater or lesser extent from mild Acute Mountain Sickness caused by low oxygen levels due to the high altitude of the cave entrance. Fortunately the clinical signs were restricted to breathlessness and feelings of faintness on exertion, nausea and headaches. Those suffering from headaches were easily able to control them with simple non-steroidal anti-inflammatory drugs (aspirin and ibuprofen) and within four to five days everyone had acclimatized well. This was helped greatly by being able to sleep at a much lower altitude. Oxygen and appropriate medications for treating the more serious forms of AMS (pulmonary and cerebral oedema) were included in the medical kit but were not required.

Because of the increased water loss through panting particular care was taken to avoid dehydration including the establishment of depots of water and electrolyte solutions within the cave. Apart from the above and a slightly infected small wound on a digit, which responded rapidly to topical medication, there were no medical problems

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Acknowledgements

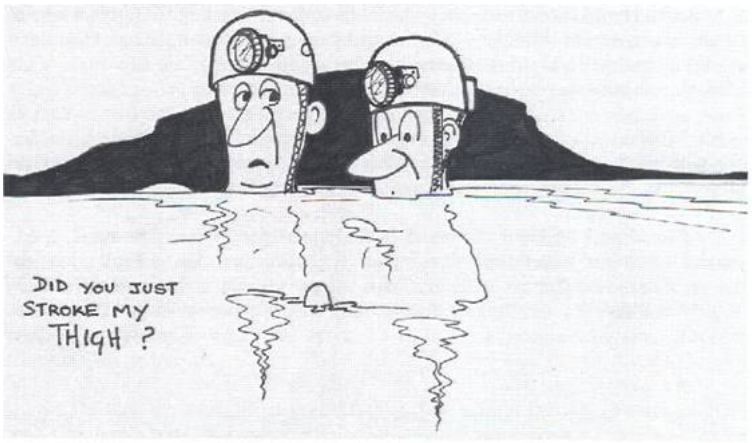
mine and hyro-electric station owner, Don Jesus Arias, who most generously provided both food and secure lodging for us during our stay. In addition we wish to thank Jenny the cook and all the security personnel at the hydro-electric station for making our stay so enjoyable.

Our thanks must also go to Sterling Ropes for providing a generous discount on five hundred metres of rope.

Conclusion

The speleological potential of this area is immense – as shown by the results of just one small reconnaissance expedition. At -430m Sima Pumacocha is the deepest limestone cave and the second deepest natural underground cavity yet explored in South America and, so far, has shown no sign of ending. The presumed resurgence is approximately 16km distant from the entrance and almost 1000m lower in altitude thus there is great potential for a very extensive cave system. There is also the exciting possibility that some of the shafts noted by expedition members near the Yauricocha mine may be higher entrances to Sima Pumacocha. If a connection exists then Sima Pumacocha could be one of the deepest known caves in the world.

A full colour version of this expedition report is available. Contact Rob for details.



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John Stafford's Memoirs.

By Chris Castle

The March '97 batch of new guides at Cheddar included one whom we thought to be the famous actor Patrick Stewart, fallen onto bad times. This was not the case; it was in fact John Stafford. He had moved down from Northants, having previously lived in many parts of the British Isles, and had taken a job at the Caves for a quiet life until he retired. He had to put up with cries of "Make it so" and "Belay that order, Mr. Worf'-indeed, he joined in with the fun and told visitors that he used to be a Starship captain. Fortunately we have since become bored with the joke.