

wheel. The new ones have gears and a less efficient wheel. The guts out of the older Brevetatto brush are of value to me because they work so well on generators. If you see one I'd be really pleased if you could get it!

Thursday was a very rainy day. After some more electrical improvements we took Raymond into the cave as he had been hounding us to do. Friday we packed up and upon leaving, set three bug bombs going, so the next visitors may be greeted by thousands of dead ants.

Going the Distance

Peru, June 2001: *Les Oldham, Nick Hawkes, Mark Hassell (R), Juan Castro, Ian McKenzie, Matt Tuck, Rob Harper.*

As soon as I arrive, I feel the need to leave. It's ugly down here. Through the hammering spray I see the lights of Matt and Rob, struggling through the relentlessly surging water. First Matt arrives at the ledge, utterly soaked and out of breath. "It's bullshit down there, let's get out of here. I've put the aliens on a ledge down below".

That signifies to me that this is the end of our exploration. Matt's young son had given him two plastic alien figures to put at the end of the cave, and even though the cave still goes, this seems as far as we will get.

We've achieved more than we intended to do on this trip. Our objective was a 'recce' trip to look at three sinkholes at 4300 metres in elevation in the Peruvian Andes. Being a small team of five, two Brits, two Canucks, and one Aussie, we hoped to drop the pits, and if they proved significant, our plan was to organize a bigger expedition the following year.

We certainly found what we were looking for. The three vertical entrances looked significant even from the surface; the first one was swallowing water from Pumacocha Lake and was littered with discarded dynamite and blasting wires; the second and third pits vented furiously. We left the first pit alone after a brief foray into the entrance, and upon finding the third pit choked after a 120 metre rappel, we concentrated our efforts on the second pit, named Sima Pumacocha. Right from the start it went vertical, and drop after drop it continued down. The longest pitch was Ammonite Shaft at 113 metres, named because of the fist-sized ammonite fossils sticking out of the walls. We rotated our roles, usually two guys rigging and pushing new passage, the other three coming behind surveying. The 500 metres of 9mm rope just magically seemed to keep rolling out of the bag as we pushed deeper and deeper, the only significant horizontal ground being a side rift that eventually went vertical and continued on into the unknown.

As we progresses further into the cave I became increasingly concerned about the rope. Sure, 9mm is great to pack and light to carry, but it just can't handle any abrasion. In the excitement of exploring new passage, a few rub points that should have been eliminated by rebelay or directionals were missed. I'd had two bad omens before the trip. Our flight was delayed 24 hours by a storm in Houston, and then Calgary airport was struck by lightning as Matt's boarding pass was being printed. All our rope was committed down the cave, and if our thin thread of rope back to the surface was severed, there was no one who would come and rescue us.

One day when Nick and I were pushing new passage, I rappelled down into a pit and reached a boulder-choke at the bottom. I was enjoying the sensation of being alone and the first human ever to be there when my light caught something on the wall. I turned to find myself staring at a perfect white crucifix, formed naturally out of calcite. That was enough

omens for me, so I spent the next day re-rigging any rub-points on our previous pitches, and found two sheath blowouts.

Below the boulder-choke things got nasty. After weaving through the hanging boulders, we could see and hear water thundering through the cave. The foaming white water snaked its way through the cave, earning the name "The Shining Path", and the passage beyond seemed almost as brutal as the guerilla army of the same name. The passage was wet and incredibly noisy; water vapour filled the air, waterfalls cascaded down drop after drop, and communication consisted of shouting into each other's ears or blowing on whistles. It was in this passage that I rappelled down and met Rob and Matt coming out, and we decided to pull the pin and start derigging the cave. The ledge where Matt had placed the alien figures was named X-Files ledge.

We pulled the ropes back out to the boulder-choke, and decided to come back the next day to finish derigging. That night we went back to the Hydro station where we were staying (which was a very generous arrangement made by the local mine owner), and we ran the survey data. Soon it dawned on us that we were only 50 metres shy of having the deepest limestone cave in South America, the deepest being Millpu de Kaukiran at -409 metres. Sima Pumacocha was definitely going to go deeper. We sat around the table and discussed our next move. No one was really keen to go back down there, but in the end Rob and I decided to go. Ian gave me his wet-suit socks, which would later become the greatest gift in the world.

Rob and I got up early the next morning, and the rest of the team was going to come in four hours after us to help derig. I choked down a salty omfast and we drove quietly to the cave with Juan Castro, a Peruvian who had joined our expedition and provided awesome surface support and Spanish lessons.

Rob and I quickly rappelled down to the boulder-choke where the ropes were stacked, and we started re-rigging down to the Shining Path. We stopped to sort gear just before we entered the ear-numbing wetness below, and Rob asked me how I felt. I said I had a few butterflies fluttering about in my stomach, and Rob said, "Perception is everything. It's noisy down there, that's all. You've just got to put it into perspective, and then you'll find it's really not that bad". We continued down and I tried to put his words into practice.

I gave Rob the survey gear and I waited near the X-Files ledge while he crossed over the lip of a waterfall and climbed around the corner to try and get a thy hang for the rope. I heard him hammering in a bolt, then his light slowly disappeared into the pit below. If things were good he was going to whistle for me to come across.

I sat in the darkness, feeling water vapour condense on my face and run down my cheeks like tears. Ten minutes went past, no light, no whistle. Twenty minutes. Then thirty. I began to run scenarios through my head, and to visualize what I would do if Rob didn't reappear, or if I heard him whistle for help. I also kept moving as much as I could, which wasn't much as I was clipped in on a small ledge with water swishing by my feet. I focused on keeping my hands warm, as I would need the dexterity for crossing rebelayes and derigging the bolt hangers. I felt like a madman, stamping my feet and drumming my hands to keep warm while I waited. Ian's wetsuit booties were now worth their weight in gold.

It seemed like an hour went by, and then I saw a few flickers of light coming back up the pitch. Slowly Rob reappeared, and derigged his way back to the ledge I was on. "I think we've done it Mark" he shouted in my ear, "let's get out of here". I gathered the ropes and we started back up the cave, pulling out the gear as we went. Once we were out of the Shining Path and the noise subsided, Rob told me his story. He could see a dry fossil passage that seemed to parallel the wet one, but as hard as he tried he just couldn't get to it. So he just rappelled down the wet shaft until he got to the end of the rope. The shaft still continued, and even with his light on halogen the waterfall beside him disappeared into the blackness

below, no floor on sight. He'd got down to -430 metres, a new depth record. Elated, we continued up and met the others above the boulder-choke. It wasn't until after midnight that the cave was derigged and everyone was out. After nearly two weeks of caving and traveling around the Andes, we headed back to Nick's place in Lima.

Matt, Nick and I had a quick stop for whitewater rafting on the way, then we met back up with Ian and Rob for a few days of partying in Lima before our flights back home. We plan to head back in September next year to finish, or at least continue, what we started. The local mining company dye-traced the water entering the first pit, and it reappeared 12 kilometers away, 900 metres lower in elevation.

I'm already practicing tying knots under a cold shower with the lights off in eager anticipation.

Equipment

Some Thoughts on Cowstails

Mark Hassell

Most vertical cavers in Canada seem to use the Frog ascending system, an integral part of which is a pair of cowstails. From what I've seen, many people will grab whatever is lying around to make cowstails, be it webbing, static rope, dynamic rope, or prussik cord. I would encourage people, however, to put a bit of thought into the selection of materials to make cowstails, as there is potential for disaster with some rigs.

Before we get too far along, the reader should have an understanding of the term "fall factor." Have a look at the technical section of a Petzl catalogue if you're unsure, but simply, the fall factor is the length of a fall, divided by the amount of rope you fall on. For example, if you fall one metre onto one metre of rope, it is a fall factor one. If you fall one metre onto three metres of rope, that's a factor of 0.3. The bigger the number, the more severe the fall. A very hard fall is a factor two, which means falling twice the length of the rope you're attached to (e.g. a two metre fall onto one metre of rope). This is usually experienced by multipitch rock climbers who climb above a belay ledge, fall off, and end up dangling below the ledge. It also can happen to aid-climbers and cavers who clip a cowstail into an anchor, then climb above the anchor to fix some high rigging, and fall. Easily done.

Don't be fooled into thinking that you have to fall a long way to generate enough force to hurt yourself. A short slip onto a short rope can create a big shockload, which has to be absorbed somehow.

Shockload results from the interplay of three factors;

1. the fall factor
2. the nature of the rope you're falling on (high stretch, low stretch, diameter, etc)
3. the weight of the falling object (you).

The thing you have the most control over is the nature of the rope you're falling on, which is why I suggest choosing your cowstails with careful thought.

In a fall, a cowstail needs to be able to do two things. First, it should be strong enough to survive a factor 2 fall without breaking. Second, it must provide sufficient shock absorption to keep the forces transmitted to the caver below tolerable levels. The UIAA sets 12 kN as the tolerable level, as studies have shown that the human body can briefly withstand forces up to