

Oxford University Cave Club Huerta del Rey Expedition 1992

Final Report



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Expedition Members

Expedition Committee

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Equipment Officer:	Mark Crossley
Supplies Officer and Nurse:	Joan Arthur
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Introduction

On 3 July the advance party of the OUCC expedition, consisting of two drivers, a car and trailer full of kit, arrived in the Picos de Europa in Northern Spain. We had planned for 7 other members of the expedition to arrive at the same time with the expedition minibus, but they were scattered through France. Five were struggling across the French railway network and two were lying in a tent on a campsite in the town of Saint Maixent L'Ecole, eating french bread and Camembert. The change of plan was due to the fact that the minibus engine had seized up while we were driving through France, and rather than hold the expedition up for a week while it was replaced, we had sent the car, trailer and most of the cavers on ahead so that they could get on with the expedition.

The first few days were tough, there was a bare minimum of camping equipment because it seemed better to use the limited capacity of the trailer to carry important things like rope and rigging gear rather than tents. Despite the miserable weather and the lack of any nice things to eat (all the peanuts and caramel wafers were still in the van in France), the caving was not held up at all, and the rigging of Pozu Jultayu (2/7) was completed ten days after our arrival in Spain. Nor was 2/7 the sole focus of attention, because in the same period another two caves (66/5 and 53/5) were rigged and 18 new entrances located and investigated.

The expedition divided itself into two, and the groups kept themselves to themselves for most of the expedition. The reason for this was simply that it was important to ensure that the underground camp, which had been installed with such effort, was kept fully occupied. The camps needed four people, and each camp lasted for four days before the camping team had had enough and came out needing four days to recover. There were eight people interested in exploring 2/7 at the start of the expedition, so this meant that they were either down 2/7 or resting, and they were not available to go caving elsewhere.

The group exploring 2/7 knew what they wanted to do, and set to it with a single-mindedness that is detailed later in the report. The group who were not involved in 2/7 wanted an interesting cave as well, but they knew that they had to find it first. The number of entrances that they investigated at the beginning of the expedition is a testimony to the dedication with which they applied themselves to this task. As the diary shows, their attention gradually focused on a cave, Pozu Cabeza Julagua (8/11), discovered in 1991 but not seriously investigated until this year. On the first trips the cavers were tentative, uncertain of the importance of their find, and the expedition logbook records their exhortations to the rest of us that 'this cave has potential'. Then it was potential no more, and every trip down it returned with new discoveries to add to the rapidly growing survey.

By the end of the expedition we had extended 2/7 by over 1km upstream, up narrow canyons, along beautiful stream passages and through huge boulder chambers. Elsewhere in the cave we had found another stream, and followed this along a finely decorated, twisting passage for 300m. 8/11 had proved equally interesting. It had turned out to be highly complex, with a 1200m of interconnected streams, passages and chambers. The variety of passage made it a much nicer cave than many that we have found in the past. Both caves are still open at the end, awaiting our return in 1993.

The two teams united to ensure that all the caves were derigged efficiently and that our gear was carried down to Base Camp in the shortest time possible. We left Los Lagos on time and had an uneventful journey home.

David Monaghan

Jargon Explained...

Like most practitioners of any esoteric art, when talking among ourselves we tend to use jargon without thinking about it. I hope that I can explain some of the more obscure words here, so that you are not too puzzled by the articles that follow.

Say that it is a hot day and you are *shaft bashing*, that is walking across the scorching bare limestone, or *karst*, looking for cave entrances. Imagine your joy when you find one that looks as if it has not been descended before: this is your chance to do some *pushing*, or original exploration. The first thing to do is to mark the reference number on the cave using an aluminium tag. Referring to the *shaft bashing kit*, which details all the caves that we have found in the area in the last 13 years, you notice that this cave is the 71st entrance to be recorded in Area 5, so you mark the cave 71/5. You go in. The first part of the cave is a *rift*, a tall narrow passage, where sometimes you can see the floor and sometimes you can't. With uncoordinated movements of your arms and legs you *thrutch* along it, making good progress. Then, horror of horrors, you come to a *squeeze*, and the passage narrows until it is only 7 inches wide, *tight*, but not so tight that you have to *hammer* it open. You breathe out and try to relax as you let yourself slide gently through. On the other side of the squeeze you come to a vertical drop or *shaft*. You can't decide whether it is *free-climbable* and can be climbed without artificial aid, or whether it needs to be *rigged* with artificial aids, in which case the *climb* becomes a *pitch*. You decide not to risk free climbing. You have a choice of equipment for rigging the pitch: you can either put a wire *ladder* on it, in which case you are *laddering the pitch* or you can rig it with a rope, so that you are doing it *on SRT* (Single Rope Technique).

You start to rig the pitch for SRT by hammering an artificial anchor, a *bolt*, into the wall. You screw a *hanger* into the bolt and attach the rope to it with a metal link called a *maillon*. This is the first *belay*: for safe SRT you need at least one more belay at the *pitch head*, so you place a second bolt and tie the knots to give you a *Y-hang* where the load on the rope is shared equally between the two belays. You attach your *descender* to the rope and use it to slide down in a controlled fashion, this is *abseiling*. For the first part of the pitch the rope hangs clear of the walls, and you notice with satisfaction that you have thus got a good *free hang*. A bit lower down the rope touches the wall and you are worried about the possibility of a *rub point*, this could cut the rope, so you are anxious to avoid it. First of all you experiment with a *deviation*, where you pull the rope slightly out of line using a piece of nylon *tape* attached to the opposite wall of the shaft. This doesn't work, so you decide to put in a *rebelay*, where you re-attach the rope to the wall of the cave. There is a spike of rock handy, which makes a very good *natural*, so you tie the rope to this, rather than using another bolt.

At the bottom of the rope you find yourself in a roomy *chamber*, with water entering down one wall as an *inlet*. The route out of the chamber, the *way on*, is down a passage with the water, a small *streamway*. The roof of the passage drops until it is very close to the water, and you can only get through by lying on your back in the water with your nose pressed against the roof: this is a *duck*. The roof lifts slightly, and then drops under the water at a *sump*. You see that there is a continuation in a *high level passage* above the sump, and you follow this. It is well decorated with *pretties*: *stal* (stalagmites and stalactites), *helictites*, which grow horizontally out from the wall, and *flowstone* where the walls and floor are covered with white deposits. Shortly afterwards you find that the passage is blocked with fallen rocks, this a *boulder choke*. You can feel a slight breeze: the fact that the *choke* is *draughting* is a good sign, it means that there is more passage on the other side. You know that you will have to *dig* the choke open. The cave *goes*, and, elated, you return to the

chamber and climb, or *prussik*, up the pitch using two *jammers* which slide up the rope but not down it.

You return to camp, and bore your colleagues with exaggerated talk of the size of the new cave that you have found. Next day you return to the cave that you found, with a compass, a clinometer (*clino*) and a tape and make a map, or *survey*, of your discovery.

David Monaghan

Diary

30 June	—	First expedition members leave England with the minibus and trailer, and car.	—
1 July	—	Minibus engine seizes up near Saint Maixent L'Ecole in France.	—
2 July	—	Car and trailer departs from Saint Maixent L'Ecole for Los Lagos with two drivers. Two drivers stay with the minibus. Rest of expedition members take train to Los Lagos.	—
3 July	—	Car and trailer with most of expedition gear arrive at Los Lagos in the early morning. Remainder of expedition members arrive in the evening.	—
4 July	2/7	Cave rigged to Graham's Todger Pitch.	ADS, PAR, RB
5 July	66/5	Cave rigged, Wormhole hammered open, Right Said Fred discovered.	GL, DEL
	2/7	Cave rigged to Armageddon Ledge.	PMM, TSH, SB, SJP
6 July	Area 5	67/5 and 68/5 discovered.	GL
	2/7	Cave rigged to bottom of The Hundred.	ADS, DEL, RB
7 July	Area 4	5/4, 7/4, 9/4, 10/4, 15/4 and 16/4 located. 15/4 bottomed.	TSH, DEL, PAR
	Area 5	67/5 and 68/5 dug without success.	GL, RB, ADS
8 July	—	Minibus arrives at Los Lagos with a new engine.	—
8 July	Area 4	10/4 and 11/4 descended.	GL
	Area 11	8/11 located, 13/11, 14/11, 15/11 investigated.	PMM, SB
	66/5	1991 Limit passed through tight squeeze, to 1992 limit, a tight sump.	ADS, DEL, PAR
9 July	2/7	Rope carried to the end of the rifts.	DEL, DJM, SB, SJP
	2/7	Cave rigged to Crash Pad.	ADS
	8/11	Cave rigged to 1991 limit and next pitch partially descended.	PMM, SJP
10 July	Area 11	16/11 and 17/11 discovered.	SB, SJP
11 July	53/5	Entrance series rigged in search of the elusive draught. Source traced to draughting choke beyond Piranha Pendule.	GL, SB
	2/7	Camping kit carried to the end of rifts.	DJM, SB, SJP, ADS
12 July	2/7	First camp goes down and returns after running into difficulties on the way in.	DEL, PAR, RB, ADS
	2/7	Seventh Heaven rerigged.	DJM
	Area 4	5/4 located and descended.	TSH, SB, SJP
13 July	Area 4	5/4 bottomed, 9/4 descended.	TSH, SB, SJP

	Areas 7 and 9	43/7, 44/7, 45/7, 46/7, 16/9, 17/9, C5 investigated.	GL
14 July	—	Shaft bashing: cut short when cavers became separated.	DRB, GL
	Area 4	9/4 investigated.	TSH, PAR
14-16 July	2/7	Second camp goes down. Day 1 — Camp set up on Big Ledge. Day 2 — Tantalus descended, upstream extended to just beyond the Blowhole. Day 3 — Returned to Surface.	PMM, ADS, RB, DEL
15 July	Area 4	9/4 bottomed.	TSH, PAR
	Area 12	27/4, 6/12, 7/12, 8/12, 9/12, 10/12 found.	GL
16 July	2/7	Rope carried to Armageddon Ledge.	CJL, SB, DJM
	53/5	Rift beyond Piranha Pendule pushed.	GL, PAR
17-20 July	2/7	Third camp goes down. Day 1 — Travelled to camp, laying telephone cable. Day 2 — Tackle retrieved from Primula Point, IWWI Streamway discovered and explored, Upstream extensions surveyed from Windy Sump to Paris Metro. Day 3 — Upstream extensions surveyed from Big Ledge to Paris Metro. Dead Sea discovered. Day 4 — Returned to surface.	DRB, DJM, TSH, SB
17 July	Area 5	Various entrances near 66/5 examined.	GL
18 July	Area 5	69/5 in the Valley of Dry Bones dug open.	GL, DH, SJP
19 July	Area 10	13/10 'Cave in Green Ridge' investigated.	GL
	8/11	Cave extended to Peanut Pot.	PMM, SJP
	Area 4	Shaft bashing.	DH, CJL
20 July	8/11	Big Chamber found. Entrance series surveyed.	GL, SJP, ADS, CJL
21-25 July	2/7	Fourth camp goes down. Day 1 — Travelled to camp. Day 2 — Downstream leads investigated. Day 3 — Dead Sea Strolls discovered. Day 4 — Downstream leads investigated. Day 5 — Returned to surface.	ADS, CJL
22 July	69/5	Digging	DH, GL, SJP
24-28 July	2/7	Fifth camp goes down. Day 1 — DEL and PAR travelled to camp. Day 2 — TSH and DJM travelled to camp, rift explored upstream. Day 3 — IWWI Streamway pushed and surveyed to upstream limit. Oregano Pitch rigged. Day 4 — Upstream surveyed from Oregano Pitch to Windy Sump. Day 5 — Returned to surface.	PAR, DEL, DJM, TSH
24 July	8/11	Start of Insalubrious found by climbing out of Big Chamber. Cave surveyed to third pitch.	GL, SJP
	Areas 4 and 12	Dowsing.	JDW
25 July	8/11	Cave surveyed to Peanut Pot. Rest of Insalubrious, Sloping Chamber and Passage With No Name Yet explored.	HMS, DH, GL
26 July	Area 5	Dowsing.	JDW
	2/7	Photography equipment carried to end of rifts.	HMS, SB, SJP
	Area 9	Shaft bashing.	DH, MH
27 July	8/11	Cave surveyed from the top of Peanut Pitch to the end of Insalubrious.	GL, CJD, FAB
	53/5	Entrance series examined in search of missing draught.	TCG, SJP, JC

28 July	8/11	Rio Pequeño discovered and explored upstream to dry sump and downstream to end of El Meandro. Surveyed from end of Insalubrious to dry sump.	GL, CJD, SJB
	69/5	Digging.	TCG, CJD, HMS, ML
28 July-1 August	2/7	Sixth camp goes down. Day 1 — Travelled to camp. Day 2 — Photography in Just Awesome. Day 3 — Photography in Just Awesome. Day 4 — MH and DRB return to surface, ADS and JC investigate leads downstream. Day 5 — ADS and JC return to surface.	ADS, JC, DRB, MH
29 July	Area E	Surface prospecting. E9 discovered.	ML, CJD, HMS
	8/11	Rio Pequeño surveyed downstream to bottom of third pitch and extended to sump.	GL, FB, SB
	8/11	Climbs and pitches investigated. Very Big Chamber, 11 O'clock High and Map Room discovered.	TCG, SJP
30 July	8/11	Very Big Chamber surveyed.	CJD, HMS, SJP
	8/11	Boulder choke at bottom of Peanut Pitch dug open and connected to Very Big Chamber. 11 O'clock High surveyed. Bottom of 3rd pitch investigated.	TCG, SB
	Area G	Caves G1, G2 and G3 investigated.	DH, ML
31 July	8/11	El Meandro and route through choke from Peanut Pitch to Very Big Chamber surveyed.	GL, CJD, ML
	8/11	11 O'clock High surveyed to the end. Leads in Very Big Chamber investigated.	TCG, DH
	Area 4	Dowsing.	JDW
31 July - 4 August	2/7	Seventh Camp goes down. Day 1 — SB and TSH travelled to camp. Day 2 — DJM travelled to camp. TSH and SB surveyed high level routes in Grisly Rift. Day 3 — Upstream photographed as far as Windy Sump. Day 4 — Upstream photographed to Oregon Pitch. Day 5 — Returned to surface.	SB, TSH, DJM
1 August	2/7	Carried photo gear to the end of Rifts with DJM.	DEL
2 August	8/11	Lower streamway surveyed.	GL, DH, MH
3 August	2/7	Somnambulist Series pushed and surveyed. Tackle removed.	DEL, PAR
	8/11	Cave extended to top of The Unwell.	TCG, CJD
	F54	Cave discovered.	GL, MH
4 August	49/5	Cave rediscovered and extended.	DEL, PAR
	8/11	Wet Cheeks rift surveyed. Explored down The Unwell and along Codeine Phosphate Rift.	MH, JC, HMS
5 August	E9	Cave bottomed.	CJD, ML, JC
	49/5	Squeezes hammered open.	DEL, PAR
	16/11	Cave bottomed.	SB, SJP
6 August	8/11	Surveyed to Fever Pitch.	CJD, SJP, HMS
	53/5, 69/5	Caves derigged.	GL
	70/5	Cave discovered and dug open.	DEL, PAR
7-8 August	2/7	Derigging camp. Day 1 — Travelled to camp. Day 2 — Packed camp and returned to surface, detackling cave to Armageddon Ledge.	DEL, SB, SJP, TETK

8 August	2/7	Tackle retrieved from the end of the rifts.	DJM, HMS
	8/11	Surveyed to end of Codeine Phosphate Rift.	JC, GL
9 August	8/11	Pushed and surveyed down October along streamway to sump and along Big Wind.	JC, GL
10 August	2/7	Tackle retrieved from Armageddon Ledge.	JC, DJM, HMS
	66/5	Cave derigged.	GL
11 August	8/11	Rio Pequeño derigged.	GL, EB
	2/7	Cave detackled to top of Pessimists Pot. Tackle bags removed from cave.	DJM, TSH, TETK, DRB, HMS
12 August	8/11	Remainder of cave derigged	GL, SJP
13 August	2/7	1500m of rope and all remaining tackle bags removed from cave.	GN, IA, SJP, SB, DRB, DJM, HMS, EB.
14-17 August	—	All equipment carried down from entrance of 2/7 and Ario Camp to Los Lagos.	—
18 August	—	Minibus and trailer leave Los Lagos.	—
20 August	—	Minibus arrives back in England.	—

David Monaghan

Pozu Jultayu (2/7)

A full description of the previous discoveries in Pozu Jultayu is to be found in OUCC Proceedings 13¹.

The Discoveries Upstream

While waiting for dinner during the derigging camp on the Big Ledge at the end of the 1991 expedition I decided to have a brief wander upstream. I found the previous limit of exploration, a waterfall with a large rock blocking the rift above it, without any difficulty. However the passage before the waterfall looked sufficiently bouldery and complicated to make a way over the top quite likely. Within fifteen minutes I had found a route over boulders along the left hand wall and was standing in a narrow rift above the waterfall with a fast-flowing stream at my feet. I had found the way on. Throughout the expedition upstream exploration had been discouraged so as not to reduce manpower at the Egbert end, so I named this section of the cave The Forbidden Zone.

The following morning I managed to find half an hour to spare after breakfast, so Pauline Rigby and I returned to The Forbidden Zone. Following the rift upstream soon led us to another waterfall. Fortunately the walls of the rift were close enough to make this an easy climb, and we went up about fifteen metres to the foot of another short cascade. This looked equally easy to climb, but we were running short of time, so we retreated, leaving the end wide open for a return in 1992.

First Camp

The first camp of the Huerta Del Rey expedition was actually our second attempt to send a camping team down, the first one having being forced to return to the surface, and it

¹D. Horsley, U.Mead and M. Mead (Eds), *Proc. Oxford Univ. Cave Club*, 13, Oxford 1991.

consisted of Tony Seddon, Paul Mann, Richard Barnes and me. Tony and Paul wanted to explore downstream, so that left just the two of us to push The Forbidden Zone. The terminal waterfall that had looked easy to climb in 1991 turned out to be a bit more tricky in 1992 because higher water levels meant that it was completely obscured by spray.

Doubling back in the rift led to a sloping ledge which zigzagged up the right hand wall and ended at a slight pinching in of the walls about ten metres above the floor. This climb was particularly unpleasant because not only was the left hand wall too far away to provide any assistance, but the rock was extremely fragile and handholds had a disturbing tendency to become hand sized rocks. Despite this I forced the squeeze at the top of the ledge and called Richard up to join me.

At the top was a wider section with the water gushing down a hole in the floor, but looking more placid upstream. Becoming excited now we pushed on through a short crawl, along a section of rift with the stream flowing deep and ominous at our feet, and into another short area of large boulders. The route through these boulders turned out to be an easy squeeze under the left hand wall and this led to a huge black space.

This black space extended up as far as we could see, the walls were at least ten metres apart, and the passage appeared to continue back over the boulders we had just come through, but most importantly it carried tantalizingly on in front of us. The sound of rushing water that had been with us since we came out of Gusamo Grovel the previous afternoon was now strangely absent and this made the passage seem even larger. We concluded that this was the upstream continuation of The London Underground that Paul Mann had been predicting, so we named it The Paris Metro.

After a short break for food we started walking along the new passage. We soon had rejoined the water, although now it was a wide slow-flowing stream rather than the rushing cataract we had left behind. Stomping new passage it may have been, but we still didn't want to get our feet wet¹, so we spent the next half hour picking our way carefully along the bank, using fortuitously placed rocks to change bank when one bank got too difficult, until we reached a spot where no dry route was available. On subsequent trips rocks were thrown into the stream here for stepping stones, but we had to wade across. We were thus obliged to call the passage Virginia Streamway. A little further on we reached a sump.

This sump was a large pool, roughly semi-circular and 4m across, with a pile of rocks extending from the centre to within about 1m of the right hand wall. At first we thought there was no way over the sump, so we went back a short way and found a window at chest height in the right hand wall. This led to an ascending series of narrow rifts which became uncomfortably tight, and the complete lack of a draught caused us to abandon this line of enquiry and return to the sump.

On a second inspection we discovered a hole about 1.5m above the water, issuing a storm force wind which blew out carbide flames. We named this The Blowhole and the sump The Windy Sump. The water immediately beneath the hole seemed to be about 1.5m deep and the lack of footholds on the wall made it a major obstacle, so for half an hour we repositioned several hundred kilos of boulders in the stream beneath The Blowhole until we could stand in the sump with water only up to our thighs. This enabled us to hammer the hole without drowning, but not, unfortunately, without freezing.

After not very long a combination of optimism and incipient hypothermia made me decide to give it a go. Richard gave me a leg-up and with much difficulty I managed to get through. Unfortunately Richard's shoulders are wider than mine, so without the assistance of a leg-up

¹ If you think that Dave and Richard sound a bit faint hearted in their keenness to avoid the water you should bear in mind that it is barely above freezing and they had no dry clothes to change into during their four days 700m underground. *Ed.*

he had no hope of coming to join me. The obvious solution was to hammer The Blowhole some more, but this turned out to be a long job and before long my wrist had had enough. The next solution involved tying loops in a piece of rope, belaying it above The Blowhole and using it as a ladder. This proved more successful, but several attempts were needed to get the right loop spacing and in the process Richard fell into the sump twice. However he was determined to get up and eventually we were both on the other side.

The other side was short but promising. It ended at the upstream sump pool which was dark, still, and looked very deep (it was later plumbed to a depth of 5m), and we weren't prepared to risk falling into it. So we beat a strategic retreat.

Before going back down The Blowhole we had a quick look up an inlet on the right. This soon became a narrow rift reminiscent of the rift on the other side of The Blowhole, but with no apparent connection. Lacking the determination to push tight rifts we abandoned this for a later date.

The return trip was rather more difficult than we expected. We found the hole through boulders at the beginning of The Paris Metro without problem as we had left carbide arrows to show the way. However, on the way in we had not noticed that the squeeze at the top of the zigzagging ledge was not unique. Two or three routes down looked possible, so, rather than forcing a squeeze and finding nothing but black space underneath, we decided to try to find an alternative.

The Forbidden Zone is a very tall rift with regular pinchings of the walls which make easy levels to walk along. We started following one of these levels back towards Just Awesome. This particular level looked rather interesting, so, although we noticed several possible routes down, I decided to stay at this height in the hope of finding a way up into Gusamo Grovel. Soon the passage got a bit wider and I had to traverse on one wall. This traverse was rather hair-raising, so I told Richard to wait, while I looked to see if it was worth carrying on.

Shortly beyond the traverse the passage forked unexpectedly. The left hand fork was a climb down that looked a bit awkward, but the right hand fork suddenly gained a solid floor and looked extremely promising. I went back to the traverse and told Richard what I had found and asked him if he was prepared to attempt the traverse. He said he'd give it a go and started to come across to join me. This was a mistake because Richard hadn't yet got to grips with the friability of Picos limestone, and the words 'Don't trust your right foothold' were on my lips as his foothold snapped off and Richard fell.

Seconds after Richard hit the unbelievably well-placed floor 5m below I was down with him. Luckily he was just a bit cut and bruised, but the rocks all round him were covered in blood which made it look much worse. Most of this blood seemed to be coming out of a tiny cut on his finger (it was only later we found the much deeper cut on his elbow), so I put a plaster on it and by then Richard said he was ready to carry on. Later we named this section of rift Barnes Loop The Loop.

We returned to the most promising of the potential descents that we had seen. Fortunately we had a forty five metre rope that we had left for the descent, but I didn't want to take Richard down a climb, only to find it impossible lower down and have to ask him to climb back up again. So I climbed down the rift until I reached a bit that I recognised and then climbed back up to belay the rope for Richard.

The following day we decided that in view of Richard's condition we should come out of the cave a day early, leaving the surveying of the new finds to the next team.

Second Camp

The second camping team was Dave Bell, Sam Bunting, Sean Houlihane and David Monaghan. Their intentions were to survey all the new passage and find some more.

On the first day Dave and Sam surveyed from the Windy Sump to the Paris Metro while David and Sean collected camping equipment from Primula Point, and on their way discovered IWWI Streamway.

The next day they surveyed from the start of the Forbidden Zone to Paris Metro and then carried on to see if they could find some new passage. On the far side of The Blowhole Sam looked up and saw a black space. He asked David what was up there, to which David replied, 'Go and see'. Sam, lacking things like fear glands or common sense, did just this and found a huge chamber. David has lots of the above, so he sent Sean up to join Sam, and Dave to go and make supper while he waited by the pool.

From the chamber a short climb up led to a 10m pitch. At least now it is a pitch: at the time Sam decided it looked free-climbable and Sean followed him down it. At the bottom they found an even bigger chamber, which they named Echo Beach, because of the large amounts of sand and the amazing echo. The stream flowed out of one corner of this chamber, across to the opposite corner and into the upstream end of the sump pool. From this point they could see David waiting on the other side of the pool, so they told him what they were doing and carried on to find more new passage.

Following the water upstream they soon came to a low arch, where the only way on appeared to involve total immersion. Although the idea of falling thirty feet didn't bother them, neither of them wanted to push a duck 700m underground, so they returned to Echo Beach to find an alternative. Climbing up sandy slopes on the left hand wall, and then down through boulders, led to a large pool. Climbing up over this they found a large ledge on the right hand wall and below this a nice solid-floored section of fossil streamway. This they named The Dead Sea, because of the unusual coral-like formations on the floor. A short distance along this passage they came to a hole, at the bottom of which they could hear the stream. By dropping rocks they estimated the water to be about 20m below although fortunately they decided not to attempt to climb it. Instead they returned to The Blowhole and went back to camp.

Third Camp

Camp Three was a two person camp, owing to lack of available personnel. They were Tony Seddon and Chris Lloyd, a Canadian caver and climber who had come to join us for a few weeks. They only spent one of their three days pushing upstream, preferring to look at the other end of the cave.

Following the vague descriptions in the underground log book they eventually managed, as they put it, 'to rediscover' The Dead Sea and found the pitch down to the stream at the end. Rather than rigging this, Chris traversed along the right hand wall to a continuation of the fossil streamway straight ahead. Tony followed him and they walked into 300m of fossil streamway and bouldery rift, which they named The Dead Sea Strolls. They were eventually stopped by a hole in the floor similar to the one they had started at, but even they didn't try the traverse into the continuation of the fossil level ahead of them.

Fourth Camp

Camp Four went down in two pairs. Pauline Rigby and I went down first to relieve Chris and Tony, who were intending to stay down either for six days or until they were relieved. David Monaghan and Sean Houlihan joined us the following day.

On our first day Pauline and I intended to bolt our way across to the continuation of the fossil passage that Chris and Tony had seen. However the route out of Echo Beach was so complicated that by the time we reached the end we were running short of light and time, so we left the bolting kit and the rope and returned to camp, where David and Sean were waiting for us.

On the second day all four of us went to the end of The Dead Sea Strolls and surveyed back to The Blowhole.

On the third day David and Sean went downstream, while Pauline and I returned to The Forbidden Zone to look for Barnes Loop The Loop and the interesting fork. We found this without problem, and started pushing. The left hand fork turned out to be blind, but the right fork continued as a narrow rift until it widened and the floor disappeared. Traversing easily along the right hand wall led to a narrow section and then another wide section. I continued ahead while Pauline looked at a climb up on the right. The passage in front of me continued with a solid floor for a while and then suddenly stopped at a black space. With some surprise I realised I was looking out onto Just Awesome and there was a rather large drop beneath me. Throwing a large rock I discovered this drop to be about 125 metres, so I retreated hastily to where I had left Pauline.

While I had been finding frightening black spaces, Pauline had discovered an obscure, but nice and easy, climb. This led up into a nice friendly black space which we soon realised was the downstream continuation of The Paris Metro leading back towards Just Awesome. In the Just Awesome direction was a traverse that we weren't prepared to attempt, so we decided to look in the upstream direction to make sure that it connected with the known Paris Metro. Despite a desperate traverse the connection was made quickly, and we departed to push at the far end of The Dead Sea Strolls.

The traverse over into the possible continuation of the fossil level looked rather intimidating, especially when the only foothold was a lump of rock, about 2m by 1m by 1m, that was just about hanging onto the wall and looked as though it would fall off at the slightest pressure. Instead we decided to rig the pitch down to the stream. This proved to be shorter than expected, only about 5m, but the stream at the bottom looked very promising. Climbing up a 2m cascade led to a nice flat section of stream with smooth scalloped walls about 2m apart. This looked easy to push, particularly for someone with an exposure suit, but we were short of time, so we left with the end wide open for next year's expedition to enjoy. We named the pitch Oregano Pitch on account of the strong smell issuing from the pot, previously used to carry salad dressing, containing the bolts that we had used.

Camp four proved to be the last real pushing camp, the other camps being used for photography, but one other discovery upstream was made. On the last photography camp Sean Houlihane and Sam Bunting surveyed the passage from The Forbidden Zone to the Just Awesome window and the next day Sean and David Monaghan climbed up into The Paris Metro and crossed the traverse that we had not attempted. This led into more large passage and another window over Just Awesome.

Dave Lacey

Description of Upstream Extensions¹

Upstream begins at a 5m climb at the back of the *Big Ledge* camp, into *The Forbidden Zone*. At the top a window on the left looks back down onto the stream, but the way on is to climb up over car-sized boulders, until a spiky flake on the right hand wall is reached. This slopes up at about sixty degrees and provides another easy 5m climb. At the top of this climb the route moves to the left hand wall, where a scramble between boulders and a solid wall leads to the stream.

Straight ahead are two climbable cascades, but the best way up is to double back where the water is met and thrutch up in the narrowest part of the rift. This leads to the bottom of a 45m handline up a three stage climb to the top of the cascades.

¹In all the formal cave descriptions in this report, side passages are indicated in a different typeface.

At this point the main route follows the water upstream through boulders into *The Paris Metro*, a large stream passage. Doubling back and following the rift back towards *The Big Ledge* leads, via *Barnes Loop* *The Loop*, to a fork. Straight on opens suddenly at a window where rocks fall for five seconds into *Just Awesome*. An easy but obscure climb goes up to large fossil passage which connects, after an exposed sloping ledge, with downstream end of *The Paris Metro*.

The Paris Metro continues as a wide stream passage, with the driest route changing sides several times, until *The Windy Sump* is reached. Slightly downstream of the sump a window at chest height on the right leads into dry rift but becomes too tight. Directly above the sump, a chain of footloops make the climb up through *The Blowhole* reasonably straightforward, although the strong draught makes a working electric light necessary. Once through *The Blowhole*, a rift on the right, similar to the one downstream of *The Windy Sump*, but carrying a small inlet, also becomes too tight.

Upstream from *The Blowhole* a sump pool is met after 15m. This has been plumbed to a depth of 5 m, and, although a traverse over the pool is probably possible, the safest route is a handline protected climb up through a squeeze into a chamber. Climbing up on the upstream side of this chamber leads to a loose 20m pitch down into a very large chamber, with the stream flowing through the middle. This is *Echo Beach*. Following the water downstream leads back to the sump pool; upstream ends at a low arch where complete immersion might lead to a continuation. The way on is to climb up on the left of the chamber, where a route down through boulders leads to a static pool, *The Dead Sea*. This deep pool is passed by a climb up the left hand wall and a bold step across at the narrowest part onto a broad ledge, worse on the way back, which comes down to meet the floor of a fossil streamway, . 15m along the passage there is pitch down to the stream.

Rather than descending to the stream, the way on is an exposed traverse around on the right into *The Dead Sea Strolls*, a continuation of the fossil level. This is 300m of passage on two levels: a fossil floor and a high level on boulders. The route is not always obvious. At the first inlet climb up on the right. At the second inlet climb down on the left and then traverse along the rift. Under a rock arch on the left the passage opens out again and the only remaining tricky bit is where the bouldery level suddenly ends. Circling round and down between the boulders is the least exposed way of regaining the solid floor. This ends with a 5m pitch, *Oregano Pitch*, at the bottom of which is a short series of disproportionately noisy cascades. Upstream two easy 2m climbs lead to wide stream. This is a temporary end to exploration.

Dave Lacey

Animal Collection

The expedition set out from Britain well equipped for the collection of cave-dwelling arthropods because we had planned that this should form a significant part of the expedition. A shortage of personnel meant, however, that the cave where animals had been spotted in 1991 was seldom visited, and the planned 'mark, release, recapture' experiments were thus not possible.

We did, however, make one interesting find, 700m underground in Pozu Jultayu. Tony Seddon and Chris Lloyd spotted a small (12mm) white milipede in a side passage at the Windy Sump, and Sean Houlihane and David Monaghan succeeded in relocating and capturing it. Milipedes have previously been seen in Pozu Jultayu, but this is the first one that has been captured for identification.

David Monaghan

As well as the discoveries made upstream of the Big Ledge, several other parts of Pozu Jultayu were investigated. Tony Seddon was the driving force behind the explorations at the

very downstream end of the cave, while Sean Houlihane and David Monaghan spent some time looking at IWWI streamway on the side of Heathrow.

Description of IWWI Streamway

In *Tony's Back Passage*, climb down into the inlet to the head of a pitch which can be rigged with a 25m rope from a good thread belay round a boulder low down on one side and a long wire to a spike high on the other. 2m down the rope is deviated with a very short tape round a convenient spike to land on a drippy ledge. A rebelay from a wire round a spike on the left below the ledge gives an acceptable hang down onto a second ledge. Facing the rope, the way on is to the left, where a crawl behind a boulder leads to a narrowing of the rift and a free-climbable route down to a small stream. Upstream can be followed tortuously for some 250m along a progressively narrowing passage with some fine flowstone, helictites and miniature cave pearls until the collapse of one wall makes the passage too tight. At the end there are several climbs, one of which leads to a draughting aven. Downstream the stream meanders for some 50m into a chamber with a 4m waterfall down into a pot. Traversing round the top of the pot on the left side leads to a climbable rift to the bottom. It is imperative to climb down the rift as early as possible, because it continues over the top of a 5m diameter circular shaft with a 3 second free drop that awaits exploration.

David Monaghan

Downstream 2/7

During the first camp in the cave in 1992, Paul Mann and Tony Seddon decided to investigate Tantalus, the partially descended pitch rigged in the course of the final camp of 1991. Equipped with 60m of rope, plus lots of rigging gear, they made the tip to the pit in around two hours from the camp on the Big Ledge. This was in sharp contrast to the twenty minute dash which was all the effort needed to reach the same spot from the earlier camp at Primula Point. Most pushing downstream which took place this year was done in the course of trips in excess of twelve hours duration.

The descent of the shaft took relatively little time as the bolts at its head had been placed in 1991. A further pair of deviations kept the rope clear of the rock for over 30m to where a buttress of frangible limestone necessitated a difficult bolt placement for a rebelay. A further deviation brought the cavers to a floor a further 30+ m below, in the spray of a small inlet which entered part way down the pitch.

This stream meandered away in a deepening narrow trench, but broad ledges above allowed easy progress around a few bends to a splashy 3m climb. Here the waterway widened appreciably, but the excitement was short-lived because, no more than 10m further on, the way closed down in a tiny inclined rift and pebbly sump. The rest of day was spent trying to locate a high level rift bypass, and involved some nervous traversing on fragile and often slimy ledges as lights faded and became choked with mud. All to no avail: although we could not state conclusively that the pit was blind, the hope that this was the key to the system beyond dwindled away. Tantalus it had been named, and tantalising it remained.

The next camp to pass this way was the third, a quiet trip with only two members, Chris Lloyd and Tony Seddon. The first day saw some interesting scrambling up the right hand side of Heathrow, locating two pitches above Tony's Back Passage, which presumably drop into that part of the cave. Moving onwards, three pitches were descended in the left hand side of Bod. Two were blind, and the third dropped onto a balcony roughly 20m above the Pimpernel Streamway, which provided exciting traversing and a nice view, but still no way on.

On the following day the hopeful explorers were in Choke Egbert, digging in the cobble-floored tube, but lack of tools prevented serious progress, despite the draught emerging through the rubble fill immediately ahead. Back up the cave, they investigated the boulder choke above the climb, Reach For the Skyhook, put up in 1991. The black space seen in that year was reached after some tense upward digging amid slumping rocks the size of TV sets and run-ins of gravel slurry. Unfortunately the continuation consisted of one body length before more of the same, and with no way of retreating rapidly from collapsing rubble it was deemed prudent to retire. Most interestingly a large dark space was noted across the streamway from the first climb into Postman Pat. Further investigation was resolved upon.

The final pair to undertake the long slog through the London Underground and Zasadka Way were Jonathan Cooper and Tony Seddon. These two stayed in the cave an extra day at the end of the camp which took the prize-winning picture of the Just Awesome chamber. With a full set of aid-climbing gear they cheated their way up a slimy 15m ramp at the top of Postman Pat, reaching the base of a high, inclined aven. This was free-climbed to its top, some 60m higher, in a series of easy, but exposed, climbs on dubious rock. Various leads were noted and investigated, and although most pinched out, there was one draughting crawl heading further into the cave which ended in a hammerable flake and calcite blockage. Fading lights prompted a retreat, but not before a further upward lead was noticed, along from the base of the original climb, as well as a drop, which seems to head back up the cave, but which the expedition geologist says may nevertheless be significant. Finally a bright handtorch left behind by the photographers was used to illuminate the hole noted across the stream during the earlier camp, confirming that it might be reached by an exercise in bolting.

In summary, this year's hard work downstream was not repaid as it might have been, but several leads were ticked off, and some encouraging new ones were discovered. The potential remains the same, only the commitment may need to be increased (again). If enough areas are investigated, the one which goes is bound to turn up.

Tony Seddon

8/11: Pozu Cabeza Julagua

Location

From the Ario Refugio, follow the path that crosses the flank of Cabeza Julagua, skirting round above the Jou de Ario. After a while, the col between Cabeza Julagua and Cabeza de las Campanas will be seen; on the far side of this col is a valley, split near the top by a spur: the cave entrance is located in the right hand side of this spur: a large hole in the cliff with a perched boulder above, bushes growing from the sides, a tarpaulin in the entrance and a faded 'SIE Ø 84' mark. Bearings: Cabeza Julagua 126°, Cabeza de las Campanas 300°, Cabeza Forma 227°.

Description

The 9m entrance pitch descends over boulders and lands on a boulder slope: this is somewhat unstable and should not be descended while other cavers are on the pitch below. At the bottom of the slope are two alternative descents on either side of a jammed boulder: the normal route is to the left, a 7m pitch. To the right at the bottom of the pitch is a chamber containing a snow plug: this is where the alternative descent route lands.

The way on is to the left where a short boulder slope leads to a 2m drop into a chamber — the normal place to wait while avoiding boulders knocked down from above. A typical

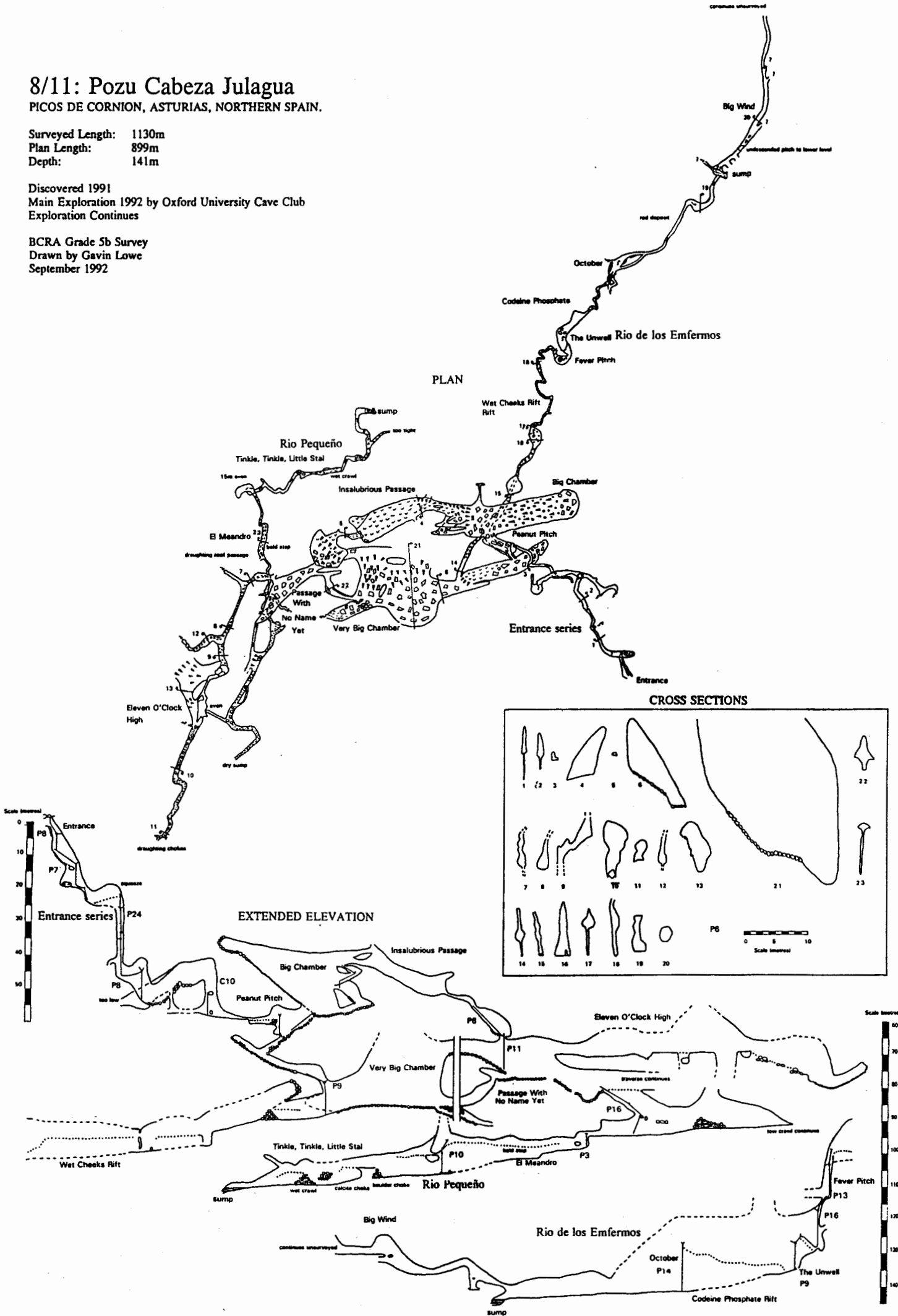
8/11: Pozu Cabeza Julagua

PICOS DE CORNION, ASTURIAS, NORTHERN SPAIN.

Surveyed Length: 1130m
 Plan Length: 899m
 Depth: 141m

Discovered 1991
 Main Exploration 1992 by Oxford University Cave Club
 Exploration Continues

BCRA Grade 5b Survey
 Drawn by Gavin Lowe
 September 1992



The way on is to the left where a short boulder slope leads to a 2m drop into a chamber — the normal place to wait while avoiding boulders knocked down from above. A typical Picos-style ascending rift passage leads to a slight squeeze — easily passed at roof level — to the top of the third pitch. The first 4m is constricted and is probably the hardest part of the cave. Descent is best made by clipping into the line with a cowstail and sliding down the rift, using your left hand on the ladder to control your descent. Where the rift bells out, the rope is tied off to a bolt so as to catch cavers who pop out of the tight part. The rift is best ascended by climbing the ladder to get into the tight part, and then using your left hand and foot on the ladder, your right hand on the rope, and your right foot on the rock, climbing the ladder one rung at a time. This can be made easier by removing gear and hauling it up on the ladder afterwards. Friends below can also help by providing foot holds for the right foot, and by guiding the left foot into the ladder.

From the bottom of the tight section, the pitch continues as a 21m abseil down the rift. At the bottom, a short traverse leads to a further 8m descent. Larger rift passage continues to a boulder pile at a three-way junction. To the right, a descending passage passes two inlets before ending at another inlet after 12m. To the left at the three-way junction is a small chamber from where a 5m climb down a rift lands on boulders. Looking back, one can see down into a chamber. Climbing down through boulders reaches a junction: the way on is back underneath the descent route, an easier 4m climb down into the chamber noted above. Alternatively, a hole in the other direction is the top of a 2m climb down to the floor of a passage, about 15m long and 3m wide. This ends in a steep slope, which can be climbed up for some way. At the base of the slope is a small crawl, starting about 1–2m up the wall, which becomes too tight, although there is an audible connection with the crawl to the top of *Peanut Pitch* (see below).

At the base of the climb is a chamber. Ahead closes down to a too-tight inlet, which communicates with a point reached by descending through boulders at the three-way junction. The way on is to double back under the climb down into the chamber, following the stream: ducking under a boulder reaches the start of a crawl. The crawl starts off over sand, before the streamway cuts down suddenly to form a T-shaped passage: following the top of the passage soon leads to the top of *Peanut Pitch*.

Five metres down the pitch is a large ledge with a convenient pool for filling generators; the bottom 2m is normally free climbed. At the bottom is an unstable boulder slope with a choice of two ways on: ascending the boulder slope leads to *Insalubrious Route*; doubling back under the pitch and crawling through a choke is the way to *Very Big Chamber*. The latter route is the normal one taken.

In the rigging guides which follow, " indicates that the rope from the previous pitch is continued for this section.

<i>Pitch</i>	<i>Rope</i>	<i>Belays</i>
Entrance pitch (P9)	40m	Tape round large perched boulder and tape over spike for Y-hang for descent down boulders; spike deviation for final hang.
Boulder slope	"	Thread belay.
Second pitch (P7)	"	Y-hang from traverse line on boulder slope and bolt: needs a second bolt.

Boulder slope and two metre climb	"	Thread belay.
Third pitch (C4, P21)	50m	Bolt and spike Y-hang, with ladder hung from spike for constricted section; 2 bolt Y-hang below constriction; spike deviation at -7m; spike deviation on opposite wall 2m lower.
Traverse	"	Large boss, high up.
Fourth pitch	"	2 spikes on opposite walls, right-hand one high up.
10m climb (bottom section)	8m	Two jammed boulders.
Peanut Pitch (P7)	10m	Two jammed boulders.

Insalubrious Route

From the bottom of *Peanut Pitch*, ascending the boulder slope (handline useful) leads into *The Big Chamber*. To the right a 30m long, 45° boulder slope ascends to a boulder choke. Opposite the point of entry, a narrow rift leads for 5m to a mud choke. To the left, 6m above the floor, is a balcony overlooking the chamber. The way on is below and slightly to the left of this balcony, where a crawl at floor level leads into a small chamber. Straight ahead leads to a choke after a few metres. Doubling back and climbing up boulders leads to the balcony. From here a 2m climb on the right leads to an ascending slope leading back away from the chamber, at the top of which is a further 3m climb up onto a calcite platform looking back down onto the chamber. A 1m diameter hole opens out into *Insalubrious Passage*.

Insalubrious Passage is 20m long and 8m wide and is the best-decorated part of the cave found to date, containing many calcite columns and with a moon milk floor. A route along the passage is taped off. High up to the right at the point of entry is a hole back into *The Big Chamber* above some formations; from the top of the formations an exposed traverse out over the wall of *Insalubrious* brings you to directly underneath an overhang with a hole above; reaching this would involve bolting.

A passage to the left of the taped route through *Insalubrious* drops down a steep slippery slope to a mud choke. At the end of *Insalubrious*, a climb on the right to a promising looking hole unfortunately doesn't go. The way on is a crawl to the left by a small cairn. This leads into a 1.5m diameter passage which opens out at the top of a chamber with a sloping wall, *Sloping Chamber*. A rope can be rigged down the wall. At the bottom, a hole under a gravity-defying perched boulder is the top of an 11m pitch landing in *Passage With No Name Yet*.

From the bottom of the pitch are a number of possible routes. Directly opposite the pitch, a chossy climb down leads into a short rift which opens out into *Very Big Chamber* (see below). Upslope from the bottom of the pitch leads after about 15m to a drop into *Very Big Chamber*. The most obvious way on is along the passage, slightly downslope. Half way along the passage a triangular gap in the right hand wall gives a 2m climb down to 3m of passage, leading to a 45° descending, body-sized tube to an undescended pitch head. Above this hole is the route to *Eleven O'Clock High* and *The Map Room* (see below).

Slightly further on is a smaller hole. This is about 5m deep and can be free climbed with the aid of a rope. A shingle slope leads down at 45° and round a bend to a junction. To the right the narrow passage seems to disappear under the boulder ruckle forming the floor of *Passage With No*

Name Yet, but was unexplored. To the left the passage continues for a short section to a wet two-way junction, with both routes narrow and remaining unexplored.

At the end of *Passage With No Name Yet*, the floor drops away and a descending traverse line can be followed to a bolt, from where a descent can be made to a boulder a few metres above the floor. This is *Rio Pequeño*.

Alternatively, from the end of *Passage With No Name Yet*, a traverse on the right hand wall follows a small abandoned watercourse out above the upstream section of *Rio Pequeño*, through a rock arch to a point where it is possible to climb down to the dry stream passage. Above connects to *Eleven O'Clock High*. A slightly exposed traverse then continues at this level to a short pitch into an inlet: this probably feeds *Rio Pequeño*, but was not descended.

Ascent of boulder slope into Big Chamber	10m	<i>Solid</i> boulder.
Scree slope in Big Chamber	30m	Large boulder.
Climbs up to Insalubrious Passage (C2, C2)	15m	Bolt; stal boss; spike; tied off to thread at bottom.
Pitch in Sloping Chamber (P8)	35m	2 thread belays; large boss.
Hanging Boulder Pitch (P11)	"	Bolt; spike deviation one metre down.
Descent to Rio Pequeño (P9)	25m	Thread backup; large spike for descending traverse; deviation off <i>solid</i> boulder; bolt rebelay for descent to jammed boulder; rebelay or deviation needed for final descent to downstream route.

Eleven O'Clock High and The Map Room

Just before the triangular hole in *Passage With No Name Yet*, a way through large boulders on the right leads to a 4m climb up through a hole in the floor of the passage to a junction: to the right leads to *Eleven O'Clock High*; to the left leads to *The Map Room*.

To the right a short, exposed traverse above *Passage With No Name Yet* is soon found leading into the start of a rift, *Eleven O'Clock High*. After 10m a junction is met: to the right an inlet leads to a pool with a too narrow climb above. The main passage continues to a second junction: a large inlet enters from the right; a climb leads to a larger, unexplored high level. The way on is up a 1.5m step into a large passage leading to a rift chamber. Ahead a pitch down has been visually connected to the dry, upstream section of *Rio Pequeño*. A steep slope to the right is unexplored. The way on from the rift chamber is a short traverse which leads to a step up into a rift passage, leading to another chamber. Ahead an undescended pitch again probably connects with upstream *Rio Pequeño*. To the right the passage continues up a steep slope into a high level connection with the previous chamber. An easy traverse passes a squeeze into an active inlet, leading to a rift with a boulder choked floor. The rift continues past formations, and a continuing traverse leads to a short climb down. Here the passage doubles back underneath and leads to a short pitch: this probably drops into *Rio Pequeño* near the sump.

The passage continues from the climb down, round a corner, up a climb, before eventually closing down at a draughting choke.

Alternatively, to the left from the top of the climb out of *Passage With No Name Yet*, a hading passage continues for about 15m to a high, hading, draughting rift, *The Map Room*. Here there are at least two leads. The first, a high, dry inlet reached after about 20m, contains detailed map-like wall markings, and continues past an oxbow. The second, reached after a further 15m, is a small active inlet entering from the right (with easily hammered route down) which goes upstream for about 25m to a junction. To the left is a climb to a hole. Ahead the passage continues for 20m to a muddier section, which remains unexplored. *The Map Room* and passages leading from it are unurveyed.

Rio Pequeño

From the boulder at the foot of the descent from *Passage With No Name Yet*, continuing straight ahead is the 'upstream' route along an abandoned stream passage. After 20m of scrambling passage, a junction is met. To the right, a short climb leads to a few metres of passage ending at an aven: this connects with *Eleven O'Clock High*. To the left at the junction, the passage becomes more meandering until the roof shelves down into what must once have been a sump. This is now choked with mud to within a few centimetres of the roof, although it appears that it could be dug open.

Alternatively, from the boulder at the descent from *Passage With No Name Yet*, doubling back and continuing down to the floor leads to the start of the 'downstream' route. After 8m is a small chamber with a picturesque false floor and a choice of two routes. To the right, under the false floor, is a passage taking a small stream; after about 2m this splits in two with both ways rapidly becoming too tight. To the left, a short crawl leads to the top of an annoying 3m pitch, called *The Hundred Metre Pitch* because of its distance below the surface rather than the length of rope that it needs. To the left from the top of the pitch, a muddy crawl has been forced to a junction, but no further.

At the foot of *The Hundred Metre Pitch*, the passage turns into a meandering rift, *El Meandro*. A stream enters from the right: this can be followed upstream along a small passage which lowers to a hand and knees crawl; the water emerges from a wet, flat-out crawl with well sculpted mud banks. This route was not fully pushed and may connect with the streamway at the bottom of *The Very Big Chamber*. Following the water downstream leads after only a couple of metres to a smaller inlet entering from the left: this can be followed upstream for 5-6 m to a pool at the foot of a 2.5m climb with a seemingly passable crawl at the top. Continuing along the main rift, a traverse leads to a bold step, best rigged with a rope to help cavers with short legs. Just before the bold step is a draughting roof tube which has not been pushed. Ahead, the easiest route is to traverse at roof level, until the rift opens into a chamber. Down a Picos-style ramp to the left is an inlet at the base of a tall aven. To the right, a slot is the top of a 10m pitch.

The pitch lands in a chamber where the base of the *El Meandro* rift enters from one side. Part way down the pitch, a large passage leads off, but this soon drops back into the downstream continuation. Downstream, the passage can be followed mostly at floor level until a boulder choke is reached. This can be bypassed by climbing up into a grotto, from where a calcite squeeze leads into a well decorated passage, with a trench in the floor which after 5m becomes wide enough to descend back to stream level. A short crawl in the streamway is passed to a short traverse. A decorated passage to the right soon becomes too tight, but may deserve further attention. Ahead, the passage becomes more meandering until suddenly a sump is met. About 50cm underwater, a tube continues, sloping downwards at about 45°. The passage near the sump draughts quite well, so there are hopes of finding a sump bypass.

Hundred Metre Pitch (P3) 5m Two bolts.

Bold step	5m	Two spikes
Second pitch in Rio Pequeño (P10)	15m	Two spikes; deviation at -3m.

Very Big Chamber Route

From the bottom of *Peanut Pitch*, a short, unstable boulder choke (care!) can be passed into larger passage. To the left, a short ascending passage leads to a choke: this can be passed to a further choke. To the right, the passage continues, along the bottom of a boulder slope, to a calcite platform at the top of a 10m pitch.

At the bottom of the pitch is a choice of routes. To the left, a large rift passage appears to choke, but has not been thoroughly investigated. Doubling back under the descent route leads to the start of *Rio de los Emfermos* (see below). To the right leads into *Very Big Chamber*. This is about 30m long and 20m wide, split into two by a rock arch, and has a boulder floor sloping down from right to left. At the far end, low down to the left, a climb down through unstable boulders emerges in a stream passage, 2–3m high and a metre wide. The upstream route is blocked with boulders; downstream gets steadily smaller until a wet crawl is reached with nice mud formations. This streamway is believed to be the main source of the water in *Rio Pequeño*. Straight ahead in *Very Big Chamber* a rift leads to a chossy climb up into *Passage With No Name Yet*. To the right a slope leads up to a drop down from *Passage With No Name Yet*.

Pitch into Very Big Chamber (P10)	20m	Spike backup; spike belay; spike deviations at -2m and -6m.
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Rio de los Emfermos

The route to *Rio de los Emfermos* starts as a walking sized rift passage. After 10m is a boulder choke; this can be bypassed by climbing up into the top of the rift (ladder useful). This leads out onto a boulder slope, descending to the left. Upslope leads to a hanging-death boulder choke. Downslope, a stream is encountered at the bottom of a very pleasant rift, *Wet Cheeks Rift*. After a while, chert is found on the walls. A few metres ahead is a bold step; this is best avoided by climbing up slightly from the chert to a much easier step. The rift continues until the passage opens out above a small chamber. Here it is necessary to descend to floor level; a short crawl in the stream is followed by a climb up to a ledge from where a window looks back over the chamber. This section would be much easier if a pitch were rigged from the top of the rift on the near side, penduling across the pit and in through the window.

Traversing along the rift, following a good draught, leads, via an oxbow, to the head of *Fever Pitch*. This is in two sections of 13m and 16m. From the ledge at the bottom of the first section a rift leads off; this can be followed for about 20m to the top of a drop which is believed to connect back into the main passage. A sizeable stream enters partway down the second section. At the bottom a climb up leads to the top of *The Unwell*, a 10m pitch. This lands in larger passage which runs under a large aven before closing down at the start of a traverse along *Codeine Phosphate Rift*. The rift meanders, with an awkward climb up on the second corner of an S-bend after 10m. A further 8m of traversing leads to the top of a 14m pitch, *October*.

At the base of the pitch the stream is met again. This can be followed upstream for a few metres via an oxbow and a pool, before the rift closes in. Downstream the passage continues as a pleasant, tall, meandering rift until suddenly the roof appears and a few metres further on a sump pool is reached. To the left an inlet enters: walking up this for a few metres, and

then climbing up and doubling back leads to a balcony looking back down on the sump pool: this is the start of a phreatic high level series, *Big Wind*.

Climb into Wet Cheeks Rift (C2)	-	Wire round chockstone; 4m ladder.
Bold step	-	Tape round spike to clip into.
Pitch above pit	15m	Bolts at top; pendule in through window and tie off to natural.
Fever Pitch (P13, P16)	55m	Bolts for traverse out; bolt belay for descent to ledge; thread belay; deviations at -2m and -4m.
Climb to top of Unwell (C4)	"	Two bolts.
The Unwell (P10)	"	Y-hang from bolts used for the climb to the pitch-head; deviation.
October (P14)	20m	Spike backup; 2 bolts for Y-hang; spike deviation at -8m.
Step across sump pool	-	Tape through thread to provide handhold.

Big Wind

The passage starts as a pleasant 2m diameter phreatic passage, carrying a strong draught. A couple of side passages on the right are passed: these appear to head off over the sump but have not been explored. After 10m is a hole in the floor. Climbing 4m down through the hole leads to a choice of three ways: straight ahead, a squeeze down between loose boulders to a crawl, which is probably too tight; behind, a short, small passage to a sandy choke; to the right, a sandy crawl upwards which may connect with one of the previous unexplored side passages. The way on is to climb up above the hole for 5m to a window (rope useful). The passage continues and becomes more vadose. An unexplored side passage is passed after 5m; after a further 20m the wind is followed up a climb to the left; the passage straight ahead remains unexplored. At a widening of the passage, two holes lead downwards towards the sound of water: the larger of these can be descended for about 15m to a chamber, although this appears to only contain an inlet rather than the main stream. A further 25m ahead, past yet more unexplored side passages, is the current limit of exploration, a small chamber with two passages leading off: the passage to the left seems to carry the wind, and appears to continue without obstacle.

Five metre climb	10m	Bolt.
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Gavin Lowe

Other Caves

Small Caves in the Ario Area.

Area 4

This is the area beyond the Cabeza Covu-Cabeza Julagua ridge.

5/4

Location: 40m SE of 7/4, bearing 294° to Cabeza Julagua in 10m diameter shakehole.

Description: Large shakehole with a wedged boulder (small rocks can be dislodged from behind this onto the pitch). 15m pitch lands on a snow-plug with a steeply sloping rift heading NW. A climb and ladder leads to more rift with a perched lump of snow. Pitch drops 20m. To NNE a small stream passage leads off but it is too small to follow. Digging here would be very time consuming. To NW three more shafts connect from above, presumably 7/4

7/4

Location: 295° to Cabeza Julagua, 100m SE (down valley) from 9/4 and 40m SW of the tree.

Description: Boulder slope with 2m free climb leads to a chamber with no way on.

9/4

Location: 30m from tree on bearing of 335°, in cleft. Marked SIE ⊙.

Description: At base of 18m entrance shaft two shafts lead off. The left hand shaft is about 25m deep and completely choked at the bottom. The right hand one is about 8m deep and partly climbable although a ladder is recommended. At the bottom of this shaft a passage zig zags for a short way before coming to an end. On the outside of the second left hand bend is a 4m climb leading to a hole that was not investigated.

10/4

Location: Over the ridge from 5/4, in a green depression, a small hole between boulders in the valley floor. Marked SIE ⊙.

Description: 3m climb down to the head of 15m pitch, rigged from thread, which lands on a snow plug. At the bottom a bolt gives a 6m descent, with squeeze past second snow plug, onto third snow plug. There might be a way on under the snow, but this is unlikely.

11/4

Location: Upslope from 10/4. Marked SIE 1 ⊗.

Description: Descends about 20m, free climbable with care, to a snow plug. Near the bottom a slot on L might be passable by a determined team with chisels, but doesn't look very promising.

15/4

Location: Same as the unnumbered shaft by 7/4 marked OUCC 88 ⊗.

Description: Descends 8m to a choke

27/4

Location: 5m to the right off the Culiembro path, 5 minutes over the Julagua ridge. Shaft with beech tree marked SIE ⊗. 10-15m to a snow plug.

Description: Undescended.

Area 5

This is the area around Ario and includes the lower slopes of Jultayu and the Valle Extremero down as far as 53/5.

27/5

Location: Opposite Xitu, 500m distant and out of sight of the refugio on the slopes of Gustuteru. 040° to top of hill above Xitu col, 075° to Cabeza del Covu (the hill with the shepherds huts on it), 234° to Gustuteru. Marked OUCC 80.

Description: Doesn't go at all. No sign of draughts mentioned in shaft bashing kit.

Unnumbered

Location: Possibly in area 9. Just up slope and 3m up valley from 27/5.

Description: Two blocked shafts. The larger of the two contains many butterworts (*Pinguicula grandiflora*). Between the two blocked shafts, and under the rock arch separating them, is a 3m drop, best negotiated via a short crawl from the larger shaft. Not descended, but worth a look.

Unnumbered

Location: Just below the top of Gustuteru, approach from the left side of Gustuteru and climb up the obvious gully near some sheep shelter caves. Bearings Jultayu 135°, Cabeza Llabria 095°, Cabeza del Covu 074°.

Description: Two shafts 20-40m deep, marked SIE ⊗. 'May be well worth a look'.

67/5

Location: 20m from 66/5 on a bearing of 300°. Narrow shaft in shakehole.

Description: A shaft into too-tight rift, dug open but no way on.

68/5

Location: 40m W of 67/5, at base of cliff.

Description: A shaft which chokes, with lots of perched boulders at the top .

69/5

Location: In the Valley of Dry Bones, a strongly draughting hole.

Description: Dug to 5m depth. A little unstable.

70/5

Location: In the green valley going W from the metal signpost on the Trea path towards the site of the 1992 flooded campsite. A bedding plane crawl on the S side of the valley at an obvious overhang.

Description: A T-shaped passage, a bedding plane with a rift in the floor. After 5m it becomes flat out and two moonmilk stalactites impede progress slightly. Beyond a wiggle and squeeze, *The Squish*, leads to a right hand bend which must be passed on one's right side. Ends in a knob of rock which needs hammering to reach an enlargement of the passage. Total length about 25m.

Area 7

This area is made up of the Jou del Jultayu, the bowl between Jultayu and Cuvicente and the slopes of Jultayu and Cuvicente.

43/7

Location: above 46/7 on left (true right) hand side of limestone.

Description: Apparently undescended.

44/7

Location: Small hole 5m S of 46/7.

Description: Undescended 5m climb.

45/7

Location: 30m WNW of 46/7.

Description: Rift with snow plug: possible way on past snow.

46/7

Location: W of Jultayu bowl.

Description: Snow plugged.

Area 9

This is the area around the 306m vertical shaft Tras la Jayada between areas 7 and 8.

16/9

Location: Just below Cuvicente-Verdelluenga ridge, 100m to col on bearing of 160°.

Description: Several 30m shafts with snow in them.

17/9

Location: To right (true left) of La Jayada is a green area with an obvious choked shakehole. Uphill to the right over a little ridge is a shallow valley with a snow plug. In the (true) right side of this wall is a cleft.

Description: Clamber down and double back under boulders. Not pushed further.

Area 10

This is the area on and beyond the Green Ridge of Jultayu and including the Valle Extremero below the 53/5 bowl.

17/10

Location: The cave is reached from a point on the green ridge of Jultayu, overlooking the Trea Valley, about 50m above the Trea path and 10m below a prominent lump of rock with a tree in the Trea side. Bearings: Cad la Requexada 92°, first bunch of trees in the Trea valley 120°.

Description: An exciting 50m abseil (two spike belays, bolt 8m down, bolt just above lip) with fine views of the gorge, lands on a vegetated ledge. The cave is at the top the ledge, and visible from the prow in the Trea valley. Chokes immediately.

Area 11

This is the area behind the ridge behind the Ario refugio, first investigated in 1991. It is marked as Jou de Ario on the maps.

13/11

Location: On the SE face of the first ridge, about 600m on a bearing of 310° from the peak of Cabeza Julagua.

Description: Small system with 5 separate entrances, 3 easily passable. Cleft in cliff can be entered into a rift about 10m long, access to entrance is easier at higher level and the rift widens out after about 2m, where small skylight entrance can be seen above. The rift closes down again, although it may be just passable, about 7m into cave, where daylight is visible beyond the constriction. This comes from one of two entrances in large cleft near ridge top, and this entrance gives access to the remaining 3m of rift beyond the above noted constriction. Doubling back under this entrance, the rift continues slightly to the right and can be followed for about 2m to an easy squeeze into a roomy chamber. The other entrance comes in above this squeeze. The chamber is about 5m long and slopes away from the entrance. Halfway down the right hand wall an inlet comes in along a tight sinuous rift through which the fifth entrance can be seen but is too tight. At the bottom of the chamber a rift leads off downwards but is choked after 4 metres by largish boulders. No way on or draught is apparent.

14/11

Location: In valley below 13/11, at bottom of shakehole.

Description: Two large bouldery rills with trickling water draining into a shakehole.

15/11

Location: On NW face of Cabeza Julagua 50m below summit, just above one of the paths leading to Ario. 2 Obvious entrances.

Description: Right hand entrance: short climb up, obviously blind.

Left hand entrance: entertaining traverse to reach sizeable entrance and vestibule about 4m long and 2m deep. Three ways off, all appear to be silted up. Bottom entrances seep water, and appear to be probably resurgence entrances rather than inlet entrances. Not speleologically exciting, but very obvious landmarks from valley below.

16/11

Location: On the NE side of Cabeza La Forma, 5m N of the path leading to the Ario Refugio and on top of a small spur. Cabeza La Forma 193°, Cabeza Julagua 101°, Cabeza Las Campanas 345°. Not marked.

Description: Obvious hole in the ground. Triangular vertical shaft about 2.5m by 1.5m at the top and 10m deep. A passage heads S at the bottom by a small snow plug several metres high.

17/11

Location: Not recorded

Description: Surface rift 0.75m by 5m at the top and approximately 4m deep with a bouldery floor. The rift is oriented N - S, and the floor slopes slightly to the S. At the bottom a tight squeeze leads E, passable if a few boulders were removed. Beyond the squeeze a narrow passage leads N. On the surface, 10m to the N, a tight vertical slit is almost certainly the end of the passage described above. 2 or 3 small holes in the rock lie along the line between the end of the passage and the second surface slit.

Area 12

This is the area on the slopes above Culiembro. It is of interest because it may be the site of a fossil resurgence of 2/7.

6/12

Location: On Culiembro path, obvious large entrance in cliff at altitude of around 800m.

Description: Might be 3/12. Chokes immediately.

7/12

Location: A bit below 6/12, another large entrance.

Description: This might be 3/12 too. An artificial staircase of rock leads up to a wooden fence across the entrance. Chokes immediately.

8/12

Location: Follow the higher of the two Culiembro paths from Oston. Where it starts zig-zagging down the valley go straight on at the first bend and follow a goat track round onto the rib. Climb down and continue traversing downwards to meet a narrow and exposed goat track round the edge of the rib to suddenly arrive at the cave.

Description: Chokes immediately.

9/12

Location: Same height as Oston, on a bearing of 50° to Oston.

Description: Triangular entrance 3m high, 1.5m wide. Chokes immediately.

10/12

Location: 40m above 9/12.

Description: Large entrance under overhang with fir tree in entrance. Large chamber with artificial walls at back. Crawl at back chokes immediately. Climb to right leads to second chamber with 10cm wide continuation.

Caves in other areas

C5 (or C4?)

Location: A bit below 16/9 on the left hand side of the valley in an area of karst with lots of blind shafts. Cuvicente 106°, second summit of Cuvicente 122°.

Description: 10-15m pitch with Gavin's sunglasses at the bottom.

E9

Location: Below the col between La Verdelluenga and its subsidiary peak.

Description: Two snow choked shafts join, with a number of possible leads both down and into the mountain. Larger shaft can be laddered down onto a rock bridge from which both shafts can be reached, although there is no way down the subsidiary shaft. A climb up from the bridge allows the larger shaft to be rigged, to a snow plug at the bottom.

F54

Location: 68° to top camp, about 50m above and 30m left (true right) of dolomite band, 150m left (true right) of F20 gully at highest comfortable traverse level.

Description: 10m pitch to snow from where 2 20m shafts continue.

G1

Location: Follow path to Los Lagos past the sheep folds. A bit further on, drop down to the lower path on L, this parallels the Los Lagos path for a while before heading for Las Fuentes.

Description: Obvious cow shelter full of cowsh' on R. Of interest due to the phytokarst in the back of the cave. Closes down, but does draught a bit.

G3

Location: From G1 continue along the Las Fuentes path. At T-junction turn L (R goes to Las Fuentes) over the lip of the bowl are three shafts.

Description: Middle shaft can be rigged from large boulder labelled OUCC G3 Ø. A 5m drop to a ledge is followed by a 20m drop to a snow plug. Down the snow plug a passage descends for 20m before ending in an aven. Part way down along the passage an alcove on the right contains a second aven. Back at the snow plug a 60° gravel slope can be ascended to a skylight and on the left a hairy climb to a balcony overlooking a shaft (which may be the original shaft).

G4

Location: To the left of the path going down Sod 4, at the bottom of the hill. Large entrance at the end of a blind valley.

Description: Climbing down a snowplug the passage divides. To the right a rift can be followed for up and along for 5m and then down 2m to the floor, the rift continues. To the left at the bottom of the snow plug continue down the snow to reach an unlocked wooden door to a small chamber containing racks for cheese. At the of the chamber a passage ascends with more racks. The passage seems to close down.

G5

Location: 60m down valley from the cave above. Shaft labelled SIE 84 ⊗.

Description: Stones rattle down for 4-6 seconds.

David Monaghan

Top Camp Campaign

For the first time since 1989 the Jorcada Blanca area was revisited in earnest, seeking and providing evidence that its caving potential has barely been scratched yet, that serious shaft bashing there can be undertaken from Ario despite the long walk up and back down, but serious caving cannot and will require re-establishing the old Top Camp.

Shortage of people meant that only two day trips took place; shortage of time (we tried to be back at Ario by nightfall and, well, there were the usual 'early' Oxford starts) limited what could be done each time. Attention therefore focused on entrances F44-F49 (logged in 1989) all of which are situated below and NW-NE of Pozu los Perdices at 5-10 minutes' walk from the Top Camp site. The fault controlling much of F20 is visible at the surface in this area as a set of mildly ramified parallel mineral veins, cut and offset occasionally by younger faults. Snow levels were comparable to 1989: little snow at the surface; snow-plugs and snow-piles in cave entrances sometimes larger, sometimes smaller than 3 years ago.

See the 1989 Expedition Report¹, the 1991 1:1000 Map² and the 1991/1992 Shaft Bashing Kit³ for cave locations. All pitches mentioned in the following were rigged from obvious naturals.

¹D. Horsley, S.G. Roberts, J. Arthur and R. Taylor (Eds.), *Oxford University Cave Club Juaracao Expedition Final Report*, Oxford University Cave Club, 1989.

²D. Horsley, U. Mead and M. Mead (Eds.), *Proc. Oxford Univ. Cave Club*, 13, 1991

³G. Lowe, *Total Area Shaft Bashing Guide*, Oxford University Cave Club Internal Publication, 1992

F44

Description: The doline was laddered from the N corner giving a 1m climb and 4m pitch onto snow (2m above floor of doline). Rock arch in E wall of doline leads to chamber in iron ore vein with daylight seeping in through roof boulders; all possible routes lead upward and choke. Rift in SE corner of doline on S by E trend passes underneath skylit aven and leads to a drop after a few metres. A 2m pitch lands on top of second snow pile in 5m by 8m chamber with bedding plane roof. The gap between snow and wall was sounded to at least 4m on the left side; this may or may not be a plugged shaft. Descending the snow pile to the right gains a depth of 10m below lip of doline with two ways on: a crawl to the right past fossil aragonite 'popcorn' and some stal ascends back to daylight under snow in the SW corner of the doline, while straight ahead, despite the draught, a narrow descending rift with a snow floor remains unentered due to lack of oversuits.

F45

Description: Snowed out - rather higher than in 1989; apparently completely blocked at the moment and not descended this summer.

Would provide, however, a virtually inexhaustible water supply (haul up snow in tackle bags) as well as a perfectly sheep-proof fridge. By using up snow, a future expedition could well re-open the snowplug on its W side, where it had a blow-hole in 1989.

F46

Description: Undescended due to lack of time, this contained less snow than in 1989 and needs a closer look. Take care; entrance is at bottom of steep loose surface rift and large 'holds' tend to come off.

F47

Description: Snow-floored chamber at W side of bottom of doline was entered by rigging a 7m pitch through its skylight, and left by ascending a tricky 2m climb to floor of doline and 1m and 3m climbs up out of same. Snow is resting on either ledges or floor 1.5m lower and remains a dubious affair. Descending 2 badly supported snow "tongues" and a large chockstone in obvious rift down dip (N) leads to 30cm high bedding plane descending further to an estimated 10m drop but obstructed by large floor flake and roof stal. Impassable without hammering.

F48

Description: At present snow levels, The *Vestibule*, an 11m by 6m chamber on an E-W fault with three large skylights, is still accessible by a 1m climb from the entrance doline, keeping to the right of the boulders. God knows what the snow is resting on (not on much on the W side). Aided by a rope hung down from a 4th small rift skylight W of the largest one, a large rift leading SW from the W wall of the *Vestibule* was entered after kicking down the most precariously perched part of the snow; this could be free-climbed (5m climb to snow floor 2m above real floor) but a rope is useful to avoid the snow. At bottom, looking back offers interesting views of VW sized holes 'supporting' much of the snow in the *Vestibule*, while walking forward eventually gains a decent floor in a tall 2-3m wide by 5m chamber. Ascend boulder slope to the left to enter continuation of rift 50-80 cm wide after right hand bend, with chockstones at various levels. This was followed at floor level to where a well-developed pair of ramps betrayed the original flow direction (inward), shortly before the floor drops out of sight down a (probably short) shaft, and (from the chocks) at an obvious traverse level to where this bells out above same shaft and was seen to continue

beyond to what looked like a T junction into a fault-controlled passage. There is a good strong outward draught.

According to a single compass reading, the fault at the T-junction could again be the E-W one seen in the Vestibule, W of the entrance; this would place the junction more or less below F49.

F49

Description: This boulder dig was left alone for the time being (it ought to connect into F48 anyway). Would require 3-5 people, a pulley system and a few slings to be cleared.

Many further entrances await investigation (F23-24, 27, 31, 43; 3/6; to mention some more likely ones) or re-investigation (F40). A large part of area F remains entirely unvisited (most of the higher slopes of the Punta Gregoriana and Pico de la Jorcada ridges, as well as Los Llombes, the slopes N and NW of Top Camp descending towards the Vega de Aliseda).

Gerhard Niklasch

A Small Study of the Diet Underground...

A typical caver made a record of all the food that he ate while he was on an underground camping trip for four days. Unfortunately it was not possible to weigh accurately all the foods eaten, so the following results are rather approximate. The study also included the day that the caver went underground, and, for comparison, a day of his normal diet in Britain

In general the diet while camping underground consisted of breakfast and supper, with almost perpetual snacking on peanuts, chocolate, tinned fruit and biscuits in between. Liberal quantities of margarine were added to any meal in which they did not seem out of place.

The meals were made up as follows:

Going to underground camp

Breakfast of 2 eggs, one half loaf of bread, jam.

Snacks of biscuits, chocolate, peanuts, Itona high protein biscuits, Primula cheese, cup-a-soups.

Dinner of a soya protein reconstituted meal, pasta, mashed potato, tinned vegetables, tinned peaches, tea.

Underground camp days

Breakfast of porridge with syrup, peanut butter, dried fruit, margarine, tea.

Snacks and dinner as on the day travelling to camp.

A typical day in Britain

Breakfast of muesli with milk, tea.

Snack of a rock bun and tea.

Lunch of marmite sandwiches, apple and squash.

Dinner of, for example, vegetable moussaka and salad.

It will be noticed that the diet excludes meat, this is because a vocal minority of the expedition are, for various sensible reasons, vegetarian. Those who do wish to eat meat can buy a beautifully grilled steak sandwich, typically containing 6oz of meat and oozing with juices and garlic, from the local bar. Experience has shown, however, that for reasons of simplicity and hygiene it is sensible to leave meat out of the expedition catering arrangements, although the occasional tin of fish has been known to reach the underground camp.

The diet of a typical caver while in Spain and in Britain

Activity	Energy	Protein	Calcium	Iron	Vitamins						
					A	C	D	Thiamin	Riboflavin	Niacin	
Going to Camp											
RDA	3350 kCal	84g	500mg	10mg	750 μ g	30mg	10 μ g	1.3mg	1.6mg	18mg	
% RDA achieved	109	86	264	150	93	141	30	76	94	126	
alternative breakfast	122	88	309	176	177	148	35	103	120	136	
Underground day											
RDA	6140 kCal	96g	500mg	10mg	750 μ g	30mg	10 μ g	1.3mg	1.6mg	18mg	
%RDA achieved	100	138	340	247	234	450	28	173	247	327	
British Diet			500mg								
RDA	3350 kCal	84g	269	10mg	750 μ g	30mg	10 μ	1.3mg	1.6mg	18mg	
%RDA achieved	100	116	143	143	468	199	100	223	160	238	

Cheese is generally expensive and often riddled with (cheese tasting) maggots and therefore rarely eaten. In Spain the most common source of complete protein is eggs.

The results are shown in the table, with recommended daily amounts determined by figures from the World Health Organisation and as described in *Manual of Nutrition*¹. Important factors to the caver are the provision of enough energy, and this must be derived from fats and carbohydrates in sufficient quantity to prevent the use of protein as a form of energy because this is needed to build muscle. An analysis of the energy provided shows that this requirement is met by the diet underground. The calorific needs of the caver shown in the table are provided by the protein, fats and carbohydrates eaten during the days recorded. Protein is used as a source of energy if necessary, but given that body fat decreases markedly during the expedition it appears that the use of body fat allows the protein to go to muscle building. By the end of expedition (average of 8 weeks) the situation appears to have reached a stable state with new muscle having been built and most protein becoming energy.

The vegetarian diet of the expedition does mean, however, that it is important to ensure that a full complement of amino acids is provided. Again, analysis of the sources of protein in the diet shows very little imbalance with, for example, peanuts and biscuits and chocolate bars being eaten at one time. The expedition pressure cooks all its beans, which means that more of their proteins can be absorbed during digestion. Sufficient calcium, iron, and vitamins are provided by the diet. Camps of four days are unlikely to cause a problem with regard to vitamin D intake, any lack of sunlight being made up for by copious quantities of margarine. The only change proposed is an alternative breakfast for the day travelling to underground camp of porridge followed by the remains of last night's stew and rice or pasta: this provides more calories and a better balance of proteins and vitamins.

The diet in Britain is also seen to be sufficient, which is not surprising considering that the subject has been living on it quite happily for the last three years. Within the club, and on expeditions, there is no obvious difference in the fitness of those who do and do not eat meat, and in fact it is probably true that the fittest cavers in the club are ovo-lacto vegetarian.

Joan Arthur

Communications

Radios

This year OUCC decided to use CB radios on our expedition. The expedition is split between a base camp accessible by road, and a higher camp, Ario, about 2 hours walk up the mountain. We decided that radio communication would help to improve the organisation of the expedition, mainly by making it possible for those at Ario to radio down to Base before people started walking up in the morning, and to control the flow of essential supplies. They also proved very useful when people were unable to keep to a pre-arranged plan, because instead of having a caving trip delayed while cavers at Ario waited for someone to arrive from Base, they could be warned by Base and could make other arrangements.

The equipment we were using consisted of two Team TRX404 radios. These are European CEPT specification, rather than the original UK CB standard, which means that they are legal both in the UK and in Europe. Most countries in Europe have arrangements whereby a UK licence allows you to operate abroad, however Spain is one of the exceptions, and we had to obtain a Spanish licence for each radio. One radio was mounted either in the minibus with a centre loaded aerial on a magmount, or in the main tent, using two 10m

¹D. Buss and J. Robertson, *Manual of Nutrition*, 8th edition, HMSO, London, 1976

lengths of cable from the van for power and the aerial. The other radio, for use at Ario, was mounted inside a steel box to protect it from cavers. This was powered from a separate 12V 6Ah sealed lead-acid cell with three 4.5V flat-packs built into the ammo box for emergency use, although we found that the emergency batteries were used in preference to carrying the heavy lead acid one around. We intended using a large 'base-station' type aerial at Ario, on the end of a 7m pole, but for portable use we also had a small helical aerial, as used on hand-held radios. The battery was charged from a solar panel which produced 180mA in full sunlight.

The distance between the two camps is about 5 km, and almost line-of-sight. Base Camp is beside a lake in a bowl, the main obstruction between it and Ario being a steep 200m high hill some 400m from the camp. The Ario campsite is on the far side of a ridge, 500m from and 30m below, the ridge. Whilst carrying the radio up to Ario I managed occasional communication with Base Camp which improved steadily as I climbed higher, and dropped off very rapidly after passing the ridge, as expected. At both camps we suffered from interference from other CB users, some as far away as Germany, and even one in the UK. The amount varied throughout the day, but a noticeable drop in interference was noticed when the mist came down.

The big aerial we had planned to use at Ario proved to be almost useless. After failing to make contact from the camp we moved the aerial closer to the ridge. Eventually we managed to get a very broken and almost unintelligible signal. When we moved closer to the ridge, we lost this signal altogether. Getting tired of carrying the aerial about, we left it guyed down overnight. The following day we found it lying on the ground with two broken poles and a broken guy rope. We had to resort to using the portable aerial, and walking to the top of the ridge when we wanted to use the radio. This limited us to calling from Ario to Base only. This actually was not too much of a problem because most of the important messages would be from Ario anyway, e.g. rescue callouts, 'Send some people up the hill to go caving', and 'Go and buy some bread, we've run out!'. To this end, the radio at Base was left on continuously and we tried to make regular calls from Ario every morning to see if there were any messages.

We found that the quality of reception at both camps was heavily dependent on the position of the van at Base. The van was never in line of sight of Ario, because the view was blocked by the large hill mentioned above. However, moving the van 5m *towards* the line of sight made the difference between a garbled message and a clear signal.

In spite of the problems with the aerial, we found the radios very useful. There were a couple of times when we were able to avoid having to put the schedule back by a day when people couldn't go caving, and we also found them worthwhile for passing messages regarding supplies of food and caving gear at Ario. A further improvement in the system would be a third, portable, radio to use for rescue call-outs to 2/7, especially in misty weather, to let the advance rescue team talk to people at Ario.

Walkie-Talkies

This year Martin Hicks, a highly accomplished cave photographer, came on the expedition with the main aim of taking a successful photograph of Just Awesome, the huge chamber at the bottom of Pozu Jultayu. To coordinate the discharge of flash guns in different parts of the chamber he took four CB Walkie-Talkies (bought from Tandy) on his photography trip. The radios worked successfully underground, but he found that although the four were nominally on the same channel, they only worked as two separate pairs underground. We can only assume that this is due to the pairs being at slightly different frequencies, and a loss in signal strength caused by the surrounding rock and water.

The walkie talkies were to the standard UK specification, and not compatible with the system we were using on the surface, so it was not possible to use them to extend our surface communication network. In fact we found that the performance of the walkie talkies on the surface was very disappointing, and we would not recommend them for serious use.

Phones

This year we were fortunate to be loaned some Mitchie-phones by Nigel Lovell. We had been hoping to investigate the possibility of providing a reliable communications link between the underground camp on the Big Ledge in Pozu Jultayu and the surface. The reasoning behind this was mainly that with good telecommunications the time taken to get rescuers to the underground camp could be cut from 10 hours to 3, vital in the event of an accident. It would also be useful for more mundane communication between the camping team and the surface ('Where exactly was that 5 second drop?' and 'Send Tony down with a 200m rope!').

The phones we were lent are high impedance earth return types. They require a single wire between the instruments, and an earth connection, usually provided through the person holding the instrument. Any number of instruments can be connected to the system, but they will eventually increase the signal drain and the volume will drop. Devices of this type have been tested to a range of 4km. The limitations on the range are the resistance of the cable and of the earth return path, and current leakage from the cable to earth. We were loaned three instruments, one large, base station which ran off two 4.5v batteries with 'Call' and 'Push to Talk' buttons, and two hand-sized units, one with a rotary switch for 'Off', 'Receive', 'Talk' and 'Call', and one with just an on/off push switch and a 'Push to Talk' switch. The base station was the loudest unit, and of the hand held units, the second was much more sensitive, giving a louder signal even when not well earthed.

We had hoped to lay a cable from the entrance all the way to the Big Ledge, but we decided that we couldn't afford to buy any cable specifically for this so we used some cotton covered enamelled wire which we had been given. Although we had hoped to lay the cable while the cave was being rigged, the delay to the van meant that the cave was almost completely rigged by the time the wire reached Spain, and it was not until the third camping trip that we tried to lay the cable. We left Chris Lloyd at the entrance with the base station and started down the entrance pitches with a reel of cable. We had expected the pitches to be easy, with the rifts posing more problems, but it turned out to be surprisingly difficult to fix the wire far enough from the rope to avoid swinging into it, there was also a problem with the wire getting wrapped round the rope. If we had had a stronger wire which could have been dropped down pitches then this would not have been a problem. By the time we had reached the bottom of Seventh Heaven we were starting to realise how long it would take to run the cable all the way to Just Awesome, and then the cable broke somewhere above us. We gave up, and continued down to camp. Since the Just Awesome chamber is one of the worst places to try and communicate over any distance, we also tried running a cable from the camp on the Big Ledge down to the bottom of the Just Awesome pitch. At the bottom the air was full of spray, with water running down the cable, but we experienced no problems in talking to people at camp once we had attracted their attention. It was obvious that a call tone was essential to make people at the other end listen to the phone, and we also decided that a rotary switch that could be accidentally left in the 'Talk' position was not a very good idea.

Despite our lack of success at rigging a wire through the cave this year, we found that the phones were very effective, and we hope to be able to do the job better next year, maybe with a radio link at the entrance to relay signals back to Ario.

Sean Houlihane

Accounts

Income

Grants:

Oxford University Chest	£233.33
Oxford Society	£100.00
Special Projects Fund	£500.00
Sports Council	£300.00
Previous OU Expeditions	£200.00

From Extremero Expedition:

£1,333.33
£300.00

From Members:

Deposits	£4,580.48
Gear Order	£3,950.55
Travel	£1,520.00
Kitty	£1,159.43

£11,210.46

Other:

Insurance Claim	£340.00
Insurance Premium Refund	£211.16
Bank Interest	£17.75

Total Income:

£13,412.70

Expenditure

Gear:

Rope	£999.64
Rigging Gear	£522.68
Tacklebags	£188.80
Climbing Gear	£89.08
Carbide	£130.00
Sleeping Bag hire	£33.00
Personal Gear Order	£3,908.55
Radios	£136.18
Trailer	£750.00
Safety	£54.82
Misc	£627.84
Gear Order Administration	£71.72

£7,512.31

Travel:

Vehicle Insurance	£127.22
Ferry	£424.00
Tolls	£35.00
Fuel	£315.23
Repairs to van	£141.00
New Engine	£1,670.00
Van costs	£600.00

£3,312.45

Kitty:

Food purchased in UK	£222.63
Fuel in Spain	£66.21
Purchases in Spain	£897.51

£1,186.35

Photography:

Report:	£81.80
Science:	£185.06
Personal Insurance:	£20.90
Administration:	£1,023.00
Sponsorship Administration:	£110.66
	£44.66

Total Expenditure:

£13,477.19