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BENARAT 2005

An Anglo-Malaysian Expedition to Gunung Benarat,
Gunung Mulu National Park, Sarawak.



Moon Cave © Robbie Shone

Leaders: Dick Willis, Tim Allen, Andy Eavis
Editor: Dick Willis

We are greatly indebted to the following for their support and assistance:

The Sarawak State Secretary.
The Director of Forests, Sarawak.
The Staff of the National Parks and Wildlife Division, Dept of Forestry, Sarawak.

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In Mulu, we lose caves as well as find them.

This may sound like a ridiculous idea but in 2003 two members of the team, Matt Kirby and Richard Chambers, set out to relocate the entrance to Blackrock cave. Despite covering over 100km, traversing back and forth around the foot of G.Api, they failed; the entrance seemed to have disappeared. Their determination led to the pair being nick-named 'The Pointless Team' as their companions watched them set off into the forest, day after day, on what appeared to be a pointless task.

Nonetheless, it was Richard and Matt who had the last laugh. On one of their pointless outings they smelt the distinctive odour of bat guano drifting down the mountainside from above – the peculiar breath of a Mulu cave at certain times of day, when the cool cave air flows out of the entrance and down to towards the alluvial plain below. Knowing what this indicated, they worked their way up the steep broken limestone to the entrance of what we now know as Whiterock Cave, so named from the obvious cliff above. Inside was a sizeable chamber and across it, and up a short climb, a draughting passage heading into the hillside. Another piece in Mulu's underground jigsaw had been revealed.

Within a few days, Whiterock was 3.7km long and clearly had a long way to go. It was an obvious objective for a future expedition and the returning team in 2005 headed straight for it... Their expectations were surpassed and their successes are described in this report.

Across the Melinau Gorge, high on the southern cliffs of Benarat, an obvious entrance overlooked Camp 5. Higher and further east than the huge entrance to Tiger Cave, to which Martin Farr and Tim Lyons had climbed in 1984, it presented a tantalising challenge. Mark Wright made it a personal objective for a brief visit in 2005 and set off with great enthusiasm to scale the cliffs, fully equipped with the latest Bosch drills, bandoliers of bolts and hangers. In the event he didn't get there, he had been beaten to it by local birds-nesters who had ab-seiled down from the edge of the forest, high above.

However, his day out was not in vain – as he worked his way up the rock, he passed a small alcove with an entrance. While he bolted on upwards, his companions gingerly passed a lurking snake to enter what became the start of a 6km journey into Moon Cave. Once again, a chance find took them off on a new journey into the heart of the mountain, a journey that remains unfinished, at least until the next time...

Setting the scene

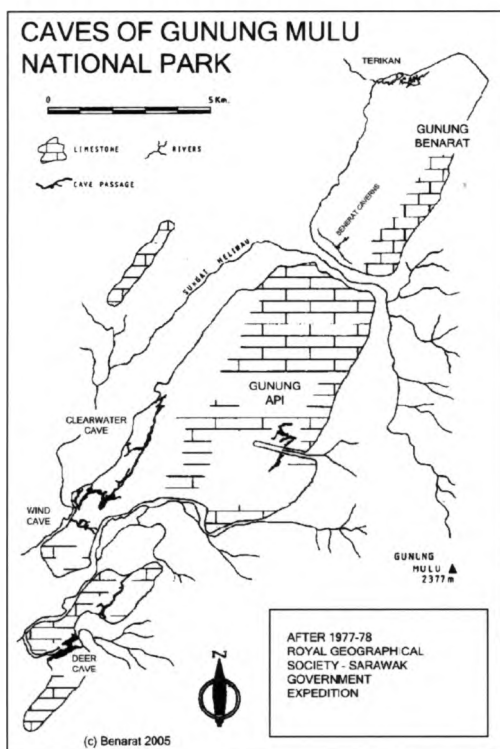
Dick Willis

The exploration of the caves of Mulu began in 1978 when a small group of British cavers was invited to join a Joint Sarawak-Royal Geographical Society expedition which, over a period of some 15 months, undertook a comprehensive scientific study of the Park and its rich, varied environments.

The presence of large caves in Mulu had been noted in 1961 by G.E. Wilford of the Malaysian Geological Survey. This reference was sufficient for the RGS to include a small team of cavers, Dave Brook, Mike Farnworth, Andy Eavis, Ben Lyon, & Tony Waltham who were also joined by RGS expedition geologist Martin Lavery. In the space of a few short weeks their finds electrified the caving community and established the reputation of Mulu as one of the world's greatest caving areas. By the end of their visit, the team had surveyed over 40km of vast passages, including opening up Clearwater—now the 10th longest cave in the

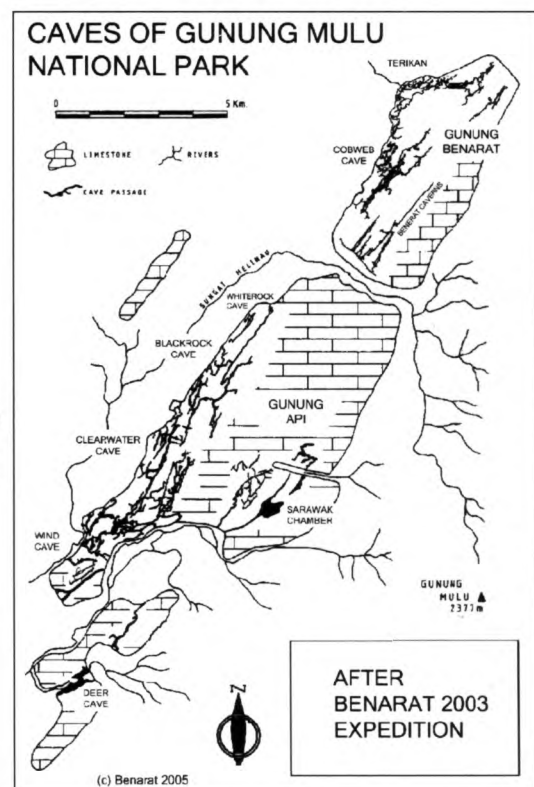
world and confirming Deer Cave as the world's biggest single passage.

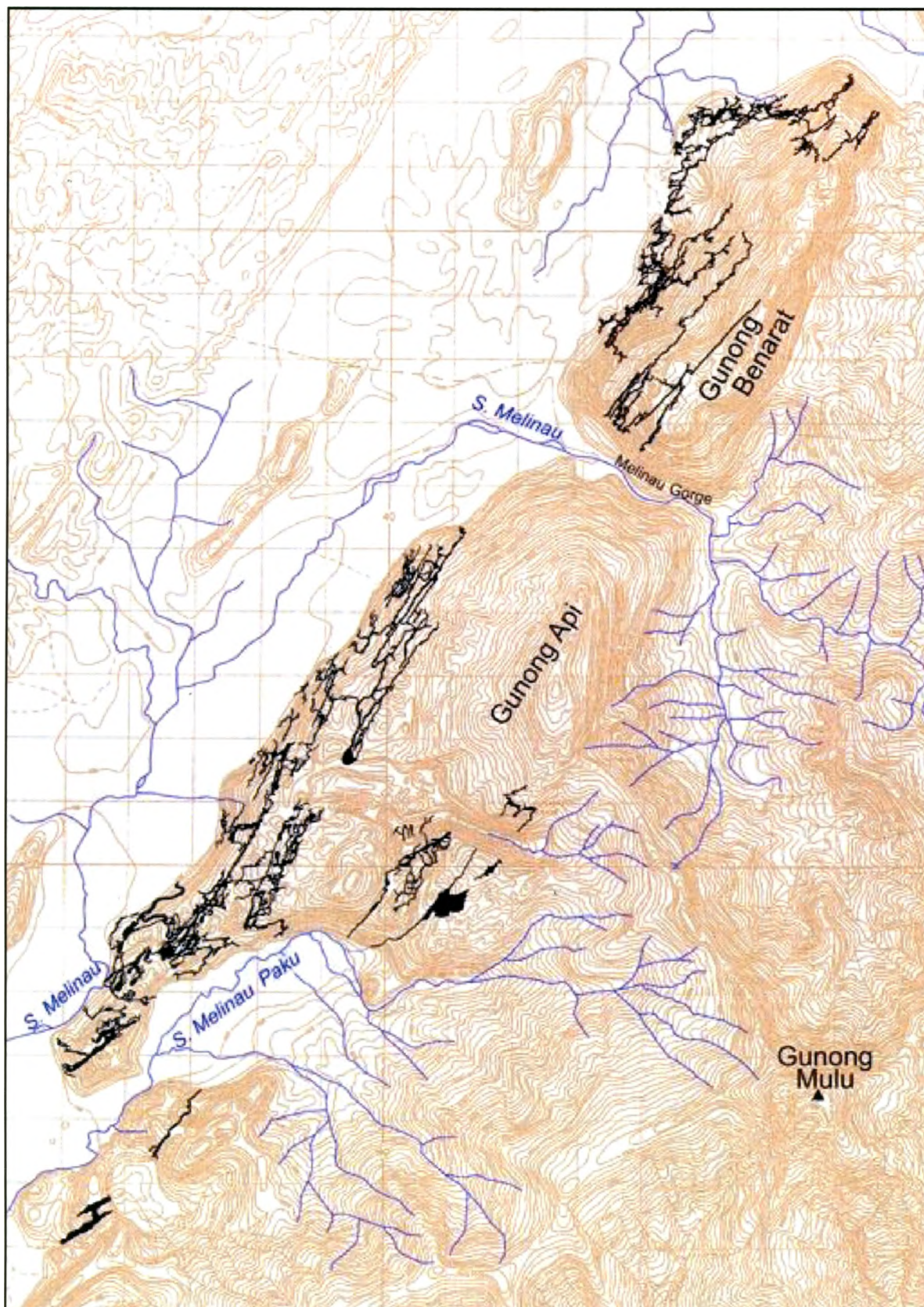
With successes like this it was inevitable that the cavers would want to return to continue their explorations. In 1980 a larger expedition was back in Mulu and, working closely with officers from the National Parks & Wildlife Department, they surveyed a further 38km of wonderful cave. Since then, a succession of expeditions has taken the field, each building upon the work of previous teams. Slowly, over the years, the black outlines of the caves have spread across the map of Mulu's limestone mountains.



The maps above and to the right demonstrate this success. They show the outlines of the known caves after the initial expedition in 1978 and at the start of the 2005 expedition. The map opposite is updated to show the caves after the 2005 expedition, superimposed on the topography of the Park.

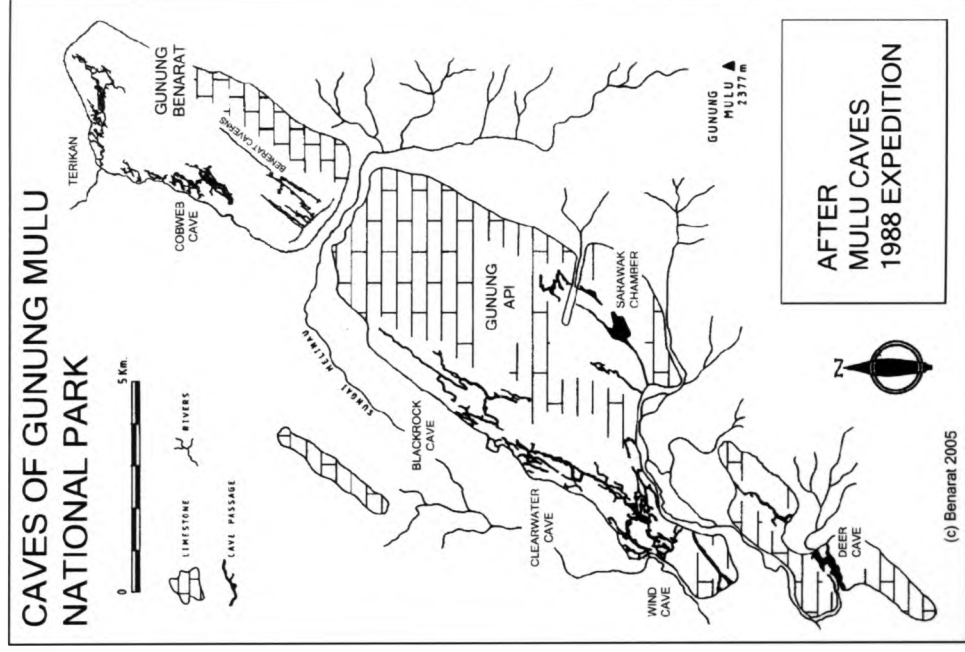
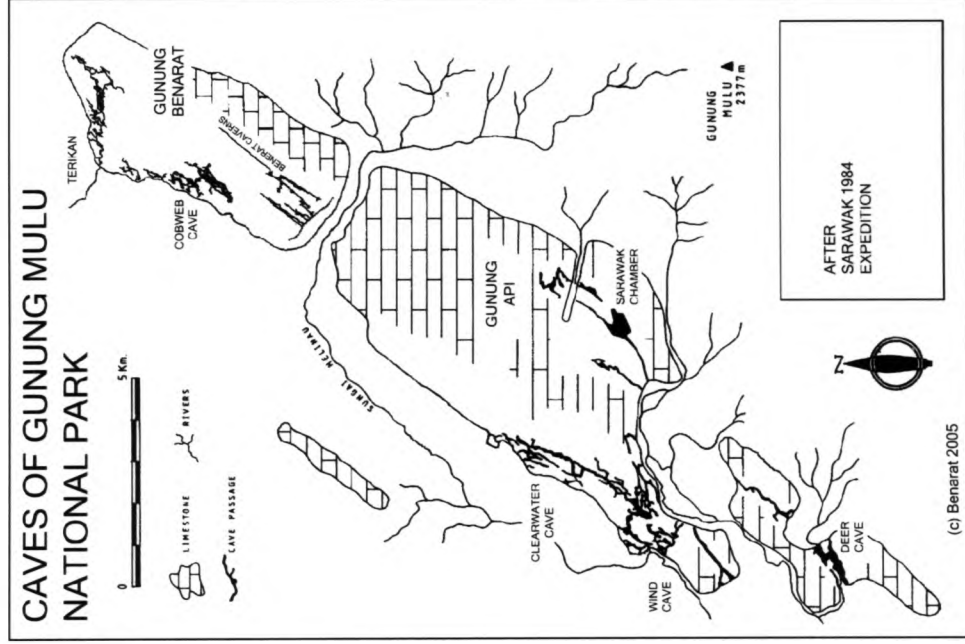
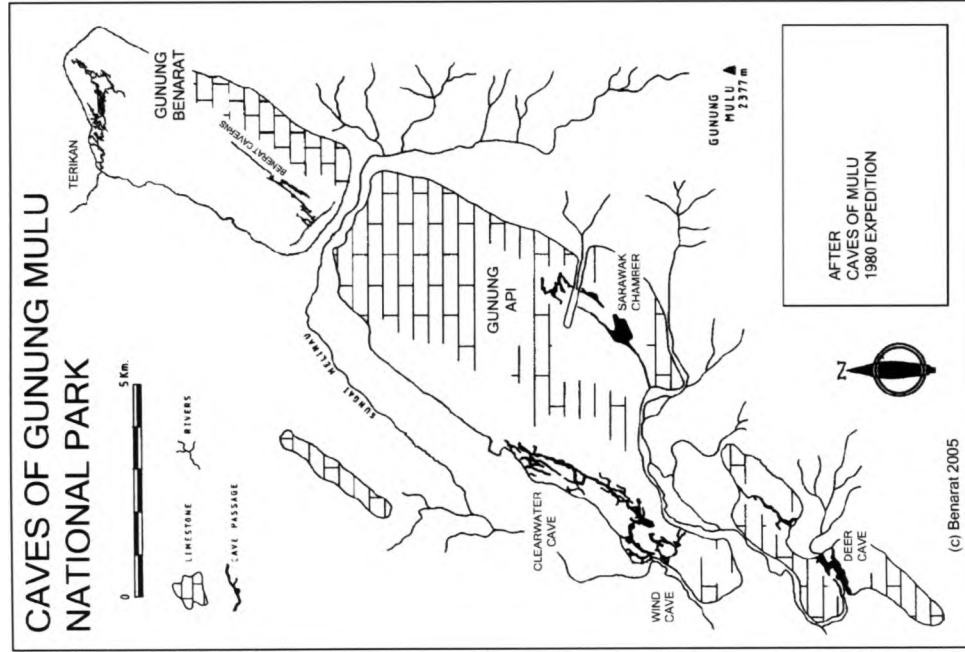
On the following pages are a series of maps showing the progression of cave exploration in Mulu from 1980 until 2000.



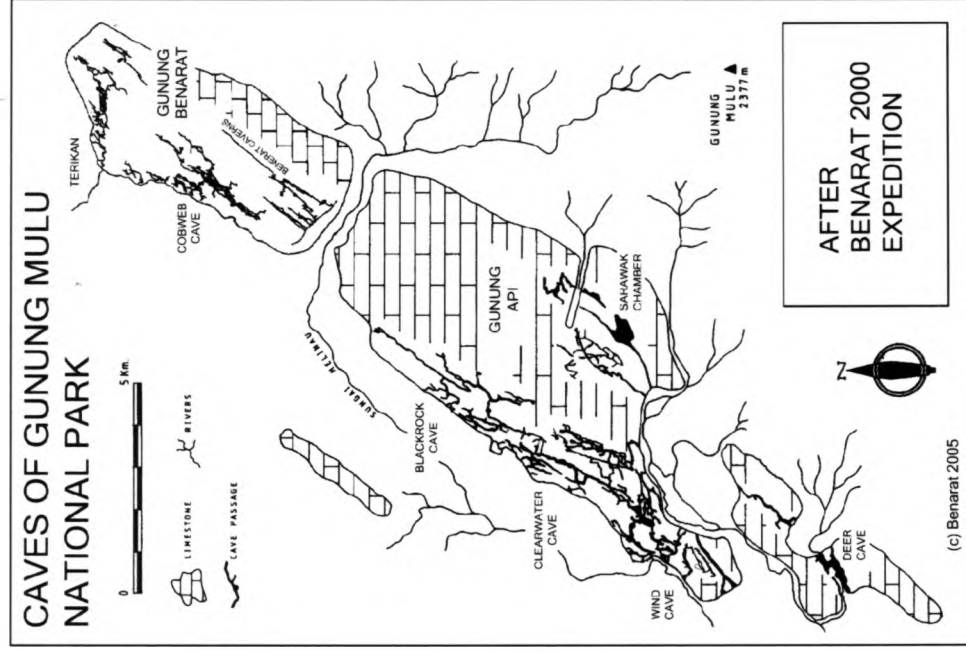
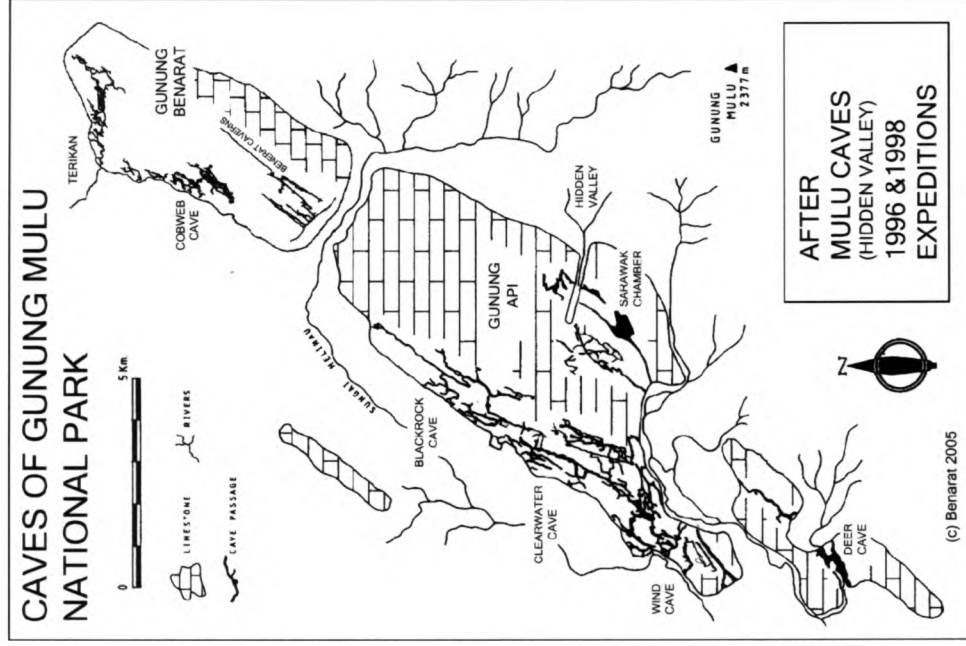
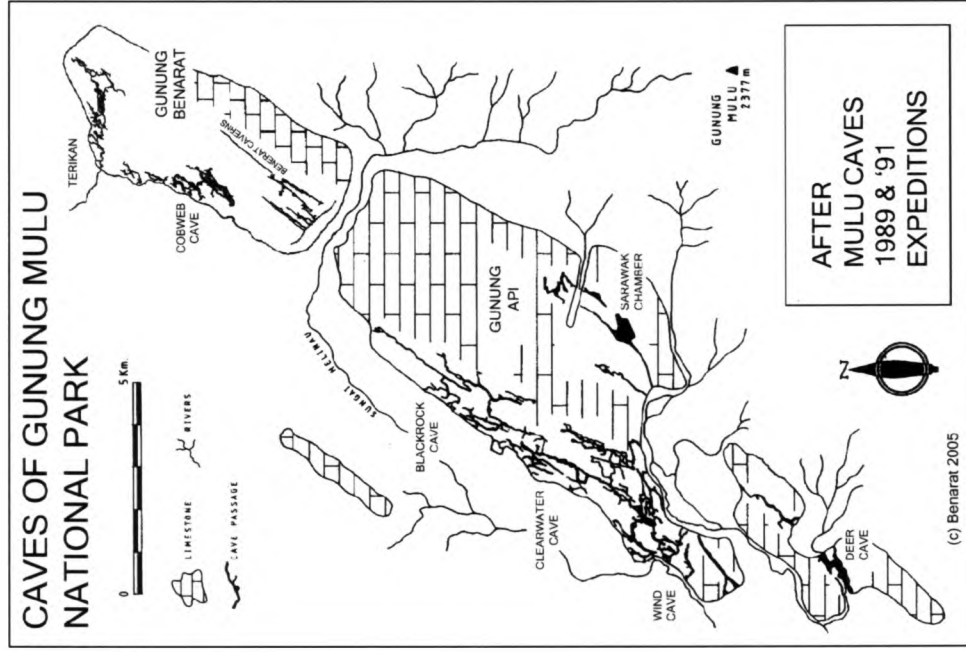


Mulu topography with caves superimposed.

Jerry Wooldridge and Tim Allen



Sequential maps showing extent of discoveries after each expedition



Sequential maps showing extent of discoveries after each expedition

The Caves of Gunung Api

English Name	Malay Name	RGS '78	Mulu '80	S'wak '84	Mulu '88	Mulu '89	Api '90
Clearwater Cave	<i>Gua Air Jernih</i>	26330.00	11255.00	14015.00	212.00	15048.50	922.00
Cleartop Cave	-			0.00			
Lady's Cave	-			0.00		323.80	
Cave of the Winds	<i>Gua Angin</i>	2300.00	4250.00	960.00	59.50		
Drunken Forest Cave	-			1300.00			
Blackrock Cave	<i>Gua Batu Hitam</i>				14123.20	6570.40	
Leopard Cave	<i>Gua Harimau Bintang</i>		3375.00				
Whiterock Cave	<i>Gua Batu Putih</i>						
Nilong's Cave	<i>Lubang Nilong</i>			0.00			
Lagang' Cave	<i>Lubang Lagang</i>			3900.00			
Water Polo Cave	-		0.00				
Solo	<i>Sendirian</i>	259.00					
Cobra Cave	<i>Lubang Lipah Sileh</i>			3400.00			
Good Luck Cave	<i>Lubang Nasib Bagus</i>		2900.00				
Prediction Cave	<i>Lubang Ramalan</i>	610.00					
Wonder Cave	<i>Gua Ajaib</i>	4770.00					
Imperial Cave	<i>Gua Imperial</i>		705.00				
Birthday Cave	<i>Gua Harijadi</i>				200.00		
Noah's Cave	<i>Lubang Noah</i>				425.00		
Python Exit	-				80.00		
Racer Cave*						1072.70	3412.00
Metric Cave	<i>Gua Metric</i>					1085.30	
Snail Cave	<i>Gua Supit</i>			80.00			281.00
Ipoi's Cave	<i>Lubang Ipoi</i>						
Palm Cave	<i>Gua Sago</i>						
Damocles Cave	<i>Gua Damocles</i>						
No Name Cave	-						
Yellow Viper's Pit	-						
Arch Cave	<i>Gua Gerbang</i>						
Perseverance Cave	<i>Gua Ketabahan</i>						
Bridge Cave	<i>Gua Jambatan</i>						
Cloud Cave	<i>Gua Awan</i>						
Invader	-						
Streamway	-						
Tiger Back Cave	<i>Gua Harimau</i>						
Tiger Water Cave	<i>Gua Harimau</i>						
Highest Cave in Mulu	-						
Helicopter Cave	-						
Western Front Cave	-						
Moonmilk Cave	<i>Gua Bulan Susa</i>						
Expedition Totals (Api)		34269.00	22485.00	23655.00	15099.70	24100.70	4615.00
Clearwater System Total		26330.00	37585.00	51600.00	59381.50	74753.80	76975.80
Cobra System Total		0.00	0.00	3400.00	3400.00	3400.00	3400.00
Gunung Api Total		34269.00	56754.00	80409.00	95508.70	119609.40	124224.40

* formerly known as Simon's Cave

Api '91	Mulu '91	1992	Recce '93	Api '94	Mulu '96	Mulu '98	B'rat '03	B'rat '05	Total Lengths
	2837.80		893.10	160.90		1476.40			73150.70
									0.00
									323.80
	133.70			85.00					7788.20
									1300.00
	1352.60			174.30					22220.50
				344.10					3719.10
							3707.72	17261.21	20968.93
									0.00
									3900.00
									0.00
									259.00
									3400.00
									2900.00
					42.10				652.10
					200.00				4970.00
									705.00
									200.00
									425.00
									80.00
398.00	320.50	104.00	104.00						5411.20
									1085.30
									361.00
	233.80								233.80
163.00	686.50								849.50
					244.90				244.90
					70.00				70.00
					124.00				124.00
					980.50				980.50
					953.10	625.70			1578.80
					6053.30	3843.10			9896.40
					2192.50	17.40			2209.90
						618.60			618.60
						296.70			296.70
						1285.80			1285.80
						280.00			280.00
						30.00			30.00
						30.00			30.00
		115.00							115.00
561.00	5564.90	219.00	997.10	764.30	10860.40	8503.70	3707.72	17261.00	
76975.80	101993.50	101993.50	102886.60	107025.90	107025.90	108502.30	108502.30	129471.23	129471.23
3400.00	3400.00	3400.00	3400.00	3400.00	5592.50	15506.30	15506.30	15506.30	6 15506.30
124785.40	130350.30	130569.30	131566.40	132330.70	143191.10	151694.80	155402.52	172663.52	172663.73

The Caves of Gunung Benarat

English name	Malay name	RGS '78	Mulu 80	S'wak '84	Buda '97*	Buda 2000	Ben't 2000	Ben't 2003	Ben't 2005	Total
Moon Cave	Gua Bulan								6635	6635
Benarat Caverns	Lubang Benarat	1355	4870	2095						8320
Hurricane Hole	Lubang Taufan						372	1106		1478
Sakai's Cave	Lubang Sakai		1120	1525						2645
Tiger Cave	Gua Harimau			3800						3800
Cobweb Cave	Lubang Sarang Laba-Laba			15185			10747	4414		30346
Daud's Cave	Lubang Daud							349		349
Deception Cave	Lubang Tipu			1510						1510
Menagerie Cave	Lubang Kumpulan Binatang			1875						1875
Terikan Rising Cave	Gua Sungai Terikan	775						12532		13307
Terikan River Cave West	Gua Sungai Terikan Barat	2270							20	2290
Terikan River Cave East	Gua Sungai Terikan Timor	3840							40	3880
Blue Moonlight Bay Cave	Gua Teluk Cahaya Bulan Yang		9400					257	53	9710
Deliverance Cave*	Gua Pembebasan				3577	740				4317
Expedition totals (Benarat)		8240	15390	25990	3577	740	11119	18658	6748	
Benarat Caverns total		1355	4870	2095	0	0	372	1106	6635	16433
Terikan System total		6885	9400	3385	0	0	0	12789	113	32572
Gunung Benarat total		8240	15390	25990	3577	740	11119	18658	6748	90462

* Buda '97 & Buda '99/2000 were American expeditions.

The Climb up the Cliff

Mark Wright

The idea of climbing the Benarat cliff face opposite Camp 5 was first mooted during early October 2004. One of the constant attractions of the cliff for cavers, since Martin Farr and Tim Lyons made the ascent to Tiger Cave in 1984, has been the large hole visible to the right and at the same height as Tiger Cave, with a distinctive tree in the entrance. In early reports, this was estimated at being 200m above the base of the cliff, although 300m is probably closer. Using available photographs we outlined a route and, based on previous bolt routes in similar limestone carried out by Tim Allen and myself during the 1996 Hidden Valley expedition, we estimated that the climb should take no longer than 5 or 6 days. This became my personal objective for 2005.

Time for the ascent would be tight - due to other commitments I had only the first 2 weeks of the 2005 expedition to carry out the climb and part of this would be taken up with initial logistics and shopping for supplies: we would have our work cut out.

We had used Bosch cordless drills for all previous bolt climbs in Mulu and I approached Robert Bosch once again to see if they could help. A copy of the 'Giant Caves Of Borneo' and the 1996 and 1998 expedition reports were sent off to their marketing department, triggering very prompt telephone call from the company confirming that they would be in a position to help. To my surprise they offered us both a 24v and a new 36v GBH model, despite the fact that the 36v machine was not due to be introduced until after the expedition's return.

We were not short of ring hangers and bolts for the ascent, Lyon Equipment having generously given us a significant discount on the latest Petzl bolting accessories, and this left us only requiring around 300m of rope. The expedition already had a stock of 8mm and 10.5mm ropes but these were a bit too 'used' for such a major undertaking! I contacted Richard Chambers, of Activ Safety Systems Ltd., and after making a few calls he had soon obtained the donation of 10 x 40m x 9mm low stretch Edelrid ropes.

My first sight of the cliff from the helicopter was breathtaking. We flew very close to the cliff to take some photographs and were surprised to see that the large tree covering the entrance was missing. Not only that, but a rope could clearly be seen tied off and hanging from the top of the cliff. It was clear that the bird nester's had refined their single rope techniques and entered the cave already, abseiling down from the forest above - an approach that will have necessitated cutting up the side of Benarat and across the hideous, sharp limestone on its flanks to reach the descent point.

The first day in the field saw Robbie Shone, Pete O'Neill and me blazing a trail to the base of the cliff. Pete led the way as he and Tim had made a previous ascent on the cliff in 2003 and he thought that he knew where we needed to start our route. From the base of the cliff the tree canopy was up to 50m above us, with only the odd place where the cliff could be seen through the trees. Finding the right start point could be a nightmare.

From Pete's recommended start point a relatively easy 15m free climb led to a 20m bolted section up a vertical wall of good rock, with just a few tree roots and loose boulders near the top slowing down progress. After using up my allocation of bolt hangers I returned to the base of the climb to let Robbie take over at the front. From my previous high point he continued for a further 25m of easy free-climbing and find a small cave entrance from which a substantial draught was blowing.

At this early stage we were not prepared for any caving and made our way back to Camp 5 in daylight. The journey, which had taken over 1½ hours on the way out, took only 20 minutes on return!

The following day the same team was back on the cliff. Pete and Robbie had decided to explore the new cave while I continued with the climb. Because of poor rock around the entrance I descended 15m and began climbing a new line up a large overhanging wall of good rock. Unfortunately, after a further 20m a massive overhanging section was encountered in which the rock consistency was very soft, which put a stop to the day's climbing. I returned to camp and a few hours later Pete and Robbie walked in, grinning, with news that they new cave was still going and that they had explored over 1km of passage. Robbie's account of the exploration of this system, Moon Cave, is given in the next section.

The following day saw a day off from climbing and the three of us headed back to Moon Cave to continue its exploration and add another 1km+ of new passage.

After a day's break from bolting, spent exploring in Moon, I headed back to my previous high point and tried without success to find a safe route over the overhang. At this point I was above the tree canopy and the views up and down the valley were spectacular. I called it a day, re-rigged some of the ropes to enable the others to see the views and headed back to camp. When Pete and Robbie returned from Moon that evening, they reported finding nesters' footprints in the cave. It was fairly obvious that the entry point for these people will have been via their rope access to the entrance high above and this convinced me to abandon the climb and divert my attention to exploring Moon Cave.

My last day in the field saw Robbie, Richard Gerrish and myself up to the high point for some photographs and then de-rigged the route above Moon Cave in darkness and back to camp for my last night.

The climb was carried out using the Bosch GBH 36v machine and, despite my initial fears of it being a little too heavy for prolonged 'above the head' reaches, it proved to be an excellent machine. A full charge would place over 60 bolts. This is a major improvement on all previous machines.

When Mark Wright told me that he intended to aid climb the south face of Gunung Benarat to reach a high, square shaped entrance some 250m up from the floor of the forest, I thought he was mad! What's the point, when there are so many other easier prospects to go at? However, for some odd reason, I wanted to help him and I'm really glad that I did!

After completing the first 30m of our climb, Mark handed over the bolting gear and said, "Right youth, your turn". At that point I wasn't sure what was in store for me; his progress had seemed fairly good but our objective was hidden on the cliff face high above and, in true Mulu style, it was raining. I left Mark and Pete O'Neil on the forest floor, huddled together under Pete's cagoule, and started my ascent. Mark had reached a ledge where the way on up a gully full of dry mud and roots looked steady and free-climbable. Using a reversed Petzl Shunt as my protection, I set off, threading a short sling around one of the roots. Up ahead I could see what looked like a potential cave entrance where rock pendants hung down from an overhanging roof - was it just an alcove, or could our luck be in already?

When I got there it was an entrance, only about 12m from Mark's final belay. Immediately optimistic, I could feel a cool breeze blowing out from a small black hole. However, without a head torch, all I could do was peer into the blackness and wonder what lay ahead. Encouraged by the draught I sat for a few minutes, cooling down. We had brought walkie-talkie radios to ensure communications with the lead climber at all times and I now used mine to tell Mark and Pete about my discovery.

Over the next few weeks, this cave yielded over six and a half kilometres of tremendous passage of all shapes and sizes, entertaining half the team for much of the expedition. The following account describes how it all unfolded, and how it ends... for now!

10/09/05: Pete and I left Mark continuing his courageous bolt climb up Benarat's south face in search of the inaccessible entrance some 200m above. Switching on our lights, we entered the small arched entrance I had found the day before. Immediately it became apparent that this cave had great potential - not only did it emit a very powerful draught but curled up above us lay a cave racer [snake] waiting for its lunch of bats or swiftlets to fly in. Cautiously Pete carefully slid underneath the snake and gingerly abseiled down a short 3m drop into the passage beyond. I passed our two tackle bags of gear down to him and then it was my turn anxiously to slide by the snake. Once our eyes had adjusted to the darkness we could see that this part of the cave was very well decorated, with long stalactites and crystal covered rocks, and another racer snake clung to the roof in the entrance chamber. As Pete and I surveyed our way into the 8m diameter dry fossil passage, I remembered that Mark was battling his way up the cliff face on some sketchy limestone in the full heat of the day. Ho ho!

The passage soon grew in size to an average cross-section of around 12m and we passed several large pits in the floor, each about 15m deep. In recognition of Pete's recent performance and a recent song by Oasis, this section of the cave was named 'The Importance of Being Idle'. After surveying about 200m along the strike, straight into the mountain, we stopped for a snack and our delicious moon cake prompted a name for the cave.

Very quickly the passage grew into a monster. Within 500m of the entrance, we were surveying along a tunnel where the walls had fallen away into the blackness and even our powerful LED head torches lacked a beam strong enough to pick up the walls. From here on,



Mark Wright drilling on the Benarat Cliffs

© Robbie Shone



Mark Brown at the entrance to Moon Cave.

© Robbie Shone



Matt Kirby on the ascent to Moon Cave

© Robbie Shone



Pete O'Neil on Moon Cave's 3m entrance pitch

© Robbie Shone

towards the first of several kilometres, we were travelling along a major conduit into G. Benarat – the best passage either of us had ever discovered. We passed inlets and another pit, the largest of them all, down which rocks would fall for several seconds, bouncing down a deep ramp, possibly into 'Sakai's Cave' somewhere below. We left the drop undescended. After covering 1km, we stopped surveying and went ahead briefly to make sure the passage continued and then made the steady plod back to Camp 5.

11/09/05: Not surprisingly Mark wanted to join us in Moon Cave; he had had little success on his climb. The three of us soon reached our final survey station, picked up our instruments and surveyed onwards in fantastic passage that stayed much the same as the previous day. On this occasion we were joined by Mark Brown and Andrew Atkinson who were celebrating Mark's 30th birthday by exploring some of the side passages off the main line in the first 1km. They were not as fortunate as us, only discovering short amounts of cave passage, but they did find time to photograph in the entrance series.

Up ahead at the sharp end, the three of us increased the total length of the cave by almost a thousand meters, leaving yet more open leads for the next trip. The cave passage seemed to be gathering speed the further it went into the mountain and there were times when we believed there was no way this major fossil route could possibly end other than by bursting out of the north end of Benarat! However, we were stopped by a large hole in the floor, about 30m deep, which would require a bolt traverse in order to continue along the main passage.

Up to this point the going had been very good but we had not quite surveyed the 1km that was our target for the day. So on our way back we checked out some of the side leads. One passage in particular led to a section of beautifully formed strike passage in which a single survey leg of c130m was possible! This lead is still wide open, with only the minor problem of a large hole in the floor blocking the way on.

12/09/05: Before leaving the UK, Pete had told us that every so often he would have to take time off in order to rest a knee problem. Today was one of those days and his place was taken by Andy and Robert Eavis; the formidable family combo had just returned from a reconnaissance trip around the north side of G. Benarat in search of Gawai's Cave. Andy's stay with the expedition was very short and he was keen to see the latest discovery before flying out.

The three of us watched Andrew and Mark prussic up the ropes to the entrance, aiming to traverse around the pit that had previously stopped us. When we finally caught them up, we found that Andrew had successfully traversed the hole and installed a fixed line but then realised he had forgotten to bring the tape measure! However, he had run ahead for c200m along wide-open passage to confirm that the system continued. While they were rigging, we had made ourselves busy surveying loops around the main passage of Moon Cave - one of the small phreatic tubes, 'Snake Bones' passage, burst out from a window into the main passage some 15m below. We closed this survey loop before moving on towards a big black chamber we had called 'Ganymede', after Jupiter's largest moon. Andy was the first to descend while Rob and I quickly unloaded our tackle bags ready to use as rope protectors for our subsequent ascents. Eventually, Andy yelled up that the rope was free and we were safe to follow him down. We joined him in a massive cavity – a huge collapse on the strike. Andy pointed out a small cairn and we later calculated that we had entered 'The Big Mistake' from the opposite side to its original discoverers. This chamber was first found in 1984 by Colin Boothroyd and Tim Fogg, during their exploration of Benarat Caverns. We had unwittingly connected the systems and made another major link within the mountain.

14/09/05: Pete O'Neill and I left Mark Wright bolting upward, still determined to make progress up the wall of Benarat. Despite our discoveries in Moon Cave, he remained focussed on reaching the high entrance that was his personal objective; clearly as mad as a hatter!

Mark and Andrew were back in the cave having chosen to examine a phreatic ramp close to the entrance, which they hoped would ascend to an upper strike passage and burst out onto the surface somewhere close to Mark Wright - much easier than bolting up the cliff!

In the meanwhile, Pete and I were briskly walking towards the traverse line that Andrew and Mark had rigged a couple of days before. The end of the cave was reached at 1130hrs and we clipped our cows' tails to the loop of rope and set off. Around the corner, after the traverse, the passage set off in almost a straight line through clean white limestone. The floor was a mixture of white limestone boulders and a red mud deposit, which as time went on, slowly became softer and softer, to a point where walking became tricky.

We quickly surveyed 500m of very pleasant cave until my distomat developed a fault. The liquid inside the screen had run, resulting in total failure of the unit. I had obviously knocked it against a rock as I climbed over boulders. "Damn, that's a shame", I said; Pete said something stronger! This part of the cave was consequently named 'Dead as a Disto'. Up ahead lay another huge black hole, which seemed to block the entire passage but this was not to be. Pete found a small ledge around the left hand wall, underneath a waterfall and over some sharp, spiky rock. This gained us access into a different passage leading up a mud ramp for 45m before descending into a 30m deep pit which remains undescended. We turned around and traversed back before taking a break to decide where to go from there. As the day was still young we chose to bolt the traverse line.

The passage we had been following for 2.5km looked to continue on the other side of the drop; so Pete set off around the left hand wall. He quickly bolted a short 5m-rope line to aid cavers crossing the wet ledge, before working around the large ledge over the far end. As Pete precariously moved along the ledge I fed out the rope and watched small rocks slide away from under his feet before disappearing into the blackness beneath him. I wondered how well the 8mm diameter rope would stand up to a dynamic load over a sharp lump of limestone...

When Pete was safely on the other side, I followed him round into the continuation of the passage. Sure enough, the passage was quickly back on the strike and heading into the mountain once again. Without any surveying equipment, Pete and I climbed down a rubble heap into an even larger section; both directions were open and we chose the right lead. The walls were 15m apart, separated by a dry silted floor with, to our astonishment, one set of footprints—evidence of bird nesters. At this point, with a huge passage heading off and every prospect of going straight through the mountain, we turned around and made our way back towards the entrance. Needless to say, we felt some disappointment that we were unable to survey any more passage because of the broken disto! Roughly 600m from the entrance, Pete and I caught up with Andrew and Mark. They had explored a few more side passages, adding a bit more complexity to the system.

On exit we found that Mark Wright had re-rigged the pitches down into the forest making a slower but safer route through the loose vegetation. As always, once the last man was down, the bottom rope was flung up around a tree to keep it out of harms way and safe from passers-by. Back at Camp 5, as Pete and I spent the evening describing what we had found but not surveyed and tins of Tiger beer were consumed, our caving team for the following day grew and grew in numbers...

15/09/05: Boosted by the promise of caverns measureless, we split into two groups. An ad-

vance team of four, Pete, Mark Wright, Park Guide Jeffery and me, left Camp Five followed later by Mark Brown, Andrew and Rob. The first group would begin to survey from our last known station, through the traverse and into the 'monster' passage while the others would follow on and catch us up.

The journey along the well-worn path was brisk and hassle free. Mark and Jeffery re-rigged the 8mm diameter traverse rope with something more substantial whilst Pete and I surveyed. Soon the second team caught us up and a main station was created on a giant rock in the 'monster' passage, later named as 'Benarat Mainline'. This survey station marked the point where we separated and two teams headed off into the unknown in opposite directions.

Following the bearing that had brought us halfway into Benarat, we continued with Pete taking the survey book, Mark working the disto and me reading the instruments. The passage size grew in places to an impressive 20m wide by 40m high and most of the initial legs were satisfyingly straight. As we explored further into the cave we noticed the walls developed a sparkle and shimmer on the surface due to a covering of selenite crystals, some of which stuck out from the walls by a good 200mm: one small alcove protected a vast array.

We pressed on, following a few footprints from the bird nester. We assumed that he had dropped down from a higher level which must have been accessed through the entrance that was Mark's climbing objective. As we surveyed we searched for a good camp site for future trips – we were now 2 hours from the entrance – and one good spot was discovered close to a huge junction. Here we opted for the left hand branch, which continued to offer flat floored, easy walking passage, leaving the right fork for another day.

After a short distance we were forced to drop a short 3m climb down, through a well-formed phreatic chute, and we rigged a hand line although it appeared that the nester had gone on without any form of assistance. The passage descended down a section where the rocks were coated with popcorn-like, crystal formations similar to those in the entrance series. Just as we had surveyed a kilometre of passage, Andrew, Mark and Robert caught up with us. Unfortunately for them, the passage they had set out to explore ended after only a short distance in a huge boulder choke where the rocks were well cemented with a fine layer of calcite. Despite a good draught, they had been unable to find a route through, which was very disappointing because they had been heading straight towards the eastern boundaries of Cobweb Cave, the system that dominates the western flank of Gunung Benarat.

We made our way out, while the other 3 took over at the sharp end. We arrived back at Camp Five around 2030 hrs, a journey out that took two and a half hours of steady progress and the other team showed up a couple of hours later. They had surveyed a further 150m, leaving the 'Mainline' satisfyingly wide open for another day. However, despite this promising prospect, we all took time away from Moon over the next week to concentrate on the explosion of leads in Whiterock.

24/09/05 – Despite the progress in Whiterock, Pete and I had always regarded Moon Cave as our own and went back in as soon as we could, together with Dave Nixon (aka 'Moose'). Our objective for this trip was to photograph the first 1.5km of passage. However, when we arrived back at the foot of the cliff we discovered that our rope had been stolen, almost certainly by nesters. Pete had experienced something like this during the Hidden Valley expeditions of 1996 & 1998, when ropes had been taken while the caving team had been underground – a situation that could easily have ended in disaster. I scrambled up the rutted gully where Mark Wright had originally began his climb in order to get a better view up the bare rock wall but there was no sign of any rope hanging down from the upper bolt belay. Mixed emotions ran through me and I wondered if the nesters had also stolen the rope inside the

cave. I felt very annoyed, finding it infuriating to believe that all our hard work had gone to waste! You wouldn't get this in Derbyshire!

We faced a choice - to re-climb Mark's 50m route up to the entrance or to leave the cave for another expedition and not take the risk of the ropes been stripped whilst we are underground. We returned to camp to debate the issue with the others. Inevitably the decision was made to make the climb again and, a couple of days later Tim Allen was back at the entrance. Mark having returned to the UK.

30/09/05: A photographic team of five, Pete, me, Richard Chambers, Matt Kirby & Roland (a Park Guide) eventually re-entered the welcoming blackness. Tim's re-ascent had been an epic: struggling to complete the 2nd pitch, he was not aware that Mark had traversed around to the right to escape the awkward tree roots straight up ahead. So Tim bravely hacked his way up through the vertical maze of tree roots on a long run-out above some distant bolt belays. Eventually he reached Mark's final 'Y- hang' on a ledge and was pleased to see that the next pitch up the dry gully was still rigged with our rope. Despite the exposure, he later wrote in the team's logbook, "What was all the fuss about then?" He also suggested that we should make a 'cheating stick' - a pole with a karabiner taped to the end so that could be clipped to the first belay, 2.5m above the first ledge - an innovative device to enable us to strip the lower rope after each visit and thus prevent ropes from being stolen again.

When the five of us turned up at the base of the cliff, Pete set about searching the forest floor for a suitable 3m long stick; the trick worked very well and didn't hold us up too much. Fortunately, the rope down the 3m-entrance pitch remained in place. This was Matt Kirby's first time underground inside G. Benarat despite his repeated trips to Mulu - he has spent too much time looking for entrances on G.Apil. Anyway, he was in for a treat.

The steady journey through Moon Cave ended at the 60m pitch down into the vast blackness of 'The Big Mistake'. We had a short rest for food and then began taking pictures, working our way back towards the cave entrance. It felt good to be back inside Moon Cave again and Pete and I spoke several times about a 'route through the hill' now being a possibility. However, we were increasingly aware of the few caving days left before our departure - had we left it too late to push the furthest limit of the Benarat Mainline or would luck play its part and reveal caverns measureless to man? Pete was still concerned about his injuries; whether or not he would have part in the cave's destiny would be down to his back and knees holding out.

Matt and Richard seemed to enjoy their opportunity to take a look at Moon Cave. The task was much more relaxed than that of jungle bashing for hours on end in a desperate attempt to rediscover cave entrances! To their amusement, I preferred to use them as photographic models because of their brightly coloured overalls and exaggerated poses. The current fashion for black running trousers and long-sleeved vests is not as good for photos as the traditional Mulu orange boiler suits.

The five of us burst out of the cave at around 1900hrs to be bowled over by a delightful sunset burning down over the mist-shrouded forest floor some way beneath us - the perfect end to a successful day. As the last man down, Pete de-rigged the lower section of ropes, pulling through so as not to leave any sign of our presence and thus committing future parties to using Tim's 'cheating stick' technique to reattach the ropes to the upper belay.

02/10/05: Pete O'Neill felt fit and free from any back or knee pain. Like me he was raring to go and push at the sharp end of the cave. Andrew, who wanted a break from installing survey data into the laptops, made up the 3rd member of the day's team. Once again I got the job of scrambling up the slope to the ledge. Pete found a suitable stick, taped a karabiner to

one end and I hauled it up and re-rigged the rope.

The cave now felt more like home than anywhere else in the last month or so. We now knew the route through the entrance series and beyond like the back of our hands. Our pace was brisk and the three of us knew that we were in for a long, hard day if we were to add significant distance to the overall length. At the same time we knew we had to be mindful of Pete's recurrent back and knee problems.

After more than two hours we finally reached survey station 44, our starting point. On this occasion Pete was in charge of the Disto, Andrew was reading the instruments and I had the notebook. Andrew, who had surveyed on the last trip to this point, led us through the short section of passage beyond the last cairn which was smaller than that of the previous tunnels. We were still following the nester's tracks even though, at this elevation, there are apparently no swifts. Andrew reached a point where the nester's footprints ended at a sheer drop down about 10m. Arrow marks on the walls suggested that the nester had simply climbed around the drop and Pete eventually found a route by climbing down a section of prickly 'popcorn' coated rocks and up the other side into the passage continuation; I rigged a hand line to help following parties.

At this point the cave grew in size; scattered all over the floor were very loose boulders, some coated with the now familiar popcorn formation. As the passage climbed up into blackness, we found it difficult not to dislodge some very loose rocks, sending them bouncing downwards. At the top of the slope we found ourselves looking up a series of avens - possibly the place where the bird nester had entered Moon Cave from the upper system. We moved on and shortly entered a large round chamber. From a large boulder near the centre our state-of-the-art LED head torches gave off just enough light for us to see the passage striking off on a similar bearing to the Benarat Mainline. Traversing around the western wall of the chamber we were off again, climbing up another boulder slope and trying to avoid a huge hole in the floor, which remains undescended. As I desperately tried to scribble down every little bit of detail we found ourselves skirting around the right hand side of a monster passage, its size indicated by the massive echo that followed every whoop of enthusiasm.

Eventually our path took us out from the vadose trench and up into the passage proper. I remember making out a perfectly sculptured, arched roof some 50m across... However, the left hand wall was hidden behind a huge pile of rocks, some the size of small caravans. This was by far the largest part of Moon Cave we had found and, standing in the middle of the slanting boulder slope, the roof looked to be some 30m away whilst the lowest point was around 20m further down, close to the right hand wall. We didn't investigate at low level; we just traversed through the passage, hoping we were following the route of the water that had carved its way through the mountain several hundred thousand years earlier.

Our judgment proved correct and after a couple hundred meters we found ourselves in big but more manageable surroundings and we pressed on. Looking at the survey notes, we saw that the passage had just passed a ninety-degree left hand bend, taking Moon Cave towards the northwest parts of Cobweb Cave, possibly towards the area known as 'Powder Mountain'.

Some of the crystal formations that coat the rocks in this part of Moon Cave were extremely beautiful. One particular structure resembled a perfect, white bonsai tree clinging to a boulder so delicate that it looked as though a mere breath of air would shatter it into a million pieces. We soon surveyed another two hundred meters of similar sized passage before building a cairn and then took a quick look at the way ahead. There were two exciting passages, possibly an oxbow, but big, wide open and all to play for... or at least so we thought!

As we made our way back through the cave to the entrance, we speculated on where the current end of Moon Cave lay in relation to Cobweb.

Due to the lack of water throughout the trip, the journey home proved wearisome and hard. At every tiny, flowing inlet we stopped and tried to get enough water for a drink. Those three hours proved a real test and we were glad to reach Camp Five, with its food, water and beer!

03/10/05: Hopes were high at Camp Five as we enjoyed a rest day, whilst Mark Brown and John Volanthen went into Moon to continue the push. Unfortunately, after only about 150m beyond our last survey station, the giant passage terminated in a massive boulder ramp with no obvious route through. Mark and John spent some time desperately attempting to find a way on but their efforts proved futile and they eventually retreated back to camp. On their dispirited arrival, we were all surprised and astonished: Pete and I simply couldn't believe it. We had felt sure that the passage could only get bigger and bigger. Sadly it was not the case – Mulu pulls these tricks - and the route through the hill now looked unlikely.

04/10/05: Pete and I were joined by Rich Gerrish, who had spent four consecutive weeks caving in Whiterock. We were convinced that Mark and John would have tried their best to find a way through the boulder obstruction and so we intended to look at the other large side passages within five hundred meters of the terminal blockage.

Unfortunately however, Pete's back had been causing him grief and although he had taken several strong painkillers, he was still in pain. His modest attempt at prussiking to the entrance left him with no question about the trip ahead and his decision to turn back was obvious but poignant; Rich and I continued regardless. I felt a little sad - Pete and I had discovered all the best parts of this marvellous cave and it was a great shame that he would not be able to continue. Nevertheless, we had a job to do and my feelings soon changed. Pete's back problems were replaced by thoughts of surveying into yet more glorious, large passage.

We set a record pace through the initial 3km before we stopped. For Rich, the difference between Moon and Whiterock was striking - Moon Cave seemed determined to run straight through the mountain whereas Whiterock is a complex multi-level system. The very end of Moon Cave certainly feels a lot further away from daylight than Whiterock, but only because it's formed in almost a straight line. We were delighted to take a rest break after spending an age trudging up a huge 60m high boulder ramp in search of open passage. This was the first of three leads lined up for us and we were keen to try and discover a route that took us back on the bearing that had brought us so far into Benarat. Rich climbed up into a high level passage only to discover quickly that we would need a rope in order to continue. He looked over a drop into an eyehole that was out of reach. We duly recorded this passage but didn't survey into it.

The next lead was a sizeable inlet, one of three passages off the large circular chamber. However, we believed that there was a strong chance this might be an oxbow, looping back round to another part of the 'Mainline' where a major lead veered off. However, our optimism was high and we began surveying from our marked station, the prominent boulder in the chamber. After only a couple of survey legs, we were walking along a beautifully decorated fossil passage in the steeply angled bedding. Large gour pools were completely pristine, glistening perfectly in the light from our head torches and we did our best to avoid marking the white flowstone floor as we walked. The passage rose up through large boulders, taking us onto a flowstone ramp with contoured ribs over which the water had once rushed. Unfortunately this turned out to be the other giant lead - we had proved our theory that the passage was simply an oxbow, albeit a very pretty one.

This marked the end of our day's exploration. We had concluded several leads but found nothing significant. As we made our way back out through the cave, we noticed that all the inlets had been transformed into raging torrents. Some of them totally blocked the path and we were forced to take a soaking. At the entrance, we found that the day's heavy rain had produced amazing clouds of moisture in every depression in the forest canopy as far as the eye could see; a beautiful and memorable sight. The forest was very wet and by the time we reached Camp Five we were covered with leeches.

06/10/05: The last trip to take place inside Moon was a serious photographic assault along the 'Benarat Mainline'. The day's team comprised of me, Andrew Atkinson, Martin Holroyd and Mark Brown. We retraced our footsteps through the cave to the ramp where Mark believed the 'bird nesters' had dropped down from the upper cave entrance. Earlier in the trip, while we were busy exploring the 'Mainline', I had asked Jeffery (the Park Guide) to run up this ramp and examine it for footprints. He had returned saying there was no apparent way on. So I was surprised to see that the ramp was wide open with a set of footprints wandering up the middle of the tube and I followed them.

Climbing up the ramp proved challenging and the thought of the return was a bit of a concern. However, drawn on by thoughts of open passages and climbs up to higher levels, I went onward, checking out the side passages as I went. The main ramp continued up to a junction where the route to the left went for about 50 meters to a huge hole overlooking a massive passage some way below. It's likely that this will lead down into the 'Mainline' passage somewhere further upstream from where the others were waiting and Mark later reported that he had heard the sound of rocks falling. Further up the phreatic tube I discovered conclusive evidence of other visitors in the form of several footprints. It looked as though a few guys had dropped down the ramp from up above, but only one had gone the whole way down into the main cave. At my furthest point I reached a junction where I could see up yet another ramp, gradually ascending into blackness. Dotted all over the floor were muddy footprints, leaving a trail for future expeditions to explore up into the higher levels.

Back with the others, we set up the first of many successful shots and worked our way back towards the entrance, stopping frequently to take pictures. As this was our last trip in Moon Cave, we wanted to be sure we hadn't missed anything. In addition, every time we crossed a traverse or hand line climb, we stripped the ropes and hanger plates. With a good supply of large bulbs and the benefit of instant review provided by our digital cameras, Andrew and I were able to get comprehensive coverage of the cave. As we left the system, the final pair pulled-through all the ropes, leaving the cliff-face clear of gear.

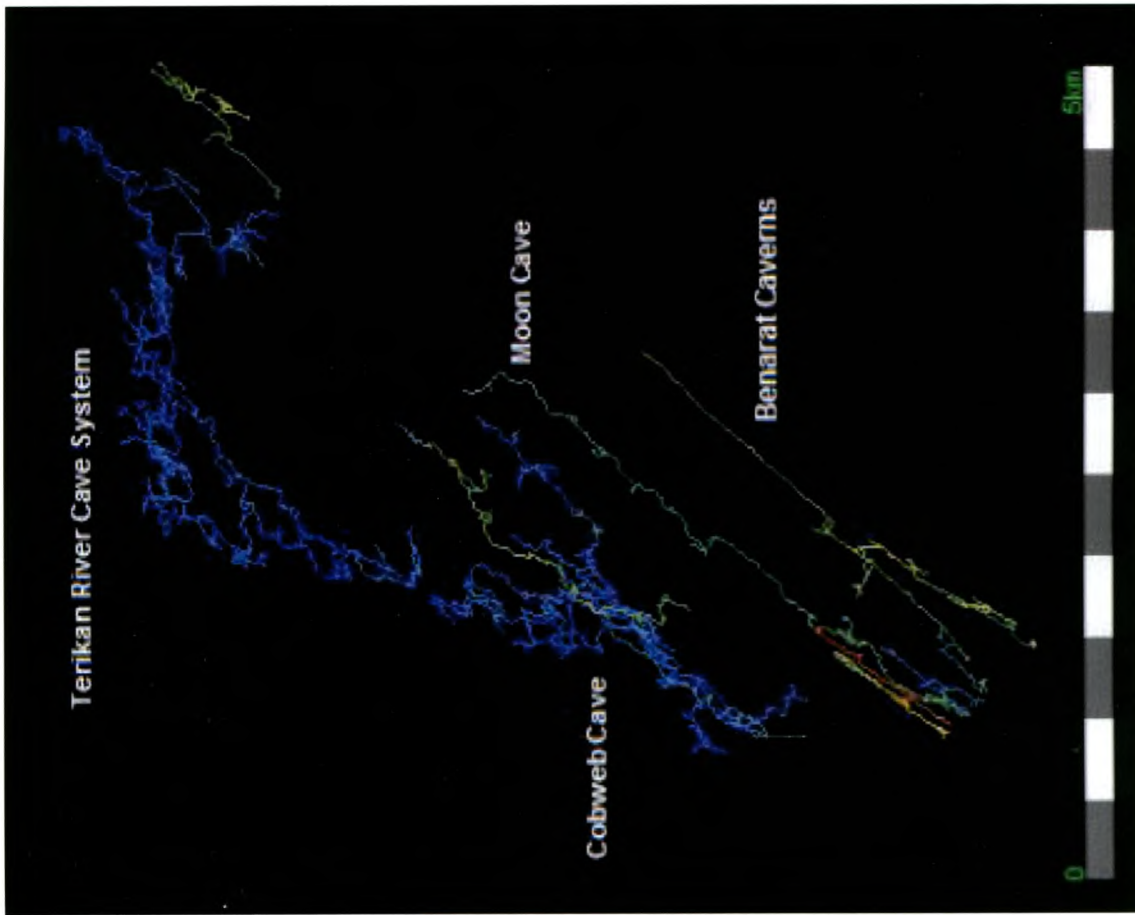
In the course of 260 man-hours spread over eleven days we had explored and surveyed a new 6.635km system. This included making the connection to Benarat Cavems, creating a combined system of 16.433km. At its far end, Moon Cave is a short distance away from the Terikan River Cave network whilst to the west lies the 30km of Cobweb Cave and the chances of a connection, producing a 45+km cave system, seem good. Whether or not it will be possible to pass around the boulder choke at the end of the 'Mainline' and create a route right through the mountain will have to be seen. There's still a lot to do!



Benarat Mainline, with open lead going off right. © Robbie Shone



Martin Holroyd and Mark Brown in Benarat Mainline © Robbie Shone



Major Caves of G. Benarat

2005



The Importance of Being Idle

© Robbie Shone



© Robbie Shone

Api Chamber

Whiterock Cave, G.Api

**Dave Nixon, Richard Chambers,
Rob Eavis, Tim Allen and Mark
Brown**

Introduction

Tim Allen

Whiterock Cave was first discovered by Matt Kirby and Richard Chambers in the final days of the 2003 expedition. Only two exploratory trips were possible at that time and Whiterock was made a number one priority for the returning team in 2005. By the end of 2005 21kms of passage had been surveyed, a huge chamber discovered, two connections made with Blackrock Cave (and therefore the Clearwater System), and many leads remained unexplored. The Clearwater System is now 130km long and 10th longest cave in the world. It was clear that Whiterock was the key to unlocking the northern end of Gunung Api and extending the Clearwater system all the way to the Melinau Gorge. In this report the explorers relate the story of exploration. This begins with a climb from the 2003 entrance series to enter 'the Ashes Series', the main route which terminates after 5kms in the enormous void of 'Api Chamber'. Following this 'the Northern Leads' describe a number of passages that lead from the Ashes Series and head north towards the Melinau Gorge, these are still going leads. The 'Upper Series' describes two further climbs into a level some 70m above the Ashes Series. 'Connections' describe the two different routes that link Whiterock Cave with Blackrock Cave and therefore the whole of the Clearwater system. Finally the 'Entrance Series' describes the extensions made to the 2003 discoveries below the breakthrough ramp.

The beginning

Dave Nixon

"If you like, how about you, me and Rich going to Whiterock?" These were Tim Allen's immortal words to me at the Camp 5 breakfast table. Instinctively I agreed, after all it seemed like a good idea, and for the next 4 weeks I never looked over my shoulder. However, I did spend some considerable time looking into my survey instruments!

Briefly, the exploration of Whiterock Cave began right at the end of the 2003 Mulu expedition. 3.7 km of fine cave were surveyed and a number of open leads were left - regrettable perhaps, but only for the departing few. In particular, a tantalising ramp had been noted rising up from Zebra passage and this suggested the potential for a higher level series; this was to be our first objective.

With Tim leading the way, Rich and I, two Mulu virgins, followed on behind, not quite knowing exactly what we had let ourselves in for. On the 2003 trip the lads had cut a trail to the entrance of Whiterock, having turned off the Head Hunters Trail at the 6km mark. All well and good, except that in the intervening time, someone had kindly replaced the markers with new ones, in a different place. Thanks to a cross between good judgement and a blind stab in the dark, this led us to turn east at a point 100-200m south of a solitary large bamboo clump, a point which didn't look very promising but we had faith and, as it turned out, we were blessed with good luck.

Following a bearing of 120°, progress was slow and the seemingly endless amounts of green were occasionally broken up by a stream or two. As well as being partly lost, things deteriorated when the heavens opened to give us a complete soaking, not that it mattered. Having spent the previous day flying past what I could only describe as "probably the largest single lump of limestone I've ever seen", rising dramatically out of the forest, I was getting a bit frustrated that I had spent four hours thrashing away through forest and was still unable to locate any part of it. Fear not: shortly after these thoughts passed through my head we encountered a lonesome fragment of the blessed Whiterock and were spurred on,

knowing that we were not simply going round in a big circle. Shortly afterwards the battle of the plains was over and Gunung Api loomed large in front of us as did the next challenge - to locate the entrance, no mean feat in itself.

Confident that we were too far south, we followed the contact in a northerly direction, passing a swallet and soon encountering an area which seemed vaguely familiar to our leader. Having reached a fairly prominent area of clean, white cliff which extended for about 40m, we began our ascent up the steep, sharp limestone immediately to the north. By this time it was fairly obvious that Tim knew exactly where he was and 'Lo and Behold' the entrance to Whiterock Cave was relocated: the game was on...

Having travelled fairly light, with the intention of getting to the entrance and spending only a small amount of time underground prior to our return to Camp 5, things were unravelling quite well. The last mission of the day was to locate a suitable camp site in the cave, preferably without going to any great difficulty to reach it. The entrance pitch was rigged and we progressed slowly along to the 'Bold Step' as our search for the camp continued.

We found a marginally suitable spot near the beginning of Zebra passage and seeing as we were nearly there anyway, we decided to go and have a look at the lead Tim had lined up for us on tomorrow's agenda. We made haste to the point where the first of two ramps head upwards on the eastern side of the passage following the prominent, steeply dipping beds that govern the development in this area. It didn't look that challenging and having led a largely UK domestic caving career so far, it underlined my thoughts that for expeditions the challenges lie in the logistics much more than the caving.

Without further ado we retraced our steps back to the entrance and stashed all our caving gear. Little did we know that we and our caving kit were destined to spend almost the entire expedition within the limits of Whiterock Cave! Triumphant, we returned to Camp five at 19:35 where I vowed never to wear wellies for a 10km forest walk ever again.

So it was that on September 10th, the first day's caving of the Benarat 2005 expedition, Rich Gerrish, Tim Allen and I started making preparations for an imminent camping trip into Whiterock. At a leisurely pace, this time we were loaded down with the necessary camping accoutrements and the odd, not quite so necessary 12 volt lead acid battery (thanks, Rich!). We reached what turned out to be our temporary campsite by mid evening and took stock of the situation while relaxing with a mug of soup and quite happy to be underground, away from all those biting things. After several days travelling and much planning we were ready for the exploration to begin and, rested we moved on to the base of the climb we had inspected yesterday.

Here we found the first bad news of the trip - at some stage over the last two years the 'bird nesters' had paid a visit to Whiterock Cave. The evidence was present at the foot of the climb where discarded batteries littered the floor. Slightly deflated by this discovery we continued our preparations.

The ramp rose up at about 45 ° but had enough good handholds to attempt a free climb. From the bottom it looked about 40m high but it soon became apparent that it would be twice that height and somewhat committing. As Tim climbed up, Rich had to tie on all 3 of our ropes. Even so, as Tim pulled up over the top, the end of the bottom rope was just leaving the ground. He secured the end of the rope and returned to the bottom re-belaying as necessary to avoid the worst of the many rub points.

We also had time to locate a small campsite within 100m of the base of the ramp. This was in a small side passage which we named 'Diagon Alley' and, over the next few weeks it became as a home from home: not to mention the going lead beyond the campsite...

The Ashes Series.

Dave Nixon

So, it was time to head off into the great wide open... Tim returned down the ramp with tales of a powerful draught and large passages heading off in a variety of directions: what more could we ask for?

At the top of the ramp we hit the jackpot. The ramp opened out into the floor of a major four-way junction, the start of the 'Ashes Series' (named in memory of the victorious English cricket team's efforts).

As with most of our exploration in Whiterock, the general order of play was for Moose to read the instruments, Rich to set up stations and be target while Tim was driving the notebook. This worked well and everyone seemed to be happy with their role, this was fortunate as we were destined to do a substantial amount of it!

The first passage we explored headed south along the strike. Although not huge, it continued for 400m before turning west and dropping into a sediment-choked pit. As this was our first find of the first day's caving we called this passage 'Up and Running'. A short way back from the end, however, we had traversed around a large descending ramp. This seemed to be directly above the other ramp we had noted heading up from Zebra Passage. Most interestingly, though, above this a cold draught blew down from another ramp which headed up to even higher possibilities. On this occasion, Tim free climbed 50m to find an undulating tube continuing at the top. This soon led to an easy climb up 'popcorn' to the base of a further ramp which was, at the beginning at least, almost vertical. Carefully Tim retraced his steps and together we continued surveying and exploring the Ashes Series.

Our second port of call, as we returned to the head of the ramp, was what is now called 'Keel Passage', taking its name from the numerous keel-shaped stalactites which adorn the roof, formed by the prevailing air currents. After a brief encounter with a handsome but angry racer snake we continued on in fine style into a large breakdown chamber with ways on in all directions, except upwards. In the floor to the south were undescended shafts which we presumed to connect back to the lower sections of Whiterock. The passage here was now of considerable size, being close to 50m wide and 10m high. Straight ahead was a large alcove, which according to our leading station/target man, Rich, had no way on. This puzzled us to the point where we simply didn't believe him and wandered over to satisfy our curiosity: the 10m wide passage heading off south was christened 'Dazed and Confused' for obvious reasons... Exploration continued for 143m in a southerly direction until a calcite blockage was met, which firmly signified the end of this part of Whiterock.

Meanwhile, back in the large breakdown chamber, the obvious way to progress was in a northerly direction, following a gradually diminishing passage which apparently ended in a small chamber after 200m. Initially it didn't look promising but Rich rooted around in amongst some fine stalactites, relocated the draught and found the way on. The route, although small, soon led to an ascending clamber for a further 55m upwards towards a new 'Midnight Entrance' somewhere high up on the north side of the mountain. A couple of points worthy of note in this area: we spotted a superb 'racer snake hunting' stalagmite situated right in the centre of the smallest section of cave, within easy reach of anything flying in or out. As evidence that the stal was used in this way, we observed that its entire surface was highly polished. Secondly, rubbish and tracks on the floor made it clear that this was the nesters' route in and out of the cave.

Moose recalled getting back to the Diagon Alley camp that night at an absurd hour, something like 03:10 and said he'd never been so glad to see a packet of powdered soup! Nevertheless, having made a great start to our campaign we were all tremendously happy. He

even felt the need to open the Tiger beers and crack open the Sigg bottle containing some port, and why not?

The scene was set for a late start and so it was that the following day nothing much happened before lunch. At or about that time we set out for another stint up the ramp and another day pushing at Whiterock's limits.

At the top of the ramp we took the left (northward) heading route, ascending a large pile of collapsed boulders with a couple of pits in the floor on the eastern side. After a mere 70m we could see down to the east into what was the largest section of cave yet, heading off into the great wide open but, resisting temptation, we continued in the northerly direction along a passage we called 'Catch 22' due to the uncanny repetition of survey legs which were 22 [point something] metres in length.

This was a straight run as the passage stuck to a consistent bearing and size; averaging 15m x 5m it continued for 485m, the majority of the last few hundred meters containing a veritable forest of stalagmites, which made setting up survey stations a very easy job. We continued to a point where we were stopped by a calcite blockage which was clearly very close to the surface. A minor draught could be felt, disappearing down a series of gaps between stals with roots and vegetation present, unfortunately with no hope of finding a new way out. A small steeply ascending tube on the eastern side of the passage, 85m from the end, was concluded; Tim ascended it for 45m until further progress was halted by a calcite blockage.

Now, without resorting to climbing/rigging, or dare one say 'digging', we were down to one lead to explore. It's a good job we never doubted Lady Luck, as things were about to take a turn for the better. The underground world of North Api had been unlocked, and we were about to be the first ones to know all about it.

Daydream Believer.

Dave Nixon

"Bit further, bit further, go on, I'll tell you when to stop." went the message to Rich, "OK somewhere there will be fine"; beep went the disto, 63 meters, "that'll do nicely", in a passage 40 metres wide.

So begins 'Daydream Believer', 2.5km of trunk passage heading first east and then generally south and containing a wealth of leads, most of them being inlets congregating on their mission southwards towards the Clearwater system.

In the beginning, the route leads through a well decorated low section which gives the explorer a taste of the things to come by means of the very powerful draught. A large sweeping bend is soon encountered, 'Hells Corner', noted for its fine collection of helictites in a passage so wide and low that it is not possible to define the outermost edge of the curving walls. Our hearts missed a beat or two when we started to record bearings of a northerly trend but this soon rectified itself as we encountered a major junction.

We initially took the eastern (right) branch of Daydream Believer and explored a mere 120m, to satisfy our suspicions that the passage would continue in similar fashion, with dimensions averaging 30m wide by 15m high. Despite Moose and Rich's eagerness to press on we went along with Tim's call - his plan was to have a good lead to come back and walk into on another day and this turned out to be an excellent decision.

Meanwhile, having retraced our steps to the junction, the plan was to run a few legs down the West (left) passage, just to get an idea of the general trend of the development in the area. Unfortunately this didn't actually help matters, as within 55m we encountered another

junction. This threw us into even more confusion as to what was happening, not that we were complaining as we now found ourselves fairly well off for leads! The junction contained a mature passage which headed north (Out of Africa) and, as was discovered later in the trip, the route up on the west shoulder of the passage led to a mini round trip back to the start of Daydream Believer.

After our first adventurous foray into Daydream Believer, we returned to Diagon Alley and made grand plans as we refuelled. These involved doing some exploration in the entrance series just before we set off out for Camp 5 later that day but, as it turned out, they were just plans. The reality was that with over 2km of new cave in the bag we were happy to take a steady stroll back to meet up with the others and 'compare notes' - not that there was any sense of competition between the Benarat and Api teams, of course. No, not at all...

With our first successful camping trip completed we were quickly scheming about our next visit. Indeed, the very next day (admittedly in the late afternoon) we were back on the trail. Our team remained the same because the Moon Cave explorers were happy with their lot and no one was tempted to jump ship and move to the other mountain.

Because our kit was already in the cave, the journey to Whiterock was much more pleasant. In addition, the trail was now fairly well established and we were able to get underground an hour and a half after leaving Camp 5. We timed it perfectly and as we arrived at the entrance the deafening dusk chorus of cicadas commenced. We left the noise behind and proceeded to the camp for a well earned coffee. But by 20:00hrs we felt that it was time to do a spot of evening exploring, so we went back up Tim's ramp and straight on to the main Daydream Believer lead, fully charged and ready to go.

Within half an hour of the camp we were in a 30m x 15m sized passage at 20:30, surveying big new cave trending south-southwest and at 02:00hrs we were still at it... We were obviously in a passage that is clearly a major component of the Northern Clearwater system and we continued deep into the mountain for 2km, frequently rattling in 60, 70 and 80m legs: what a terrific session of truly adventurous exploits! We moved through a superbly shaped passage, complete with the occasional Mulu notch, beautiful formations from the imposing 'Night Watchmen' to delicate helictites and mud formations; Daydream Believer has them all and more.

Perhaps 1.5km into this section we passed an inlet guarded by a solitary stalagmite about six metres high. This was later called 'Ancestors' Passage'.

Close to Ancestors' Passage are two more leads worthy of note. 'Black Aven' can be found 68m west of the Ancestors' Passage junction where a 5m diameter inlet aven intersects the passage. This point is very close to the downstream end of Api Birthday and it may be possible to access any upward continuation of the aven from above should the upper continuation close down.

A further 360m south of the Ancestors' junction at a point we were forced into the 'Corridor of Uncertainty', a diminishing traverse along the east wall of the passage. Down a drop to one side is a large elongated pit in the floor, Tim investigated this briefly but the area remains to be thoroughly checked out.

The last section of Daydream Believer is particularly attractive, with white, crusted calcite floors which looked as if there had been a hard frost during the night and even produced the same crusty, tingly noise you get when you walk over frosted grass - hence the name, 'A Touch of Frost'. Exploring the main line of Daydream Believer, with its numerous leads, was a fantastic experience. Little did we know what lay ahead...

Evidently there are numerous small leads along the way, any of which would be worthy of a look at, on another trip, but considering the fact that we had initially concentrated just on the mainline we'd had a great run, and it had brought us to the point that signifies the end of Daydream Believer where we gazed up into the 'Middle Order Collapse'.

When we initially found this section of the cave we were still using the Diagon Alley Camp. After a quick peek into the Middle Order, which appeared to be more of the same - disappearing off into yet more caverns measureless to man, we withdrew. Once again we got back to camp at a late hour, around 04:00, it seemed as though we'd almost reverted back to GMT

The Middle Order Collapse.

Dave Nixon

The 'collapse' is a large pile of debris which can be fairly easily ascended to gain access into a fairly significant chamber, 120m wide x 70m long x 40m high, from which there was an obvious continuation to the east.

We clambered down the back of the boulder pile, passing a couple of prominent leads on the south side of the passage, and into the extension. However it soon dawned on us that something odd was occurring as we consistently began to record compass bearings that showed we were now going north. In fact we were heading back up towards Camp 5, apparently parallel with Daydream Believer but in a passage that was, if anything, larger and more significant. Suddenly the penny dropped, the large collapse chamber we had just passed represented the confluence of two passages. It stood to reason that downstream of where we were existed an even larger passage... With leads roughly in the right place this prospect loomed large in our minds, even though we were currently stomping off in the opposite direction (the 'Northern Line').

We returned to the 'collapse' and investigated the smaller leads to the south hoping to find a bypass to the choke. Clambering down into a 3m x 3m passage there were various junctions ('Mirror passage') in this short traverse most ending tangled up in the choke. Only one route was open, leading to a 10m climb up, and popping out into a large and very impressive continuation. It was again long into the early hours of the morning, but persistence had paid off and as a response to the Moon Cave team's discovery of 'Importance of Being Idle', the breakthrough was duly named 'the Importance of Being Active'! We surveyed on for a few hundred metres in increasingly large passage until fatigue got the better of us and we returned to Diagon Alley camp with another 2km in the book and another fantastic underground occurrence.

Insomnia.

Dave Nixon

Back at camp 5 a meeting was called. The expedition was now down to eight cavers with open leads in both Api and Benarat to explore, the team was spread too thinly and the decision was taken to throw the whole expedition at Whiterock. Therefore we were joined by Robbie, Rob, Pete, Mark and Andrew and split into two underground teams. One based at Diagon Alley to check out leads in the near series, and the other to push beyond the Middle Order Collapse taking their camp to a new location much further in.

Continuing on from the Importance of Being Active climbs in the roof and holes in the floor weren't initially looked at in the area as we pressed on. The route we took was 29m wide and 27m high, as a snap shot in the survey notes records, and it just got better and better. Rich and I just had time to admire a fine group of stalagmites, which we named the 'Ladies of the Night', when we were immediately confronted by what was arguably the view of the trip - 'Insomnia'.

From a tailor-made viewpoint beside a boulder the size of a house, a vista opened up in front of us which would fire up the imagination of cavers far and wide. We were standing at the confluence point of two passages, which between them had carved out a dead straight rock tube 20m wide by 30m high, which vanished into the distance. Ignoring the small open passage behind us, we traversed a convoluted route down through the boulders to access the continuation. Unfortunately, although we tried and tried, we just couldn't get a Disto reading of over 100m.

The source of the incoming passage was a smaller phreatic overflow feed entering from the north. We investigated this and found a perfect campsite location with a dry, level sandy floor and plenty of room to spread out and, almost inevitably, yet another way on. This camp was named 'Hotel California' and disk jockey Rob kept us entertained with his iPod full of tunes.

By the time we'd reached this stage in the Whiterock exploration, numbers had grown and at one stage there were seven people camping at the 'Hotel': Andrew, me, Mark, Rob, Robbie, Rich and Syria. It's a good thing that it is a spacious campsite!

This inlet was explored in a northerly direction for 100m ('Sweet Dreams') to a dry phreatic section explored to the 'Devils Lair' - a network of complicated tubes accessed by a steep climb and incorporating a 25m pitch descended only by Rob Eavis. We only took the survey to the head of the pitch and further work is required to locate the inevitable way on, there is a steady draught.

Heading south from Hotel California, the awesome rock tube heads straight for 105m to a big fork where a high-level, mainly phreatic route heads off to the east and a recently inactive, vadose lower route to the west, the Highland and Lowland.

Highland.

Dave Nixon

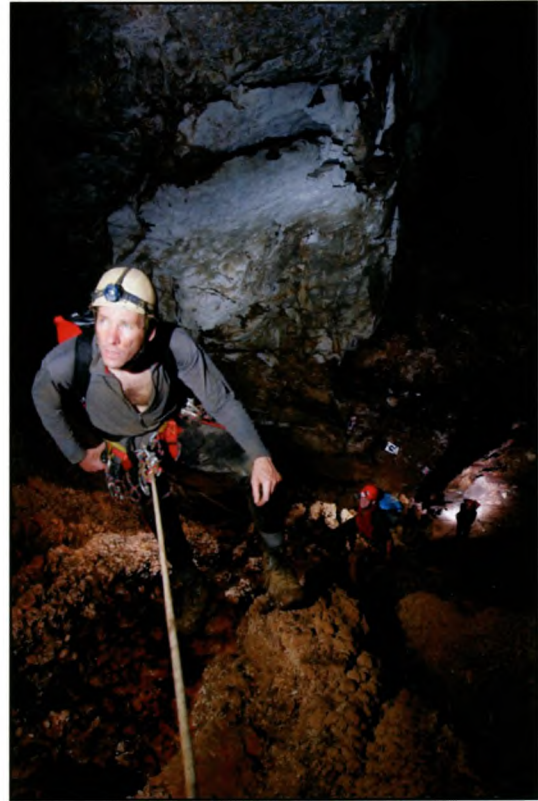
The higher, eastern branch is initially rather inaccessible. An awkward 8m climb up was negotiated by means of some rather suspect rope techniques and general gravity-cheating manoeuvres; I leave the rest to your imagination! In the end it all worked out beautifully and, as we wiped the sweat off our brows we stared into a magnificent 25m diameter tube bombing off into the blackness; not surprisingly Whiterock continued to rock...

The next 410m were much of the same, complete with some superb formations and a wealth of photographic opportunities. There were no other leads to follow but that didn't matter, not in a passage of this nature. Unfortunately, if ever there's a curse in cave exploration that's it - never think that you can't go wrong because, sure enough, around the next corner everything goes horribly wrong - and it did go horribly wrong. In a puzzling feature that is well worth a thorough investigation on another day, Highland takes a sharp turn to the east and enters a small breakdown chamber which is about 30x40m. In complete confidence that the way on was 'down there', at the base of that big boulder slope, Mark and I enjoyed another tin of tuna mayonnaise followed by some peanuts and 200g of chocolate. I am, of course, using the word 'enjoy' in the broadest possible sense...

After lunch I trundled down the slope to locate the best spot for the next survey station. I was horrified to find that the route on appeared to be completely choked. After much head-scratching and a mild touch of depression, we had to resort to following a relatively grotty little side passage which headed off directly opposite the way into the breakdown chamber. This didn't look good at all, there was no draught and the route was gradually diminishing; we found ourselves staring defeat in the face. We explored a couple of small side chambers but to no avail, we had lost the big way on - we were on the crest of a slump! Fortunately, just at the point where things were at their smallest, we discovered that we needn't be too



Tim Allen at the entrance of Whiterock Cave
© Dave Nixon



Dave Nixon ascending Tim's ramp from Zebra Series to The Ashes.
© Robbie Shone



Dave Nixon dwarfed by Highland Passage, beyond Insomnia
© Robbie Shone



Rich Gerrish admiring helictites in Lowland
© Dave Nixon



Andrew Atkinson at the start of Daydream Believer © Robbie Shone



Andrew Atkinson and Rich Gerrish in Mirror Passage © Robbie Shone



Diagon Alley camp © Matt Kirby



Rich Gerrish in A Touch of Frost © Robbie Shone

down hearted - we found ourselves looking down a short free-climbable pitch into what appeared to be another trunk passage.

We had progressed along the usual bearings around 220°, for 175 frustrating metres before rejoining the Lowland route and were presented with a 25m x 8m passage heading north and south. Clearly the southerly route was of the greatest interest and no attention was paid to the way north for several days.

We walked past some very fine cracked mud floors, adorned with some elegant white stalagmites and progress was easy again. On the west, only a matter of 50m south of the junction is 'Poppets' Passage' which remains as a going lead. This is another one of the inter-connecting phreatic link-routes, very old and well decorated, steeply ascending but not too steep to free-climb. I conducted an initial reconnaissance of this fascinating little tube and it went up and up and up. I expected to pop up into another big passage, which would zoom off in grand style, as seems the pattern in Whiterock. However, after ascending about 200m I gave up, having reached a short horizontal section close to the most remarkable pure white helictite I had ever seen. A return to this area is certainly required, but who ever goes, please take some rope for the descent as a free-climb down is really rather hair-raising!. A connection here with Janet's Way wouldn't be out of the question and further work on both fronts is required.

In the main southerly route Mark and I were on a roll, notching up more big legs and moving slowly and steadily towards Clearwater. Two smallish routes in the floor were passed, one on either side of the passage, (see the section on Lowland). The bouldery route down to the east was never fully checked out and is a lead for the next expedition.

We were now some distance from Hotel California and, at the rate we were going, a new (4th) camping site was looking likely. At least it was looking likely until we met a massive slope of boulders which occupied the entire width of the passage and shot off up all the way to the roof at 45°. Uncertainty was back on the agenda.

The last survey leg dropped us right in the middle of the slope, I waited patiently 45m away while Mark had a poke about to try and find the way on. He soon returned with bad news, announcing that it didn't look too good – there was no obvious way on and no draught. Was this the end of the major southerly development in Whiterock? We intended to find out.

Lowland.

Mark Brown

At the end of Insomnia passage, Moose had climbed up a slippery 8m or so to gain the fine, large Highland passage. However, a large passage had continued past the base of this climb and, on the first Hotel California trip, Rich, Andrew and I set out to survey it.

Since the upper level had been named Highland, this one was of course named Lowland. This began as a clean washed, nicely decorated passage, 15m wide and 20m high, leading to a 5m drop. This was by-passed by a cunning backtrack into a dripping rift, back under the floor and back into the main passage again.

A couple of awkward "chocolate staircase" traverses were passed (which were later rigged with hand lines) until the passage rose up over a big pile of breakdown to rejoin Highland after the sharp rift section. Lowland then provided an alternative and slightly easier walking route to Api Chamber.

On arrival at Hotel California for the final camping stint, Rich and I decided to tick off some of the side passages in Lowland and the latter part of Highland. The first was a short passage off the southwest side of Lowland that led quickly to a beautiful pitch-head with a white

cascade (named Bridal Veil Falls) which is un descended. The second passage, off a left hand bend in Highland near the big choke, ended quickly in a mud choke. It is probably close to the right hand fork at the start of Janet's way and above the Blackrock Purgatory area.

Api (Fire) Chamber.

Dave Nixon & Mark Brown

Mark, "For the first time in the trip I found Moose in circumstances that were much more familiar to his normal Derbyshire habitat. He was lying flat out and able to touch all four walls at once, surrounded by numerous unstable boulders and with no apparent way on: home from home for Moose. A squeeze through a slot led us into a small ante-chamber which contained an obvious, stooping clamber up a boulder slope to the base of a large and fairly loose 70° boulder / mud incline. From the bottom it was obvious to Moose that there was a sizeable continuation at the top and off he went". Moose, "After 30m of excitedly scrambling up the right hand side I eventually reached the col, heart thumping and sweat dripping off the rim of my helmet. Ahead of me was a vast open expanse of blackness, the like of which I had never experienced before in my caving career and, to top it all, this was new blackness!

Struggling to comprehend something so big, my mind flashed through various thoughts, involving big chambers. Knowing that we were in the same mountain as Sarawak Chamber it did briefly cross my mind that we'd actually found another way in to the world's largest natural void. For a couple of minutes I had completely forgotten about Mark and I wasn't prepared to take another step from the top of the col until he had joined me. Actually, for a couple of minutes I had forgotten about everything!

Having retraced my steps I encountered Mark who had also successfully found his way through the boulder choke. I remember saying, "bloody hell Mark," at the top of my voice, "you want to get yourself up here, you're not going to believe this!" then promptly turning on my heels and re-ascending the slope.

Mark, "I threw a rock down into the blackness below the balcony perch in the ante chamber... it rattled down for several seconds... 'this looks good,' I thought, 'time to see how Moose is getting on and tell him what I've found'. I returned through the ante chamber in the choke and headed in the direction from which I had heard Moose moving rocks a couple of minutes earlier. 'Mark! Get yourself up here! You're not gonna believe this!' Moose led me out of the choke and up a steep scree slope to a col, where a huge sense of space hit me. 'Listen to this echo: whooo...who...who,' ten seconds, then, '...who...who...' The hairs tingled down the back of my neck, we looked at each other with expressions like school kids who have just found an unattended sweetshop, 'this is huge...'"

Back at the top of the slope we stepped out onto a floor predictably strewn with a mishmash of boulders, ranging from the miniscule to the downright massive. Along the sides sections of the roof had collapsed, leaving large slabs of cracked limestone, with tapered cracks 1m wide at the top and 15m deep. We took a path across the lifeless chamber in what seemed to be a valley of boulders heading roughly south, with little concern as to what lay over to the sides, those areas could just be made out with our feeble head torches whereas the route ahead was still blackness and drew us in ever deeper.

Having long since abandoned any policy of "Survey it as you find it" we gradually ascended to a point where we could roughly define the nature of what we'd found. Satisfied that it was indeed a very large chamber (200m wide x 300m long) we both agreed to call off the day's explorations and return to the others, who had been photographing around Insomnia. We had bagged the jewel in the crown of the 2005 expedition to Mulu!

We caught up with the others just on the north side of the Middle Order collapse and broke the news. The others were delighted and a barrage of questions followed as we began to recount the day's events, knowing full well that we were likely to be repeating the story several times over the next few weeks or so. Our news de-railed the photographic trip and it wasn't long before tripods were being thrown in tackle bags and progress was being made back up north. The discussions went on into the night and we shared another instalment from the sigg bottle of celebratory port - we had about 10ml each!

Two subsequent trips were made to Api (Fire) Chamber, firstly to survey it and finally to produce a photograph record. For once we seemed to have broken the trend of finding something very impressive or important the day before getting on the plane back to Miri.

Walking into the chamber it was immediately apparent that it was a huge space, the resonance of even the smallest noise was a tremendous experience, and much fun was derived from the fact that the echo of a simple sound could be clearly heard for a full ten seconds after it was created. Api (Fire) Chamber, as it was named, has a clearly defined roof spanning a width of 80m and of questionable height – a look at the survey notes reveals a lot of question marks in the 'up' column. To the north of our way in is an inlet passage, 'Janet's Way' which represents the only horizontal way off the chamber. Continuing south, the low arched roof gradually turns into a larger expanse of breakdown and promptly disappears to a height, well out of Disto range. We never got to the stage where we managed to get a sufficiently powerful light but it seemed that there was at least one central hole in the roof right at its apex, the most inaccessible piece of cave they we had ever cast our eyes on.

The sides of Api Chamber develop into a clearly defined boulder slope running up to vertical walls on either side and at this point it is at its widest, just before the southern termination. A great red wall of limestone 80m wide plummets into the bouldery floor and along a section of about 40m, the draught can be observed powerfully blowing out of the gaps between the blocks. Moose and Robert Eavis spent a few hours here, in an attempt to find a way on. Between us, we managed to dig, wriggle and peer through various places along the wall boulder contact, at one point being nearly 25m down, but to no avail. In this location discretion was certainly the better part of valour and the way down into what must be a significant passage eluded us.

However, this doesn't mean that we don't intend to return!

The Northern Passages

The main route of the Ashes Series has a number of large feeder passages joining from the north. These are described in order from the entrance heading south into the cave.

Out of Africa.

Matt Kirby & Richard Chambers

Towards the end of the expedition, we made a two night trip into Whiterock Cave to explore northerly leads which would hopefully allow further progress toward the Melinau Gorge. We camped at the Diagon Alley camp, just below the main ramp up into 'Up and Running'.

On the first day, after ditching the camping gear, we headed off up the ramp and located a lead spotted by Tim; this went north from the Oxbow in Daydream Believer. This oxbow loops round Daydream Believer and the two form a shape remarkably similar to a map of the African sub continent, hence the name of the passage.

Two ways led up into an impressive Northerly passage which enlarged in size. After approximately 330m a passage was seen heading off upwards to the right. A climb up boulders led us to the base of a steep ramp which we left for the following day. Continuing in the main passage, after 50m a short climb took us up into a breakdown chamber. We climbed

over boulders to a gravel floored passage which widened on a bend but directly ahead was a pit in the floor where sediments have been washed away. The passage swung round to the left into a narrower section; the sandy floor cuts steeply down to the base of a climb which we didn't attempt. At this point the passage formed a 20m high narrow canyon with a flat roof. We could see a way on at the top of the climb, which was approximately 15m up boulders and sediment; unfortunately no significant draughts were felt. This point is 120m away from the Northern end of 'Catch 22' and at approximately the same level.

Back at the sediment pit, a low way on led into a parallel passage and junction. To the South ended in boulders which were not pushed but it is heading towards the breakdown chamber. To the North, a short climb down led us to another junction. A low flat out crawl on the right went over a gypsum-strewn, gravelly floor, which we did not explore. To the left and through a short, narrow, bouldery passage the floor sloped down to the head of a shaft in water worn limestone and stones thrown down here suggested great depth. There was no other way out of this chamber.

The next day we returned to the big ramp leading off from the main Out of Africa passage. A climb up boulders from the main passage led us to a flat sandy area at the base of the ramp. To the right of here is a vertical cliff, over which anything falling from above would drop. The climb started up mud, where the footholds crumble away as you move up. After traversing across the top of the cliff, the going became firmer and led us onto calcited boulders. The next section was fairly straightforward until the walls narrowed and the floor became a smooth rock ramp. A ledge on the left was littered with loose boulders and with a combination of iffy handholds, stupidity and good luck we reached the top, 60m above the main passage. This left us with a small problem - how would we reverse it without a hand line?

Progress at this horizon proved difficult as most of the passages were formed on the strike with ramps heading off both up and down dip. Immediately North from the top of the ramp led into steeply inclined bouldery chambers with dry sand slopes running in from above. Matt climbed up one of these and found himself in the base of a steep-sided, gravelly pit in the floor of what appeared to be a passage running above.

Going right from the head of the ramp led us to the base of another gravel pit which we could not safely climb, however it appeared to lead into a passage above. We could feel a draught coming from boulders at floor level. Going through a squeeze took us into a strike controlled passage, which we followed to a climb up. This went into another gravel pit which, this time, we climbed easily to gain a large passage above. Northwards led to a vertical wall of sediment with a passage continuing below. We backtracked into the pit where it was possible to tunnel through into the canyon at a point where two pits were almost joined. This tunnel is referred to as 'The Eyehole'

Heading North led through a canyon with gravel walls to a four-way junction at the base of a large bouldery ramp up on the right. This was climbed to a small hole between boulders at the top, which was followed for a short distance. There was no sign of a draught but all the walls were covered in sharp needles of calcite. This was not pushed to a conclusion, but is worth another look as this is one of the highest points in the cave and is currently the highest point at the North end of the system and is only matched by the high points of Fire (Api) Chamber.

From the base of the ramp to the left, a narrow passage led over a calcited gravel floor but ended, after a few metres, at the lip of a sediment pit. We could see the passage continue at the other side but no draught was detected.

Going straight ahead from the base of the ramp we went down a short climb into a water-

worn, gravel floored passage which became lower. We passed a pit on the left which tied up with the one Matt had seen from below and which had a strong draught dropping down it. About 40m beyond here the floor dropped away again into another pit which spanned the passage and blocked the way on. Once again we could see the passage continuing on the other side but no draught was detected.

Back at The Eyehole we were able to head South by traversing round the left wall on a narrow ledge of sediment and arrived on a sediment arête overlooking a water washed chamber with large columns. A careful climb down on the right led us to the chamber floor. At this point the passage is approximately 30m wide but is steeply inclined on the dip; going up the dip leads to a position high above the floor. The main route on was left and upwards to a point where we overlooked an enormous dark chamber. From this vantage point muddy sediment banks ran steeply down both to the right and straight ahead. As we were pondering how to get down, we noticed a cairn on a small arête some 15m below us. This turned out to be station TA61 in the Apprenticeship Series, which had been explored the week before. We now had the potential for a round trip and another lead had been ticked off.

The Northern end of Out of Africa is filled with water worn gravels which almost reach the roof on two horizons. This suggests sudden and total inundation by a surface river at some time in the geological past. Subsequent erosion has caused sediments to collapse and large pits be formed in the floors of passages.

It is interesting to note that Out of Africa, Pensioners' Paradise and Up and Running all end at approximately the same Northerly limit. This corresponds with the big white cliff which runs west – east and appears to have cut off the Northerly continuation of these passages. Beyond the cliff the slopes of G.Api are on a much shallower gradient.

It would appear that progress Northwards will only be made in passages much further into the mountain.

Ancestors' Passage

Dave Nixon

Approximately 1.5km into Daydream Believer, a solitary stalagmite about six metres high, guards the entrance to a fascinating inlet which has the slightly contentious name of Ancestors' Passage. The passage was initially explored for 195m on the first Daydream Believer trip and got its name as a result of the discovery of a calcified skeleton of what appeared to be a primate.

Laid out in the floor of the passage these remains were remarkably well preserved with a body approximately 600mm long and a tail of about the same length.

Unfortunately none of us was a qualified zoologist; had one of us been so, we been we might well have realised that the size and body proportions were close to those of the Civet/ Bearcat or Binturon¹ (*Arctictis binturong*). This is a species of the civet family - a small bodied carnivore with a muscular tail and large tail vertebrae. Binturong bones have been found in Niah Cave in Sarawak² and it is reasonable that Bearcat remains could also be found in Whiterock Cave.

Clearly, further work will be required to establish more information about the skeleton and questions still remain, not the least of which is how the animal came to be in its final resting place, 2-3km from the nearest known entrance. An aven observed south of the skeleton could be worthy of investigation, although it would appear that from this point it's going to be a considerable distance to daylight, no matter which direction you take.

Further exploration later in the trip by Andrew, Robbie and Mark Brown pushed Ancestors'

Passage in a northerly direction but revealed no additional finds. The passage maintains its dimensions of 3m x 3m for a surveyed length of 540m at which point the team turned back, leaving the way on still open.

The Northern Line.

Dave Nixon

Nobody actually named this passage, it just seemed suitably appropriate, if a bit unimaginative as Tim, Rich and I talked amongst ourselves during our visit. The Northern Line (heading north from Middle Order Collapse) is a completely different beast to Daydream Believer. It is approximately the same size (20m x 30m) and follows a steeply undulating development pattern governed by the prominent strike/joint structure. This makes for fairly awkward ground, as the route is always ascending and descending, and not helped at all by the generous coating in places of 'rock rot', that visually good-looking surface which transforms on touch into 30mm of sloppy, wet, slippery mess which generally makes life unpleasant.

We surveyed for 940m, recording consistent bearings of around 37°, which open the possibility of a traverse towards Camp 5 via an entrance in the numerous cliffs which feature on the south side of the Melinau Gorge. At the point where we turned back we had discovered two small leads on the west side of the passage, 'Silly mid on' and 'Silly mid off'. Both Tim and I went into investigative exploration mode as we were both aware that Ancestors' Passage couldn't be far away in a westerly direction. Making a sneaky connection between the two would cut out a big corner and save us an hour or more of transit time back to Diagon Alley. We both made valiant attempts but, after 15 minutes or so, neither of us got to the point where we thought a connection was going to come off and we retreated. Both routes require a return visit to survey and definitively conclude the exploration.

At station number 73 in the Northern Line we called it a day. The area was only visited once and represents a top priority lead. For the lucky team that goes back, a fascinating bit of exploration remains with the possibility of unexpectedly rocking up at Camp 5 one night with an account of a spectacular through trip!

Janet's Way

Mark Brown

After the survey of Api Chamber was completed, Moose, Andrew, Syria and Rich investigated the passage leading off the "lower" end of the chamber (actually the north). This started at a fork where the right branch descended to a climb that required a rope and is undescended. They then followed the left branch along a fine, high gallery which was up to 10m wide and 20m high. Several leads branched off and the passage got larger towards the point at which they turned back due to hunger, after c500m. A well decorated grotto en route was named Syria's Palace.

Janet's Way has fine helictites and other formations and remains wide open, with several promising, unexplored side passages. It seems to be trending back northeast but at a mid-level above Highland and below Api Birthday.

The Upper Series

The upper series represents a higher development level some 70-80m above the Ashes Series with many similarities to Daydream believer. Two sections have been discovered to date, the first accessed by means of another typical connection ramp from 'Up and Running' and named the The Apprenticeship, subsequently a connection was made to 'Out of Africa'.

The second section of this higher level was discovered part way along Daydream Believer adjacent to the Monkey Camp and is called 'Api Birthday' and although not yet connected is

almost certainly part of the same development.

The Apprenticeship.

Tim Allen

On the 18th September a return was made to Up and Running, particularly the Upper Ramp system and this time I was accompanied by Rob Eavis. We rigged a rope on the first ramp before attempting the steeper second section. Although the bottom 8m was vertical, the rock was clean and there was plenty of 'popcorn' to use as dubious handholds. I ascended this section carefully before the slope eased and allowed swift progress to the top. A final climb up the side of a huge overhanging boulder saw us on the floor of a large passage heading both north and south.

We surveyed south first, following a healthy draught in a passage with an average dimension of 20x20m. Huge sediment deposits were banked up to one side with occasional islands of stalagmites and flowstone. After several hundred metres, the sediment rose up to within 2m of the roof and in this area another small draughting ramp rose up the bedding on the left hand wall, suggesting an even higher level. At its base were a number of discarded snake skins which suggested a possible link to the surface. Beyond this, the passage opened up again, much as before, until we met a large boulder pile, running down from the right, where the passage split. To the left, the route continued due south and we left it unexplored on this occasion. We chose a way on up to the right, where the passage began to swing towards the west. In this section much of the rock was very sharp and shattered, possibly due to being close to the escarpment edge. Eventually, after almost exactly a kilometre, the passage narrowed and became heavily calcited. A draughting squeeze 3m from the floor was the only possible way on and Rob launched himself into it. He disappeared, returning to say that although he had progressed some 60m through several chambers he could find no way on beyond that point.

We returned to the top of the ramp and decided to survey a short distance to the north. This passage was even larger and was as straight as a die, along the strike. On the right hand side several inlets trickled down the bedding, forming large calcite flows. After an easy 400m we stopped at the start of a bend to the east. Rob checked out the opposite corner to see if the passage continued along the strike. It didn't but there were some wonderful chocolate-coloured flow formations stretching from roof to floor. As we returned down the passage the inlets along the wall burst into life, no doubt the result of a thunderstorm raging up top. We surveyed down the ramps, which were now slightly wet, to tie in a total of 1.6km for the day. Rob named the passage 'The Apprenticeship' as it was his first major Mulu find.

A return visit to the northern lead was made later in the expedition in the company of Matt Kirby and Richard Chambers. To our surprise, the passage swung 180 degrees and headed south! The huge switchback (35m across at this point) was much easier to follow in the deep notch on the inside of the bend rather than in the main passage where there were huge pits in the floor. These were not descended and may indicate that there is more to this bend than meets the eye. Further on, a chamber was reached with a passage entering from the left hand (north) side where later in the trip, 'Out of Africa' was connected. Continuing south we encountered many more banks of sediment: incised by invading ancient streams or by collapses from below these 10m walls of crumbling cobbles provided formidable obstacles and, after 650m, the cobble deposits met the roof.

Out on the surface, we inputted the survey data and the results showed that this southerly trending, northern passage lined up with the other high level find of 'Api Birthday'. This prompted a final trip to 'the Apprenticeship' with Dick Willis and Martin Holroyd on 4th October. Back at the 'northern' southerly lead, the cobble choke and other side leads nearby were investigated but no significant way on could be found. At the southern end proper we started to explore the passage which had been left by Rob and myself on 18th September.

Unfortunately, after only 220m, we were thwarted by a total collapse – the cave had obviously heard that Dick was on his way! On the return, both Martin and I checked out the 'snake skin' ramp. Although this was smaller than the lower ramps, it draughted well. However, after 100m of progress upwards, which included a squeeze, the way above became too steep to climb without protection. But it's still going...

In total, 'The Apprenticeship' yielded 3km of passages which lie about 70m above the more extensive 'Ashes Series', and to some extent mirrored those passages below. Although all routes south terminated in this section, the discovery of 'Api Birthday' suggests a lot more to be found at this level. The size of the sediment cobbles, up to 400mm diameter, may also be significant in understanding the geomorphology at this end of the mountain. There is even the possibility of even higher levels, perhaps accessed from the snake skin ramp or other ascending features. Further work with the older surveys of Clearwater will relate these levels to the main system.

Api Birthday.

Dave Nixon

Ironically, the day after the big breakthrough into Api Chamber, was my birthday (19th September) – I thought that I had unwrapped my present a day early! From my pit at 'Monkey Camp' I had been staring up at a passage on the shoulder of the east side of Daydream Believer and thinking that I really should go and investigate it. Well, today was the day and off I went with Mark Brown as my partner. The lead was so close to camp that the first survey leg could almost have been done from where I had my breakfast. The others went south to explore further along Ancestors' Passage and for a while the birthday boys almost regretted our choice of objective.

The walking size tube was developed on the 45° strike, involving more of a scramble than a walk, and it gradually degenerated to a body-sized hole lined with popcorn formation and a small stream trickling through it. In passages the size of Mulu, something this small would normally be left for a day when all other leads had petered out but I persevered with my impression of a contortionist for a few more metres while Mark patiently awaited the outcome of the investigation.

Squeezing over a few blocks I found myself at the bottom of a moderately challenging clamber up into what was clearly another huge passage, of the same dimensions as 'Daydream Believer', running off north and south; the grovel was well worth that bit of perseverance. The passage was named 'Api Birthday' for obvious reasons and represents a higher level development, apparently on the same horizon as the Upper Ramp/'Apprenticeship' extensions: in fact it's hard to believe that it's not the southern continuation. Like its counterpart, it has large deposits of decomposed sandstone cobbles and banks of sediment deposits which occupy a high proportion of the passage.

With time being our limiting factor we were only able to survey up and downstream for a short distance, just enough to prove that we had got a mature passage which was running on the same orientation as the rest of the newly discovered cave but 88m higher. Both routes were left open as we turned back to prepare to exit the cave and they are outstanding leads for the next expedition.

The Connections

With the arrival of Richard Chambers and Matt Kirby in the middle of September discussions about exploration in Whiterock had taken a swing towards the possibility of a connection with Blackrock Cave. Since Blackrock is a part of the Clearwater Cave System, we knew this would be an achievement of some significance: a connection between the two caves would create a system around 130km in length, pushing Clearwater even higher in

the ranking of the 'world's longest caves'.

Unfortunately, things weren't made easy on two fronts: firstly no electronic survey data existed for Blackrock. The good news was that the Blackrock notebook data had been brought out from the UK and this was laboriously entered into Survex. However, this still posed problems because there were no reliable co-ordinates for the Racer entrance of Blackrock. All the same, due to the discoveries in Whiterock, it was looking increasingly likely that Firecracker passage would be the most likely target for our efforts.

Secondly and more fundamentally was the fact that, despite several valiant attempts Richard and Matt were still struggling to locate the entrances to Blackrock. Fortunately, after several frustrating attempts, they managed to relocate Racer and began a surface survey between Whiterock and Blackrock. (See below: *'The Search for Blackrock Cave'*.)

Down Under.

Dave Nixon

Meanwhile, the underground activities were progressing nicely. After the very successful surveying trip in the southern reaches of the cave we planned to do a bit more surveying on our return trip. Initially we had pencilled in another visit to Api Birthday but during the trudge out we had a change of plan. When we were about halfway along Daydream Believer, around 260m south of Monkey Camp, my mind flashed back to the day we had found this passage. In particular, I remembered a small route Tim had looked at on the west side, adjacent to a prominent breakdown corner. We dumped our tackle bags and set off, initially down a challenging 45° scramble through a typical Whiterock interconnecting phreatic passage.

The draught was very encouraging and the 2m diameter tube was followed for a hundred meters until a free climb down was met at the junction with what looked like another major trunk passage heading north-south. At this point I could hear a small stream in the distance and returned to inform the others of the developments: they proceeded to survey in.

We had no climbing tackle with us on this occasion so all the climbs down were a potential problem. The first was a fairly easy, juggy climb down onto a large bench high on the east wall of the passage. Checking up and down the passage revealed no easier way for the next drop so a second free climb was tackled. This was rather neckier and involved placing complete trust in a mud covered flake. Two of us made it, only to be denied once more by a similar but more frustrating feature. This third climb down was certainly the last as the gravelly floor of the passage and a stream could clearly be seen about 30m below. With memories of other dangerous free climbs still fresh on my mind, I gingerly tiptoed around the head of the climb, weighing up the possibilities. From whichever angle I looked, it could not be done. The climb down was far too unstable at the pitch head and led to an overhanging section in the middle. I took a long, hard look and could see no evidence of footprints. Even so, it was likely that I was looking down into Firecracker – a connection to Blackrock and the Clearwater System. Regrettably I concluded that this particular challenge would have to wait until the next visit.

It was the 26th September by the time we returned, this time on our way towards Api Chamber and with a slightly different team – me, Robbie, Robert and Andrew. After studying the surveys and interrogating anyone with any knowledge of the Blackrock system, we were fairly convinced that we'd already made the connection on our earlier trip; all we had to do was to prove the connection and survey it. Arrangements were made with Matt and Richard to rendezvous somewhere en route from Firecracker to the Racer entrance – an optimistic arrangement that assumed they would rediscover Racer! Unfortunately they had another unsuccessful attempt at locating the entrance - another pointless exercise... In the mean time we had returned with the necessary tackle to rig the three pitches and we

made short work of getting to our previous end point. The loose pitch-head was cleared and, with what could be described as 'not the best bit of rigging' on my part, we all safely descended into Firecracker. We knew instantly that we had made the connection as there were with footprints in abundance and surveying cairns strategically constructed, by Messrs Fogg et al, some 18 years previously. So the statisticians in the team had some numbers to digest and we faced the fascination of reducing all of Blackrock into accessible data. After tying the survey in to an obvious station all we wanted to do was have a romp about in Blackrock, or was it Whiterock? Both, but we had now been swallowed up by the very impressive Clearwater Cave.

For the first time on the expedition we literally had nothing to do other than cave, so with no equipment to carry we joyfully headed off to meet up with the Racer guys... guys where are you..?

Navigation was easy and at this stage it dawned on me just how big Clearwater is and just how long it would take, for instance, to do a traverse of the whole system from Whiterock to the Clearwater resurgence: it's awesome. Unfortunately, our efforts to exit at the Racer entrance were thwarted at the final fence because the four metre climb up, from the Snake Pit into the entrance passage, was just a little bit too bold without protection. In the vain hope of meeting up with the others we hung on at the base of the climb but after half an hour or so we guessed that they were still indulging in their favourite vice of thrashing about in vegetation and we left them to it.

Our mission for the day accomplished, we headed back into Whiterock and then on to the camp where our companions, food and music awaited us.

Eagle's Ramp connection (Ibuprofen pitch)

Mark Brown

I was keen to return to the balcony perch, which lay off the antechamber in the choke prior to Api Chamber, where I had heard a rock rattle down a long way. So, at the end of the chamber photography day, I put in a bolt and, with Rob Eavis, descended a 10m drop to land at the head of a very steep, loose slope.

Abseiling to the end of the 40m rope, I reluctantly scrambled to a big boulder at the edge of the slope, choosing one that looked reasonably stable compared to the rest of the area. Anything I dislodged tumbled down a 45° chute for what sounded like forever... I had this in mind as Rob came towards me and, sure enough, the entire pile of boulders he was climbing down started to move. He shot past me in a cloud of dust and rock, my heart was in my mouth, expecting to see him disappear down the debris chute and end up in bits. By some feat of agility Rob leapt out of the tumbling mass and I was relieved to find that he had nothing more than cuts and bruises. We fumbled in the first aid kit for ibuprofen and then picked our way gingerly to the bottom of the ramp to recompose ourselves.

In our lights, a survey station cairn stood out along the passage near the base of the ramp. On closer inspection, this had a barely legible station number and date (17.1.1988) – this had to be the Eagle's Ramp in Blackrock Cave, which Matt and Rich had predicted should be nearby. Rob took more ibuprofen and we slowly started surveying back upwards to hook the Blackrock into the Whiterock survey. With this job done we rejoined the photographers at Hotel California and shared the tale. Seventeen years after its discovery, the Eagle's Ramp had been explored from above and we had created the second tie-in point with Whiterock – showing the value of labelled survey stations!

Just how close the 1988 team came to unearthing all that we had found on this trip and more, only now started to become apparent, If the connection had been made in '88 it would have been a turning point in the exploration of the caves of Northern Api. It makes

you wonder how many other such places in the mountain remain to be revealed.

Extensions to the Entrance (2003) Series

Sick Note Passage

Rob Eavis

Soon after setting up Diagon Alley camp, Tim Allen, Pete O'Neil and I headed to the end of Zebra Passage to push the many leads that remained wide open. On arriving at Old Fall Hall we split up to have a little furtle and find the most promising way on.

Pete looked at the first lead to the left, a rift passage, while I looked at the second left. This dropped down from the boulders into a small passage (1m wide and 3m high) along the tilted bedding. A tough climb up to the left seemed to join a higher level, probably where Pete had been... After a short distance the passage looked to be getting bigger and I returned to get the others.

Meanwhile, Tim had climbed to the top of the large boulder pile in Old Fall Hall and found a large passage leading off, far bigger than the other leads, so we made that our priority. Unfortunately however, Tim was suffering from the after-effects of Wan's fish paste and decided to turn back, leaving Pete and Rob to survey up the slope from the cairn at the bottom of Old Fall Hall. Halfway up, Pete managed to get caught up with some loose rocks and took a fall, damaging his back.

Once at the top of the slope, the way on was down the other side of the boulder pile, using a hand line for assistance off the end of a large boulder. This passage is a similar size to Zebra Passage (10-15m wide and high) and went for 300m, with a nice flat floor for most of the way. At the end we encountered a heavily calcified boulder choke with a slight draught. I pushed this for about 30 minutes, through some very small constrictions, into numerous well decorated galleries but the draught was lost and no way on could be found. Back in the camp by 7pm, we found a very green Tim Allen looking extremely sorry for himself!

Old Fall Hall

Richard Chambers

After our arrival at Camp 5 midway through the expedition and a subsequent day trip acclimatising ourselves to loosing cave entrances, Matt Kirby and I decided that we could really not think of another reason to avoid going underground. So, accompanied by Tim (mainly to guide us to the entrance, of course) we set off for a 2 night bivi in Whiterock in order to 'tie-up' some loose ends.

Our first evening was spent surveying what was called 'the Northern lead' from the end of Apprenticeship Passage. The cave showed its contempt for our name immediately - the first leg swung East and then South but this is described more fully elsewhere. We returned late to Diagon Alley and, as a result, started late the next morning. Our intention was to more fully explore the mass of passages that seem to converge on Old Fall Hall at the southern end of Zebra Passage.

On a previous trip, Rob Eavis had looked at a northerly passage from Old Fall and calculated that it was the end of Aah Disto, suggesting that the 2003 survey had possibly been drawn incorrectly: this was our first task. As it turned out the survey was correct (sorry Rob) and this Northerly trending phreatic passage carried on for about 170m before ending in a balcony overlooking the massive ramp that descends from Zebra, cutting across Pensioners Paradise and descending to Aah Disto. We were, in fact, in the southern continuation of Pensioners' Paradise.

Back in Old Fall we now followed the 'obvious' passage that left the hall in a north, north-

westerly direction. After about 150m the passage dropped away into a large area of breakdown which required a climb, first down to a lower level and then up across boulders to the original passage height. Here the passage split with the left hand branch rising up to an area of boulders covered with calcite with no way on. The indications were that this would be very near the surface and this was subsequently confirmed by the drawn up survey. The right hand branch again ended with no way on after some 100m.

Retracing our steps, I climbed down through boulders at the base of the breakdown area, where I had noticed a flat-floored passage on the way across, Matt and Tim having come a different (some would say safer and easier) way. This led to a low bedding passage which we followed for a couple of hundred metres to the north where, once again, the passage ended in calcited boulders which, rather uncharacteristically for Mulu, had quite a flow of water through them. To the south, the passage increased in size until turning eastwards where a climb up a boulder slope led us back to Old Fall Hall. (The moral of this story is never to abandon your tackle bag with the thought that you will be returning to it - it's not necessarily true).

Sitting back in Old Fall we looked at the options: we had looked at the obvious significant leads today, Sick Note passage had been surveyed a few days before and a less obvious continuation had been surveyed in 2003. This just left a climb high across the boulder slope into a roof passage again trending north. However, very soon this large passage hit a ramp with no obvious upwards way on. Fortunately, an easy climb down led us again into wide, high passage going north. We followed this for several hundred metres until it began climbing up a steep boulder slope, and then in typical and frustrating Mulu style it just stopped, again possibly nearing the surface.

References:

¹ Andrew Chamberlain Department of Archaeology, University of Sheffield, pers comm.

² Medway Studies in Speleology 1, p33-37



Hotel California Camp

© Robbie Shone



Daydream Believer

© Robbie Shone



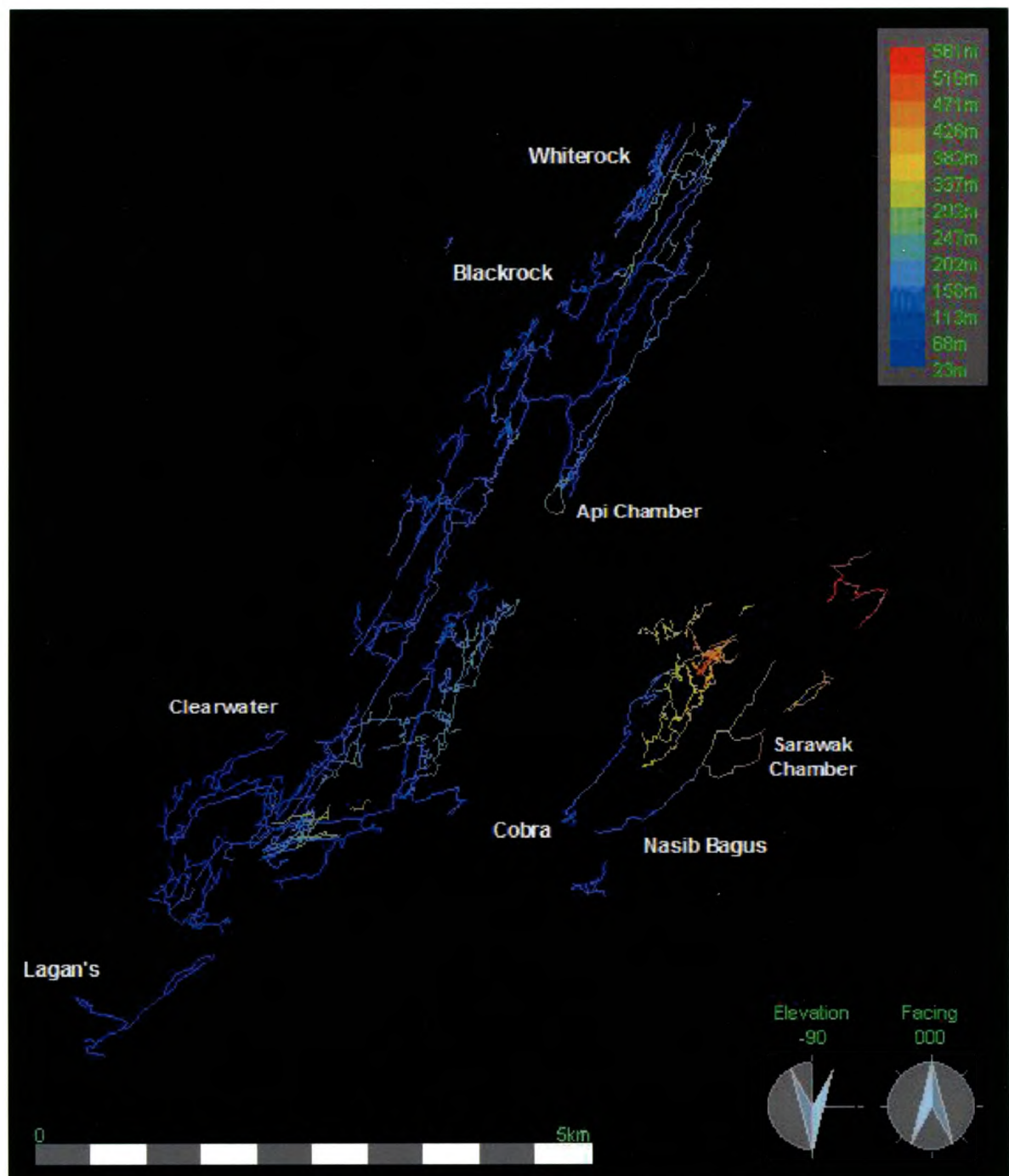
Remains of the mystery mammal in Ancestors' Passage.

© Dave Nixon

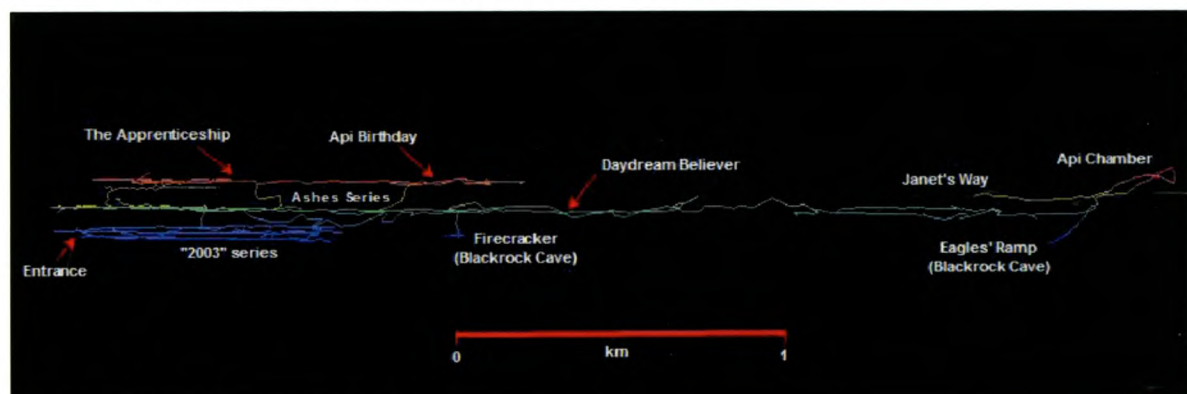


Looking 'Down Under', to the connection with Blackrock

© Andrew Atkinson



Survev image of the caves of G.Api showing elevation about sea level.



Whiterock Cave elevation facing east

The Search for Blackrock

Matt Kirby

The discovery of Whiterock in 2003 had given new impetus to the exploration of Northern Api. Although there was always potential to find more caves in this area, it alone did not justify a full scale expedition. So it was that Whiterock was found as a spin-off from a Benarat expedition based at Camp 5. An area which had been largely ignored had become one of the main aims of the expedition and was the reason that 'Benarat 2005' was exploring caves in Api.

Some had thought that a couple of days' exploration would wrap up Whiterock but this was not to be. By the time Richard and I arrived in Camp, the cave had been extended by 15km and had crossed over some of the main passages in Blackrock without connection. Indications were that the southern end of the cave was in the vicinity of the Eagle's ramp, discovered in 1988 and since then never revisited.

Apart from continuing the exploration of Whiterock, Richard and I had unfinished business further south. The embarrassing 'loss' of Blackrock had weighed heavy on our minds over the last two years. One may think that once something is discovered it remains discovered. After all, when Columbus discovered America he didn't then go and lose it; so it was that the search for Blackrock continued.

A diary note from Tim Allen's 2003 diary read:

"Matt & Richard head off on another pointless attempt to find Blackrock"

So it was that we became "The Pointless Crew"

During 2003, access to the Blackrock area had been made either via a long round trip past Leopard Cave (24km) or by hacking from the Headhunter's Trail through the forest to the vicinity of the Racer entrance. Although three trips were made, none of the Blackrock entrances had been found. On one trip a bivi had been made in a small cave near the Centipede entrance when the team became benighted without locating the Blackrock entrance.

Access to Whiterock had been made from the 6km mark on the Headhunter's Trail with a difficult south-easterly route over low lying karst. The area between Whiterock and Blackrock's Racer entrance had never been visited and this represented approximately 2km of unexplored ground.

In order to continue the exploration of Whiterock, a new track had been established from just north of the new bridge over the Melinau. This cut through some swampy ground which became 'interesting' in wet weather

Day 1

The Pointless Crew plus Tim Allen headed off for the Whiterock area to explore southwards, hopefully to cut a track through to Blackrock. The Whiterock track meets the limestone approximately 300m south of the entrance at a point now known as the Whiterock Junction at which a GPS fix was established.

Equipped with parangs and a new found enthusiasm, we headed off into the unknown. Richard and I led on with Tim bringing up the rear, hacking distinct track marks to ensure that the return was well marked. He didn't want to spend the night going round in circles with the Pointless Crew.

At first, the route was fairly straightforward; the plan was to keep to the side of the mountain in order, hopefully, to find some familiar sign of one of the Blackrock entrances. After approximately 30 minutes the track turned east as it rounded a small cliff, this had the appearance of an enormous boulder as it was detached from the main slope and a GPS fix was obtained here, too (The Big Boulder). Old Penan tracks appeared and were followed for a few yards before disappearing. Various areas of tree-fall were passed before the track turned onto the limestone. Following this proved a mistake as the going became difficult before ending up on top of tall cliffs above a small valley and stream sink. A retreat and awkward traverse down led back to the base of the limestone. The sink formed a steep valley with the ground beyond rising up onto alluvial terrace. Within a short distance an old Penan shelter was found and another GPS fix made (Penan Camp). Beyond the shelter the going became very difficult with dense forest, frequent tree-fall, rattan, thorny palms and steep muddy slopes. I remembered a large tree somewhere near Blackrock's Racer Entrance but it was remarkable how many 'large trees' there were, all of which looked familiar! (Most things in this area should have looked familiar considering the time we had spent in this area in 2003!).

Although there were signs of old tracks, these were poorly defined and easily lost. After approximately two and a half hours we arrived in the vicinity of the Centipede entrance. Richard headed further south and up-slope, intending to traverse back towards Centipede at a higher level whilst I headed off up a 'familiar' looking slope and explored an area of tree-fall against a cliff which had the appearance of the Hayloft entrance; no luck. A climb was made and a small entrance found which could have been Centipede had it been drafting but it wasn't - still no luck. The old bivi cave used in 2003 was never found, although Tim did find a small entrance.

At about this time Richard shouted down from high above. He was well up with views out over the canopy and was trying to climb back down but had ended up at the top of a big cliff. Some awkward backtracking and dodging around the cliff revealed a large entrance; bingo, success! This was one of the Dapa entrances, discovered in '88 immediately above the Centipede Entrance. A GPS fix was made (Dapa Entrance).

Time was now pressing on and shadows growing longer. In order to make sure of getting back to the Whiterock track before dusk it was time to depart. Once again the main entrance to Blackrock had us beaten! Interestingly, not very much of Tim's 'well marked track' was found on the way back and so the second route was established.

Day 2

The rediscovery of the Dapa Entrance had provided a fix by which to pinpoint the other entrances; at least, that was the theory. All the '88 & '89 survey data was in Camp 5 and we began the business of punching this into Survox.

Armed with coordinates and filled with confidence, Richard & I decided to go for it and head back to find the Racer Entrance complete with sufficient gear for a one night bivi. The plan was that another team would head into Whiterock to drop a pitch into what was thought to be Firecracker. The two teams would meet up the following morning in Firecracker and share a can of Tiger Beer... Never make plans - at least, not where Blackrock is concerned!

The Pointless Crew left Camp 5 at 9.30 at the start of what was to be our longest day! A coordinate had been established for the Racer entrance, based on the '88 data and a rudimentary understanding of the UTM grid system. As expected, this had placed the entrance near to the Penan camp. All went remarkably well and we reached the Penan camp and recommenced the search. Our start point was at the head of a small washed-out stream bed which ran alongside the mountain. From here we worked up and northwards

(remember this...). After about fifteen minutes the heavens opened and we decided to head south towards Dapa entrance for shelter. Unfortunately however, this proved further than expected and the rain eased off somewhat so we returned to continue searching. The area between the 'tall cliff' stream sink and the Penan camp were thoroughly searched in very difficult conditions. Scrambling around on steep, slippery, karst slopes in rain is recommended as a certain way of breaking a bone.

It was now 3.30 and the light was beginning to fade so we decided to cut our losses and head for Dapa Entrance to bivi. This was a mistake; it would have been more sense to head back to Camp 5!

The slope beneath Dapa entrance is very steep and littered with vertical cliffs. Richard had had a lot of trouble getting down after finding the entrance a couple of days earlier and he had the benefit of midday sunshine and dry conditions. On this occasion the light was fading, the rain was falling and everything was soaked including the explorers, their spirits and their heavy rucksacks. The GPS had no trouble fixing the entrance, 70m @ 70°, the slope became steeper, 50m @ 80°, steeper still, 30m @ 90°. Unfortunately the 30m was a vertical cliff towering above our heads. By now the light was all but gone. Backtrack, try to climb up further to the south, a slip, a fall, could have been nasty, this was getting silly. Now 7km from Camp 5, no sign of Blackrock other than a useless GPS fix, soaked, filthy, bedraggled, tired, disheartened, dejected, but never lost! What to do? The words of a wise Berawan came to mind, "never travel through the forest at night".

It had been very difficult to climb back down the slopes in the half light. Travelling through the forest in daylight is bad enough but to embark on a forest journey in the dark, after heavy rain and without a good track is a serious challenge. Although we are some of the most experienced surface bashers out of all the Mulu veterans and knew the risks, there was little option other than to head back to Camp 5. This was going to be a long and interesting night and it was now 7.00PM.

A few squares of chocolate and we were off. During the day views are never more than 10m ahead, at night this reduces to the beam of the head torch, which gives no indication of distance, detail or form: everything beyond the beam is blackness. By this time we had been on the go for nine hours. All the streams were in full spate and the ground was running with water. The slopes were muddy and slippery and the rattan showed no sympathy. I recalled an entrance just south of Racer; a possible bivi site? Remarkably we found it, right beside the track. Unfortunately it was a bouldery little hole with more drips inside than there were out. We gave it a miss; if only Blackrock had been as easy to find.

Navigation was by compass, generally heading north east but keeping as close to the mountain as possible. Unfortunately seeing the mountain was impossible unless it was within touching distance: progress was more by feel than sight! A track would be found, followed and then lost as it ploughed into tree-fall. Inevitably the route drifted away from the mountain in order to get around obstacles and this led into swampy ground which added to the discomfort. We then had to head due east to make contact with the limestone again. This process was repeated numerous times and our progress was more a zigzag than a direct route. Occasionally a cut twig would be found, bingo - back on track again but not for long, we were in the clutches of dense tree fall, yet again; the only way was to cut through it, again. Snakes... what snakes? They'd be long gone after hearing us thrashing around, just avoid the rattan...

The forest is a very different place at night: bats wheel around at low level, occasionally flying up at your head torch to take an insect trapped in its beam. The sounds are intense. Eyeballs reflect in the beam of your lamp, some spiders, some frogs, others moths, some

seem like creatures that would be at home in a science fiction movie. One set belonged to a Moon Cat, shining back with great intensity. The animal stalked around, a safe distance away, always looking towards the light. It stopped, made a move to climb a tree, then as quickly as it appeared it was gone into the blackness.

Eventually, we were heartened to arrive at the Big Boulder. By now, the rest of the team would be relaxing in camp, probably drinking Tiger Beer!

Half an hour later we were at the Whiterock junction; our journey had taken three hours but we weren't out of the wood yet. Although the track back to the Headhunter's trail was well defined we decided that one would go ahead and one stay well back to ensure one person was always on the known track. This proved a wise decision, as the lead man lost the way in a couple of places. The swampy areas were now very swampy indeed but teetering around on logs trying to keep feet dry was the last thing on our minds - by this time everything was wet for the tenth time.

The Pointless Crew arrived back at Camp 5 at midnight, with aching limbs, fifteen hours after we left. We had never stopped. Defeated again on yet another pointless attempt to find Blackrock!

Day 3

Not to be beaten, further studying of the '89 survey data revealed a surface traverse between Centipede and Racer. This would be a more accurate way of pinpointing the Racer entrance as it was a single traverse made on one day, unlike the numerous traverses made over two expeditions which had been used to establish the underground route. An error was also found in the underground data which altered the calculated position of Racer slightly.

The coordinates were punched into the GPS and, undaunted, the Pointless Crew headed off on their sixth attempt to find Blackrock. This time we were joined by Pete (I'll come with you to loosen up my bad back) O'Neil and Mulu veteran Dick 'The Choke' Willis - if any group were doomed to failure, this was the one.

Things progressed well, apart from the route-in being completely different to the last four. The group arrived at the head of the small washed out stream bed from which we had started some days before. The GPS fix suggested the entrance would be south from here, not north as previously thought. We decided to head further south, past the GPS fix, then the head up slope and split into two teams to head north at different levels. Pete and I immediately found a small hole at base level with a powerful draft emitting - things were looking up. We continued on a sloping track generally north-east, up slope and another drafting hole was found. Our theory was that there would be a howling gale coming out of Racer so it would be easy to find since the cold draft runs down slope; just keep going and wait for the draft to blow you over - wrong again!

Climbing further up, we came to a large area of tree-fall and a difficult route was taken through this on loose rocks and rotten timber. The ground below was fairly steep. Climbing down to investigate the lower area, I came on some dense foliage which appeared to be shivering, bingo! Racer entrance had been found, at last! It was totally obscured by foliage with a large tree trunk lying across the opening complete with branches and new growth. As a result we had to cut our way in, through thick undergrowth. The draft was intense but rather than running down the slope, as expected, it was directed upwards and into the tree cover. Clearly this entrance would not have been discovered easily from below, as it gave no evidence of its location.

Apart from the camouflage it was just as we remembered it. We headed in as far as the

pitch down into the Snake Pit, had a bite to eat, then returned to Camp 5. On the way back a positive attempt was made to stick to the side of the mountain, never climbing onto the limestone but always walking just off it. This proved a great success and was the easiest of all the routes taken through this ground; the sixth!

After six attempts The Pointless Crew had redeemed our reputation and re-discovered a cave which had only taken us two days to discover in 1988! Racer was fixed on GPS and we were *never* lost!

Unfortunately, there's still the niggling matter of the Centipede/Hayloft Entrance. It's out there somewhere! Will it ever be found? Are *you* tough enough to rise to this pointless challenge?

North Api Surface Reconnaissance

Rob Eavis

On arrival in the Melinau Gorge, our helicopter headed east, past Camp 5, to inspect both the route of Mark Wright's intended climb up the Benarat cliffs and the north end of Mount Api, especially the area around Canopy Cave, a huge entrance high above the floor of the gorge, which is reputedly blocked with sediment. From the air, a number of interesting features were noted, including what appeared to be a blind valley above a large escarpment just to the east of Canopy Cave.

As a result, we decided to try to locate Canopy Cave and examine these features on the ground. Years of experience in Mulu prove that you have to work through the forest, entrances can be invisible even from only a few metres and nothing replaces foot-slogging around on the broken, vegetation-covered slopes of the mountains. So, with Mazak as our guide we headed along the path up the gorge for about 1km and turned off right onto a small trail. This skirted along the bottom of the slope for some distance and, about 45 minutes from camp, we found a little clearing in the trees. From here, at the top of a sandstone ridge, we could see what we thought to be the top of the Canopy Cave entrance, on a bearing of 210 degrees and a clino reading of about +40! With these as guidance, we set off up the slope.

After two long days making tracks through difficult terrain and balancing on pinnacles, we reached a large escarpment, possibly 100m high in places, which ran for 300m across the slope at an altitude of about 700-800m. At the foot of this cliff-face we found numerous passages all of which, unfortunately, were sediment filled within <10m; however this provided definite evidence of cave development at this height. The largest entrance, tucked away up a vegetated rift, was about 5m across and 4m high. Climbing up the fill to the top of the sand, I found a small airspace with a definite draught coming out, but this would require a long term digging project to create a way on! We logged all features of interest with the GPS logged and observed a number of possible entrances higher up the wall.

Looking at the photos we had taken from the helicopter, we deduced that we had headed up slope too soon and gone past Canopy Cave. On our return we headed east across a recent rock fall onto a ledge which looked out across the entrance of Canopy. Here we were at the same level as the large stalactites hanging in the entrance but were frustratingly unable to see into it at all. Any progress from here would have needed rope and as it was getting late we turned back.

Some days later, after a camping trip in Whiterock, I was eager to get back up to Canopy and try to get to the entrance from the bottom. With Mazak as our guide again, Syria and I headed up the slope, this time in a more easterly direction. Just over an hour later we found two large entrances at the bottom of a small escarpment. The first had a steep climb down for about 30m into a sizable chamber with plenty of bats. The end of this, about 60m in from the entrance and up some loose climbs, seemed to be blocked by a huge part of the wall that had collapsed across the passage. The second feature was a little further down the slope - a horizontal passage 5m wide by 10m high which went south for about 50m to what initially looked like a calcite choke. However, half way along, I followed some interesting crawly passages for about 150m to a climb up a slippery mud slope which, to my surprise, already had a Bluewater 10m handline down it attached to a ring hanger and bolt. Looking on from this point, the cave appeared to keep going and there was a promising draught. Thinking that someone back at camp would know of this find, I returned to the surface. After taking GPS fixes on the entrances, we carried on up the slope until we hit an impassable patch of pinnacles and used this as a convenient excuse to stop for the day.

The next day I was scheduled for another Whiterock trip, so Mazak and I sat down with the aerial shots and discussed the best way to get to Canopy Cave. We decided on a route and he volunteered to spend a day cutting track to the entrance while we were underground in Whiterock. Later, when I asked him how he had got on, he showed me on the photos that he had got over 2 thirds of the way, over very easy terrain, by going up the gorge as far as he could before heading up slope.

The next day, while the others rested and drew up survey data, Andrew Atkinson and I were dragged up Mazak's trail at lightning speed. He was as keen as the rest of us to make it there today, on our fourth attempt. We followed the path up the gorge, past the ridge and down to a small stream which we followed a short way before traversing up the slope again, off to the left where we passed a large cave/shelter on our right. About 5 minutes past this, both Andrew and I noted a cool air coming down from our right, a possible indication of an entrance. Remembering this for later we carried on. After about an hour climbing up Mazak's track we hit a cliff on our left and followed the base of this up the slope until we got to a wide gulley at the top. From here, the cliff arched around and headed back down the slope to our right. Looking at the aerial shots, we figured out we must be at the gulley to the east of Canopy Cave - the one that we spotted from the air which appeared to have a blind valley behind. At the top of the gulley, Andrew climbed a very steep mud ramp to what seemed to be an entrance but found nothing and we carried on around the base of the cliff to the west, aiming for Canopy.

After 5 minutes we found a small cave on our left with multiple entrances, all quite small. Inside they immediately dropped into a sizeable chamber (40m x 30m x 10m) with a flat mud floor, covered in pig tracks, generating the name "Boar Cave". A small rift on the right side led down to a flat-out bedding plane, issuing a slight draught, but I couldn't squeeze in. About 5 minutes further along the cliff, Mazak pointed out a small cave entrance on our left which had a definite draught coming out. This went into about 80m of fossil phreatic rifts, some parts of which were quite well decorated. Andrew also located another entrance, just south of the first, where I failed to free-climb up into a small tube, heading up the steeply angled bedding, but it didn't look very promising anyway. Back on the surface we started heading down steeply into a gulley, which trended up to our left.

Heading further up the gulley we could clearly start to see the stalactites in the roof of Canopy Cave and we speeded up. A 10m high scarp, straight across the gulley blocked our way and as I went right, Mazak went straight up. After 15 minutes of butchery in thick rattan I met up with Mazak again, who was dozing off already, in the entrance of the huge cave.

The entrance to Canopy is split up into two halves, about 20m up to the first overhang and a bit further again to the top stalagmites. The whole width of the bottom half, below the first overhang, is completely full of sandy sediment but from our position it was impossible to see into the cave above the overhang. One or two swifts were flying about, near the very top of the entrance, and there was also a lot of water dripping down from both overhangs, which had deposited a slippery, white paste on the walls.

Accessing the upper level will be very difficult from the base of the entrance. Free-climbing is out of the question due to the slippery walls and the nature of the rock will make bolting very difficult. The best approach is probably to bolt across from the vantage point we had reached, earlier in the expedition.

After a good look about I followed Mazak back down his approach route. At one vertical section, we found an old climbing sling and karabiner wrapped around a rock, the only evidence we discovered of the few previous teams to have made it this far. We met up again with Andrew and started to head back down our path. On the way Andrew free-climbed

30m to an entrance on the eastern side of the gulley which we had seen on the trek up. I joined him in the entrance with lights and we started to explore. After about 10m we entered a large chamber (25m x 25m) with a flat floor. At the back of this the apparent way on was completely blocked with sediment and there was no draught. We took a few photos before returning to the entrance to admire the view of Benarat.

About 45 minutes further back along our track we again noticed the cool air coming down from above and after a few more paces I smelt guano. This was the way that the entrances to both Blackrock and Whiterock had first been located, so I was immediately off up the slope. I passed some difficult climbs and gained a 5m wide, 15m high entrance. This had a moderate draught and an awful smell of guano, but before I saw the entrance, I could hear it! This cave had more bats than I have ever seen, so close together. Inside the cave they were everywhere, swarming around me, coming out of the walls and the floor. Everywhere I looked I could see the glowing orange of their eyes. After about 30m in, I dared go no further, as more and more were flying into me. Through this flying river of black I could see a vague continuation and, satisfied with that, I retreated. After quickly fixing a GPS location we headed back to Camp 5, a journey that took less than one hour.

A return trip was carried out by Pete, Richard C and Matt about 10 days later, led by Mazak. On the climb just before the cave, a large handhold gave way causing Matt to fall. Luckily Pete was just below him and provided a soft landing! Richard and Mazak continued to the cave but they considered that the draught was caused only by the movement of the bats. Clearly a return trip is necessary, with the explorer being suitably dressed!

Diving

John Volanthen

The Benarat 2005 diving project took place over a 3 day period between September 30th and 2nd October. Rather than operate from Camp 5, we established a temporary camp in the rest hut at Lubang Cina to allow easier access to the inlets of the Terikan system.

We had 2 objectives:

1. To link the component parts of the Terikan system together by diving Sumps 1 and 2
2. To dive the upstream Sump 5 in the Terikan system and, if possible, pass this and explore cave in the direction of the Cobweb system, 4km away.

The 2 divers, Martin Holroyd and myself, accompanied by an excellent support team consisting of Tim Allen, Rich Gerrish, Dick Willis and Mark Brown, made the trek to Lubang Cina, where we collected some gear that had been stashed by other team members some days before. Once organized, we made the 40 minute walk up to Arrow Inlet, which lies downstream of Sump 2, and upstream of Sump 1. This had been previously located by Tim Allan and gave quick and easy access to the Terikan streamway and Sump 2.

Our first objective was easily achieved. Sump 2 proved to be a simple short dive of about 20m in length and 3m in depth. An arch under the left wall (looking upstream) was passed by both divers to give access to the ongoing Terikan streamway. On returning to dive base, it was decided that both divers would attempt to pass Sump 1 and then continue down the streamway to the resurgence, removing the need to carry equipment back to the camp through the forest. Martin led off and Sump 1 was passed, proving to be longer than Sump 2 (40m) and 12m in depth. Underwater visibility in this part of the cave was disappointing, being less than 2m and very milky. The streamway was followed to the resurgence where the support crew was waiting in the sunlight and swimming in the river.

After an uncomfortable night's sleep, the walk up to the Blue Moonlight Bay entrance commenced with more equipment than the previous day. The approach started with about an hour's walk on the flat alluvial plain, past the Arrow inlet, and then a strenuous ascent up the karst to the entrance, situated in a depression. Once underground, the caving was fairly straightforward and the streamway was gained after about an hour. Tim and Rich went off to pursue another lead, whilst Dick and Mark helped us to kit up. Once in the water the sump pool was found about 50m upstream. Visibility was worse than the day before and after securing the line we dived along the right wall of the cave. Underwater, the sump dropped vertically downwards as a large fluted pot. This was followed to a depth of -53m where current could still be felt coming up and the shaft appeared to continue. At this point, the dive was turned, as neither of us was really equipped for such a deep dive. The shaft circumference was examined at both -20m and -6m and, as expected, nothing of significance was found. The way on is certainly down!

On surfacing and returning to base, we decided to take a look at the downstream Sump 4 with a view to diving our gear out again. Once again the sump proved to be shallow but on surfacing in an off-route air bell it was decided that it would be a better bet to carry out the way we came in, rather than risk not getting through and having to bivi in the cave without gear. The camp at Lubang Cina was reached at dusk after a successful but frustrating day.

Equipment

I used a small chest-mounted rebreather with a 4L and 11L cylinder. Martin used 2No 11L

Both the 11L (Ali 80) cylinders and Oxygen (for the rebreather) were sourced locally in Miri and neither proved ideal; the 11L cylinders were too large to carry easily in the forest or the cave, whilst the oxygen was only 150bar supply pressure.

From the limited diving done by ourselves and Martin Farr the sumps here seem to fall into 2 categories, so far:

1. Sumps on joints or faults. These are fairly short and shallow. For these, a pair of 4's or at most 7's should be more than adequate, with no BC, minimal lead, small lights etc. Sumps that pass under whole beds of limestone. These appear to be deep and a diver attempting to pass this type of sump needs to be prepared and fully equipped to dive to at least -100m.

Due to the type of equipment we sourced locally, we went for a middle ground between the 2 types and, with hindsight, this was not ideal. Future expeditions should probably decide which model to go for and then stick to it, accepting that a lightweight approach will not allow deep sumps to be passed, whilst a heavyweight approach is not suitable for carrying gear up a long streamway beyond sumps.

It seems that cylinders sourced locally will be filled to <200 bar and O2 to 120 bar. Next time, it will probably be worth shipping filled cylinders by air freight or taking a booster. The Ali 80's available locally are not ideal for short sumps and filling 3 or 4L cylinders by decanting in the field leaves both cylinders with less than ideal fills.

Notes for future divers in caves of Mulu

Carrying diving gear anywhere in the forest is not easy, so keep gear to an absolute minimum! This is particularly the case on the limestone slopes of the mountains, which are characterized by sharply eroded and often unstable blocks of limestone, obscured below rotten vegetation.

Whilst there are many "dry" leads in Benarat and Api to go at, at some point it will again be desirable to attempt to pass sump 5 in Terikan. With the benefit of this year's experience I would suggest the following:

2 Divers, with the following equipment each:

1 rebreather

1x 11 Air

1x 11 Trimix minimum 10/50

Spare Fill of softlime and minimal camping gear

Spare O2

Thin Dry suit (I shivered at -50m and during decompression with a 5mm wetsuit)

1x 7L of 50% and 1x7L of 100% O2 hung in the shaft for emergency use.

To avoid decompression problems associated with tiredness, exercise and dehydration. I suggest camping the night before diving and the night after surfacing. The dive site has a good, sandy floor close to the water's edge. Diving with camping gear will allow divers to make maximum use of a single traversal of the sump. In practice, it is unlikely that more than one attempt can be made on each expedition as cylinders and other gear need to be ferried to Camp 5, then to Lubang Cina, then to the cave.



John Volanthen and Martin Holroyd exit from Terikan River.

© Rich Gerrish



Canopy Cave seen from the helicopter

© Rob Eavis

Photography

Robbie Shone

Underground Photography can be and most often is a very difficult practice in which to achieve high-class results. Thankfully, developments in modern digital technology have made the success rate a lot higher. This was particularly evident during this expedition when almost every team member had brought out a compact digital camera and a few had digital SLRs. (Only Dick Willis had a non-digital SLR!). The immediacy of the digital results ensured that we had a great selection of photographs of surface scenery and Camp 5.

However, underground in the giant fossil passages and enormous black chambers that characterise Mulu, photography was another story. I had been fortunate enough to assist Andy Eavis on his photographic trips in 2003 and this gave me some limited insight into what lay ahead.

Andrew Atkinson and I led the photographic assault over the duration of the expedition. Early on I struggled to complete successful photography trips whilst trying to carry out exploration and keeping up with the survey teams. Needless to say, this resulted in the photography taking a back seat. Meanwhile, Andrew recorded the early discoveries in Moon Cave whilst the explorers pressed on ahead.

The expedition had several laptop computers and I had brought out a card reader to ensure that all card types could be downloaded. We set up a system in which all expedition members had their own folder into which they could download their photographs, for storage and backup and from which they were readily available.

Andrew Atkinson used a Pentax *ist D digital SLR camera, with an 18–35mm zoom lens, on which he endeavoured to shoot all his work using ISO 200 - a difficult challenge in Mulu, especially when your maximum aperture is F4. However, with a combination of five electric flashguns rated between GN 25 – 40 (ISO 100), Andrew collected a comprehensive portfolio of images from each cave he visited. He used 'Firefly' slave units mounted to the hot shoe of each flashgun, all triggered by an infrared flash from his camera.

Meanwhile, I used a Canon EOS 20D digital SLR camera with a 10–22mm (16–35mm) wide-angle zoom lens, enabling me to take useable shots even in Api Chamber. Both of us mounted our cameras onto tripods when taking long exposure photographs, but tended to hold the camera in our hands and slave the electric flashguns. This method is much more efficient and less time is wasted setting up photographs.

In Mulu the high humidity is a serious problem when electric devices are exposed for some time. Most of the team tried to store their cameras in sealed airtight containers packed with silica gel crystals, to keep the moisture at bay. Even so, towards the end of the expedition, I lost control of all functions with my camera for a couple of hours, a problem cured by a day in silica gel. Two other members of the team developed condensation and the early stages of fungus on the inside of their lenses. Again, silica gel removed the moisture and stopped further fungal spread.

Part-way through the expedition, the entire team focused attention in Whiterock, due to the high number of going leads and this was a good opportunity for a photography team to record the newly discovered cave passages. After a 3-day camp, the two photographers came away with plenty of useful data. As an added bonus, during this photographic trip Dave Nixon and Mark Brown discovered a chamber of colossal proportions – Api Chamber. This created an immediate problem - had we brought enough big flashbulbs? How many big flashbulbs did we actually need to illuminate the space? The fear of not successfully re-

cording this massive void played on my mind and when Tim Allen used the sat-phone to call Dick Willis prior to his departure from the UK, he asked him to collect as many large PF100'S and PF60's as he could and bring them out to Mulu.

Not knowing how successful this collection of bulbs would be, I thought seriously about the photographic team, for the monster chamber. I calculated that I might be able to sacrificing flash-power for reliable 'flash monkeys. After much thought I decided to go ahead and carry out the photographic trip of the chamber before Dick's arrival and therefore missed out on the chance to add yet more giant flashbulbs to my small stock of large Edison screw bulbs. Photographically, this turned out to be the right decision but led to a lot of grief from Dick, who had driven all over the UK to build up a supply of big bulbs, carefully packed them and brought them out to Camp 5 without a single breakage. They were never unpacked and came back to England to be stored for the next expedition! Thanks, all the same, Dick.

'Api Chamber' was photographed using 3 x PF60b's, 1 x PF5b and a single flash from an electric Vivitar 283 flashgun as foreground lighting. Not having the benefit of a Polaroid camera, as Jerry Wooldridge had in Sarawak Chamber in '84, we located everyone's position using small Edison screw clear bulbs before proceeding with the ultimate shot and we used walkie-talkie communications to ensure correct positioning. Using ISO 400, we were able to capture a dark, cloudless image and I knew that, with a small amount of trickery in Photoshop, I could lighten up the shot: I didn't want to use ISO800. Using open shutter, we were able to manually fire each bulb and build up the image over a period of a few seconds. At 14mm (22mm), a large proportion of the chamber was in the viewfinder, however at this setting it does throw everything much further away and make the space appear slightly bigger than it actually is. Using a maximum aperture setting of F4 over six seconds we eventually got the result we were after.

We then moved camera position to a much lower location on the boulder ramp from which the chamber had been discovered a few days earlier. Here, with only 2 x PF60b's and plenty of PF5b's left, we decided to try our luck on a 'one off' shot looking up towards the point from which we had taken the first photo. With some trepidation, waiting for the furthest PF60b to go off, I closed the shutter and we had captured a second good image of the chamber from a different viewpoint. This image appeared slightly more noisy (grainy) than the previous one, due to the camera's shutter being open for around 20 seconds while we waited the final bulb to go off.

Turning our attention to Moon Cave, Andrew and I continued the photographic work with assistance from the team on a further two more trips, interspersed with exploration.

We found the PF5b bayonet fitting flashbulbs worked best in the large dry fossil passages in both caves. Andrew maintained his technique of using four or five electric flashguns all slaved simultaneously. However, out here in Mulu the caves are simply too big for electric flashguns and at times he had to resort to using the more powerful flashbulb.

One of the great benefits of digital technology was that we were able to present a CD of the best of our underground photographs to the National Park Management immediately after we concluded our time at Camp Five.

Special thanks to Dick Willis, Jerry Wooldridge, Glenn Jones, Kym ap Rhys, Paul Deakin, David Gibson, Andy Eavis (Mel), and anyone else who I have missed off this list. Their time and effort supporting our photographic needs were overwhelming. I appreciated it then and still do. Without their help we would certainly not have been on top of the photographic situation at Camp Five. Thank-you.

"No survey, no evidence". It's a mantra familiar to all cavers - if you explore it you survey it. But surveying is in a state of change. Computer hardware has developed to the point at which it is possible to take kit into difficult environments and more or less guarantee its survival. Combined with advances in software this has created a situation in which it should be possible to process survey data and generate a finished drawing, plan and elevations, by the end of the trip. The change is undoubtedly taking place and the evidence from a number of groups is that it already has. In the context of our Mulu expeditions, things are moving in the right direction but have not yet fully arrived.

Why not? Well, as usual, a combination of the limitations of technology (hard and software), combined with the habits and attitudes of team members.

Underground surveying in Mulu aspires to good practice and is improving continuously: instrument sets are numbered and calibrated, allowing their accuracy to be checked and, if a set is shown to misbehave, earlier data sets can be identified and corrected where necessary; fixed survey stations are used wherever possible, replacing old habits of sighting on the surveyor, and survey teams leap-frog, to correct errors created by differences in height. For someone brought up on Dave Brook's assertion that errors are largely self-cancelling the latter, in particular, represents a change of habit but the results justify it, no doubt. The inertia doesn't come underground – it's manifest back at camp and after the trip.

Our equipment included 2 expedition laptops – a Panasonic Toughbook (very kindly provided by courtesy of the company, <http://www.panasonic.co.uk/toughbook/>) and a Toshiba, loaned by Winston Eavis, plus various personal machines and accessories. Camp 5 has a generator to supplement its solar panel/battery system and we paid for additional fuel to run the generator each evening in order to have sufficient power to use the computers and charge batteries.

On return to camp, survey data was processed into Survox (www.survox.org) to generate 3-d line surveys. On this trip our survey-guru was Andrew Atkinson and his intention was to further process survey notes using Therion (<http://therion.speleo.sk/>). However, this stage performed poorly for a number of reasons – firstly it relied on the ability to scan drawings in order to digitise them. However the scanner didn't arrive in Camp 5 until more than half-way through the trip, by which time a substantial backlog of data had built up; secondly a bug in Survox meant elevations could not be produced; thirdly, the software was not user-friendly, partly due to the software and partly due to the complexity of the job it performs. As a result there was little enthusiasm from members of the team to spend time working with it in the evenings (there's an interesting contrast here to the perceived sociability of 'drawing-up' using traditional pencil & paper techniques); finally, the programme was not fully stable and users encountered software glitches which required technical expertise to sort out. Fortunately, the team had this expertise in the form of Andrew but his enthusiasm and commitment for the use of this final stage in computerising the survey was not widely shared and, much to his chagrin, as a result he was unable to generate the final, completed surveys on the day of departure. By the end of the expedition all the walls of the new survey and some of the detail were done and a small scale printout of both caves was produced and handed to the Park Warden although this was lacking the 2003 finds in Whiterock which had not been digitised.

The difficulties of using Therion continued on return to the UK where Andrew and Wookey established an online data repository using (<http://subversion.tigris.org/>) and Andrew produced and circulated a comprehensive user guide. The system provides access to all

authorised users, with full version control and the facility to 'roll-back' to an earlier data-set if an error results from any process. Andrew's intention was that team members would download material from the repository, Therionise their drawings and upload the resulting data. At the end of this process he would then be able to compile the finished survey from its constituent parts with the effort having been shared between the various surveyors rather than largely falling to one individual, as in the past - a fine objective.

Unfortunately this didn't happen. On return to the UK (Hong Kong in Rich's case), the lack of enthusiasm for Therion or drawing elevations on the centre line was compounded when the pressures of daily life took over and little progress was made. Weeks drew into months as an extended debate took place between the advocates of a computerised process and the cynics. Eventually a pragmatic decision was taken and it was agreed that the final surveys of Whiterock and Moon would be produced by traditional drawing techniques using the Survox centreline as a basis: Moose (Whiterock) and Robbie (Moon) sharpened their pencils...

Reflecting on this (and similar lessons from 2003) the following key lessons stand out:

- There should be an accepted consensus about the detailed process to be followed and tools to be used, before surveying starts – this includes agreeing the version of any software.
- All members of the team should be familiar with the agreed software tools in advance
- Software tools should be developed to the point at which they are stable and sufficiently user-friendly to be acceptable to non-techies. Complicated and/or unstable tools (or versions) make it necessary for the team to include someone with appropriate technical skills which may not always be possible.

In a location like Mulu, with repeated visits over an extended period, documentation and storage of data is critical to provide continuity and to enable datasets to be maintained over time, as necessary, a point clearly illustrated by the loss of the early Mulu data. This process will be enhanced by one nominated individual taking ownership of the survey process for an extended period of time, a role Matt Kirby has now kindly volunteered to adopt. Passing this responsibility from individual to individual, depending on participation in each individual expedition, has created long term problems.

Building on work carried out by Ollie Betts and Wookey, during and after the 2003 trip, Tim Allen used the same processes to reconstruct data for Clearwater, Wind, Lagan's, Leopard, Imperial, Wonder, Prediction, Cobra, Nasib Bagus, and Drunken Forest; for which the original survey data has been lost. Meanwhile Matt Kirby reworked the original survey data from the '88, '89, '91, '96 and '98 expeditions and then linked all the resulting data sets to form an overall Survox dataset for Api. This was a true labour of love on both their parts. As a result, we are now able to generate 3-d files for all Mulu caves; a total of 230,461km. Tim has also now created a wire-frame diagram for G.Api onto which the 3-d files will be presented.

In the event that sufficient resource becomes available, we intend to digitise the drawn surveys to create a fully digital survey record. Therion is not the only programme under consideration and as one of them reaches the appropriate levels of usability it will be adopted for field use.

Medical report

Pete O'Neil

The expedition's medical kit was essentially the Benarat 2000 kit, originally put together by Dr Angela Hare. Since 2000, the kit has been used on many trips and before each one, out of date items have been replaced and the contents checked.

Prior to our trip, the kit had been used by the Vietnam expedition team and through an arrangement with Howard & Deb Limbert we did not repurchase the kit but borrowed it on the understanding that we replace and restock where appropriate, a task carried out by me and Dr Hare after my return from Mulu.

In the field we worked with one main base camp kit and three small travelling kits. The contents of these are specified below.

Medical problems and injuries were thankfully few and minor. Good hygiene and the comparative luxury of Camp 5 were no doubt major factors in our overall good health, assisted by drying out clothes and feet in the sun whilst, at the same time, getting sunlight onto cuts & wounds. Good weather notwithstanding, small cuts and abrasions were also treated with betadine and most members of the team liberally applied anti-fungal foot powder.

Medical problems experienced during the expedition:

Signs of Mulu foot were observed occasionally but this unpleasant condition didn't fully establish itself on anyone: most people were diligent with foot powder and clean socks.

A fungal infection/rash in the groin area of one caver was treated with Daktacort hc cream and responded well.

An eye infection was treated with Chloramphenical. However, as the eyes cleared up it became apparent that a sty in right eye was also a problem and this awaited treatment on the caver's return home.

A member of the park staff was treated by Rich Gerrish for infected boils in his armpit, the infected area was cut & drained then cleaned and dressed. A course of Erythromycin was supplied.

Various painkillers and anti-inflammatories were used for an assortment of injuries including bad backs, sore knees, headaches etcetera; none were serious.

Medical kits

Travelling kits (3 in total) contained assorted pain killers, bandages, Imodium, plasters and medi-swabs.

Two emergency dental kits were also taken.

No medical kit will ever be perfect. Prevention is always better than a cure and this must be a top priority in the field - particularly when the medical officer is actually an electrician!

Medical Kit Contents:

Mepore dressing	Stitching kits	Loperamide
Burns dressing	Scissors	Prochlorperazine
Betadine	Tweezers	Rehydration sachets
Inadine dressings	Safety pins	Diazepam
Topper swabs	Thermometer	Daktarin foot powder
Tapes & plasters	Rubber gloves	Canesten
Foam splints	Sterile water	Daktarin cream
Cotton buds	Chloroquine phosphate	Flamazine
Tubi grip	Mefloquine	Lamsil
Large, medium and small bandages	Malarone	Flucloxacillin
Crepe bandages	Bactroban	Amoxicillin
Leukostrips	Audicort	Erythromycin
Tape bandages	Chloramphenicol	Daktacort hc
Medi swabs	Cetirizine	Diclofenac
Cling film for burns	Chlorpheniramine	Ibuprofen
Paracetamol	Dihydrocodene	Tramadol
Savlon	Co-proxamol	Epipen (adrenalin injector)

Logistics

Dick Willis

Permission for exploration is granted by the Director of Forests, following a defined application protocol. Obtaining permission takes time and its receipt is a considerable privilege.

The expedition members flew on standard flights. However Malaysia Airlines provided us with an invaluable excess baggage allowance.

As in recent years, the expedition used the services of Tropical Adventure Sdn Bhd to organise logistics in Sarawak, as well as river transport, cooking and field support at Camp 5. As usual, their services were provided efficiently and with great good humour. The use of local personnel adds value to the community and reduces logistical demands upon the team, allowing its members to concentrate on exploration.

Accommodation at Long Pala on arrival and departure was provided by The Royal Mulu Resort and for this we are very grateful. Overnight stays at the Resort, on arrival and prior to departure, provided a welcome rest after or before travel, an opportunity to see old friends in and around Long Pala and a secure deposit for valuables and equipment.

In the field, both above and below ground, we were accompanied by various National Park Officers who were supportive, competent and great company. Their colleagues at Headquarters were welcoming, efficient and highly supportive. Without the cooperation of the Park staff our work would be impossible and the experience of caving in Mulu would be greatly impoverished.

With the permission of the National Park, the expedition utilised the VIP room at Camp 5 as a base, over-spilling on occasions into other rooms. There is now a capacity limit for guests at Camp 5 and it is essential that the Park is aware of numbers well in advance so that they can balance visitors to ensure that capacity is not exceeded. Camp 5 has diesel generation to supplement solar electrical power and the expedition supplied additional fuel to allow us to run the generator in the evenings to power laptops, chargers etc.

The establishment of forest camps is no longer generally permissible. All activity was therefore carried out from Camp 5, other than activities around the Terikan and towards the Medalam Gorge. For these trips, we utilised the rest shelter at Lubang China, extending the cover with the use of a camp sheet.

For underground camping, it is no longer permissible to use petrol stoves, in order to avoid contamination of the cave environment. The Park kindly loaned us gas stoves which were light and stable but were bulky and took up substantial space in rucksacks. All forms of waste now have to be removed from the caves. Carbide lights are no longer permitted in Mulu. The majority of the team used Petzl Myo lights but two individuals were supplied with Speleotechnics Nova 3 lamps.

Boat hire costs were substantially increased in 2005 as a result of too much flexibility in travel arrangements. Future trips will set standard dates and individuals who travel outside these will cover the costs of their river transport to/from Camp 5 from their personal funds. Frequent team journeys did, however, ensure a regular supply of fresh vegetables and beer!

Helicopter costs were also sharply increased. This partly reflected increased fuel costs and partly the need to source the aircraft from Sabah, as all units of the Hornbill fleet had been grounded at the time, following accidents.

Finance

Dick Willis

The following table sets out income and expenditure for the 2005 trip with the figures for 2000 and 2003 in comparison.

Insurance for the trip was treated as an individual responsibility. A variety of forms of cover were used, including BCRA, FFS, credit card and extended domestic insurance policies.

Income				Expenditure			
	2000	2003	2005		2000	2003	2005
Item	£	£		Item	£	£	£
Mount Everest Foundatio	1300.00	0.00	250.00	Equipment purchased	1185.60	250.00	425.68
Ghar Parau Foundation	500.00	0.00	0.00	Medical equipment	300.00	300.00	73.11
Hood Award	1000.00	700.00	0.00	Brochure	103.00	0.00	0.00
Sports Council	800.00	0.00	0.00	Vehicle hire	72.48	75.00	470.77
China Caves Project	1000.00	0.00	0.00	Ferry	90.58	100.00	0.00
Spel. Union of Ireland	312.00	0.00	0.00	Boat Hire	480.07	500.00	1384.62
Sales of equipment etc	809.01	0.00	0.00	Helicopter	1449.28	1500.00	1923.08
CF from previous	0.00	1000.00	0.00	Taxi	2.17	0.00	55.38
				Accommodation	824.64	900.00	675.28
Sub total	5721.01	1700.00	250.00	Carbide	45.29	50.00	0.00
Members contributions	11902.45	13525.00	19545.93	Petrol	6.16	20.00	0.00
				Diesel	12.23	20.00	0.00
Total income	17623.46	15225.00	20045.93	Porters	260.87	300.00	295.38
				Guides and camp staff	1273.91	1000.00	1058.46
				Postage	52.86	60.00	81.50
				Misc expenses	256.11	250.00	63.38
				Data processing	200.00	0.00	0.00
				Report	490.00	300.00	300.00
				Contingency		1000.00	
				Core costs sub-total	7105.25	6625.00	6806.64
				Less projected income		1700.00	0.00
				Core costs total		4925.00	6806.64
				Flights	7080.86	6600.00	10869.23
				Insurance	331.00	0.00	0.00
				Food and drink	1917.70	2000.00	2010.45
				Total Expenditure	16434.81	15225.00	19686.32

Expedition members

From the UK.

Andrew Atkinson

Mark Brown

Andy Eavis

Rich Gerrish

Matt Kirby

Pete O'Neil

John Volanthen

Mark Wright

Tim Allen

Richard Chambers

Robert Eavis

Martin Holroyd

Dave Nixon

Robbie Shone

Dick Willis

From the National Park

Syria Lejau

Roland Gau

Jeffrey Simon

Acknowledgements

The members of Benarat 2005 are grateful to the following for their support in establishing the expedition and for granting permission for it to take place.

The State Secretary, Sarawak
The Chief Minister of Sarawak
The Director of Forests, Sarawak
Borsarmulu Park Management Sdn Bhd
Ariena Binti Borhan
Dr Lim Chan Koon
Datu Cheong Ek Choon
Uning Paun
Oswald Braken Tisen

And to the following for their practical support for the expedition:

	For:
The Royal Mulu Resort (particularly Stefan Kubis, Alan Robinson and Marcus Hanke)	Accommodation and equipment storage
Mount Everest Foundation	Grant assistance
Malaysia Airlines, Steve Brindle	Excess baggage
Lyon Equipment, Ben Lyon	Discount on equipment
Speleotechnics, Keith Lewis	Nova 3 lights
Conformance Ltd, Nick Williams & Pete Hall	Logistical support
Panasonic, Chris Bye	Panasonic Toughbook computer
Winston Eavis	Toshiba laptop computer
Robert Bosch Limited	Drills
Jerry Wooldridge	Logistical support
Dave Gibson, Glenn Jones, Paul Deakin and Kym ap Rhys	Flashbulbs
Richard Hii and the staff of Tropical Adventure Sdn Bhd. (particularly Anderson Gawan, Awg Ikwan Awg Zain, Kallang No, Majak Nypun)	Logistical support
Dr Angela C Hare	Medical advice sheets and upgrade of medical kit.
Howard & Deb Limbert (Vietnam Caves)	Loan of basic medical kit.
Dave & Elizabeth Clucas	Support in Miri, Dave for support in C5
Outward Bound Hong Kong	Support for Rich Gerrish
Brian Clark, National Park Manager	Support and encouragement
Other National Park Staff	Welcome and support.
Sue Clark	Hospitality at Park HQ

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