

BENARAT 2020



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



REPORT
on the findings of the
BENARAT 2020
EXPEDITION
to the
GUNUNG MULU
NATIONAL PARK
SARAWAK

During January 2020

Expedition Leader: Tim Allen

Edited by Mark Sims & Tim Allen .



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Introduction/general background/objectives

Tim Allen

This is the report of '**Benarat 2020**' the 29th Anglo-Sarawak Expedition to Gunung Mulu National Park and a part of the '**Mulu Caves project**'.

The expedition arrived in Gunung Mulu National Park on 29th December 2019 and departed on 17th January 2020. Once preparations had been made at Park Headquarters the expedition left for Camp 5 on 31st December and stayed there for a two week period.

The expedition's sole focus was on the caves of Gunung Benarat with the following objectives.

1. To explore leads left by our previous expeditions in the Benarat Caverns System at the southern end of the mountain.
2. To explore underground leads at the northern end of the mountain in the Terikan River System.
3. To identify and explore any leads which may make a connection between the two systems.
4. To investigate surface features for caves
5. To review the survey database for Benarat and make improvements where possible.

Location

The Gunung Mulu National Park is situated in north-eastern Sarawak within the Limbang and Baram Divisions, with its north-west boundary forming part of the border with Brunei Darussalam, (Figs. 1 & 2). It was officially constituted in 1974 and opened to visitors in 1985 and lies approximately 4° N. of the equator. The original boundary of the park covered an area of 528sq km. Gunung Buda National Park was established in 2000 and with extensions to both Parks the totally protected area now stands at 972sq km.

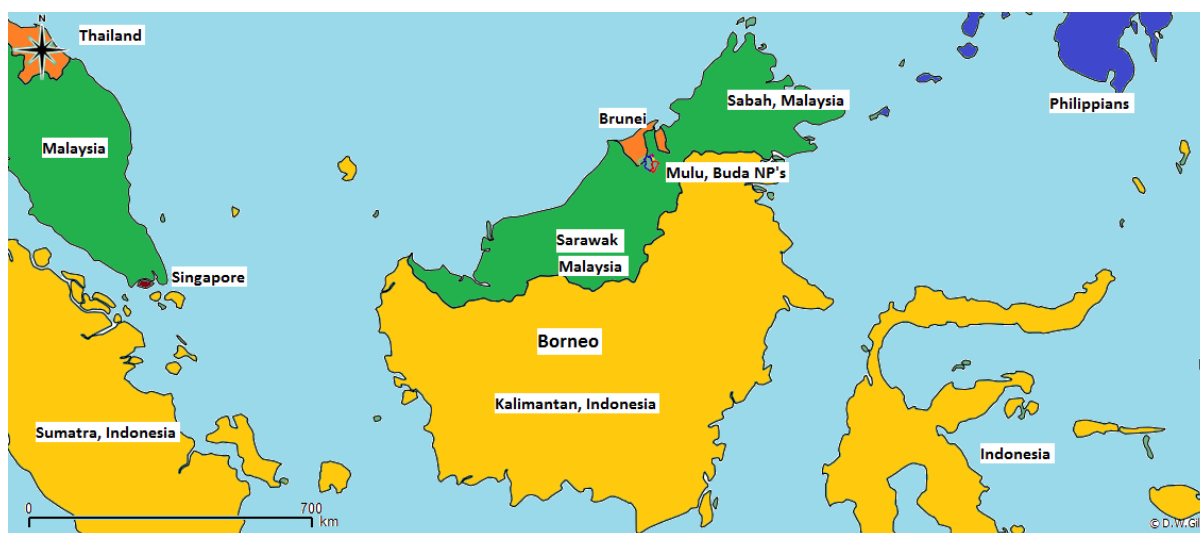


Figure 1 Map showing location of Mulu in Borneo

Centre point of the Totally Protected Area:

4 degrees, 08 minutes, 16.58 seconds north.

114 degrees, 53 minutes, 32.32 seconds east.

UTM Zone 50 N Easting: 45670. Northing: 86750

World Heritage Area Gunung Mulu National Park. (1974)	528.64 Km ² .
Gunung Mulu National Park Extension No 1. (2011)	45.55 Km ²
Gunung Mulu National Park Extension No 2. (2011)	285.30 Km ²
Total Area of the Gunung Mulu National Park. (2011)	859.49 Km ²
The Gunung Buda National Park. (2000)	62.35 Km ²
The Gunung Buda National Park Extension No 1. (2011)	50.62 Km ²
The Total Area Gunung Buda National Park. (2011)	112.97 Km ²
Totally Protected Area. (2011)	972.46 Km²

The caves of Gunung Mulu National Park

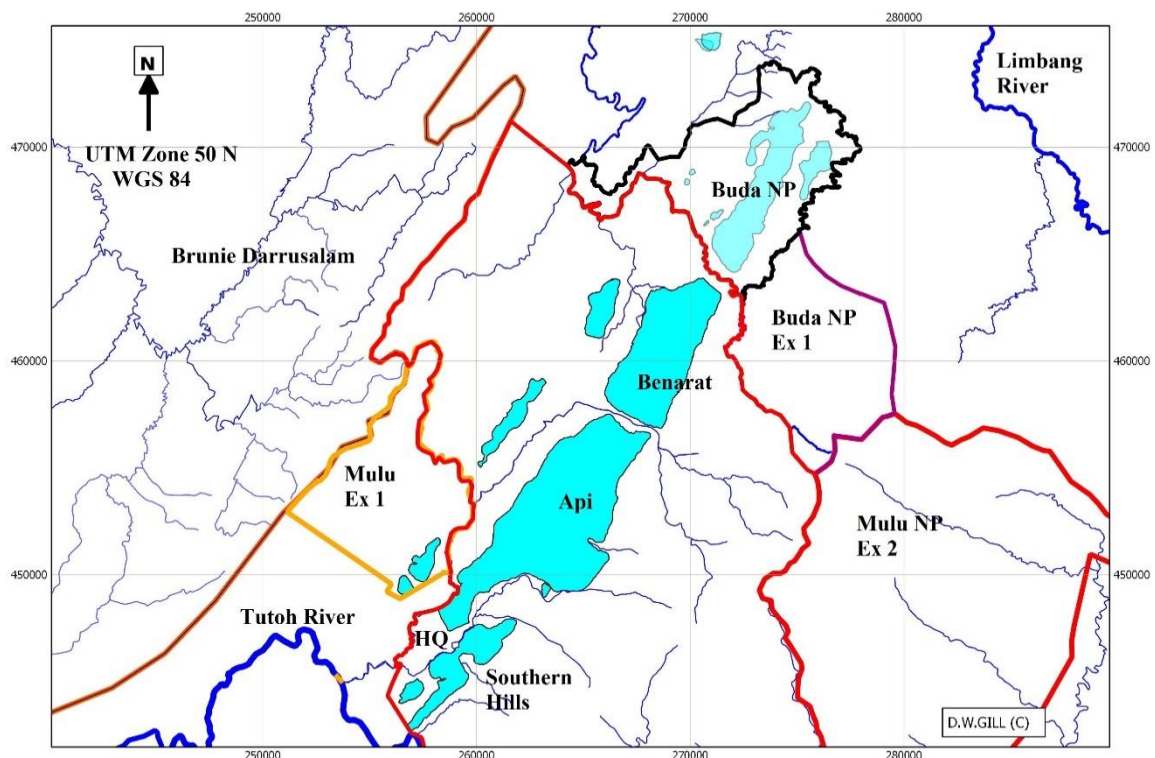


Figure 2 Map of the main cave-bearing regions of Gunung Mulu National Park

The Park is dominated by the sandstone mass of Gunung Mulu, which rises to 2376m. To the west of Mulu, and on its flank, lies a band of 'Melinau' limestone, which forms the lesser peaks of Gunung Api and Gunung Benarat. The lower slopes are covered in dense tropical rainforest, which rises to meet the montane forest of Mulu's upper slopes.

Mulu is a rich mixture of plant and wildlife and in the limestones, beneath the forest canopy, lie some of the world's most impressive caves.

The existence of large caves in the Gunung Mulu area of Northern Sarawak was certainly known by the indigenous population for many centuries where some have been used as burial places. Western interest has been documented for over 150 years. In 1858 reference was made to "Detached masses of limestone, much water-worn, with caverns and natural tunnels" around the base of Mulu by Spenser St. John in his book *'Life in the Forests of the Far East'*, (St. John, 1862).

St. John was 'Consul General in the Great Island of Borneo' and made some of the earliest exploratory journeys of any European into the interior of Sarawak. His attempts to reach the summit of Mulu were thwarted by limestone cliffs, dense forest and sharp pinnacles of rock and he says, "It is almost impossible to conceive the difficulty of ascending this mountain". Mulu was to keep the secrets of its summit for a further 74 years until Edward Shackleton successfully climbed the mountain during the Oxford University Expedition of 1932, (Harrison, 1938).

In 1961 G.E. Wilford, of the Malaysian Geological Survey, visited the area to explore its caves. His work included the surveying of Deer Cave and parts of Cave of the Winds. He predicted that Mulu would yield many more caves in the future, (Wilford, 1964).

History of exploration under Gunung Benarat

In 1977-8 the ***'Royal Geographical Society Mulu Expedition'*** spent 15 months in the area studying many aspects of the rainforest. This was the largest scientific expedition ever to leave the UK. Included in the team were speleologists who, in three months, explored and surveyed 50kms of cave passages. Although focused mainly on Gunung Api and the Southern Hills, amongst the discoveries were the first explorations of the main resurgence of Gunung Benarat. This included Terikan Rising, Terikan East and West accessed mostly from inlets along the alluvial plain and separated by sumps. Exploration ended upstream at sump number four. High up on the vertical cliffs of the Melinau Gorge several obvious entrances were noted, the largest of which was known locally as Tiger Cave. The only cave entered was at the base and called Tiger Foot Cave (which was later to be renamed Benarat Caverns), this was left with an enticing draughting lead at 'Way-on Aven'.

As a result of the RGS expedition two large scale caving expeditions were mounted in the early '80s. The ***'Mulu '80'*** expedition visited the Southern Hills, Gunung Api, Gunung Buda as well as Gunung Benarat. The Terikan River Caves were extended with the discovery of Blue Moonlight Bay Cave, although separated by undived sumps, it was clearly the upstream continuation of the resurgence system and surveyed for 9.4km. 'Way-on Aven' in Benarat Caverns led to major discoveries of trunk passages heading deep into the hill. Sakai's Cave was explored via five pitches to old horizontal passages. Leads in both caves were left ongoing.

In 1984, the ***'Sarawak '84'*** expedition made a return with objectives across the Mulu limestone. There was more focus on Gunung Benarat, where both Sakai's Cave and Benarat Caverns were extended but the major discovery was of Cobweb Cave which led to a complex mid-mountain system of over 15km. North of the Cobweb entrance the shorter marginal caves of Menagerie, Deception and David's Caves were explored. In the north the major surface feature known as Gawai was reached only to find the passage choked. A determined climb up the Benarat cliffs in the Melinau Gorge reached a lower entrance to Tiger Cave exploring 3.8km of high level passage.

Over the next decade or so British exploration in the area focused on Gunung Api, Blackrock Cave in the west and Hidden valley in the east, where many discoveries were made. It was not until **1997** that a significant discovery in Gunung Benarat was reported. An American expedition exploring the caves of Gunung Buda crossed the Medalam River and discovered Deliverance Cave in the northern tip of Gunung Benarat where 3.6km of major Mulu trunk route was discovered heading south. They returned in 2000 and made some small extensions to the cave.

Also in **1997** a Japanese expedition visited Mulu. Little information was made available as they did not produce a report although they supposedly mapped a 1.7km long cave in the Gawai area. To date this has not been located or confirmed.

It was 16 years before another Sarawak-British expedition returned to Gunung Benarat in the shape of **'Benarat 2000'**. Cobweb Cave was the major objective and was extended both to the north and south amounting to 10km of new passages. On the final day of the expedition a choked entrance in the Melinau Gorge was forced to enter Hurricane Hole which looked set to connect with Benarat Caverns as time ran out.

As a follow up to the 2000 expedition, the **'Benarat 2003'** expedition returned to the park. Hurricane Hole was soon connected to Benarat Caverns and a kilometer of passage added to the total. A further 4.4km were explored in Cobweb Cave at both ends of the system. The significant discovery of the expedition was made in Terikan Rising Cave where 12.5km of passages were explored including the impressive River of Sound which led to new entrances to both the west and north of Batu Mentawai. This system was also connected to Menagerie and Deception Caves to the south but ended a frustrating 300m from passages in Cobweb. A connection was also made between Terikan East and Blue Moonlight Bay Cave. This left just a short sump separating the two parts of a 32km system.

A significant event took place in Gunung Api during this expedition with the discovery of Whiterock Cave. From 2003 to date most of the exploration effort has focused on this cave which is now over 100km long and work in Benarat became reduced to just a few small projects.

'Benarat 2005' included two cave divers who dived the sump between Terikan East and Terikan West making a system with a total length of 32.5km. The upstream sump of Blue Moonlight Bay Cave was dived to -53m deep but was found to continue going down beyond the limit of the equipment. This was a surprise as, until now, the sumps in Mulu had been found to be shallow. In the Melinau Gorge an attempt to climb up to an entrance high in the cliffs opposite Camp 5 was cut short when a small entrance was discovered only 60m above the ground. This cave was named Moon Cave and was explored for 6.6km in an almost straight line into the mountain. A connection was also established with Benarat Caverns making the total length of this system 16.4km

During January and February of 2007 the **'Mulu Caves '07'** expedition continued the exploration of Moon Cave where a significant connection was made with Cobweb and over 3km of passages mapped. The new Benarat Caverns System now ranked as second longest in the Park at 50.7km.

The **'Mulu Caves '09'** expedition managed to negotiate access to the 'nesters' cave high up in the southern cliffs. The exposed 70m abseil into 'Hole of the Moon' led to 2.5km of ancient passage heading into the hill at the same level as upper Tiger Cave. Hurricane Hole was revisited and the Mother of all Voids descended.

A project on the **'Mulu Caves 2011'** expedition established series of Geodetic GPS fixed points around the park to better understand the relative levels of the caves within the Survex dataset.

Included were stations at Terikan Rising, Cobweb and Benarat Caverns. The expedition relocated the Gawai feature at the north end of Benarat. It was not fully explored but nearby Paradise Cave was discovered and surveyed for 1.1km. This cave appears to be a missing part of the main fossil trunk route between Blue Moonlight Bays' Casting Vote and the River of Sound in the Terikan system. The 'Big Feature' to the east of Hole of the Moon was partly investigated but no significant cave found.

October 2013 saw the '**Mulu Caves 2013**' expedition based at Camp 5. A sub-camp was set up at the northern end of Benarat and a number of serious climbing leads explored in Deliverance Cave without significant success. Gawai Cave was revisited finding an open pitch thought to be above Blue Moonlight Bay but it was not descended. In the southern cliffs a 350m abseil down the full Benarat face reached a prominent entrance visible from Camp 5 but there was no way on.

During the '**Mulu Caves 2015**' expedition an entrance in the SE corner of Benarat was identified in the cliffs above the tree line. Attempts to climb up to the entrance were unsuccessful.

'Mulu Caves 2019' returned to the Mother of all Voids in Hurricane Hole and aid climbed for 100m above the entry point without reaching the top.

The total length of caves surveyed in Benarat was now 101.58km.

Team

Benarat 2020 fielded a team of twelve cavers from the UK supported by local organiser Veno Enar. The expedition was further enabled by the management and staff of Gunung Mulu National Park. All of the UK team were experienced expedition cavers although seven were completely new to caving in Mulu, five had been before but only three of those had caved in Gunung Benarat. The leader was vastly experienced and on his twelfth Mulu expedition, many of which he had led.

From the UK - Tim Allen (leader), Diane Arthurs, Mark Burkey, Toby Buxton, Simon Cornhill, Ben Enticknap, Rachel Findlay, Chris Haigh, Frank Pearson, David Rose, Mark Sims, Mark Wright.

From Sarawak – Rambli Ahmad, Veno Enar, Steve Lian, Joe.



Figure 3 The 2020 Mulu team at Camp 5. Left- right: Mark Burkey, Mark Wright, Dave Rose, Rachel Findlay, Tim Allen, Chris Haigh, Mark Sims, Toby Buxton, Diane Arthurs, Steve Lian, Frank Pearson, Joe, Simon Cornhill, Ben Enticknap.

Logistics

Tim Allen

The overall logistics followed much the same plan that was adopted under my leadership in 2009 and which most expeditions have followed since. Prior to 2009 expeditions had employed Miri based outfitters to make all local arrangements and used a helicopter to move equipment and supplies from Park HQ to Camp 5. Since then all personnel and equipment have been transported up river by local boatmen and porters employed to carry loads, mostly from the village of Batu Bungan. All this being organised by professional guide and local logistics expert, Veno Enar.

Co-ordinating with our local organiser and NP staff some of the team arrived a few days early in Miri to purchase essential supplies. Most of these were air freighted up to NPHQ and then together with

equipment from the Mulu Caves store were taken to Camp 5 by long boat and porters over the course of a few days.

When all was ready the whole team moved up to Camp 5 together (and returned together at the end of the trip). This approach was adopted to keep costs down and to have a minimum effect on NP tourism and was a significant change to normal where members come and go subject to their own timetable. The tactic worked very efficiently.

A camp manager and cook were employed at Camp 5 where most meals were taken. Expedition members catered for themselves when away from base either in underground camps or out on day trips.

The expedition benefited by early liaison with the October 2019 expedition so that we were able to share the use of certain items such as the generator and fridge. The 2019 team took them up to Camp 5 and we brought them back.

Overall the expedition worked efficiently and maintained a low profile.

Equipment

Tim Allen

The Mulu Caves Project equipment store located at the Research Centre has grown considerably since it was first established in 2009. Prior to that equipment was brought out each year with a small amount stored in Miri from time to time. We were fortunate that the October 2019 expedition had carried out a full inventory of the store and we only purchased and took to Mulu the extra equipment they recommended. This was left in the store on our departure, with the exception of the new radios which went back to the UK for safe keeping.

All members provided their own personal caving and camping gear as usual. From the store we transported to Camp 5 lots of rope and associated vertical caving gear, together with underground camping equipment as necessary. Survey equipment was brought from home.

At the end of the trip a new inventory was made and any perishables found in the store removed to deter rodents and insects. This inventory was made available ready for the next expedition. There was some broken, tired or out of date equipment which will probably never get used again but which does clutter up the store. I would recommend that the next expedition which spends time based at Park HQ should designate an experienced group to sort out the gear and remove any items which are unlikely to be used again.

Acknowledgements

In Sarawak:

The Chief Minister of Sarawak

The Sarawak Secretary of State

The Director of Forests, Sarawak

Protected Areas & Biodiversity Conservation Unit, Sarawak Forestry Corporation

The Sarawak Ministry of Planning and Resource Management

The Resident, Miri Division

The Sarawak Immigration Department

The Sarawak Police Department

Gunung Mulu National Park Management & Staff

Hein & Andia Gerstner

Rambli Ahmad

In the UK:

Ghar Parau Foundation

Richard Walters

Jerry Wooldridge

Matt Kirby

Rob Middleton and members of the October 2019 Mulu expedition

Caving/Exploration

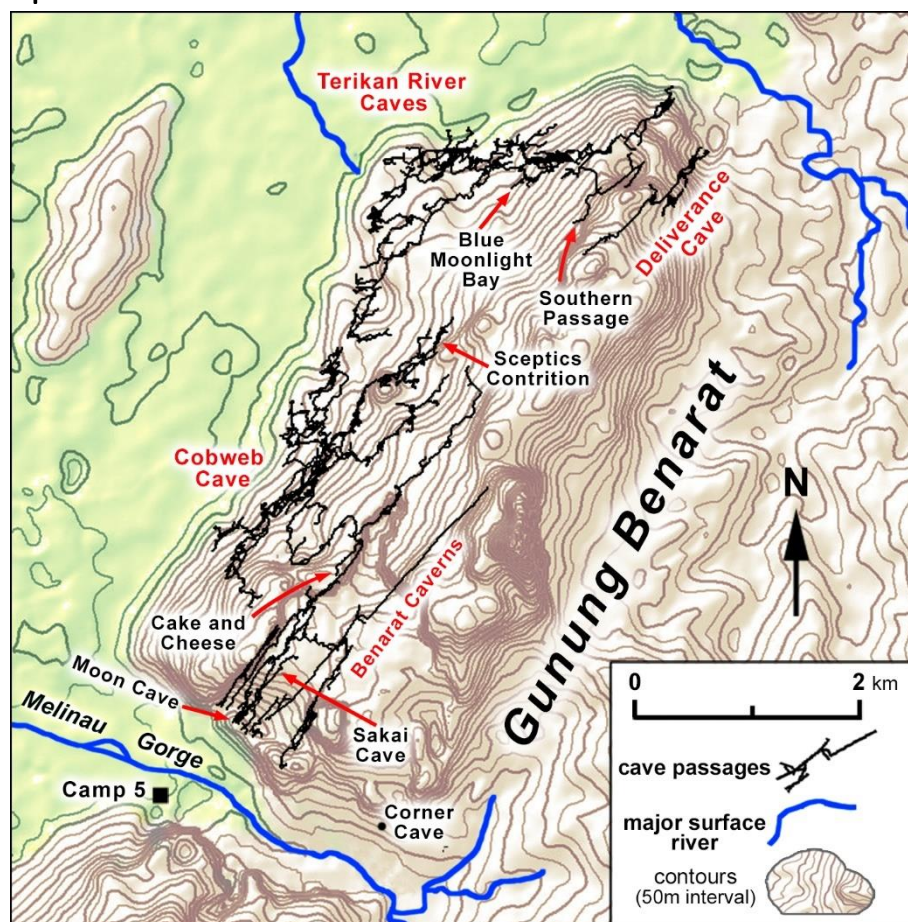


Figure 4 Map showing the caves of Benarat with the areas investigated during the 2020 expedition highlighted.

Cobweb Cave

The route to Monolith

Tim

Cobweb, as the name suggests, is a complex cave and route finding in its maze of passageways, on multiple levels, is difficult even with experience. From the entrance to Top of the Morning is a single large trunk passage but route finding can take hours if it is unknown. There are enormous boulders and deep holes which must be traversed, notches and tricky climbs to locate and secret sandy crawl frequented by racer snakes shedding their skin. On arrival in the large chamber of Top of the Morning, Monolith passage can be clearly seen on the far side to the north. However, entry cannot be made as there is a vertical pitch up which needs to be rigged by following a much longer route.

Although I had considerable experience of certain parts of Cobweb, none of the team had been around the Monolith loop before. On day one we arrived at Top of the Morning in good time, we travelled light and our only objective was familiarisation and to place a rope on the Monolith pitch from above, therefore making it easier for future trips. With time on our hands I took the team down the Bypass/Bypass to Husky Hall, then via the old campsite and the Rubik Cubes to look at the main Cobweb River Passage. A more thorough understanding of the survey would have saved some time here as the correct way on to the loop was just a little downstream of us. Unfortunately, the complex nature of the cave in this area and the way the survey has been separated into different levels meant that this fact was not apparent at the time. Instead we retreated back to the higher

route and soon found our way to the Watery Place. Here, there was a 16m pitch down but it was unclear whether it was possible to just traverse across into the ongoing passage. In the event the Watery Place ends at the pitch which must be dropped and there is no traverse. Rigging on natural belays is very technical and there are no bolts. At the bottom it becomes more obvious that the descending passage to the left leads back to the main Cobweb river, probably just five minutes from where we had been over an hour ago. From here the route ascends and is easier to follow with just one awkward section near where a pitch drops down to the Powder Mountain series on the right. Straight ahead is obvious and quite huge in places as the Elephant Warren junction is passed. The Monolith itself soon comes into view with the 10m pitch just beyond. There are bolts and naturals on the left. With knowledge and by following the correct route this loop should take around one and a half hours to complete. If no one knows the way it could be a lot longer.

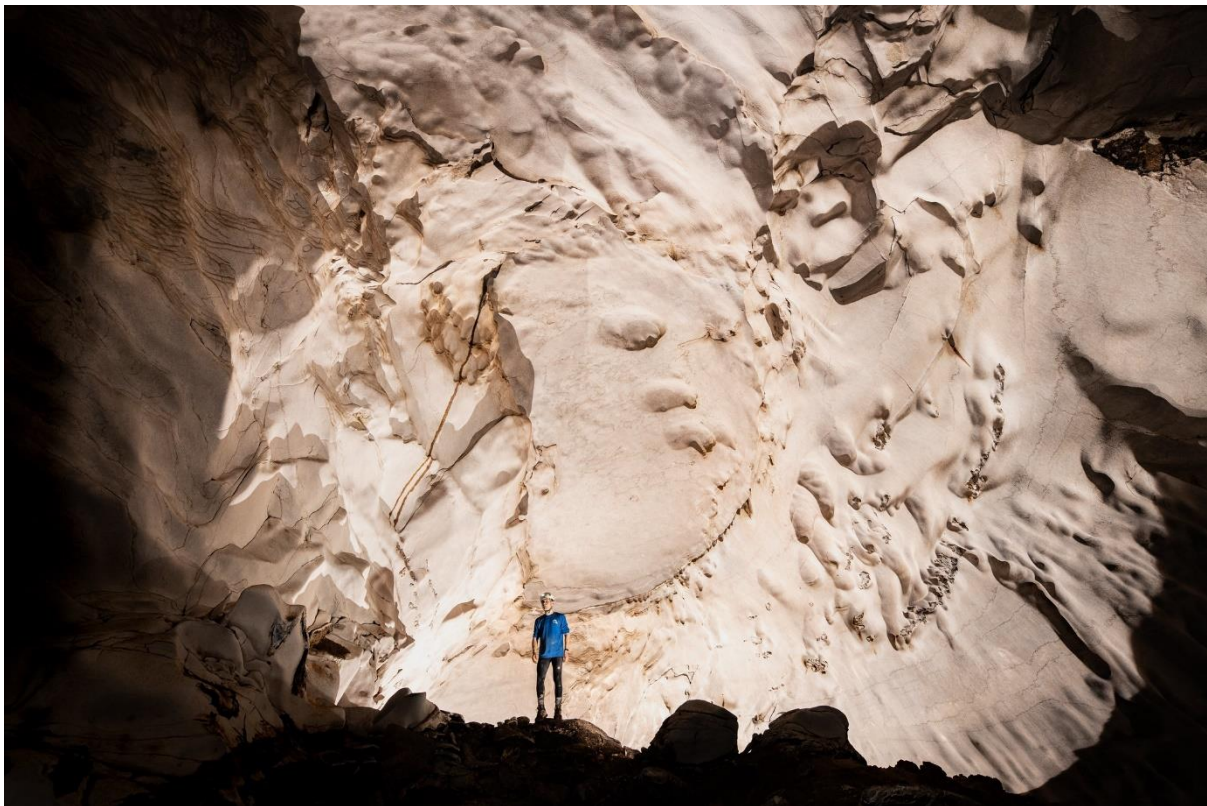


Figure 5 The lower passages of Cobweb Cave provide the alternative route to the Monolith to enable the pitch to the direct route to be rigged (photo Mark Burkey).



Figure 6 The pitch up into Monolith passage (photo Mark Burkey).

The Elephant Warren

Tim Allen, Ben Enticknap

It has always been a mystery why most of the routes which head north in Cobweb quickly close down. The Elephant Warren is one such passage. Explored during the 1984 expedition a survey was produced but no description was included in the report. It seemed worth a visit to check out the end to see if anything had been missed and at the same time to look at the reported 'passages' in the roof at the junction between Monolith Passage and the start of the Elephant Warren. Whilst bolting work commenced Tim and Ben checked out the passage for any missed leads. It is a typical large Mulu passage but after only 150m or so there is a 10m rope pitch. This has simple natural belays and lands on a steep slope on essentially a sharp left turn. Against the far wall a number of inlets crash in and the floor beneath has a number of large holes down between huge blocks. These would require some work to explore and were not fully looked at. The main passage continues to the left along dusty guano slopes undulating up and down to the end, as shown on the '84 survey. There is no noticeable draught and the air feels very hot and humid. At the end the roof plunges down steeply to meet the dusty guano floor and there is no way onwards. There are a few small developments up the beds to the east but they do not inspire. Half way back, again on the east, a small passage was pursued for 50m without end but also without a draught. If the passage does continue to the north, which it must, there must be another way to gain access to it.

Monolith Passage climb and Just a Mile resurvey

Mark Sims, Toby Buxton, Rachel Findlay, Chris Haigh, Ben Enticknap

On the first day in Monolith Passage we scoped out the three features above the entrance to the Elephant Warren, between 30 and 55 m above the floor. The lowest and smallest looked to have a reasonable ascending ledge ascending to it, which looked like relatively straightforward going. The upper two were not only much higher up, but would also necessitate climbing a fairly big overhang. Fingers crossed the bottom one either led to plenty of new stuff, or linked with at least one of the upper alcoves/passages!

The next day we returned with climbing kit, and pleasingly the straightforward looking ascending ledge was just that. Unfortunately before the final section to the lowest passage, other duties called and I was needed to go and derig the pitch at the Watery Place before heading out.

The 2nd day on the climb saw us reach the entrance fairly quickly and Toby followed me, derigging the traverse as he went so that we could rig a much easier pitch instead. I had a scout ahead to see if there was any way on, following the narrow passage to a loose climb with multiple ways on. I semi-systematically checked the options as I went, eventually deciding that it wasn't a good idea without another person following a moderately exposed climb. I dropped back down to the top of the climb, making use of the convenient inlet as a shower, before returning with Toby.



Figure 7 Ben looks across the climb over the Elephant Warren below. A caver can be seen on the traverse ascending to the lowest of the passages above where another caver's light is visible (photo Mark Burkey).

A narrow, steeply-sloping climb led us to a low crawl (not what we'd signed up for!) that eventually enlarged before popping out into what turned out to be the higher right-hand feature we had seen from the junction in the main passage below. Success! At least now as a minimum we could just bolt a traverse around to the other high-level passage if needed. Turning away from the main passage, we followed a hot, airless, stooping height passage to what we initially decided was a pitch.

We later returned here to survey it, and managed to clamber down with just a knotted rope. The passage dropped again and seemed to lower to a crawl ahead, so we decided it wasn't worth pursuing. There was no draught.

Back in the passages below the narrow climb, there was more to look at. Most of the potential leads either ended at solution pockets, or at calcited chokes, but Toby followed one of the more extensive potential ways on, and pleasingly popped up in the other high-level passage. This one was way larger than the other, and gave a great view down over the passage below. We didn't dare touch the car-sized boulder seemingly levitating at the lip of the passage!

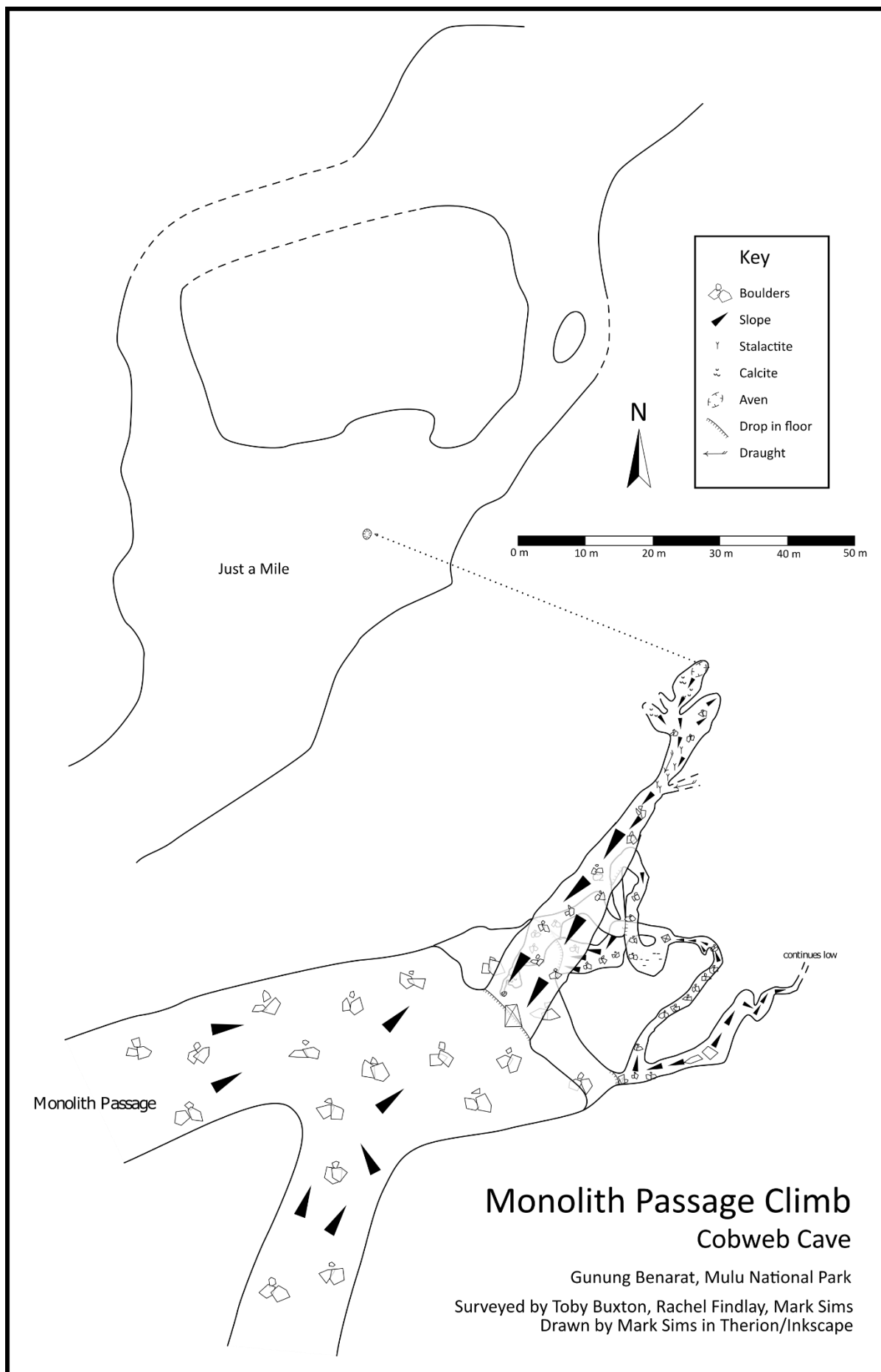
We followed the steeply-sloping feature upwards, pleased to be accompanied by swifts. A climb and traverse proved particularly tricky with no kit, so we decided it was best if just one of us negotiated it. I continued upwards towards the point ahead where the floor seemed to meet the roof. Just as it seemed to be closing down, I stuck my head into a gap between stal and felt a cool wind on my face – it had to lead somewhere, but we were out of time.

Having returned for a camping trip we surveyed up to the limit of our previous exploration, through a snagging crawl beyond the stal, into a modest chamber. A bit of hunting around revealed the draught to be coming down a calcited climb, at the top of which we popped out of the floor of a huge chamber!

To cut a long story short, despite thinking we were somewhere new, we were to find out after surveying that we were not – we had unknowingly popped out of a previously-unseen hole in Just a Mile. Nevertheless, we got the full “Mulu experience” of big survey legs along huge “new” passage, and the climb represented a significant shortcut that proved crucial to later exploration.



Figure 8 Chris H in the lower passages of Cobweb Cave provide on the alternative route to the Monolith (photo Mark Burkey).



Camp

Toby, Ben, Chris, Mark S, Rachel

We set up our camp in Cobweb very near to the Monolith. Above the pitch there is a fairly flat area with various rocks for possessions, and a nearby area for a toilet screened by boulders. A little way down the passage the large chamber at the start of the Elephant Warren, in which Mark completed the climb up to Just a Mile, provides various water sources by way of drips and pools. We hung our water container from the monolith itself; there were other options, but it seemed like the thing to do.

There is enough space for at least three different flattish berths. Candles can be lit to dissuade most of the insects, and swift activity generally seemed to be fairly minimal. That being said, on at least one occasion a clumsy swift crashed to the ground in the middle of camp after knocking itself out up in the ceiling somewhere. Our other creature encounters involved a large huntsman which took to warning off intruders to the toilet area and a small scorpion which headed grumpily on its way after being disturbed from sleep beneath the stove.

The Monolith Camp provided a good base for exploration of the Elephant Warren climb and Just a Mile. A trip all the way to the end of Just a Mile to explore Sceptics' Contrition would have been quite a day without it.



Figure 9 Chris admires the Monolith in Cobweb Cave (photo Mark Burkey).



Figure 10 Rachel admires the Monolith in Cobweb Cave (photo Mark Burkey).

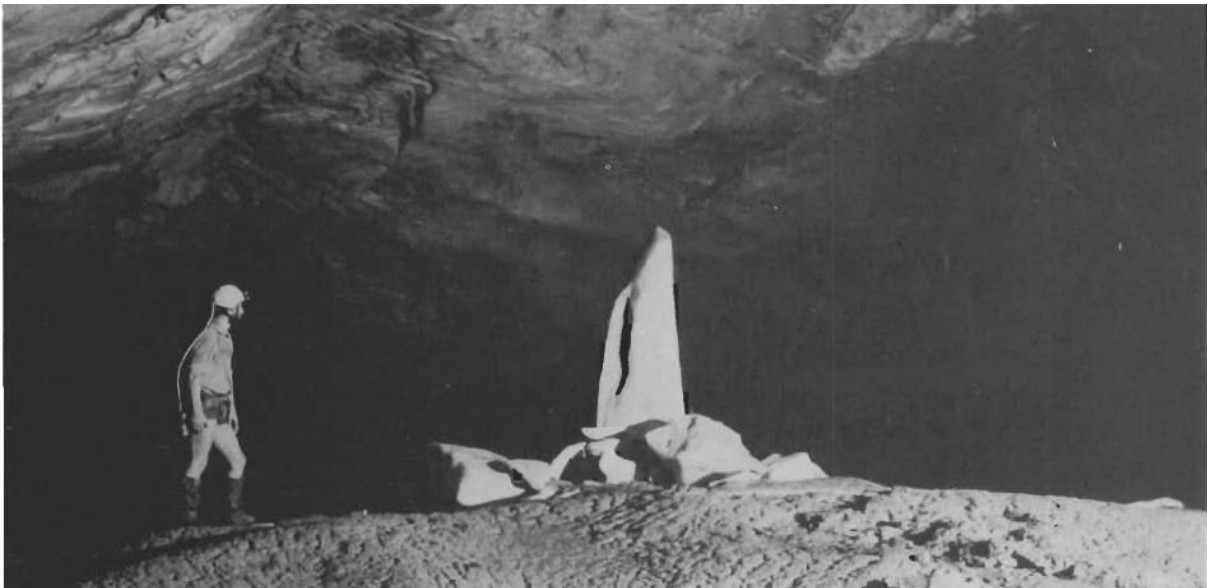


Figure 11 A photo of the Monolith from the 1984 report by Jerry Wooldridge. Photography equipment has moved on a bit in 35 years!

Outrageous Junction climb

Mark Sims, Si Cornhill, Di Arthurs

The word was that at Outrageous Junction there was an obvious continuation of the passage 20 m up the wall. We were pretty dispirited to find when we got there to scout it in the evening that it did in fact appear to be going straight back in the direction we'd come ! We did discuss giving up on it entirely on our return to the camp in Monolith passage because it didn't look like a totally straightforward climb, but since we'd carted all the kit to near the end, we figured we may as well go for it the next day. Somewhat remarkably, the description was at least correct that it did look to be a big passage and it was about 20 m up the wall!

The next day, having dragged all the climbing kit through the aptly named Arm Stabber Choke, Si and I found ourselves beneath the passage entrance above pondering our options. The only real option to start the climb was 10 m or so left of the passage entrance, some 15 m lower. The floor was higher at this point than directly beneath the passage, but the horizontal distance would be a challenge. A longer but vertical climb was out of the question due to the absence of any usable rock. It really didn't look good, but it was probably the least bad of our options.

After kitting up I reached a hand up to first 'ledge', which heralded an immediate cascade of loose rocks over my head. Not the best start. I waited for the dwindling flow of scree to peter out, allowing me to look up and reassess. It was the only option, so I reached up to clear more, again unavoidably cascading over my head on its way down. Sadly, this was a sign of things to come.

It felt pretty stressful just getting off the ground, which wasn't too promising, and things didn't exactly improve as I had to immediately traverse horizontally, playing a tune on the wall with the hammer before finding somewhere to place a vaguely acceptable anchor.

The ascent to the next 'ledge' was similar, and it was at this point that I realised that I was really just moving from one huge flake to the next. Nevertheless, another poor anchor made me feel a bit better before I concluded that further progress directly upwards was an absolute no-go. Horizontal progress was the only way from here, initiating some hefty zig-zags in the belay rope. It was really beginning to feel like a fool's errand.

A couple more poor anchors later left me at what seemed like a dead end in terms of possible routes, frustratingly with a 'solid' calcite face tantalisingly out of reach. Maybe the skyhook I had borrowed would be worth a go. I just managed to move up far enough to reach the calcite face, hooking the skyhook over the flake I was now on. This felt pretty uncomfortable, not really trusting the protection below, so two anchors were rapidly placed, followed by a minute thread.

Breathe.

I carried on, onwards and upwards, constantly on the verge of bailing. There was barely any choice of anchor placement at any point, just going from the least bad to least bad until, shortly before the largest looking ledge, the zig zagging belay rope finally had too much friction to overcome. Being 'relatively' happy where I was, Simon endured a loose clamber up below me to unclip the first few anchors, easing the friction enough for me to make progress.

I finally made it up to the (steeply outwardly sloping) ledge above, of course only after clearing loads of debris. I got a couple of anchors in and breathed a sigh of relief. Just eager to be back on the floor, I abseiled off without really looking around, de-rigging the dubious anchors as I went.

I made it fairly clear to Simon once I was back on the floor that I really didn't fancy the next bit. I didn't know what it would involve, but I wasn't keen! Simon went up to look, and unfortunately came to the same conclusion.

The ledge we had reached was not far off the level of the passage we were aiming for, but a huge loose buttress separated us from it. What had looked like a relatively straightforward traverse from below turned out to be a total nightmare of hollow-sounding hammer blows and concealed cracks.

I naively volunteered to give it a go, deciding that it was just too unsafe to progress at or above our current level. The only way I was prepared to traverse the buttress was to gradually descend as I went, minimising the fall distance if anything gave way. This part of the "climb" was a bit unnerving, but an improvement on the initial ascent. More like conventional rigging than climbing, albeit on totally awful rock.

Sooner than I'd have liked, I reached the inevitable point where upwards progress was required. I had dropped a few metres from where Simon was now belaying from the ledge, but at least I was round the worst of the buttress. A direct diagonal ascent to the passage entrance was out of the question at this point, with the band of completely useless rock that had prevented a vertical climb initially now in my way. The only option from here looked to be a vertical ascent from my current position up to a sloping bedding above me – the same that the passage was formed in, albeit higher at the point above me than at the passage entrance.

This ascent started off reasonably, relative to what had preceded, but inevitably deteriorated as I went. The deterioration culminated in what looked to be the final crux move: the bedding above me looked tantalisingly like I could almost walk along it if I could get there, but there was nothing I could see that I could sensibly place an anchor in. After a bit of procrastination and desperately scrabbling around with my hands over the lip above me, I grabbed hold of a solid calcite overhang. Relief. From my position below the lip of the ledge, I couldn't see what was there, but I could see the calcite above and was relieved to see it appeared crack-free and pretty solid. Feeling around there were various nooks and crannies in the calcite. There was bound to be *something* I could get a sling round if I made the next move. Left with no other options I grabbed the calcite and asked for some slack from Simon. I heaved upwards, getting most of my weight on the ledge, and was immediately dismayed to find there was absolutely nothing to get a sling on! Precariously balanced and taking far more weight than I wanted on the hand gripping the calcite I managed to get an anchor in with my other hand. Finally, some real relief.

On a real high at this point I gratefully placed another anchor, providing enough protection for the exposed but gentle descent of the bedding into the passage entrance. To my relief, it continued as far as I could see, so I agreed with the others that I would go and have a quick check to see if it was worth them following.

The next couple of minutes gave me the real "Mulu experience". I made the first footprints along a beautifully decorated 10 m wide, 5 m high phreatic tube passing a few inlets before it started descending into a larger space. This was certainly worth surveying. I rushed back and somehow Simon managed to derig my bizarre descending – ascending – descending route from his belay station and we could rig a straightforward pitch from the mouth of the passage to the floor. At least no one will need to climb it again!



Figure 12: Sketch of Mark and Simon on the climb, drawn by Di. Later this artistic activity would prove to have used a chunk of the phone battery needed for surveying!

Sceptics' Contrition exploration

Di Arthurs, Si Cornhill, Mark Sims

Whilst Mark and Si headed towards the base of Outrageous Junction chamber to begin the bolt climb, I traversed around the top and made myself comfortable on a ledge on the opposite side of the faulted chamber. From this position I had a fantastic vantage point of the climbers and was also looking directly into the mouth of the passage we were aiming for. This proved to be a fine viewing gallery for what I can only describe as the most visually gripping climbing scene I have ever witnessed! Sitting there for 3 hours, rooted to the ledge, apprehensive to move in case I missed any of the excitement but also gripped by the fact that climbing was very challenging due to the very poor and loose rock.

With Si belaying Mark begin to climb, I could clearly hear them discussing the climbing routes as well as the hollow tapping sound of Mark's bolting hammer, musically echoing around the chamber every time he looked for locations to place anchors. After an hour he had progressed vertically straight up the corner to gain a small sloping ledge to belay on, which was several metres higher than the passage, Si climbed up to join him de-rigging the lower section as he went.

I tried to record the event with the camera, but my lights were not up to the job of illuminating the vast chamber and the images only showed a dim light in blackness. Instead, I drew a sketch on the survey phone, which, in hindsight probably was not a good idea as the spare battery and chargers had been left with the inessential gear on the other side of Arm Stabber Choke and the stal squeeze.

Mark then began traversing which was more complex than it looked, rather than a straightforward horizontal move it began with Si lowering Mark down so that he could swing past a large unclimbable band of rock. At every move I could see he was struggling to find somewhere to place a decent anchor. Later on, Si mentioned that whilst belaying on the stance, he quietly watched one of his belay points pulling out of the wall, luckily it was the backup's backup!

Once Mark had got part way along the second climb I realised they were totally committed from this point on, as we only had one rope which was being used to climb with there wouldn't be enough rope to return to the ground until the climb was completed. The spectacle became increasingly gripping, I silently urged them on as every move drew them closer to the passage. The cycle of watching Mark reach out, hollow tapping, falling rock, careful consideration, hollow tapping, discussions, cautious and bold moves were captivating. Sat on my lofty perch watching my own personal action movie I had time to contemplate on the remoteness of our location and the implications if things didn't go according to the plan.

After two and a half hours and some incredible acrobatic moves Mark eventually gained access to the top of the ramp which led down scrambling over loose boulders leading to the mouth of the passage – with 2m of rope to spare! To see if the efforts were worthwhile Mark unclipped himself from the rope, leaving Si on the stance and I watched him disappear down the passage, I had my fingers crossed it wasn't an alcove.

Meanwhile, Si was pondering on how to follow this outrageous climb, de-rig and get safely into the passage himself. Mark returned shouting to get the survey gear ready, the climbing endeavour had indeed been worth it... but the action was not quite over yet! Mark did not have anywhere decent to tie off the rope, so he lassoed a couple of small knobbles with his remaining slings and acted as half belay and half counterbalance as Si de-rigged the convoluted pitch.

Si abseiled off the ledge a short distance to get onto the traverse pulling the rope through and then headed up to where Mark had traversed a second time. At this point, to prevent the thin 9mm rope from twanging over large loose rocks directly above, he did a second pull through to gently lower his weight onto the rope. Reaching the top of the ramp he carried out a third pull through only leaving the minimum equipment behind before safely joining Mark in the new passage. Mark aptly named this section, 'The Rocky Horror Show'.

The pitch down was quickly rigged from large natural stal, which was fortunate as we had run out of bolts. Si's harness was lowered down for me as mine had been left behind to save weight and I joined them, gardening the loose wall as I prussiked up reminding me of the challenge they had faced! At the top of the pitch a short traverse to the left takes you up to the mouth of the passage, after three hours of exhilarating climbing we were ready to explore!

The elliptical shaped passage had mounds of sandy mud dunes that sloped down towards a flat calcited floor in the centre, ahead the passage could be seen to continue for at least 200m. It was

easy going, over more mounds of mud and sandy sections with a few boulders to climb and well decorated with stal and helictites. A small inlet could be seen coming in on the right however, glancing in it looked too tight.

Mark led the way, marking the survey stations, Si measuring with the distoX and I followed sketching the details. A trench developed in the floor and the mud became deeper and gloopier for a short while before returning to a sandy floor. Ahead we could hear the sound of flowing water and after ascending a gentle sandy slope we encountered a spectacular airy chamber divided by a natural sandy dam. The airy vastness was awe-inspiring. To our left a small streamway came down from a sloping boulder inlet and another more powerful impressive shower of water spouting out from the roof. The inlets joined making a pool and creating the dam wall as the stream cut across the chamber, descending in the right-hand wall. Continuing over the stream and across water-drenched boulders the passage turned 180 degrees back on itself and the streamway was seen to re-join the main passage and disappear again through boulders. There were a number of welcoming showering inlets from the roof along the next section of passage, which cooled us down as we passed close to them. We assumed it was raining heavily on the surface and this was later confirmed as we encountered increased water levels back at Monolith camp. The passage continued on a gradual descent zigzagging twice until we came to a 4m pitch. Fortunately, we had a short length of rope suitable for a hand line, which was tied around a convenient boulder and with careful descent we were able to continue the exploration.

At the bottom of the pitch the continuing passage immediately turned 90 degrees left. Looking directly ahead we could see a side passage which we did not have time to explore. It looked enticing with a large black space accessed via a 3m climb up a muddy mound of boulders. Chris, Ben and Toby pushed this on a later trip. The main passage continued to gently descend with a floor of clean-washed pebbles underfoot and boulders which seemed to increase in size as we continued. After 100m at a left turn we walked under two giant slabs leaning together creating the letter 'A', A Corner.

Travelling in a South Westerly direction the going became increasingly more challenging with slippery mud coating the boulders. The time was close to midnight, we had been going for 14 hours and the passage was continuing with no sign of ending when I noticed that we had 15% battery power left on the Samsung survey phone. We were all becoming increasingly tired and dehydrated, climbing from one slippery giant car-sized boulder to the next, sliding down or easing between the gaps. Our pace was now naturally a lot slower to ensure good footing, but we were all still slipping around a bit, clearly exhausted and feeling it was nearly time to return to camp.

To conserve battery power I had been switching the phone off every time I moved, checking the statistics and realising that we were only 50 metres off 1 kilometre we all mustered up the strength and determination to continue on for a short distance. The going got slightly better and a stream could be heard trickling deep below. Getting closer to Si and Mark, the last few legs came in... 1046m and then the phone battery went flat, perfect timing! Our exploration came to an end leaving the ongoing passage wide open and I must admit that I was relieved as the thought of sleeping was very appealing. Unfortunately, we had a four-hour return journey ahead of us back to our camp. We took a final photo and left the way on for other explorers another day.

Finally arriving back at camp, it was 5am. We all showered in the refreshing cascading water before sinking into our beds. What an exhilarating and unforgettable 19-hour trip!



Figure 13 Di, Mark and Si at the end of exploration showing ongoing passage (photo: can't remember who set it up, timer).

Further Sceptics' Contrition exploration

Toby, Ben, Chris

Enter and camp at Monolith 13th. Pushing 14th. Exit 15th am.

We made the standard slog to Monolith after dinner on the 13th. The team were universally knackered after 2 weeks of caving, most of it being Cobweb slogs. At camp, I immediately occupied the berth nearest the monolith, which everyone now calls Findles' Space, and confirmed it is the best space available.

Our objective was the major side passage in Sceptic's Contrition, discovered on the last big Cobweb trip by Mark, Si and Di. It took around 3 hours to make our way up into Just a Mile and along though the chokes. We were impressed by the skill of the climbers on the pitch up, which is unpleasantly loose. The junction with the side passage is around a third of the way down the current surveyed length of SC.

The side passage began with a short climb up into more big passage, with similar dimensions initially to the main SC passage. The mud was slightly easier going for around 100m, leading to a high, large chamber sloping up steeply to the right. We kept up our long survey legs up the boulder slope, encountering an extensive area of impressive stals near the top. The chamber was initially christened Stal Hall, rather unimaginatively. After Chris sat on a calcite spike, Stal-in-the-Arse Hall began to gain traction. The chamber ends in a calcite choke right at the top, but a little way down the slope on the left a side passage was explored.

This smaller passage began with a flat-floored tunnel, liberally supplied with 'Neapolitan ice-cream' mud. This quickly led to a very steep mud slope. After some alarming climbing attempts, it was agreed that this was actually a pitch. At least a 40m rope was the estimate for a descent. The pitch descends a steep slope in a hexagonal passage, leading to several short drops (as far as can be

ascertained from thrown rocks). Due to its shape, this area was named Hex Passage, which was upgraded to Hexadecimal Passage for science reasons, before being shortened again to Hex Passage to preserve everyone's sanity.

Pleased with this lead, we headed back up Sceptic's Contrition and down the pitch with one of the leads in Just a Mile in mind.

We aimed for the free climb as described in Chris's report of 11 January. This looked straightforward at first but without any climbing gear presented a certain amount of challenge. A fairly vertical wall of around 13m led up to what we hoped was nice flat passage.

I belayed Ben on a sturdy Italian hitch, while Chris held my belt in case he actually fell off and catapulted me into the wall. Ben made his way up to a dubious natural, on which he placed a sling for some marginal protection. After some monkeying around, he managed to pass this and move it to a higher natural (unorthodox).

We had hoped that the top of the climb would give on to a flattish passage. Unfortunately, around the corner Ben reported that the climb continued without respite, and trad protection or bolt climbing would be needed to reach the top. I managed to lower Ben off, with the sling having to remain behind, perhaps to give a bolt climber a head start one day. This is a promising lead, as the climb looks simple enough with bolting gear and there is a strong sound of water coming from above.

Having left two good leads, we stumbled back to camp after a 12 hour day of pushing. The next morning we headed slowly out, arriving back at camp just in time to meet Mark W and Si heading off for porter duty at Blue Moonlight Bay. We resisted the temptation to join them and settled down for lunch instead.

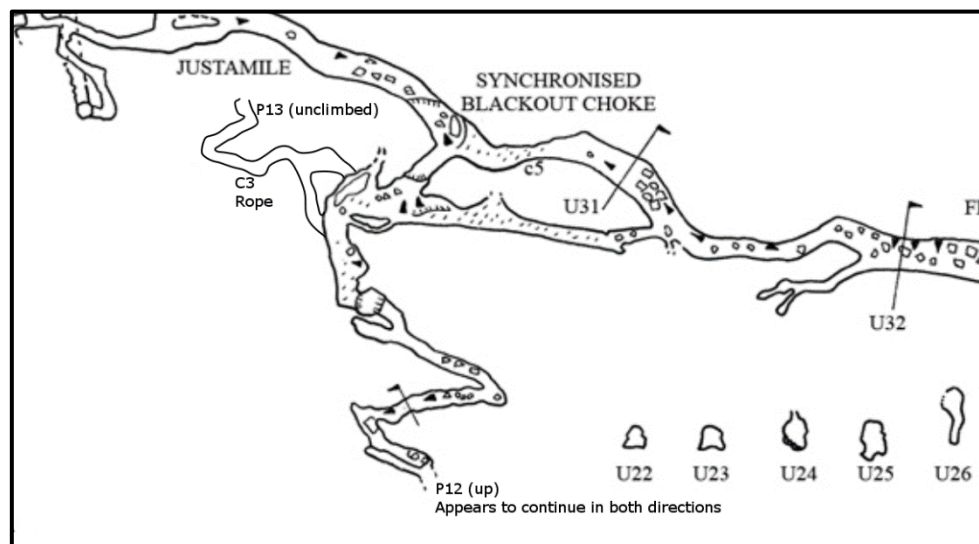


Figure 14 Extract of the 2007 Benarat Caverns survey with the leads identified in 2020 labelled.

Sceptics' Contrition Cobweb Cave

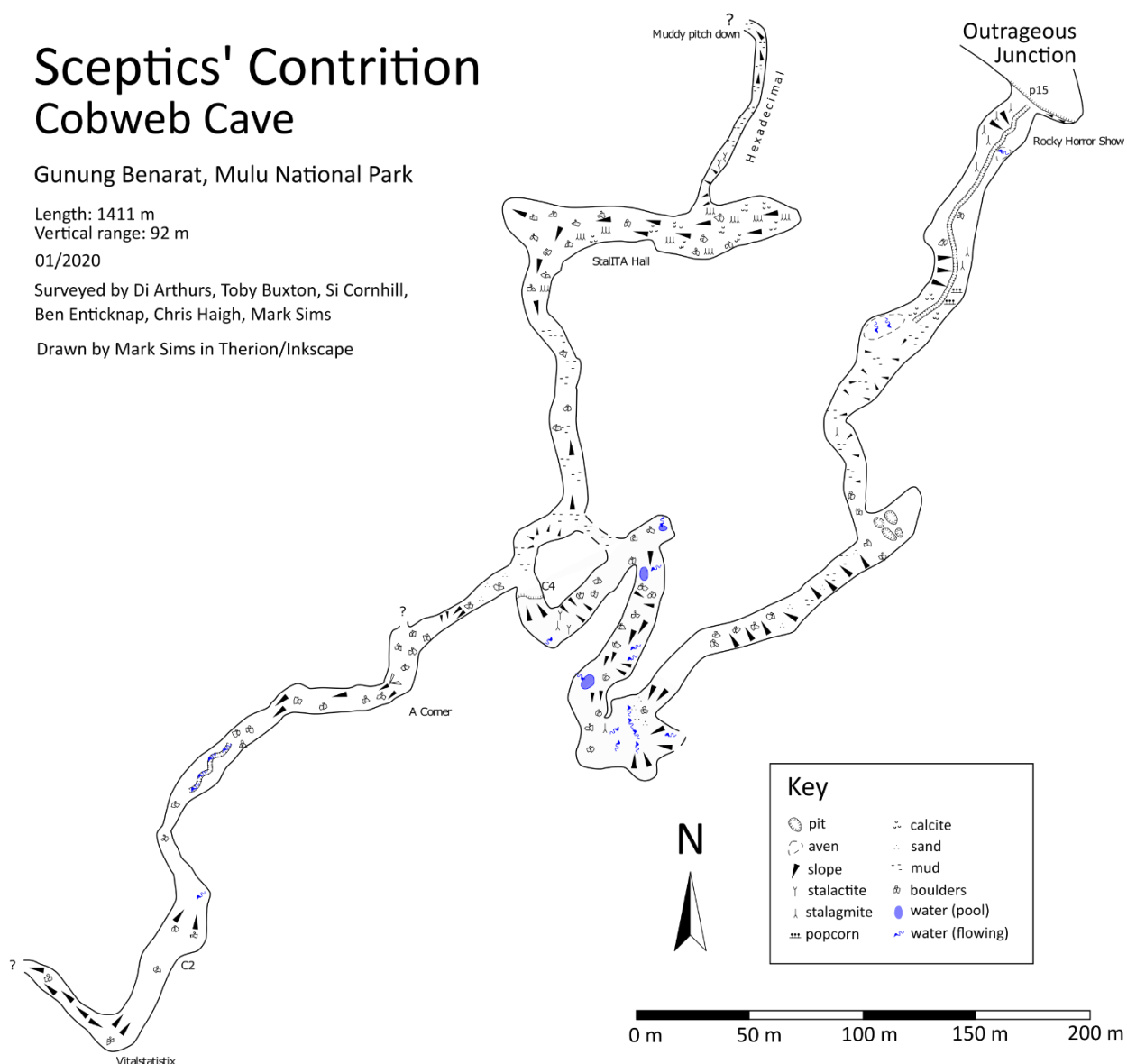
Gunung Benarat, Mulu National Park

Length: 1411 m
Vertical range: 92 m

01/2020

Surveyed by Di Arthurs, Toby Buxton, Si Cornhill,
Ben Enticknap, Chris Haigh, Mark Sims

Drawn by Mark Sims in Therion/Inkscape



Just a Mile entrance bashing

Ben, Chris, Toby

Three men and two Parangs set off from camp 5 at 9-ish with a mission to connect the upper entrance to Just a Mile to the Headhunters' trail. With the new connection from the monolith providing easier access to the upper reaches of Cobweb, even easier access was sought through the previously surveyed openings to the jungle.

The 4km trudge along the Headhunters' trail was relatively quick and efficient, with only a minor overshoot of the Cobweb entrance. Progress into the cave was halted only to quickly remove a leech from Ben's back and the group made the camp at the Monolith by midday. After a quick brew, swift progress was made up the new connection, with the added luggage making the squeezes a little bit more taxing. Just a Mile was achieved shortly after and once a squeeze was negotiated the daylight of the jungle entrance shone into the darkness. The passage to the surface was, for the most part, large with a boulder-strewn floor and at least 1 major inlet on the left. Several bolder chokes must be negotiated where roof-collapses in the larger sections of passage block fast progress.

Like an unlikely bastion of technology in a world ruled by mother nature, we attached our GPS unit to the top of a large unwieldy piece of jungle wood using vines and hoisted it into the canopy. This attempt to aid its negotiation with the limited satellites above was successful and resulted in a relatively accurate fix for the upper entrance to Cobweb. (0267547, 0460347 @256m height). A swift lunch, consisting of crackers & "cheese", was consumed among the historic debris of the nesters camp just inside the cave entrance. A quick scout of the nearby foliage, with the aim of finding the Nester's historic path, was unsuccessful and the team soon came to realise just how inhospitable the world-renowned karst jungle can be.

The entrance opens into a large jungle-filled depression structure. Initial path-cutting was relatively easy going down the steep limestone fragments but soon became obstructed, at the base of the depression, by 7m high, blades of treacherous moss-covered limestone. With Ben on point, the team pushed on, cutting a slow path through the strange and wonderful jungle flora. Tangled webs of vines amid thickets of strange 3m high "trees" made entirely of insubstantial sponge were dispatched with glee. Dreams of super-human-lumberjacking aside, our jungle guide was later to point out that these "trees" were in fact *Amorphophallus*; a large single-leafed plant that produces a single flower, once every seven years or so, that smells like rotting flesh. Every day's a school day in the jungle, and despite their intrigue, *Amorphophallus* were still very satisfying to cut down with a single over-dramatic chop of a parang (and yes, I did have to look up the plural)! As the team found itself balancing on treacherous razor sharp limestone blades, our way blocked by 7m high limestone pinnacles which somehow managed to be both sharp and slimy at the same time, we unanimously came to the conclusion that our path was not fit for purpose and we should perhaps try another direction.

We returned to the cave entrance and sought a higher route around the depression. In an attempt to circumnavigate the lower limestone impasse, we attempted to stay high and cut a path to the south. This was slightly more fruitful, and we were able to exit the doline with only minor limestone knife-edges to contend with. As we pushed on, the jungle became increasingly dense and steep, with the sharp limestone karst once again slicing at the rubber of our boots. At this point, horizontally looking through jungle thicket opened out on to clear sky. With the jungle floor dropping away almost vertically, just meters in front of us, we had reached cliff. Dejected at our lack of progress, we took a break and once again offered our technological deity to the heavens – the GPS told us we had made it just 150m from the entrance and were still at an altitude of 200m. 4 hours of sweaty manual

labour had seemingly got us nowhere, and with the light now fading an executive decision was made to return to the entrance and make our way back out whence we had come – through the cave itself.

After what seemed like an eternity of mindless trudging, rock-hopping, crawling & descending, the team made it back to the Monolith camp for a consolatory Milo brew before turning tail and heading out of the system. Our 4km night-time jungle hike back along the Headhunters' trail was interspersed with the strange mechanical noises, glowing eyes & fleeing animals we had become accustomed to. The relentless audio bombardment of the jungle insects accompanied our return to camp 5 at 9:30pm.

The upper Cobweb entrance still offers a tantalising entrance to the Cobweb system and future effort should be allocated to attempting to connect it to the Headhunters' trail. Our GPS coordinates show the relationship between the upper and lower entrances, along with our furthest point of path-making. Although we felt like we had achieved nothing, we were only 500m from intersecting the Headhunters' trail. The cliff we came across can be seen on the satellite imagery and our direction seems to have been correct for interception. Further exploration of the further reaches of Cobweb, namely the exciting extensions, and dare I say it connections, to be found in Sceptics Contrition would be much more accessible via a homely camp in the upper entrance series.

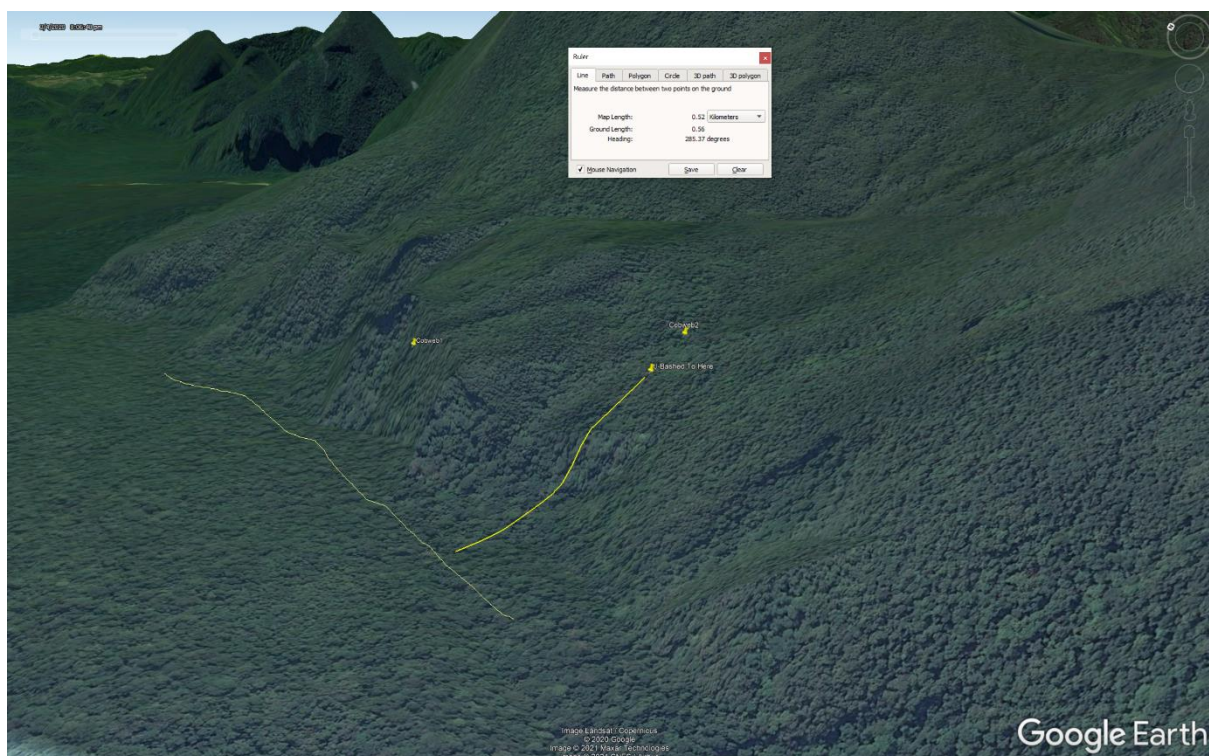


Figure 15: Cobweb Entrances & Headhunters' trail (Approximate) (image Google Earth)



Figure 16: Still from head-cam video footage while path-cutting. Toby, centre, for scale & some of the smaller limestone pinnacles faced on the right (photo Ben Enticknap).



Figure 17: Still from head-cam video footage. Impenetrable jungle & Karst limestone (photo:Ben Enticknap).

Moon Cave

Cake and Cheese

Mark W, Toby, Rachel, Ben, Chris, Mark S

Almost 15 years had passed since Tim Allen, Robbie Shone and I had peered over the edge of what we estimated to be about a 20m drop into quite a sizeable chamber with what looked like passages leading off in a couple of different directions.

We had named the large, descending, muddy passage leading to this point, Cake & Cheese, after our usual caving snack during the expedition. We were completely out of rope and with the 2005 expedition nearing its end we decided to leave it for another expedition. Despite three further visits to Mulu in 2007, 2009 and 2011, the pitch at the end of Cake & Cheese remained undescended.

With the 2020 Mulu expedition focussing on unexplored leads inside Benarat, Cake & Cheese was one of my key objectives.

We awoke, only slightly hungover, on the first day of 2020, at Camp 5. A leisurely start saw us at the base of the impressive Benarat cliff, just 1.5hrs after leaving camp. Once the track was re-cut we would regularly make the journey in around 40mins.

With the team splitting up into three, to find their respective cave entrances, Simon and I began to assess the route up to Moon Cave. Simon had never been to Mulu before, so it was up to me to try and remember the start point of the original route from 15 years before. No pressure then.

After attempting four different 20m + climbs, one of which we climbed twice without realising, nothing was looking familiar and with no sign of any of the previously placed anchors we decided to call it a day and head back to camp.

For the second attempt we decided relying on a 15 year old memory wasn't the best option. This time Simon and I opted for carrying out a surface survey from Sakai's Cave to a point directly below the Moon Cave entrance. Sakai's Cave was located and the entrance climb rigged with relative ease. Surveying along the base of the cliff, the first Moon Cave climb anchor could be seen exactly where it should have been. We were off. Alternating the climbing leads, Simon and I were soon looking out over the canopy towards Camp 5 and the excellent views up the valley and down towards Park HQ.

The 78m rope used for the climb was just long enough to drop us down the short entrance pitch. It was great to be back. Noting the time, we discarded our SRT gear and headed into the Benarat mountain for our first underground trip of the expedition.

Our 1 hour long journey into Moon Cave gave Simon a good taste of what Mulu had in store for him. We turned around, leaving the bolting gear at a prominent junction ready for the Cake & Cheese trip later in the expedition. We were both back at the bottom of the cliff before dark and showered and fed by 7.30pm.

Other leads in Sakai's Cave had taken priority meaning it wouldn't be until much later in the expedition before we headed back to Moon Cave.

Mark S, Toby, Chris, Ben and I were soon stomping along the enormous 'Bed Shaped' and other musically inspired passage names. We picked up the bolting gear and continued to the hairy traverse, about 2.5km in, leading up to the big pitch into Cake & Cheese. The traverse was already rigged and the pitch had a 60m rope already rigged at the top from the 2013 expedition. I dropped the pitch, installing the re-belay on the way, and landed at the bottom with only just enough rope. I

attached my hand jammer and foot cord to the end of the rope just in case it disappeared out of reach when I let go. It's a good job I did!

With the full team reassembled at the base of the pitch we headed off down to the previous limit of exploration, the awkward climbs in thick glutinous mud making it quite entertaining, particularly for the shorter legged amongst us.

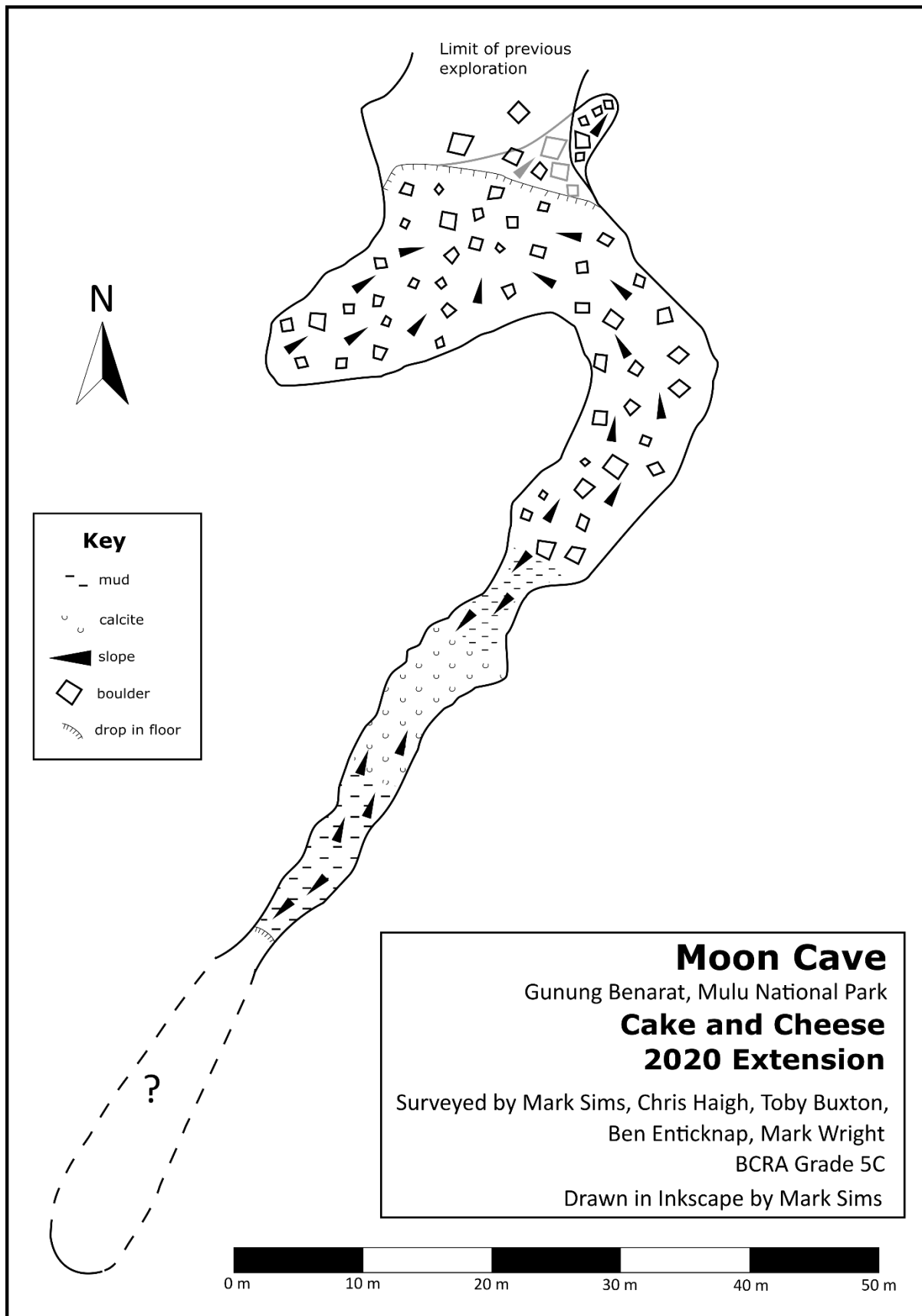
The drill was soon out of the bag and I had a couple of bolts placed at the head of the undescended pitch into a large chamber. A couple of re-belays later and we were into new ground.

In the 15 years since my last visit I had dreamed up all sorts of scenarios of where Cake & Cheese might lead. Needless to say, it didn't match any of the scenarios I dreamed up. The chamber itself is quite sizeable. One lead in the base of the chamber soon closed down into a small impenetrable choke. A second lead looked more promising, heading up a steep slope opposite the base of the pitch. Unfortunately, this too soon petered out to low muddy areas. With no draughts noticeable in any of the new finds we decided to call it a day on the exploration and survey what new passage we had found before heading back to a well-earned Tiger Beer at Camp 5.

A short tourist trip with Dave and Frank towards the end of the expedition saw the entrance climb de-rigged. I'm sure somebody will be back there one day, there are still certainly plenty of good leads.



Figure 18 Dave and Mark W near the Moon Cave entrance (Photo Frank Pearson).



Sakai's Cave

Previous limit leads and finding the source of the draught

Diane Arthurs, Tim Allen, Mark Burkey, Toby -Buxton, Simon Cornhill, Rachel Findlay, Mark Sims, Mark Wright.

The draught from Sakai vigorously wafts the tree leaves obscuring the entrance which can be spotted approximately five metres above the track leading to Benarat Caverns. Due to loose ground and a steep slope we rigged up a leftwards traverse to the entrance using a 25 metre rope tied around trees.

Exploration of Sakai previously took place in both 1981 and 1984. These reports accurately detail the rigging required for the pitches however, we increased the length of rope on the final entrance series pitch from 22m to 25m in order to comfortably reach the bottom of the pitch. We also used a handline on the slippery mud slopes at a 3m climb and after Small Mercies a 52m rope was used to rig the final pitch marked as P25.

Our aim this year was to investigate the previous limit marked at the end of the survey as a draughting aven. The 1984 log book describes this area as, *'a climb through loose boulders into a chamber with black holes in the roof far above, but no safe way of continuing past overhanging banks of fill ahead'*.

The first four trips involved rigging the pitches, depositing gear ready for bolt climbing and photography. We followed the previous explorer's recommendation of wearing crampons for the muddy slope traverse which were very welcome but later dug steps which made traversing a lot easier and crampons are no longer needed. Reaching the end of the '84 survey and inspecting the aven, at the base of the proposed climb a short passage led to a hole and a very steep ascending unstable boulder slope, assumed to be the overhanging banks of fill which had halted the previous exploration 36 years earlier. Tim Allen tiptoed up the slope following a draught which led to a boulder strewn chamber, 70m x 30m x 70m high and the obvious way on was climbing the wall at the far end of the chamber. A 20m pit was also noted against the left-hand wall.

Care needs to be taken on the slope up to the chamber as knocking anything back down could potentially cause a landslide and block the exit.

At the far end of the chamber a climb up to a roomy ledge at the base of a steep smooth wall made a good stance for the initial bolt climb started off by Tim and Si, quickly reaching approximately 30m on this first trip. Mark W. continued the climb up another 60m getting close to the top where a passage was seen and accessed on a further trip, by Mark W. and Mark S. using some innovative techniques which wouldn't be found in any textbooks! This gained access to a horizontal passage which unfortunately ended after 15m.

The 20m pit in the floor of the chamber was descended by Si. This turned out to be a funnel of overhanging loose boulders which narrowed down to a small vertical hole in the boulders which was deemed too dangerous to descend.

During our time in Sakai, fantastic photos of various locations were taken by Mark B., including eggs discovered after the first entrance pitch and a calcified small crab spotted in the phreatic tube just before the camp location. In total there were nine trips to Sakai including locating the entrance.



Figure 19: Di in the entrance series (photo Mark Burkey).



Figure 20: Di in the passage near P14 to Late Night Chamber (photo Mark Burkey).



Figure 21: Calcited crab discovered in the phreatic tube prior to the camp location (photo Mark Burkey).



Figure 22: Mark W. descending the final pitch marked at P25 (photo Mark Burkey).



Figure 23 Di in the phreatic tube (photo Mark Burkey).



Figure 24: Di (red top) & Si looking up the 1984 final aven just before the 2020 extension, the entrance to Road to Nowhere just behind Di (photo Mark Burkey).



Figure 25: Tim in front of the boulder slope leading to the Road to Nowhere (photo Mark Burkey).



Figure 26: Tim & Di looking back into the chamber before the 2020 extension (photo Mark Burkey).



Figure 27: Si bolting the descent into P20 in the Road to Nowhere (photo Mark Burkey).

Road to Nowhere climb

Mark W, Simon, Tim, Mark S

A big aid climb always gets me excited and when the Sakai team came back with stories of a big sloping climb at their current limit of exploration in Sakai's Cave I was keen to lend a hand.

Simon and I headed in at around lunchtime on the 6th and within only a couple of hours I was at the previous high point of 27m with a full battery and a bandolier full of bolts and hangers. With excellent reaches possible between anchor placements I had soon reached a new high point of approximately 60m and was just below where the sloping wall met the roof. A small passage could be seen leading off about 6m below the roof but the ground looked very loose and chossy and wouldn't be easily protected. A decision was made to return in a couple days.

I was joined by Mark S on the 8th and we were soon at the previous high point and preparing for a climb that looked distinctly more dodgy than I remembered. With little you could consider as being 'sound rock' for placing anchors I opted for a lower start point than the top of the original climb, ensuring that if I did fall it would 'only' be a potentially 15m pendulum swing!!

As it turned out, what looked like very loose and chossy limestone was actually quite solid and it wasn't long before I finally entered the new passage, all 15m of it. The tall, wide passage soon narrowed and lowered until becoming completely choked with calcite.

Following in the Mulu tradition of musically inspired cave names, the new section of cave was aptly named after the classic Talking Heads track 'Road to Nowhere'. The de-rigging of the traverse was probably more dodgy than the original climb and did involve a short length of sacrificial rope to complete the manoeuvre.

The following day saw Si, Di, Mark B and I return to photograph the large final chamber and allow me to carry out the final de-rigging of the climb with a series of pull-throughs.

Simon placed a couple of bolts above a hole in the floor of the final chamber but on investigation this too proved to lead nowhere.

We exited the cave taking photographs and de-rigging on the way and were rewarded with a most beautiful sunset at the entrance, finally reaching camp around 7.30pm.



Figure 28: Si in the foreground, Mark W. bolt climbing Road to Nowhere (photo Mark Burkey).

Sakai's Cave

Gunong Benarat Mulu National Park Sarawak

UTM 50N 266923 E 456092 N

Altitude 277m - Length: 1987m Depth: 171m (2020 extension 187m)

2020 extension surveyed by Diane Arthurs, Simon Cornhill, Mark Sims, Mark Wright

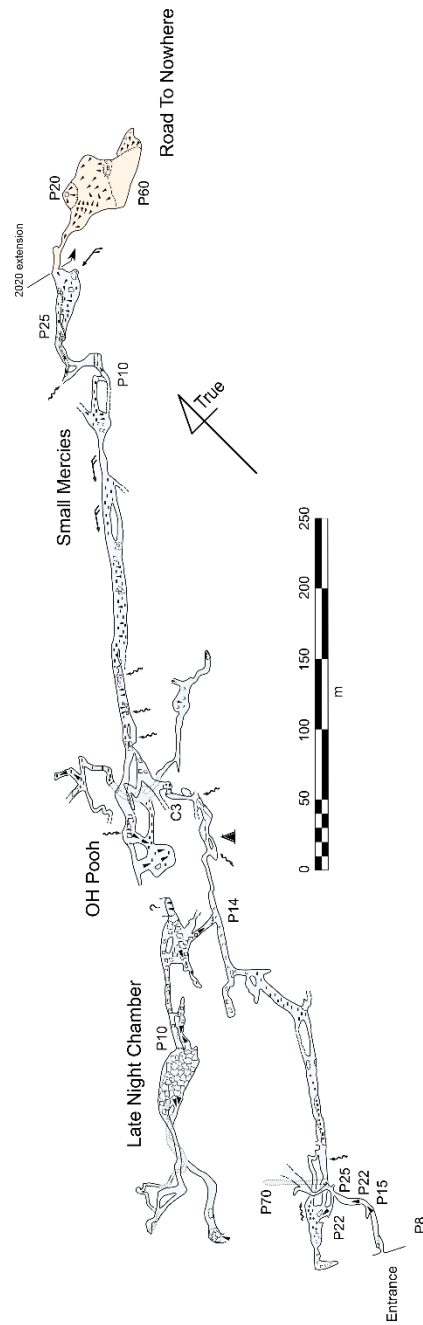
Instruments Note4 & Distox2 calibrated to <0.5°

Survey accuracy: 1984 to BCRA Grade 3B-5B, 2020 to BCRA Grade 5c

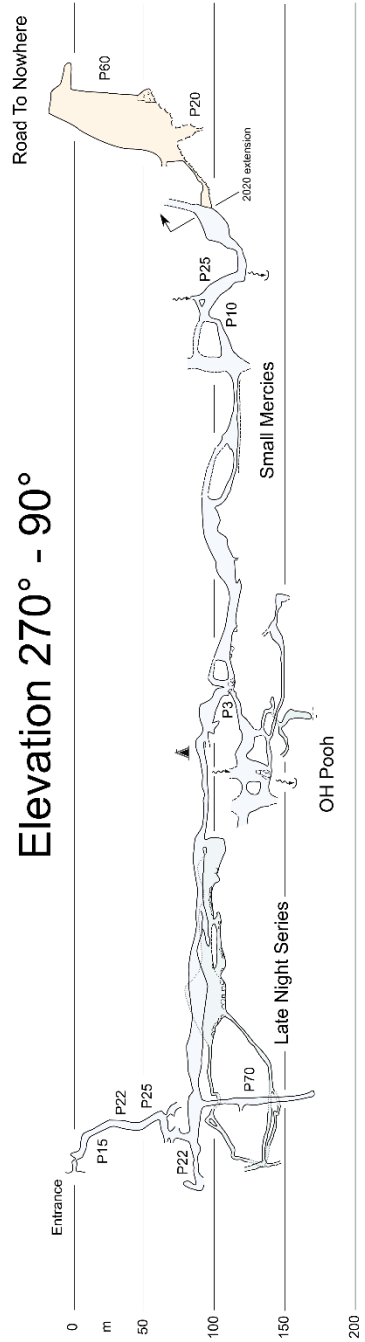
Drawn In InkScape: Diane Arthurs & Simon Cornhill - 2020

Legend

	Cave Passage		Aven		Rocks/Boulders		Water Flow
	Estimated Cave Passage		Silt		Boulder Floor		Water Sink
	Lower Cave Passage		Cobbles		Campsite		Step/Pitch
					Calcite		Popcorn Calcite
					Draught		
					Slope		



Elevation 270° - 90°



Benarat Corner Cave

Frank Pearson, David Rose (with Mark Burkey, Tim Allen, Di Arthurs, Rachel Findlay)

Several attempts were made over the duration of the expedition to find and enter this potential cave some 70 metres above the forest floor at the eastern end of the far Benarat cliff (with the imposing golden prow), near the northern corner of the Melinau Gorge. Two routes, following the Benarat cliff and up the river, were used to locate the foot of the climb. The cave had previously been seen from a helicopter, and from Canopy Cave and from a ridge overlooking the river parallel with Bat Cave, both on the Api side of the gorge. An attempt to reach it was made in 2015 but failed to climb the vegetated lower wall. The cave has only been seen from a considerable distance and may yet be a calcited old entrance, an alcove or a stain weeping from the diagonal joint it is located on. There is a possibility of some form of passage as a very narrow slot in the joint 60m below the cave draughts strongly. However, it is in what is believed to be the re-crystallized limestone zone of eastern Benarat where, yet, no caves have been found.

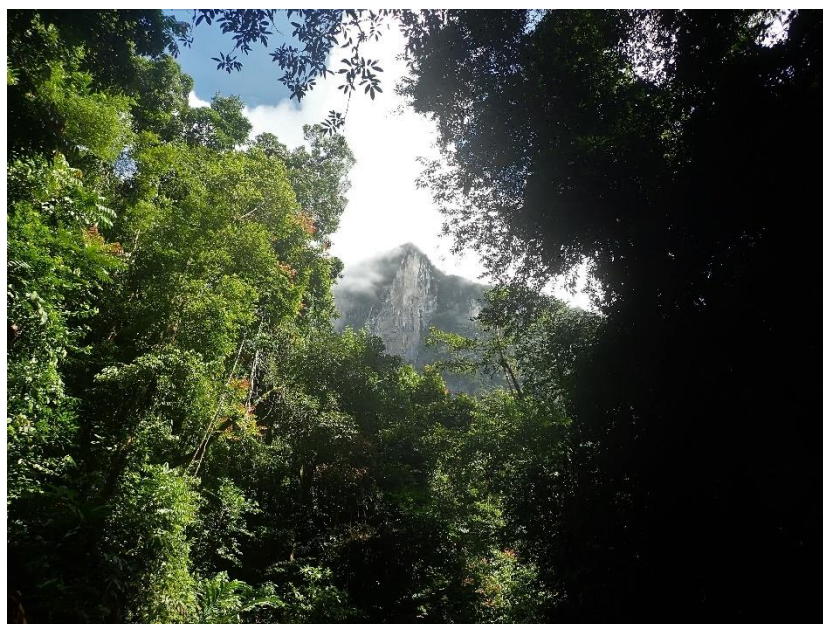


Figure 29 View of the Golden Prow of the Melinau Gorge, seen from the river where the climb up begins (photo Frank Pearson).

The route following the cliff began by utilizing the expedition's main trail to the foot of the Moon Cave climb and following the trail to the east below Benarat Caverns and Hurricane Hole. Beyond Hurricane Hole the trail continues to a climb up to a higher terrace with a cave at either end. The first cave has a substantial entrance and draughts very strongly but is choked with mud, calcite and roof collapse and the second is completely choked after 3m. The terrace ends as the cliff drops below into the forest. The trail descends to the foot of the lower cliff and continues past a large cave entrance with a fallen tree leaning across it that becomes too tight after 10m. The trail ends at the eastern limit of the cliff where the vertical flank rises back up the slope towards the cliff with the golden prow. Here a traverse was cut to a clay lined gully and a trail further cut up to the foot of the cliff beneath the prominent overhang on its western side where there have been extensive rockfalls. At this point the cliff descends diagonally back down into the forest. This is not evident when looking at the cliff from Camp 5. The climb to the cave rises from a terrace leading off this descending buttress some way below. This proved to be a long walk over very difficult ground, much further than it appears from Camp 5. Cutting the trail to the cliff and checking the caves took us 4 hours.

Much faster though prone to daily flooding is the river route first followed in 2015. Leaving the south riverbank at the limit of the path that runs from the footbridge, 13 river crossings take you to a prominent cobble bank and a right-hand bend in the river. A slab beneath hanging trees to the left leads to a clearly defined gully beneath a cliff and a cut trail up to the toe of the descending buttress. A three-trunked tree is a strange marker. Part way up the diagonal cliff foot is a large terrace which is a dead end at another huge cliff, though it provides spectacular views of the corner of Api, the Melinau Gorge and the catchment area below Gunung Mulu. Continuing up the diagonal trail past this terrace leads you to the head of a dry gully and cairn beneath a prominent joint / crack-line that holds a strongly draughting hole (too tight) 8m above. A scramble up to the right past tree roots leads to a short terrace at the far end of which the climb begins.

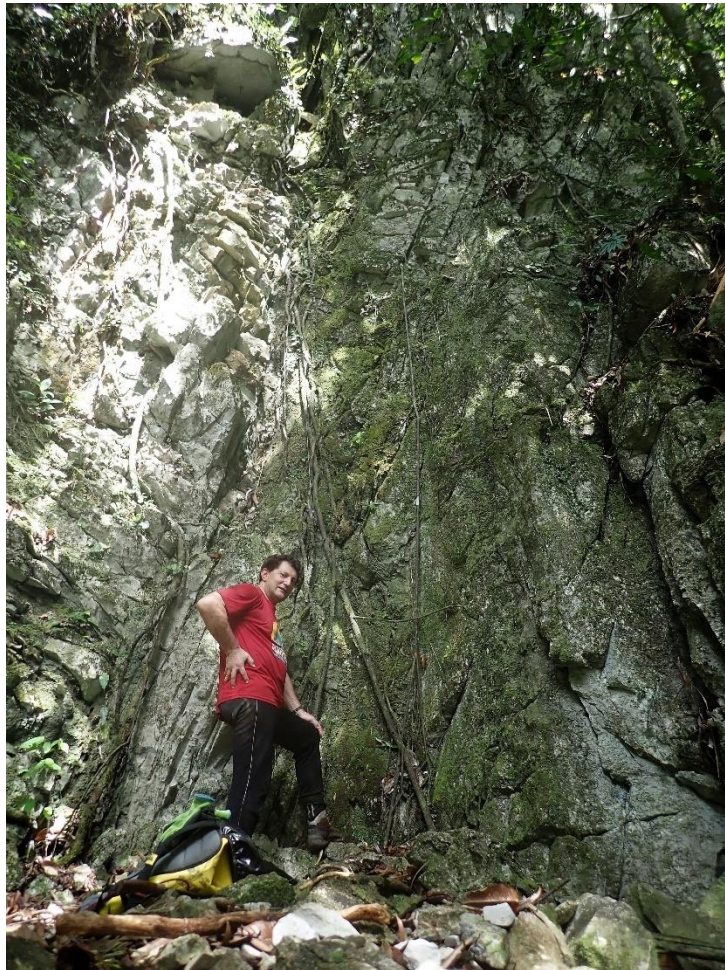


Figure 30 Dave at the foot of the CC cliff, with the draughting hole above. This joint appears to be the one that has the cave entrance - way above (photo Frank Pearson).

The climb is steep and loose up to a large tree, with a grassy ramp running further right to a grassy bay and more large trees. The climb then traverses back left, over ledges to an overhang with a tree and roots. A weakness moves up and slightly back right past further narrow ledges to a steepening. Here the rock becomes much looser and the roots of the trees and shrubs, though providing handholds, are levering out large blocks. This was followed until the loose rock became too dangerous. Over to the left, the lip of the overhang above the suspected cave could be seen some 20m away. Several alternative routes up were attempted but all were dangerously loose. A storm swept in at this point threatening our return down the river. The climb was very heavily vegetated,

and the rain would have made climbing impossible. We abseiled off and returned down the trail and along down the river.



Figure 31 Rachel on the attempted climb up to Benarat Corner Cave (photo Frank Pearson).

It is difficult to say whether this climb could be completed. We took a drill and bolts though they would have been useless in the loose, shattered rock, belays were on roots only. The climb may be possible, but the person belaying would be in the direct line of falling rock, trees and climber. Another possible way could be found following the crack-line / joint past the draughting hole, though this looks equally loose and overhanging. Further thought could be given to starting to the left of the gully / cairn and then traversing over to the right into the crack-line above the overhangs. Whichever way is followed will present a steep, loose, vegetated and poorly protected climb.

The northwest

Tim Allen

The team was based at the southern end of Gunung Benarat in Camp 5. To reach the NW corner of the mountain is a two hour walk and the area around Blue Moonlight Bay Cave three and a half hours walking once the track is cut. As our time was short only limited work was attempted at this end of the mountain. However, the geomorphology here is not so well understood and many mysteries remain to be solved, therefore it is worth reporting on some general observations as well as our limited work here.

Terikan Rising is the main resurgence for the mountain. Its course can be followed underground through Terikan West and Terikan East to Blue Moonlight Bay where the upstream sump descends to -54m and continues downwards. The river is not seen again until four short sections of river

passage in the central area of the Cobweb system. Upstream, or south of there, its origin is unknown. The main high level passages of the Terikan System do not appear to be associated with the modern riverway but rather of the Medalam River. To date many of the huge passages which head north from entrances in the southern cliffs have not been located in the north of the mountain. Clearly there is much hard exploratory work to do in order to fully understand this mountain's caves.

Unnamed resurgence/Troll Canal was first reported in the 2011 expedition report although it must have been noticed by cavers earlier than that. It is located less than 500m south from the Lubang Cina rope bridge. At the bridge the smaller river can be seen joining the Terikan. The water resurges through boulder collapse from the cliff above and there is no direct route in. A 2011 sketch survey showed that the main passage continued unexplored. Tim Allen and Mark Sims visited the area on a day trip to check this out. A body sized tube gives access to a larger tube which abruptly drops into a deep water passage which sumps just upstream. On the day of our visit the water was crystal clear. It is not known where this water comes from and there is little written speculation to its source. It may be connected to marginal drainage in a similar way to Goldwater in Gunung Api, but little flowing water is noted in the marginal caves so far.

The same pair climbed above the unnamed resurgence where draughts rattled the leaves and indicated entrances. Two were soon located and the higher one connected by large passage to the **Elevator Entrance** of the Terikan System. It was highly unlikely that this passage was not explored before but did not seem to fit with the 2003 survey. The lower entrance led to a number of complex passageways which were not on the survey. Half a kilometre was surveyed until, as we headed towards the daylight of a third entrance, a survey station from 2003 was found (CB, TF, DS – Hornbill Cave). It appears that this complex area was never fully surveyed or at least did not make it onto the finished 2003 survey. Work here will need to be repeated at some future date to make sense of this complex area of cave.

Blue Moonlight Bay (BMB) Cave

Tim Allen, Mark Burkey, Rachel Findlay, Mark Sims

BMB had not been visited since the 2005 expedition which dived the upstream sump. There were two outstanding leads to check deep within the system. Both were a long way in and would require considerable expedition resource to push to a conclusion. In addition, it is unclear just how the development of this system fits in with the other major caves of Gunung Benarat.

The route to the cave.

This is a difficult cave to find because both the entrances are high up on the pinnacle and dolined karst, once described as the most difficult terrain known to man. On my previous trips in 2003 and 2005 we used the Doline Entrance which gives straight forward access to the river and the passages beyond. It was expected that all track markers would be long gone.

Crossing the Melinau river from camp 5, the Headhunters' trail is easy to follow for 6km to Lubang Cina and the Terikan River rope bridge. Over the river is the timber rain shelter and just 50m beyond the turn off to the Resurgence itself. This is a smaller track, not obvious in places but otherwise quite well marked. After a kilometre the dark mouth of Terikan Rising is passed and a small clearing which was the site of a 1980's sub camp. Beyond, the track is indistinct but follows the edge of the limestone passing a number of inlet entrances which give access to Terikans West and then East. Along here any faint route was obscured by a number of tree falls and the ground is wet and boggy in places. After perhaps two kilometres a 'cove' in the limestone is reached where the vegetation is a little more open. Although it cannot be seen from below the Battery Entrance to the River of

Sound is located on the south side of the cove and could make a pleasant campsite (if memory serves well). It is necessary to head east into the far corner of the cove where the limestone turns north for a short distance. Behind a large tree is a fretted and rocky gully which leads steeply up to a col. From here the going is challenging and impossible to keep to any sort of straight line. There are a number of dolines and open shafts to traverse. From the col the direction is east. We found the two GPS fixes from 2003 of Tea Time Hole and the rim of the BMB doline very useful where it was possible for the GPS to see enough satellites (not often). The entrance is at the very bottom of a large fern lined doline and not visible until you are directly above it but a powerful siren draught blows the vegetation. Entry to the cave is a climb down between boulders.

We were fortunate to locate the entrance in a single day trip. I was assisted by Mark Burkey where the two of us reached the entrance in seven hours. Our return to camp 5 took three and a half hours. It felt a long hard day.

GPS co-ordinates from 2003.

Tea Time Hole – 0269191 0463218 168

BMB Rim1 – 0269234 0463173 146

BMB Rim2 – 0269252 0463144 146

BMB and the leads

Both leads were deep into the cave system, too far for day trips from camp 5. Once the track to the entrance was established a day trip to carry in camping gear, rig the pitch, route find and locate a suitable campsite took place. This involved Rachel, Toby, Mark B, Frank, Dave and myself. With loads and slow going it took nearly four hours to reach the entrance on this occasion.

The route to Dark Star Chamber is easy enough as is finding the pitch on the other side. I had failed to remember the secret to rigging this pitch where a route under stal at the back of the ledge leads down to a lower level where a pitch of 15m can be rigged on naturals. Frank and Dave retreated at this point and the four of us carried on hoping to get to the Casting Vote. The huge ramp down from the pitch leads directly to the main river junction which is just a wade at this point but one where high flood levels might be a problem. Heading up the Nilong River inlet and turning right leads to a dry passage into a large breakdown chamber. I missed the route down through boulders (back to the right as you enter this first chamber) into Batukah Chamber and led the team on a merry dance across exposed traverses into unnamed passages. Once corrected we found Strangers Gallery easily and dropped our bags at the pitch down into the Casting Vote. We made the entrance as darkness fell and a very wet walk back to camp 5 took over three hours.

After a day of rest there was just time for a two night camp in BMB before we had to pack up and return home. Four of us, Mark B, Rachel, Mark S and me, had heavy packs which became enormous as we picked up the rope and bolting gear at Strangers Galley. Fortunately, we found a good level campsite with water nearby at the entrance to the Southern Passage. The end of that passage was to be the next day's objective.

At the end of the Casting Vote just back from the final choke is an undescended pitch. Me and Pete Hall had been there in 2003 but without enough equipment to descend it. The pitch is described on the 1980 survey as '20m+'. We had brought 80m of rope just in case. The pitch starts off down a sandy slope to a huge jammed boulder and a rebelay. Vertically down a large rift leads to another huge jammed boulder and further rebelay before a straight descent passing snaggy flakes to the

floor. The rift is a huge feature which continues back beneath the floor of the passage traversed to this point. The descent uses most of the rope in what is probably a 60m pitch. A muddy route down through boulders and under a low arch leads to a final static sump chamber. No one else came down and no survey was made due to loose rock on the pitch and the lack of anything to tie into but the sump would appear to be at the same depth as the sump shown on the survey at the opposite end of the rift.

Mark B took some stunning photographs in both Strangers Gallery and the area around camp.

The following day, after a pleasant night's sleep in a very comfortable camp, we set off to look at climbs at the end of the Southern Passage. In 2003, with Pete Hall we found a way on here through a small calcited route. In 2005, with Rich Gerrish, and whilst diving operations were taking place, we free climbed an aven and friction ramp to arrive in a large aven chamber with a huge calcite flow running down the wall from high above. This was the lead. We arrived here to climb the flow but rather than take a direct ascent, opted for an easier free route up the opposite side to where a rift gave access to a window at high level. I started an airy bolt route from here, out and upwards, towards the flow. The rock became alarmingly hollow sounding but I ran out of gear just short of a wide ledge. As the flow would still need to be navigated to progress we decided to leave it there. The rope was left fixed to good anchors near to the top of the climb to assist future exploration. This is the one significant passage to head south from BMB and is likely to be key to progressing exploration in the area.

Mark B took more stunning photos both of the aven and along the route back to camp. The following day camp was packed up and ridiculously heavy packs transported out of the cave. We were much relieved to meet Simon and Mark W at Lubang Cina who had come to help carry the gear back to camp.



Figure 32 Mark S and Tim Allen at the main river junction in Blue Moonlight Bay Cave (photo Mark Burkey).



Figure 33 Tim and Mark S in Southern Passage. (photo Mark Burkey).



Figure 34 Rachel and Mark S in Southern Passage. (photo Mark Burkey).



Figure 35 Rachel in the chamber and the tiny dot of light in the roof above her head is Tim on the bolt route (photo Mark Burkey).



Figure 36 Mark S and a racer snake near the camp (photo Mark Burkey).

Other odds and ends

Lagang Cave

Toby, Rachel, Mark S

Mark, Findles and I had an extra day at HQ after the rest of the team had departed for Miri. I can't remember exactly why, but nobody was complaining. We decided to have a look at Lagang's Cave, following excitement from Dave about a lead that 'only needed a hammer' from his trip on the first day. Having gained the key from HQ using our important people badges, we made our way over to the entrance. I was quickly restrained from mucking about with the controls for the lighting.

Once inside, things turned out be mildly more complex than the survey suggested. We followed the boardwalk to the other entrance, which we hadn't realised existed, before finding our way back to the something run (?), where we understood Dave's lead was to be found. The main passage in Lagang's is a huge, ancient trunk passage, and we spent a good deal of time climbing up and down over big boulders and deciding which bit of the passage was the best way.

Eventually we made it up to the top entrance, which seems to pop out in the middle of the jungle. We didn't climb up to it, as Dave's lead was apparently some way back from it on the left of the main passage. We headed in that direction, nearly falling down various holes, before gaining a lower level. This soon entered a series of small (tiny by Mulu standards) crawls and squeezes, with muddy puddles. After a great deal of searching around and not finding anything resembling a lead, we got sick of this and turned around. The most interesting thing in this area was the presence of feline tracks, which we immediately decided were left by the non-cave-dwelling Cloud Leopard. Veno later told us they were probably the tracks of a 'Cave Cat', which is presumably very like a Cloud Leopard.

On the way out, Mark got his camera out and produced a fine picture of the main passage, which makes the team look rather bigger - actually it's just five versions of Findles, with five different semi-correct lighting positions by me.



Figure 37 Rachel (x4) in the main passage in Lagang Cave (photo Mark Sims).

We had intended the day to be a fairly relaxing one, but after easily the most unpleasant bits of caving on the whole trip, and a fairly significant round trip from HQ to the entrance, it didn't feel so relaxing. Nevertheless we'd had a fun time and felt that we had earned even more battered aubergine that evening.

For about ten days in January 2020, I found myself fearful that the Mulu Caves Project Benarat expedition was likely to be my last chance to visit anywhere so remote for a very long while. The rainforest, and the almost total lack of communication with the outside world that living within it requires, seemed to amplify these fears, which turned out to be correct.

On January 3, an American drone strike killed the Iranian Revolutionary Guard commander Major-General Qassem Soleimani, together with nine companions. Sandwiched as it is between the massifs of Gunung Api and Gunung Benarat, there is no TV news or internet at Camp 5, and getting a sketchy mobile phone signal involves a long climb up the trail that leads to The Pinnacles – something that no one on the expedition team could be bothered to do. Nevertheless, a few days after it happened, we got to hear about President Trump's decision to take out Soleimani, the second most powerful man in Iran. Our sources, a group of trekkers, arrived one evening, as sunset was transforming turned the rock of the Benarat cliffs into a wall of flame, as if hit by a Vietnam war napalm strike.

This, they said, had to be big. No doubt Iran would close the Gulf to shipping, and the inevitable series of escalations by both sides would eventually trigger full-blown combat. Global havoc would surely ensue

I sighed as the trekkers, a mixture of Aussies and Brits, laid out their doomy scenarios. Then, what could one do? I chose to emulate Somerset Maugham: to make and down a cocktail. We still had plenty of gin, left over from a somewhat riotous New Year's Eve. I wasn't quite sure how to make a stenga or a pahit, Maugham's favourite drinks, and we didn't have all the ingredients, so I made do with the spirit and some powdered orangeade.

I had Maugham's *Far Eastern Tales* by my bedside, and these brilliant short stories, mostly set in early 20th century Borneo, proved to be an excellent choice. I was spending my days with Dr Frank Pearson, global caving's leading literary scholar, in search of a hole glimpsed from across the gorge on the slopes of Api and 'almost' reached by The Dark Lord, Hugh St Lawrence, some years before. Hanging out with Frank requires one to exhibit some intellectual ballast, and Maugham was able to supply it.

In one story, *Neil MacAdam*, Maugham relates the shocking disappearance of a naturalist's faithless wife on a collecting trip deep in the jungle. He sets the scene in the 'primeval forest, huge trees swathed in luxuriant creepers, an inextricable tangle' and how, upon entering this realm, 'awe descended'. Then, he goes on, 'they cut their way through the undergrowth. They walked in twilight and only now and then caught through the dense foliage above them a glimpse of sunshine. They saw neither man nor beast, for the denizens of the jungle are shy and at the first sound of footsteps vanish from sight. They heard birds up in the tall trees, but saw none save the twittering sunbirds that flew in the underwoods and delicately coquetted with the wild flowers.'

At night, Maugham adds, 'the darkness was profound. The noise was deafening of innumerable insects, but like the roar of traffic in a great city, it was so constant that in a little while it was like an impenetrable silence, and when on a sudden he [the protagonist, Neil] heard the shriek of a monkey he nearly jumped out of his skin. He had a mysterious sensation that all around creatures were watching them.'

Many times, as we indulged our search for the cave we had dubbed Benarat Corner Cavern, day after gruelling day, Frank and I felt lost. But as we toiled across the endlessly difficult landscape, with

its enervating heat, downpours, blades of fragile, weaponised karst and malevolent vegetation, I drew solace from the fact that Maugham had been here before – if not actually hunting for a cave entrance high on Clogwyn dur Benarat, then somewhere very much like it.

Tales of previous struggles with this landscape that I had previously found hard to compute suddenly seemed understandable – such as Matt Kirby’s epic ten-day search to rediscover the Blackrock entrance to the Clearwater system. Frank reminded of a saying of the Greek philosopher Democritus – ‘appearances are a glimpse of the unseen’. And indeed, in January 2020, we failed even to catch a glimpse of Benarat Corner Cavern. When after our first few days’ fruitless efforts we climbed up the slopes of Api, hoping to see the entrance from there, the parting between the fronds of foliage which had once permitted this had closed up again, concealing the hole from view just as surely as if it had been swallowed by a verdant ocean.

Yet we knew it had been there once, and so still must be. It should, we reasoned, be roughly in line with the great discovery of 2017, the 12km of stonking new passage in the further reaches of Wonder Cave on Api. Like this major system, the Benarat corner, where the cliff edge swings round to the north, appears to lie on the far side of the caveless zone of re-crystallised limestone, and hence to hold great potential.

Our first mistake was to spend days trying to reach it from much further back along the escarpment, in the vicinity of Moon Cave and Benarat Caverns. From there, we descended steeply, a long way, then fought our way back up, slowly working rightwards, or east, away from Camp 5. We found several draughting entrances that seemed to hold promise, but though we spent hours digging one, they were, we realised, ‘fake news’.

On day three, we carried on past the lowest point of the cliff, then up a very long, very steep, very difficult slope, tormented by just an occasional, fleeting sighting of the wall still further to the right where the entrance must be located. All the time were being eaten alive by tiny, black sandflies that left itchy, pus-filled pimples as a parting gift. Defeated by a rattan tsunami, a more effective defence to this part of the mountain than anything offered by the Greeks at Thermopylae, we gave up our first line and then tried another next day, cutting a diagonal track across treacherous clayey slopes, horrendous when wet, in and out of razor-karst gullies and through dense thickets where progress was only possible after multiple swings of the parang.

This time, we thought we were on to it. But just as our hearts were filling with optimism, we got to a spot where the only way to move further right would have been to make a 200-metre abseil, and then, laboriously, to re-ascend.

That was the end of our attempt to reach the cave via the cliff edge. Next day, we turned to the river, wading across it some 17 times as we made our way upstream through the gorge. At least we were keeping cool, and after a while we came across a family of five wild boar, the daddy the size of a small cow, his brown, snuffling youngsters trotting obediently behind. Further on was a large, monitor lizard, who sportingly agreed to vacate the tree trunk we needed to cross to make progress. There were other species. Porcupine, little mice, other big rodents and an array of exquisite butterflies. So far as I know, none carried zoonotic viruses. Walking up that riverbed, it occurred to me that it must have looked much the same for tens of thousands of years – Borneo’s climate during the ice age was little different from now.

Who could not love this wildness? But there were also leeches. One afternoon I found one sucking blood from my throat as I removed my sweat-soaked T-shirt on returning to Camp 5. Another time, I

was puzzled by a feeling of unexpected moistness behind my right knee. I touched the skin and was startled to find a puddle of blood. Bloated, my unwelcome guest had by then dropped off.

We knew it was risky to approach Benarat Corner via the river. We could easily be stranded by a flood, unable to get back to camp because the river crossings had become impassable, and one evening, we almost were. I cannot improve on Maugham's account from the same short story: 'The storm broke suddenly. A great wind blew and then the lightning rent the darkness, like the scream of a woman in pain, and the tortured flashes, quick, quick, one on the heels of the other, like demon dancers in a frantic reel, wriggled down the night... The rain pelted in fierce torrents. The tumult was awful.' The river rose – but not quite enough to stop us getting home.

Nevertheless, we did find our cave. Striking up from the riverbank, following a series of obvious geological features, we came to a platform at the bottom of the cliff where the angle, until now steeper and steeper, finally relented for a few metres: a circular ledge where we could have lunch and gear up. This was the bottom of a corner of far from solid limestone, and high above our heads, we could see the evidence of the great cave system we hoped lay within these wobbly ramparts. Leaves fluttered wildly in a cold wind that we could feel even where we sat.

We found it, but we didn't manage to get into it. Over two heroic days, Frank tried via a zigzag, wandering line, climbing three pitches with effectively no gear on tremulous flakes, rattan daggers and loosely-embedded tree roots, while I paid out the rope. It was, of course, ungradeable, but I would guess it would rate around E4, 3c. Eventually he was defeated by a great, white, protruding beak of choss that, had he challenged it, would have wrought a localised Armageddon: the collapse of several hundred tonnes of crag. But at least we know now where the cave entrance is, and how to reach the final part of the approach, and we have cut and marked a track from the riverbank far below.

The killing of Qassem Soleimani proved, in terms of global consequences, to be a non-event, and I didn't pick up on the real threat to life as we used to know it until I was back in England, though I did notice that more than the usual quotient of travellers seemed to be wearing surgical masks when I passed in transit through Kuala Lumpur. Writing of our adventures now, exactly a year later, in locked-down, pandemic-stricken Oxford, Mulu seems as distant as the world of tiffin, bearers and mad Edwardian adultery portrayed by Somerset Maugham.

But last week Frank and I chatted on the phone, and discussed the prospects for new finds on the November 2021 trip (postponed from February) which is still being planned – and our hope we might return to Camp 5. And, one day, to try to reach Benarat Corner Cavern by climbing direct from our luncheon ledge, drilling our way through the overhangs. Long as the storm has been, we still dare to dream.

Conclusions

The expedition was a resounding success especially considering the relatively short period of time we had at camp 5. The team bonded well together working very effectively across the disciplines of exploration, survey and photography. Several experienced cavers were introduced to the underground delights of Gunung Benarat who had not caved in tropical conditions before.

Much was learnt about the forest terrain towards the south-east corner of Benarat where a route up the cliff to the fabled 'corner cave' entrance still awaits discovery.

Sakai's cave was revisited for the first time in 36 years. A small extension was discovered, the survey updated and a full photographic record made. After many years of speculation Cake & Cheese in Moon Cave was pushed to a disappointing end but elsewhere at this development level other leads remain for the next expedition.

Climbs in Cobweb cave regained access to the lost level of Just a Mile which is the same level as Moon Cave. Only two leads out of many were explored here and both continue. A wild piece of climbing gained access to passages beyond the Elephant Warren and the main downstream river sump. Future work here will tell how significant this passage turns out to be. There are also leads at the lower level where a connection to the Terikan System via passages in Parangs/Thunder cave is possible. The distance is only 300m and must offer the best hope of connecting another Mulu mega-system of at least 90km in length.

At Blue Moonlight Bay and environs in the north much work is still to be done to gain a better understanding of the underground network here. Ongoing climbs in the Southern passage may prove to be the key to more cave in this area as might more surface investigation beyond the limits of the known cave.

There is plenty of work for the next Benarat expedition to do.

Appendices

Financial summary

Chris

In total the expedition cost around £23,000 to field. Members covered their own airfares individually or in small groups which cost over 1K per person depending on route, time of booking, etc. Fares were more expensive than usual as we all departed over the Christmas holiday period but this meant that expedition members could use part of the statutory holidays as part of their leave.

Everyone took out the P J Haymen caving expedition insurance. This cost the group around £1680.

Each member contributed £600 towards field costs (£7800 total) which included National Park charges for accommodation, meals at the HQ café, etc., as well as all other local boats, equipment, porters, food and wages. These costs were supplemented by a £750 grant received from the Ghar Parau Foundation and a personal donation of £250 from Roo Walters.

It is worth noting that in early 2019 the expedition enquired if any of the £5000 expedition balance held by the Mulu Caves Project was available to help fund the expedition but this was declined. Similar enquiries were made of the Merdeka award, an award of some £50,000 in recognition of the work of the Mulu cave explorers But it was pointed out that this was a personal award and not available to support expeditions at the time.

Medical summary

Rachel

Little preparation was required before setting off. Emergency details were gathered and taken in the form of hard copies. This included next of kin contacts, medical conditions, allergies and insurance policy details (most of the team were included in the group insurance policy recommended by the BCA). Thanks to a detailed inventory from the Mulu Caves 2019 Expedition, all required first aid equipment and drugs were deemed to be in good supply at Park HQ.

Luckily there were no serious incidents during the expedition, especially since the numerous doctors in attendance were more of the philosophical variety than medical. A couple of fairly deep lacerations were cleaned and treated without the requirement of sutures. These were sustained by a fall on a sharp limestone outcrop on route to Sakai and the slip of a Parang (machete) whilst at Camp 5. Additionally, our esteemed expedition leader injured his toe – treatment prescribed a new pair of shoes which could hold themselves together better.

On return however, a bout of confirmed Leptospirosis affected one member of the expedition. Leptospirosis (aka Weil's disease) is a bacterial infection predominantly spread by animal (commonly rodent) urine. The case required hospitalisation and treatment with. Leptospirosis has not been reported in Mulu Cave Expeditions since 2003 and previous to that not since the 1980's. Many theories have been speculated of potential transmission sources during our trip (including the river and Tiger beer) however the connections are ambiguous and hence the original cause remains introuvable. Even more puzzling was one mystery illness (confirmed not to be Leptospirosis), that evaded diagnosis altogether. Initial loss of taste and later respiratory problems are consistent with some symptoms of COVID-19, but this was considered unlikely by medical professionals at the time.

Photography

Mark B

This year it was my privilege to join the expedition out of camp 5 to help document as the team pushed potential leads in the Benarat area. I would like to take this opportunity to thank the entire team for their help and support with this role.

As well as documenting various surface aspects of camp and expedition life above ground, caves focused on from a photography point of view were:

Cobweb cave with photography in the Lower passages, Monolith Passage and the bolted traverse leading to the connection to Just a Mile passage.

Sakai cave was extensively photographed throughout and culminated in shots of the previously unexplored end chamber and bolt climb.

Blue Moonlight Bay Cave where photography was used to document the end passages and chambers of the cave as well as record underground camp life.

Equipment used:

Main camera - Nikon D850 with Nikon 14-24 f2.8 nikkor lens.

Lighting – Godox AD200 & 400 strobe units

Backup/Video Lumix GX80 with Olympus 12-40 f2.8 lens

Notes/thoughts:

Although the use of Daren drums worked, a Peli-case set up would have been more efficient for this type of caving / shooting.

Silica gel was used to help with humidity and photography on the expedition would have been near impossible without having taken it.

Although expedition members had been asked to wear photography friendly colours, as is the norm on expeditions, this did not always happen which made making a model visible in shot for scale more difficult in some instances.

Survey info

Survey Statistics

2020 discoveries:

sceptics_contribution: 1410.76m

monolith_climb: 767.29m (2051.67m total surveyed, 1284.38m resurveyed)

Sakais_2020_1b: 187.41m

cake_cheese2020: 98.84m

Total new cave found Jan 2020 = **2464.3m**

The Caves of Benarat After January 2020

English Name	Malay Name	RGS '78	Mulu '80	S'wak '84	Buda '97	DWG '97	Buda '00	B'rat '00	B'rat '03	B'rat '05	Mulu '07	Mulu '09	Mulu '11	Mulu '13	Mulu '19/2	Mulu '20	Totals
Moon Cave	Gua Bulan									6635.00	3787.77					98.84	10,521.61
Benarat Caverns	Lubang Benarat	1355.00	4870.00	2095.00													8,320.00
Hurricane Hole	Lubang Taufan							372.00	1106.00			102.30			272.42		1,852.72
Cobweb Cave	Lubang Sarang Laba-Laba			15185.00				10747.00	4414.00							2178.05	32,524.05
Sakai's Cave	Lubang Sakai		1120.00	1525.00												187.41	2,832.41
Tiger Cave	Gua Harimau			3800.00													3,800.00
David's Cave	Lubang Daud			439.00					349.00								788.00
Deception Cave	Lubang Tipu			1510.00													1,510.00
Menagerie Cave	Lubang Kumpulan Binatang			1875.00													1,875.00
Terikan Rising Cave	Gua Sungai Terikan	775.00							12532.00								13,307.00
Terikan River Cave West	Gua Sungai Terikan Barat	2270.00								20.00							2,290.00
Terikan River Cave East	Gua Sungai Terikan Timur	3840.00								40.00							3,880.00
Blue Moonlight Bay Cave	Gua Teluk Cahaya Bulan Yang		9400.00						257.00	53.00							9,710.00
Deliverance Cave*	Gua Pembebasan				3617.67		739.97							596.37			4,954.01
Gawai Cave*	Gua Gawai			300.00		1775.00											2,075.00
Buda Overlook Cave	-						20.50										20.50
Hole of the Moon	-											2553.00					2,553.00
Paradise	-												1192.87				1,192.87
Gardener's World	-													33.75			33.75
Little Deliverance	-													7.40			7.40
Half Moon	-													0.00			0.00
Penguin Cave	-																
Benarat Total																	104,047.32

Benarat System Total	53,218.38 m
Terikan River Total	32,572.00 m

splay_chomp

Mark S

This was little bit of python hacked together to solve a problem with the output from the disto x/topo droid combination. It had been (rightly) noted that it was a pain dealing with survey files when there were large numbers of splay legs separating each centre-line length. It can also be a pain when all splay legs are displayed in Aven for very large datasets. Removing splay legs seems an unsatisfactory solution since it would just mean throwing away data. This brief script separates the splays from the survey legs/LRUD data, puts it all at the end of the file, and comments it out. This way it does not affect the readability of the main survey data, does not display on Aven, but is not lost entirely.

```
#!/usr/bin/python3

import sys
import re

splays = []
notsplays = []
filename = sys.argv[1]
infile = open(filename,"r")

#flag for whether the current block is in a "*flags splay" section
SPLAY_FLAG = False

for line in infile:
    if SPLAY_FLAG == False:
        flagsearch = re.search('\s*\*flags splay', line,re.IGNORECASE)
        splaysearch = re.search('\s*\d+\s-\s\d+\.\d+\s\d+\.\d+', line)
        if flagsearch:
            splays.append(line)
            SPLAY_FLAG = True
        elif splaysearch:
            splays.append(line)
        else:
            notsplays.append(line)
    else:
        #search to see if end of block is reached
        flagsearch = re.search('\s*\*', line)
        splaysearch = re.search('not splay',line,re.IGNORECASE)
        #search & comment out "*NOT SPLAY"
        if flagsearch and splaysearch:
            splays.append(line)
            SPLAY_FLAG = False
        #don't comment out other flags
        elif flagsearch:
            notsplays.append(line)
            SPLAY_FLAG = False
        else:
            splays.append(line)

infile.close
```

```
#write to output file
outfile = open(filename,"w")
for i in notsplays:
    outfile.write(i)
outfile.write("\n;splay data (removed from main data)\n")
for i in splays:
    outfile.write(";"+i)
outfile.close
```

Redistributing survey loop closure errors along 'Fake' Reconstructed Data - preserving 'real' data

Si

After studying the various Benarat Caverns system surveys and survey model for this area, it was noticed that the survey centreline had been disconnected in two places, where Benarat Caverns joins Moon Cave at 'The Big Mistake' (**equate benarat_caverns_master.Fakebenarat.57 moon_master.Side_Passages2.59a*) and Hurricane hole entrance to the surface survey (**equate melinau_gorge_surface_master.Hurricane_Surface.1 hurricane_hole_master.Hurricane_Hole.1*). The reason for this is there are large loop closure errors, which when closed evenly distorts both the real and fake reconstructed data. In order to reclose this loop any error corrections would have to be forced along the fake survey legs, thereby preserving the real data.

To accomplish this, in *melinau_gorge_area_master.svx* file the **INCLUDE* and **EQUATE* entries were grouped into 'real data' which were put at the top of the file and 'fake data' at the bottom, inserting the command **SOLVE* in-between them. So now when the 3d model is being processed **SOLVE* makes survey stop, calculate all of its equations up to that point and then carries on. This means that the real data is now not affected by the fake data and any further loop closure errors are distributed along the surveys included below this command. The effect of this can be easily seen when the survey view is coloured by error.

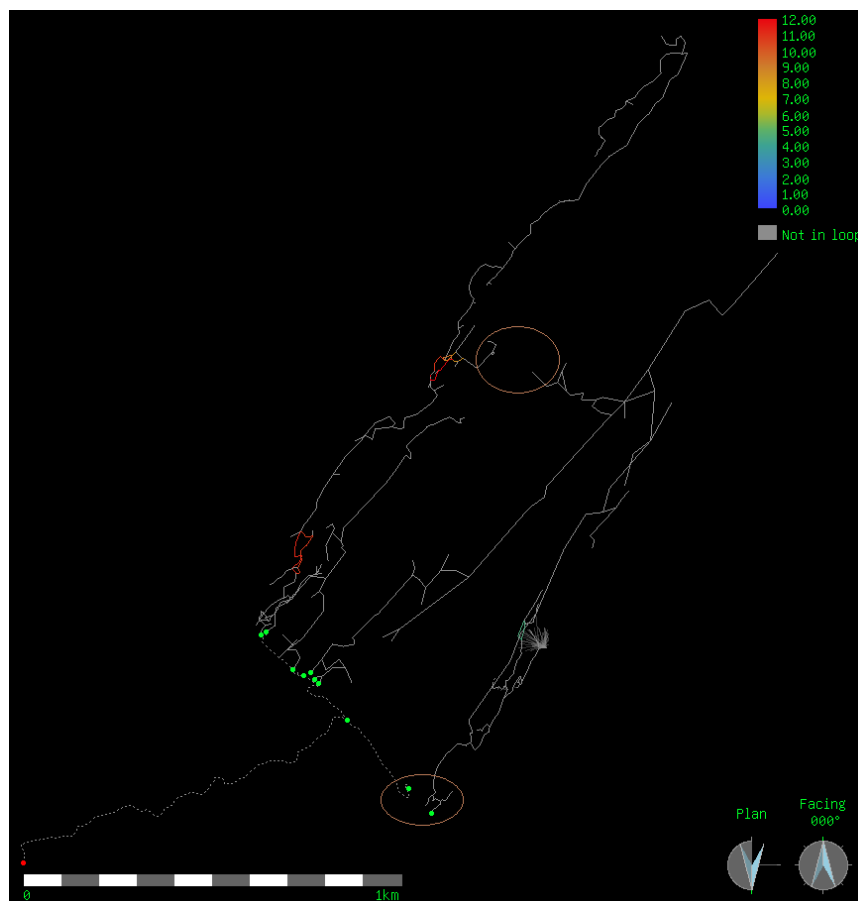


Figure 38 Survey Coloured by error - original (loops open)

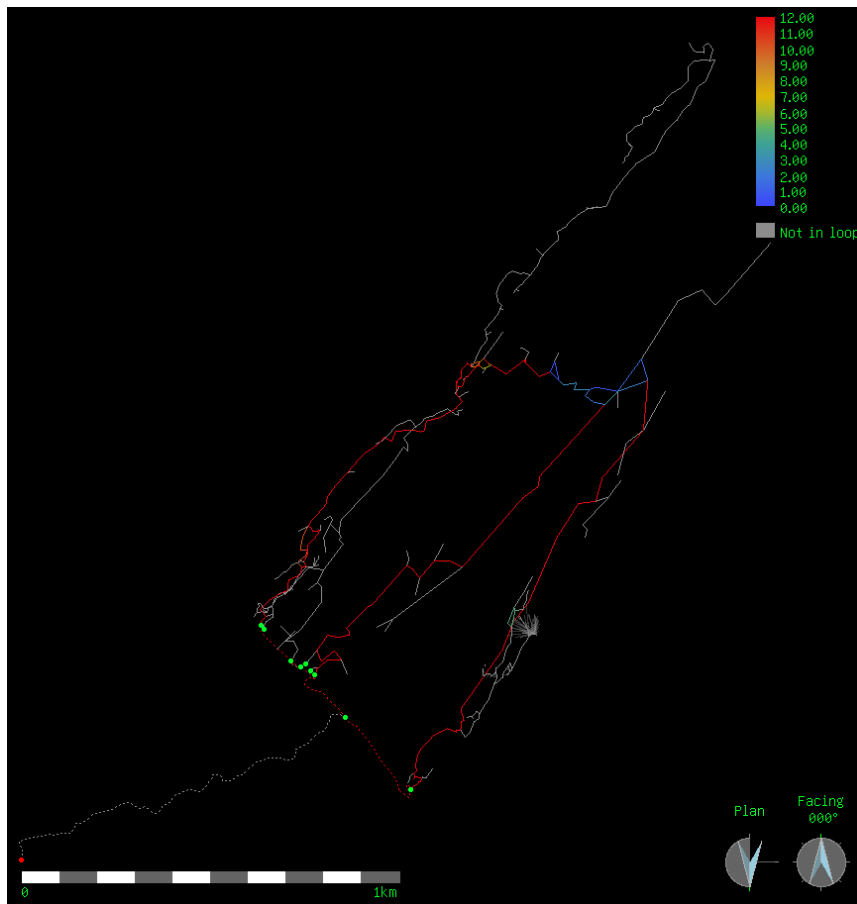


Figure 39 SurveX Coloured by error – loops closed

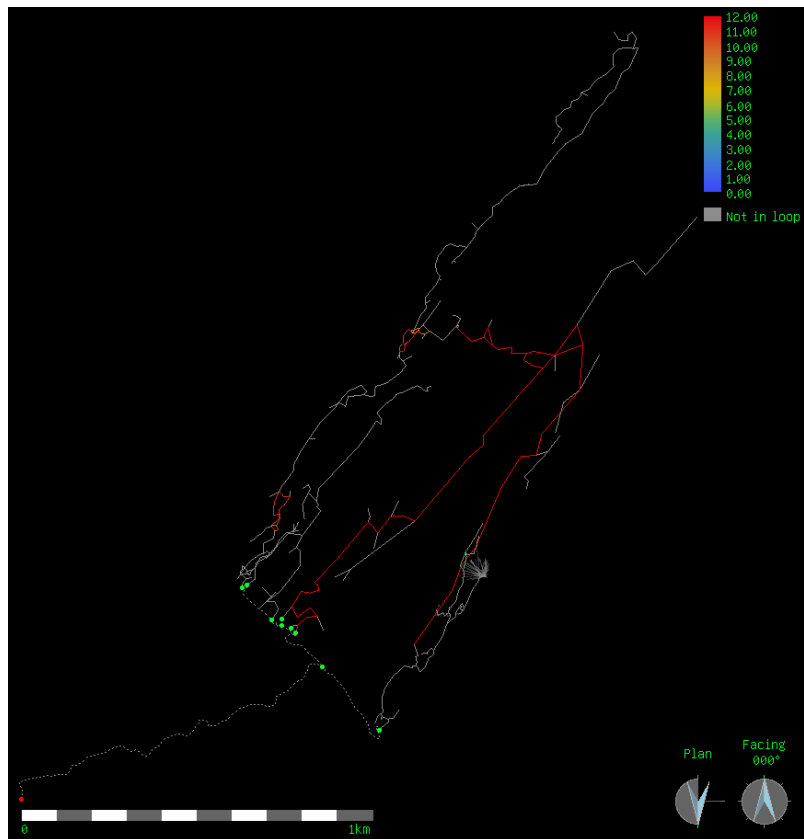


Figure 40 Survel Coloured by error – loops closed and errors distributed along ‘fake’ data

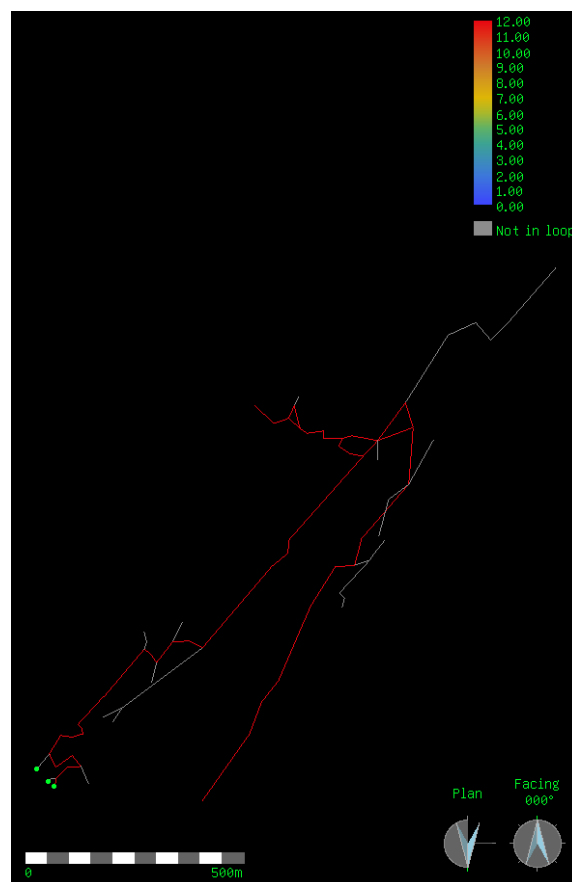


Figure 41 ‘Fake’ Benarat data only

melinau_gorge_area_master.svx

;<<<<REAL DATA>>>>

**include Melinau_Surface/Melinau_Gorge_Surface_Master.svx*

**include Moon_Cave/Moon_Master.svx*

**include Tiger_Cave/Tiger_Master.svx*

**include hole_of_the_moon/hole_of_the_moon_master.svx*

**include hurricane_hole/hurricane_hole_master.svx*

**include gardeners_world/gardeners_world_master.svx*

**include half_moon_penguin_cave/half_moon_penguin_master.svx*

**equate gardeners_world_master.Gardeners_World.1*

melinau_gorge_surface_master.Benarat_Caverns_To_Gardeners_World.23

**equate melinau_gorge_surface_master.Moon_to_Sakais.22 moon_master.Importance_of_Being_Idle_1.0*

**equate melinau_gorge_surface_master.Hurricane_Surface.1 hurricane_hole_master.Hurricane_Hole.1 ;(surface connection) (either-or)*

**solve ;this command processes the 'real survey data' before the fake data, so that loop closure errors are distributed along the fake data sets.*

;<<<<FAKE DATA>>>>

**include Benarat_Caverns/Benarat_Caverns_Master.svx*

**include Sakais_Cave/Sakais_Master.svx*

**equate melinau_gorge_surface_master.Moon_to_Sakais.0 sakais_master.Sakais_Fake.1*

**equate benarat_caverns_master.fakebenarat.30 hurricane_hole_master.hurrconn.1; (connects benarat caverns to hurricane hole; underground conn)*

**equate benarat_caverns_master.Fakebenarat.57 moon_master.Side_Passages2.59a ;(underground connection) (either-or) (connects Moon to Benarat) <<< commented back in Jan 2020>>>*

*;*equate melinau_gorge_surface_master.melinau_gorge.10 benarat_caverns_master.fakebenarat.39; pulls benarat caverns to KD's GPS*

**equate benarat_caverns_master.fakebenarat.36 melinau_gorge_surface_master.melinau_gorge.10*

*;*fix benarat_caverns_master.fakebenarat.36 0267004.19 458018.58 271.96; Benarat_Caverns_ent_KD, only required when viewing this file, sets a fixed point by which to join Tiger and HOTM*

The end



the **MULU** Caves Project

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Front cover: the Monolith in Cobweb Cave - photo Mark Burkey
Rear cover: Di Arthurs in Sakai's Cave - photo Mark Burkey

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