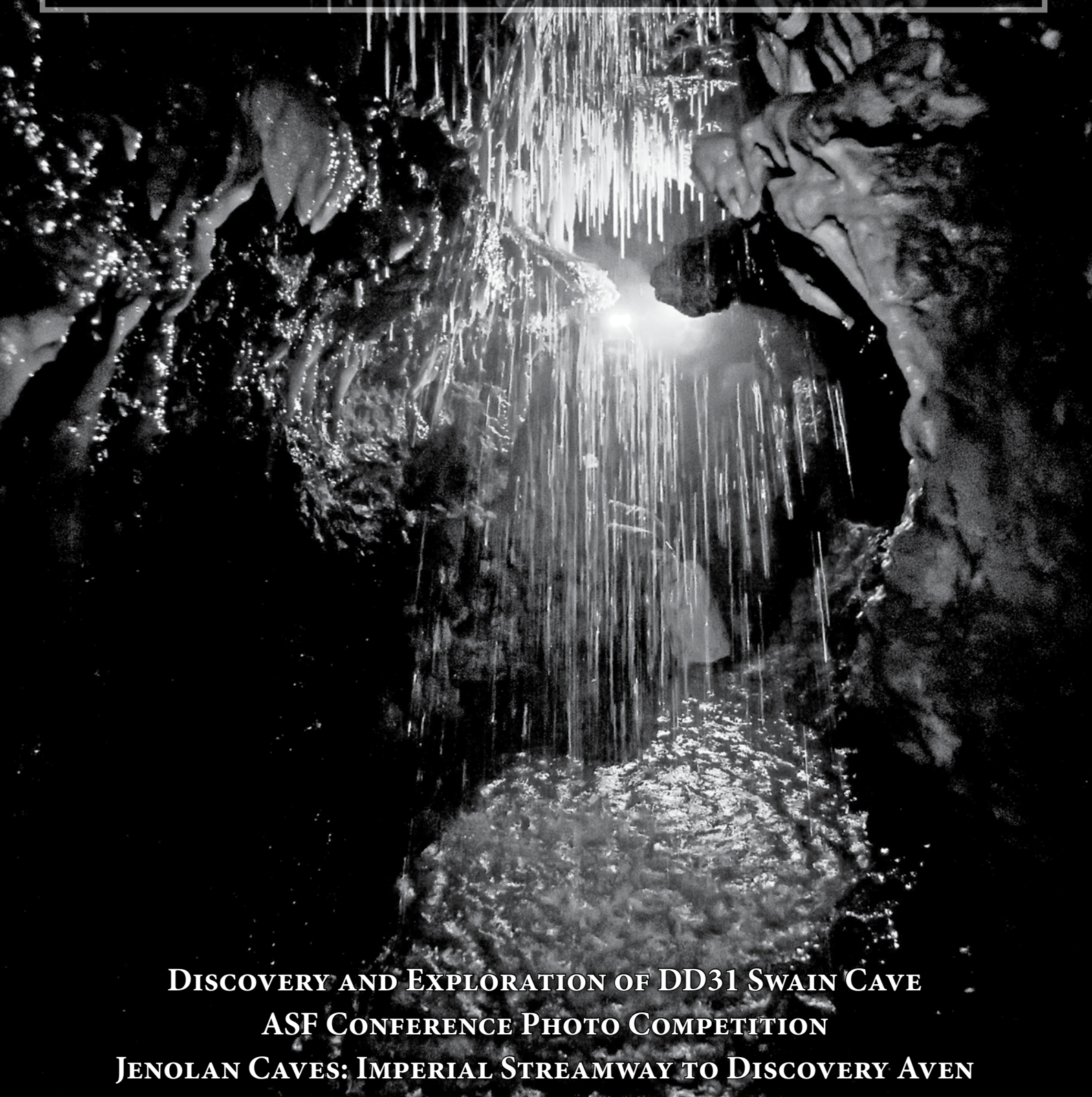


CAVES

The Journal of the Australian Speleological Federation



AUSTRALIA



DISCOVERY AND EXPLORATION OF DD31 SWAIN CAVE

ASF CONFERENCE PHOTO COMPETITION

JENOLAN CAVES: IMPERIAL STREAMWAY TO DISCOVERY AVEN

No. 193 • JUNE 2013

CAVES AUSTRALIA

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Cover: One of the showers, DD31 Swain Cave. Photo by Catherine Hemley

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How to make a donation to the ASF Karst Conservation Fund

Via Paypal

DO YOU have a Paypal account and wish to donate to the ASF Karst Conservation Fund?

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1. **Log in** in to your Paypal account and follow these easy steps:

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8. You can leave a message as to which program you want your donation to go towards—for example, Scrubby Creek, the Ghost Bats Appeal or just general funds.
9. Click the **Send** button and you will be taken to a confirmation page where you follow the rest of the prompts.

Continued on page 4

Editorial: Welcome to the best yet

WELCOME to your latest *Caves Australia*. This issue features two major explorations: one at Jenolan using diving gear; and the other, a more traditional exploration in Victoria, entailing lots of grovelling and mud.

Both expeditions needed several trips to realise their objectives and illustrate the amount of planning needed to do so.

Those of us who travel and cave for several weeks (I am thinking of the VSA-led trips to the Nullarbor and Pungalina in the Northern Territory, and of the multi-club trips to Bullita) will be aware of the logistics and the demands involved.

Many readers, when they have more time will, I am sure, be looking to doing their caving further afield than their local 'patch'.

As well, Trogalong features prominently. Bob Kershaw gives a brief overview of the program and we have included the winning photos, judged by conference attendees.

The photos were a highlight of the week and it is very pleasing that we are able to present them in colour.

The photographs in the four-page centre section of this issue are the first three placings in the digital class of the competition. We'd like to have run those from the print class too, but space and budget just aren't big enough.

My thanks, too, to those who have submitted articles that, through space restraints, we have not been able to print in this issue.

Good luck with the two quizzes. Enjoy the issue. It's one of the best yet.

—Ian Curtis

Using a credit card

IF YOU don't have a PayPal account but have a credit card you can still donate to a specific project via the PayPal site. Follow the simple steps below and the Karst Conservation Fund will thank you.

1. Go to www.caves.org.au

2. Click on the **Conservation Tab** and select **Donating to the fund**.
3. Click the yellow **Donate** button under the **By PayPal** heading.
4. You will see the page displayed as below.

5. Enter your donation amount in the box marked **1** in the diagram.
6. Then complete ALL the information adjacent to **2**.
7. Once completed, click on the orange box at the bottom of the page and you will then see the second set of information as shown in the next diagram.
8. Next to number **3**, click the **plus sign** so that the box opens and you can type in what project you would like to donate to—for example, Ghost Bats, Scrubby Creek or General.

9. All your information is shown in fields indicated in the diagrams by black boxes.
10. Click the **Continue** box and you will be presented with a confirmation number shown at 4 on the page, such as diagram 3.
11. Click on the orange box at 5 to return to the ASF website.

President's Report



Attack of the giant amphibian—this may be a clue to the non-appearance of the President's report

TERRY REARDON

Discovery and Exploration of DD31 Swain Cave, Drik Drik, Victoria

Peter Freeman
VSA

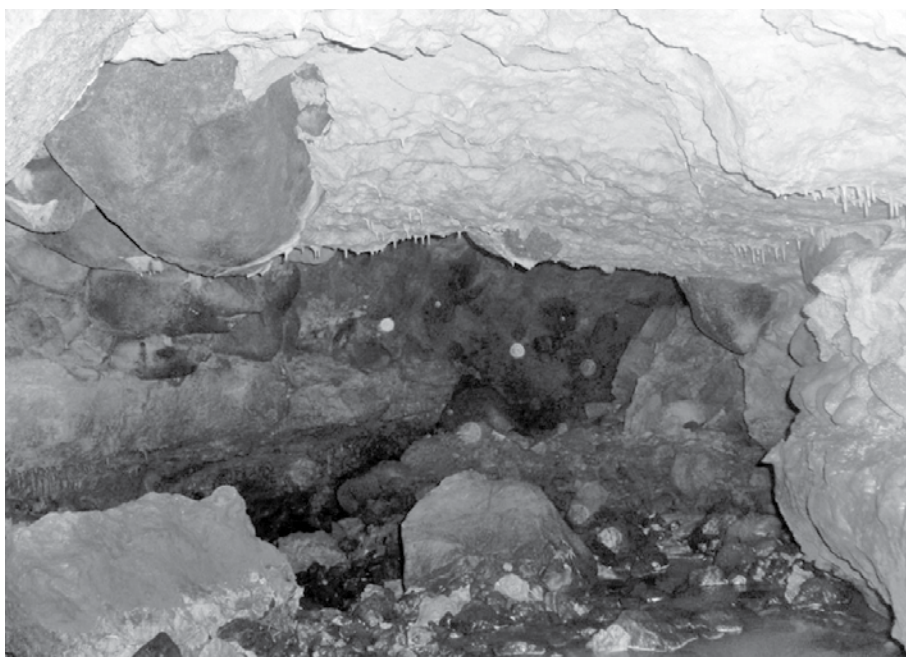
PROLOGUE

3DD4 Jones Ridge Cave, in the far west of Victoria, is one of the state's few lengthy and active stream caves. A return trip to the upstream sump is a rewarding excursion. VSA's serious connection with DD4 began in the late 1990s, and between 1998 and 2004 it was surveyed to around 2.2 km in length by Glenn Baddeley, Reto Zollinger and Roger Taylor. I first encountered DD4 when I joined one of Glenn's visits in late 2004, my caving pastime having only just recommenced at that time. I was captivated by the cave.

Since then we have visited many times. Although there have been important side-branch discoveries (Crystal Dome in 2007 and Five Bar Creek in 2008), the sump has defeated our determined attempts to drain it, and also an attempt by cave diver Agnes Milowka in 2010 to swim through it. Also, our hope of finding a new way in via the small inflow cave DD18, and thus making a through-trip, has come to nothing after much effort.

DD4 is entered through a roof collapse into its streamway. This entrance is at the base of a very large doline. The water is followed in the upstream direction to negotiate the known cave. Downstream from the entrance the stream can be followed for only a few metres to where the water disappears into breakdown beneath the doline. On my very first trip Glenn and his team were still trying to make some digging progress there, but that was actually the final attempt. We conjectured much about a possible continuation, and about the route that the water might take to the Glenelg River only a couple of kilometres away, but it seemed we would never get to know it.

In late 2011 there was a period of heavy rainfall in the area and soon after one of the landowner's cattle became entrapped in the doline (a regular occurrence) and was retrieved. The farmer noticed a new hole



The first exciting view of the streamway

in the base of the doline during the cow rescue, and, as we prepared for a DD4 trip some weeks later, he mentioned this to us. Our ears pricked up at this news and both Glenn and I put our eyes and ears next to that new hole as we entered DD4. We were looking down a 1 m wide drop that would need a ladder and we could hear flowing water. Bingo. As we then executed our planned DD4 trip, my mind was racing ahead to plot a return to Drik Drik, and was anticipating the proverbial 'caverns measureless to man'.

VISIT 1 – 25 FEBRUARY 2012

Participants: Glenn Baddeley, Peter Freeman, Doug Henry, David Rueda-Roca, Reto Zollinger.

I lobbied hard to make a return ASAP, and we were back in Drik Drik four weeks later. Glenn and I were joined by Doug, who had made several trips to DD4, David and Reto. Reto hadn't done any Drik Drik

caving for a few years, but his historical association with DD4 made him a must-invite. Although Drik Drik is 400 km from Melbourne, we did this as a day trip for various reasons, so it was 12:30 pm by the time we had a ladder down the hole and a lifeline belay arranged.

It was easily agreed that Glenn should have the honour of first descent. Photographs were taken and also some short movie clips—we all appreciated the possible historical significance of the moment, even at that stage. Glenn gave a commentary as he went, and soon announced that he had stepped off the ladder at 8 m depth (one small step for...). It was a few minutes until he returned to be life-lined back up the shaft. On the surface, he reported to an excited audience that he'd seen at least 40 m of comfortable stream passage and gave us a brief description.

I was down next, followed by all the rest. Reto, slowly and methodically as al-

*The entrance shaft*

CATHERINE HEMLEY

*Glenn descends first*

DOUG HENRY

ways, determined to survey and sketch as he went (and a few days later he produced an excellent, detailed sketch of the first 90 m of the cave). Meanwhile, Doug, David and I set off at a brisk, but still observant, pace down the fascinating streamway. We were struck first by the beautifully clean cave floor: many cobbles, relatively little mud, and a lively splashing water flow. The passage size was a comfortable walking or just-stooping height, and the roof was studded with spherical, black basalt boulders, half-protruding from the pale limestone.

After 90 m we encountered the first obstacle: a lovely unspoiled white flowstone floor. We could see that it would be feasible to traverse across without contact, but first searched for an alternative—unsuccessfully. So, as carefully as possible, one by one, we crawled awkwardly across, stretching between narrow wall ledges with only a little manoeuvring space above us. We achieved the traverse with very little material knocked onto the flowstone (and this was cleaned later).

Speeding up again at the far side, we encountered a more serious obstacle after a further 80 m. This was a major collapse, forming a breakdown chamber with no way on. Three progress possibilities were identified, each of which would require some excavation, so we reluctantly retraced our

steps. Our 10 m nylon tape formed a crude measuring tool, revealing the length so far as 175 m.

We expected to meet Reto along the way, but he had halted at the flowstone floor and exited. We now did the same, having spent three hours in the cave. We were all very satisfied as we drove back home that evening.

VISIT 2 – 14 APRIL 2012

Participants: GB, PF, DH, DRR, Neil Wilson.

Without Reto this time, but joined by Neil Wilson, this trip more closely followed our standard Drik Drik logistics: we travelled out on Friday evening in order to make an early start the next morning. Our team was soon at the flowstone floor obstacle. I had brought along several large pieces of plastic sheet to cover the delicate floors, in case more material dropped on them as we traversed above.

At the rockfall we reassessed all our progress possibilities, and then Neil and David set to work on the most likely one. Their work soon opened up a hole that dropped one metre into the very constricted streamway that we had seen running below. David wriggled down and got wet, his voice fading gradually as he worked along the cobbly floor with his back scraping the roof. After what seemed to us a long time, he shouted distantly “Chamber.” At first I wondered whether the faintness and the Spanish accent were tricking us, but soon it was clearly repeated, accompanied by happy laughter. Needless to say, it wasn’t long before we were all following.

And, indeed, there was a chamber: a few metres of muddy uphill slope out of the

streamway had led into a spacious gallery, and away to the left was ‘Surprise Chamber’. The way on lay obviously to the right, and half the party quickly went that way while some of us lingered in the chamber. We explored it only cursorily, but it was assumed, and later verified, to lie close to the breakdown room that we had recently dug our way out of.

I was in the second group, which expected to quickly catch up with the first. The route was now well out of the stream, but before long a muddy slide led us back to it.

I later named this place ‘Disorientation Chamber’, since the stream seemed to be flowing the wrong way. In retrospect, on the cave survey it can be seen that the inaccessible streamway passes under our upper gallery, but at this time it was disturbingly confusing.

Pressing on, we passed through a large breakdown chamber, again leaving the water behind us – and still with no sighting of the other group. Finally, and once again wading in the stream, we found David, Doug and Neil stymied by a roof collapse. This turned out to be our turnaround for the day, but not before a good poke around identified possible digs.

Glenn and I surveyed halfway out as we retreated, and I got my first taste of how awkward the surveying of this cave would be. Mud, alternately gooey and sloppy, plus lots of water, made the scribing task using pen and paper quite maddening. I had to carefully consider my tactics and equipment for next time.

Seven hours of work had more than doubled DD31’s length, so our satisfaction was no less than after our previous visit.

*A low part of the streamway*

CATHERINE HEMLEY

VISIT 3 – 13 OCTOBER 2012

Participants: GB, PF, DH, DRR, NW, Scott Hall.

Our return to Swain Cave was delayed by a few months, mainly due to my overseas travel commitments. Now, on this springtime trip, our duration underground extended to 9.5 hours and Scott Hall joined us. My first priority, assisted by Scott, was to survey inwards from the entrance in order to tie in the hanging survey that I'd performed with Glenn. Meanwhile, Glenn and Doug moved ahead.

On both previous visits we had noticed that the most delicate flowstone floor, now protected by a plastic sheet, was built on loose rockpile, while the stream flowed quietly, through an archway too low for us, into a lower level on the left side. In fact this is a frequently-repeated pattern in the first few hundred metres of this cave. The unstable rockpile sloping up to the delicate area seemed loose enough to be shifted, allowing a hole to be formed down into the streamway. This task was therefore on our agenda, and was just being completed by Doug as Scott and I caught up. Glenn was simultaneously using an electric pump, hose and brushes to thoroughly restore the beautiful floor that we would never need to cross again.

Neil and David, having travelled from Melbourne that morning, also caught up at this time, joining a traffic jam behind the surveyors. But within minutes all of the excavation and cleaning work was completed, and all non-surveyors went ahead. With the traffic jam out of our way, surveying resumed, seeming to take ages to reach the tie-in at Surprise Chamber.

With our B-survey joined to the A-

survey, Scott and I rushed to catch up. Strangely, at the previously blocked far-point, where we felt sure that we would meet the others, they were nowhere to be seen. A close inspection revealed that the blockage had already been removed. It had been quick work by Doug, and his remark "That was too easy" provided the name 'Too Easy Dig', leading into 'Too Easy Chamber'. Through the opening, again we hurried on, and a very wet fifteen minutes later found the other four munching chocolate bars at a comfortable area that they'd already named 'House of Straws'. We were all, of course, elated at the extent of cave being revealed; and such interesting and varied cave.

On the move again, we passed through another 200 m of varied terrain until we reached a near-sump. Not quite a roof-sniff; more an 'ear-dip'. At this point we learned that Glenn, not anticipating such progress, was not wearing thermals under his overalls, and in view of this he decided not to pass through the duck. He agreed to await our return for a period, but then exit if we overstayed (which we did).

The duck was quite tame. The cave now took us relentlessly on, continuing the varied menu of low crawls through water, nuisance breakdown climbs, and classic walking streamway. After 200 m a wide, sloping, boulder-floor chamber led us into a tall canyon-shaped passage, which now became the norm. This was not a total reprieve from obstacles; in fact they were frequent, but there was a consistency to our progress. This feeling was enhanced by the increased water volume and general cleanliness of the cave hereabouts. After a further 200 m we encountered the obstacle that would halt us for this day.

The scene that we faced would later be known as the 'Up-and-Over', but right now it was only 'Up'. The stream entered a low crawl on the right hand side. This was not unusual—we had negotiated a few of those—but this one was quite definitely blocked. However, on the left hand side was the 'Up'. Neil and David clambered up the 'Up', and found there was more 'Up', the next step looking more difficult than the first. It seemed like they were half-way into a big breakdown chamber, and there were hints that a continuation was possible. However, we had no difficulty in reaching a consensus that this obstacle would be a challenge for our next visit.

We set off towards daylight. The only minor diversion was for Neil to check out the far side of Too Easy Chamber, where he found water flowing in from a low, unexplored passage. At this stage of our exit, that could wait.

We caught up with Glenn as he was about to climb the entrance shaft, his careful solo return having been uneventful. Again, the cave had not disappointed us. Also, I now had two surveys joined up, so a week or so later I could distribute our first progressive cave map. It looked neat.

VISIT 4 – 17 NOVEMBER 2012

Participants: PF, SH, DH, DRR, NW, Catherine Hemley.

By this time we all knew that something important was unfolding here. So far the invited team had been kept small; and the new cave, while not a secret, had not been too openly discussed. However, as always in VSA, scraping together sufficient participants on a nominated date was not easy, so the invitation list was being gradually expanded. On this trip Catherine joined existing team members Doug, David, Neil, Scott and me.

Owing to the larger party size, we split into two three-person teams for efficiency, and I reluctantly elected to lead the second team in order to perform the essential task of bringing the survey closer to the exploration front. Catherine and Scott, who had both surveyed with me before, would be on my team. The other three would proceed to the current downstream end and try to progress past the 'Up-and-Over'. On the way they would check-out the apparent tributary at Too Easy Chamber.

We entered at 10:00 am, and it would be 13 hours before we were all out again. The six stayed together as far as Surprise Chamber, where the survey party halted to check for leads. Alas, only one lead was located there and it didn't go far, so after around thirty minutes we were in the footsteps of the push party.



Spar on a basalt boulder

CATHERINE HEMLEY



Preparing to rig the entrance

GLENN BADDELEY

Our new survey began just upstream of Too Easy Dig. As we surveyed into, and inside, Too Easy Chamber, Neil, Doug and David emerged from the low stream passage at its northern edge. Their report was rather negative, although leaving open a slight possibility that it could still be the tributary we had hoped for. They were ready, however, to press on downstream, and I decided not to push or survey where they had been but instead to get on with the job of surveying the main route.

The real nature of the second ascent at the 'Up-and-Over' was a mystery at this time, but one way to get up it had seemed to be to throw a grappling hook. This unconventional approach had worked for Doug and me when first entering Queen Elizabeth Gallery in DD4, so it was worth a try. The hook, provided by Doug, was the very same one for good luck. As it turned out, hook-throwing was not successful. Instead, David used a small mattock to cut steps, mountaineer-style, into the steep earthen slope, allowing him and Neil to ascend. The hook did find its use at the top, as an anchor for a handline.

At the far side of the Up-and-Over there was the reverse problem: getting down. We had, of course, anticipated this, and a short ladder soon placed David, followed by the other two explorers, back into the streamway. They then proceeded to a new far-point, where Neil crawled a few metres into a dismal canal with low air space. Enough, they decided, had been done in the main passage for one day, especially as, on the way down, they had observed a possible lead up a steep bank in a collapse chamber.

Travelling back up the very active, still-canyon-shaped passage, they reached the chamber, and Neil, with some difficulty, climbed the slope. Unfortunately, it didn't go, so they continued moving upstream.

David then noticed a branch passage, missed earlier. Stepping up into it, David was delighted with the find and called the others in. It surprised them with its wonderful decoration. They followed it, carefully, for a few tens of metres, before turning around with going cave still stretching ahead.

Thus, the push team had passed the major obstacle for the day, and we had two new frontiers.

Meanwhile, the survey team had bagged 380 m of streamway before being thwarted by a waterlogged distometer. After clearly labelling the final station, we had decided to join the fun downstream, and we met the returning explorers as the latter were about to ascend the Up-and-Over ladder. Stories were exchanged and food was consumed before the long trek out of the cave began.

Another trip was over, and another major advance had been made.

VISIT 5 – 15 DECEMBER 2012

Participants: PF, Ken Murrey, Ian (Chalky) Thomas.

On this trip, where I was accompanied by only Ken and Chalky, both new recruits onto the DD31 team, our objectives were limited. The first was to fill in some mapping details, and the second was to firmly discover the nature of the apparent inlet in Too Easy Chamber. Long before DD31's discovery I had created a rather fanciful map of possible underground water routes in the Jones Ridge area; and recently I had optimistically drawn a dotted line from a nearby doline to Too Easy Chamber. The dotted line was, as it turned out, rather hasty.

As we moved down the cave, we added three minor surveys. The first one was of Surprise Chamber and its one short lead. The next one was up a short length of

streamway accessible from Disorientation Chamber. The third one was in a route running parallel to Spar Chamber. At the northern end of Too Easy we began what we hoped would be a major survey, but we soon proved that the supposed tributary was in fact the main stream. It had tricked us by taking a circuitous path through the breakdown that almost fills this room. It would henceforth be known as 'Disappointment Creek'.

After peering into various other crevices in this pile of breakdown, we left the cave after seven hours.

VISIT 6 – 2 MARCH 2013

Participants: PF, CH, KM, DRR, Rowan Bulpit, Silvana Iannello.

A trip to the cave was planned for January, but it had to be cancelled while a large bushfire ravaged the area. I stayed in touch with the owner of the land, who narrowly escaped major damage to his property and stock. After a suitable cooling down period the trip was reconvened in March.

We again had a six-person team, allowing for a push party and a survey party. Also, we had two new recruits into the pool of Swain Cave explorers. The two newcomers, Rowan and Sil, would survey under the direction of Catherine, while David, Ken and I explored ahead.

Our sixsome negotiated the cave together as far as the survey-start point, allowing some time for sightseeing and appreciation by Rowan and Sil. The exploring party's progress through the cave was then rapid, travelling light with only one pack. By now we could predict and identify familiar landmarks on our route: the start of the canyon, the DD12 collapse, the Slot-Drop, the Shower, the Waterfall, and the Up-and-Over. I now went past this limit for my first time, with only David retreading known ground. After what seemed a long way, the branch passage was reached. As arranged, we left our pack there as a signal to Catherine's team that we had left the main route.

As we entered, David remarked "Welcome to Wonderland", and it seemed that we had found a name for this place. We carefully negotiated the highly decorated initial section, and expected that style of passage to continue and for the branch to be revealed as a gradually rising tributary. However, that was not to be. Instead we entered a drier and dirtier area, with multiple acute turns, instability, and soily roof collapses. It reminded me of Bats Ridge. So much for Wonderland. One point required the shifting of some rubble to enter a small collapse chamber, after which the passage continued. Glancing at my compass periodically showed that the trend was

north-easterly, so we were able to roughly understand the surface locations we were underneath. Finally we had explored to two blocked ends in that area and we returned to our pack.

Now, going further downstream, our spirits were high, but soon I dampened them by realising that I had made a packing error outside the cave and we had fewer spare batteries than intended. We therefore decided, for safety, to limit our remaining exploration time. After another few minutes we halted for food. In order to conserve my light, Ken volunteered to wait in the dark and lend me his Scurion (still bright and with many hours left) so that David and I could complete the final 200 m to the exploration limit. This we did, but we had to forgo entering the Dismal Canal.

Heading back up the cave we met the survey team around the Wonderland Junction. Their survey had been aborted by a waterlogged disto—again—but they had added 165 m to the main route. Catherine confided that she'd had trouble keeping her underlings focussed, with Rowan wanting to explore leads and Sil wanting to take photographs. Still, Sil had found a shark tooth embedded in the floor, and also a set of rock-embedded fossil bones protruding from the wall.

We emerged from the cave into twilight after a ten hour trip. All that remained was to de-rig and perform the tedious climb out of the deep doline, always the annoying ending to any DD4 or DD31 visit. Need I say it, we had again found new cave, even though the main route had not been extended this time.

VISIT 7 – 16 MARCH 2013

Participants: PF, DRR.

With the surveying lagging behind exploration, as usual, this trip was focussed on growing my map. We knew it would be a hard one. Worse, a short-notice drop-out left only David and me to do the job, and lack of Friday night accommodation caused us to travel 400 km out on Saturday morning before commencing caving.

Despite all, we did achieve our main aim. 400 m of survey data was collected, in 72 shots, under quite trying circumstances: often low, and very wet. As on two previous occasions in this cave, the end of surveying was forced on us by instrument water-logging: first the distometer packed up (but I had a tape as backup), then the Suunto compass. Actually the forced ending was a relief—I was on the verge of quitting, anyway.

After packing up the equipment, we went on down the cave. At a point not far from the current exploration limit there is



Line-up for the November trip (from left) Scott Hall, Neil Wilson, Doug Henry, Peter Freeman, David Rueda and Catherine Hemley

a large collapse chamber up a slope on the left side. Neil had looked at this previously, but we decided to also check it out. David ascended the dodgy mud slope and then helped me up. There were tree roots entering through the roof, but seemingly no way onwards.

By this time we were debating whether to execute our final planned action: to push the Dismal Canal at the cave's end. We decided "No". As often happens, we later wondered whether we should have forced ourselves on, but we were quite cold and tired. And so we began the 3.5 hour journey out. David did most of the carrying of our one quite-heavy pack, for which I was most grateful. We emerged from the cave at 02:45 am, after 13 hours underground.

VISIT 8 – 06 APRIL 2013

Participants: PF, DRR.

Despite the arduous trips, this was getting too exciting to leave alone for long. Hence David and I were back only three weeks later, again driving five hours to the cave on the same day as our descent.

Our mission this time, as last, was to survey first and then push the end. Our survey target was the area we were calling Wonderland (though the wondrous part only lasted a few tens of metres before degrading to dim and muddy tunnels through crumbly dune limestone). We bagged over 400 m of cave in 78 shots. This included finding a new passage. By the time that was all done we'd had enough for one day, and, foregoing the cave-end push, we made the long trek upstream to emerge at 1:30 am—a 12-hour trip. The Dismal Canal would have to wait.

VISIT 9 – 20 APRIL 2013

Participants: PF, DRR, DH.

Our agenda for this trip was depress-

ingly familiar – force ourselves to do a swag of unpleasant surveying down the main streamway before pushing the end-point. We accomplished this. First, 414 m of survey data was gained in 48 shots (yes, it got a little easier!), then we carefully packed away our instruments and data and I prepared to challenge the Canal. With 20 m of tape tied to me for safety, I squeezed into the wet flat-tener. It was very flat, but nowhere near as wet as I expected. With my chest scraping the floor, my back scraping the roof, and with my head turned sideways and unable to change sides, I needed to endure only 20 m before emerging into easier stream passage.

David joined me, and, after a brief celebration, we continued along a low streamway. After little more than 20 m David pushed up into a small breakdown chamber with no apparent exit. This place was evidently near the surface, and we concluded that our cave had virtually reached the expected resurgence near the river (later confirmed by the survey). Unfortunately, we could not escape.

CONCLUSION

This is the Swain Cave story so far. A brilliant ending to the story would say, "... and finally we emerged from the resurgence on the east bank of the Glenelg River". Although that now seems unlikely, there is definitely more cave to find under this fascinating landscape, so the project continues and a follow-up article may tell more.

Considering only the cave we have now, it is a fabulous find—the Victorian cave of this decade. A description and a map will be published in due course.

I must thank my fellow explorers—especially my fellow surveyors—and the land-owners Trevor and Glenys Brown for their always-friendly welcome over many years.

Photographic Competition

29th ASF Biennial Conference

Garry K. Smith
Photo Competition Convener

THE photographic competition rules and information document were well publicised leading up to the conference.

Thankfully the rules must have been clearly spelt out and acceptable in the literature as there were no objections received. Well maybe that is not strictly true – a couple of people suggested at the conference, that it would be a good idea to split 'geology' and 'scientific' into stand-alone categories. Something for future conference organisers to ponder! Anyway for this conference the following categories were set the same for both the 'Print' and 'Digital' images.

A - Action (Cavers in Action)

B - Bugs, Bats, Fauna, Geology, Scientific, etc

C - Chamber and Passage

D - Decorations (eg. Speleothems, rock or ice forms etc.)

E - Entrances and Above Ground

F - Funny and Humorous.

For this conference I decided to run with judging of the whole competition by 'people's choice', so each attendee at the conference had a chance to vote for their favourite image in each of the six categories in 'Digital' and in 'Print'.

As at December 1st 2012, which was the cut-off date for the early bird entry fee of \$3, only two people had entered 18 images— Norman Poulter and Bob Kershaw. Things were looking grim, as this meant entry fees fell far short of recouping the cost of already purchased first place prizes. Despite

my hopeful assurances to Bob Kershaw (Conference Convenor) and the rest of the Conference Committee that I was expecting a rush of entrants on registration day, I sensed there was plenty of scepticism from within the ranks of the committee.

Still no more entries had been received by 24th December 2012, but I remained confident that more people would enter. P-day loomed closer and the organisation of the nitty-gritty aspects were well underway in anticipation of the event.

A number of people greatly assisted with items required to display the images. I would especially like to thank Brian Evans, who arranged to borrow some display boards from Molong Central School for the print section. Also, Michael and Jodie Rutledge brought along their large TV so my computer could be hooked up to display the digital entries. Cathy Brown brought along her laptop in case mine failed during the week and Bob Kershaw bought the prizes. Sonia Taylor-Smith designed and printed the classy certificates for the placegetters in each section.

I had been playing around with a computer program, IrfanView, to verify that it could show a continuous slideshow with the image title and category displayed next to the image. There were also numerous other minor items to be considered to ensure the event went without a hitch.

On registration day of the conference, my fears of a flop were washed away as

people began arriving with many entries. A significant number were forthcoming from Brian Evans, Joe Sydney, David Wools-Cobb and many others. In total there were 145 entries from 18 photographers.

Thanks to Pat Hyde, for her invaluable assistance during the conference, in hanging prints on the display boards and collating votes. Also a special thanks to Grace Matts for writing out receipts for the many late photos entered at \$4 per image. Of the 86 conference attendees (including full-time and part-time), there were 56 voting slips placed in the ballot box. This is an excellent participation level and showed that people certainly got behind the concept of people's choice.

Prizes awarded to the top three entries in each category included head torches, Eneloop rechargeable batteries and chargers, bottles of wine and conference stubby holders.

All the photographers who entered the competition must be congratulated on their excellent images and for allowing attendees to view their work. It was obvious from the time attendees spent pondering over the entries showing on the continuous digital slide show and the displayed prints that their personal choice vote was difficult in each class. Unfortunately, not every entry can win a place; however, the people's choice came through with the following results. Congratulations to the winning photographers on their excellent images.

Digital

Category	Entrant	Image Title	Place
A	Al Warild	Beyond the Sump	1st Place
A	Al Warild	Reflections	2nd Place
A	David Wools-Cobb	SJ Midnight	3rd Place
B	Bob Kershaw	Fungi at Bullita	1st Place
B	Brian Evans	'It's a way of making a living'	
		Chillagoe	2nd Place
B	Andrew Baker	Cave Invertebrate,	
		Phantasmagoria Cave, Gunns Plains	3rd Place
C	Al Warild	Pink Panther	1st Place
C	Andrew Baker	Caver abseiling Midnight Hole	2nd Place
C	Joe Sydney	The Extension Drum Cave-Bungonia	3rd Place
D	Norman Poulter	Halite stalactite & water drop	1st Place
D	Andrew Baker	Aragonite at Jenolan (2)	2nd Place
D	Evelyn Taylor	Layer Upon Layer	3rd Place
E	Brian Evans	Tunnel Creek NZ (2)	1st Place
E	Brian Evans	Pang Mapha Thailand (2)	2nd Place
E	Norman Poulter	Nullarbor Sunset	3rd Place
F	Al Warild	Don't Breathe	1st Place
F	Gregory Leeder	Not quite deep enough	2nd Place
F	Norman Poulter	I think it's flat!	3rd Place

Print

Category	Entrant	Image Title	Place
A	Brian Evans	It's a Tad Damp	1st Place
A	Gregory Leeder	Data Entry Nullarbor Style	2nd Place
A	Brian Evans	ISS Goes South	3rd Place
B	Brian Evans	Leave Me alone	1st Place
B	David Wools-Cobb	Hairy Mary	2nd Place
B	David Wools-Cobb	Spider	3rd Place
C	David Wools-Cobb	Croesus	1st Place
C	David Wools-Cobb	Jodie	2nd Place
C	Brian Evans	Unusual Formation	3rd Place
D	Brian Evans	Delights within Delights	1st Place
D	Brian Evans	Up North	2nd Place
D	David Wools-Cobb	Bullita Balls	3rd Place
E	John Dunkley	Stadsaal Cave,	
		Western Cape, South Africa.	1st Place
E	David Wools-Cobb	Bullita Karst	2nd Place
E	Brian Evans	Do I have to go down	
		yet another hole?	3rd Place
F	John Dunkley	Trog Dipped at Buchan	1st Place
F	Gregory Leeder	Beast of Burden	2nd Place
F	John Dunkley	The real Story of Broken Column	3rd Place

Category: Action

1st place (left)

Below the Sump

Al Warild

2nd place (below left)

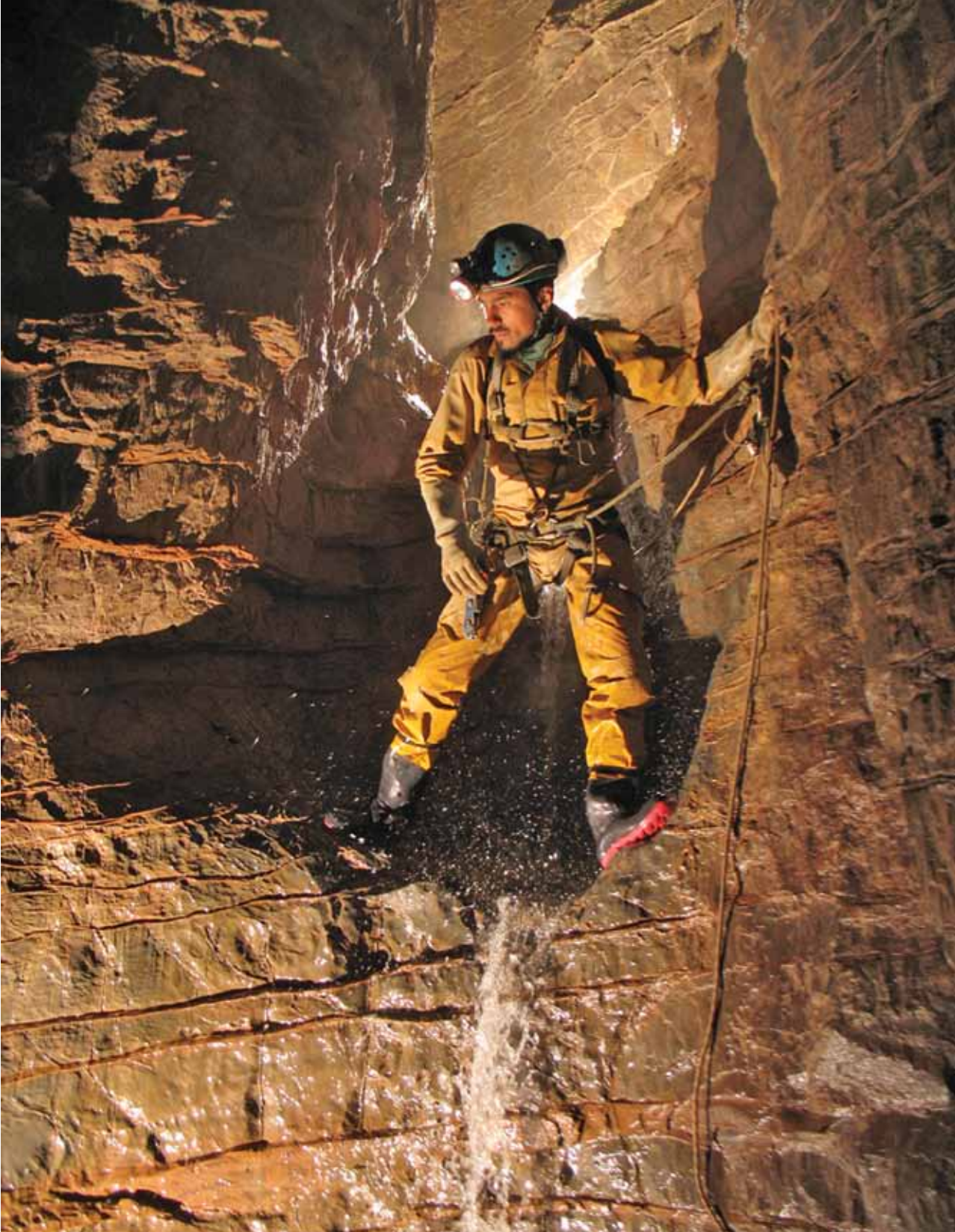
Reflections

Al Warild

3rd place (below right)

A-22 SJ Midnight

David Wools-Cobb



CATEGORY: Bugs

1st place: (left)

Fungi at Bullita

Bob Kershaw

2nd place: (below left)

It's a way of making a living — Chillagoe

Brian Evans

3rd place: (below right)

Cave invertebrate, Phantasmagoria Cave Gunns Plains

Andrew Baker



Category: Decorations

1st place (far left)

Halite stalactite and water drop

Norman Poulter

2nd place: (left)

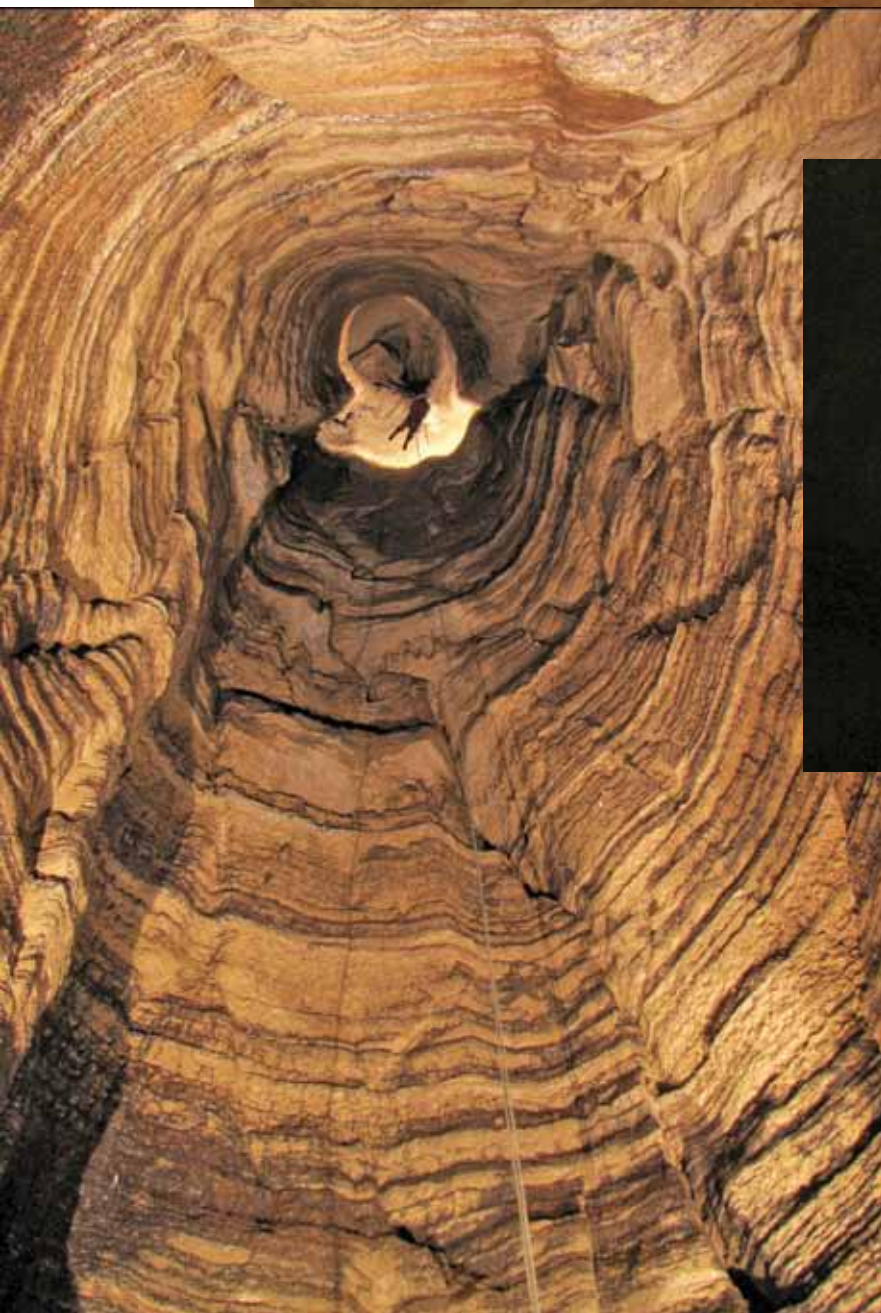
Aragonite at Jenolan

Andrew Baker

3rd place (below)

Layer upon layer

Evelyn Taylor



CATEGORY: CHAMBER AND PASSAGE

1st place (top)
C-13 Pink Panther
Al Warild

2nd place (left)
Caver abseiling Midnight Hole
Andrew Baker

3rd place (above)
The Extension, Drum Cave, Bungonia
Joe Sydney



Category:
Entrance/above ground
1st place (left)
Tunnel Creek, New Zealand
Brian Evans

2nd place (below left)
Pang Mapha, Thailand
Brian Evans

3rd place (below right)
Nullarbor sunset
Norman Poulter



Category: Funny/humorous
1st place (left)
Don't breathe!
Al Warild

2nd Place (below)
Not quite deep enough
Gregory Leeder

3rd place (bottom)
I think it's flat
Norman Poulter



TROGalong 2013

Bob Kershaw

ISS, Convenor

WHETHER we were above or below ground pre- and post-conference, subject to the weather at the conference or observing the wethers in the adjacent paddocks, the attendees of TROGalong 2013 had a magnificent time at the St Clement's Retreat at Galong.

I would like to again thank the organising committee for their efforts in preparing for the conference:

- Denis Marsh for organising the location (assisted in the early stages of organisation by Mark Euston) and for assistance with organising the pre- and post-conference trips.
- Brian Evans for helping Denis and in organising trip information.
- Jodie Rutledge for organising registration, sorting accommodation and undertaking merchandise sales prior to the conference. Thanks, too, for drumming up a few speakers.
- Garry Smith for organising the photographic competition.
- Grace Matts for smoothly running finances and obtaining the bags from Commbank.
- Jim Crockett for organising the Speleosports.
- Joan Crabb for her time spent behind the bar quenching the thirst of the attendees.
- Jill Rowling for all the preparation of the program, constantly changing due to the weather.
- Kevin Moore for producing the Proceedings.
- Evelyn and Amy Taylor for all their time spent in preparing the dessert for the Dinner.
- Colin Tyrrell for printing Proceedings.
- Rod Smith for organising the conference website, online registration form prior to the conference and assisting speakers with their technology.
- Cathy Brown for her assistance during the conference.
- Al Warild for organising and conducting the prusik challenge.



GARRY K SMITH

29th ASF Conference, Galong, January 6th—11th 2013

The accommodation and site were excellent. The pool brought relief to many in the afternoons with some enjoying a morning swim prior to the day's events. Many walked around the adjacent area. We had 88 at the Dinner and numerous part-time attendees to complement the full-time attendees.

Trogalong turned a small profit to be shared between ASF and the NSWSC. The volunteer wages to conduct this event I estimate to be approximately \$100,000 over the course of 2012.

This includes all the above work by the committee, so, if we had had to pay for that, the registration fees would have had to increase by about \$1,535 per person!

The hot weather did play a great part in altering the program on two days.

Outdoor events were moved to the morning and presentations moved to the air-conditioned lecture room in the afternoon. Changes were generally well received, although it did mean the speleosports organisers had limited time to prepare their activity.

The pre-conference trip to Wee Jasper was excellent, and although it was very hot we had a great time with the Taswegians and West Aussies. Another pre-conference canyoning trip to Claustal Canyon, conducted by Rod Smith, was an enjoyable, albeit long, day.



GARRY K SMITH

Talks under way at the ASF Conference



St Clements Retreat at Galong

The post-conference day at Wyanbene was enjoyed by all and participants put in approximately 15 person hours cleaning aspects of Helictite Chamber before continuing to the Gunbarrel Aven.

Denis reports that the caving at Cliefden was well received. Unfortunately, the weather forced the cancellation of the canyoning trips.

SUSS ran post-conference trips to Jenolan for about seven conference attendees. Highlights included a trip into Mammoth Cave. Thank you to SUSS for opening up their club trip for post-conference caving.

We were fortunate enough to be able to offer financial assistance to several attendees under the auspices of the ASF Grants Commission. If you wish to attend the

next Conference in WA but need financial assistance to attend, ask the committee to see if they can help, especially if you are new to the speleo scene or wish to present a paper.

If you missed the Conference you missed information on the following which should be available soon as a download from the new ASF website when it becomes 'live'.

PROGRAM OVERVIEW

Dr Armstrong Osborne gave us a thought-provoking opening address: 'Recent Developments in Cave and Karst Science.' He discussed how the collapse of the Soviet bloc and emergence of democratic governance in central Europe in the 1990s

promoted the development of new ideas in the traditional homes of cave science.

Fiona Ferguson, Manager of the Canowindra Age of Fishes Museum, followed, outlining how the museum (another volunteer organisation) attracts volunteers and uses their talents.

Dr Julia James, standing in for Kath Bellamy and Craig Barnes, spoke on the origins of cave and feature names in the Jenolan Show Caves. Further Jenolan information was provided by Julia and Al Warild in their paper 'The Jenolan Show Cave Survey—Publish or Perish.'

Dr Andy Herries provided a great deal of insight into who actually were the world's first cavers, dating the associations between man and caves over 3 million years of human history in South Africa, while Dr Julien Louys gave us an inspiring talk: 'Cave palaeontology in the 21st Century: Unearthing our underground biodiversity records to help conserve our future.'

David Wools-Cobb encouraged us with his tales and tribulations in his paper 'Core Sampling in Western Sumatra, Indonesia' and Dr Sue White keep us enthralled with 'Flank margin caves on a passive continental margin: the evidence from Southern Australia.'

Information on Gap Creek Boulder Caves in the Watagan Mountains of NSW was provided by Garry Smith, while I provided an insight into the history of, and reason for, the cleaning and rehabilitation project being undertaken in Wyanbene Cave in NSW.

Peter Dykes gave an interesting talk on the biobanking agreement on his property at Jaunter (Trickett's Arch) while Dr Armstrong Osborne looked at where research may be heading in his paper 'The Tasmanic Caves of Eastern Australia.' Henry Shannon gave us 'Bedrock, fills and cut surfaces; the story from Pungalina, the Nullarbor and Golden Valley.'

On the conservation side, Nicholas White gave us an update on the Scrubby Creek Cave acquisition (2011) and its management by VSA and Rimstone Coop-



The pool at Galong



David Wools-Cobb presents a paper

erative Ltd. Nic spoke of the importance of the ASF Karst Conservation Fund and thanked cavers for their support.

Workshops were provided by Graham Pilkington of CEGSA on the electronic database that is used by the Cave Exploration Group of South Australia and the relationships between data, GIS and storage requirements; Dr Susan White (VSA), who gave the non-geologists a piece of her mind with two hours of fun-filled, practical introductory geology; and Ian Collette, Greg Thomas and Janice Marsh (WASG, NC) who had us tied up in stretchers with their cave rescue demonstration. Al Warild tried to convert us all to electronic cave surveying with his workshop on Auriga.

On the publishing side Bruce Welch provided us with a how-to paper: 'The Conversion of printed Club Journals to Electronic Storage, and Specifications for Electronic Publishing.'

Two young speleologists gave us hope that we are not a demographically dying organisation. Lydia Belford (NHVSS) showed us how she discovered CO₂ fluctuations in two Wombeyan caves and implications for speleothem growth. Harry Burkitt (HSC & NHVSS) inspired us with Oziexplorer and how he uses various programs in his cave documentation process.

On the cultural side of things, John Dunkley brought us soothing sounds of original cave music from Australia and photos of salt caves around the world. John also looked at sandstone caves in the Blue Mountains and characters associated with them.

Garry Smith gave us hints on how to improve our cave photography. Garry's organisation of the photo competition assisted in providing you with the various winning examples shown throughout this issue of *Caves Australia*.

So all I can say is thank you to everyone who attended, assisted in the organisation and participated in the pre- and post-conference trips. Save your dollars for the 30th conference being held in Western Australia in Exmouth in 2015, weather permitting.



GARRY K SMITH

The ASF dinner

GARRY K SMITH

Speleosports participants in action

GARRY K SMITH

Young cavers (from left) Eric March (NC), Eleanor March (NC), Elise Scobie (ISS) and Kate Whitby (ISS) cut the cakes at the ASF dinner

GARRY K SMITH

Guest speaker Al Warild at the dinner

Jenolan Caves

Imperial Streamway to Discovery Aven

Three trips 2012

Keir Vaughan-Taylor
SUSS

THIS is a condensed account of a persistent investigation of an aven noticed in the roof of Jenolan's Imperial Streamway.

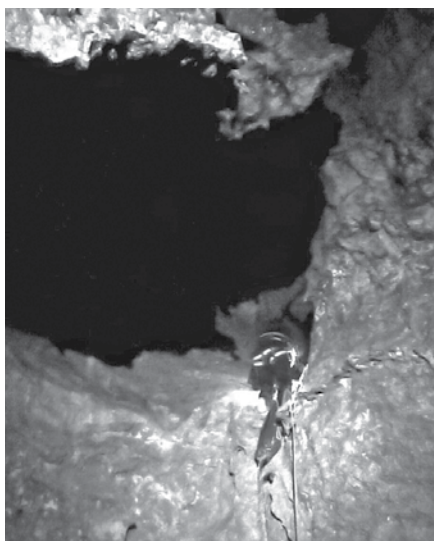
Those who participated in this noble attempt included Deborah Johnston, Andreas Klocker, Bill Lamb, Phil Maynard, Rod O'Brien, Aiden Lloyd, Scott Moores, Tom Short, Mel Stammell, Keir Vaughan-Taylor, Jack Wachsmann and special appreciation of the support from Ted for his in-house support and the Guiding Staff of Jenolan.

I've trogged the Imperial Streamway many times now. It's a classic trip. There are many avenues, grikes, side chambers and holes to explore.

The Imperial tourist cave has narrow winding steps that descend to the Imperial River. The cement arch bridge that crosses the streamway marks the beginning of Sump 1 upstream and another excellent dive downstream.

Going upstream a dive through Sump 1 is followed by a walk along streamway curling through a variety of changing river passage, chambers and hallways coming to a short second sump—Sump 2. Between Sump 1 and Sump 2 there is a hole in the roof; a large aven with all the hallmarks of a major inflow passage. The only way up would be with scaling poles. It's a long way to carry poles, bolts and brackets. Easy along the tourist cave paths but more difficult down through the barrel, through the tunnel squeeze down a ladder pitch dropping into Far Country, then into Bell Chamber, breathe, hold, duck-under and through Sump 2. If you have to go through Sump 2 with the poles you might as well go through Sump 1. It's only a little bit longer.

Diving with scaling pole equipment through Sump 1 avoids the need to carry poles and equipment a longer way through the caves, thereby reducing the time to transport gear and also protect the cave. Three two-metre-long poles were lashed



Phil Maynard on the climb

together with climbing tape with a reverse cinch knot providing a tape handle running the length of the pole trio. With three pole clusters, the bag of brackets, nuts, bolts, spanners and the climbing equipment, we dived back and forth through Sump 1 adding each time to the not-so-ethereal colour of the water. The tourists' experience of the beautiful underground stream was compensated by whale-like air-venting from our buoyancy compensators supporting all that weight moving deep into the cave. We could see the flashes from the cameras just before we surfaced.

The first dive through the sump was uneventful, delivering half the poles and the heavy bag of bolts and brackets to start the climb. The second set of poles was left on a ledge to be picked up on the second trip through the sump. They slipped off the ledge into the water and were for a short while lost. Assembling the poles at the discovery avens we realised there was a trio of poles missing. I returned through Sump 1 and searched rift holes in the floor of the sump where they might have gone having slipped off the ledge above. After some time

I located the poles and delivered them to the climb site. Tom was keen to lead the climb and so he accompanied a small group that would join us by going round the long way. The group's brave-hearted would free-dive Sump 2 and join in any successes had at the top of the aven. This was ambitious, optimistically assuming an easy discovery. After all these years I should know discoveries are hard won.

With the gear ready to go there was no sign of our other group. I went upstream with my diving gear to make sure the climbing team free-dived Sump 2 without any problems. This seemed to take forever since the five-metre-long sump seemed to cause trepidation among some of our seasoned cavers. It's the cold that puts you off. With a little encouragement and a little anti-drowning advice the group were encouraged through, but it took hours and I eventually became very cold with all the sump travelling.

Meanwhile, back at our potential big discovery, there was a choice of aven holes to ascend. The scaling poles were assembled and placed in the lower aven which was followed some distance to the termination of the passage. A passage seen through a thin roof slot above could be seen but at this time there was to be no grand discovery. There was another hole but a little higher and that would require one more length of scaling pole.

TRIP 2

With the scaling poles bolted together and erected into the lead in the roof they displayed a worrisome curve reaching to their ambitious high point. We attached rigging tapes onto bolts on sections part way up and secured the other ends to natural anchors on ledges on the left and right sides. Tom ascended, the scaling poles supporting each side preventing a slip of the pole end away from the desired position in

the roof. We spent a long time getting this right so as to ensure the safety of our valued climber. The upper passage continued but presented a second scaling pole lead.

After making safe belay points in the upper chamber the scaling poles were raised from their lower position to the upper ledge and used a second time to get to another higher level.

Exploration and further climbs connected to a small but technical climb, at the top of which could be seen what looked like a canyon passage clearly delineated in the roof but a serpentine pressure tube and a large walk-along stream canyon.

We curtailed the climbs because we were already later than we had arranged with the guides. A rope was fixed at the furthest point of exploration and rigged for descent and as a means to prusik back in future without scaling poles.

After derigging we reversed the transport through the sump and the climb team returned upstream and out of the cave.

The two passages in the roof are in an area of the caves where there is no other known passage. The closest tourist cave is Chifley but the map shows the position of the avens to be far. We were still enthusiastic. Well, at least I was.

TRIP 3 26-27 OCTOBER 2012

This time, expecting to be climbing into the attic avens, I wore my caving suit over a dilapidated surfing suit, underneath generous layers of thermal clothing. Knee and elbow pads are an essential when go-



GREG RYAN

Keir Vaughan-Taylor waits in the cold

ing light. I would only be underwater for at most five minutes and hopefully a short time later climbing way up in the roof where the expected lead would take us. There was no second group to look after so much simpler logistics. Climbing gear and various equipment we did not want wet was packed in a waterproof drum and suitably loaded with lead to get a neutral buoyancy passing through Sump 1. We had tested the underwater performance of the drum at Manly Dam, depth testing to 10 metres off the dam wall. The drum emerged just a little bit squashed by the pressure but there was no leak.

Phil's brand new regulator leaked air profusely at the edge of the Imperial Bridge Sump. The cause was a minor problem that required tightening the high pressure hose. Usually we have a tool kit on hand but being in lightweight mode we had no tools

with us. Phil had to leave the cave and find a spanner back at the car.

Meanwhile, Greg and I swam back and forth through Sump 1 transporting all our paraphernalia and setting up the gear under the rope hanging from the climb.

In time Phil returned. He was first up the climb and was the only person who could safely go into the upper regions because when least expected, lumps of falling mud would rebound from above. The climb was a one-person job. Greg and I waited in the river watching Phil's light as it gradually moved higher and higher to become a small beacon in a sea of darkness. Phil would occasionally shout some piece of information but in the echoes it was impossible to hear what he said.

Hours passed with Greg and I standing with our necks bent back trying to catch glimpses of light way up there. There was a two-syllable shout from Phil, completely inaudible, but the tone carried the news that the tunnel had terminated.

It remained to remove the belay points, derig each belay point and abseil to ground. Returning to the streamway we could see Phil, completely covered with mud. I could tell that this was not the huge passage we had imagined. Oh well—it had been a brave effort.

This was one of several Jenolan projects running concurrently. While this trip had been lots of fun, cracking the Jenolan code would be more successful in the River Lethe and Barralong—soon to be summarised in a *Caves Australia* near you.

Cave Words: Aven

Stephen Bunton
STC

IN AUSTRALIA and England an *aven* is a shaft that rises vertically from a known cave passage.

This is an example of a word we have appropriated from another language, French, and changed the meaning to suit ourselves. The most famous example of this in Australia would be the Gunbarrel Aven in Wyandene Cave, NSW—a prominent landmark in the epic trip to the far end of the cave. It was partly climbed in the late 1970s and photographed around that time, its final height being measured at 112 m, which left it only 6 m short of intersecting the surface.

In France, an *aven* is an entrance shaft, the best translation being an abyss.

It has been used as the name of the cave,

for example, Aven Jean-Nouveau which has a 163 m deep entrance shaft. There are several words for cave in French; *aven*, *grotte*, *puit*, *trou* but not *cave*: a *cave* is a wine cellar.

These are almost synonyms that are found in various regions as if part of the regional dialect.

In Australia we have pit, pitch, pot, pot-hole and shaft but these are not restricted to any particular area.

The term *aven* could also be applied to describe a shaft that can extend both upwards and down; one that the caver intersects part way down.

In this case, the most impressive *aven* in Australia would be the Black Supergiant in Niggly Cave, Tasmania.

The 191 m final pitch starts from the floor of a rock-filled chamber, which in reality is false floor, a collection of boulders and debris plugging the shaft. The ceiling at this point is another 30 m higher taking the whole shaft to well over 200 m in height. This would be an impressive landmark on a horizontal through trip from Growling Swallet towards June Cave!

Around the world there are quite a number of 200 m deep pitches, a handful that exceed 300 m and several that exceed 400 m.

The world's deepest is the 600+ m pitch in Vrtiglavica Vertigo, Slovenia. Imagine if this were discovered from the bottom; now that would be an *aven*!

Hungarian Cave Exam

Answers to Part 3 – Geology

Sue White
VSA

THESE answers to the cave geology questions are the last for the Hungarian cave exam.

As stated in previous issues of *Caves Australia*, the answers are not always easy or straightforward to give in an Australian context. Some of our systems are different and the answers are therefore given in a general sense rather than specifically for each question. Nevertheless, it is useful to see the European perspective.

These are as simple as I can give and obviously much more complex answers would give more accurate detail. For cave geology questions, the best current book is probably Art Palmer's *Cave Geology* (2007) published by Cave Books.

If you know some of the answers here that are not specifically answered or with which you disagree and can give clear reasons why, please let the editor know and updated information can be published in later editions of *Caves Australia* or *ESpeleo*.

1. Group rocks according to how they were created.

Igneous or magmatic formed by cooling of magma i.e. molten rock;

Sedimentary formed as aggregates deposited by a transporting medium e.g. water, or as chemical precipitates e.g. gypsum, halite or as deposits of organic origin e.g. coal.

Metamorphic formed by recrystallisation and deformation of pre-existing rocks under increased temperature &/or pressure conditions.

2. Group sedimentary rocks.

Detrital (clastic) e.g. sandstone, conglomerate, limestone, siltstone, mudstone.

Chemical chemical precipitates e.g. limestone.

Organic formed from organic remains e.g. limestones, coal.

But you can get combinations of these e.g. bioclastic i.e. fragments of biological remains deposited as fragments (clasts) which is a common limestone formation.

3. Group magmata (magmatic) rocks.

These are what we tend to call igneous rocks.

There are two types:

Extrusive or volcanic rocks which are formed from lava erupted onto the surface of the Earth, have been cooled rapidly and have fine grained textures e.g. basalt and rhyolite.

Intrusive rocks which are formed by injection into other rocks (intrusions), crystallise beneath the surface of the Earth and undergo slow cooling and have coarse-grained textures e.g. granite, granodiorite, gabbro.

4. How do metamorphic rocks come into being?

These are formed by recrystallisation and deformation of pre-existing rocks under increased temperature and/or pressure conditions. They must be recrystallised.

There are two types:

Contact metamorphic rocks where there is high temperature but not very high pressure, and

Regional metamorphic rocks where there is high pressure and a more variable temperature from medium to high. Examples of contact metamorphic rocks are hornfels and marble. Regional metamorphic rocks are slate, marble, meta-quartzite, gneiss and schist.

5. Describe how mountains are formed.

Mountains are usually formed from uplift. It is a very complex subject, and a good summary can be found at http://www.bbc.co.uk/science/earth/surface_and_interior/mountain_formation. While most mountains are generally formed by the slow and gigantic movement of the earth's tectonic plates, a few are formed as a result of erosion and volcanic activities.

6. What is the geometric gradient? What causes it?

I am not sure what they mean by this but perhaps they mean the geothermal gradient which is the rate of increasing temperature with respect to increasing depth in the Earth's interior. Although the geothermal gradient varies from place to place, it averages 25°C to 30°C per kilometre. Temperature gradients may increase dramatically around volcanic areas.

7. What is the definition of rock?

A rock can be made of one mineral but is more commonly a mixture of different minerals that are held firmly to each other within the rock structure. A mineral, however, is a naturally occurring, inorganic chemical compound.

8. What is the definition of cave?

A natural cavity in rock, large enough for a human to enter. A cave system may

have more than one entrance and consist of many chambers and passages. The term still applies if the cavity is totally filled with water.

9. List karstic and non-karstic rocks.

Karstic rocks are those which relatively easily undergo solution and solution is the dominant weathering and landscape formation process. These are generally limestone, dolomite, gypsum, marble, calcareous sandstones and halite (common salt). However, significant karstic i.e. solutional caves, are found in quartz sandstones and quartzite. Non-karstic rocks are those which are less soluble and where solution is not the dominant process of landscape development e.g. granites, basalt, shale, slate, quartz sandstones, gneiss, schist, and lots of others. These are more numerous than karstic rocks.

10. Describe the types of syngenetic cave formation.

Karst developed contemporaneously with the lithification of the rock, as in aeolian calcarenite where lithification and karstification of dune calcareous sands occur simultaneously. This includes the karst landforms that developed upon such young, porous carbonate rocks, such as aeolianites, as they underwent lithification.

11. Describe the types of postgenetic cave formation.

This is karst that occurs in quartzose rocks which is the result of post-genetic weathering and dissolutional processes. It is not a term used much in Australia.

12. What is the function of mixture corrosion?

Mixture corrosion is where the mixing of two different waters with different amounts of carbon dioxide (CO₂), both originally saturated with calcite, results in a mixture which is under-saturated and capable of further calcite dissolution. The reason for this behaviour is the non-linear relationship between calcite solubility and carbon dioxide partial pressure.

It means that caves may form when such saturated waters mix as solution capacity is increased.

13. Why is limestone the most suitable rock for cave formation?

Because it dissolves relatively easily in natural waters which are mildly acidic from

the presence of dissolved CO_2 from the air. It is also a very common rock worldwide.

14. What role does tectonic performance play in the formation of caves?

Faults may allow access to water and increase solution. Tectonics may also result in greater altitude above sea level and as such a greater potential for solution.

15. What are the effective factors of limestone dissolution?

Altitude above sea level, climate, subsoil and sub-aerial exposure, vegetation, karst morphology, soil humidity, lithology and surface morphology. There may be other local factors as well.

16. What is a sinkhole? Where do we find them?

A doline, sink or sinkhole is a closed depression draining underground in karst areas. Found in karst areas and may be due to solution or collapse or both.

17. Describe erosional cave formation.

Erosion is the removal of material and most caves are the result of that. Most caves also are enlarged by removal of material.

18. Describe corrosional cave formation.

Corrosion is the gradual destruction of material by chemical reaction with its environment e.g. rusting. I am not sure that what is meant here is corrosion which is erosion by abrasion i.e. fragments rubbing over an area and causing erosion.

19. How do levels of caves get formed?

Caves form generally at or near the water table. If the water table drops or rises the solution then occurs at the new levels.

20. What marks vertical caves? How do they get formed?

Vertical caves are those where there are vertical passages. There are a number of reasons why this occurs e.g. the geology, joints, altitude above sea level and the amount of water present.

21. Draw and name the main units and types of karst.

I assume this is the types of karst i.e. Tower karst, polygonal karst, cockpit karst, (all tropical karst forms), syngenetic karst (aeolianite karst), arid and semi-arid karst, humid temperate karst, arctic and alpine karst. Most of these types relate to climatic conditions.

22. What is the definition of erosion base?

Base level is the lowest level to which erosion by running water can take place. This grades to sea level but can be influenced by tectonics (rising or falling land relative to sea level) or by rising or falling sea levels.

23. Describe deep karst.

Caves and karst fissures are common at shallow depths beneath the ground surface but they are also known to exist at great depths. The mechanism by which deep

karst features are formed is not wholly understood.

24. Describe shallow karst.

See the answer above.

25. How does a karst spring gaining water from a deep or a shallow karst react to the rain falling on the surface?

The karst spring will generally react in two ways: first, the surface water is often turbid (i.e. full of sediment and "dirty") and the spring becomes turbid also and secondly, the water from the surface adds to the volume from the karst. The surface water may recharge the groundwater, especially if it has been depleted by pumping.

26. What flowing factors determine shallow and deep karst?

There has been a great deal of discussion about the difference between deep and shallow karst and its formation. Deep flow is assisted by the lower viscosity of geothermally heated water at depth. Analysis of cave data shows that depth of flow is primarily a function of flow path length, stratal dip and fracture anisotropy. This is explained by Steve Worthington in his article 'Hydraulic and geological factors influencing conduit flow depth' in *Cave and Karst Science*, 31 (3), 2004, 123-134.

27. What is the typical cavity-forming effect on the deep and the shallow karst and on the border of the two?

This is also explained in the Worthington article (see question 26).

28. What is the border of the shallow and the deep karst?

Stephen Worthington has spent a lot of time trying to work out these questions. He has found that there are systematic differences in depth of flow between different areas and that conduit flow to depths >100 m below the water table is not uncommon. Such deep flow is facilitated by the lower viscosity of geothermally heated water at depth. Analysis of data from caves shows that depth of flow is primarily a function of flow path length, stratal dip and fracture anisotropy. This explains why conduits form at shallow depths in platform settings such as in Kentucky, at moderate depths (10-100 m) in folded strata such as in England and in the Appalachian Mountains, and at depths of several hundred metres in exceptional settings where there are very long flow paths. For details check out Steve's papers on www.speleogenesis.info.

29. How do a sinkhole, a doline and a collapse get formed?

Sinkholes may capture surface drainage from running or standing water, but may also form in high and dry places in a certain location. The mechanisms of formation involve natural processes of erosion or gradual removal of slightly soluble bedrock

by percolating water, the collapse of a cave roof, or a lowering of the water table. Sinkholes often form through the process of suffusion.

30. What is a clint? How does it get formed? What are its types?

A clint is a section of a limestone pavement separated from adjacent sections by solution fissures. These fissures are called grikes. It is formed generally by solution along the cracks (grikes). In many places the limestone pavement may have been glaciated, but not in all cases.

31. What is a polje? What are its characteristics?

A polje is an elongated basin having a flat floor and steep walls; it is often formed by the coalescence of several sinkholes. The basins often cover 250 sq km and may expose "disappearing streams." The flat floor of a polje is characteristically covered with a soil and the areas often flood in the wet seasons as the water table rises. These areas may constitute the only arable part of the rock wasteland in a karst region.

32. To what effect does lime separate from karst water?

It precipitates to form speleothems.

33. Why do travertine dikes get formed by karst springs and why by waterfalls?

Travertine is a form of dense, closely compacted limestone consisting mainly of banded layers. It forms from precipitation from water supersaturated in CaCO_3 when the water degasses and is unable to hold the CaCO_3 in solution. Turbulence in degassing water will probably increase the loss of CO_2 e.g. water flowing over waterfalls, and flowstone (travertine) deposition will occur.

34. Group deposits in caves.

Deposits in caves can be grouped according to whether they are clastic (detrital), chemical (speleothem) or organic e.g. guano piles. This type of grouping is the same as for any sediment.

35. What are stalagmites, stalactites and stalagnates?

Speleothems. Stalagmites form on the floor and grow upwards, stalactites hang from the ceiling and grow downwards and stalagnates is a European term for columns.

36. Describe the process of dripstone formation.

Water rich in CO_2 is saturated in CaCO_3 as it seeps through the cracks in soil and limestone above a cave. When such water enters a cave it is supersaturated in CaCO_3 . However, the cave air has less CO_2 than the water and the water degasses i.e. loses CO_2 to the cave atmosphere. When this happens the water is no longer able to carry the amount of CaCO_3 it has in solution and precipitates CaCO_3 as dripstone.

37. List the main types of dripstone.

These are all types of speleothems: stalagmites, stalactites, columns, shawls, helictites, gour pools and many others.

38. What are a sifon, a helictite, and a meander?

A sifon (siphon) is a sump i.e. a passage in a cave that is submerged under water. A sump may be static, with no inward or outward flow, or active, with continuous through-flow. Static sumps may also be connected underwater to active stream passage.

Helictites are contorted depositional

speleothems which grow in any direction, seemingly defying gravity. They occur in many forms from tiny filaments to thick, antler-like forms. Most helictites are formed from calcite. Their formation is often argued about and there appear to be several reasons why they occur rather than straighter forms.

A meander is a bend in a sinuous watercourse or stream. It is related to the discharge of the stream.

Cave geography of Hungary:

These questions are rather outside what anyone here is really interested in. But can

you answer these questions for Australia?

■ Can you identify the main karst territories of Australia on a map?

■ Can you list the three deepest, the three longest caves and the show caves open for the public, even in your own state?

■ What about caves with bat colonies, archaeological material or the main caves with multiple levels, shafts and sinkholes?

■ What examples do you know in Australia of crystal-caves, stream caves and thermal-originated caves, and

■ Can you name some caves not in limestone and name the rock they are in?

The Australian Caving Exam

Stephen Bunton

STC

IN AN ATTEMPT to make caving exams in this country easier, I have resorted to the old, faithful, quick and easy to mark multiple-choice test.

1. The temperature of Australian caves is:

- a) Too hot on the mainland.
- b) Too cold in Tasmania.
- c) About right for a short trip.
- d) Never any good for cooling the beer.

2. The correct method of rescue from a cave is:

- a) Self-rescue.
- b) Best initiated by caving party affected by the accident.
- c) Initiated by contacting the Cave Search and Rescue mob and hope you don't die of hypothermia in the meantime.
- d) Don't worry about it and curl up in a corner. Everyone has to die of something.

3. The longest cave in Australia is:

- a) Too far away.
- b) Worth the effort of visiting.
- c) Somewhere to visit when you retire.
- d) Just too long.

4. The deepest cave in Australia is:

- a) On the hit list.
- b) Something you train for.
- c) Something you've done already.
- d) A nuisance because it keeps changing.

5) Cave invertebrates are:

- a) Invisible.
- b) Interesting.
- c) Innocuous.
- d) Inedible.

6) The draughts in caves:

- a) Are air moving from high pressure to low pressure.
- b) Are always in your face.
- c) Are caused by old farts bragging.
- d) Emanate from boffins' bumholes.

7. The correct way to negotiate a squeeze is:

- a) Head on.
- b) One hand forward, one hand backwards.
- c) Feet first so you can exit quickly if needs be.
- d) In a caving computer game.

8. Pitches in caves:

- a) Make the exploration exciting.
- b) Make the cave deeper.
- c) Make the cave more tedious.
- d) Make you think twice about going along on the trip.

9. Cave decorations are:

- a) Something that get in the way.
- b) Worth photographing.
- c) Interesting if you know how they form.
- d) All the same after a while.

10. The best cave in Australia is:

- a) The muddiest, most horrible one with nasty squeezes and lots of gnarly climbs.
- b) The deepest.
- c) The one that makes for the best bragging.
- d) A distant memory.

11. Caving clubs in Australia are:

- a) A source of intense rivalry.
- b) A means to an end.
- c) A repository for vast amounts of knowledge about caves.
- d) Almost as old as I am.

12. The Australian Speleological Federation is:

- a) Irrelevant.
- b) Full of speleo-politicians.
- c) An important lobby group for the conservation of Australian caves.
- d) Almost as old as I am.

13. Geology in Australian caves is:

- a) Irrelevant.
- b) Interesting.
- c) Complicated.
- d) Almost as old as I am.

14. Australian caves are formed in:

- a) Limestone.
- b) Limestone and basalt.
- c) All sorts of different rocks.
- d) Places that are too far away.

15. Bats are:

- a) Critters that keep you out of caves during the summer holidays.
- b) Creatures that keep biospeleologists from going sport caving.
- c) Remarkable if you know a bit about them.
- d) Inedible.

16. Water in caves:

- a) Flows in at the top and out at the bottom.
- b) Flows north to south.
- c) Flows through vadose or phreatic passages.
- d) Makes me want to pee.

17. Sumps in caves:

- a) Make exploration exciting.
- b) Make me want to take up scuba diving.
- c) Make exploration dangerous.
- d) Mean that I can now go back to the surface.

18. Exploration of Australian caves should be done:

- a) All day every day.
- b) Weekends and holidays.
- c) After a gentlemanly start.
- d) In the morning, so that you can go to the pub afterwards.

19. Petzl:

- a) Makes stuff.
- b) Was a bit of a hero.
- c) Stuff costs too much.
- d) Is almost as old as I am.

20. The best way to descend a pitch is:

- a) Freeclimbing.
- b) Using SRT.
- c) On ladders.
- d) Using the steps in the tourist cave.

How did you score?

If you scored between 20 and 30:

Congratulations. You are a very keen caver. You are probably a novice and if you survive the next two years of your caving career, you should become an asset to your caving club and be involved in some really exciting exploration.

If you scored between 30 and 45:

Well done. You have probably survived your first few years of caving and are possibly in training for bigger and better caves. You are probably very involved in your club's activities. You are most likely to

make a positive contribution to your club over the coming years.

If you scored between 45 and 60:

Not bad. You seem to be a very sensible caver who has been around for quite some time, without your enthusiasm being dampened. You have visited a vast number of caves, you are still active and you have already made a valuable contribution to your caving club.

If you scored between 60 and 80:

My goodness. You were a good caver once, but what happened to you?

You are only as good as your last caving trip and that was probably a long time ago when you visited some local wormhole that you dabbled a toe into, just so you could get a pathetic survey in your club newsletter. You've been to too many conferences, read too many boring papers and probably presented a few too many of your own.

You need to be honest with yourself, get out of caving altogether and pursue some of those other interests that distract you from that filthy habit you once loved.

COMING EVENTS

This list covers events of interest to anyone seriously interested in caves and karst. The list is just that: if you want further information the contact details for each event are included in the list for you to contact directly. A more extensive list was published in the last ESpeleo. The relevant websites and details of other international and regional events may be listed on the UIS/IUS website <http://www.uisspeleo.org/> or on the ASF website <http://www.caves.org.au>. For international events, the Chair of International Commission (Nicholas White, nicholaswhite@netspace.net.au) may have extra information.

July 21–28 2013

16th International Congress of Speleology, Brno, Czech Republic. For details see the website <http://www.speleo2013.com/>. The second circular is now available for download and online registration has been available since 1st August 2012. The circular has lots of information. For personal registration, booking accommodation and making reservations for excursions and field trips, register online or use the paper form which can be downloaded from the website, filled in and returned by fax or as an email attachment. For interest, Ryanair (www.ryanair.com) has cheap flights from Stansted airport north of London directly to Brno. The ICS is a spectacular event that occurs every four years and it is also a function of the International Union of Speleology (IUS). You can find detailed information about fees, accommodation and excursions on the Congress website www.speleo2013.com and also in the recently published second circular.

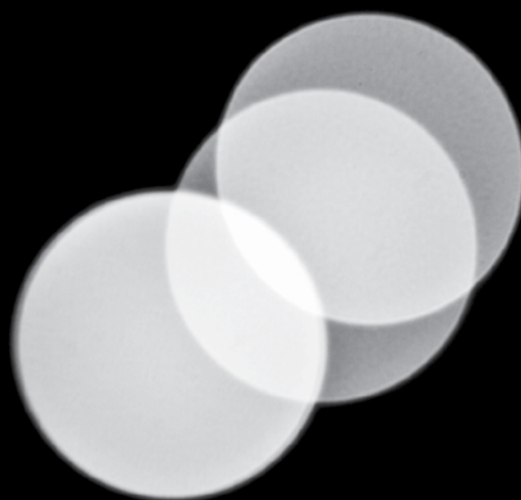
November 4–8 2013

20th National Cave and Karst Management Symposium (NCKMS), Carlsbad, New Mexico. NCKMS covers all fields of cave and karst management (geology, biology, legal, show caves, restoration, and more) and is an excellent forum to exchange ideas and network within and between those topic areas. Online registration is now open; for all of the details and to register, visit www.nckri.org/nckms2013. Papers must have been submitted by 1st June 2013. The proceedings will be provided digitally to everyone as part of their registration fees. A limited number of printed copies will be available to those who order them by mid-September. After you register, look under the "Carlsbad" tab of the conference website for "Lodging" and book your hotels. For well over a year, occupancy of Carlsbad hotels is generally exceeding 95% every day. It is often impossible to find a room at the last minute, and if you do, you will find it very expensive. Reserve your rooms now while they are available at good prices.

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