CAVES AUSTRALIA

The Journal of the Australian Speleological Federation

Calthemites
Tasmania Cave Rescue
Stromatolites and Thrombolites

No. 203 • MARCH 2018

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.

The relevant websites and details of other international and regional events may be listed on the UIS/IUS website www.uis-speleo.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.

A similar calendar is published in *ESpeleo*. This calendar is for known events in 2018.

2018

April 2-6

The Sinkhole Conference & Third Appalachian Karst Symposium, Shepherdstown, West Virginia, USA. Registrations if possible by 23 February 2018. Later and on-site registrants may not be allowed on the grounds (National Conservation Training Center). Please register as soon as possible and reserve your lodging. The conference circular, which is a convenient summary of the conference, is available from http://www.sinkholeconference.com/, where all other conference details can also be found.

April 8–13

Speleogenesis, Geomorphology and Hazards in Karst, European Geosciences Union, Vienna, Austria. Details from http://meetingorganizer.copernicus.org/EGU2018/session/27715

April 28

California Cave Life Symposium, San Francisco, California, USA. Details: http://cavelife.info/ or speodesmus@gmail.com

May 6-11

ACKMA Cave Management Conference, Margaret River, Western Australia. Both the pre- and post- conference field trip are yet to be confirmed, and will be subject to interest. Details from the ACKMA conference website: http://www.ackma.org/conf2018/index.html or send an email to conferenceregistrations@ackma.org

May 27–June 5

Characterisation and Engineering of Karst Aquifers Workshop, Trebinje, Bosnia-Herzegovina. http://www.karst.edu.rs/

June 6-9

Karst 2018: Expect the Unexpected. Trebinje, Bosnia-Herzegovina, http://www.karst.edu.rs/

June 3-August 10

USA Karst Field Studies Program, Grand Canyon National Park and Mammoth Cave National Park. Six different 5-6 day courses. www.karstfieldstudies.com

June 11-16

8th International Workshop on Ice caves (IWIC-VIII) Picos de Europa National Park, Spain, To register and for more information visit https://eventos.uva.es/go/iwic8 or https://www5.uva.es/gir_pangea/

June 18-22

26th International Karstological School: theme 'Classical Karst' — show caves and science, Postojna, Slovenia, website to be posted soon.

July 2-6

EuroKarst 2018 Besançon, France. http://www.eurokarst.org/

July 21-27

18th International Vulcanospeleology Symposium, Lava Beds National Monument, California, USA. http://18ivslavabeds.com/

July 29-August 20

BERGER 2018 "Clean deep" International gathering for the clean-up of Gouffre Berger, Vercors, France About 500 kg of waste were extracted from Gouffre Berger in 2017. The work has to concentrate from now on the deep parts of the cave, between -800 m and the camp -1000 m.The 2017 gathering saw a strong foreign participation; the objective for 2018 is 150 European cavers. More than 300 cavers are expected during three weeks. Please, get in touch with Rémy Limagne before March 2018 r.limagne@gmail.com.
http://cds39.fr/BFC/B18/
https://www.facebook.com/groups/816551028409538/

July 30-August 3

US National Speleological Society Convention, Helena, Montana, USA. http://nss2018.caves.org/

August 23-26

EuroSpeleo Forum 2018, Ebensee, Austria http://eurospeleo.at/expo.html.

August 20-24

24th International Conference on Subterranean Biology, University of Aveiro, Portugal http://24icsb.web.ua.pt/.

September 27-30

24th International Cave Bear Symposium, Chepelare, Bulgaria. http://icbs2018.at .

October 12-18

8th Congress of the International Show Caves Association, Genga, Italy. http://www.i-s-c-a.com/event/68-8th-isca-congress

2019 and beyond

December 30–January 4 2019

31st Australian Speleological Federation Conference – The Darkness Beneath: Caving Tasmania Devonport, Tasmania. For more information: https://asfconference2019.com/general-information/ Presentation: https://prezi.com/view/KavyRw5tX1ExvDqCr7aY/

23-29 July 2021

18th International Congress of Speleology Lyon, France http://uis2021.speleos.fr/

A very useful international calendar is posted on the Speleogenesis Network website at www.speleogenesis.info/directory/calendar/
Many of the meetings listed above are on it but new ones are posted regularly.

www.aspiringsafety.com.au

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ASF

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Contents

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Photo: Garry K Smith

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WANTED
ARTICLES FOR *CAVES AUSTRALIA!*

Whether caving, cave diving or generally just caving, *Caves Australia* readers are interested in YOUR story. It is only with YOUR contribution that we can produce a quality magazine for all to enjoy. For writing and style guidelines, contact the Editor or Production Manager.

EDITORIAL

IT HAS been a lean few years for *Caves Australia* but hopefully that has now changed for the better.

The majority of content in this issue is a bit dated but interesting nonetheless and I hope that having old stuff to read is better than having no stuff.

Putting this issue together has effectively exhausted the supply of material so I make a genuine plea for new material ASAP, please.

Hopefully, my record as Production Manager between 2008 and 2015 convinces you that this isn't a hollow promise and your efforts writing articles will now be rewarded with prompt publishing.

I have also taken on the role of editor from Ian Curtis and I thank him for his efforts in the role since 2010. I encourage him to write articles to fill the void his retirement must leave.

◆◆◆

It is with sadness that we report on the death of John Dunkley AM. John was a stalwart of ASF and Australian caving and his contribution massive.

He was no slouch on the international scene either. We extend our condolences to Jeanette and family.

A brief obituary is included in this issue and we hope to have a more detailed article for a future issue.

— Alan Jackson

President's Report

2017 was a prodigious year for the ASF. We held our AGM in Adelaide, followed by a dinner to commemorate that 60 years ago a group of clubs gathered to form the ASF. Lots of reminiscing on the night and discussion on the relevance of the ASF then and now.

In July, the ASF was the host for the UIS 2017 Congress. The Commission's report is included with the annual report. I would like to extend a big thanks to Denis Marsh and his team from all of the ASF for a job well done, along with the many volunteers who made this event happen.

Australian speleology can be proud of its presence in the international speleological arena and its achievements. Dr Timothy Moulds was elected to the UIS Bureau at the UIS Congress. The next UIS Congress is in Lyon France in 2021 so start planning your attendance.

As reported in some of the Commissioners' reports, we have been very lucky once again in 2017 in that we had no long-term serious caving injuries or deaths. I am sure that there have been many close calls that have not been reported. Please report all incidents to the SLARM Commissioner, Darren Brooks, so that we can make caving safer for all, by disseminating recommendations and conclusions.

The ASF is a completely volunteer federation with all giving up their time for free. In dollar terms $11,624 worth of time was worked as a conservative estimate by the executive plus all the extra things that are done for free. You can easily triple this figure for all the time spent by the Commissioners and their teams.

Thank you to all my fellow ASF members on the executive for all their work and efforts in making sure that the Federation

is functioning and looking after caves and karst. They all put in a large amount of volunteer time and travel, so thank you to their partners and families too.

Lots of the work for the Federation happens in the Commissions. A big thanks to the Commissioners and their teams for the outstanding efforts in 2017.

We welcome new faces, ideas and input. So before the next AGM think 'What can I do for the ASF?' to assist in the protection of caves and karst and nominate for a role.

In 2018, the ASF Executive will be continuing from planning sessions in 2017 on strategic planning. A session was held at the January 2018 Council meeting.

The next ASF Conference, for those members who did not attend the Australia night at the UIS Congress and saw the outstanding presentation by the Tasmanians, is on 30th December 2018 to 4 January 2019 in Devonport.

— John Cugley

Calthemite Deposits Form Stalactite Straws Beneath Concrete Structures

Garry K. Smith
NHVSS

THIS study was first presented at the ASF's 30th Biennial Conference, 21st–26th June 2015, Exmouth, Western Australia and later published in *Cave and Karst Science,* Vol.43, No.1, P.4-10, (April 2016), British Cave Research Association, ISSN 1356-191X.

To most people the sight of straw stalactites growing beneath a concrete structure is no big deal. 'So what?' some may say. It is however a concern to structural engineers as it is a sign of degrading concrete. I suspect there are many cavers like me who have pondered over the sight of such wonders. This prompted me to take on a study of these secondary calcium carbonate deposits under man-made structures.

The initial focus was to determine how quickly the straws grew and what factors influence their growth and also to identify the chemical reaction causing calcium carbonate ($CaCO_3$) deposition and measure the solution pH.

This proved to be just the starting point which raised many more questions and widened the project scope. The quest for answers led to a number of interesting and previously undocumented observations and the introduction of a new word: calthemite.

WHAT TERM TO USE?

Concrete secondary deposits in the shape of straws, stalactites, shawls, flowstone, stalagmites etc. mimic cave speleothems in many respects. This led me to an extensive literature search for the appropriate term to use. Descriptions in published papers circumnavigate the question of a concise term to cover calcium carbonate precipitates on man-made structures.

Examples from *Cave Minerals of the World,* Hill and Forti (1997) include: 'non-cave stalactites which derive their calcium carbonate from concrete', 'formations under concrete structures' and 'deposits in the outside world, while not speleothems in the strict sense, nevertheless mimic the forms taken by speleothems'.

GARRY K SMITH

Location of calthemite straws on the supermarket carpark ceiling

The term 'speleothem' by definition can only be used to describe stalactites, straws, stalagmites, flowstone etc. which were created in a cave. Hence, for the purposes of this study, the term 'Calthemite' was used to encompass the various decorations mimicking speleothems, derived from man-made structures containing cement, mortar, lime or other calcareous material. The word 'calthemite' is derived from the Latin *calx* (genitive *calcis)* 'lime' + Latin < Greek *théma*, 'deposit' meaning 'something laid down', (also mediaeval Latin *thema,* 'deposit') and the Latin *–ita* < Greek *-ītēs* used as a suffix indicating a mineral or rock.

GARRY K SMITH

Measuring calthemite straws with engineering metal ruler graduatedin 0.5 mm increments

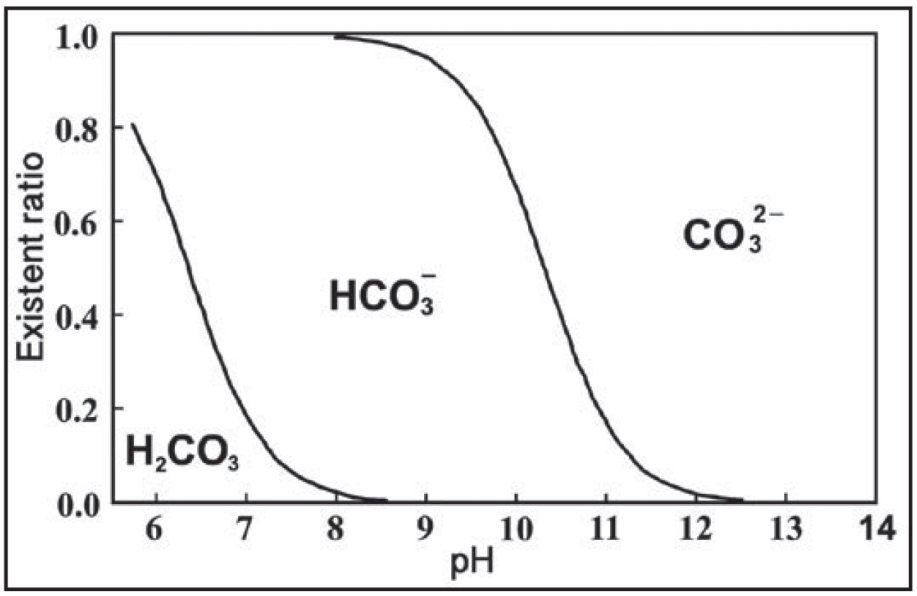
So in essence the simplistic analogy is that calthemite encompasses secondary deposits derived from a man-made structure outside a cave environment, which includes mines and tunnels, where the secondary deposit may be derived from concrete, lime, mortar, limestone, dolomite or other calcareous material.

For clarification, the term 'speleothem', first used by Moore (1952) can only be used to describe 'secondary deposits' inside a cave. Hill and Forti (1997) went on to further define 'speleothem secondary deposits' in the excellent publication, *Cave Minerals of the World,* (2nd edition) p13, which specifically disallowed secondary deposits in mines and tunnels from being classed as speleothems.

CALTHEMITE PROPERTIES

Calthemites consist predominantly of calcium carbonate ($CaCO_3$), but may contain other trace elements such as iron, copper and zinc, or minerals e.g. gypsum. These elements and minerals may colour the calthemite when transported by the leaching solution and deposited at the same time as the $CaCO_3$ hence the predominantly white calcium carbonate will be stained yellow, orange or red from rusting steel reinforcing bars and copper pipes passing through concrete, which can produce a green or blue copper oxide colour.

Specialist equipment was not available to determine the morphology of the deposited $CaCO_3$. However, it is most likely being precipitated from solution as calcite, as opposed to the less stable polymorphs of aragonite and vaterite.



Relationship between equilibrium of carbonic acid and pH in solution. Carbonic acid includes both carbonates and bicarbonates. Graph after Maekawa et al., *2009.*

CHEMISTRY

To make concrete, aggregate and sand are mixed with cement. When water is added to the mix it reacts readily with the calcium oxide (CaO) in the cement to form calcium hydroxide ($Ca(OH)_2$), which is a key component in the chemistry creating calthemites.

The solution pH influences which chemical reactions are occurring at a particular time to deposit the $CaCO_3$. This can also have a bearing on the deposition rates and growth of straws.

Of the three main reactions, two rely on absorption of CO_2 from the atmosphere for $CaCO_3$ deposition to occur, as opposed to cave straws (speleothems) where deposition occurs due to degassing of CO_2 from solution. The third reaction appears to only occur under specific circumstances relating to very old concrete or mortar, possibly tens or hundreds of years old, and is essentially the same as the reaction occurring in limestone caves.

There are of course the circumstances where mine shafts and vehicle and train tunnels are cut through limestone, dolomite or other calcareous rock and the secondary deposits — the calthemites in them — are precipitated by the same chemistry as in limestone caves.

For an in-depth look at the chemistry, refer to the complete paper published in *Cave and Karst Science,* Vol.43, No.1 (April 2016) or search Wikipedia for calthemite.

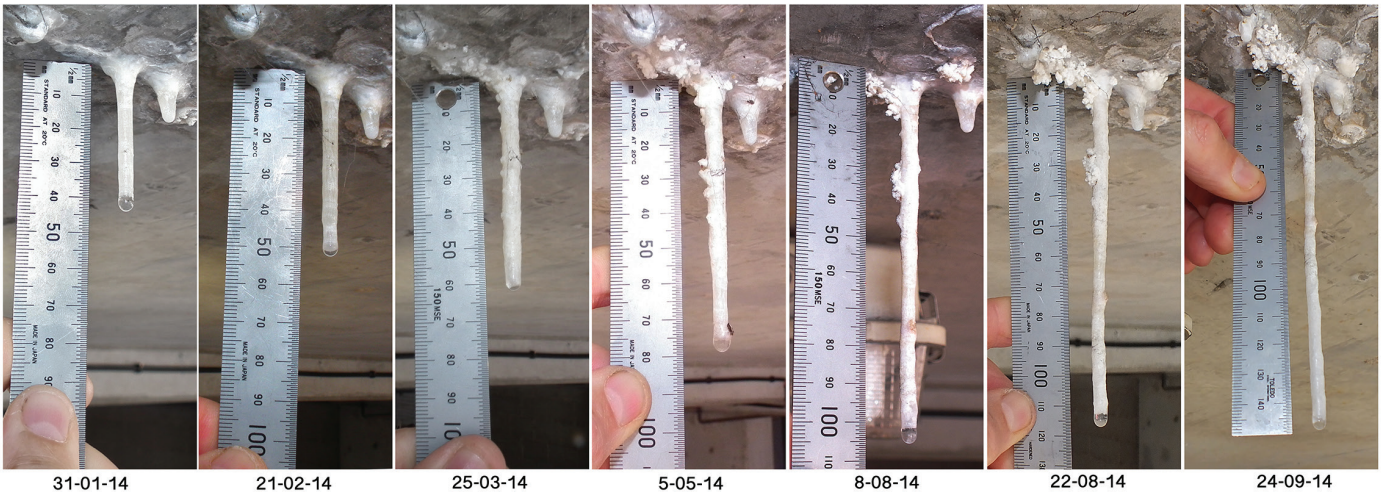
RAFTS OBSERVED ON SOLUTION DROPS

A long period between drips (≥5 minutes) was sufficient time for absorbed CO_2 to cause precipitation of $CaCO_3$ from solution and form rafts on the drop surface, which were visible to the naked eye (up to 0.5 mm across). Their sporadic movement around the drop surface aided by air movement and internal solution pulses, caused some rafts to be pushed onto the straw's outer surface. These rafts influenced the thickness and irregularities of a straw's outside diameter.

A 34-second video of rafts spinning on the surface of a solution drop can be viewed on YouTube at https://www.youtube.com/watch?v=G-gm_kN5Xes

SUMMARY OF FINDINGS

1. Continuity of solution and drip rate has the most influence on a calthemite straw's growth rate.
2. Evaporation due to atmospheric temperature and humidity had no measurable effect on a calthemite straw's growth rate.
3. No straw growth occurs if the drip rate is more frequent than 1 drip/min.
4. A maximum growth rate of 2 mm/day was recorded when there was 11 min between drips.
5. The pH of the hyperalkaline solution influences which chemical reaction or reactions is/are depositing calcium carbonate at a particular time and location.
6. The hyperalkaline solution creating the straws is typically pH > 9 and commonly reaches pH 13.5, which can easily burn human skin.
7. Deposition of calcium carbonate occurs when atmospheric CO_2 diffuses into the drop solution, as opposed to normal cave speleothem chemistry where CO_2 is degassed from solution.
8. Calcite rafts may form on the surface of solution drops and can influence a calthemite straw's growth and outside diameter, and create surface irregularities.
9. When there is almost no air movement, calcite rafts form a latticework over the drop surface when drip rate is slower than approximately 1 drip every 5 minutes. Air movement or a pulse of solution through the straw will break up any latticework to create small rafts which may spin violently. Stronger air movement can shear some rafts from the drop surface and push them onto the straw's outside surface.



GARRY K SMITH

Growth of calthemite straw No.1. The sequence shows the growth of 104 mm in 237 days. When there was only one drip every 11 minutes, this straw grew at 2 mm per day. The date below each image relates to date of measurement recording.

BACKGROUND TO STUDY

The study concept evolved from a wild brainstorm while loading my car with groceries at the local supermarket and pondering what I could do to contribute to the ASF's 2015 Biennial Conference, which was still 18 months away at the time. Looking up, I saw about 30 active stalactites of various lengths hanging from the concrete building above.

This raised many questions in my mind. How quickly do they grow? What chemistry is involved? Has anyone studied non-cave stalactites before? What are they called if the term 'speleothem' can only be used to describe secondary deposits in caves?

All these unanswered questions certainly sparked my interest.

I remembered seeing these straws and stalactites growing within a very short period of the building's completion six years earlier and many were still very actively growing.

After many nights at the computer scouring the internet, I only had some answers and not very comprehensive ones at that.

The next day I was down at the shopping centre and up a ladder after the supermarket closing time. The months rolled by with weekly and often daily return visits to measure, photograph and record data such as temperature, humidity, atmospheric CO_2 concentration, solution pH and drip rates.

A short period into the study I was unable to do the measurements after closing time, so I put on a fluoro vest and took the readings during the shopping centre opening hours.

It is surprising how a fluoro vest makes a person look official. I was never questioned by staff or security personnel while making the measurements.

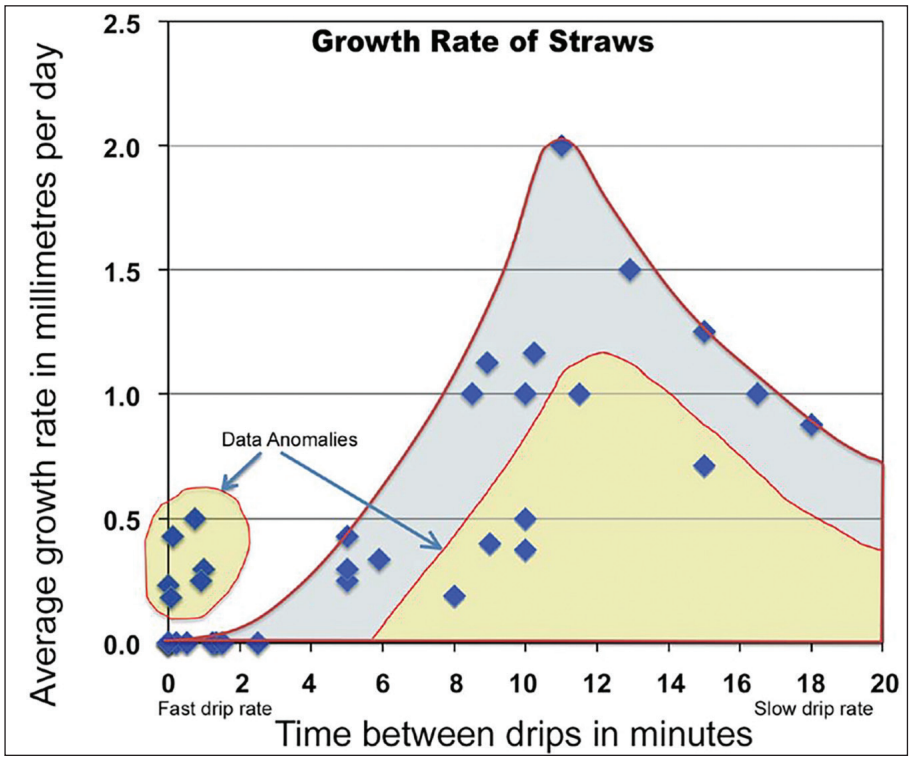
Ten months of collecting data allowed me to gain a pretty good grasp of growth rates and how it related to the drip rate. I must admit that staring up at a straw drip waiting for it to drop can be time-consuming, especially when there may be 20 minutes or more between drips.

The rest is history. I was able to present the study at the ASF's 30th Biennial Conference in Exmouth, WA, 21st–26th June 2015.

It has been a very time-consuming task, but very rewarding in that I have personally learnt a lot from the exercise.

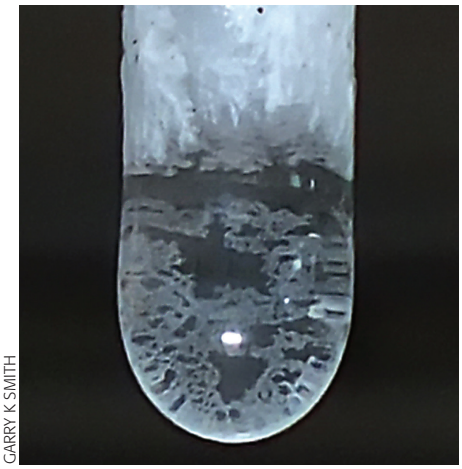
ACKNOWLEDGEMENTS

A special thanks to Dr Ken Turner, whom I consulted on many occasions for advice on the chemistry, and Dr Andrew C Baker and Jodie Rutledge for critical reviews of the paper.



GARRY K SMITH

Plot of calthemite straw average growth rates between periods of data recording, measured in mm/day vs solution drip rate in minutes. The 'Data Anomalies' are measurements recorded in a period when the drip rate changed dramatically between recordings.



GARRY K SMITH

Drip with calcite rafts latticework formed on a very slow-dripping calthemite straw (≈ >12 minutes between drops) on a day with no wind or vehicle movement

GARRY K SMITH

Calcite rafts are broken up and spinning around the drip surface, influenced by air movement

ABSTRACT

The following is the abstract from the peer reviewed paper published in *Cave and Karst Science,* Vol.43, No.1 (April 2016):

Abstract: In this paper, the term 'calthemite' is used to encompass the various concrete-, mortar- or lime-derived secondary deposits consisting primarily of calcium carbonate ($CaCO_3$) that grow from man-made alkaline structures outside the cave environment. Calthemites are very similar in composition and form to speleothems in limestone caves, but in concrete-derived straws carbon dioxide (CO_2) is a reactant as opposed to a product. The growth rates and corresponding drip rates of four stalactite straws growing beneath a concrete building were recorded over a ten month period. The major influencing factors determining calcite deposition were the supply continuity of leachate and the drip rate. Growth rates up to two millimetres per day were recorded. Minute calcite rafts were observed and photographed on the solution drop surface. Sporadic movement of rafts around the drop surface (induced by air movement), is identified as affecting straw diameter and wall thickness. Deposition of $CaCO_3$ straws derived from concrete is usually associated with hyperalkaline solution (pH > 9) as opposed to the near neutral pH to mildly alkaline solutions (pH 7.5 – 8.5) that commonly deposit speleothems.

IB-14 Exit Cave, Ida Bay, Tasmania

D'Entrecasteaux River Sumps exploration continued December 2014

Janine McKinnon
STC

BACKGROUND

Exit Cave is a large, multi-entrance system in southern Tasmania. The left anabranch of the D'Entrecasteaux River sinks at IB232 D'Entrecasteaux River Third Sink and reappears in D'Entrecasteaux Passage in Exit Cave.

In February and March 2013 I undertook a series of trips to explore and survey the passages between these two points (McKinnon 2014). I was unable to connect the two entrances at this time, but thought another attempt was warranted. So, in late December 2014 I returned to complete some survey tasks and attempt to pass the rockpile that had stopped my progress in 2013. This time I had another diver along to help. I thought this would make the job much easier. I didn't realise how much easier it would be.

We had chosen this time of year as we were hoping to catch the water levels at the optimum height to continue explorations of the flow.

Too early in spring and the levels would be too high to access the site, too late in summer and no flow makes finding the way that the main flow is going difficult (as my previous attempts had proved).

THE APPROACH

The team this year was very small. Just myself, Michael Packer (Pax), my dive buddy and recent discoverer of caving, and Ric Tunney, perennial support, sherpa and general multi-task guy.

The walk to Exit Cave takes between one and one and a half hours, depending how heavy one's pack is. There is a 200 m saddle to cross. The sump is twenty minutes walking (and a little scrambling) inside the cave. Thus, getting a load of diving gear to the dive site is hard work unless a reasonable number of sherpas are available; each diver's gear creates four loads. We did not have it easy this year — we had an extra diver and fewer sherpas, so I had pre-positioned some of the gear at the site in early December.

On Boxing Day we three headed in to the cave with our first load.

I had anticipated that we would be doing a fair bit of diving, as we attempted to find an underwater route bypassing the rockpile, and also surveying underwater sections. Thus we each carried twin larger tanks and a set of small three litre tanks. The large ones were to be used for commuting through Sanguine Expectations (SE - the sump in D'Entrecasteaux Passage), and any long dives further into the system, and the small ones were for the shorter daily tasks I envisioned being our main activity. These small tanks we planned to carry back each evening and refill. The large ones would stay in the cave for the whole exercise, and would have sufficient air to complete their tasks safely.

That was the plan. A heavier carry than strictly necessary at the beginning and end, and light carries during the project.

The following day, 27 December, we ferried the remaining gear to the dive site and prepared to start.

The thick line that I had placed at the end of activities in 2013, from the surface of the sump pool through the entrance restriction to SE, had been abraded and broken sometime in the intervening twenty months. I had seen this when I inspected the sump after dropping gear a few weeks earlier, so I had carried in a hundred metres of Telstra rope to replace it, and run a (hopefully) more permanent line all the way through the sump.

This was some of the line I had purchased with the ASF grant for re-lining Junee Resurgence in 2014. The grant had allowed for any surplus line to be used for other cave diving lining tasks.

The plan for this first day was to re-line the sump and visit the areas of the cave I had explored last time. This would re-familiarise me with the system, and allow Pax to get a feel for it, before starting more difficult tasks.

We also thought we might have a poke at that rockpile as a first priority.

THE CONNECTION

I dived first, laid the line, and waited in Never Say Die (NSD) chamber for Pax. Once he arrived we dropped tanks and waded off upstream to explore the system.

The water level was about half a metre higher than 2013, and the flow was visible. This was good.

We passed the line heading into Sump 2, went over the line into Sump 3 (both still taut, so in situ) and swam through the roof sniff in between. We followed the swimming passage to the right to a rockpile. I thought this was the Sump 3 rockpile I found last year. (I now have reasons to doubt that.) I could see large passage through the rockpile at the far left end, and gaps up through it.

There was a moderate volume of water flowing through the rockpile in many places, and we determined that the rockpile was probably sufficiently leaky to allow for flood flows to be coming through it.

We took off our harnesses and fins. I moved some rocks and started squeezing up. I needed to remove my helmet. I just fitted through and then started gardening behind me for Pax. Meanwhile, he had found a squeezy way through further to the right and was down at water level. I had a clear path down the 5 m to the water, and dropped down. We reunited and swam out of the rockpile to find ourselves in Sign of the Times (SOTT) passage. We were through!

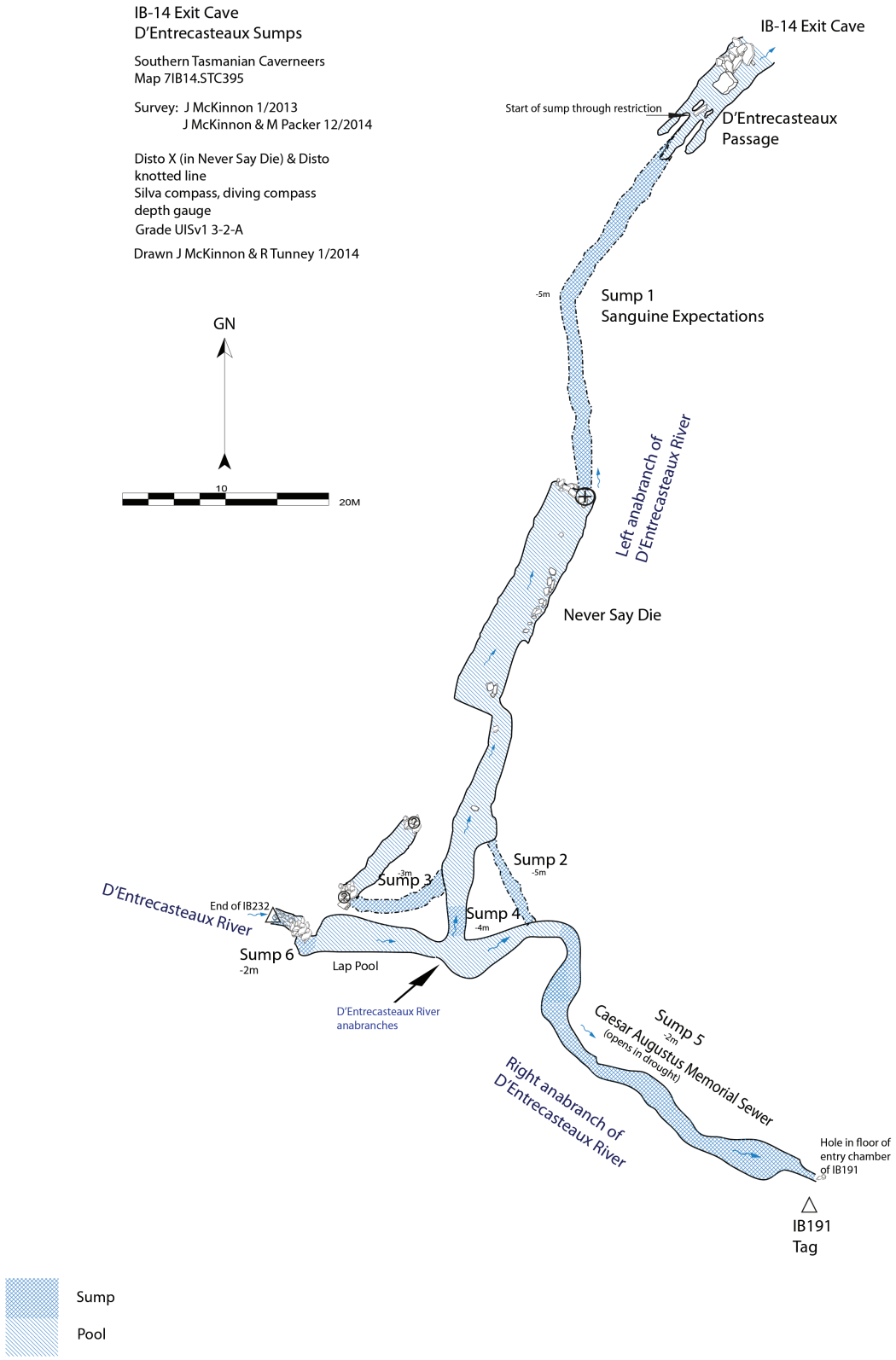
We followed this to the entrance of IB232, where the river sinks to enter Exit Cave, to be sure we were in the right place.

We spent some time exploring the maze of passages in this entrance area. The sink was open but obviously higher than 18 months ago.

We retraced our (swimming) steps to the rockpile. Significant water was flowing through a hole on the RHS (looking downstream) and I crawled through it several metres. The water then sumped.

We looked for the permanent marker Alan Jackson had left at the furthest end

IB-14 Exit Cave, Ida Bay, Tasmania



of his survey of IB232 in 2013 but couldn't find it. We then went back through the rockpile and headed downstream past the junction back to NSD and along the smaller passages in that direction.

A few metres past the turn to NSD I found the end of my line through Sump 2. So this short sump cut through the wall from NSD into the passage leading to the main IB232 flow. This meant that the rockpile I had found on the day I dived through Sump 2 last year, and didn't look closely at because I thought it was not the correct direction, was the rockpile to IB232. If I had but examined it more closely at the time. Damn. There must be a lesson here.

We continued on, along the muddy crawlways I explored last year. The higher water levels made it swimming and sliding rather than sticky, deep mud crawling, so we moved much more easily and quickly this time.

A few places were short roof sniffs, with a very short duck, but we got through. We went further than I got last year and Pax reached a climb up from the stream where the water suddenly went through slots too small to fit. We decided to return the next day to survey and do the climb.

Ric was waiting back at the base at the start of the passage. We left caving suits and lights at the cave entrance and walked out to the car in 1 hr 5 min with light packs.

SURVEYING

The next day we left all dive kit at the end of the sump, except fins for swimming. We moved to the start of survey Sump 2 position, as a known survey station, and the start of swimming.

We surveyed down to the rockpile, up through the rockpile, and joined in to Alan's permanent station on the rockpile at the end of SOTT, left in March 2013. (Yes, we found it this time.)

We then swam back to the junction with NSD passage and started the survey in the other direction.

We surveyed through low passages, in water and with a couple of roof sniffs and a duck, until we couldn't follow the water any further as it disappeared into cracks. There was a climb up here (at yesterday's turn around point), which we surveyed up, and found ourselves in a dry chamber with access to the surface. We surveyed to the entrance and found a tag, IB191, which we surveyed to. Another entrance joined to Exit Cave!

This was the end of the day's work.

This was the end of our plans for this exercise too so we started packing gear for the removal once back at base. We carried all gear back to the cave entrance, in two loads each, and secured some to pick up the next day and some to carry out then.

It was raining as we walked back and the river had risen a little.

GEAR RETRIEVAL AND TIDYING UP

It had rained heavily during that night and was still pouring the next day, so we deferred the final gear retrieval for three days.

We planned to look at the D'Entrecasteaux River sinks and IB232 entrances, and survey downstream IB191 from the entrance chamber as well today.

The Exit Creek water level was significantly higher, by about 1 m.

We went around to IB232 and found it sumped. We then went to IB191 and found the upstream passage (that we had surveyed on Monday) sumped.

Pax and I then followed the downstream cave to its terminus in a rockpile with the stream sumping into small, but not impossibly small, passage. This is probably worth a look at low flow times to see if it is crawlable or diveable.

FINAL RESULTS

- Survey from D'Entrecasteaux Passage in Exit Cave through to IB232 entrance complete.
- Survey from NSD to IB191 entrance complete.
- Labyrinth of side passages in SOTT still not surveyed.
- Another water connection from downstream end of IB191 to Exit Cave suspected but not confirmed.
- NSD accessible with airspace all the way from IB232 sink in low water conditions.

THOUGHTS

We did not follow the dive line from NSD through Sump 3 to a rockpile, as at the time I thought it was just undercutting the wall and arriving at the rockpile that leads through to SOTT. This was a big mistake as I now have serious doubts that it arrives at the same place as the rockpile we climbed through to SOTT because:

a. The survey from the previous year implies a different passage.
b. The rockpile doesn't look the same (from viewing video taken last year).
c. We didn't find the dive line (from last year) near the rockpile we surveyed through this year.
d. There were more holes in this year's rockpile (including the two we climbed through).

I suspect that Sump 3 leads to another rockpile, or a part of the one we were at this year but not accessible from it, with other passage accessed from there.

Another visit in the future to check this Sump 3 terminus should be planned.

Given the very poor visibility in this water, we would not have seen any potential side passages running off underwater along the passages we swam and surveyed. Possible dive exploration along these walls may find additional passages.

A short video can be found here:
https://vimeo.com/118454518

And finally, thanks to ASF for supplying the Telstra line.

REFERENCE

McKinnon, J. 2014 Exit Cave, Tasmania — D'Entrecasteaux River Sumps exploration 2013. *Caves Australia* ,196: 20-21

Cliefden Caves Heritage Listing

IN THE *NSW Government Gazette* No. 96 of Wednesday 30 August 2017 the Cliefden Caves Area — Natural and Cultural Landscape was listed on the State Heritage Register by the Hon Gabrielle Upton, NSW Minister for Heritage.

This listing gives a measure of protection to the caves and surrounding karst and is a successful first step in a long campaign by Australian cavers and environmental groups to protect the caves area from a proposed dam on the Belubula River.

Announcement of a preferred dam site on the Belubula or Lachlan has not yet been made. Local cavers are optimistic that the shortcomings of both projected Belubula sites may see the Belubula options ruled out by the state government. — *Ian Curtis*

Karsting light on Stromatolites and Thrombolites

Garry K Smith
NHVSS

THERE ARE many locations around the world where large areas of limestone deposits, now karst areas, have been laid down primarily by microscopic photosynthetic organisms (cyanobacteria), which created stromatolitic and thrombolytic structures of calcium carbonate.

Cyanobacteria are prokaryotic cells (the simplest form of modern carbon-based life), which lack a DNA-packaging nucleus. These prokaryotic bacteria belong to the domain of life called Eubacteria. They appeared on earth about 3.5 billion years ago and were the only life form till about 1.5 billion years ago.

The prolific spread of cyanobacteria across the globe about 2.5 billion years ago resulted in a gradual change in the earth's atmosphere from carbon dioxide-rich to the present-day oxygen-rich. This paved the way for the next evolutionary step, the appearance of life based on the eukaryotic cell — a cell with a nucleus.

Therefore, classifying the early life forms which created stromatolites and thrombolites as colonies of photosynthesising cyanobacteria is an oversimplification given that the majority of scientific evidence suggests that all three domains of life (the Archaeans, Eubacteria, and Eukaryotes) appeared in the Archaean Era. The microbial mat colonies probably contained representatives from all three domains.

During Precambrian times, these photosynthetic bacteria flourished in shallow calcium-rich waters, taking in carbon dioxide and releasing oxygen. As a result of photosynthesis, they reduced the carbon dioxide content of the surrounding water, particularly within the sticky mucilage layers covering their surface.

This small reduction in solution acidity caused precipitation of calcium carbonate within and around the mucilage which helped to cement together other sediment particles trapped within the sticky layers. The cyanobacteria produced the mucilage film as protection from the sun's ultraviolet

SONJA TAYLOR-SMITH

Garry examines stromatolites at Lake Thetis, WA

radiation. The bacterial colonies grew layer upon layer of calcium carbonate along with any trapped sediment, while constantly reoccupying the uppermost layer to create large calcareous structures.

The prolific growth of photosynthesising cyanobacteria, often loosely referred to as marine algae, has created large areas of rocky structures which can now be seen in various locations around the world as laminated calcareous fossils. They are among the earliest fossil records on earth and their structures can even be seen on images taken from orbiting satellites. Such examples, up to 15 metres in diameter, can be found in the Gregory National Park, Northern Territory, Australia.

Since being laid down in shallow lagoons, these laminated calcareous fossil beds have been overlaid with sediments, undergone upheaval due to tectonic plate movement and endured environmental weathering, so that today their remains can be observed in large areas of limestone karst containing significant cave systems.

The term 'Stromatolite' is derived from the Greek στρώμα, strōma, mattress, bed, stratum, and λίθος, lithos, stone, rock) which literally means 'layered rock' and are the actual solid structures created by single-celled microbes called cyanobacteria.

Stromatolites are a major constituent of the fossil record of the first life forms on earth. The earliest stromatolite fossils date to 3.5 billion years ago. They peaked about 1.25 billion years ago and subsequently declined in abundance and diversity, so that by the start of the Cambrian they had fallen to 20 per cent of their peak. The most widely supported explanation is that stromatolite builders fell victim to grazing creatures — the Cambrian substrate revolution. This theory implies that sufficiently complex organisms were common more than a billion years ago.

Research by Linda Moore (University of WA) on the Lake Clifton thrombolites determined that they probably evolved from stromatolites; however, thrombolites grew in intimate association with a variety of metazoan life for which they provided shelter within their clot-like structure. Thrombolites gained their name from the clot-like calcite structure which resembles

GARRY K SMITH

Walkway over the thrombolites at Lake Clifton, WA

GARRY K SMITH

Stromatolites still growing today at Hamelin Bay, in water twice as saline as usual seawater

thrombosis. The stromatolites' and thrombolites' downfall is that corals can grow much faster and could outcompete for precious sunlight in favourable saltwater environments.

Once widespread, there is now just a handful of isolated areas in the world where stromatolites and thrombolites are still growing and several of these areas occur in Western Australia (WA). They include the stromatolites at Hamelin Pool in the Shark Bay World Heritage Area, stromatolites and thrombolites at Lake Thetis near Cervantes, and the thrombolites at Lake Clifton, south of Mandurah (see attached photos).

They survive in harsh environmental conditions (e.g. high salinity water), which supports few marine animals to graze on them. The colonies of cyanobacteria which build these stromatolites today are similar to the earliest organisms to appear on earth that produced oxygen for subsequent life forms.

Western Australia is internationally significant for its variety of stromatolite sites, both fossilised and living. Research indicates that the present Hamlin Pool and Lake Thetis stromatolites have been growing for about 3500 years. It can take a stromatolite 100 years to grow just 5 cm, hence a metre-high stromatolite may be easily 2000 years old. In a way it could be said that the thousands of very ordinary-looking rocks sitting in the shallow waters at these locations are alive. This statement is excellent for capturing the tourists' imagination but it is somewhat over-exaggerated given that it is really only the thin film of bacteria on the surface of the rock which is alive. It is true that the calcium carbonate structure underneath the biofilm was and continues to be accreted by a form of life which is the

GARRY K SMITH

A cross section of a Stromatolite fossil in northern Australia

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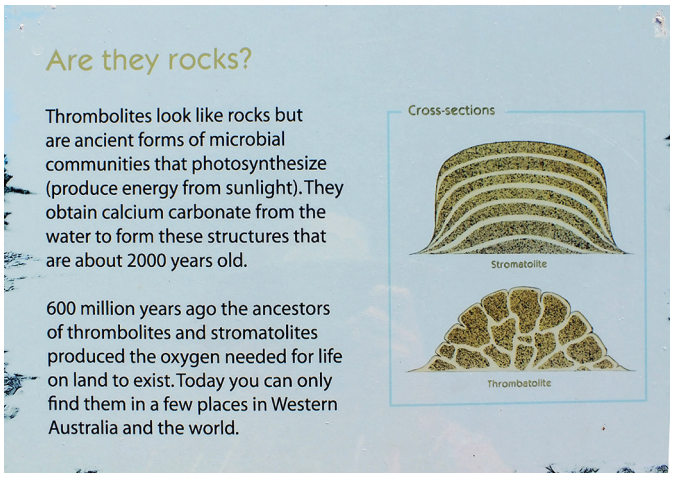
Sonia Taylor-Smith next to damaged stromatolites at Lake Thetis (WA). These are reported to be up to 3,500 years old and still growing

GARRY K SMITH

A 15 metre diameter stromatolite dome in a karst area of northern Australia

GARRY K SMITH

View from the boardwalk over the stromatolites in Hamelin Pool WA



GARRY K SMITH

WA Parks and Wildlife interpretive sign at Hamelin Pool - thrombolites

GARRY K SMITH

WA Parks and Wildlife interpretive sign about Stromatolites at Hamelin Pool

closest thing we can see to the first life on earth. In recent times, living stromatolites have also been discovered in a few other locations around the world, such as the Bahamas, the Indian Ocean and Yellowstone National Park. Their survival is constantly under threat wherever they exist today by the encroachment of human activity and our effect on the environment.

Sub-aerial stromatolites (accretions of calcareous algae in the shape of domes and craybacks) and the influence of the photosynthetic cyanobacteria will be the subject of another article in the future.

REFERENCES

Pleş G., Mircescu C.V., Bucur I.I. & Săsăran E. (2013). 'Encrusting micro-organisms and microbial structures in Upper Jurassic limestones from the Southern Carpathians (Romania)'. *Facies,* 59 (1): 19-48.

Grimes K. G., (2012). 'Surface Karst Features of the Judbarra/Gregory National Park, Northern Territory, Australia', *Helictite*, (2012) 41: 15-36

Burne R. (2011). 'Linda Moore and the Thrombolites of Lake Clifton, Western Australia'. *The Australian Geologist*, 159: 24-27.

Western Australia Dept. of Parks and Wildlife — interpretive signs at Hamlin Pool, Lake Thetis and Lake Clifton.

Wikipedia at en.wikipedia.org/wiki/Stromatolite

Indiana University Bloomington www.indiana.edu/~geol105b/images/gaia_chapter_10/stromatolites.htm

The Virtual Fossil Museum www.fossilmuseum.net/Tree_of_Life/Stromatolites.htm

See also back cover for another photograph of stromatolite domes up to 15 metres diameter in Northern Australia

Vale Robert Wray

Ian Houshold and Highland Caving Group

ROBERT was a most enthusiastic geomorphologist with a wide range of interests in the evolution of natural landscapes.

As with many Australian researchers, he devoted much thought to reconciling anomalies between measured process rates and historical evidence for ancient land surfaces. In this context, he chose to focus on the processes and evolution of sandstone and quartzite landforms where, as he put it:

'This paradox of dissolutional landforms on some of the world's most insoluble rocks mimicking those on some of the most soluble, both in appearance and scale, has become increasingly difficult to ignore in recent years, yet little attention has been given to the detailed study of the landforms themselves or the dissolutional processes involved.'

He was intrigued by the beauty and variety of sandstone landforms and the lithological, chemical, climatic and hydrological controls which encompass some of Australia's most spectacular and extensive terrains; including distinctive beehive forms of the Bungle Bungles, escarpments, caves and waterfalls of Kakadu and Arnhem Land, the cliffed and deeply incised canyons of the Blue Mountains and the iconic rounded forms of Uluru and Kata Tjuta.

Robert contributed significantly to the discussion of solution vs mechanical erosion of sandstones and quartzites, and the continuum of karst–karst-like–pseudokarst landforms.

However, he did not allow the terminology to distract him from his chief aim of understanding the role of processes and long term environmental change in sandstone landscape evolution, regardless of how we label them.

JAYNE THOMAS

Following his PhD on the Sydney Sandstones, his horizons expanded to work in the Carnarvon Ranges of Queensland, Hunan, China and the Venezuelan Tepuis, providing material for international reviews of solutional and mechanical weathering and erosion.

These include his contributions to *Earth-Science Reviews* and the 2013 *Treatise on Geomorphology,* and the beautifully presented book *Sandstone Landforms* co-authored with his mentors Robert and Anne Young.

His work on the phreatic drainage networks of the Precipice Sandstone (Qld) will inspire novel approaches to the assessment and management of hydrogeology in sandstone terrains, and his research into silica and iron speleothems significantly adds to our knowledge of depositional features.

Robert was a strong advocate for geoconservation and appropriate management of geodiversity. Recognising the abiotic significance of iconic sandstone landforms, he contributed to many regional geoheritage assessments of Australian sandstone landscapes, with specific focus on the 'pagodas' of the western Blue Mountains, karst, karst-like and pseudokarst landforms of tropical northern Australia and internationally, on the peak forests of Hunan, China as part of the development of the UNESCO Geopark network.

Dr Wray was a very active caver with Highland Caving Group in NSW from 1988 to 1997 as he was always looking down holes to explore and was given the nickname 'Rabbit'.

He was HCG president for four years and secretary who helped resurrect the club's newsletter.

He took a very active role in producing the two volume book *Under Bungonia* in the mid-1990s, now the guidebook to this the most visited wild caving location in Australia.

Vale John Robert Dunkley AM

Robert J Dunn

JOHN ROBERT DUNKLEY AM passed away peacefully on 1 February 2018. John was born on 19 March 1943.

He married Jeanette Parkes in 1970 in Sydney. John is survived by Jeanette and his sister Margaret. He attended West Ryde Public School and Fort Street Boys High School and graduated from the University of Sydney with a degree in geography and economics (BEc) and later with both DipEd and MEd.

His career was dedicated to teaching, first in economics and later geography and legal studies. Over time he had taught at most high schools in Canberra.

Perhaps John is most widely noted for his studies of caves. Among many positions both nationally and internationally, at various times he was twice president of the Australian Speleological Federation, the Sydney University Speleological Society and the Canberra Speleological Society.

He has authored or co-authored more than 16 publications on caves and their history plus numerous articles. He became

UNKNOWN

a Member of the General Division of the Order of Australia in 2013 for services to speleology. John believed that none of his life's work could have been accomplished without the love and support of Jeanette.

John had other keen interests including trains, classical music, science fiction movies, reading the news and overseas travel.

His twin careers of teaching and caving leave a lasting and valuable legacy and he trusted that his pioneering cave research will be carried forward by future generations.

We deeply grieve for his untimely passing. For all his life's work teaching, mentoring, caving and being a caring friend and loving husband, we bid a very sad farewell to an amazing, one-of-a-kind man.

To quote his own signature catchphrase, John Robert Dunkley was "a classic of the genre".

In accordance with his wishes, John has been privately cremated and there will be no funeral service. Instead of flowers, John and Jeanette asked that donations be made to the ASF Karst Conservation Fund. John worked hard to help establish the Fund and was extremely pleased to see the Fund's important conservation achievements. Tax-deductible donations can be made through the ASF website: www.caves.org.au/conservation/karst-conservation-fund/donating-to-the-fund

▮ A comprehensive chronicle of John's life and his contribution to ASF and caving will be prepared for a future issue of *Caves Australia*.

Vale Ted Lane

Susan White

EDWARD (TED) LANE passed away peacefully on 9 July 2017, 95 years old. Although not involved with caving for many years, he was a foundation member of Canberra Speleological Society and the inaugural vice-president and secretary in 1954.

Some of his caving activities are described in CSS' *The Very Latest* 10 (3) as a member of the party discovering White Fish Cave at Coolaman.

In 1962 he founded *Helictite* with Aola Richards, and was an editor of the journal from the first edition in 1962 to 1975.

His establishment of *Helictite* was an important and innovative decision, which has enduring significance for Australian speleology. Ted and Aola's vision for the journal is described in the introduction to the first issue Volume 1(1) in 1962.

A transcription of that introduction follows. *Helictite* has been published by the ASF since 2000. The ASF owes him a great debt.

TRANSCRIPT

'This is the first issue of a new quarterly publication, *Helictite*, and it marks the production of the first periodical in Australia devoted entirely to papers on cave research.

'The scope of *Helictite* will be wide, ranging from the scientific study of caves and their contents, to the history of caves and cave areas, and the technical aspects of cave study and exploration. It will also include fringe subjects such as rock paintings and excavation of rock shelters, in view of their great interest in relation to similar art and artifacts found in caves in Europe, Africa, etc.

'The territory to be covered incorporates all Australasia in the truest sense - Australia, New Zealand, the near Pacific islands, New Guinea and surrounding areas, Indonesia and Borneo.

'*Helictite* is a non-profit publication devoted to providing a reliable news service and collection of speleological papers for those interested in any of its disciplines. For the time being the editors are financing its production. Eventually *Helictite* will become self supporting through subscriptions, donations, and sales of reprints.

'Scientific interest in Australasian caves has increased considerably over the past few years, it was because of this the editors felt it would serve a worthwhile purpose to gather together all relevant papers into a journal of cave science.

'We have made a start — now the success of *Helictite* is in the hands of its readers. We need subscribers and we welcome regular contributions in all fields related to speleology in Australasia. Overseas contributions will also be considered'.

Cave Rescue – Midnight Hole, Tasmania

Alan Jackson
STC

GABRIEL KINZLER

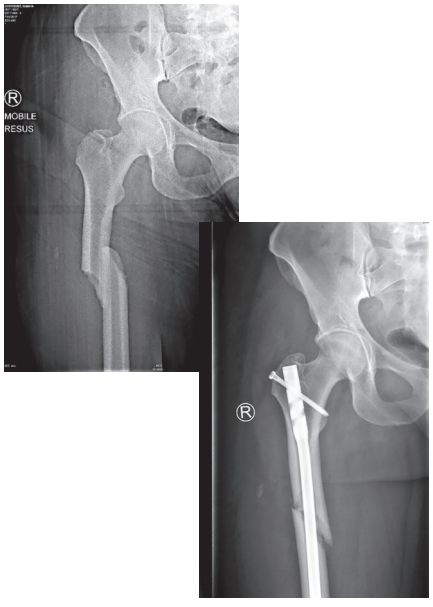
The patient awaiting rescue wrapped in space blankets

OLA LÖFQUIST

Helicopter evacuation of the patient

GABRIEL KINZLER

Packaging the patient in the stretcher



ON 13 July 2017 a fall on pitch 4 in Midnight Hole in southern Tasmania resulted in a broken femur and a full vertical cave rescue (involving Tasmania Police, State Emergency Service, Ambulance Tasmania and STC).

The casualty was a visiting French-Swiss caver in Australia to attend the 2017 UIS Congress in Sydney.

The trip was run by Southern Tasmanian Caverneers and was not a formal UIS pre-congress trip.

An exhaustive report on the rescue was published in *Speleo Spiel* 422, which is available for download at http://tinyurl.com/y84hn8vs Those interested in the minutiae of who, what, where, when and how should read the above reference.

The rescue was a success and confirmed that all the work STC, Tasmanian emergency service agencies and NSW Cave Rescue Squad have been doing is worth the effort.

Practise your rescue skills and cultivate your club's relationship with relevant emergency services; your life could depend on it one day.

JF36 Growling Swallet:
The Niggly Connection Project Phase 1

Stephen Fordyce
STC, VSA

Since this article was written nearly three years ago the 'Niggly Connection Project' has been ongoing and other significant new finds have been achieved. Hopefully another article will bring us all up to speed in the not-too-distant future – Ed.

BACKGROUND:

JF36 Growling Swallet is a particularly extensive and significant cave in the Junee-Florentine area of Tasmania and has been known since the time of early European settlement.

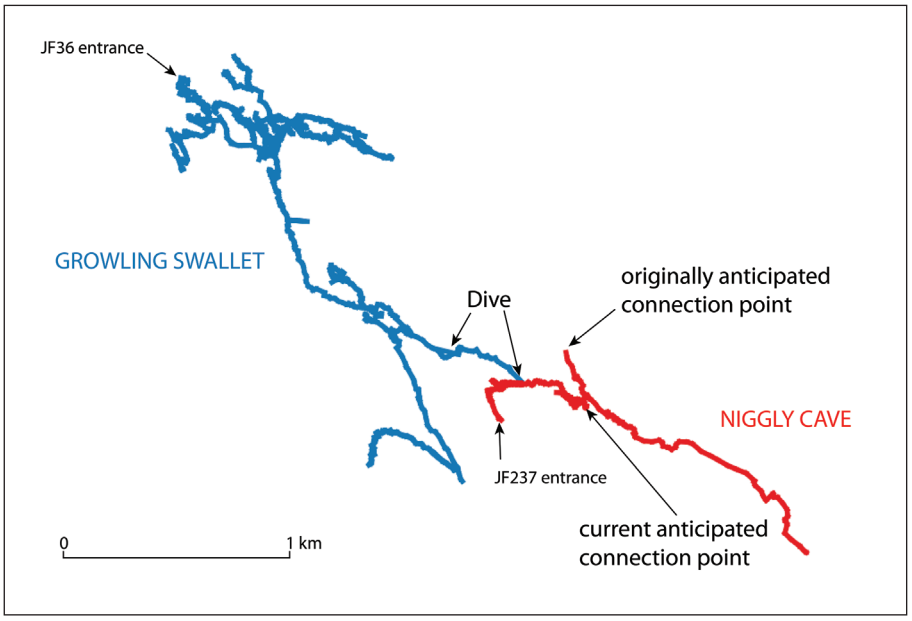
The cave has a very impressive opening in the form of a slot in a cliff, with a significant creek flowing into it in summer, and by all accounts a practically unimaginable torrent of water in winter. The water has been dye traced to emerge from JF8 Junee Cave, approx. 8 km away as the crow flies, and Growling Swallet is generally considered to be one of the major feeders to this system.

With over 11 km of surveyed passages, many of which are of 'master cave' proportions, and at present four entrances, the Growling Swallet system is big, and complicated. Being a streamway cave with lots of water, there are inevitably passages which terminate in sumps.

Additionally, only about 500 m separated it from the nearby Niggly Cave, which apart from having Australia's longest free-hanging pitch (a ball-breaking 190 m) is a big system in itself. Also a probably more likely (and exciting) prospect is making a connection to the Porcupine Pot/Tassy Pot/Owl Pot master cave system which is kind of in the middle. There is big potential for discovery of gigantic 'classic master cave' streamway passages, like those in Niggly, which ends (both upstream and downstream) in gigantic rockpiles.

THE PROJECT

Obviously, connecting these systems would be a significant achievement, and the Dreamtime Sump in Growling Swallet has the best prospects for doing this underwater. It had been dived before in the 1980s without much success in the good direction, but Andreas Klocker (the fiercely anti-mainlander Tasmanian resident of 12 months) thought with the passage of time, improving of equipment and (at least as Sandy put it) 'balls so big, they had to be put on my chest' there was a decent chance someone could get further.



The relationship between Growling and Niggly as at 2015

Thus Andreas got together what I am going to call the Niggly Connection Project. Over the course of four trips through the summer of 2014-15, with what we are going to call Phase 1 complete: we have successfully extended Growling Swallet by an extra 500 m, most of this being underwater. It is now only 200 m from the likely connection point in Niggly, although this is anticipated to be in rockfall so it may be difficult to achieve.

THE TRIP TO DREAMTIME SUMP

After a reconnaissance trip to Dreamtime Sump by Andreas earlier in the year, December 2014 saw grand caving wizard Alan Jackson with sorcerer's apprentice Dan Haley spiriting a pair of 7L tanks wrapped in the wetsuit of Andreas Klocker to the top of Avons Aven under the guise of a 'beginner trip'. And with only a small amount of convincing by Andreas, this set the scene for the first dive trip which took place on Saturday 13 December, along with the arrival of Liz Rogers, Dave Bardi, Sandy Varin and me (Stephen Fordyce) as the mainland <insert suitably derogatory comment here> Sherpa and moral dive support contingent.

As usual, Andreas did a stellar job of preparations and picking us up from the airport — I was on an earlier flight and as I was the alternate diver, we double checked the gear and packed my drysuit, brought along with much weight-related creativity on crummy Tiger Airlines. Wearing your kneepads under jeans makes for a good place to hang all sorts of heavy caving gear that will otherwise make your carry-on luggage too heavy. My only regret is that the only people I had on hand to share the experience with were the unamused Tiger Airways staff.

Anyway, we got to the cave on Saturday morning and were underground about 10 am. It was a hot day and we were glad to get out of the sun, until after 15 minutes of climbing down wet rocks in 8°C Tassie cave

Alan outside the cave in the lovely forest and sunshine, wondering whether he could hang tanks off his kneepad straps under his trogsuit.

air, and that was a distant memory for the next 12 hours. The cave is obviously a very active streamway that sees a lot of water, so it is not much decorated in most places, but it is still pretty in a shiny-black-rock-with-mud-on-it kind of way. There were some bypasses we took, some careful edging around the outside of pools and crawling along ledges, so that most of us had dry feet and relatively dry undersuits by the time we reached the turnoff from the water, and crawled up into a small dirty passage past gigantic mudbanks with flood debris 5 m higher than current river levels. A comforting thought ...

There followed some interesting obstacles, starting with the windy rift, having a draught so strong that teeth were quickly chattering, while bodies and bags were wedged in awkward positions. The fun continued with some more improbable squeezes, and several sphincter-clenching ladders, both up and down, which have been in the cave possibly since before Alan got rid of his trendy mullet. Oh and also Herpes III – a lovely little squeeze in ankle-deep mud that smells nasty and you have to wallow in it to get through. Sadness levels increased proportionally with sock wetness levels. As Andreas pointed out, rich people pay a lot of money to get mud like that smeared all over them, so we should consider ourselves lucky. Perhaps we should bring some out and leave it in Andreas' shower next time.

The complicated breakdown passage through Necrosis and Bronchial was bigger but we had to pay attention to find the way through as it was very complicated and despite the heroic attempts by the survey and mapping teams of yesteryear, the map was about as helpful as Sandy's offer to lend Alan her spare trogsuit.

Having collected the tanks and wetsuit at the top of Avons Aven they made for a much heavier load and we contemplated bringing in bigger tanks to slow Alan down and stop him complaining about the mainlander pace as we negotiated the rockpiles.

Finally we heard the sounds of the stream, and we reached the 'running passage', which Andreas had insisted was so big and smooth we could jog down it. Sadly, the visions of a concrete walkway complete with handrail quickly evaporated, but we did make good time over the cobblestones. A minor muddy detour up and over 'Bloody Smokers' to avoid dunking ourselves in the stream and after a final slippery climb-and-slide we were at the Dreamtime Sump, with strict but largely futile instructions not to muddy the water flowing into it.

The trip out is like most trips out of caves. Did I mention it's ~200 m of vertical to climb (no SRT but still the sketchy ladders) and seems to see us getting out well after dark every trip.

How many cavers does it take to eventually put a diver into a sump five hours away from the cave entrance? Answer: it depends whether they are mainlanders and whether you like getting out before midnight.

DIVING TRIPS:

Dive Trip 1 – 13 December 2014

The first dive trip was limited to a pair of 7L steel tanks — pretty standard kit for seeing if it goes, but giving you a decent bit of gas if it does. With Andreas ambivalent about transitioning to his wetsuit and back again, I was to have first go in my drysuit, so with the 1980s map in my head, I stuck to the right-hand wall and went in.

After wriggling through rather a lot of uninspiring, wide but very low flat passage things started to open up and I was able to swim, dropping to 3.5 m water depth before coming up into an air chamber, complete with small beach, room to stand up and another sump.

The sharp left turn in the sump came as a surprise as I swam into the wall in the low vis, but opened up into the 'She Goes Tunnel', a comfortable 4 m wide x 1 m high running in very shallow depths only just below the water table. I quickly exhausted the 150 m of guideline and had to return with an empty reel but relatively full tanks to report that 'She Goes'. I should mention that as there was 180 bar left in Andreas' tanks, he was unanimously outvoted on the subject of whether they should be left in the cave for the next trip.

With no more guideline available to be laid, Andreas was understandably not keen to go for a pleasure dive, but there followed an impressive motivational effort where instead of making a beeline for the exit, we made a scenic detour into the Dreamtime passage, with nice high ceilings and wide walk-along floors.

Dive Trip 2 – 7 February 2015

Unfortunately there were some equipment malfunctions early in Andreas' dive, so no further progress was made – such is life sometimes. David, Sandy and Alan returned, joined by Michael (Pax) Packer and Petr Smejkal as gear haulers, which was greatly appreciated.

Dive Trip 3 - 21 February 2015:

With an earlier start and making good time through the cave (with the help of 'new' recruits Ken Murrey and Dave Taberner and selected repeat offenders — Alan, Pax, Sandy, David, Andreas and myself), we were a well oiled machine moving at slightly more than one-third optimum Alan Jackson speed.

This trip was a great success, with a further 350 m of guideline added through

Chillin' at Camp Comfort, where the team waited for about two hours. Despite the smiles, chillin' was a compulsory activity.

the course of a 2 hr dive, and the full 500 m surveyed on the way out, revealing that the cave was only 200 m from Niggly. It was agreed that this would conclude diving for the summer and we would pull out all the tanks, while leaving the weights and guideline in situ and hoping they survived the winter.

DIVING DETAILS

This concentrates on diving trip 3, in February 2015. By this point, the gear requirements and configurations were pretty well sorted, to make sure we would have the opportunity to get maximum return (new cave!) for the effort we would put in to get everything there. I was to be the diver, and the equipment for the dive was selected as follows:

- 2x 9L carbon fibre tanks with 6 kg of weight strapped to each
- 1x 7L steel tank – clipped 'over the top' of the carbon fibre tank on my left
- Drysuit with 7 mm hood, Fourth Element 'Arctic' undergarment plus polypro thermals, and a thick synthetic jumper
- 4.5 kg of weight on a weightbelt
- ~10 yellow silt pegs
- Three reels with a total of ~500 m of line — there was no way I was going to run out again.

The gas plan was to dive in breathing only the 7L steel until it was basically empty (15 bar), then dive out breathing only one of the carbon fibre tanks unless it got too low to make an exit on if the full tank failed for some reason, coming out with two largely empty tanks, and one full tank which could be left in the cave for next time, while still maintaining enough reserve gas to safely exit the cave in the event of any piece of equipment failing.

The Nomad LTZ Harness/Wing about to begin what is probably going to be a hard, miserable and relatively short life, but with much excitement.

NARRATIVE OF THE FINAL DIVE

Arriving at the sump, there was the usual dance of trying to get changed from filthy wet trogsuit into dry undersuit and drysuit, without getting too much mud on the zip — all this on a small mud/sandbank with about 1.4 m vertical space.) With plenty of willing hands to make the process quicker, I was promptly geared up and face down in the mud, wriggling out into water deep enough to float in.

It wasn't too much of a drama getting through the first long and flat restriction with the third tank; in fact, having it unclipped was a pain and it was much easier leaving it clipped for the way back. I made good time and popped up into the small chamber at the end of sump 1, crawled across the couple of muddy metres and continued into sump 2. The line was pleasantly still in the same condition — excellent — that I'd left it in and it didn't need much tidying up.

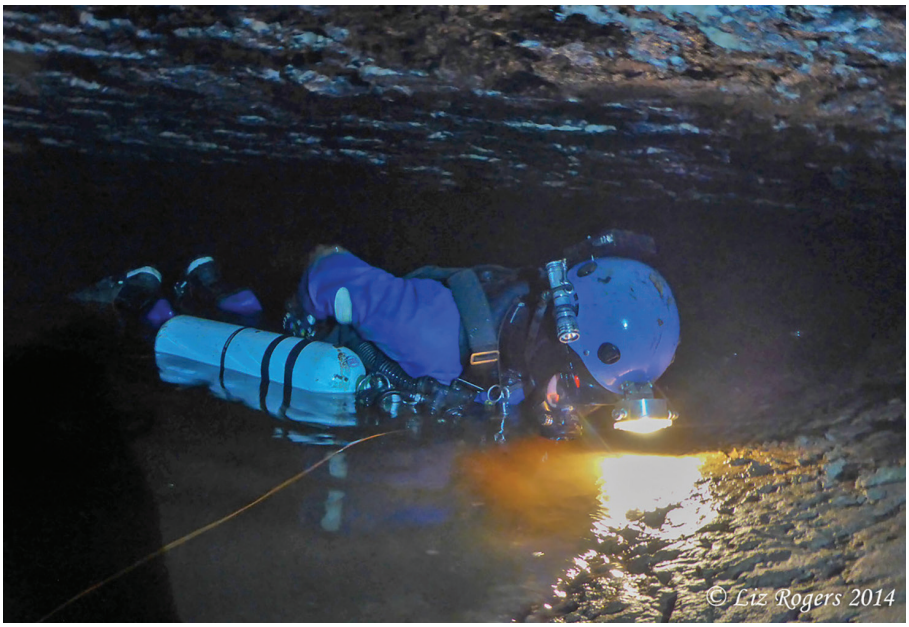
Visibility seemed to be a slight improvement on last time at ~3-4 m, and pretty soon the reel was unspooling into new cave after noting gas pressures, with the nice 'She Goes Tunnel' continuing straight ahead. The profile was square, with a flat silty floor and weak rock or mud chunks on the walls that preferred to fall off rather than be tied off to.

Siltpegs were used occasionally, but the straight tunnel allowed a good long distance between them. At regular points there were shallow air pockets on the ceiling, one big enough to stick my head up into.

The tunnel constricted ahead and I wondered if it would be a terminal rockpile, as there were rounded rocks about 10-30 cm in diameter piled at the bottom of a slope in 3.5 m water depth.

But no, although it was low and sloping up, I could happily fit through and after having some difficulty jamming a siltpeg in at the start of the slope, I followed the sloping restriction upwards. The gentle current had started to push some silt ahead of me, but I was relieved when the ceiling disappeared and I broke surface into a nicely sized chamber. Actually, it was really pretty big, being about 30 m long, 4 m high and 3 m wide.

Coming out of the water, I found that the cave took a 90-degree turn to the right in a high passage with a shallow lake and a beach. I took a moment to sunbathe, catch my breath and also make a solid couple of tie-offs and tie on an arrow pointing towards home. It was interesting to note the same little white cave bugs *(Anaspides*



This sort of diving is quite glamorous, especially if you enjoy lying face down in mud.

shrimp) in the water, similar to the ones at the start of the Dreamtime Sump.

Checking my gas, I still had heaps left for penetration, and if the cave kept on at this depth it was going to be one seriously epic long dive and I would probably run out of line again.

But the cave had other ideas: after wading the 30 m long '30 m Long Lake' lake and sumping again, it dropped straight to 12 m. Ok, that was fine, I still had plenty of gas for that... but over the next 200 m and tying in the third reel the passage continued to slope down in regular steps with low sections, but nothing too bad before it bottomed out at 26 m.

Getting towards turn pressure, at 25 m depth and with only 9L tanks and by this point a good hour away from the support crew, there were definitely some mind games going on. I reckon being on edge at times like these is a very useful survival mechanism. Confidence in your planning also helps.

Having a bit of penetration gas remaining, a conservative plan and an airspace not too far back, I pushed on and the cave came up.

Up a series of steep slopes with some tight flat bits, with a few clumps of silt rolling down, until the cave turned into more of a rift passage in 5 m water depth. It was showing all the signs of surfacing again, perhaps into the fabled gigantic master cave, and with not much penetration gas left I followed the ceiling, eventually reaching a tantalising 1 m water depth but with no cigar and no surface, either. The rift passage looked high as I couldn't see the bottom, and it didn't seem to be going all the way to airspace, although it was certainly going on ahead.With turn pressure reached and my 7L steel tank now basically empty, I reluctantly wound in 10 m or so of line to find a final tie-off point, having well and truly used all the siltpegs.

With the reel clipped off and wetnotes out it felt good to be heading home, even though it was a cold, long way which all had to be surveyed — what so-called responsible explorers do. This helped to keep me focused and the gentle current made for a nice swim back in relatively good visibility compared to most sump exits due to the percolation of silt off the ceiling from exhaust bubbles. It turns out I had added 350 m of new line and surveyed 500 m in that dive — a pretty good effort. Mind you, considering the 85 person-hours of in-cave time contributed by the team, perhaps this is debatable.

As usual, I was told unceremoniously to hurry up and get changed so we could get out of there.

This may seem unfair to the non-caver, but the reality is that I was dry, warmish and doing exciting stuff, while the others had been sitting in the mud in damp muddy clothes in a cave with an ambient temperature of 8°C for the best part of an hour and a half with only the occasional hot drink or a Dave and Sandy domestic argument for entertainment. The idea of cooking up some of the abundant aquatic cave fauna was also floated (pun intended) but discarded.

EPILOGUE

Before the considered pfaffing which is a prerequisite to getting packed up and moving again, we had a quick council of war and decided to bring all the tanks out — this was sad, but it was felt that for the effort involved to go much further, the next push would need a different approach and that wouldn't be happening before winter. However, we left all the weights (no belts or rigging) tied to a protrusion on the wall back from the sump in the larger passage. Hopefully they would survive the winter floods.

Alan plotted the survey data next day and the sump has surprised us; rather than heading to upstream Niggly and the projected master cave beyond the terminal upstream Niggly rockpile, it is heading for the downstream section and only 200 m away right where there is a record of a stream entering through rockpile.

With key personnel unavailable, an attempt at making the connection is going to have to wait until next summer, and plans of attack are under discussion: stay posted for the next instalment.

THANKS AND ACKNOWLEDGEMENTS

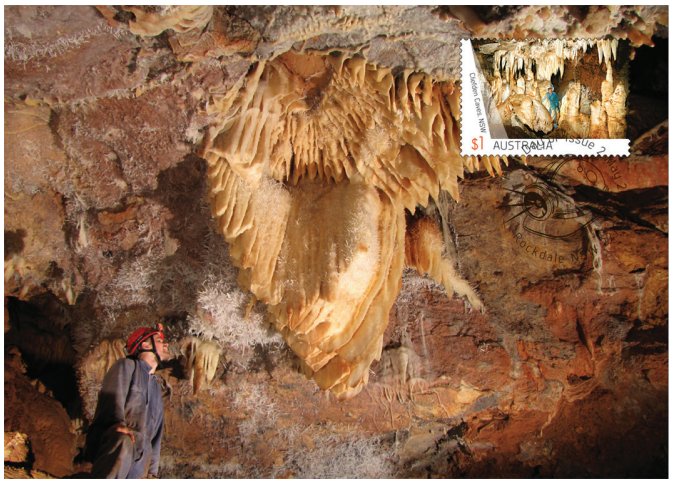
The usual thanks go to Andreas for generally organising pretty much everything, Liz for taking photos even when no-one else was motivated, Alan for mapping and generally being a JF guru and everyone who carried gear or did setup trips. This sort of thing is not done so someone can have a fun dive — it's to carry out meaningful exploration and bring back data with purpose. I'm glad that we as a team could achieve this.

Being the push diver is a great privilege, but the whole thing is so much a team effort that the efforts of the push divers are tiny in comparison to the efforts of the rest of the team that makes it all possible. Thus, thanks need to go to all team members who made the underwater extension of the cave possible:

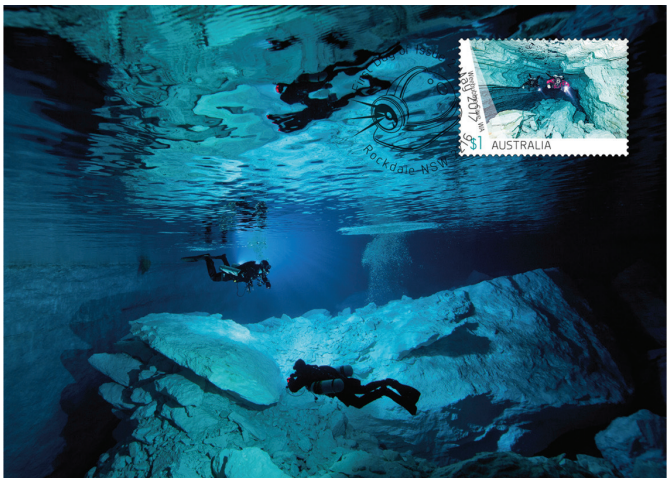
Andreas Klocker
Stephen Fordyce
David Bardi
Sandy Varin
Alan Jackson
Liz Rogers
Dan Haley
Michael 'Pax' Packer
Petr Smejkal
Ken Murrey
David Taberner

Cave Stamps Issue

Ian Curtis



Cliefden Cave maxicard



Weebubbie Cave maxicard

Undara maxicard

Kubla Khan maxicard

ON 2 MAY 2017 four cave stamps were issued by Australia Post: $1 Cliefden Caves, NSW; $1 Weebubbie Cave, WA; $2 Undara Lava Tube, Queensland; and $3 Kubla Khan Cave, Tasmania.

Associated products were issued as well: first day covers postmarked with a caving helmet, maxicards and postcards. Interestingly, the postcards are of different caves and their existence is not widely known. The postcards depict formations in Jenolan Caves, NSW, Naracoorte Caves, SA, Capricorn Caves, Qld and Lake Cave, WA.

The first day cover describes the caves depicted:

'From the vast underground limestone landscapes of the Nullarbor to the deepest depths of Junee in Tasmania, Australia is home to many spectacular and highly significant caves. This stamp issue showcases impressive and important caves from around the country, from the bright white limestone and crystal-clear lakes of Weebubbie Cave in Western Australia to the spectacular golden stalagmites and stalactites of Cliefden caves in New South Wales. Kubla Khan Cave, in the Mole Creek Karst National Park, Tasmania, is filled with incredible formations, including the Silk Shop shawl formation and gigantic stalagmite known as the Khan. In Queensland, Undara Volcanic National Park is home to one of the longest lava tube cave formations in the world. [sic] *It was formed about 190,000 years ago from a single lava flow, and surviving segments of the tube form caves and arches.'*

Photographs for the issue were taken by Alan Pryke, Steve Trewavas and Liz Rogers. The withdrawal date for the stamps was 30 November 2017.

ASF 60th Anniversary Council Meeting and Dinner

Somerset Hotel, Para Hills, Adelaide, 7th January 2017

Bob Kershaw

IN 1954 members of SUSS and SSS circulated ideas on the formation of a national speleological movement in Australia. As a result, the first National Convention of the Australian Speleological Federation was held at the National Fitness Camp, Parnanga, in South Australia on December 27th and 28th 1956 and hosted by the Cave Exploration Group (South Australia).

The January 2017 Council meeting was attended by representatives of 18 clubs and several visitors who discussed various aspects of the ASF annual reports and the usual bugbears of insurance and fees.

After the meeting the representatives had a chance to refresh, have an afternoon nap or quell their thirst in the air-conditioned surroundings before dinner.

During the dinner photos were shown on trips in Western Australia and the recent Bunda Cliffs expedition.

A brief discussion on how life would be without the ASF was pursued briefly before the article below was found and read by the previous ASF President, Stan Flavel.

All agreed that the Federation has a major place in Australia's development and protection of our karst and cave resources and associated aspects of cave safety and codes.

On Sunday Graham Pilkington led many representatives to Corra-Lyn Cave to enjoy the beauty of caving in South Australia. A huge thanks to Graham for organising the venue, dinner and caving activity.

BOB KERSHAW

ASF president John Cugley welcomes guests during a brief speech at the 60th anniversary dinner

Why a Speleological Federation?

From *CEGSA Newsletter* Vol 1 No. 3

IN VARIOUS parts of Australia during the past few years, comparatively small numbers of people have gathered together to form specialist bodies devoted to the study and exploration of caves.

At first, interest centred mainly on the exploratory side of Speleology, but as more people with scientific training came into these groups, and as more cavers came to appreciate the scientific aspects of this 'sport', the need rapidly became apparent for a central body to act as an agency for the collection, preservation and publication of scientific, historical and other information relating to Speleology.

It was found that similar work was being carried out independently by different groups; that questions posed by one group could often be answered another; and so on ad infinitum.

So little by little, events led to this occasion when representatives of the leading Speleological societies of Australia have come together to establish a Federation as a central information agency and as a general directing body for special projects which could best be carried out on a National basis.

It is no accident that the countries in which Speleology has gained most ground possess flourishing national organisations. France, Italy, Britain, and the United States of America in particular have shown us the way, but we must expect that we will have to solve many problems peculiar to our own conditions.

Australia is a vast country, with numerous cave areas, most of which offer limitless scope for further exploration. To use a common expression, the face of Australia has 'only been scratched'.

Therefore, let us take this grand opportunity to create an organisation which will be a major step forward in the story of Australian Speleology.

ASF's 31st Biennial Conference

The Darkness Beneath: Caving Tasmania

THE NEXT biennial caving conference is to be held in Devonport, Tasmania with caving expeditions in Mt Cripps, Mole Creek, Ida Bay and Junee-Florentine areas.

Devonport is situated on the Mersey River and provides a pristine gateway to Tasmania, the Apple Isle. This unique location lends itself to both ocean and mountain views and is known for its recreational and cultural facilities.

Our conference venue is Reece High School which is close to the heart of Devonport and lends itself to a range of activities not far from campus. A relatively new building, Reece has excellent facilities and offers conference attendees a range of easy services such as on site accommodation (camp grounds), kitchen and conference tools.

Devonport is the home of two luxury passenger ferries, *Spirit of Tasmania I* & *II,* which offer daily and overnight sailings to and from Melbourne.

Qantas flies direct into Devonport and Launceston airport is only one hour away by road.

NORTHERN CAVERNEERS

31ST ASF 2018–2019 The Darkness Beneath

With a variety of caving adventures pre and post conference as well as activities aimed at all age groups, this conference is shaping up to be the best yet. Kayaking, mountain bike riding, historical tours, bushwalking and canyoning are just some of the activities on offer during the conference week as well as a comprehensive caving program for pre and post conference.

The conference week will be filled with guest speakers, caving veterans and subject-specific experts sharing their knowledge for the wider caving community.

If you are planning to join us for what's shaping up to be an action-packed family-friendly event,we would urge you book your passage on the ferry NOW if bringing your own vehicle as spaces are limited, or flights as it is our peak tourist season.

Our conference website will be live in March for more information regarding pre and post conference activities, getting to Tasmania, events throughout the conference week and much, much more!

For more information about Devonport's municipality, landscape, history and more please visit tinyurl.com/y72gs89h

For any pressing questions please email asftasmania2019@gmail.com

ASPIRING SAFETY

Proud sponsor of the 31st ASF Conference. Following on from our support of Speleo 2017 we are looking forward to meeting up again with the members of the Australian caving community. It is also great to see the return of Caves Australia !

Our thanks go out to all the hard working volunteers that makes these events and publications possible.

To help celebrate the return of Caves Australia when ordering anything on our website enter the code: **CAVEAU** at checkout to receive 10% off your order.

www.aspiringsafety.com.au

Stromatolite domes up to 15 metres diameter in Northern Australia. Photo: Garry K Smith

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