Journal of the

Australasian Cave and Karst Management Association

No. 111 June 2018 Australia Post—Print Post Approved: PP381624/02050. ISSN 1835-5374 Published Quarterly

The ACKMA Journal

Official Publication of the Australasian Cave and Karst Management Association Incorporated.

Published quarterly in March, June, September and December.

EDITOR: Tim Moore

SUB EDITORS: Tony Culberg, Andy Spate

Photos taken by the authors or editor unless otherwise acknowledged.

PRINTER: Hansen Print, Smith Street, Naracoorte, South Australia 5271.

Ph: +61 8 8762 3699

ACKMA Inc is cross-affiliated or otherwise associated with:

Australian Speleological Federation, New Zealand Speleological Society, Australasian Bat Society, The WCPA Working Group on Cave and Karst Protection, Guiding Organisations Australia, Bat Conservation International, American Cave Conservation Association, International Show Caves Association, Cave Diving Association of Australia, The Malaysian Karst Society, The Jenolan Caves Historical & Preservation Society and the USA National Speleological Society Cave Conservation and Management Section

LIFE MEMBERS of ACKMA Inc

Steve Bourne*, Michael Chalker*, Peter Chandler*, Brian Clark*, Alan Costigan, Grant Gartrell*, Kent Henderson*, Ernst Holland*, Greg Martin*, Chester Shaw*, Dave Smith*, Andy Spate*, Dianne Vavryn*, Rauleigh Webb*, Kevan Wilde*, David Williams*

(*previously elected as Fellows)

FELLOWS of ACKMA Inc

John Ash, Anne Augusteyn, Peter Bell, Dale Calnin, Deborah Carden, Arthur Clarke, Ken Grimes, Ian Houshold, Julia James, Neil Kell, Kevin Kiernan, Lana Little, Robyn McBeath, Cathie Plowman, Dennis Rebbechi, Barry Richard, John Watson, Nicholas White, Anne Wood, Phil Wood

ACKMA PRESIDENTS

Ernst Holland 1987-91, Andy Spate 1991-95, Michael Chalker 1995-97, Greg Martin 1997-99, Brian Clark 1999 -2001, Peter Dimond 2001-02, Peter Chandler 2002-03, Robyn McBeath 2003-05, Steve Bourne 2005-11, Peter Chandler 2011-13, Dan Cove 2013-16, Dale Calnin 2016-2018, Andy Spate 2018-

FRONT COVER: Floor rise over 40 years (see page 14)
PHOTOS: John Brush

IN THIS ISSUE

EDITORIAL

It is an honour to follow Steve Bourne as the Journal's editor. I have read his quality product over the past seven years and this has inspired me to volunteer to follow him.

Although my active years of caving are now long behind me, I have graced the pages of this journal twice over that period of time. First, in June 2001, when a complimentary mention was made of my after-dinner address to the 2001 conference of the Association (when I spoke on "*Parliamentary colleagues and other troglodytes I have known*").

Second, in September 2016 when I submitted (and Steve Bourne kindly accepted for publication) what journalists would describe as a "puff" piece about my family's circumnavigation of the Isle of Capri and what I observed about the karst features of that predominantly limestone island.

However, my interest in caving goes back more than 50 years to the days of largely unregulated access to wild caves in some parts of New South Wales when three or four of my friends and I camped by the Kowmung River and would spend the weekend exploring the Tuglow Caves – an activity we undertook, on many occasions, over a period of some three or four years.

It is, next, appropriate to fast forward until 1988 when, after a change of government in New South Wales, I was appointed Minister for the Environment. One of my responsibilities was for the National Parks and Wildlife Service. This afforded me the opportunity to rekindle my interest in caving and to have a serious engagement with policy and legislative matters involved in the management of caves and the karst landforms within which they are located.

Perhaps more importantly, and serendipitously, I was afforded the opportunity to meet and (because of my rejection of formality) become a friend of Andy Spate, a friendship which has endured over the intervening years. Although he may demur from this assessment, Andy and I have much in common arising from our mutually idiosyncratic personalities and occasional rejection of hierarchical orthodoxy.

My first memory of him is at a conference I attended of NPWS managers at Caves House at Yarrangobilly Caves. The (then much younger) Mister Spate had been assigned to uncomplicated aspects of the catering operation, namely the making of a tossed salad to feed some 15 or so people. I stumbled across Andy in the kitchen, shaking a large green garbage bag and looking as though he was infected and doing the St Vitus Dance. When I shyly enquired what he was doing, he informed me that he had concluded the most efficient way to make this high volume tossed salad was to put all the ingredients in the garbage bag; pour a bottle of white vinegar and 1/4 of a bottle of olive oil in; close the neck of the bag firmly shut; and shake the whole arrangement vigorously. I instantly detected a kindred spirit!

My next specific memory is from a period some years later when I was phoned by the then Tasmanian Minister for the Environment, Judy Jackson MLA. She asked if I would consider seconding Andy to the Tasmanian Parks Service for a period of time to undertake a project to recommend, from memory, management measures at the then Marakoopa Caves Reserve (now Mole Creek Karst National Park), specifically for the Kubla Khan system.

I mulled over her request for several days before returning the call and advising that the secondment was acceptable. I told her that there were two conditions that had to be met for this to happen. The first (having a duty to be frugal with the finances of the honest taxpayers of New South Wales) was that the entirety of the cost of the secondment had to be met by the Tasmanian government.

The second condition, which rather took her aback (and which I had tested with Andy beforehand and discovered was acceptable to him) was that I would take part in some of the survey work as Andy's honorary (and unskilled) field hand. She accepted on both bases. It was as a result of this arrangement that, some little time later, I had the honour to be guided through Kubla Khan and Croesus caves by Andy.

More importantly, the visit to the Marrakoopa Caves Reserve led to (from memory) more than one night of constructive conversation with Andy and with Neil Kell in the Spartan surrounds of the research hut at the caves reserve. That discussion led to me drafting a cabinet submission (I used to cause fear and trepidation the upper levels of some of the bureaucracies for which I was responsible by preparing my own cabinet submissions, a practice strongly frowned upon by the Sir Humphreys of the world who wished to give "guidance" to their Ministers and curtail ministerial enthusiasms) proposing that there should be specific provisions in the *National Parks and Wildlife Act 1974 (NSW)* to enable karst conservation. That legislative proposal, later enacted as the *National Parks and Wildlife (Karst Conservation) Amendment Act 1991,* was adopted by cabinet; introduced to the NSW Parliament by me and coming into effect in February 1992.

My membership of ACKMA dates from that era—signed up by Andy. I have, as an interested bystander as it were, enjoyed reading this Journal under the editorship of my predecessors. I concluded, when the plaintive call was made for a volunteer to take over, that I should give back a little of that which I have received whilst I still have the ability to do so. Hence my nomination for the position.

It is, however, to be observed that a Judge in New South Wales (that being my current role in life), upon one's 72nd birthday, now reaches what is known, jokingly, as "statutory senility" and, hence, mandated retirement. As a consequence of that fate befalling me in some two years' time, I have indicated to the ACKMA committee that my undertaking of this role is to be a limited one and that I will be standing down after the June edition in 2020.

Be warned, therefore, dear reader, that the hand of fate may seek to tap you on the shoulder to take over this role in a little more than two years' time!

Tim Moore

President's Report from Andy Spate

I write as your new President.

Mark Delane and his team gave us a wonderful conference at Margaret River. The pre-conference tour went well and one hopes that post-conference activities were equally successful. Great caves! Great people! Kirsty and I gave the wineries a miss but went to the Ginversity instead. Wine, whether made from water or not, is a little light on! Great presentations which included several themes new to ACKMA – fire impacts on karst processes; tree-rings as indicators of climate change; human bacteria invading show cave ecosystems and Scott's great story on 'Enid Blyton – a Closet Caver'. Possibly the most enjoyed presentation of the whole conference.

We welcomed our first Japanese member in the person of Erie K Ando. Katie Coleborn was the recipient of the Ken Grimes Award, talked about the role of fire on karst processes. Erie was the runner-up. Miles Pierce and Peter Robertson received the Elery Hamilton-Smith Award for the best Journal article, *Relighting Federal Cave Buchan Victoria using the Sun's Rays, Buchan*, with John Brush and Paul Williams as runners-up. Congratulations to all seven.

Your Committee is little changed. Dale has stepped down from the Presidency to become the Australian Vice President and we welcome Cathie Plowman to the Committee. Our other new Committee member is Tim Moore as Publications Officer – more on Tim below. I urge you all to write for the Journal – even a few words and an image or two about happenings at your sites will be grist to Tim's mill. We have about 24 show and adventure cave operations in Australia and I don't know how many in New Zealand (can somebody provide me with a number?). Just a few paragraphs once a year on your happenings will help fill the Journal —make your editor happy — and provide us all with news of our activities across Australasia.

So, who is the unknown Tim? A Judge in the NSW Land and Environment Court. He has been interested in caves and caving since his teens. He has been a quiet ACKMA member for ~25 years.

He and his children regularly visit both show and wild caves.

In 1991 – after a trip through Kubla Khan with Andy Spate - he introduced the pioneering *National Parks and Wildlife (Karst Conservation) Act 1991 (NSW)* – legislation based on a Cabinet submission that Tim had personally drafted [and I was woken up in the very early hour of ~3 am by a parliamentary draughtsman wanting a definition of karst!]. This *Act* is the most progressive karst legislation in Australia and probably New Zealand, if not wider across the globe.

Leaving aside his various Court appointments, he was the Member for Gordon in the NSW Parliament from 1976 to 1992 and NSW Minister for the Environment from 1988 to 1992. From 1993 to 1996, he was an Assistant Secretary in the Department of the Prime Minister and Cabinet and Secretary to the Council for Aboriginal Reconciliation. He is also a nationally accredited mediator – may be handy in ACKMA Committee deliberations? But, he is happy to be Tim for ACKMA.

Moving on to other ACKMA issues:

- We must establish definitive program for our next conferences, AGMs and Guide Schools. We have not much at present and this is deeply worrying. We need to know – very soon – about:
    - AGM and Guide School in 2019. The AGM must happen about May according to the incorporation rules but the vital Guide School can be held anywhere at any time. But we need both! And better together, maybe? One issue here is that an AGM host may not have the expertise to run a guide school. AGM 2019 may be Naracoorte …
    - ACKMA Conference in 2020. This might be Jenolan …
    - Guide School and ACKMA 2021 – needs someone to put their hand up.
    - Conference 2022 – maybe North Island, New Zealand? Need to put the NZ in there because from Tasmanian perspectives there are two North Islands!
- So get onto this and make a bid.
- We did have a circuit of conferences every eight years in north NZ and another eight years later in the South Island with Oz sites interposed. We need to re-introduce this circuit or similar. Of the 24 Oz show cave operations obviously, some are not able to host either a conference or AGM/Guide School. Clearly the same applies in New Zealand. It looks like that we may be getting this under control again so we have some ideas for our collective plans.

Other issues we face include:

- Establishing better relationships with management agencies. Any ideas on how to do this would be greatly appreciated by your committee.
- Building our membership base. Again your ideas please.
- Reaching out to a few show cave operators who don't relate to, or we don't see at, ACKMA.
- Establishing an archive of ACKMA's administrative history. I call on all long term members to search their papers for any minutes, committee reports and so on and get them to me or John Brush as hard copy or preferably digitized.
- Guide survey. We need to finalise (deadline 30 June) and develop approaches for the future of guide training
- ACKMA history. It would be good to try and summarise our history over and above the administrative work.

There will probably be much else. Please feel free to make suggestions.

Delegates to the 2018 ACKMA Conference at Margaret River, Western Australia (Dirk Stoffels)

The 2018 ACKMA Conference summary

By Kirsty Dixon

Kirsty Dixon (Ann Augusteyn)

The standard and breadth of topics presented at the recent ACKMA conference in Margaret River was outstanding and there truly was something for everyone. From in-depth scientific studies to Scotty Melton's unforgettable exposé on Enid Blyton!

If I had to choose something that was highlighted in every single presentation, I believe that it would be the power of storytelling (perhaps this would be an appropriate theme for the next conference???) and the many forms that this can take. Much discussion was generated by the Guides' survey results and how we can best address the presentation of cave related material in a variety of situations.

To rise to the challenge of filling Steve Bourne's shoes in providing a conference summary, I also decided to rise to the challenge of telling these stories in a new and perhaps unexpected format.

Paper descriptions are in the order they were presented.

I mean no disrespect to any of the presenters, nor do I wish to diminish the time and efforts in formulating these excellent items – I merely wish to stimulate further discussion on the benefits (or otherwise!) of novel ways of information presentation.

So for the first time in the history of ACKMA I present for your perusal:

Carolina Paice and Kirsty Dixon (Ann Augusteyn)

A Summary of the 22nd ACKMA Conference in Rhyming Verse

Margaret River – famed for surf and wine,
Beauties of the eye and wonders of the vine,
And yet there still remains hidden secrets to behold
For the adventurous at heart, both young and old.
Caverns dark and deep, yet sparkling fair,
Beckoning to the caving tribe – those who are aware.
And so from many lands we come and meet,
Renewing friendships old and new and memories so sweet.
Joining together in a quest to share
Knowledge and insights precious and rare;
Science, interps, caving and guiding,
New ways and old ways, the best ways deciding.
Until at last our time of gathering and revelry ends
And for a while we part, but remain forever friends.

Conference Proceedings – Day 2:

Poor Stefan's lovely streams devolved into nothing more than dreams
With nary a drop of moisture to be found.
Continued importunities on root mat communities
Has caused them to cease to abound;
Potentially due to gums that are blue
Sucking too much from the ground.

(Mark Delane)

One of Pauline's things is counting tree growth rings
To determine past cycles of drought.
An atlas she's making, but this vast undertaking
In south-west WA won't work out.
So new species she's seeking, with rings worth the reading
To fill the big picture throughout.

Adventure and exploration led to Mulu's World Heritage declaration,
And cave discovery and recording continues apace.
Using Centre, shop and cafeteria to promote World Heritage criteria
Helps empower local people to share their special space.
Sharing knowledge and abilities through partnerships and facilities
Enables best practice management of tourism and place.

Julia says Jenolan is drying, but there is yet no risk of people crying,
As areas still remain that are considerably wet.
Waters of reflection provide pictures of perfection,
But debate on coloured lights will be ongoing yet.
Animals in streams and interpreting indigenous dreams
Set a perfect demonstration for the ecotourism set.

Conference Proceedings – Day 3:

Many eyebrows were raised at the site of Nick's Cave,
Mostly beneath the bulk of the town,
Yet Devonian sediment was to archaeology no impediment
With records of sea level and climate laid down.
Excavations revealed three species of hominids concealed
In the Geopark's layers with yet more to be found.

The study of karst springs over 10 years of Tim's life brings
A better understanding of Vancouver Island's flow.
Domestic use is tapping, but bacteria needs zapping
And turbidity needs reducing to levels that are low.
New methods of recording will allow more data hoarding
And allow good forest management and education to go.

The drawcard of show caves is now in need of being saved
As Peter found sites highly impacted by lint.
Familiarity creates blindness and they must return to loving kindness
And focus on conservation and control for a stint.
Building conservation teams and using this in education streams
Is demonstrating how this management holds a hopeful glint.

John told of volcanic terrain and of the efforts for protection to gain,
For a landscape losing connection with its formative past.
Human activity is impacting by rock quarrying and extracting,
Disrupting surface features and diminishing values fast.
A significant landscape overlay needs implementing without delay
To provide permanent protection for this valuable pseudokarst.

Lao's tourist potential is huge, but their facilities are crude,
So Greg and John were invited to lend a helping hand.
Overcoming a history very rugged and infrastructure that is buggered
Provides significant challenges in interpreting their land.
Yet sites they have that sing, and potential World Heritage will bring
And hopes of creating something meaningful and grand.

Caring for the karst in Camooweal has been far less than ideal
With high impacts of grazing, and Ghost bat numbers in decline.
Wild fires caused destruction and cows vegetation reduction
Results in no recovery and of a management plan, no sign.
To help save this special place we need greater understanding of this space
And management protection implemented by design.

Mark Delane (right) waiting for Peter Bell (left) to demonstrate his innovative management projects in Mammoth Cave (Ann Augusteyn)

Above—Teagan Symons from Yarrangobilly in the Borungup Forest (Ann Augusteyn)

Left—Preparing to go underground (Mark Delane)

Rauleigh and Samantha Webb (Ann Augusteyn)

Dale Calnin and Katie Coleborn- Ken Grimes award winner (Ann Augusteyn)

John Brush and Hein Gerstner (Ann Augusteyn)

Conference Proceedings – Day 4:

Katie's interest is in fire, both moderate and dire
And the impact it has on the karst system below.
With geochemistry and hydrology, can we determine the chronology
Of paleo fires recorded in stalagmites long ago?
Some promising trace markers will do fine for starters,
And then maybe moving on to aerosols is the way to go.

Andy says Australian a-tents are unusual and require more study and perusal
As they are the only ones from a non-glaciated limestone source.
Cooleman Plains has the greatest number, but due to environmental slumber,
These precious, rare karst features are under threat from the horse.
With their crushing and scraping, a significant feature they are erasing,
But heated debate is ongoing about a remedial course.

Cathie is seeking a way to rave and inspire about habitats of the cave,
And decided on Australian cave animal of the year.
With the aim of spotlighting protection and engendering affection
For creatures and locations that most people fear.
With greater elaboration and invitations for collaboration
The way forward together is clear.

Shayne inspires the next generation through outside-the-classroom education
And linked curriculum needs in development of ed packs.
Using multiple sites, from the depths to the heights
And providing teaching resources with no lack.
There are now 10 tours across 6 sites and the students' delights
Ensure that they keep coming back.

Scott Melton and friends wanted to examine the trends
In the training and perceptions of guides,
So they instituted a survey with the aim to purvey
The requirements that would these results provide.
Managers want interpretation skills, guides want more content fill,
But for accredited training both were on-side.

Cathie let everyone know that for bookings not to be slow
For the 31st ASF conference in December.
A raft of activities to suit all proclivities
Will ensure an event to remember.
The venue is right and with camping on-site,
Early bird rego is open 'til September.

Below—Libby Chandler with Anita and Ian Eddison (Ann Augusteyn)

Conference Proceedings – Day 5 – Part 1:

Barry Richard and Julia James
(Ann Augusteyn)

Threatened Ecological Communities have very little climatic immunity
And subterranean wetlands have a vital role to play.
Very susceptible to disturbance, with current environmental perturbance
There is doubt that wet cave communities will be able to stay.
There is hope biospeleology can reveal unique species ecology
That will allow recolonization when favourable conditions are the way.

Guides shape visitor perceptions but one of the enduring questions
Is how to get them to retain the information you provide?
Make your tour meaningful and engaging, but authentic in your staging
They are there to see the cave, not the performance of the guide.
Integrating information into an evolving storytelling presentation,
Will create a special memory and have them always on your side.

Andy found a website showing (with effusive language overflowing)
Some distance learning adventures in caving and karst.
The question proposed, from which vigorous discussion arose,
Was whether ACKMA should do something so vast?
Support with some reservations and questions of funding allocations
Indicate further consultation needed before the idea can be passed.

Part of Naracoorte's evolution is moving toward a regional tourism solution,
With connection to wider visitor activities and stays,
By upgrading visitor facilities to promote access for those with disabilities
And adding surface interpretation of the below ground displays.
Involving the community and highlighting business opportunity
Through collaboration and special themed activity days.

Police, cavers and the Parks Service were all getting very nervous
About the prospect of cave rescue and who was best to do the deed.
After some previous distrust it became apparent that they must
Collaborate to provide a strong response in need.
Developing a draft set of questions to determine the best resource directions
Helps responders assess the need for manpower and speed.

Marjorie Coggan giving Judy Christensen a helping hand
(Ann Augusteyn)

Conference Proceedings – Day 5 – Part 2:

The Association of British and Irish Show caves is a vehicle for pathways to pave
For collaboration of all attractions underground.
Shared cross-promotion of sites gives them opportunities to highlight
The wonders that in the UK abound.
Changing views on conservation abilities has allowed some of these tourist facilities
To participate in Geopark status and explore new avenues profound.

Dirk Stoffels and Lilly Petrovic (Ann Augusteyn)

Erie wanted to know the levels of bacteria, high and low
That could only be present with humans around.
Looking at cave visitation gave her a good indication
Of whether an impact on sites could be found.
Using lab techniques on water samples, gave her multiple examples
Showing levels of bacteria reflect when visitors abound.

The methods of cave survey and the amount of information they purvey
Is now growing in both complexity and breadth,
Yet this highlights the requirement, before archiving to retirement,
Correct and accurate descriptions of survey points in depth.
New techniques of 3D mapping can still benefit from overlapping
With historical cave sections and the detail they possess.

Dave is undertaking a revision, for a wonderful new edition
Of the book he wrote on caves almost 20 years ago.
Each chapter will have samples and investigate with examples,
The topic of discussion, with links and PowerPoint download.
Several new insertions will provide interesting diversions
On such things as historical use e.g. sacred shrines aglow.

Well, whoever would have guessed Enid Blyton was obsessed
With the idea of caves as refuge and as places of escape?
While her descriptions and illustrations were an excellent foundation,
Some of her other inclusions left most of us agape;
Glow worms got a range extension and the chickens and abundant food retention
Left us full of joyful laughter with tears running down our face.

The use of the voice for cave guides is no choice,
And its care and upkeep is most vital.
A voice care manual is provided, to the ACKMA website be guided,
That provides exercises to help with recital.
If issues of strain and misuse arise through vocal abuse,
Then discuss with your manager concerning revival.

Originally used as a caving base, the Rimstone Cooperative now must face
The challenges of cave upkeep and access.
Rehabilitation and remediation and upgrades to automation
Raise many questions that require more experts to assess.
Their stated intention to responsibly manage all intervention
To best practice requires implementing plans to address.

Nick Powe, Tony Culberg and Rhonwen Pierce (Ann Augusteyn)

Conference Convenor's wrap up!

By Mark Delane

Katherine Herring (see page 21) and Mark Delane (Ann Augusteyn)

Now that the conference has come and gone, we have a chance to reminisce and reflect on what was a fantastic and uplifting experience. Our ability to come together from so many different parts of the world, so many different roles, occupations and levels of experience, and to become one for the conference is truly amazing. To think that guides, managers, academics, land managers, cavers, students, employed and retired, all respect and embrace each other in the interest of learning and sharing is so cool!

I hope that when you read this that you take a moment to reflect on the conference and that it brings a smile to your face.

Personally, I had a blast; and while yes there was lots to do and organise before and during the conference, I still had a wonderful time, I learnt a lot and got to meet so many amazing people. I know you all did also, which makes the experience so much more and the conference such a success.

As I said in my closing address, my part as convenor was straightforward, like herding cats! But, I cannot stress enough nor thank you all – for the success of the conference was as a result of all that attended. To take the time and make the effort to travel and attend, often at your own expense, and then to participate in so many ways, really did make the conference. The presenters were amazing, you engaged us all and stimulated conversation, ideas and questions.

I would love to take credit for how well each presentation flowed to the next, almost like a script, but it was mostly on the strength of each presentation, as Andy and I only shuffled a few around to suit times and days. I certainly loved them all, some with great practical application like Jordan and Christian's presentation on interpretation and storytelling for guides, Peter's on Cave cleaning and Shayne's on education packs for schools. Others were of great value for demonstrating applications of ideas and management, like Chaka and Nic on Naracoorte along with Julia's presentation on Cave Surveying.

The theme of the conference was Hydrology and the management of water within Cave and Karst regions, with Stefan certainly painting the picture so well for our region, it was a good shot in the arm for us all, I think, and then to be supported with presentations by Pauline, Jay, Tim and Julia was fantastic.

Equally, there were some thought inspiring presentations by Katie on the impact of Fire on Karst and by Erie's presentation on Human Indicating Bacteria in caves. Then to have Pauline's presentation on tree rings, hydrology and rainfall … wow! It was exciting to see that there is so much research taking place. While we all agree there are so many other areas of research yet to be undertaken, I think these presentations gave us all some renewed hope. I know I am looking more at how we can be apart of some research projects into the future.

Then we had the entertaining; we all laughed along with Scott and his retelling of Enid's stories and we all partook in group vocal training with Cathie's presentation on your voice, which was fun but a really important topic. We also had some great sharing of examples from Hein, Greg, Tim and Nick with their presentations on overseas sites and experiences, and we all look forward, hopefully, to seeing them first hand ourselves now!

Pre-conference adventurers near the entrance to Coorow Cave (Mark Delane)

I know I have only mentioned a few of the presenters and their topics, and I could go on listing them all, but simply, they where all amazing, and all deserving of our praise. Thank you!

The afternoon field trips I hope were complementary to the presentations, and judging on everyone's smiles, questions and the feedback from Mike and Max, our trusty bus drivers, everyone was well pleased. I know a true highlight for so many was Josh's welcome to country at his meeting place at Cape Naturaliste – we all agreed it was so fitting and perfect and, for many, the best.

Welcome to country at Cape Naturaliste (Mark Delane)

We covered a lot of ground, all with an underlying purpose, to get you all incredibly disorientated and equally jealous of our region and I know it worked… We did get to see so many beautiful parts of the region, starting with Cape Naturaliste to Shelly Beach to Ngilgi on Monday; then to Mammoth, Calgardup and Tunnel Caves on Tuesday; to Moondyne or Calgardup or winery/brewery tour on Wednesday; then Giants and Lake Cave on Thursday with a stop in Borranup Forest; and finished off with Jewel and Cape Leeuwin on Friday. Wow… that was a lot now I think of it! But given how great the weather was all week, I think it was worth it and it would have been wrong not to take advantage of that stunning weather.

The evenings were also a great way to connect, to strengthen new relationships, to forge others, to discuss the day's presentations, to share jokes and to show some support to the local establishments, to ease their pain and disappointment of Steve Bourne not attending for the first time in forever.

For those that made the extra effort to attend the pre-conference fieldtrip, thank you. I hope you got as much from it as I did! It was an amazing few days, and a true treasure.

For those that stayed longer in the region, I trust you all had a great time, certainly your photos and smiles suggest that you did!

Overall, I hope you all enjoyed the conference, that you learnt something, you shared something, that you made new friends and contacts and that you reconnected with old ones. Know that you are not alone and that someone in ACKMA can help you – simply ask.

To all of you who attended, it was my privilege to have shared the time and experiences with you. It was great fun and with the support of you all, it was pain free! I look forward to our paths crossing again. For those new friends on Facebook, hello! …and for those yet to accept my request……I have your details…..

Cheers

Mark

Pre-Conference Field Trip

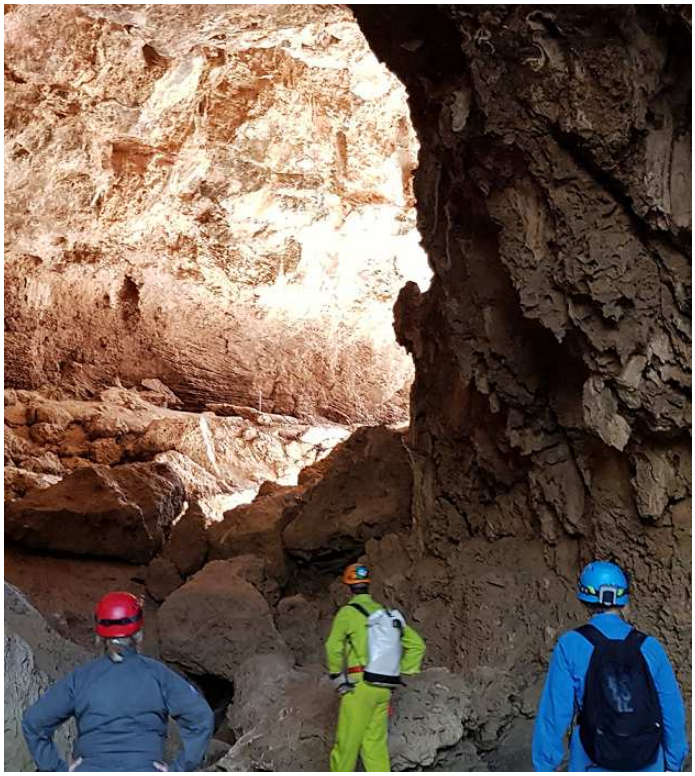
John Brush

Canberra Speleological Society Inc

There we were, perched on the edge. It was late in the day, we were tired, a cold wind was blowing through our rudimentary shelter and SuperMark was looking worried. The look on his face said it all. Would those difficult easterners revolt at the prospect of drinking Margaret River wine? Did any self-respecting caver actually drink Spumante or Chianti? Would the far-easterners simply prefer a Marlborough Sauvignon Blanc? Would those pesky South Australians prefer to stick with their local brew? How does one assess the needs of a lone Canuck? And most importantly, was it true the local cavers preferred their drinking water to come straight from the bore? Such are the difficulties faced by a conference convenor who somehow also found time to organise and participate on the field trip as well as buying all the necessary provisions, arranging transport and booking the accommodation for it.

The original plan was to camp. However, SuperMark organised motel-like units in a caravan park for everyone after one difficult participant threatened to pull out at the prospect of roughing it in the sandy wastelands of coastal WA. SuperMark has revealed elsewhere that he "enjoyed the sleeping arrangements". I think this means he appreciated the sheer curtain that screened off the double bed in each unit, rather than having separate bedrooms as he had originally led us to believe. It certainly helped engender a sense of togetherness.

"SuperMark" (Ian Eddison)



In Stockyard Tunnel (Ian Eddison)

The transport and pickup arrangements were complex, but suffice to say that at various times on the first evening, all 14 participants and guides arrived at the Leeman caravan park about 280km north of Perth. There was Tim Stokes all the way from Vancouver Island; Philip and Anne Woodward and Pete and Libby Chandler from New Zealand; Matthew Cooper and Nick Heath from Kangaroo Island; Ian and Anita Eddison from NSW; Marjorie Coggan and John Brush from the ACT; Ian Collette and Greg Thomas from the WA Speleo Group (who kindly agreed to be our cave guides); and, as noted above, SuperMark Delane. Despite the chilly wind cutting through the open-sided kitchen shelter in the caravan park, everyone soon settled back from the edge of their seats to enjoy a welcoming drink and an extensive BBQ meal.

Early next morning we headed off for the Stockyard Gully National Park, which is named after the main cave we were to visit. Stockyard Gully Cave is an intermittently active stream passage forming a major part of an underground drainage system comprising several caves and a string of large collapse dolines on a north-westerly trend. All of the caves in the area occur in Aeolian Calcarenite, a rock formed from wind-blown calcareous sands. Old sand dunes in other words. It is thought that the caves are syngenetic with cave formation taking place at the same time as the sand dunes were consolidating. The rock is very soft and friable but on the surface it often protected by a hardened crust of redeposited calcite called calcrete or duricrust.

Three sections of the Stockyard system (the Tunnel, the Bridge and Stockyard Cave) are open for public access and since my last visit nearly 40 years ago, visitor facilities such as a car park, picnic tables, formed walking tracks to/from the caves and interpretive and hazard signs have been provided.

The proliferation of hazard signs in national parks seems to be a WA speciality and at Stockyard Gully, visitors are warned at various points of cliff, water, quicksand and feral bee risks. However, my favourite sign, seen in the Nambung National Park at the end of the field trip, was a limestone risk area – "dangerous limestone outcrop ahead".

In the car park the party split into two groups with one led by Greg going straight to Stockyard Gully while the other one went to Aiennyu Cave with Ian C. After lunch, the groups swapped over.

The walking track to the first cave in the system (Stockyard Tunnel) drops into a gully and then follows it to the stream sink entrance.

From there it is about 300 metres along the main passage to the outflow. On the day of our visit, the cave was dry and it was easy walking on a sandy floor. According to Greg, clearing and farming activities on private land immediately to the east of the national park has resulted in so much sediment washing into the cave that the floor is now several metres higher than it used to be. This seemed a little hard to believe until I later compared photos with some I took in January 1979 (**Editor—**see front cover). Near the downstream entrance, it looks like the floor level is three to four metres above where it was about 40 years ago.

Stockyard Bridge, the next part of the system lies a further 300 metres along the gully. It is a spacious, airy feature about 50 metres long. Walking and scrambling through it provides the easiest means of accessing the nearby Stockyard Cave.

Stockyard Cave is about one kilometre long and is generally spacious (at least 10 metres wide and several metres high). At first it is easy walking on a sandy floor but further in there is more rock scrambling and also some crawling towards the inner end. The main passage ends in a large domed room that has a flood mark on the walls – everything below the mark has a thin coating of mud, apart from the rocks that have fallen out of the roof since the flood. Sobering. On the way back to the entrance we picked up quite a lot of litter in the cave. Some of it may have washed in, but most appeared to have been left behind by messy visitors.

Top left—Walking track to Stockyard Tunnel (John Brush)

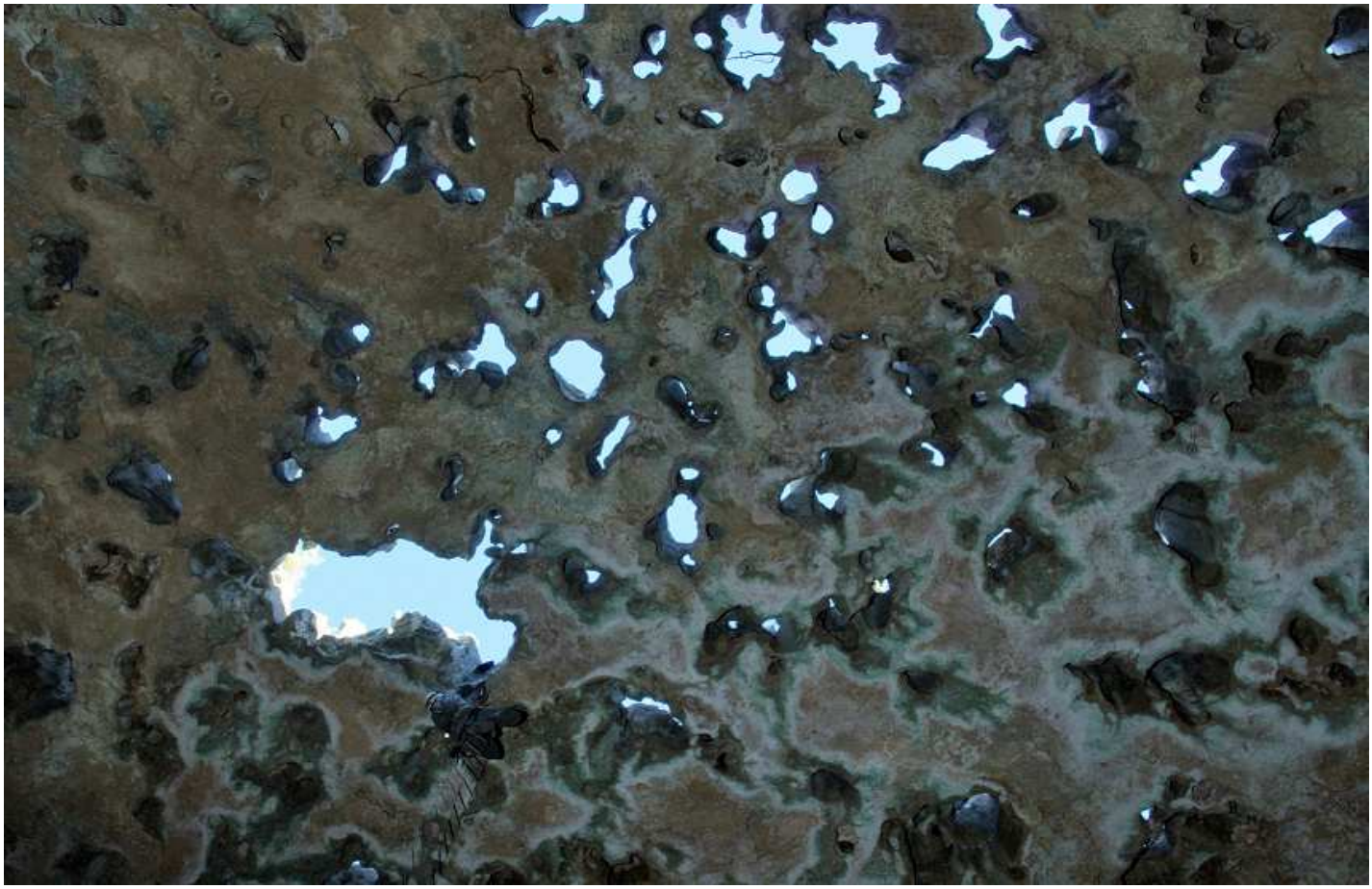
Below Left—The entrance to Coorow Cave (John Brush)

Below right—Anne Woodward and the owner of the sheep station where Coorow Cave is located (Ian Eddison)

Ian Eddison and Ian Collette on the perforated calcrete pavement above Aiennyu Cave (John Brush)

Aiennyu Cave is about a kilometre northwest of Stockyard Cave and is another part of the Stockyard system, although it has not (yet) been physically connected to Stockyard Cave. The cave is essentially a single chamber about 80 metres long, 30 metres wide and 20 to 30 metres deep. The roof is a thin layer of calcrete that has been perforated by more than 100 solution tubes.

In other words, the cave has more than 100 entrances, the largest of which is about two metres in diameter. It is a disturbing sight when viewed from the floor 20 metres below. One day it will undoubtedly fall in. When it does, it is likely that what is left will be similar to the nearby collapse doline at Beekeepers Cave. With expert guidance from Ian C, six or seven people abseiled into the cave and made it out again safely



Ian Eddison (at bottom near left) climbing out of the many Aiennyu Cave entrances (John Brush)

Next morning we all packed up and headed about 100 kilometres inland to look at two caves in a sequence of Precambrian sediments where the original dolomite has been partially replaced by chert, a microcrystalline form silica or quartz.

Our first stop was at a property several kilometres outside the small town of Coorow ("*Curroo*"). The helpful landowner showed us the entrance to Coorow Cave in a depression in the middle of a sandy paddock. The small entrance opened out into silt-floored passage several metres wide and two to three metres high. In total, the cave has about 500 metres of maze-like joint-controlled passages, some of which are quite low. At the time of our visit, there were several pools of standing water, adding to the excitement for Greg and John. The cave contains a few bones and some old guano deposits. There is almost no speleothem development but it does have some interesting passage features. In many places there are thin sheets of silica projecting from the walls that must have formed as joint infillings in the dolomite before the cave passages developed. The sheets are delicate and quite impressive, but have obviously been badly damaged by visitors over the years.

Libby Chandler in a tight section of Coorow Cave (John Brush)

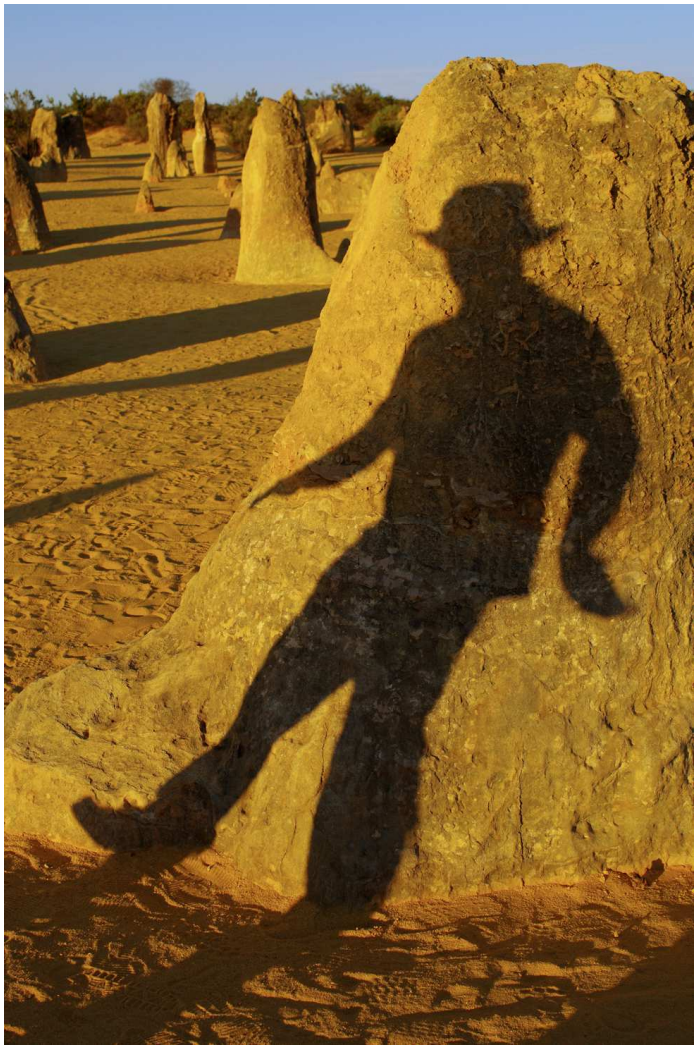
The landowner came into the cave with us and wondered about the scope for developing it into a tourist attraction, commenting that when his family bought the property, the cave was listed as one of its assets. It is an interesting cave but its potential for development as a show cave would seem to be limited.

After a quick bite to eat in Coorow, the party headed about 50 kilometres south to Jingemia Cave. This is a pit about 60 metres across and 25 metres deep. It has vertical walls on three sides and on the remaining side, there is a steep scree slope leading to the bottom of the pit, where there are a couple of short passages. The cliffs and cave walls are all in chert and there is not much sign of any remnant dolomite. In the early days of the 20th century guano was mined in the cave and at the time, it was reported that the guano was about 12 metres deep. A few relics of the mining operation remain at the bottom of the cave.

The Jingemia area has been developed as a low-key attraction for visitors. There are interpretive signs and a formed walking track leads to and around the pit from a car park. Jingemia Cave is an impressive and surprising feature to find in gently rolling country and it is well worth making a detour to see it.

Remnants of guano mining in Jingemia Cave (John Brush)

From Jingemia, most people headed back to Perth but Marjorie and I, along with Pete and Libby Chandler, decided to overnight at Cervantes so that we could visit the Nambung National Park and see the Pinnacles at sunset.



The ghost of Peter Chandler at Nambung National Park (John Brush)

Without a doubt, the pre-conference trip was a most enjoyable experience. It was a great bunch of people and we saw several spectacular, interesting and unusual caves. A big thank you to Ian Collette and Greg Thomas for showing us the caves and to SuperMark for organising the trip.

Pre-conference and conference activities—an additional pictorial roundup

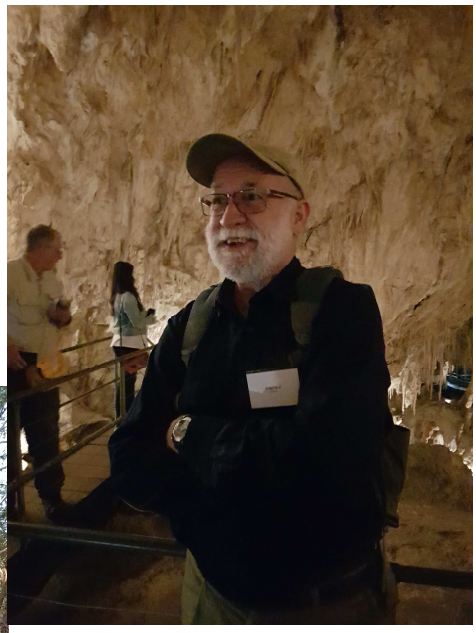
Cathie Plowman (Ian Eddison)

<u>Above</u>

Jingemia Cave (John Brush)

<u>Below</u>

Katie Coleborn (Ian Eddison)



Peter Bell (Ian Eddison)

"The mystery shopper" – an occasional column

<u>Editor's note</u>: The concept of a "mystery shopper" is used regularly in the conventional media. The person writing the consumer report purchases an item or consumes a service and then writes a review. The purchase is undertaken anonymously so that the supplier is unaware of its true purpose.

Over a number of years, people I know have consumed experiences at show caves in both Australia and New Zealand. For the future, I propose to solicit short "mystery shopper" articles for publication in this Journal. The first of them appears below.

I urge all of you potential "mystery shoppers" to contribute your reviews of sites you have visited — they will be published anonymously!

-o0O0o-

A return visit to Waitomo – decades later

In the mid-1990s, I took my (then) teenage twin daughters on a two-week father/daughter adventure trip to various locations across the North and South islands of New Zealand. An inevitable part of such a journey was a visit to, and undertaking adventure activities at, Waitomo. On that occasion, we went Black Water Rafting and, the next day, did the abseil descent into The Lost World. The experience for us was unforgettable

One of the 2018 party descends into The Lost World

The world and life moves on, however! In January 2018, I decided to reprise that earlier trip with my wife and my youngest (now teenaged) children. We revisited all of the various activities undertaken some two decades earlier, including those at Waitomo.

One of the 2018 party enjoying Black Water Rafting

I have been asked to write a "mystery shopper" piece about the comparison between these experiences decades apart. I should say, at the outset, that the experiences were all positive, but the more recent ones were, in several respects, quite distinctly different from those in the 1990s.

The first (and blindingly obvious) differences were in the physical facilities. Today, for both Black Water Rafting and The Lost World, the check-in facilities are computerised and efficient; and Internet booking of the activity makes it possible to arrive on a specified day and to depart on the activity at the nominated time. This is to be compared with the more haphazard experience those decades ago of trying to make arrangements by telephone from some hundreds of kilometres away. In addition, the equipment handling facilities were a lot more organised and, to the relief of my wife and children, the post-activity catering at both bases was tastier and with a much wider range of food that I had led them to expect!

For my own part, however, having had to engage with issues of site safety many times during my working life, I was significantly impressed by the changes in the induction processes for each of these activities. Although, at the time of my much earlier visit, the induction and safety briefing (as well as the guides' management and control of any risky elements of either activity) did not give rise to any matters of concern, the changes (improvements) since then were immediately obvious. The inductions were more focussed on safety than I recalled and the emphasis on seeking to understand who needed special assistance (and providing it) was impressive on both activities.

Although my knees will not permit any future attempt of the 32m ladder pitch necessary to exit The Lost World, my children have both told me they propose to return independently when they leave school. I am satisfied that they will be in safe hands!

From the Conference "first timers"

No 1

Nick Powe (Ian Eddison)

Kents Cavern, UK has been a member of the ACKMA for many years and we have enjoyed receiving the quarterly magazine. In May 2018 I attended the ACKMA conference in Margaret River, WA for the first time and I am very pleased I did. This association embodies all the disciplines that are relevant to the work we do managing and protecting natural underground environments. The papers presented were diverse and covered aspects of cave guiding, karst conservation, education and geotourism. Above all, the people attending were passionate about caves, caving and cave research, and I gained much from the many conversations during the week.

What a privilege it was to discover the Margaret River, with its many fantastic show caves, each offering visitors a slightly different underground experience, from Ngilgi Cave in the north with its rich cultural connections and self-guided exploration tours, to Jewel Cave in the south offering visitors an exceptional insight into the majesty of what can lie beneath our feet. This area not only has great caves, but it has an amazing coastline, deep rooted culture heritage and a tradition of food and drink recognised internationally through its famous wine production. All these are connected to the fascinating geological heritage in this, the most south-western corner of Western Australia. Geotourism at its best and all exceptionally well presented during the conference.

I would recommend anyone involved in cave operations, cave exploration and cave and karst science to become a member of this organisation and attend its conferences.

Nick Powe
Director
Kents Cavern Prehistoric Caves

No 2

Nick McIntyre (a"selfie"?)

Feedback points on the conference:

- Good mix of presentation, discussion, questions and practical exercises/field work. Having the site visits in the afternoons was a great idea as by lunchtime people can become a little disengaged if having a full day of presentations. The site visits in the afternoon just broke this up nicely.
- It was great to see a mix of generations in the crowd and gave me great hope that there are future up-and-coming caving managers, guides and researchers around who can learn from the wisdom and experience of older members.
- Catering and logistics was really well done and set a high standard.

I had a lot of fun….. most important….. and there was a great balance between social and learning interactions.

As a cave site manager with tourism interests, I was particularly engaged with the audience around me as I could link into a range of caving expertise from researchers, explorers, site managers, guides which was very useful.

Overall a good experience & well done to all.

Nick McIntyre
Acting Site Manager Naracoorte & Tantanoola Caves

No 3

Margaret River 2018 was my first ACKMA Conference experience. I went with little expectation of what I may learn or see, and I was blown away. The conference was fascinating; the papers that were presented inspired me to learn a lot more about the natural world. Every day was perfectly broken up by the field trip in the afternoon. I have not yet been to many caves in Australia, especially caves as decorated as in Margaret River, and seeing such a place has further instilled my passion for cave and karst environments.

Christian Bom
Capricorn Caves

Anne and Philip Woodward about to ladder out of Aiennyu Cave (Peter Chandler)

It is not the destination but the journey

When we started to run commercial tours in Nikau Cave twenty-four years ago, the destination was foremost in our minds. Survival and retaining the farm!

We had early guidance from the Auckland Adventure Operators Group, learnt about RAM documents and shared marketing dollars. They were fun times and we learnt lots, using our children as guides with no training other than their carefree, rural upbringing. Our training was no more – farming, shearing, nursing, raising five children.

After twelve years, although visitor numbers were increasing, we needed a boost, so made a leap of faith and started planning to build the Café. About then, I think, we appeared on the ACKMA radar and have been members since. It made us official! We met Peter and Libby Chandler who became mentors of sorts, although they may not realise that. They encouraged us for years to attend a conference and finally we attended a full day at Waitomo. We felt like frauds amidst such high–powered and experienced company but were warmly welcomed; loved it; and were inspired by our day.

Five years ago, the Adventure Safety Standards for caving were introduced and we had our first audit. While we were successful in achieving our accreditation, the auditor commented that we had developed in isolation and needed more contact with the caving community.

Finally, with sufficient dollars now available, we are able to have that contact.

We really enjoyed our visit to Te Anau, and benefited from being able to discuss shared issues and problems.

Now, a year later, after our first full conference, we feel truly part of the ACKMA *whanau*; have learnt and experienced so much; and appreciate the opportunity to grow.

Neil and Mark, you have been outstanding hosts, showcasing your home patches with pride and passion. Thank you! (And a sincere "thank you" to Ian Collette for enabling a 'first' for us in Aiennyu Cave.)

Yes, the journey. We can't rest at our destination yet, but the approach is so enriching.

Anne Woodward
Nikau Cave and Café

Editor's note: Nikau Cave and Café is less than 90 minutes drive south-west of Auckland, New Zealand.

No 5

Working as a Cave guide has been one of the most rewarding jobs I have been fortunate to have. Coupled with a fun work "family", the days are more enjoyable, rather than mediocre.

We are so grateful that our Management team continually encourage staff to better our skills and knowledge. Staff enrichment can often take you to 'AMAZING FAR AWAY LANDS you may have never been before'... for example, the west coast of Australia.

So off we set, 8 staff members, to the other side of the Australian continent. There we were met by Mark Delane, the conference convenor, Asset and Environment Manager, Margaret River Busselton Tourism Association. Thus began the 22nd ACKMA Conference Margaret River - 10 days of great weather and absolute BLISS!

The Conference theme, "Hydrology management", well and truly ran its course through the papers over the week. Papers highlighted the relationships with land usage of karst neighbours and the reduction of water inflow, due to follow-on effects from these usages. Water, as we know, is such a precious ingredient for Cave process both biotic and abiotic.

Cave Hygiene is a new aspect of Cave Management that has only recently shown to cause great management issues. Cave Hygiene could include but is not limited to dirt, mud, lint, dust introduced into the cave system. A little grosser is the addition to these contaminants with skin flakes, hair and even bacteria. These introduced build-ups seem to be constantly increasing due to the ever-increasing visitation to caves all over the world. It was exciting to witness the implementation of ideas and witnessing some of the actions being trialled to combat this issue. A field trip to Mammoth Cave gave us the opportunity to view both the "Stair Nappy" and the "kick rails". The "Stair Nappy" is a plastic sheet that is hung under the stairs. This collects soils and contaminants that are caught below.

Another day had the Leeuwin - Naturaliste Ridge - Cave Rescue Response Plan presentation. This motivating discussion on the journey undertaken by all parties involved in producing a working Response Plan for cave emergencies in the park. It didn't take long for them to realise how under-prepared all stakeholders would have been in the event of a real emergency. This would have been a take home message for all, I'm sure.

Never to be called dull, ACKMA will always enjoy a light hearted romp. This was highlighted by the collective enjoyment of attendees to the hilarious presentation of adventures through the Caves with kids, Enid Blyton and a Chicken.....

Each afternoon, we were spoilt with Caves we were able to visit. It was like visiting other worlds. Much fun was also had on the journey to our destination. It was wonderful to experience other cave environments and management issues that we may not usually encounter.

Thank you for an experience that was priceless.

Katherine Herring
Interpretive Guide
Capricorn Caves

Christian Bom and Katherine Herring (Ann Augusteyn)

-oOOo-

Honorary Life Members' Fund

At the recent Margaret River Conference, a policy on management and operation of the Honorary Life Members' Fund was agreed to at the Association's AGM.

An important element of the new policy was establishment of a sub-committee of three Honorary Life Members each year to make recommendations to the ACKMA Committee on expenditure proposals from the Honorary Life Members' Fund. Nominations were sought from current Honorary Life Members wishing to be considered for sub-committee membership.

The ACKMA Committee received three nominations - Brian Clark, Greg Martin (NZ) and Dave Smith (NZ).

The ACKMA Committee has confirmed these three as constituting the sub-committee until the next AGM.

"Around the show caves"

-o0O0o-

Reported on 29 May 2018 by Inga Stunzner of ABC Capricornia and reproduced with permission.

Photos—Ann Augusteyn, Capricorn Caves, Queensland

Want to hear the best opera in the country? Forget the Sydney Opera House and head to Capricorn Caves

Forget the Sydney Opera House, the best place to listen to opera lies under 30 metres of limestone, through tunnels and narrow passages, in a spectacular cavern that is described as the closest thing to having perfect natural acoustics.

It is for this reason that for 10 years Bruce Edwards has been bringing his Underground Opera Company to the Capricorn Caves, just north of Rockhampton in central Queensland.

"If you're looking for acoustics, this is the place to be," Mr Edwards said.

"They say a perfect acoustic equals a value of two, which is about two-tenths of a second before your voice is reverberated back to you.

"The Opera House has been measured at about 1.8, but here it's actually been measured at 2.1."

Mr Edwards knows a thing or two about underground spaces, having spent 25 years in the mining and tunnelling industry before hanging up his boots permanently four years ago.

On his time off, he dabbled in musical theatre.

It was while he was working in a mine in Tasmania that the seed for underground opera was sown.

A foreman on that mine heard of Mr Edward's hobby and mentioned that the Tasmanian Symphony Orchestra had performed at the Renison Bell tin mine.

"I thought 'what a fantastic idea'," Mr Edwards said.

It was not until several months later that he did something about it.

"I was working halfway between Darwin and Kakadu in a little place called Tom's Gully Mine and I was chatting with one of the guys there, and he said 'Didn't they do some show down in Renison mine?'

"And I thought 'Hold on a tick. If they can hear about a show that was done in the middle of nowhere in Tassie, in the absolute middle of nowhere in the Northern Territory, then maybe we should be actually producing some stuff'."

So he did.

Over the past 11 years, the Underground Opera Company has performed in caves, abandoned and working mines, tunnels, power stations and castles all over the country.

"After working in mines for years and years, coming into these natural caves is just a breath of fresh air," he said.

It is not so easy to find the perfect caves to perform in, so Mr Edwards is always on the look-out.

"There are many caves across the country, but not many of them are suitable for what we do," he said.

"A lot might be too small or not have a nice, large cavernous sort of space, but when we get places like the Capricorn Caves it's just amazing."

The Cathedral Chamber is fitted with pews and, at a stretch, can squeeze in 90 people.

But it is more comfortable with about 75.

"What I love about it is you can sit here in the audience and even if you've never heard an opera piece before you just get the voices, you get the sound, and it just goes straight through you and it turns something that is just audible into something physical," he said.

"It's just magical."

Ann Augusteyn owns the caves and jumped at the chance to host opera when Mr Edwards approached her a decade ago.

"It's been a fantastic relationship," she said.

Since then, people from all over Australia and overseas have come specifically to hear the opera, but it still remains a bit of a secret from locals.

"So many people have never been to the caves until they come to the opera and then all of a sudden the visual beauty hits them," Ms Augusteyn said.

From the outside, it looks unassuming.

It is an above-ground cave system in a hill of limestone that is covered in vegetation — a foil for what lies inside and underneath.

"There are many chambers in our cave system, but the Cathedral, where we're standing now, is an absolute highlight," she said.

"When we come through different tunnels and passages, through another cave, then you have a whole new experience when it takes you through to our fossil deposits.

"There is so much in this limestone rock."

Performing this particular night are tenor Glenn Lorimer, soprano Dominique Fegan, baritone Lionel Theunissen, mezzo soprano Kathryn Bradbury and pianist Mark Connors.

These caves are one of the nicest venues to sing in, they said, and there is the added bonus of inquisitive bats.

"I got pretty close to them the first time I performed here 10 years ago," Mr Lorimer recalled.

"I went to the top of the stairs and sang the end of Rossini's La Danza, where I sustain a high note at the end.

"And the bats actually came out of what I usually refer to as 'the bell tower' above and were spiralling around me."

Sadly there was no camera to capture this, and when Mr Lorimer performed the following night in front of various media the bats did not make an appearance.

Upgrades to facilities at Jenolan Caves, NSW

On 30 May 2018, the Sydney Morning Herald ran a story concerning a number of upgrades (both completed and proposed) for visitor facilities at Jenolan Caves. The following information is taken from the two Ministerial press releases concerning these facility upgrades.

The first announcement was on 24 April by the New South Wales Deputy Premier, John Barilaro MP. He visited Jenolan and announced that $8.5 million had been committed "*to give the ancient cave system and tourism hotspot a modern facelift*". The funding was allocated from the state's *Regional Growth - Environment and Tourism Fund*. The funding is to improve visitor facilities within the caves' precinct.

The Deputy Premier said:

> *… we are funding the long overdue renovation of Jenolan Caves which will not only improve the grand entrance to the caves, but will also build and upgrade nearby walking tracks to give tourists unique access to the amazing landscape, lake and wildlife that surrounds the ancient caves system.*

The Minister said that the funding will go towards three key projects. These are the upgrading of the Blue Lake area; construction of the Binoomea Track and Inspiration Point Lookout; and upgrading of the visitors' centre.

The works in the vicinity of the Blue Lake will include upgraded walking tracks, boardwalks and observation platforms.

Construction of the three project elements announced by the Deputy Premier is expected to commence in December 2018 with the works to be completed by December 2021.

This announcement was followed, on 29 May, by the opening by the Minister for the Environment, Gabrielle Upton MP, of the renovated heritage café after a $1.9 million upgrade. The Minister also indicated that the caves management was also investigating and costing possible renovations to Caves House.

Photos — NPWS

The intriguing tale of the orphaned stalagmite - the power of story-telling

John Brush and Regina Roach
Canberra Speleological Society Inc

This is the incredible story of how a large calcite stalagmite that was about to be obliterated at the Wagga Wagga tip in New South Wales came to be there; of how the cave it was from was identified; and of how it is linked to the early history of the Canberra Speleological Society.

In November 2017, an eagle-eyed Wagga resident was dropping off rubbish at the local tip (or the Gregadoo Waste Management Centre as it is more accurately known) and noticed what appeared to be a stalagmite in a heap of broken bricks and concrete. The resident alerted staff and in the nick of time, a loader operator who was about to tidy up the pile was radioed to stop.

The stalagmite that was retrieved from the Wagga Wagga tip (John Brush)

The stalagmite was retrieved and carried with some difficulty to the Manager's office where it sat for a couple of months. As the stalagmite measures more than metre around the base, is about 60cm long and weighs in at 50-60kg, it is not hard to imagine it getting in the way. In a quandary about what to do with it, Greg Pym, the Manager, eventually phoned Yarrangobilly Caves and offered to deliver it there (a 400km, 5-hour round trip). In other words, to pass the problem on to George Bradford.

The stalagmite was presented to George in February and the following month, a brief article and a photo of the handover appeared in the Wagga Council's newsletter. The story was re-published in a local newspaper, which led to the local ABC radio station phoning Yarrangobilly Caves for more information. Regina Roach gave an interview and speculated that the stalagmite might have been a by-product of 'renovation' works at Yarrangobilly in the late 1960s or early 1970s.

After the interview went to air, Wendy Lockley, a former Wagga resident talked to the radio station and revealed the stalagmite once belonged to her father, the late Jim Webb.

Now Jim Webb was quite a character. For many years he lived in Canberra where he worked as a horticulturalist and botanist and in his spare time indulged in a range of outdoor activities. In the early 1950s he was a member of the Canberra Alpine Club and went skiing and bushwalking and also visited a few caves.

Significantly, in 1953 Jim and five other members of the Alpine Club joined in the search for Brian O'Brien, a Sydney Caver who became lost in East Deep Creek Cave at Yarrangobilly. None of the Alpine Club members had previously visited Yarrangobilly. However, after three days of searching, Jim and two of the other Alpine Club members were successful in finding a cold and hungry O'Brien in a previously unknown part of the cave. By this time the caving bug had bitten, and the following year, Jim, Joe Jennings and several other caving friends in the Alpine Club established the Canberra Speleological Society. One the first karst areas the newly-formed CSS focussed on was Wee Jasper, where members explored and mapped Dip Cave.

While exploring Dip Cave the cavers came across large accumulations of bat guano and the astute Jim, with his horticultural background, immediately recognised the value of the guano – not only in terms of its potential to fertilise the gardens of Canberra but also as a useful source of pocket money. So, Jim formed a company (Federal Fertilizer Company) and took out a mining lease over the cave.

An old car was positioned beside the 30m vertical Daylight Hole entrance to Dip Cave and a crane attached to the car was used to winch out bags of guano. For several years, Jim's weekends were spent digging guano, bagging it and selling it to Canberra gardeners. Today, the scattered and rusty remains of the car near the Daylight Hole are the only visible reminders of the mining operation at Dip Cave.

The old car that was used to winch guano out of the Daylight Hole of Dip Cave, Wee Jasper. The photo was taken in 1979 and since then, parts of the car have been removed and what remains has been scattered around the area (John Brush)

However, there are some timbers in nearby Church Cave which was also mined.

As noted above, Jim was quite a character and he had a prankish sense of humour, a trait shared with several other CSS members of the era such as Joe Jennings and Harry Black. There are stories of a CSIRO fire training exercise where carbide was hidden in a bonfire (more water = more fire) and of a hydrogen-filled balloon posing as Sputnik in 1956 - but I digress.

In her interview with ABC radio, Wendy Lockley said that during the course of her father's mining operations, he came across several broken stalagmites in the guano and one that particularly grabbed his attention was winched out of the cave and given a new home in their backyard in Canberra. The stalagmite apparently became a treasured family possession, as it was moved with the family from house to house around Canberra.

In 1984, Jim and his wife moved to Wagga to be closer to Wendy and her family. The stalagmite went with them.

Rob Scorse and Denis Marsh, members of the Kosciuszko Speleological Reference Group, inspecting the stalagmite (John Brush)

After Jim and his wife moved into an aged-care unit, Wendy's family became custodians of the stalagmite and continued the family tradition by placing it in their own backyard.

Sadly, Jim passed away aged 86, in July 2012. Exactly five years later, Wendy and her husband decided to downsize and move back to Canberra. Having no place to store the large stalagmite in their new home, they faced a difficult decision and decided to leave the stalagmite in the backyard when they sold their house in Wagga.

Wendy said on air she later heard from friends that the new owners had completely cleared the backyard and that she was upset to hear there was no longer any sign of the stalagmite.

When she heard Regina's interview, her feelings of "great guilt" were eased by news of the stalagmite's retrieval from the tip and its subsequent journey to the Visitor Centre at Yarrangobilly.

What will now happen to the stalagmite? Wendy indicated on air that given Jim's early association with Yarrangobilly, it would be appropriate for it to be displayed there. However, there is little display space in the Visitor Centre and the stalagmite has been temporarily consigned to a dark corner of the staff tearoom and it only sees the light of day when annoying speleos, intrigued about where it might have come from, ask George to carry it outside so that it can be photographed.

George did have a vision of using the stalagmite in an interpretive display. However, now that its origins are known, will Yarrangobilly be so keen on keeping it? Should it be returned to Wee Jasper? At the present time, CSS has yet to mount a search in Dip Cave to see if we can discover exactly where the stalagmite was once attached. Even if we do, should it be replanted there? Should it be displayed elsewhere in the Wee Jasper Valley?

Such questions cannot yet be answered.

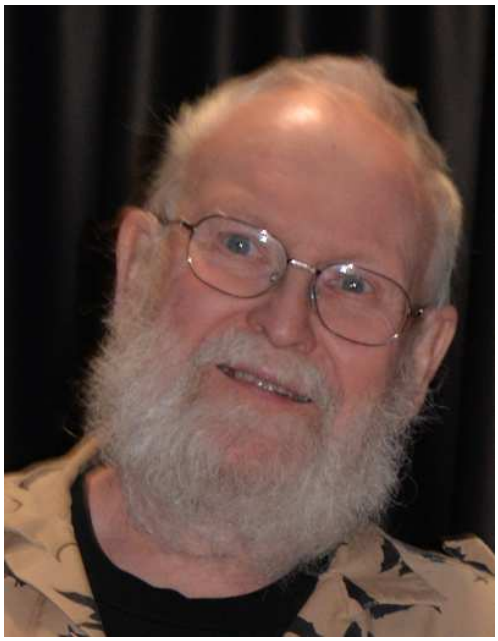
Yarrangobilly Manager, George Bradford, returns the stalagmite to the safety of the Yarrangobilly Visitor Centre (John Brush)

The ANDYSEZ columns

Way back in 1989, Kent Henderson suggested that I write a series of easy-to-understand columns on various aspects of caves and karst especially aimed at helping guides and others to understand the resource they interpret. Some 52 were written and published in the Newsletter (which later became our Journal).

Although each ANDYSEZ can be found on the ACKMA website in the "Members' Only" area, it has been suggested that some of them could usefully be reproduced in the Journal. Our Editor, Tim Moore, agrees. So here is the first set. They are related and deal with various aspects of limestone. To reach them (and the others) from the Members' area, look right at the top of the page and click on "Proceedings" – you will get a variety of choices – choose 'ANDYSEZ Columns'.

-o0O0o-



Andy Spate (Ann Augusteyn)

Let's Talk About Limestone - Part 1

ANDYSEZ Number 24 (Journal 28, September 1997, pp 32-33)

I sometimes spend my lunchtimes reading New Scientist in the sunshine in a park near my office (in which I have a micro-rabbit hutch as my workspace). The edition dated 19 July 1997 has an interesting article about the contribution of the lime and cement industry to global carbon dioxide emissions and thus to global warming. More on that later. Thinking about this article suggested to me that we could profitably talk a little about limestones and what role they play in the natural and economic environment. I suppose that we can, for the moment, take the role of limestones and other carbonate rocks as contributors to the aesthetic environment for granted - after all we all gad around enjoying karst scenery above and below the surface.

Limestone is the commonest of the carbonate rocks. It is made up of the metal calcium (Ca^{++}) and of the carbonate ion whose chemical formula is expressed as CO_3^{2-} . That is, one part of carbon (a solid) combined with three parts of oxygen (a gas) gets together with an ion of calcium to form the chemical compound $CaCO_3$(= calcium carbonate). However, as I have said many times before - nothing is that simple in nature. Limestone is made up of calcium carbonate but will always be "contaminated" with all sorts of other chemical species from a variety of sources. The most usual "contaminant" of $CaCO_3$ will be the metal magnesium.

Magnesium carbonate forms the other end of a spectrum. At the limestone end we have calcium carbonate - at the other magnesium carbonate. But we do have mixtures between with differing proportions of the two metals. At the calcium carbonate end of the spectrum we call the rock, limestone. At the magnesium-calcium carbonate midpoint we call it dolomite; at the pure magnesium carbonate end we call it magnesite. These two latter rocks have different properties from limestone - perhaps we will discuss these later.

There are lots of other contaminants. Chief amongst these will be silicates (including clay minerals), iron compounds and perhaps organic materials (including hydrocarbons). We can look at these later also if we get round to it.

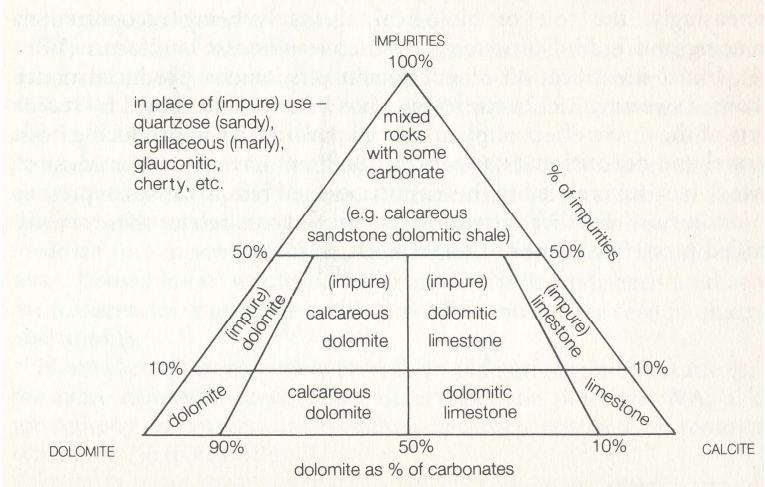


Figure 2 The classification of carbonate rocks according to Leighton and Pendexter (1962).

These three carbonate rocks are vital to our society today.

Limestone is a sedimentary rock. But sedimentation can proceed from a number of directions - and each will produce a rock with different characters. We can have physical, chemical and biological sedimentation of limestone. However, I think that we will look at the different types of limestone and the differing depositional environments which produce limestone and dolomite in a later ANDYSEZ.

Let's talk about concrete! Now!

But, back to global warming and carbon dioxide emissions. According to New Scientist (19 July 1997; page 14) "cement kilns contribute more to the world's output of carbon dioxide than aircraft" (7% versus 5%).

The New Scientist article continued - "CO_2 output is increasing faster [from cement and lime production] than any other industrial source". "This puts it behind power generation and vehicle exhausts but in front of aircraft".

The journal goes on to state:

> *Cement production creates CO_2 in two ways: by conversion of calcium carbonate to calcium oxide inside the kilns, and by burning large quantities of fossil fuels to heat the kilns to the 1450°C necessary for roasting limestone.*

We will ignore the fossil fuel question. But look at what happens when we roast limestone for cement or lime production. Let's burn one tonne of limestone - ignoring any impurities:

$CaCO_3$ + heat = $CaO + CO_2$ (↑) [↑ means that gas is given off]

Note that there are the same number of ions on each side of the equation. What are the molecular weights? Calcium = 40; Oxygen = 16; Carbon = 12. Thus:

Molecular weight $CaCO_3$= 40 + 12 + (16 x 3 = 48) = 100

Molecular weight CO_2= 44 and molecular weight CaO = 56. So 44 + 56 = 100

Note that the molecular weights are the same on either side of the equation - it must be working!

So if we add heat to our one tonne of limestone we produce (44/100) x 1000 kg of calcium oxide and (56/100) x 1000 kg of carbon dioxide. These difficult calculations lead to the following results:

1000 kg $CaCO_3$ (solid) + heat = 440 kg CaO (solid) + 560 kg CO_2 (↑)....**WOW!**

As I said this ignores impurities and is not the chemical description of cement manufacture which is more complex and consists of roasting limestone and shales (as a source of silicates) together. Rather than calcium oxide we get, in this case, very complex calcium silicate compounds. The carbon dioxide output also ignores the contribution from fossil or other fuels burnt to provide the heat.

According to an earlier issue of New Scientist (10 May) several billion tonnes of sand, crushed rock, mixtures of calcium silicate (cement) are mixed with water each year. The mixture reacts to "produce gels which then set into a rock-like mass" called concrete. Concretes continue to harden after setting as the calcium compounds react with carbon dioxide from the atmosphere. The reaction is, in fact, turning the concrete into limestone! This is a much tougher material than the original concrete. Obviously the process is very slow and it is estimated that a large slab might take 30 thousand years to carbonate fully (by which time it has probably eroded away - or been taken to the tip!).

However, someone has been doing some research to accelerate the carbonation process - and to help reduce emissions of the carbon dioxide originally produced in creating the cement. The scientist in question stated "I truly believe that...these materials [hardened concretes] will....replace steel, paper, wood and other conventional materials."

What he is doing is to bathe the concrete in $SCCO_2$ - Super Critical Carbon Dioxide. $SCCO_2$ is ordinary carbon dioxide at about 73 atmospheres (~1,000 pounds per square inch) at 31°C. This changes the concrete back to limestone in minutes rather than millennia and produces a material with amazing properties. The compressive strength doubles and tensile strength increases by 75%; the material is tougher and develops a hard impervious outer layer which will withstand acid rain. It is suggested that the method can be used to protect old buildings and statues - but how you actually treat a building *in situ*. This sounds a little difficult?

It just shows you what you can do if you keep limestone in mind! And how things go round in circles. The next ANDYSEZ will talk about limestone and other carbonate rock from more geological perspectives.

-o0O0o-

LET'S TALK ABOUT LIMESTONE - Part 2

ANDYSEZ Number 25 (Journal 29, December 1997, pp 33-34)

As Kent's deadline drew nigh yet again I received an email from Ken Grimes offering a GUEST ANDYSEZ! Such an offer is absolutely unprecedented and I wish there were more distinguished Ladies and Gentlemen around of the calibre, competence, scholarship, charm, wit and all-round good chapedness like the Lovely Lady Louisa and her consort, Professor Grimsley.

The last ANDYSEZ discussed some general attributes of limestone and a way of turning concrete into limestone again. Professor Grimsley's valued, and valuable, contribution to the field discusses a particular suite of karst landforms which, whilst not restricted to Australia, have perhaps their best expression here. He also discusses some aspects of the lithology of the rock which hosts syngenetic karst.

Whilst this is not quite what I was going to write for this ANDYSEZ it does fit the general theme that I was going to pursue over the next few issues of the Journal. The next edition will explore limestones more generally; that will be followed by another GUEST ANDYSEZ from Chris Sharples and Ian Houshold on karst in magnesite (note the deadlines, Ian and Chris).

SYNGENETIC KARST

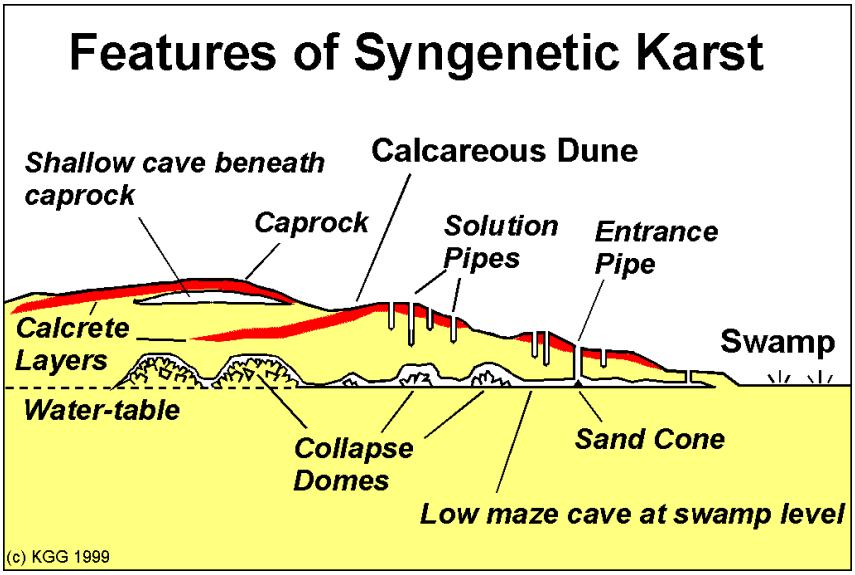
by Professor Grimsley (aka Ken Grimes)

Syngenetic karst is a special feature of the soft calcareous dune limestones found in the coastal regions of southern and western Australia.

The dune limestones are a series of calcareous sand ridges which formed as dunes along the present or prior coastlines during the Quaternary (the last 2 million years, and pretty young by geological standards). The dune ridges are now partly consolidated calcarenites: that is, sandy limestones in which the sand grains are mainly fragments of marine shells that grew in the shallow seas, were washed up onto the beach, and then blown inland. The dune limestone commonly has well-developed bedding. This includes inclined "cross-beds" that trace the series of slip-off slopes of the old dune as it moved forward, and occasionally flatter beds that might represent the associated beach sediments.

In these calcareous Quaternary dunes some karst features are "syngenetic", in that they have developed at the same time as the sand was being cemented into a rock. The term was coined by Joe Jennings in 1968, based partly on observations made by Lex Bastian in WA and Alan Hill in SA. The unconsolidated calcareous sand of the coastal dunefields is converted to limestone gradually by solution and redeposition of calcium carbonate by percolating water. This initially produces a caprock or calcrete layer which is capable of supporting the roof of a shallow cave. The downward percolating water also dissolves vertical solution pipes, and simultaneously cements the surrounding sand.

It then continues to carry dissolved calcium carbonate downward to slowly cement and strengthen the deeper sands. Simultaneously, enhanced mixing corrosion (see ANDYSEZ Number 3) occurs where percolation water meets the water table - typically at the level of an adjacent swampy plain. Initially the soft sand subsides immediately and no cavities remain, but once the rock is sufficiently hardened to support a roof, the solution at the water table results in the development of horizontal caves at that level.



Because the "rock" has limited strength, it collapses easily and breakdown is extensive, particularly in the early stages. As the rock becomes harder, and solution continues at the base of the cave (commonly beneath the rubble piles) larger chambers can form. In some West Australian cave areas, the water flow is concentrated into streams by the surface of an impermeable basement and linear stream caves result.

The main characteristics of syngenetic karst are the development of a cemented (calcreted) caprock near the surface, of vertical solution pipes, and of low, wide, horizontal maze caves either beneath the caprock or at the level of the adjoining swampy plains (see adjacent Figure).

Where the water movement has been concentrated into underground streams, as in West Australia, linear stream caves may develop. Breakdown is extensive; in many cave systems much of the original solutional system at the water-table is now supplanted by collapse domes - typically with the rubble floor rising and falling in parallel with the roof, leaving only a narrow gap for cavers to travel through. Particularly good examples of this can be seen at the Kelly Hill Caves on Kangaroo Island. Re-cemented breccias are seen in the walls of some caves. Subsidence and collapse dolines occur on the surface. In places mass subsidence can generate a chaotic surface of tumbled blocks and fissures.

Solution pipes are one of the most distinctive features of syngenetic karst. They are vertical cylindrical tubes with case-hardened walls, typically 0.5 to 1 m in diameter, which can penetrate down from the surface as far as 20 metres into the soft limestone.

The pipes may contain roots (and root growth may have occurred hand-in-hand with solution of the pipe). They occur as isolated features, or in clusters with spacings as close as a metre or so. Many of the caves are entered via such pipes.

Syngenetic karst development is typical of the Quaternary dune calcarenites; however, the Tertiary limestone at Mount Gambier is also a relatively soft porous limestone, and consequently it shows some of the features of syngenetic karst, in particular the development of solution pipes and calcreted caprocks.

Let's Talk About Limestone - Part 3 - A Limestone Fairy Tale

ANDYSEZ Number 26 (Journal 30, March 1998, pp 46-47)

As I indicated in the ANDYSEZ before last, and repeated in the introduction to Professor Grimsley's excellent piece in the last issue of the Journal, I am going to talk a little more about limestone. As we have seen limestone is made up of calcium carbonate (and that there are variations with some of the calcium being increasingly replaced by magnesium) and that there are impurities. But where does it come from...

Once upon a time, a very, very long time ago (before about 3,300,000,000 years ago) there wasn't any limestone (nor even proto-dragons!). And there was something wrong with the atmosphere - there was more carbon dioxide than oxygen. However, proto-dragons began to appear and the great explosion of life began which culminated in the highest life forms yet known (lawyers? cave guides? IOKs? Ministers of the Crown?). These life forms began to use the carbon dioxide and the oxygen and the calcium dissolved in the oceans in increasing quantities to make their skeletons - inside and outside. The composition of the oceans changed such that below an equilibrium depth the levels of dissolved gases and the metal calcium were such that the solid mineral calcite precipitated from solution. The fixing of gases and dissolved metals into limestone, dolomite and so on had begun.

From this time onward the amount of carbonate rock increased dramatically and because there was more around and because it was being re-dissolved and physically reworked and re-deposited a greater variety of carbonate rocks appeared.

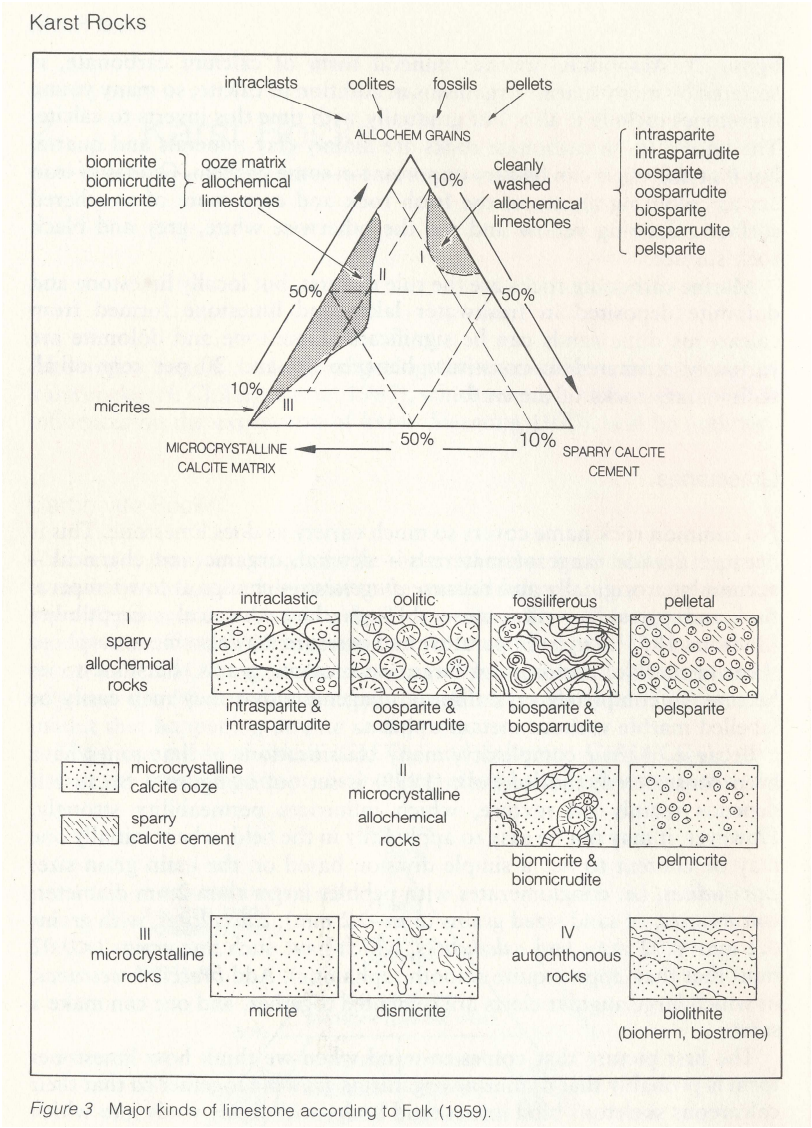


Figure 3 Major kinds of limestone according to Folk (1959).

Indeed, as Jennings (1985) says of limestones:

> No common name covers so much variety as does limestone. This is because a wide range of materials - detrital, organic and chemical - accumulate originally, and because diagenesis - change at low temperature and pressure - is intense through their chemical susceptibility. High temperature and pressure may also metamorphose them to marble, a mosaic of large, clear calcite grains, but limestones become so completely crystalline in diagenesis that they may easily be labelled marble without metamorphism (page 9).

Because of their complexity, many classifications of limestone have emerged. Some basic introductions to these classifications are given in Jennings (1985), Ford and Williams (1989) or Gillieson (1996). Whole shelves of books are devoted to carbonate petrology, depositional environments and so on. Best not confuse our shelves with elves.

Let's try and keep it fairly simple. Ford (1976) suggests that limestones are made up of four basic minerals as follows:

Calcite $CaCO_3$: the skeletal material of most marine invertebrates and the main component of limestones.

Aragonite $CaCO_3$: the skeletal material of some marine molluscs; sometimes precipitated in warm shallow waters. Compared to calcite it is less stable and more soluble; it often recrystallises to calcite.

Dolomite $CaMg(CO_3)_2$: little known as a primary sedimentary mineral, but commonly results from the invasion of calcite sediments by magnesium-rich brines which cause recrystallisation with dolomite replacing calcite.

Chalcedony SiO_2: The siliceous skeletal material of a few marine invertebrates, notably Radiolaria. Commonly present in limestones as flint and chert nodules.

Ford goes on to present the following table:

COMPONENTS OF LIMESTONE : DESCRIPTION GENESIS

Skeletal	Faunal (e.g. corals, brachiopod shells, etc.) Floral (e.g. algal stem fragments)
Encrustations	Physico-chemical (e.g. ooliths, pisoliths) Algal (e.g. blue-green algal crusts) Weathering products (e.g. travertine, stalactite)
Pellets	Faecal Bahamite pellets (pseudo-ooliths) Algal
Limeclasts	Intra-clasts - fragments of lime sediment from the immediate environment Extra-clasts - fragments of limestone from older formations
Micrite	Automicrite - calcilutite formed in the immediate environment Allomicrite - calcilutite transported from an external source
Sparite	Crystalline cementing material, granular, drusy or fibrous
Biolithite	Organic growth in situ, such as algal stromatolites, coral reefs, etc.

Well, that has made it complicated enough for now. What the hell is calcilutite, I hear you cry! Or indeed drusy? The former is a limestone of "lime muds, with grains smaller than 0.02 mm". Drusy = appearance of being covered in small crystals. That is enough for now, my children. The story continues...

Note: The figures on pages 27 and 30 are from Jennings, JN, 1985, *Karst Geomorphology*, Basil Blackwell Ltd, Oxford, pages 8 and 10.

-o0O0o-

Sinkholes – a documentary series

Commencing on Sunday 17June 2018, SBS Television commenced a week of documentaries on natural disasters. The week kicked off with an interesting three-part series on sinkholes.

During my chat with the President after the second of them, we discovered that we had both watched the program and found it compelling.

His highlight was the vision of a bus in the United Kingdom slowly disappearing down a sinkhole that had suddenly opened in a suburban street as the consequence of the collapse of centuries of unmapped mining activities.

For my own part, the footage of a stand of 30 m or so high trees disappearing in the vortex of a bayou draining into an underground collapsing cavern, caused by water injecting salt extraction mining in Florida, hit the spot.

If you are able to access Internet streaming from SBS On Demand, Andy and I are united in suggesting that these documentaries are well worth watching (if they are still available to be streamed)!

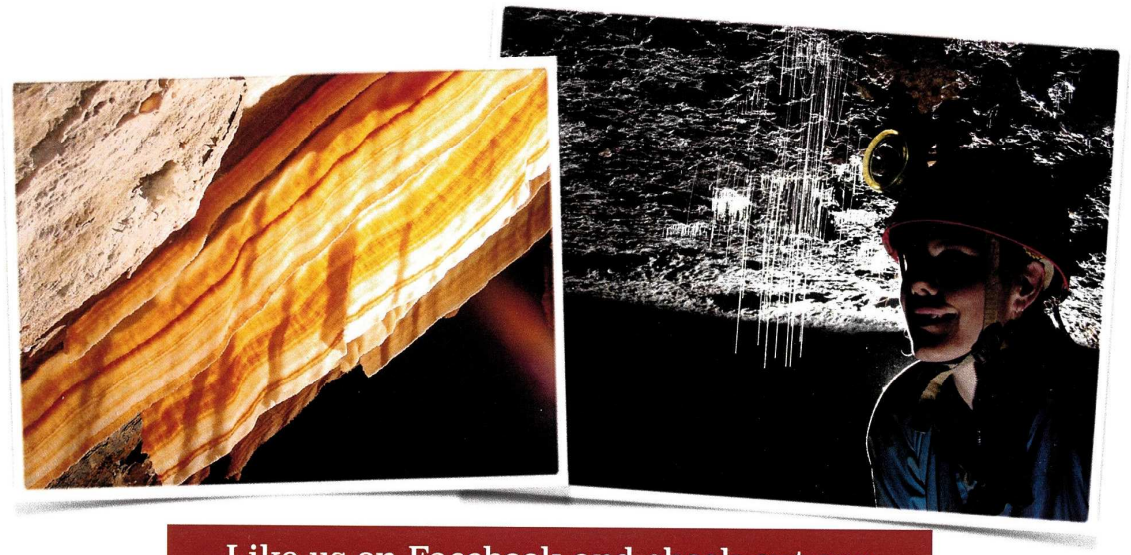
Editor

Upcoming event
Sunday 30 December 2018 - Friday 4 January 2019

31st ASF Conference

Devonport, Tasmania

Discover The Darkness Beneath this summer at the 31st Australian Speleological Federation conference.



Like us on Facebook and check out our website: www.asfconference2019.com
Enquiries: asftasmania2019@gmail.com

Photo credits: David Wools-Cobb