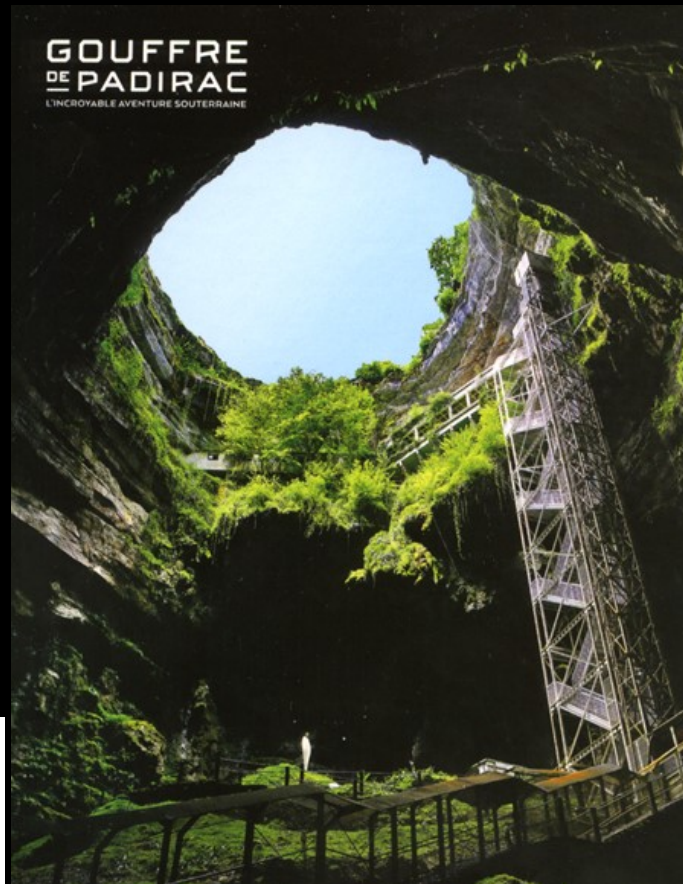


Journal of the

Australasian Cave and Karst Management Association



The ACKMA Journal

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FRONT COVER: Looking up the Gouffre de Padirac – from an official postcard (photo by J. Morel.) – looking into the Gouffre by Greg Middleton—see article from page 11

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IN THIS ISSUE

Editorial	Page 3
President's report	Page 5
Cave Animal of the Year	Page 8
NZ Vice-President's report	Page 9
ACKMA Cave Climate Project – Update.....	Page 9
A visit to show caves in France	Page 11
ANDYSEZ 60—Cave coralloids	Page 22
OPINION _ Juukan Gorge Caves	Page 25
Australia's mountains are growing	Page 26
The Ann Augusteyn Award.....	Page 27
The Guides' School and 2021 AGM	Page 30
“Around the show caves”	
Wellington Caves	Page 32
Jenolan Caves	Page 33
Spellbound Tours, Waitomo	Page 33

EDITORIAL

My final act, for each of this and the earlier editions of this Journal that I have put together, is penning my editorial. For this, my penultimate edition, I had intended to reflect on how our world in Australia and New Zealand had been fortunate in our governmental and community responses to the pandemic, resulting in a new “Covid normal” settling on our societies and our activities. I dictate this, during my 75 km, 3:15 AM commute on Christmas Eve when, in six hours or so, I will deliver my two final judgements for the year. When I get to my chambers, I will plug my digital recorder into my “pet Dragon” (a computer with Dragon NaturallySpeaking voice recognition software installed) and it will produce a near-perfect draft of this editorial. A marvel of human ingenuity! The emerging vaccines for Covid-19 are further miracles of human innovation and technology, developed in record time and able to be rolled out over the coming months or years to provide protection for humanity and, I hope, for people of all races and in all places (including the farthest flung corners of our planet).

Australia was open across the whole continent and a trans-Tasman travel bubble was in the offing – although too late for my family’s planned visit to New Zealand and the expanded range of adventure caving activities my teenage children had planned for Waitomo. Now that the younger of them had passed his 16th birthday and thus expanded the range of activities in which he was permitted to participate, he had been looking forward to writing another “mystery shopper” piece to go with those which he had already contributed during my editorship.

Then came the so-called “Avalon cluster” here in Sydney, disrupting plans for family Christmas festivities and with three differing lockdown regimes operating across Sydney depending on whether you were in the epicentre suburbs for the cluster; in the nearby but a little distant adjacent grouping of suburbs; or, living, like me, in what is described as Greater Sydney. The new, “new Covid normal” is that there is no new Covid normal and that each twist of the barrel of the kaleidoscope of life has the potential for new and different fast response restrictions on our lives.

The lengthiest piece in this edition, Greg Middleton’s description of his visits to various Neolithic cave sites in the Dordogne region of France complements my own earlier descriptions of visits to such sites in the Dordogne and the Ardèche regions of France. His piece reminds us of the available delights of earlier times when skies (and caves) were open!

A report from Peter Chandler, our New Zealand Vice-President, also shows that hope of return to a more normal life may be possible.

The Association’s cave atmosphere monitoring project continues to provide interesting data as Andy Baker, Andy Spate and Dave Gillieson report in an update in this edition.

In this edition, an opinion piece from Nicholas White appears (also published earlier in Caves Australia, the ASF journal, but reproduced with permission here) about the cavalier and thoughtless destruction by Rio Tinto of the caves of the Juukan Gorge. At least the outpouring of public anger at the senseless destruction of this priceless and sacred Aboriginal heritage provides some hope (but not certainty) that change for the better in protecting such sites may result.

Also out of the physical and metaphysical ashes of these dark times, in our next (March 2021) edition, Dave Gillieson reports on recovery efforts on Kangaroo Island following the impacts of the disastrous bushfires nearly a year ago – bushfires that impacted not only on the caves and associated infrastructure on that island but also on many other cave and karst locations in eastern Australia. Indeed, yesterday, my wife drove the two of us from west to east along the Wombeyan Caves Road and nearby fire trails where the blackened trunks of many eucalypts were producing epicormic growth (promising recovery over time) but when many of the more distant hillsides were visible showing merely black, burnt match stick like trunks with no sign of epicormic greening and very little sign of any other regrowth – such was the intensity of the firestorm that ravaged those valleys.

As my wife drove, I reflected on the fact that, in 1989 as the then NSW Minister for the Environment, I was appointed as the chair of a cabinet committee to address what should be, to the extent a state government could influence it, our response to greenhouse gas emissions. Over 30 years later, we live in a world where we have not yet reached universal common commitment to address the warming of our planet.

Enough of the maudlin ramblings of a soon to depart editor! I apologise that I was not able to publish this edition in time for it to make your electronic Christmas stocking, but the necessity to finalise, before Christmas, a lengthy decision dealing with fire safety risks in a tyre storage facility in Sydney’s southern suburbs had me in my office for the whole of last pre-Christmas weekend working on the judgement rather than on this edition as I had expected.

I hope you all had a happy festive season in whatever circumstances Covid 19 permitted to you.

I conclude with my thanks to Tony Culberg and his wife, Pat, who act as my proofreaders for this Journal. The coherence, spelling and grammar owe much to the assistance I receive from them!

Tim Moore

POSITION VACANT

Journal Editor (unpaid)

Volunteer wanted

Starting no later than May 2021!!

Apply to President Ian Eddison

President's Report

Ian Eddison

The ACKMA committee has met via Zoom several further times since the last Journal.

A submission from ACKMA on 'Short Term Contracts' surrounding employment of guides in show caves was prepared thanks to Deb Carden's efforts. This has been emailed to Prime Minister Ardern of New Zealand and Prime Minister Morrison of Australia after being revised following the committee's review of it. A copy of the submission is reproduced following this report.

Generally speaking, ACKMA encourages temporary positions to be filled by regular staff rather than engage employees on short term contracts. This would give such presently temporary staff more security with full benefits equal to that of permanent staff. ACKMA has drawn attention to the economic value of the cave tourism sector and that it requires support in these difficult times. Caves tourism will take some time to recover to normal capacity.

Kangaroo Island in SA is gaining good post-bushfire planning through two areas. These are Flinders Chase Reimagining and a Management Plan for the western end of the island's national park. David Gillieson is actively involved in both. Brett Dalziel is also involved in his role within SA Parks for Kangaroo Island which gives us hope for Kelly Hill Cave and other karst features on the island.

A revised "Best practice guidelines for show caves" is being drafted by Andy Spate and David Gillieson. They invite input (including from those managers who can contribute from recent experience). This project is an extension and update of past guidelines.

The ACKMA strategic management plan is being worked on by Jodie Anderson. Please get in touch with her if you have contributions to make to the plan.

For several months the ACKMA Guides Community Group on Facebook has had an online 'chat room' called the 'Guides Grotto' to meet and discuss guide related topics. Facebook users please look for this group and the announcements to join in. Please encourage other guides to participate and share knowledge and skills. I especially want to acknowledge Jackie Perry and Teagan Symons of Yarrangobilly Caves for their enthusiasm and drive on this project.

ACKMA and ASF are inviting all creative arts people of Australasia who also happen to love caves to celebrate the International Year of Caves and Karst in 2021. Write a story, rhyme, poem or song. Sketch, paint, sculpt, take a photograph or make a video. The medium is your choice. You may focus on one creative piece or a series throughout the 2021 year. The theme is Caves and Karst in Australasia.

ACKMA and ASF will showcase your creativity as part of our celebration of the International Year of Caves and



Karst 2021. More to come on how to submit your work. Simply let your creative juices flow for now.

The Invasive Species Council has been in touch regarding a 'Reclaim Kosci' campaign addressing feral animals, particularly horses, within Kosciuszko National Park. ACKMA will be considering its position on impacts on karst areas. ACKMA will provide a submission on a draft management plan to be released for comment by the NSW Environment Minister. This call for comment is likely to happen in March 2021.

As I prepare this report, I am heartened that COVID-19 restrictions are easing. Despite the occasional spike in infections, borders have largely re-opened and more caves are beginning to receive visitors. I caution not to become complacent; maintain your personal hygiene; and observe COVID Plans in show caves.

Wellington Caves has been open since July 2020 and has had numerous inspections by NSW Health staff as well as by local Police. My understanding is that, if you personally breach your approved COVID Plan, you can be fined as well as your operation being fined and closed. Please be careful as you do not want to cause the further spread of COVID-19 or attract poor publicity and adverse comments for your site.

I again remind you that at the 2021 AGM our Treasurer and Editor positions will become vacant so please consider which of those roles you may be prepared to take on.

I wish you a great Christmas and festive season. I hope 2021 will be good for you and yours.

9th October 2020

ABN 87 698 816 592
PO Box 131 American River SA, 5221 Australia

To: Leaders that care about human resource management of caves and karst sites throughout Australasia

Re: Short Term Contracts – Our recommendation

Introduction

The use of short-term contracts in the tourism sector, especially those managing caves and karst have long been an issue in retaining staff or at the very least in providing fairness and equality for all staff who work in caves and karst. We raise the following points with you for consideration and further deliberation on human resources policy.

This subject of short-term contracts will likely resonate with public sector cave sites and private sector businesses. The hours of work are part-time. In off-seasons when there are fewer visitors so demand for guided tours is lower and guides work, fewer hours. The opposite occurs in peak times, school and public holidays particularly, when guides often work full time+ hours. Flexibility on both employers and employees is essential. Short term contracts only add to uncertainty for the employee.

Covid-19 lockdowns brought the casualised employment tenure of cave guides to the fore. As Covid-19 kicked in and sites shut down it became apparent that cave guides on short term contracts and the casualisation of the workplace created a need for employees to reassess their position. One cave site in NSW had three resignations in a week during this time as staff reconsidered their future.

In the Covid-19 situation Australian state government employed cave guides on short term contracts were not entitled to Job Keeper. Cave guides with second jobs had some income trickling in. The application process for Job Seeker proved to be a minefield and some guides have had to access their superannuation to survive. Long term, this will be a disadvantage to those people as their retirement income will be less.

Types of Employment Contracts

We understand that the type of employment contract that can be offered to guides is contingent on the types of contract administered by an entity. Examples include:

- Casual, part or fulltime, maximum 12-months, no right of renewal.
- Permanent part-time, three to five years, no right of renewal.
- Fulltime, three to five years, may have right of renewal.

It is important to satisfy the needs of both employers and employees. Without the commitment either way, good staff often find other secure work and the renewal process occurs all over again and again which is costly to the employer as it takes time for new staff to learn the in-depth aspects of a cave site.

The Case for Security of Tenure

AMBASSADORS FOR YOUR BUSINESS

Cave guides are the front-face of the entity for whom they work, a crucial part of its commercial success. They have strong interpersonal skills, engage with, entertain and inform customers. They must have or develop skills and abilities outside of many 'normal' jobs. They must be capable and adaptable to deal with a myriad of ages, stages and interests of visitors. They are responsible for safety, monitoring customers throughout a tour to ensure their well-being. Work Health and Safety knowledge is an essential competency. Guides take action when necessary to ensure their own and visitor/s safety.

RETENTION OF STAFF SAVES MONEY

The cost of hiring and training staff is considerable. It can cost between \$3000 and \$10000 per person - costs start at the time a decision is made to employ. A position description (PD) may need to be developed or reviewed. Steps then include advertising, selecting an interview panel, choosing candidates to interview, hiring or arranging a room, maybe paying full or partial costs of bringing candidates in. After interviewing and choosing the preferred candidate the decision is written-up, referees are contacted, the job is offered/accepted. The appointment is made, the new person arrives on site. Induction occurs, training begins. Uniforms are purchased.

For sites that have 'extra layers' e.g., unique geology, hydrology, chemistry, paleontology or key fauna such as microbats, it is not uncommon that it takes several months of exposure to scientific research outcomes to learn enough to comprehensively / authoritatively interpret all the site's values. The value of training over those months is considerable.

LOYALTY AND MOTIVATION

The benefits to an employer of highly motivated and loyal staff are significant - morale tends to be high, staff respect and appreciate each other which creates a good atmosphere which is noticed by customers.

SECURE TENURE - EXAMPLE FOR YOUR CONSIDERATION

1. A new guide is hired on a 12-month casual contract with the same sick and annual leave percentage per hourly rate as at present. If at the end of 12-months good performance is proven and funding is available, they are then offered a five-year contract, which is typically set out as a 3 plus 2.
2. The five-year contract would have conditions as per usual longer-term contracts - sick, annual and other leave provisions (paternal, maternity, bereavement). At the end of a five-year contract the offer can be made for another five years based on performance.
3. There are 'base' hours with flexibility to increase by agreement between the parties.
4. Annual Performance Reviews and Development (PRDs) ensure a high standard of service is maintained and quality staff retained. All contracts have clauses to terminate if performance is not up to scratch.
5. Part Time positions should be explored more often by employers when they need regular staff to work a few days each week. A Part Time position would have the same sick, annual and other leave provisions (paternal, maternity, bereavement) as a permanent team member. Not on a contract but a determined minimum number of hours, with the expectation additional hours would be available, by agreement between the parties. This assists the employer in peak times as well as boosts the number of hours annually for the employee. Most importantly it provides security to both the employer in keeping valued staff and the employee has job security to plan a life based on secure employment.

Post-Covid-19

- The job scene will likely be different and security of tenure may take a higher priority for some people than it has in the past.
- Cave guides are likely to look for more secure positions. Many had to when their work stopped during Covid-19 shutdown and they were unable to qualify for government support.

- Managers of cave sites will review how many visitors can be taken on tour and the tour timetable will be restructured. Considerations will involve available space determining the new carrying capacity on each tour, the perceived new market demand and the available staff to carry out daily duties including tours.

Caves which have been developed to enable the average person to visit and experience their natural wonder play an important role in the tourism sector. These places need very experienced staff to protect these special sites and safely guide the public as well as properly inform them of the environment they are viewing. Being a cave guide involves many skills and if done well looks like – well a walk through a cave. These skilled people deserve secure employment. Please use your position and leadership skills to create more secure employment to this very skilled tourism sector. Tourist cave sites give a purpose for people to travel, to stay, eat and play and contribute to the myriad of associated services in each of their local communities.

I R Eddison

Ian Eddison

President ACKMA

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Cave Animal of the Year

Cave Animal of the Year 2021

What will it be?

Production of our Australian Cave Animal of the Year materials is now in process and we will launch our 2021 effort at the ASF Council Meeting on 10 January 2021.

Our exciting 2021 materials will be available after the launch date.

Please get ready to support our 2021 efforts for cave animals and place your orders for posters, bookmarks, stickers and cups at: hello@caveanimaloftheyear.org.au

www.caveanimaloftheyear.org.au

Above image courtesy: Editor, Caves Australia

2019

Tasmanian Cave Spider

Hickmania troglodytes



Image by Garry K Smith

2020

Australian cave crickets

Rhaphidophoridae



Photo by Garry K Smith

New Zealand Vice President Report

Peter Chandler

We remember Derek Lipyeat, husband of Moira, who passed away on 10 June, a few weeks after his 90th birthday. Derek first caved in Wookey Hole in 1949 and arrived in NZ in 1962. He and Moira discovered the Canterbury Caving Group in the mid-1980s and were well known for being on rambling campervan trips intersecting with ACKMA and NZSS events. We remember Derek fondly.

Tuesday 8 December was the first anniversary of the Whakaari/White Island eruption where 17 Australians, 2 Americans, 1 German and 2 local guides died during or from this steam eruption. As would be expected after such a tragic event, standards in the adventure tourism industry are in the spotlight again. In the world of cave tourism and adventure tourism, there are no exact parallels, but plenty of the duty of care for cave visitors happens during times of heavy rain, and the ability to make a call to cancel a cave visit is an essential part of the site management. Perhaps now surprising, but on 27 April 2016 White Island did erupt in a similar fashion, but in

the evening when no one was visiting. Similar alarm bells ring when we hear of close calls on cave tours.

Earlier this year, a discussion document was put out for public comment, it being about how to tackle the problem of moa and other extinct species bones being removed from protected sites and sold.

We look forward to this new law being in place and thank members who made submissions on this.

It is very difficult to say what the international travel situation will be for Kiwis wanting to attend the 2021 Wellington AGM. At this stage, getting there is relatively easy, but returning requires 14 days of quarantine and it costs \$4000 if not eligible for NZ government funding....

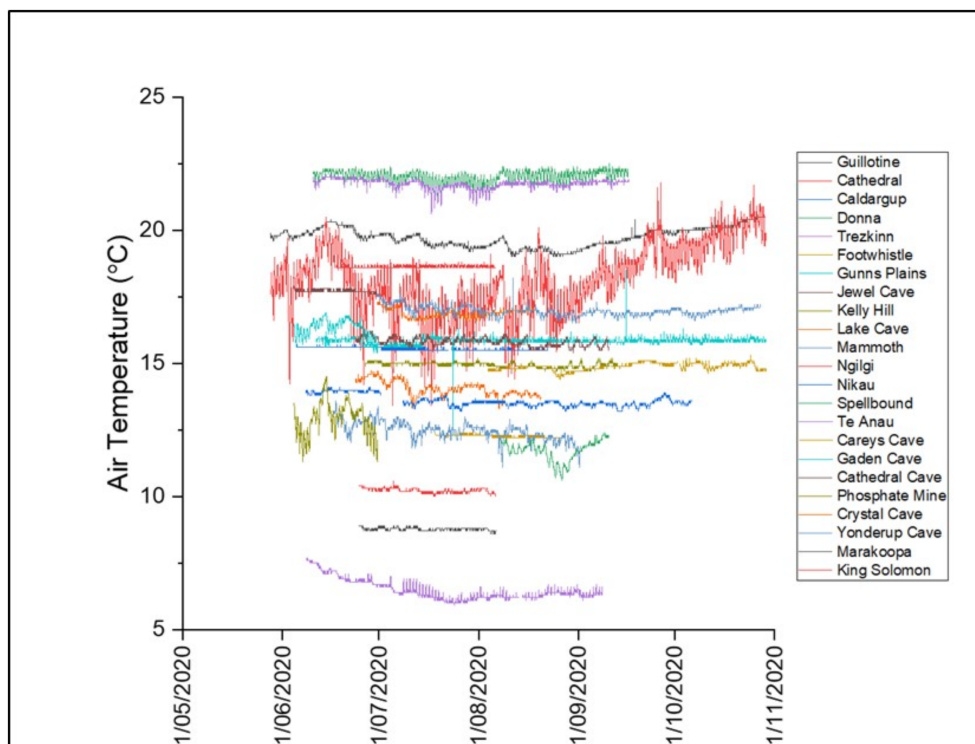
The New Zealand Speleological Society and The Waitomo Museum of Caves have both looked positively at events to be run in association with the 2021 Year of Caves and Karst.

Further out, planning is underway for a full ACKMA conference at and around Takaka, northwest of Nelson on the South Island in 2022.

ACKMA Cave Climate Project – December 2020

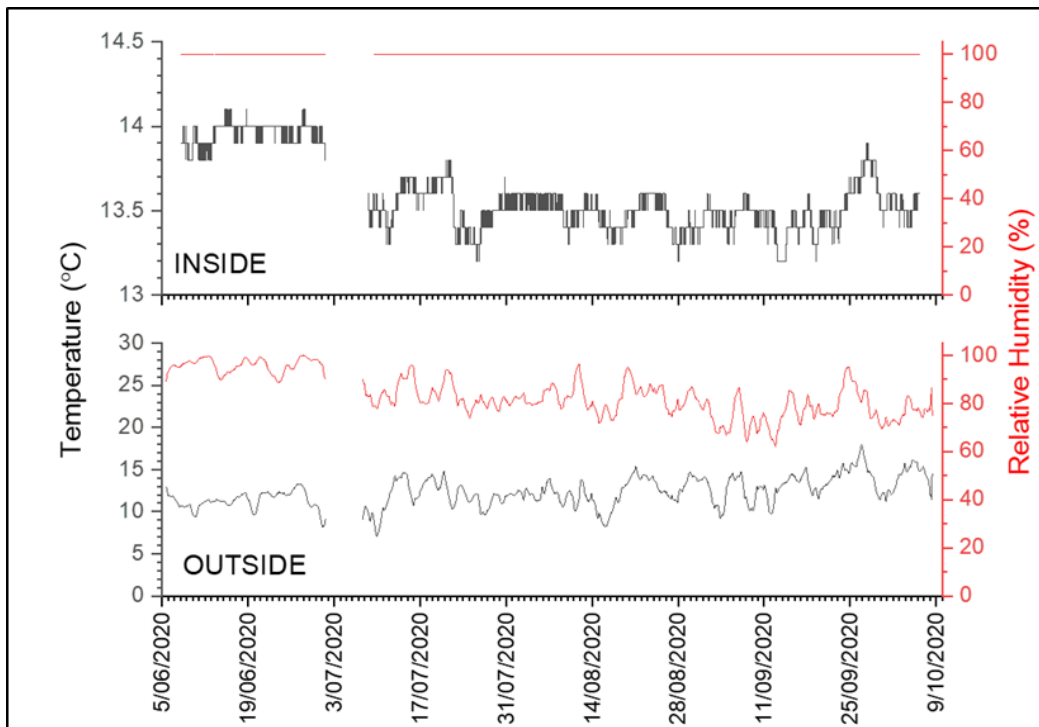
Andy Baker, Dave Gillieson and Andy Spate

The first six months of results has already improved our understanding of the cave climate at each participating cave. Ongoing results will help to inform the management of individual caves. The data so far identify the importance of conduction of heat from the overlying surface and ventilation of buoyant air from cave entrance(s). The next six months of data will cover the austral summer, a period of decreased cave ventilation. All data have been provided to participating organisations.

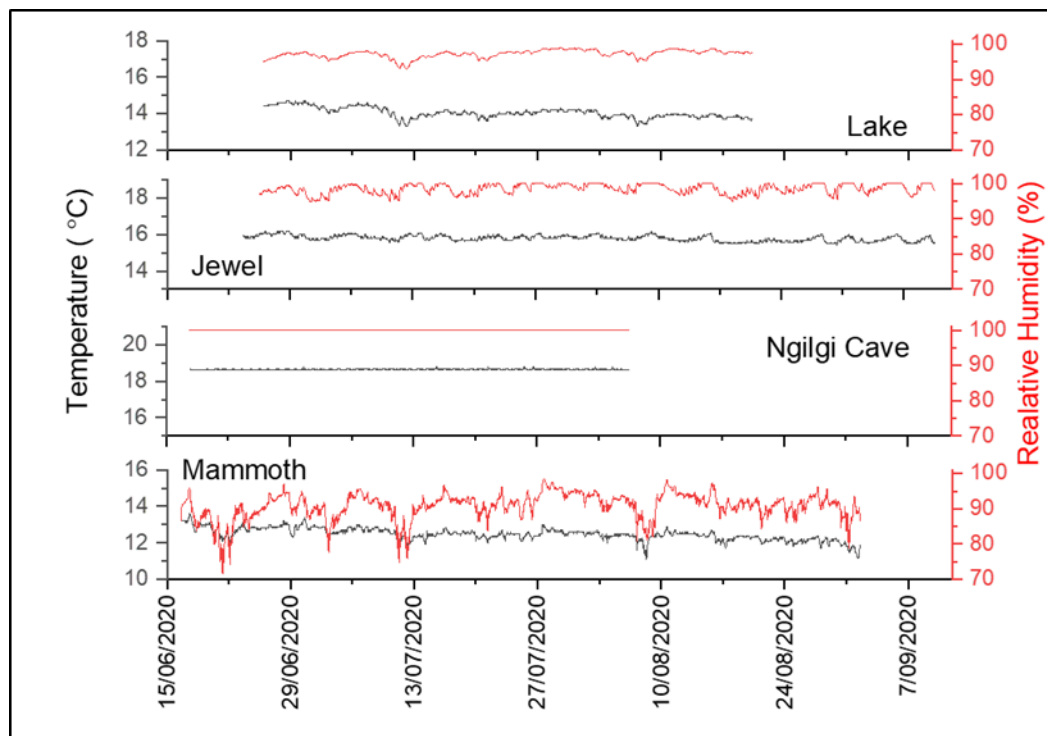


Results to date from participating cave sites

This project is running along relatively smoothly, given the large number of sites and loggers involved. We have had some technical difficulties, but these were not major. Most of our participating cave sites are supplying data, as you can see from the image above. We are working on ways of making the data easier to read and on ways of bringing out the data on individual sites on this complex graph below. Andy Baker continues to provide interpretation to individual sites on the data they submit. Some examples follow:



Nikau Cave, New Zealand. Nearly 100 tours run over three months, with 970 people walking through the cave.



Four caves from SW Western Australia, illustrating the individual nature of cave climate, depending on ventilation, cave morphology and surface heat environment

A highlight for us over the past few months has been a presentation by Andy Baker to a virtual cave science conference conducted by the British Cave Research Association (BCRA) in mid-November. You can view this presentation on YouTube at:

https://www.youtube.com/playlist?list=PLu_TDxz8KSU_OXItVlhvrzMJ1nI7nFOhJ

Andy Baker's presentation was followed by one from researchers at Poole Cavern, UK, using a similar approach to ACKMA.

A visit to some show caves of France – 2019

Greg Middleton

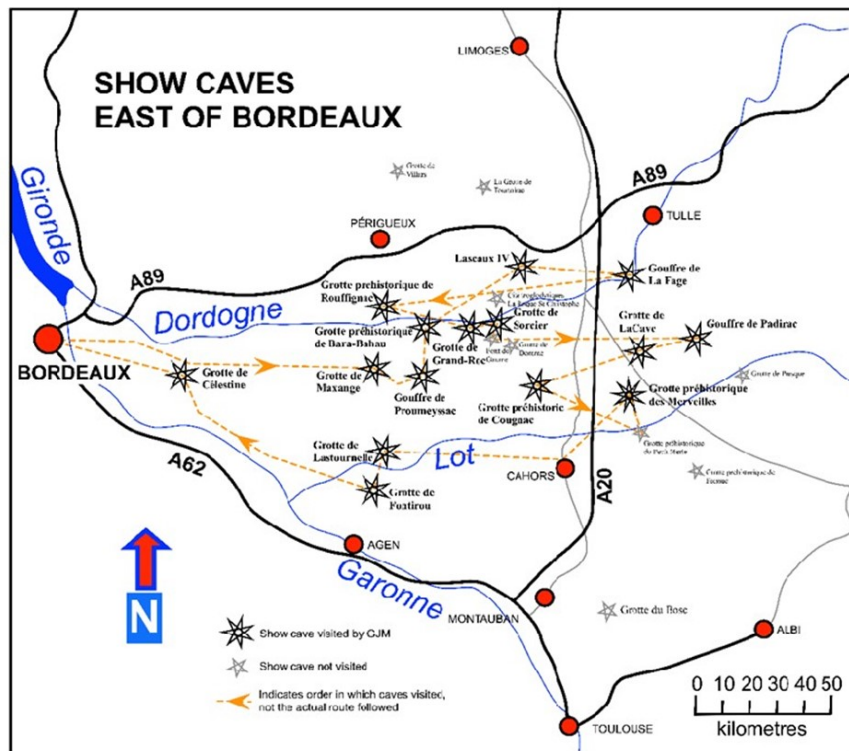
Why France?

In 2019, I was booked on a cruise through the Northwest Passage, above Canada, with the French cruise line, Ponant. As the cruise started with a charter flight from Paris to Greenland, I had to be in Paris on 24 August. So, I took advantage of the opportunity to visit a few French show caves – of which I understand there are over one hundred.

East of Bordeaux

I chose Bordeaux as the starting point for my trip. Fig. 1 shows my driving route from there and the caves visited.

On 16 August, I flew to Bordeaux and drove east, stopping the first night in St Jean de Blaignac.



Locations of show caves east of Bordeaux and the order in which they were visited.

On the morning of 17 August, I drove to **Grotte de Maxange**.

One is supposed to book tours 24 hours in advance, but I got a ticket for a tour 10 minutes after I arrived. Cost was €8.90 (about AUD15). An informative young guide handled the tour well. Although nearly all of the party was French, he provided some interpretation in English. They A card was also provided, describing the main stops, in English. The cave was opened from a building stone quarry in August 2000 and was made accessible to visitors in April 2003 after major excavation of sediment from the main passages. The cave's website immodestly claims: "the caves of Maxange, masterpiece of nature, offer the magic of a spectacle of eccentric concretions unique in the world. Maxange is today recognized as one of the most beautiful concretion caves in France" (<http://lesgrottesde-maxange.com/?lang=en>). Perhaps surprisingly, this claim proved to be justified.

The collections of helictites are extraordinary for both their number and size. There are also a few fine stalactites.



Large parts of the cave are adorned with helictites



Photo 1. Reverse of entry ticket—featuring the cave's signature speleothem, 'The Parrot'.

The unusual name is a combination of the first name of the original quarry owner, Maximilien (Caballero) and his son, Angel, who actually made the discovery.

The lighting is fair to good and is reasonably new. The pathways are serviceable, being compacted sediment. Many French caves do not allow photography, but this one does! My overall impression was favourable, having had no expectations of a cave of which I had never heard.



Helictites are the feature of the cave
 – some are remarkably large.

A 15 minute drive north from Maxange was the **Gouffre de Proumeyssac**. This appears to be a big operation, including a surrounding 'Parc'.

Two tours were offered, the standard walking tour, through a tunnel (€10.60) and one involving being lowered 50 m into the cave's main chamber in a basket/'gondola' (€18.90). I could not get a ride in the basket, so took the normal tour. It was made clear that photos were not allowed.

We had an extremely voluble young guide who spoke only in French. Quite a long tunnel gave direct access to about the middle of the gouffre where there was a balcony with quite a good view of a well-decorated chamber. I couldn't resist sneaking a shot of a notable decoration on the far side. We then walked down lower and right around chamber. Souvenirs were set out so they would be coated with calcite from dripwater.



Main chamber, Gouffre de Proumeyssac

The lighting was basic but well-placed and effective. Music was played with the lowering of the 'gondola' (which was promoted as a 'son et lumière'); we saw this twice from different sides of the chamber. Some of the pathway is cut through flowstone.

The use of the 'gondola' has been a feature of the cave since it was opened in 1907; many early postcards feature it.



Postcard showing the Proumeyssac gondola
 in the early 20th century

Leaving Proumeyssac, it was a 7 minute drive to **Grotte préhistorique de Bara Bahau**. As the next cave tour was not until 17:20, I bought a ticket (€7.20) and waited. I looked around the small gift shop, where I was able to buy some postcards and a set of colour slides! (I haven't seen slides for sale at caves for many many years, so these are real collectors' items!) Photographs are not allowed in this, or any other French caves designated as historic heritage. The tour was conducted, in French, by a middle-aged woman but she did her best to give me some information in English. This is quite a small, single-chambered cave with several large excavations up to 15 m deep to enable sediment studies. The cave was evidently inhabited though the "drawings" the occupants executed are not all very convincing.

In 1951, Norbert Casteret was the first to recognise many incised lines as art (he had to use a lot of imagination).

The Magdalenian engravings date from the Upper Palaeolithic (17,000 to 12,000 years ago). They depict various animals.

Lighting in the cave is kept fairly low (presumably to protect the artwork) and is carefully directed over the engravings.



Head of 'auroch', large extinct cattle – from a 35 mm colour slide.

This is a very low-key operation and not one of the major art caves of France but nevertheless interesting. It's surprising how many of the smaller caves like this one continue to operate.



Engraving of a so-called 'feline horse' – from a 35 mm colour slide.

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The building complex housing the International Centre for Cave Art, including the most complete facsimile yet of Lascaux Cave, Lascaux IV

On 18 August, I drove to the village of Montignac to visit perhaps the most famous cave art site there is, **Lascaux**. As Sieveking & Sieveking described it (1962, p. 89):

Lascaux is the finest painted cave in France, and among its animal paintings are some of the best examples of Palaeolithic draughtsmanship in existence. The entrance to the cave was blocked in antiquity so that none of the paintings has deteriorated and the cave walls have not been defaced by modern explorers.

Lascaux Cave was found by four boys in 1940. Although its importance was quickly recognised, World War II prevented the cave being opened until 1947. Unfortunately, “with more than one million visitors in 15 years, its fragile natural equilibrium was soon upset. The installation of air conditioning in 1958 could not prevent the development of the ‘green disease’ caused by algae, and the ‘white disease’ linked to calcite.” (St-Cyr & Feruglio 2017, p. 33). As a result, the cave was closed to the public.

After it closed in 1963, requests for visiting Lascaux arrived by the thousands. In 1972 the French government decided to build a partial [40%] replica of the cave. Work began on Lascaux II in an abandoned quarry 350 m from the original cave. From 1983, the visitors returned in droves (St-Cyr & Feruglio 2017, p. 95).

In 2012, the General Council of the Dordogne decided to share Lascaux with those who could not visit even the replica. “It was the first time that anyone had thought of making a cave travel.” (Retout 2017). The result was ‘Lascaux III’, a 1000m². exhibition featuring reproductions of those parts of the cave not shown in Lascaux II, which first opened in Bordeaux and went on to Chicago, Houston, Montreal, Brussels, Paris (where I visited it in August 2015), Geneva, South Korea and Japan.

To meet better the expectations of an ever-increasing number of visitors, work on a new facsimile, representing 90% of the famous cave, began about 2012 and opened in the International Centre for Cave Art in December 2016, at the foot of the hill containing the original cave.

“Lascaux IV” as it is known, is housed in a huge complex on the edge of Montignac. Apart from the stunningly accurate reproduction of the cave, there is a “Workshop” displaying a number of elements of the model to help the visitor understand how it was constructed, a theatre showing films on cave art, an art gallery, a very large giftshop, a restaurant and a reception area where entry tickets are sold.

I arrived in time to book into the 12:30 tour, which took about an hour. We had an extremely good English guide, Joseph, who demonstrated a keen interest in, and knowledge of, the cave. The facsimile is quite remarkable, visitors really feel they are walking through a cave – and the art is fabulous. Although it’s only a reproduction, photography is not permitted; probably to try to keep tour groups moving, but it is very frustrating for those who like to photograph caves. Fortunately, photography is permitted in the Workshop where most of the art is displayed again and one is free to wander at will. The total experience is superb.



Engraved horses under the Great Black Cow are exposed by UV illumination of the panel

I could not get a place in a tour until much later in the day so I decided to see if I could find the original entrance. I walked up to a lookout over the Vézère Valley but could find no sign indicating where the original entrance was. I was aware that the cave was closed to ordinary visitors but I thought that at least one would be able to see the entrance. I noticed an area surrounded by a high security fence with a World Heritage sign. Peering through the fence and hedge, I could just make out what I am sure is the original entrance (from my knowledge of historic photos). This is as close as I was going to get to the most famous cave art site there is.

After a couple of hours gazing at these amazing ancient artworks I tore myself away. I bought the obligatory postcards plus an unusual souvenir – a €0 ‘banknote’ featuring some of the bulls. I then drove up the hill to the ‘old’ Lascaux II.

It was hardly any easier to see the entrance to Lascaux II as the ticket barrier prevents you getting close (unless you are on a tour). I left Lascaux with a slight feeling of disappointment but feeling I had got as close as possible to the original and very impressed by the latest recreation and associated interpretation.

From Montignac I drove to **Gouffre de la Fage**, a 44 km trip but it proved not an easy cave to find.

It is a smallish operation and I was surprised to find the cave is self-guided. I was not at all impressed by way it is being operated. After you buy your ticket (€8.50), you walk down about 20 m into the pit which provides access. At the bottom of the shaft, the main part of the cave has developed horizontally.

There is no supervision of visitors whatsoever. I saw a guy climbing way off the track and in another place, you were invited to play being a caver and to walk across gours and calcite floor. There has been very bad vandalism (many broken stalactites) but it is difficult to know when this occurred (perhaps before it opened as a show cave; it has been known since the 1890s). The discoverers prevailed upon the father of speleology, Edouard Martel, to help them explore it in 1891-92. Apparently he remarked (in translation): “the crystalline ornamentation is much more beautiful there than in many too vaunted cavities.”



‘The Black Stag’ with finely drawn antlers



Figure of a man, but with a bird-like head, and below him a bird, apparently on a stick. They are confronted by a bison. The human figure is the only one at Lascaux and one of few in French art caves

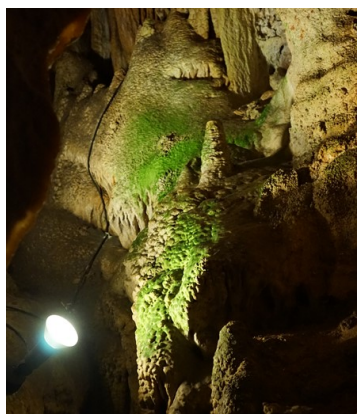
As I had seen in “Lascaux III”, the various main panels are set up and illuminated so that you can see where over-drawing has occurred. As you stand before the panels the lights are changed in sequence, revealing the original artwork below.

The cave is more extensive than I expected and very well decorated despite all the accessible stalactites being broken.



Large stalagmite in First Gallery

Paths are concrete and lighting is functional rather than aesthetic. Information concerning bats is given through bat-shaped signs affixed to the floor. This unusual presentation hasn't worked; most of the signs are not seen by visitors and many are muddled, making reading them impossible.



Serious lampenflora at Gouffre de la Fage

Lampenflora is a serious problem because the lights are on continuously. After I had completed the tour, the woman in ticket office asked me what I thought of the cave – so I told her how I thought this cave should not be

self-guided and that the amount of lampenflora was atrocious. She said the owner could not keep it open if he had to pay guides throughout the year. (Apparently it is guided only on busiest days of summer.) I was not impressed.

One thing the owner does do is display a sign showing the location of many other caves in the region. I saw this at some other caves.

On 19th I drove to **Grotte préhistorique de Rouffignac**. Arriving at 10:15, I was able to buy a ticket for the 10:30 tour (€7.80).



The entrance to Rouffignac Cave provides very easy access. The ticket office and shop are in the entrance passage.

According to Sieveking & Sieveking (1962 pp. 122-124):

“The Rouffignac Cave is well known because of the controversy over the authenticity of its paintings, which followed the announcement of their discovery in 1956. The paintings were described in July of that year but the name and the location of the cave were kept secret. This naturally aroused the interest of the press, and the cave was soon found by an enterprising reporter. Other papers then published inter-views with local historians and speleologists denying the authenticity of the paintings and claiming they were executed by members of the Resistance during World War II. Indignant denials followed and the resulting press campaign did nothing to settle the question.

“In September 1956 Rouffignac was inspected by a group of professional archaeologists, the majority of whom pronounced in its favour ... but unfortunately the evidence is largely circumstantial.

“Rouffignac resembles a modern tunnel, since, unlike most of the other caves, it has an almost perfectly flat floor, and a semicircular domed roof. This appearance is accentuated by the light railway which has been laid through the cave to take tourists to the small decorated galleries, nearly a mile from the entrance.”

Strangely, the modern guidebook (Odile & Plassard 1995) makes no mention of the controversy over the authenticity of the cave's artworks. The large entrance passage, with the ticket desk and gift shop, displays prominent chert nodules in the walls and roof; these are evident throughout the cave.

I paid (€1.50) to rent a visual guide in English. This was most informative and probably provided the best interpretation I experienced at any of the caves I visited. I walked a short way to the gate, then another 100 m to the electric train. No photos were allowed inside but I snuck one of the train.

The train carries tourists quite a long way through the almost flat, large tunnel. There is graffiti everywhere but it is difficult to see in the limited light. (The cave was first documented in 1575 and visitors were brought in by locals for over 350 years before anyone noticed the Palaeolithic art!) The train stopped a number of times to enable us to view engraved and painted art on the walls.

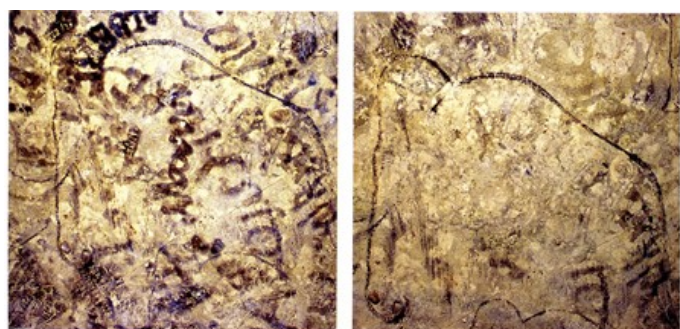
As Odile & Plassard (1995 p. 10) explain :

The artists had to adapt their technique to the type of surface, although they deliberately restricted themselves to two art forms, viz: drawing and engraving. The drawings are all outlined in black and were produced by rubbing a piece of manganese dioxide directly onto the wall or roof. The methods used in engraving are more varied. Depending on the hardness of the base medium, there are lines made with flint chisels or with a bone or wood tool, while in the soft chalk, many of the lines were drawn with the fingers.



The most complete mammoth (of 157) in the cave, drawn with fingers – from a post-card

Our guide/train driver seemed very knowledge-able, though he spoke entirely in French (the rented audio device more than made up for this). At the end, we got off the train and walked a few steps to view a gallery of animals – the ‘Great Ceiling’. The lighting is subtle and just on the artwork (no doubt to protect the art from the sort of problems that affected Lascaux, and so you can’t see much graffiti). The headlight on the train gives low light as you move through the passage.



A mammoth on the ‘Great Ceiling’ showing pre-1956 graffiti (left) and the result of 1989 cleaning (right) (from Odile & Plassard 1995, p. 29)

Next on my list was the Grotte de Grand Roc – a cave opening from what is indeed an impressive high rock face . I bought my ticket for the next tour (€8) and had to wait only a few minutes.

The tour was conducted by an older woman whose English was perfect (but who assured me she was Dutch) and who had a good knowledge of caves. A sheet was provided in English which gave some background and basic cave-related facts. Apparently, in 1922, an archaeologist working on a site below, noticed water trickling from a small hole about halfway up the cliff face.

It took him two years to cut his way into the cave and until 1927 to make the cave accessible to visitors.

The narrow, low, cave passage is extremely well decorated with a profusion of helictites and crystals which could easily gain for this cave the title of ‘Jillabanan of the North’ (for those familiar with Yarrangobilly Caves).

Unfortunately, the path has had to be cut into flowstone and the roof cleaned of stalactites in places (many of which are regrowing). Fine nylon mesh is used to protect speleothems which allows for reasonable photography provided light does not shine on the mesh.



A profusion of speleothems surrounds the narrow pathway. Nylon mesh provides protection

One particularly striking speleothem is a stalagmite to which a piece of stalactite has become attached at right angles. Naturally, they term this ‘The Cross’. (One can’t help wondering if superglue was involved.)

The cave’s ‘signature’ speleothem is a helictite said to resemble a statue in The Louvre of the Greek goddess of victory, Athena Nike, also known as ‘Winged Victory’.

Lighting is ordinary with little attempt to conceal it (though admittedly there’s not a lot of room).

From Grand Roc I set out for Grotte préhistorique de Font de Gaume, but a road sign diverted me first to **Grotte préhistorique du Sorcier** (aka Grotte de St Cirq from the nearby village). I only had to wait about 40 minutes for a tour which gave me time to look around some adjacent cliff dwellings and a small museum.



Medieval excavated cliff dwellings adjacent to Grotte du Sorcier.



The engraving of a male figure known as 'Le Sorcier'. One of only a handful of human figures in all the art caves of France.

The tour of the small chamber was conducted (in French & English) by an informative female guide who did quite well, considering how little she had to show. The engravings are small and indistinct. A mirror is used to show those at the back, including the so-called 'sorcerer' which is very indistinct. As no photos are allowed this image is from a postcard which shows the figure more clearly than you can see it in the cave.

While it is not mentioned at the site (which is World Heritage listed), Sieveking & Sieveking (1962 p. 127) comment: "This engraving is claimed to be a Perigordian [Upper Palaeolithic]. In fact, the realistic drawing of the face suggests that it could belong to mediaeval or later times."

There are also a few animals. A sign on the door to the cave (translated) reads:

"This cave contains 28 prehistoric engravings dated between 15 and 17,000 years ago. Some of these works are visible, but the cavity being of modest dimensions, certain engravings remain inaccessible to the general public."

I then continued on to the Grotte de Font de Gaume but found it fully booked for the day, as was the nearby Grotte de Combelles, both pre-historic art caves. The number of visitors on tours to these caves is limited to 13 and 7 respectively and there are only a few tours per day. People queue up early each day to get tickets for these caves. The official website (<http://www.lascaux-dordogne.com/en/patrimoine-culturel/historic-site-and-monument-caves-and-shelters-containing-rock-art/grotte-de-font>) advises:

"Font de Gaume, a prehistoric cave, is one of the most incredible Palaeolithic sites in the world still open to the public. It reveals more than two hundred painted or engraved representations of bison, horses, mammoths and reindeer, of which many are polychrome. Grotte des Combarelles is a major site for the Magdalenian culture. Horses, bison, aurochs, lions, reindeer, and more: over 800 engravings and drawings of Quaternary Period fauna reveal themselves throughout the cave."

I drove on to **Grottes du Roc de Cazelle** – a formerly inhabited cliff face with lots of tableaux - scenes with statues demonstrating life in the megalithic etc., some of which are in small caverns. One small cave 'The White Cave', about 25 m long, is included, with tunnels out to the cliff face. A sign in the cave says (in translation):

"This natural cave 25 m long served as a refuge for a large part of the population of the city who came to protect themselves in this large cavity in case of danger. They found a mild temperature there, they collected the water that oozed from the ceilings, food could be stored and ... a cave like this constituted an indestructible refuge."

It is hardly worth visiting this site just for this cave.

Another roadside sign lured me into seeking the **Grotte de Bernifal**, of which I had no prior knowledge. Sieveking & Sieveking (1962 p. 48) describe this cave as being about 60 m long with three small rooms containing “some very fine engravings, comparable with those at Les Combarelles”, difficult to decipher human hand stencils, “a natural shape changed by engraving into a schematic human figure”, a mammoth frieze of 3 or 4 mammoths, a deeply engraved horse and other animals.

I walked some 875 m on an indifferent track through forest but, on reaching the entrance at 17:40 found that the last tour had been at 17:15. This cave looks as though it is privately owned. It is difficult to see how the owner/operator can be making much out of it.

My plan for the next day began with **Gouffre de Padirac**. I arrived at 09:10 and realised this is a serious operation! I joined a huge queue to get tickets, then noticed there were ticket-vending machines. I tried to buy the last ticket for the 10:30 tour but the machine refused to accept both my credit cards. I talked a woman behind me in the queue into buying a ticket for me – I paid her €20 for a €14.50 ticket. I was very relieved at getting a ticket at all and went to look over the impressive pit nearby.

Padirac is a significant cave, not just because of its size, but also its history.

“The discovery of the Gouffre de Padirac is inseparable from the development of discipline, modern speleology, and to the career of one man, Édouard Alfred Martel (1859-1938). The often heroic explorations of this visionary, along with the development of unique facilities, reveal the hidden side of a region of France – the Causse de Gramat, limestone plateau in the Massif Central. Today, Padirac is one of the most popular tourist destinations in Europe, especially as the natural beauty of the underground site has been entirely preserved” (Dubrana 2013).

The Gouffre (or shaft) was the subject of legends going back to ancient times (including that it was an entrance to hell and that after the Hundred Years’ War the son of Edward III had thrown a fabulous treasure into the abyss) but it had never been descended until, at the urging of artist Gaston Vuillier (who wrote “this famous hole inspires immense fear among the peasants. I am sure that you will find an underground river at the bottom of it”) on 9 July 1889, Martel and three colleagues made the descent and found the river.

Well, that’s the usual story but Dubrana (2013) notes:

“In the 16th century Maleville & Rochemonteix wrote that ‘the inhabitants of this country brought out of this chasm some excellent salt-petre, descending using extremely dangerous machines.’ Around 1865, two local figures, Murat and Salvagnac, descended into the chasm in a large basket attached to a cord, although they did not discover the underground river.”

Martel, however, continues to be celebrated as the discoverer and is commemorated with signs and a bronze bust

in the cave. There is a Martel Association which ensures he is not forgotten. France has even produced a postage stamp with the slightly comical image of Martel with a candle mounted on his hat as well as a series of 4 showing scenes in Padirac.

Martel continued to lead expeditions to explore the river until, in September 1895, he was involved in a boating accident. He had explored over 2 km of the underground river but at the turn of the 20th century he decided it had become too dangerous and he forbade further expeditions (Dubrana 2013). Not content with exploration of the cave, he also championed its opening to the public. With the help of the local priest he convinced the local landowners to sell him the land over the cave. With the financial support of George Beamish, an Irish beer baron, he obtained the funds to open the cave and he set up the Société Anonyme du Puits de Padirac – though as a lawyer he was unable to be a director. The first paying visitors descended into the cave in November 1898.

The 130th anniversary of Martel’s descent was being celebrated as I visited the cave.

About 50 people filed into the building for the 10:30 tour. Each was provided with an audio device which delivered quite good interpretation at various points along the route (in your choice of language). You then walk down the series of stairs (or take the lift) to the bottom of the shaft and then into the cave proper. From the bottom there is a dramatic view back up.

Once in the horizontal part of the cave, you descend to the river passage which you walk along for a while before embarking on small boats in which you are paddled about 500 m.

Although photography is allowed in the rest of the cave, it is forbidden during the boat trip. The largest single stalactite is to be seen here, ‘La Grande Pendeloque’ (The Great Pendant) – it features on one of the stamps.

Alighting from the boats, you walk a little further along the stream before ascending into the highly decorated Grand Dome.

On the way you pass the beautiful Lac Supérieur with its strange ‘Pile d’Assiettes’ (pile of plates).

The Grand Dome is crammed with massive, active flowstones. From the Grand Dome you return to the river, take a boat back and retrace your steps to the lift which returns you to the surface, in the gift shop.

The lighting is well done, making photography comparatively easy. The pathway, apart from the entry stairs, is virtually all concrete but this is inevitable given when it was developed and the number of visitors (25 million people have done the tour!) This is certainly a most impressive cave - and an equally impressive show cave operation.

**Flowstones from the
Grand Dome on next page**



Some of the massive flowstones that crowd parts of the Grand Dome in the Gouffre de Padirac

Next on my list was the strangely named **Grotte de Lacave**. It turns out the village is named 'Lacave' (= the cellar) so they just named the cave after it. They actually call it 'Les Grottes de Lacave' but I suspect that's just to make it sound more impressive; there only appears to be one show cave.

The cave opens directly onto a main road which is convenient but makes parking problematic. You take an electric train through a tunnel below the cave (not through the cave as publicity suggests) and then lots of stairs or an elevator up into the cave itself, where you walk to left and right.

The cave is large and surprisingly well decorated.

Norbert Casteret apparently described it as "The synthesis of French caves"; it's not bad but this is something of an overstatement. The guided tour is fairly standard, with some excellent displays of flowstone and gours. There are a number of large pools ('lacs') which make for good reflections but if not entirely artificial, they are at least 'augmented'.



Flowstone and gours. Pools feature strongly, though largely artificial

From Lacave, I drove the 30 km to Grottes de Cougnac where I had to wait for the 17:15 tour. It seems this is a true case of 'grottes' as there is an 'archaeological' cave and a 'geological' cave - both are included in the tour price (€8.80).



Sign with images from the 'archaeological' cave

As photos are not allowed in the 'archaeological' cave, I had to make do with signs and postcards for my record of the cave.

A young woman conducted our tour, first through the 'mineral' or 'geological' cave - which I would rate 'just above average', and then through the separate 'prehistoric cave' - this actually contained better speleothems but no photos are allowed.

The art consists of a few scattered drawings on smooth patches of wall between speleothems - in fact, this was the first case I had seen on this trip where there were significant speleothems and art in the same cave. Motifs include a symbol like a bird, ibex with curved massive horns and two humans - both with spears through them.

Sieveking & Sieveking (1962 p. 67) describe them as "the most interesting paintings at Cougnac". They consider the figures "seem deliberately to be very roughly drawn, in contrast to the accurate and life-like animal drawings in the cave." They rate the cave (only discovered in 1952) as "The most important painted cave found since 1945".

The pathway in both caves is entirely on natural surfaces, with handrails only here and there. Not a lot of speleothem damage is evident. Lighting is just functional - it is generally not well placed nor is all of the wiring hidden.

Next morning (21 Aug.) I drove to **Grotte préhistorique de Pech-Merle**, arriving about 10:15, but found the cave tours booked for the rest of the day and the next day. I had a good look through the small museum and gift shop, and around the site.

Sieveking & Sieveking (1962 p. 45) say Pech-Merle is “less well preserved than Lascaux or Cougnac – but containing some of the more exciting and unusual paintings.” In summary, “Horses resembling Lascaux ‘Chinese’ horses and elegant black line drawings of mammoths and wild cattle. Hand stencils. One of the finest painted caves” (p. 110).

Displays in the museum compare the figures of wounded men at Pech-Merle and Cougnac, concluding “they are characteristic of the art in Quercy [region]. They suggest a link between the two great sanctuaries and show that some of the Pech-Merle paintings are contemporary with those at Cougnac.

The museum also contains photos and drawings of other art from the cave, among the more famous of which are ‘The Spotted Horses’.



The Spotted Horses’ of Pech-Merle
(photo in the museum)

A sign at the site says “At the beginning of the 20th century, speleology was in its infancy. Going underground was unusual and risky, particularly in view of the rudimentary equipment and lighting available. The courage and tenacity of a 16-year-old shepherd, André David, culminated in the discovery of the large cavern containing the paintings of Pech-Merle in September 1922.” An artificial entrance provided easier access to the cave from December 1923 and the first visitors entered the cave in 1926. The cave is now entered through a gift shop.

Disappointed at not getting into Pech-Merle, I drove on to **Grotte préhistorique des Merveilles**, L’Hospitalet, Rocamadour, fully expecting it to be fully booked, too, but I was able to get a ticket for the 11:15 tour (€7.50).

The tour was conducted entirely in French (but I was provided with an illustrated information sheet in English). Our group of about 40 was split in two before entering the cave. Our sub-group was shown the art sites first. To make out the images here requires a great deal of imagination. As Sieveking & Sieveking (1962 p. 122) put it “All the paintings are faint and difficult to perceive”. One example will give an indication of just how difficult. A post-

card on sale at the office identifies a blurry image as a ‘hyena’. The information sheet provided (Anon. n.d.) included a drawing of what is definitely the same black painting, but labelled an ‘elk’.

This single-chambered cave has a fair growth of speleothems. Most of the path is on natural surfaces with a few concrete steps. Lighting is perfunctory, though generally hidden, with detailed lights on the artwork.

Next morning I drove back towards Bordeaux to **Grotte de Lastournelle**, near Sainte Colombe de Villeneuve. I arrived at 10.15 and was able to get on the 10:30 tour. There were about 12 others on the tour (all French speakers) but the guide conducting the group gave me occasional information in English.

This is a small cave which appears to have formed along an old stream course.

There are quite a few reasonable speleothems but nothing outstanding. An unusual feature is a well shaft sunk into the cave by a local farmer in 1878 which you can look up from below. It could never have yielded much water unless the cave flooded significantly.



Looking up well dug by farmer in 1878

Rudimentary lights are installed in the cave (a mix of older incandescent and LED) but I was told they are not used on morning tours “to preserve the cave” (presumably from lampenflora, some of which is evident). They were not well placed and would be unsightly when illuminated. The operators provided each guest with an LED torch – not great for photography but adequate for finding the way through the cave. Much of path is on natural surface with apparent cement stabilization (plus handrails where needed).



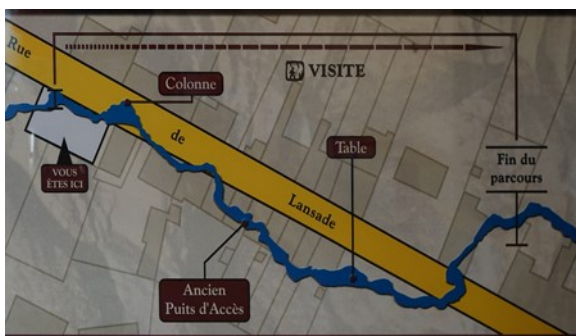
A simple bulkhead light fitting; functional but not aesthetic – with lampenflora

From Lastournelle, I drove to **Grotte de Fontirou** with some difficulty due to few signs and my GPS not listing it. Despite the problems I arrived at 11:55 and paid €8 for the 12:10 tour. I was lent some notes in English.

The cave is said to have been found by a farmer digging a well after his cow fell into it in September 1905. Our group was guided by a person who is probably the owner. The floor has mainly been excavated (a lot of limey mud has been dug out) with cement stairs and iron handrails. Lighting is adequate and carefully placed (advertised as new, LED). Speleothems are not superabundant but many are of good size and quality. A pit leads down to a small stream at the lowest point of the cave.

Next morning, I drove to **Grotte de Célestine** in the village of Rauzan. I met the staff and bought a ticket (€6.50). Although they don't normally permit photography, in view of the fact that I had come so far to visit, they agreed to let me take photos in the cave.

The cave has an interesting history. It was discovered in 1845 when the owner of the shop above decided to sink a well. By chance he was directly above the cave and broke into it (see 'Ancien Puits d'Accès' on plan below). As the town had no reliable water he was able to sell water from the stream. He also constructed a spiral stone staircase 13 m down into the passage and conducted cave tours.



Plan of toured part of Grotte de Célestine under streets of Rauzan

In 1930, the first owner died and the purchaser of the shop ceased running tours and closed the cave. Apart from sheltering resistance fighters in WWII, the cave was closed for 65 years.

In 1994, the town council decided to investigate reopening the cave. Investigations took place over the next 7 years - all relying on access via what had become a private house and the stone staircase. To recognise the owner for tolerating these continuing intrusions, the council named the cave in her honour, Célestine.

The present staircase was installed in 2001 from the new ticket office and tours recommenced in 2002. (Information from *The Celestine Cave*, 6 pp. note sheets provided by the cave operators.)

For the 11:15 am cave tour, a group of schoolkids and I were fitted out with thigh length boots and bash hats with lights. Our young guide took us from the ticket office/gift shop by a spiral staircase into the streamway passage below. The tour is almost all conducted in this

small stream, as shown in blue on the earlier reproduced plan.

The first feature encountered is the Grand Column, the cave's signature speleothem. Further along, the bottom of the old stone staircase is passed and then 'La Table', a stone table built by the cave's original owner. It is said he used to come here with friends to dine, drink wine and play cards. The cave is cool in summer and warmer than the outside temperature in winter. The table is on a small natural bridge and above the normal flow level so the friends could keep their feet out of the cold water.



Tour group wading through stream, Grotte de Célestine

Beyond La Table, the tour returned to the streamway and continued for another 50 metres or so before turning back down the passage.

The generally narrow passage contains a few large speleothems, including flowstone features, a number of gourls and some patches of straws and stalactites. For a stream passage, it is quite well decorated. Some deliberate breakage evidently

occurred in the early years.

The lighting is minimal (visitors generally have to rely on the small headlamps provided) and apparently all waterproof - the cables lie in the streambed. Overall the experience was a pleasant one. The staff, and especially the guide we had, were certainly quite enthusiastic and proud to show their cave and recount its history.

From Rauzan I drove back to Bordeaux from where I caught the TGV to Paris. Next day, I flew to Greenland to begin an almost cave-free cruise of the north. It had been a most enjoyable and interesting, if somewhat rushed, tour of the show caves of the Dordogne and Lot regions. The art caves are certainly the speleological highlights of this part of France.

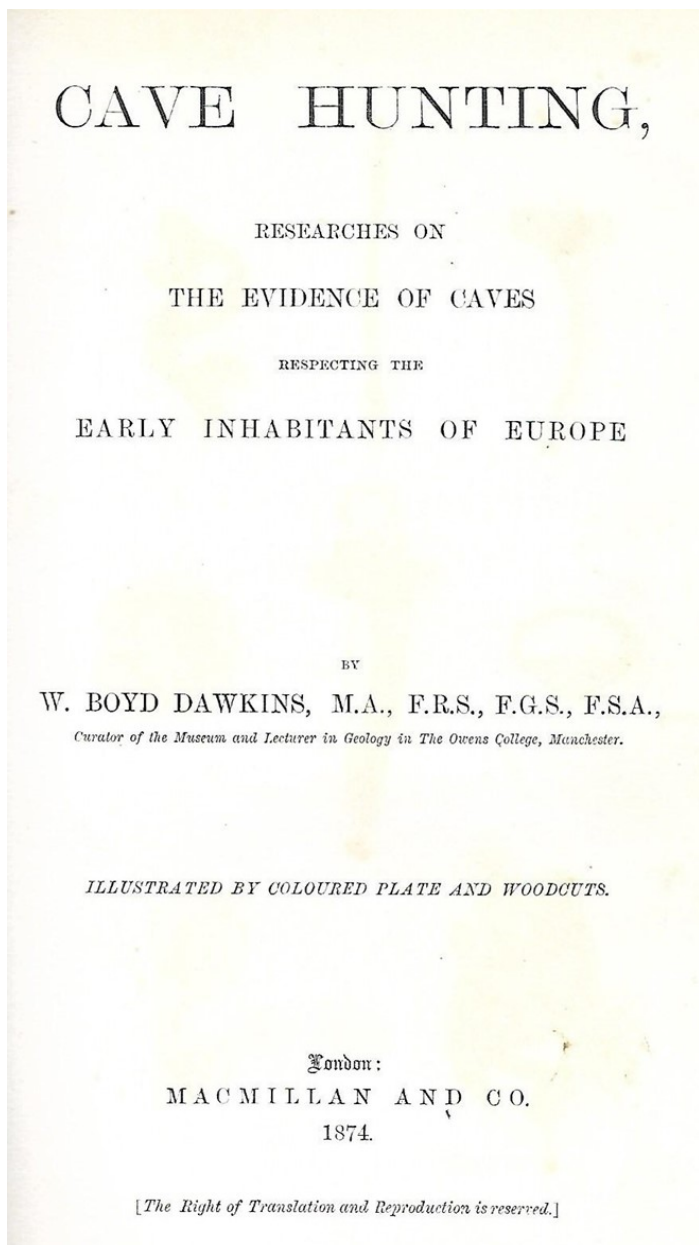
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ANDYSEZ 60-CAVE CORALLOIDS

Andy Spate

Sometime in the late 1960s my late mother found a copy of W Boyd Dawkins' wonderful 1874 leather-bound book, *Cave Hunting*. She purchased this for me at a cost of £7 (that's pounds – about \$250 now – she also thought that the antiquarian bookseller nicked £20 from her purse whilst she was browsing!).



Dawkins' book starts with the wonderful paragraph:

The exploration of caves is rapidly becoming an important field of inquiry, and their contributions to our knowledge of the early history of the sojourn of men in Europe are daily increasing in value and number ... In this volume I have attempted to bring the history of cave-exploration down to the knowledge of today and put its main conclusions before my readers in one continuous narrative.

More about Dawkins below.

What does all this have to do with cave coralloids, I hear

you cry? On page 67, Dawkins has an engraving (his Fig 17) showing his ideas on how these speleothems form. He was not the first cave scientist to discuss these features and probably will not be the last as we will see later. He termed these features Fungoid Structures. His text reads:

In the principal chamber in the cave, which is nearly free from drip, the upper surfaces of the stones and stalagmites on the floor are covered with a peculiar fungoid-like deposit of calcite, consisting of rounded bosses, attached to the general surface by a pedicle ... sometimes not much thicker than a hair. The stood close together at various levels, following the inequalities of the surface of attachment, and being on average about 0.2 inch [5 mm] long. Several microscopical sections (Fig. 17) showed that each was formed on a slight elevation of the general surface, which would cause a greater evaporation [degassing?] of water than the surrounding portions, and therefore be covered with a greater deposit of calcite. This process would go on until the height was reached to which the water slowly passing over the general surface would no longer rise. Hence the remarkable uniformity of the heights of the bosses. The evaporation [degassing?] is greater at the point furthest removed from the general surface, and therefore the apex is larger than the base.

Shaw (1992, page 244) has this to say about Boyd Dawkins:

Boyd Dawkins was well known in the second half of the 19th century, particularly in England, for his lectures and articles as well as his contributions to the *Encyclopedia Britannica*. His book, *Cave Hunting*, ... must have been printed in large numbers, for it not uncommon even now [sobs, mum], though it is much sought after. (It is still sufficiently popular to have been reprinted in 1973) [available online as a facsimile edition] It was published in German. Despite Boyd Dawkins's primarily interest in cave archaeology, the book also contains a significant amount on other branches of cave study including speleogenesis and the growth of speleothems.

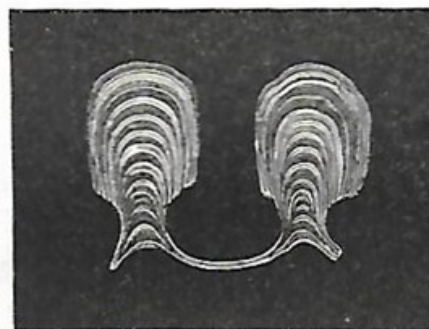


FIG. 17.—Fungoid Structures, magnified.

Figure 1 (from Dawkins 1874, page 67) from Caldy Cave, Wales]

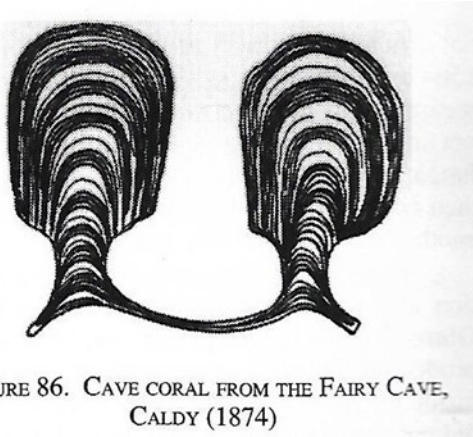


FIGURE 86. CAVE CORAL FROM THE FAIRY CAVE, CALDY (1874)

Figure 2 (from Shaw 1992, page 213) from Fairy Cave, Caldý

Time to look at more recent discussions on cave coralloids – which, by-the-way, our American cousins call ‘cave popcorn’ – amongst many other names and morphologies.

Hill and Forti’s (1997) *Cave Minerals of the World* has, as to be expected from this wonderful book, a comprehensive discussion of cave coralloids. I reproduce some of this below.

Coralloid (or corallite) is a catch-all term describing a variety of nodular, globular, botryoidal, or coral-like speleothems. ... Colloquial names for morphological varieties in this category are popcorn, grapes, knobstone, coral, clusterites, globularites, botryoids, spattermites, cauliflower and grapefruit. Coralloids range in size from tiny beads to gargoyle-like masses over 1 m in diameter. Coraloid knobs exhibit concentric growth rings in which crystals are perpendicular to the rings and radial around the knob. (see Figures 1—previous page, 2—above and 3—below).

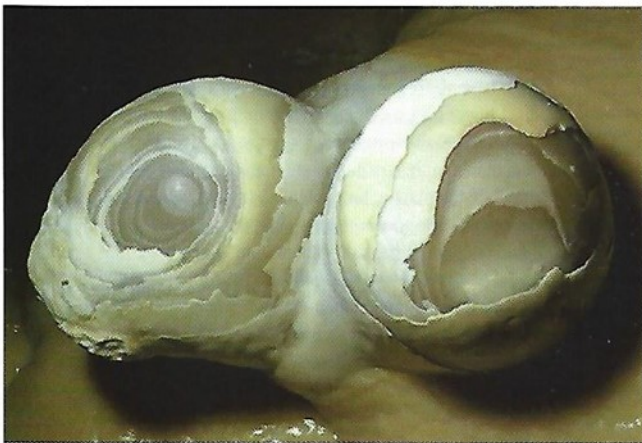


Fig. 267. Internal layers of popcorn coralloids exposed due to dissolution, Lechuguilla Cave, New Mexico. Photo by Dave Bunnell.

Figure 3 (from Hill and Forti (1972) showing the concentric layering of these two popcorn coralloids)

... It used to be thought that all coralloids develop under water [subaqueous]. ... Now it is known that most coralloids are subaerial deposits, generated by capillary-film water. They morphologically resemble their subaqueous cousins, but grow in air-filled passages not underwater. Distinguishing between

subaerial and subaqueous coralloids can sometimes be difficult.

... Subaerial coralloids assume [different] shapes, and they form due to a number of different mechanisms: (1) by water seeping through the cave bedrock and through the crystal structure of the coralloid itself; (2) by thin films of water flowing over wall irregularities; (3) by splash from dripping water; (4) by water moving upward from pools onto walls by capillary action; (5) by condensation water; and (6) by aerosols. All six mechanisms are similar in that they link coralloid growth to the presence of thin films of water (how or where the films originate is less important). Depending on the specific location one or more of processes may be responsible for coralloid growth.

The quotes above are from pages 59-60 of Hill and Forti.

Palmer (2007, page 288) states that:

Coralloids are nodular growths of various types. The most common type is cave popcorn, which consists of small balls of calcite, aragonite, or (rarely) gypsum that project outward from bedrock surfaces or other speleothems ... Popcorn makes cave surfaces rough and abrasive. In places it grows preferentially into windy areas or along bedrock projections ... Some is precipitated by CO₂ loss [degassing] especially in splash zones and has the texture of flowstone. Evaporite popcorn is chalky white and rounded so it resembles the edible varieties of popcorn, with knobs typically 5-20 mm across.

In caves with poor air exchange with the surface, evaporation is limited to a crudely stratified zone, so that popcorn growth terminates abruptly in the upwards and sometimes downwards direction. Evaporative popcorn growth is limited to the lower parts of walls and sometimes erroneously interpreted as former pool deposits.

The again wonderful book, *Speleothem Science* (Fairchild and Baker 2012), adds little to our discussion of cave coralloids. We will have to get Andy B onto the job!

Let’s look now at some examples from Jillabenan Cave, Yarrangobilly – kindly provided by Paul Sims (AKA Bernie – not to be confused with Bernadette).



‘Popcorn’ wall – a mass of subaerial coralloids in a now very dry cave



Close up of the wall - note the black dirt - dust, fibres, skin flakes, soot that has eventuated from 110 years of use of this cave.

Hildreth-Werker and Werker (2006, pages 423 and 485) provide advice on the cleaning of silicate speleothems such as cave coralloids



Stalagmite with well-developed coralloids apparently influenced by airflow or possibly focused drip water. If airflow, it suggests some antiquity as it seems likely that Jillabenan has not had open access to outside air for very many years

By the way, it is a good idea, when interpreting your cave coralloids to your visitors, to not call them cave corals - as we were wont to do in the past - shortly after talking about the corals that make up the limestone as it just adds to the confusion.

The next ANDYSEZ will deal with cave pearls. If anyone has good images of Australian or New Zealand cave pearls, I would love to see them (and potentially use them - with acknowledgement, of course).

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*Hildreth-Werker, V and Werker JC, (eds) 2006, Cave Conservation and Restoration, National Speleological Society, Alabama, 600 pp

*Hill, C and Forti, P, 1997, Cave Minerals of the World, National Speleological Society, Alabama, 463 pp

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Note: The books asterisked above should be in every show cave's library for staff to enjoy and learn from.

OPINION—Juukan Gorge Caves Destruction and its Implications

Nicholas White

This article was first published in *Caves Australia* 114 and is reproduced here by permission from the Author and the Australian Speleological Federation Inc.

On 24th May 2020, Rio Tinto destroyed two caves in the Juukan Gorge in the Pilbara, WA in preparation for expansion of the Brockman 4 Iron Ore mine.

This was the culmination of evaluation by archaeologists who discovered occupation evidence in these caves and rock shelters in 2003. In 2012 Rio Tinto applied for permission to mine the site.

This was approved in 2013 under Section 18 of the WA Aboriginal Heritage Act 1972 subject to a further archaeological study. This subsequent study determined there had been use and occupation dating back 46,000 years with many stone artefacts and a human hair belt found and dated to 4,000 years old, with genetic material related to that of the present title owners, the Puutu, Kunti, Kurrama and Pinkura (PKKP) people.

These groups have contracts with Rio Tinto, which have values based on royalties but leave them constrained when it comes to negotiation, particularly when the WA legal system is loaded against recognising other than the mining values.

This destruction has destroyed the Rio Tinto social licence. It has been compared to the Taliban destruction in 2001, of the Bamiyan Buddhas in Afghanistan.

The Western Australian government has now initiated a review of the Aboriginal Heritage Act. However, this should have been done many years ago.

The Rio Tinto CEO has been forced to resign, as have several other executives. Over 70% of current profits are attributable to the Pilbara iron ore revenues. There is an internal review in progress.

The resignations have been prompted by pressure from Australian Superannuation funds, followed by others in the United Kingdom and the Anglican Church in the UK.

Changes in the Rio Tinto organisational structure and distancing from Australian management some years ago weakened the advice being heard and understood at the Board and upper management level.

There is a Federal Parliamentary inquiry to which ASF made a submission calling for review of the WA Aboriginal Heritage Act and for such reviews to be also conducted in other States. The EPBC Act 1999 as amended, brings in some cover for National Heritage Listed sites and for cultural sites.

The Environment Defenders Office in their inquiry submission stated that Cultural Heritage Legislation needed

to be consistent with International Legislation on the rights of Indigenous Peoples. This is a possible political or legal avenue to protect such sites from damage.

This whole affair is still having ramifications for Rio Tinto but there are other Pilbara iron ore miners needing to address the same issues with their native title owners and the significance of cultural sites and their dreaming places. This issue also extends to other mining activities in Western Australia.

Such conflicts are not restricted to Western Australia nor just to mining. At present in New South Wales there is a proposal to raise the Warragamba Dam wall to protect downstream development of the expanding Sydney.

This would have the effect of inundating parts of the Blue Mountains World Heritage Area and in particular the cultural values associated with the catchment. The sites that would be affected are rock shelters in the sandstone gorges with artwork as well as numerous sites with artefact scatters.

Instead of trying to protect flood-prone property in the Hawkesbury-Nepean floodplain through other mechanisms, the simplistic solution is proposed. The Federal Department of Environment has called for a more comprehensive review of the effects on World Heritage values. In contrast, the major effects of the Snowy 2 Project were not examined in detail. These have direct effects in the Ravine Karst Area of Yarrangobilly and there are certainly inadequate provisions for dumping of the tunnelling spoil. These problems between development and protection are not limited to State jurisdictions but they are also important federally.

At present the interim review from Graeme Samuel's review of the EPBC Act has been received and the final review with recommendations is due in October 2020. However, there is legislation before the Federal Parliament that provides for many of the Federal Act's responsibilities to be devolved to the States.

This has passed the House of Representatives but it is unlikely to pass the Senate. This situation is completely confusing to interested observers. We need more discussion and inquiry before such fundamental legal changes are enacted.

The important issue here is that these problems are not going to go away and all developments need appropriate measures to protect irreplaceable cultural (and natural) values.

Legislation needs to be updated periodically as social values change. We all need to be vigilant about these issues when they occur and to then raise a fuss.

The Juukan Rock Shelter destruction has triggered repercussions which are producing a re-evaluation of laws on cultural heritage protection in all jurisdictions in Australia.

Mr John Engel, PhD candidate at the University of Melbourne

Caves Tell Us That Australia's Mountains Are Still Growing

Buchan Caves unlock technique for measuring uplift of mountains



Scientist Jon Woodhead uses a custom made machine with a diamond-tipped drill to extract speleothem 'rubble' for analyzing. Credit: John Engel

Australia has often been unfairly portrayed as an old and idle continent with little geological activity, but new research suggests that we remain geologically active and that some of our mountains are still growing.

The University of Melbourne study reveals that parts of the Eastern Highlands of Victoria, including popular skiing destinations such as Mt Baw Baw and Mt Buller, may be as young as five million years, not 90 million years as originally thought. John Engel is one of four scientists from the Isotope Geochemistry Group in the School of Earth Sciences who studied the stalagmites, stalactites, and flowstones -- technically called 'speleothems' -- in the nearby Buchan Caves to produce the findings. "At least 250 meters of additional height in the East

Victorian Highlands appears to have been gained in the last few million years," Mr Engel said.

With the help of Parks Victoria Rangers, the team visited 10 caves, climbing down through the passages and crawling through tight squeezes to collect small fragments of speleothem 'rubble' to take back to the lab to determine their age, using radiometric U-Pb dating. "Our research shows a clear trend between oldest speleothem (cave age) and height in the landscape," Mr Engel said. "The data suggests that the Buchan region has been steadily uplifting at a rate of 76 meters every million years, beginning at least 3.5 million years ago and continuing today. This means that some speleothems have been sitting in dark caves undisturbed for 3.5 million years."

Evidence suggests the Highlands originally rose up about 90 million years ago when the Tasman Sea between Australia and New Zealand opened up. Researchers say the cause of the more recent uplift is debated but a leading theory points to the friendly rivalry with New Zealand.

"The Australian and Pacific plates share a common boundary and many of the forces involved at this boundary may be propagated into the Australian plate as tectonic stress. Some of this tectonically-induced stress is then released as uplift of the mountains in South East Australia," Mr Engel said.

"This is why East Gippsland may still feel effects related to these tectonic forces. This subtle modification of classical plate tectonic theory can help explain the frequent, small earthquakes observed along South East Australia."

Mr Engel said while mountains like the Himalaya and the Swiss Alps are admired for their aesthetic appeal, uncovering the secret stories surrounding when and how mountains form provides a layer of appreciation as well as an active field of research for geologists.

"Our research showcases a new -- and rather unique -- method for measuring the uplift of mountains. This technique of using speleothem is likely to also work in other caves across the world for regions with 'recent' tectonic activity, offering geologists great opportunities to share more stories about these impressive and unchanging features of our landscape."



The Ann Augusteyn Award

Ian Eddison

The Ann Augusteyn Award is to celebrate and encourage excellence in cave and karst interpretation and presentation.

Ann was a highly-respected member of ACKMA who passed away suddenly in 2018. Ann was a very successful business operator in our industry, she was also an inspiration to many through her calm manner of inclusion of all – quietly driving us to better what we do and with a focus on visitors gaining the best possible experience. It is so appropriate that Ann be remembered and recognised this way.

The 2019/2020 ACKMA committee decided to establish an award in memory of Ann that was focussed on cave guiding and presentation. A small team worked to prepare guidelines for the award and a process to implement it. This team was led by Cathie Plowman and included several current cave guides as well as eco-tourism specialists, Professor Betty Weiler and John Pastorelli, both of whom have done extensive work in tourism guiding and have been involved in ACKMA cave guide training events.

The award overview and criteria are included in this edition of the Journal; have been emailed to show cave sites that are members of ACKMA; and have been added to the ACKMA website.

The award will be open biennially and it is planned that the award will be announced at the cave guides training event in the award year. The panel for the first three rounds will be Cathie Plowman, Professor Betty Weiler and John Pastorelli and I thank them all for their commitment. There is to be a rotation system for the award committee and a review period built into the award guidelines. I thank Associate Professor Dr Julia James for her donation of the shield that will be part of the prize for the award.

The award committee may determine that:

- one or more nominations not selected for the award may be given a ‘Highly Commended’ certificate; and**
- the award is not to be given, if there are no nominations that the committee feels are of a high enough standard to meet the aim of the award.**

I encourage members at show cave sites to ensure that information about the Ann Augusteyn Award in this edition of the Journal is displayed so that as many relevant people as possible are aware of the award. Members who are not involved in cave presenting may also know of people who could be considered as suitable nominees.

The inaugural award is scheduled to be presented at the Cave Guides’ Workshop at Wellington in 2021.

Ann Augusteyn Award

The **Ann Augusteyn Award** recognises the excellence and outstanding contribution of an individual to cave and karst guiding and interpretation. Nominations for the award will be open biennially, and the award announced at the subsequent cave guides training event that is held in conjunction with the ACKMA AGM.

The inaugural Ann Augusteyn Award will be awarded at Wellington, New South Wales in 2021.

Nominations will open on 15 January 2021 and close on 15 March 2021.



Amy Vass, Zarah Lane Photography

A celebration of Ann Augusteyn

Ann and Ken Augusteyn bought the then Olsens Caves in 1988 and embarked on a journey to further develop and promote the caves which were renamed Capricorn Caves. Ann and Ken, assisted by their family of John, Robert and Helen, worked to modernise the show cave experiences, develop accommodation facilities, provide for greater community connections with the caves and support science research.

After Ken's passing in 2008, Ann continued their vision with a special focus on guide-development and assisting guides to develop engaging cave visitor experiences. Ann was supporter of ongoing training and development and exposing guides to new and practical ideas to enhance their guiding.

Ann died suddenly in 2018 and ACKMA determined that her efforts to promote vision, excellence and new approaches in cave guiding and presenting should be celebrated and progressed.

Ann Augusteyn Award

Prize

Associate Professor Julia James has donated a shield which will rotate from one award winner to the next, with the award winner's name engraved on it.

The award winner will also receive:

- 1) The honour of being recognised by their peers.
- 2) A certificate.
- 3) A year's membership of ACKMA.
- 4) A book prize relevant to caves and karst.

Award criteria

Anyone can nominate an individual for this award. For an individual to be eligible they need meet the award criteria:

- Be a member of ACKMA or work for an organisation that is a corporate member.
- Show commitment to cave and karst guiding and interpretation.
- Demonstrate leadership in developing new and engaging ways to interpret caves and karst to the community.
- Share with and assist others to further develop the profession of cave and karst guiding and presentation.
- Adapt cave and karst presentation so that it is relevant to varying audiences.

To make a nomination

To nominate an individual please provide the following information:

YOUR DETAILS

Your name, full contact details and professional relationship (if any) with the person being nominated.

PERSON BEING NOMINATED

For the person being nominated please include:

- Their **name, workplace and workplace address**.
- A description of their **cave and karst presentation work** (maximum 250 words).
- **Why you believe they deserve this award**. Please refer to award criteria (maximum 250 words).
- **Supporting documentation** such as video, photos and other documentation (maximum of five documents).
- Names and full contact details of **three professional referees**, including each referee's relationship to the nominee and how they know of the nominee's work as a cave guide, interpreter or presenter. Please think broadly here as a referee does not need to be a speleological expert or have been a cave guide to appreciate excellence in cave and karst guiding and presenting. Referees with a variety of backgrounds relevant to cave and karst presentation are encouraged.

KEEP YOUR NOMINATION SECRET

Please note that the award committee would like to keep nominations 'a surprise' until the public announcement and encourage people making a nomination to support this.

For enquiries and to submit a nomination please email:

AnnAugusteynAward@ackma.org

CELEBRATE THE
INTERNATIONAL YEAR OF CAVES & KARST

2021

ACKMA
MEETING

Wellington Caves NSW

3-5 May 2021 - Caves Guide School 'Eco Guide'
Certification conducted by Savannah Guides

6-7 May 2021 - Post-Bushfire Workshop, operational
adaptation to COVID-19 and AGM

This event will be different to any other ACKMA event as we adapt to social distancing guidelines. Regardless of the changing restrictions and border closures, you can participate. In order to forward plan and cost all aspects of this event, including online facilitation, please consider your options and complete the expression of interest form.

P: (02) 6840 6480 E: enquiries@wellingtoncaves.com.au



2021 ACKMA Meeting Expression of Interest

If you can join us physically or would like to participate online, please register your expression of interest.

Registration fees will vary based on your participation and fees will be included on the final registration form.

If you would like to present during the Post-Bushfire Workshop or COVID-19 response, please prepare your abstract and forward through to ***president@ackma.org*** for consideration.

Please note presentations are limited to 20 minutes.

Accommodation

The Wellington Caves Caravan Park has a number of options available including suites, powered and non-powered campsites.

Please visit our website ***www.wellingtoncaves.com.au*** for further information on each accommodation type. If you would like to make a booking please contact our office on 02 6840 6481 (Monday – Friday) and mention you are attending the ACKMA event.

Expression of Interest Form

Please note a formal Registration Form will be required closer to the date.

Please return to enquiries@wellingtoncaves.com.au

Please complete and tick your response		
Name		
Phone		
Email		
Organisation		
	In person	Online
Guide School 'Eco Guide' Certification 3-5 May 2021		
ACKMA Meeting 6-7 May 2021		
20 minute presentation		

Around the show caves

Introduction

We three contributions—two from Australian sites and one from New Zealand

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Wellington Caves

Wellington Caves in the central west of NSW is currently working towards fitting out the megafauna room of the Visitor Experience Centre. An interpretation specialist company, 'Thylacine', was selected from 5 tender submissions. Thylacine is currently developing content plans for a very exciting interactive series of displays with caves management.

Wellington Caves hosts a series of ongoing scientific studies. These are:

- a paleontological dig in Cathedral cave by Flinders University;
- groundwater recharge monitoring by UNSW and Freiberg University Germany;
- the ACKMA atmospheric monitoring study; and, most recently
- the Red Browed Firetail study by Macquarie University.

This latter study looks at the mitochondrial DNA of Red Browed Firetail finches to check if the Great Dividing Range and East Coast birds are the same when compared to those of Central Western NSW. This study arose because of differences recently found in other birds such as the Eastern Yellow Robin.



Jenolan Caves Shelley China Collection now on display at Caves House

David Cook, Jenolan Caves Historical & Preservation Society

The collection of Jenolan Caves Shelley China, collected by the late Dr Elery Hamilton-Smith, a noted academic, researcher and consultant in all matters concerning caves and karst, was donated to Jenolan Caves Historical & Preservation Society by his widow, Angela Hamilton-Smith in November 2019.

Following a lengthy delay caused by snow, bushfires, torrential rain causing severe flooding and finally Covid19, the collection of 122 pieces has now been placed on public display in the recently lit cabinet in the Guests Lounge of Jenolan Caves House.



A photo of the display taken before the cabinet doors were closed & locked

Spellbound Tours, Waitomo

Peter and Libby Chandler

With the borders closed, we have been making preparations to have a visitor centre closer to 'our' caves, the Mangawhikau Glowworm cave on Derek and Jill Mason's property, and Te Ana O Te Atua, the Cave of the Spirit, under land covenanted by Graymont. Graymont is a Canadian family owned company who purchased the McDonalds lime quarry in 2015. Recently they have purchased several Australian Quarries owned by Sibelco.

Our new base is at 334 Boddies Road and is a similar distance off Highway 3 as is the Waitomo village, but 6.5 km further south and closer to the town of Te Kuiti.

The close location gives us two shorter options, the "Spellbound Excursion" from the Waitomo village will run morning and afternoon (as required) and takes around 3 hrs and 15 minutes.

The "Spellbound Essential" will be around 80 minutes – just visiting our glow-worm cave by a 2.5 km minibus ride to the site followed by a short walk and then incom-

parable views of the New Zealand Glowworm on foot and by inflatable raft on a 75 metre long section of flat water, this being made possible by courtesy of a 90 cm high weir, for which we have a resource consent. This weir, we disassemble preferably before (but sometimes after) a flood event and during recess times – traditionally our June shutdown but, in 2020, during the Covid-19 Level 4 lockdown.

What we hope will become the most popular, "Spellbound Explorer", will visit both caves without the transfer from Waitomo village, so will time in at around 2 hours 25 minutes.

A toilet block will follow, but right now we are using a 12 m x 3 m portable cabin, with a 4-metre-wide shelter alongside, with associated entrance and drop off, parking and exit. Toilet facilities are the adjacent cottage bathroom upgraded to a disabled toilet with a new outside door. This latter facility is a prerequisite to getting a NZ Transport Authority tourist attraction sign.

With the lack of internationals, visitor number statistics seem more relevant being compared with previous school holiday and term blocks, not calendar months.