CAVES AUSTRALIA

The Journal of the Australian Speleological Federation

Caves, Bats and Pandemics
Ashford Caves, NSW • Pearse Resurgence Diving
Managing Caving Accidents

No. 212 • JUNE 2020

COMING EVENTS

WITH THE advent of the COVID-19 pandemic there is little point in publishing a detailed forward programme of speleological events. Things are being cancelled and postponed across the board and if you have your eye on any particular event then it is recommended that you investigate closely if it is still scheduled (and if you can safely travel there and back). Information on UIS-sanctioned events can be viewed at http://tinyurl.com/y7rgb8ah

Don't forget that 2021 will be the International Year of Caves and Karst. You can find more information about what's going on and what you can do to help the cause at http://iyck2021.org/

In the meantime, perhaps concentrate on events and expeditions past. Here's a photograph from the Vietnam 2020 Expedition (which we just managed to squeeze in before international travel and congregating in groups became off limits).

ALAN JACKSON

Spectacular speleothems and shafts of light in Loong Coong, Vietnam Expedition 2020

ASF Conference Postponed

The next ASF Conference to be held in Ceduna SA has been postponed until April 2022 (new dates to be confirmed).

The ASF Executive supports the organising committee's recommendation to postpone due to the COVID-19 situation.

Even though we are beginning to transition back to normal, there are still too many unknowns regarding future disruptions to travel and restrictions to group gatherings, until a vaccine can be developed.

This is of particular consideration for the at-risk Indigenous community in Ceduna.

We apologise for any disruption to your travel plans that this may cause and look forward to seeing you all safely in 2022. *— Sarah Gilbert, ASF General Secretary*

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ASF

Contents

Cover: Marcia Kaye and Lachlan Bailey in Ashford Cave. Photo by Garry K Smith

ASF Executive

WANTED
ARTICLES FOR *CAVES AUSTRALIA!*

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

EDITORIAL

LAST ISSUE we were grappling to come to terms with the impact of Australia's devastating fire season. This issue we're in the grip of a pandemic.

On the bright side, there are undoubtedly plenty of caves around the world getting a welcome break from human visitation.

The same can't be said for the rock shelters in Juukan Gorge, Western Australia. That the destruction of a cultural site with evidence of occupation dating back 46,000 years can be justified by anyone is shocking.

That it can happen in the supposedly enlightened and environmentally aware society of 21st century Australia is, frankly, gobsmacking.

The current climate brings a quote from Agent Smith in *The Matrix* movie to mind:

'I'd like to share a revelation that I've had during my time here. It came to me when I tried to classify your species and I realized that you're not actually mammals. Every mammal on this planet instinctively develops a natural equilibrium with the surrounding environment but you humans do not. You move to an area and you multiply and multiply until every natural resource is consumed and the only way you can survive is to spread to another area. There is another organism on this planet that follows the same pattern. Do you know what it is? A virus. Human beings are a disease, a cancer of this planet.'

Agent Smith wasn't a particularly nice character, but he certainly made some cogent points (in between beating the crap out of lots of people and stuff).

Many people are hopeful this pandemic is the wakeup call the world needs. I suspect fewer believe it is a wakeup call the world will heed. Earth: enjoy it while it lasts.

— Alan Jackson

President's Report

THE WORLD is such a different place since my last report. COVID-19 has challenged all of us in different ways.

Many of us have been having club meetings and get-togethers via video conferencing to stay in touch. As restrictions change in your area, hopefully you can get out, meet up with your fellow club members and get underground.

COVID-19 has impacted the ASF as well.

The ASF Conference has been postponed until 2022 – a new date will be confirmed in due course.

The ASF Executive are now holding meetings monthly by video conference.

The Council meeting date will change as the conference has been postponed. It will now be in January with a date to be confirmed. The Council meeting will also be held using Webex so no need to worry about travel restrictions should they still be in place.

Postponement of the conference has changed our timeline re constitutional discussion for changes brought about by legislative changes to the ACT Incorporations Act. The discussion has been brought forward by three months in readiness for the council meeting in January 2021. If you want to get involved ask your committee for copies of the proposed changes.

Finally, the ASF Executive has appointed two new Commissioners — welcome to:

- **Rod OBrien:** Cave Diving Group, who has replaced Tim Payne and Peter Kraehenbuehl
- **Rafid Morshedi:** Safety, Leadership and Risk Management, who has replaced Darren Brooks.

Thank you to the previous Commissioners for their time volunteering to assist the ASF.

In addition to the above just a reminder that the ASF has money for various cave projects and research, so have a chat to your fellow cavers and apply for a grant. More information is available at:

https://www.caves.org.au/administration/commissions/grants

DARREN BROOKS

While having a chat to your fellow cavers about grants, have a think about someone that deserves to be recognised by an ASF award. Check the link below for further details:

https://www.caves.org.au/administration/commissions/awards-and-awardees

Many of us in winter would usually be out on an expedition, whether to the Kimberley, Nullabor or Bullita, amongst other great places to cave. It is likely for many that these places might not be able to be accessed until next year. Downtime is not lost — use it to plan, prepare, train skills, clean and service your kit or finally draw up those maps for surveys done long ago. Most of all, dream big of the exciting times that await as restrictions continue to ease.

—John Cugley

Caves, Bats and Pandemics

Could a caver become patient zero in the next pandemic?

Andrew Stempel
FUSSI

AS THE WORLD struggles with a global pandemic, my science brain can't help but ponder if a caver could become patient zero in the next pandemic.

To evaluate the risk, we need to understand viruses, their hosts, and how they can 'jump' between species. To prevent this article from becoming a novel, I'll focus on SARS-CoV-2, the virus that causes COVID-19.

VIROLOGY 101
THE 'KEY AND LOCK'

Viruses are, technically, more similar to a piece of dust than a single-celled organism. A virus is comprised of nucleic acids (either RNA or DNA), which are encased in a protein coat, known as the capsid. By definition, viruses are not living organisms, but infectious particles that require a host cell in order to replicate.

To infiltrate the host cell, viruses use spike protein(s) on the surface of the capsid. Scientists use the analogy of a 'key and lock'. The key is the spike protein of the virus and the lock is the receptor on the host cell's surface. Like any key and lock, the interaction of the protein and the host cell receptor has to be a near-perfect match. If the key fits the lock, the virus gains entry into the host cell. From there, the virus hijacks the host's cellular machinery for replication (de Wit *et al.* 2016).

Note: the receptor for SARS-CoV-2 is the angiotensin-converting enzyme II (ACE2) receptor, which is expressed on epithelial cells that line the respiratory tract as well as the digestive tract (Zhou *et al.* 2020).

THE RESERVOIR HOST

Viruses seek hosts that tolerate their presence and allow them to replicate; the perfect cell, in the perfect organism, is known as the reservoir host. The host is a place where the virus can happily replicate, without being destroyed. This can be any living organism, including bacteria, bats or humans.

The reservoir host for SARS-CoV-2 is not confirmed. However, evidence suggests that the natural reservoir is the bat. Other coronavirus outbreaks including severe acute respiratory syndrome (SARS, 2002) and Middle East respiratory syndrome (MERS, 2012) also emerged from bats (de Wit *et al.* 2016) and a laboratory in Wuhan recently published that a coronavirus previously isolated from a bat was a 96% match to the current SARS-CoV-2 (Zhou *et al.* 2020).

For SARS-CoV-2, humans have now become the natural reservoir. Over time this novel coronavirus will favour mutations that cause less severe disease, joining other coronaviruses in the human reservoir that are responsible for the common cold.

WHY BATS?

Bats are a reservoir for many viruses, which have the potential to cause disease in humans. The important factors are that bats (a) are mammals, and (b) can fly.

To the first, as mammals, humans and bats share a common ancestor, and therefore a significant portion of their DNA. Viruses must mutate, altering their 'key', in order to enter humans. The closer the genome of the reservoir host is to the human, the more likely a favourable mutation will occur in the virus to recognize a human receptor (Haymen 2016; Wang & Anderson 2019). This sometimes requires incubation in an intermediate host — another mammal — to acquire additional mutations allowing the spike protein to bind to human receptors.

Secondly, flying requires a significant amount of energy. The increased metabolism produces large quantities of metabolites, which can elicit an immune response.

A constant immune response can cause adverse effects and even disease. To adapt, bats have developed mechanisms to increase immune surveillance and promote an anti-viral response, which hinders viral replication. This unique immune response, and tolerance to viruses, makes bats a great reservoir host (Banerjee *et al.* 2019; Haymen 2016; Wang & Anderson 2019).

Additionally, fever is one mechanism that humans use to control infections. Mammals are warm-blooded creatures which are able to increase their body temperature through activity. Flying generates a significant amount of heat and can create a fever-like state in bats (O'Shea *et al.* 2014). Viruses circulating in the bat have adapted to this fever-like environment, and if they enter humans cells, our 'fever tool' is essentially ineffective.

SPILLOVER

The 'jump' of a virus from a reservoir host into humans is referred to as spillover. Using the 'key and lock' analogy, the virus must modify its spike protein key to fit a new lock. Receptors vary from cell to cell, tissue to tissue, and organism to organism. As a virus replicates, it may mutate and modify the spike protein, to gain entry into a new host cell in a different organism (Wang & Anderson 2019). The closer the host organism is genetically related to a human, the more likely a spillover event can occur.

Spillover requires close proximity between animals and people to allow favourable mutations to emerge. There is no benefit for the virus to mutate if the mutation does not help the virus to enter a new organism, allow it to become less pathogenic or to go undetected. The recent outbreak in China was likely due to a dense human population in close proximity to wildlife in a confined space (Anderson *et al.* 2020).

For the current pandemic, the exact cave and bat population has not been identified, but genetic sequencing of previously discovered coronaviruses in bats has found a 96 per cent match to a coronavirus isolated from a bat in China (Zhou *et al.* 2020). Genetic analysis has also pointed to the pangolin (a scaled mammal found in Asia and sub-Saharan Africa) as an intermediate host. Recent research has indicated that the pangolin strain is less similar to the human virus, suggesting a direct jump from bats

into humans or an unknown intermediate host (Liu *et al.* 2020).

Other coronaviruses from a bat reservoir, required an intermediate host before causing disease in humans. The virus responsible for the SARS outbreak of 2002 jumped from cave-dwelling horseshoe bats in the Yunnan Province to civet cats before entering humans (de Wit *et al.* 2016). The reservoir host for the 2012 outbreak of MERS was dromedary camels. Although the origin of the MERS virus is unknown, genetic analysis supports a bat origin (de Wit *et al.* 2016). Unlike SARS and SARS-CoV-2, MERS had limited transmission between humans. Most cases were the result of direct exposure to infected camels.

Based on history, the exact source of SARS-CoV-2 won't be known for years. The bat reservoir responsible for the 2002 outbreak of SARS wasn't described until 2017 (Hu *et al.* 2017). Because bats are such good natural reservoirs for human disease, any bat virus has the potential to become the next pandemic. Scientists devote their entire careers to 'hunting viruses' isolated from bats caught at the entrances of caves.

REVERSE ZOONOSIS

There is the concept of reverse zoonosis, which describes the transfer of a human virus back into animals. While there is evidence of tigers, dogs and domestic cats contracting the new coronavirus after close contact with humans, these reverse zoonotic events are believed to be short-lived and of little concern (Daly 2020).

Although it is possible that SARS-CoV-2 could 'jump back' into the bat population, it is unlikely. This new coronavirus has found a far better reservoir in humans. We lack the natural defences of bats, and as this coronavirus continues to adapt to the human environment, it will likely not return to bats.

CONCLUSION: A DIFFERENT PERSPECTIVE

While the planet will likely see another outbreak originating from bats, the possibility of a caver acquiring a virus that becomes the next pandemic is virtually nil.

We are constantly exposed to viruses and nearly all exposures lack the ability to cause human disease. Although zoonotic spillover events can happen at any time, it requires the perfect conditions and circumstances. This is the reason that the last time the world had to deal with a pandemic of this scale was in 1918, with the Spanish flu. If a virus is lucky enough to enter a human cell, the key is rarely a perfect fit to the lock, and the virus is usually destroyed by the immune system before it causes disease.

Viral outbreaks occur where humans live in close proximity to domestic animals or wildlife. They tend to occur in densely populated areas. Bats are not the problem — humans are the problem. We continue to encroach on natural habitats and this close contact between animals and humans could lead to another pandemic. Instead of blaming the bats, I argue for a different perspective. Not only are bats significant pollinators and control insect populations, but we could learn from our flying friends. Their unique immune system and tolerance of viruses could provide insight into human treatments and future anti-viral therapies (O'Shea *et al.* 2014; Wang & Anderson 2019).

There are many known cave-dwelling pathogens (e.g. viruses, bacteria, fungi) that have the potential to cause human disease (Adetutu & Ball 2014; Igreja 2011). Instead of fearing the unknown, we should continue to explore these subterranean environments.

Nature is intelligent and has produced some of the greatest achievements in medical history. Due to the unique environment of caves, perhaps the next penicillin, chemotherapy or other 'wonder drug' is sitting at the bottom of a dark hole in the ground. We must keep exploring.

Fun Fact: For all those beer lovers out there, coronaviruses were not named after a popular Mexican ferment, the name was given after scientists saw the first microscopic image of a coronavirus. The spike proteins resembled a halo, or crown, surrounding the capsid.

ADDITIONAL INFORMATION

www.wildlifehealthaustralia.com.au/

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Also check out the 'Keeping up with the Coronavirus' Webinars (Part 1 and 2) on the NSS Website.

https://caves.org

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Pearse Resurgence 2020

The Quest Continues

Richard Harris
CEGSA

AFTER a long break, the Wetmules and friends returned to the Pearse to continue the search for the connection to Nettlebed Cave.

PARTICIPANTS

Pearse dive team: Craig Challen, Richard Harris, John Dalla-Zuanna, Luke Nelson, Dave Apperley, Bruce Clulow, Simon Mitchell.

Nettlebed exploration: Dave Bardi, Sandy Varin and Kieran Mackay.

Support: Oz Patterson, Deb Cade, Anthony Honeybone and Phil Cooper

Some minor changes were made from 2016. The 7 m habitat was upgraded to a spacious inflatable like the 16 m, rather than the cramped (for two people) IBC. New habitat scrubbers (The Mule-o-Matic 5500) were over-engineered to ensure CO_2 did not become an issue during the 16 m and 7 m stops.

Open microphone comms to 16 m and 7 m complemented the pre-existing buzzer system. The Triton chest-mount rebreathers replaced the home-made 'ManBags' at 40 m and 30 m, as well as being used for transfers between the habitats.

Finally, Harry and Craig used Seacraft scooters as the long-suffering Sierras were retired from deep diving. A bonus feature of the Seacraft is its ENC2 electronic logger which replaced Ken Smith's C-Logger.

A change in helicopter providers this year saw the team using Toby Reid of Helicopters Nelson in Wakefield.

His AS350 Squirrel takes much heavier loads than Syd's Hughes, so access to the site in dry and dusty conditions took just seven loads.

Water levels were at a record low and Eyles Creek did not flow during the trip. There might be something in this February timing.

And in good news, the Blue Ducks were numerous, as were the mouse-eating Wekas which made their maiden appearance for us at this site.

SIMON MITCHELL

L-R Dave Bardi, Phil Cooper, Sandy Varin (sitting), Luke Nelson, Craig Challen, Simon Mitchell, John Dalla-Zuanna, (sitting) Bruce Clulow, Richard Harris, Kieran Mackay, Dave Apperley. Absent: Anthony Honeybone.

PEARSE EXPLORATION

This year's strategy meant some selfishness on the part of Challen and Harris. They started diving the MultiMegs from day 1, getting the dressing procedure streamlined which is a major early source of frustration.

Thick undergarments and dry gloves mean movement is restricted and simple tasks are clumsy.

Meanwhile, the other divers set up the cave in record time with habitats, comms, buzzers, heating cables and cylinders installed within the five days it took Craig and Harry to ready themselves.

This allowed buildup dives to 150 m to be performed and multiple minor equipment issues to be worked through. By Monday 17th, all was in readiness.

Dr Simon Mitchell took the position of dive controller. Harry and Craig were underwater and under way by 0826 hours. The plan this year was to further explore the original tunnel down Stantons Hole.

Would it connect into the back of Second Breakfast?

A straightforward descent as far as the 182 m level where loops of old line were noted, but no entanglement hazards.

It was here that things started to go awry. Craig, in the lead, scootered towards the

SIMON MITCHELL

Luke helps Harry and Craig on the day of the big dive.

smaller lower exit from this room, while Harry passed over the top via the larger passage.

In that brief moment, Craig looked back over his shoulder to note Harry wasn't there, and Harry moved in front assuming Craig was still behind him.

Harry continued down and Craig headed up looking for his buddy.

The result was a costly 5-minute separation before they found each other again at about 175 m.

They recommenced the descent. At the 200 m mark, Craig tied on a reel as the old line was becoming very fragmented again.

A short scooter to the previous limit of exploration at 221 m and they were off into virgin cave.

The passage continued in the usual pattern; steep descents interspersed with short flatter rooms.

The 200 m mark saw the cave take its first turn towards the south, away from beneath the course of the Pearse River at ~060° magnetic. At 210 m, the same pattern repeated and thus the cave has shown the first promise of heading back towards Nettlebed Cave (or at least towards the Ellis Basin). The final bearing at the end of the dive was 170° magnetic.

At that point (~65 m line laid) one tunnel headed steeply down to the left, and a second lead lay straight ahead — a question for next time.

Thus at 38 mins began the long trip home. At 4 hours run time they arrived back at the 40 m habitat.

DIVE STATISTICS

Stop times

40 m 90 mins
30 m 150 mins
16 m 257 mins
7 m 210 mins

Divers surfaced just over 16 hours after the dive started.

~218 m horizontal distance on plan view from entrance pool to EOL, ~538 m swimming distance, max depth 245 mfw.

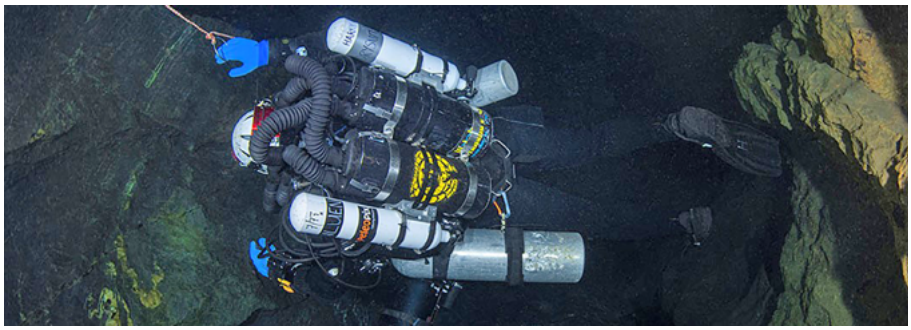
NETTLEBED EXPLORATION

The 2016 Nettlebed exploration resulted in the team coming to a halt in the Spillway, peering down a climb at dive line laid in the Sewers Canal in 2014 … we must have missed something. Back to the Spillway in 2020 to recheck.

Sandy, supported by Dave and Kieran completed the first dive in the Spillway, approximately 1.2 km into the Nettlebed system. No new way on was discovered, so the team moved diving operations to the next obvious place to dive, the Launderette. Several dives were conducted by Sandy connecting the Launderette and Sewers Canal. A continuous path connecting the Spillway, Launderette and Sewers Canal was now complete — almost.

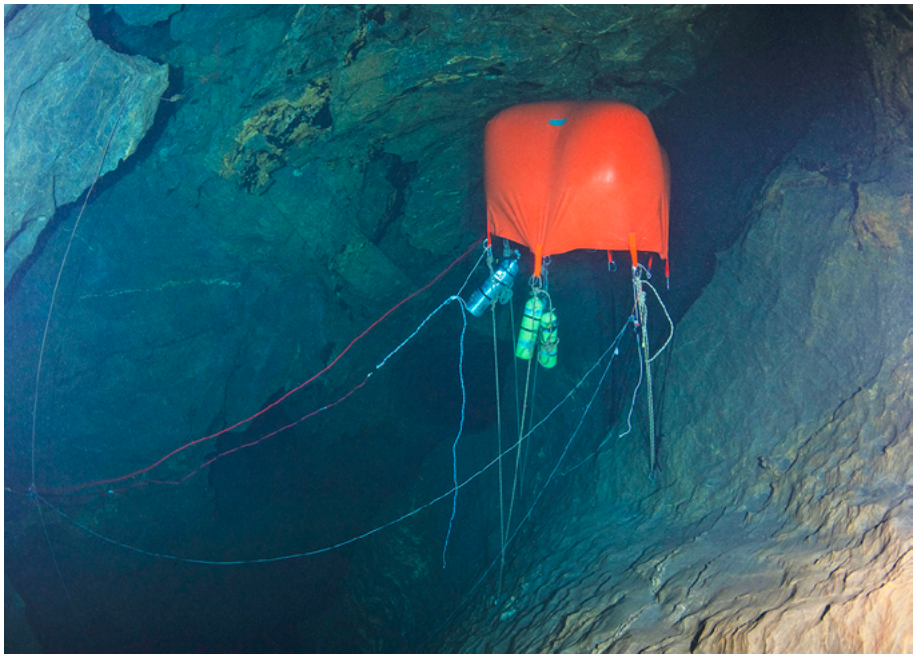
The climb from the Launderette to the Sewers Canal still needed to be checked. Dave, Sandy and Kieran set off from the Midas Chambers, right at the entrance to the cave system to bolt climb the missing section.

The team dived six upstream sumps via the Passage of Time to reach the spot where Kieran would bolt climb from a sump pool. A dye trace at the Midas Chambers was



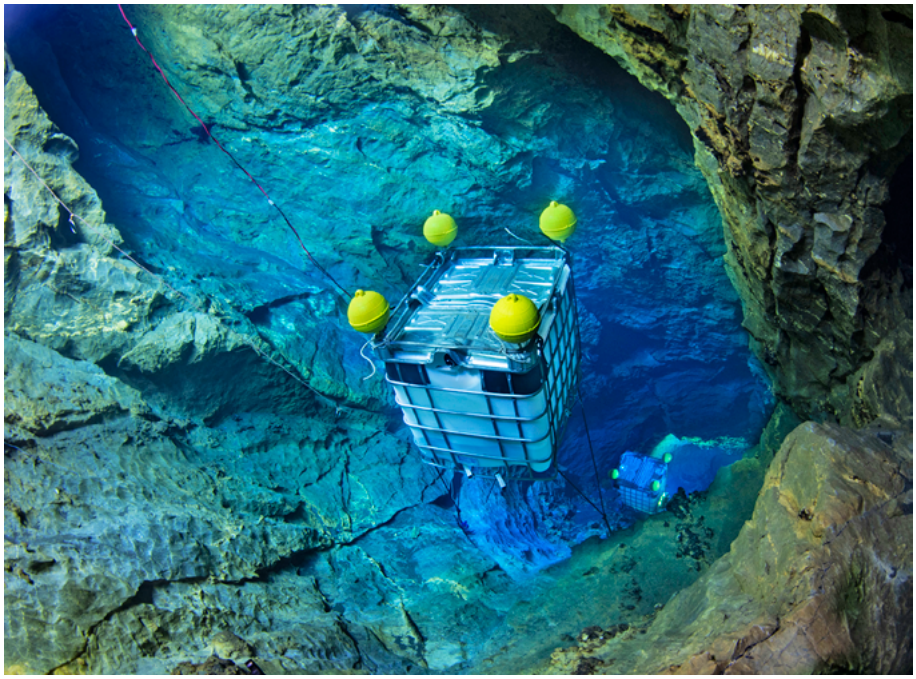
SIMON MITCHELL

Harry doing deco using the TwinMeg



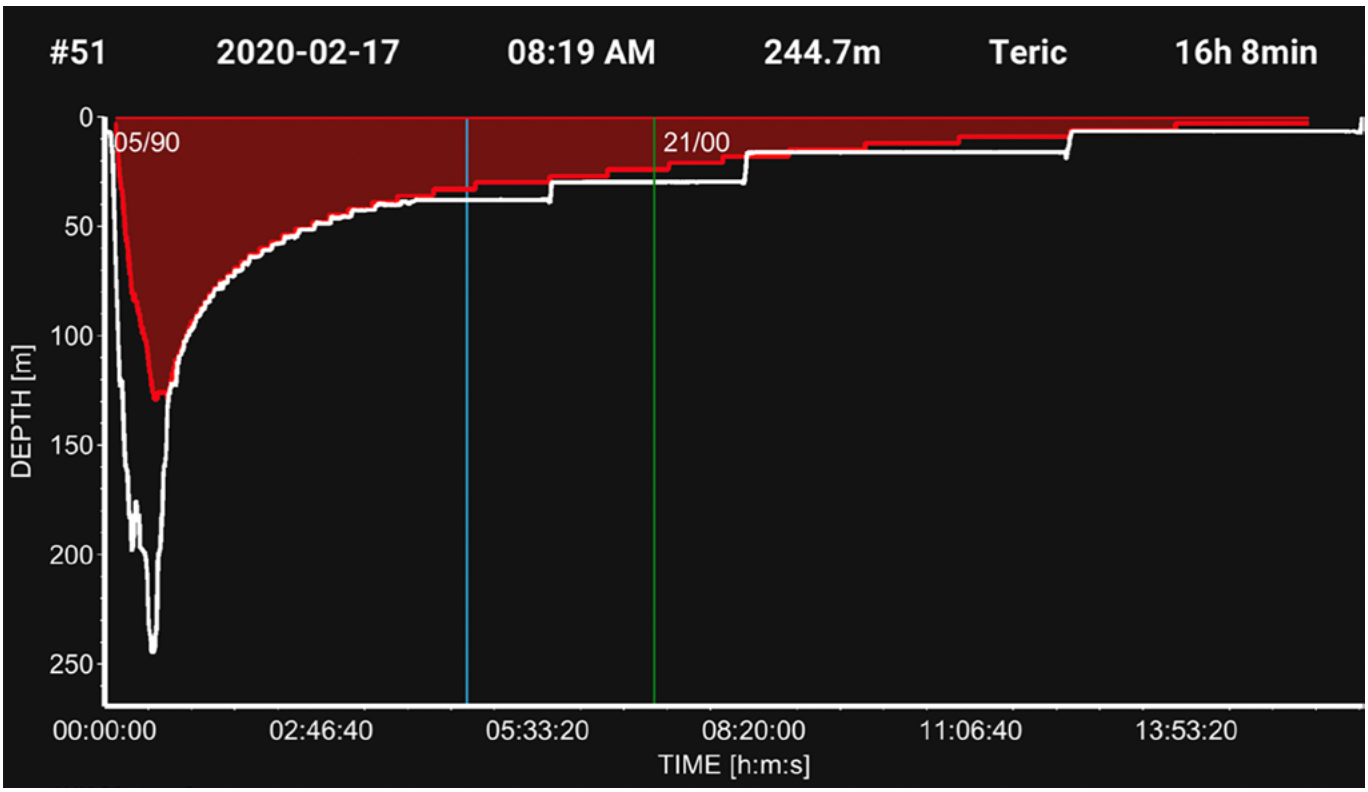
SIMON MITCHELL

The 16 m habitat looking like a large jellyfish



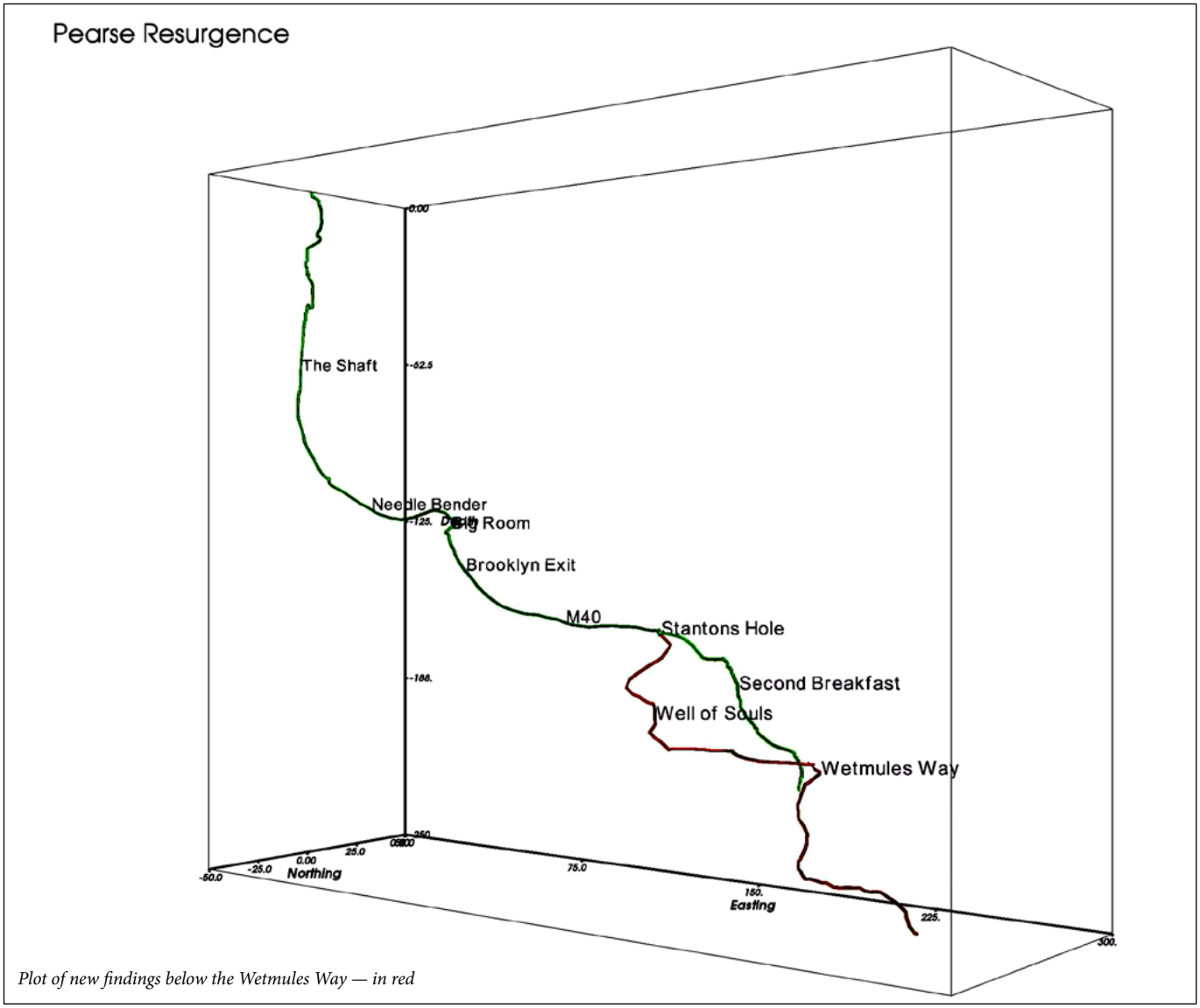
SIMON MITCHELL

Looking down at the 28 m and 40 m habitats



RICHARD HARRIS

Dive profile of the exploration dive to 245 m



RICHARD HARRIS

Plot of new findings below the Wetmules Way — in red

SIMON MITCHELL

There is no mistaking a positive fluorescein dye test.

SIMON MITCHELL

Kieran Mackay prepares to dive a sump at the base of Nettlebed Cave. Sandy and Luke watch on.

also conducted. The result of the bolt climb discovered a way on via a sump pool back in the Spillway.

The dye trace in the Midas Chambers revealed a connection to the Pearse Resurgence as the dye emerged from the deep to the entrance.

Even in the low flow conditions, the dye came through in 18 hours compared with over 30 hours for the Spillway trace in 2016.

Another way on was discovered but it is hindered by a restriction that would require work.

Two clear ways on now need to be explored in the future.

The usual thanks must be extended to Oz Patterson and Deb Cade for their unlimited generosity and hospitality. I wonder how many vagrant cavers from around the planet they have selflessly hosted and supported.

Thanks also to Shearwater Research, O'Three Drysuits, Seacraft Scooters and the New Zealand caving community.

Ashford Caves, NSW

Garry K Smith
NHVSS

GARRY K SMITH

Entrance to Ashford Cave in 2019 (from left) Lachlan Bailey, Marcia Kaye, Garry K Smith

LOCATION

The Ashford Caves are located in New England (or Northern Tablelands) in NSW, approximately 220 kilometres north of Armidale and 90 km north of Inverell.

The caves are 20 km from Ashford along Limestone Road, which heads towards Macintyre Falls. The majority of this road is unsealed. Tourist signs in Ashford direct visitors via a longer route to the caves using the bitumen sealed road toward Wallangra. About 20 km out of Ashford a right hand turn at Sand Creek Road has a sign for Ashford Caves.

There is 11 km of well-graded gravel road, with the last 4 km of this route following Limestone Road. The caves are located on a reserve (now part of Kwiambal National Park), some 300 m from this road. Visitors have to walk the last 300 m to the Main Cave entrance.

DESCRIPTION

The Ashford Main Cave (AS-1) is located in a 15 hectare reserve at an elevation of 430 m ASL. The reserve is on the northern edge of a limestone outcrop which stretches for 10 km along Limestone Creek.

The cave, often referred to as Ashford Cave, has seven entrances and is freely accessible to the adventurous tourist. The distinctive railway tunnel shape of the main entrance is the result of tunnelling through bedrock and excavation of 1-2 m of guano from the cave floor during phosphate mining. The present main cave was originally two caves, 'Eastern Cave' and 'Western Cave', but they were connected during mining of guano (Kenny 1983). Most of the present cave 'consists of large walk-through horizontal chambers and halls; some chambers reach heights of over 10 metres' (Rutledge 2001).

Two small caves on the hill above connect with the main cave via a sloping passage (Bone Cave) and a shaft (Pretty Cave), which in theory means there are nine entrances into Main Cave (Taylor 2013). As there are a large number of entrances the cave breathes very well (McDonnell 2003). The lowest level floors in the deepest caves are only just above the creek level outside (Carne 1916), so there is little chance of dry cave being found at lower levels.

The Main Cave is publicised widely throughout the local tourist information outlets as a wild cave for self-guided tours and maps were freely available from the Tourist Information Centre for many years. Ironically, the local council tourist pamphlets of the 1990s suggest visitors take no other equipment than one or more gas lanterns. No mention is made of backup lights or torches, hard hat, old clothes or dust mask, the last being for the clouds of choking dust which can be stirred up by inexperienced recreational cavers during dry periods. During a drought in the area, Rice (1986) reported 'Ashford cave is dustier than any I have seen before.'

On the whole this cave is an easy stroll for the inexperienced recreational caver who is interested in something different from guided tour caving. At least one hour should be set aside to fully explore the passages that are easy to negotiate through the horizontal system containing several large chambers. The total surveyed length is 578

GARRY K SMITH

Ashford Cave: Marcia Kaye and Lachlan Bailey

GARRY K SMITH

In the Eastern Cave chamber of Ashford Main Cave: (from left) Rod Smith, Lachlan Bailey, Peter Downes, Murray Dalton, Marcia Kaye

metres, with chambers up to 12 m high. This is quite remarkable, considering that the total relief of the limestone outcrop is only about 15 m (Smith 1994).

There are few formations (speleothems) of note in the cave and what is visible has been extensively eroded by guano, damaged by mining or by vandalism. Carne, in his report of 1915, says that if any formations ornamented any smaller chambers and passages, the scenic effect would have been long since destroyed by the corroding action of the phosphoric and nitric acids from the guano (Carne 1916). One notable feature is the large stalagmite not far from the main entrance. Many of the passages have damp compacted earth and guano floors while others are dry and extremely dusty.

Four of the entrances are easy to enter and the other three vary in difficulty up to requiring a 15 m ladder or rope to negotiate the daylight hole into the Daylight Hole Chamber.

The cave is an important maternity site for the eastern horseshoe bat *(Rhinolophus megaphyllus)*. These bats tend to congregate more in the bat chamber at the western end of the cave. Large numbers of the common bent-wing bat *(Miniopterus schreibersii oceanensis)* can also be seen roosting in and around 'The Great Cave' and 'Gallery' chambers. It is interesting to note that in the upper section of these dome-shaped chambers the air was around 7°C warmer than the bottom of the chamber during a visit in June (Smith 1994). This is an ideal situation for the bats' over-winter hibernation. Access to the caves is restricted during the bat hibernation period and the breeding season.

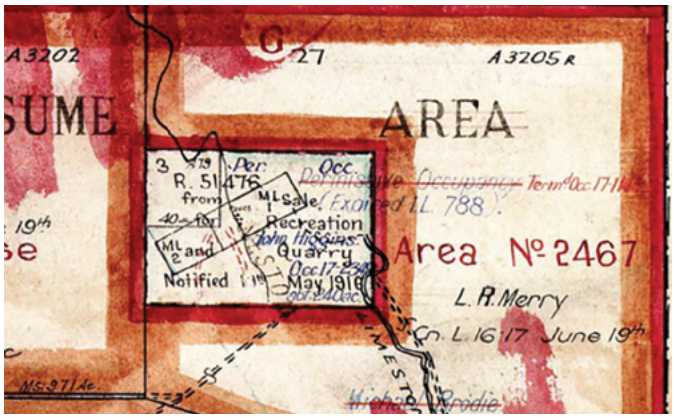
The NPWS website 'Visitor Info' page says: 'To help bats, only enter the caves during September to October or March to April, to prevent bat disturbance, infant

GARRY K SMITH

Michael Smith abseils through the Daylight Hole, July 1994

GARRY K SMITH

Lachlan Bailey and Marcia Kaye explore upper and lower levels, Western Cave



Parish map showing location of caves and leases,1901

GARRY K SMITH

Garry Smith with the cave's most prominent speleothem

abandonment and death during summer breeding season and winter hibernation.' (NSW NPWS n.d,)

It is not uncommon to see a rat or two inside the cave, as they thrive on the food scraps left behind by thoughtless recreational cavers. This has a detrimental effect on the cave's ecology.

There are at least 28 tagged cave entrances and features in the Ashford karst (Howlett 2014).

Many of these are small vertical caves and some are on private property and rarely visited. Most terminate in silt-cemented rubble fills (Kig 1987).

FACILITIES

Public facilities in the National Park cave reserve include: shelter picnic tables, barbecue facilities, a concrete water tank and two pit toilets. Overnight camping is not permitted.

The water tank is fed by the runoff from a picnic shelter roof, so when visiting during dry periods it is wise to carry some water.

A personal gas stove may be handy to cook food if required.

There is no garbage collection, so visitors will need to carry any rubbish out with them.

HISTORY

The traditional owners of the land surrounding the caves are the Kwiambal People (pronounced Kigh-am-bal). When the Europeans began settling in the region from about 1830, the Indigenous groups were killed by gangs of armed ex-convicts who worked in the area (Karst & Geodiversity Unit 2011).

Botanist and explorer Allan Cunningham in 1827 during his exploration of the area north of Inverell, found a squatter's shack and cattle in the supposedly unexplored region (McMinn 1970). He passed through the district on his way to the

GARRY K SMITH

Ashford Cave — Marcia Kaye and Lachlan Bailey (NUCC)

Darling Downs, crossing the Severn River, (which he named as Anderson's Brook) about 1 km upstream from the Severn River and Frazer's Creek junction (Ashfordonline 2020).

Settlers began arriving in the region from around the early 1830s and a settlement sprang up to service the emerging sheep and cattle properties and cultivation of cereal crops; later the tobacco growing on the flats of the Severn and Macintyre Rivers became the largest industry in the area until its decline in the late 1980s. The village of Ashford was first known as Frazer's Creek after the nearby station, taken up in 1840. The village grew in size and is believed to have taken on the name Ashford in 1845 after 'The Squatters Home Inn' was built. Ashford was probably named after a town in Kent, England. In 1851, J. J. Galloway marked out a reserve for a village and in 1860 the village was surveyed and officially named Ashford in 1863. By 1864 there were two hotels, a police station, court of petty sessions, blacksmith and post office (Ashfordonline 2020).

The caves were well known by the late 1800s and appeared on the old land titles maps in the Parish of Macintyre, County of Arrawatta. The land formed part of lease Area QR 344 which was notified on 6/3/1874 and shown on the parish map. William and John Russell owned or leased a portion of 40 acres just to the north of the caves area (Macintyre-Allawatta Parish Map 1900).

An article published in *The Maitland Mercury and Hunter River General Adverti*ser provides an early account of a visit to the Wallangra Caves in 1892. These are undoubtedly the caves now known as Ashford Caves. The account describes the trip to the caves by 19 people in six buggies and their adventures underground using candles as lighting. Their candles were extinguished for some time by the sheer number of bats, 'thousands' flying around.

The group found their way through the cave to another large entrance from where some of the party walked over the hill to their campsite where tents had been set up. The rest of the group retraced their steps back through the cave to camp. The account describes the group crawling and squeezing through tight passages and burning magnesium wire to illuminate the larger chambers (R.B. 1892).

The 1901 Macintyre Parish Map shows the land containing the caves was part of a Permissive Occupancy of about 240 acres under John Higgins. Four caves were noted on the 1901 parish map on two mining leases ML1 and ML2, which were within the Higgins' Permissive Occupancy land. L R. Merry is also noted as the landholder of the larger area of 1904 acres surrounding Higgins' Permissive Occupancy.

During 1915 Government geologist R. J. Carne undertook an investigation to ascertain whether the reported phosphatic deposits in the Ashford Caves 'could be worked without injuring the scenic features of the caves, which are now covered by Reserve No. 50,554 (notified 10th March, 1915) over Quarry Reserve No. 344 (notified 6th March, 1874).'

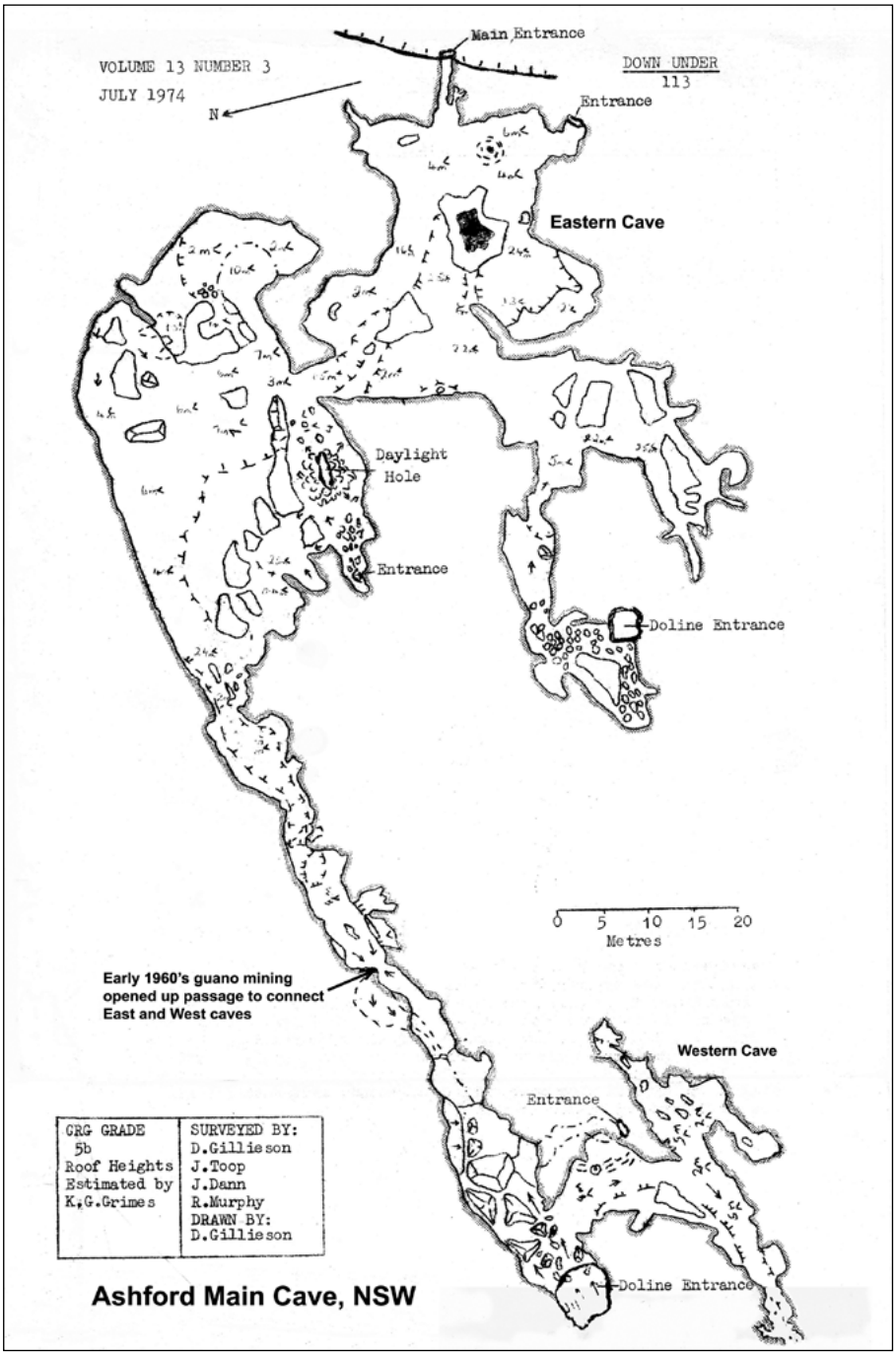
He determined from sampling that the phosphate (guano) deposit was significant and states that, 'Removal of the guano and cave earth would increase the accessibility of the caves to visitors and add to the interest always pertaining to underground caverns'. Analytical testing of the sample he collected provided an estimated value of the guano at £3 19s. 4d. per ton, based on 1915 prices (Carne 1916).

Carne (1916) provides one of the earliest descriptions of the cave, when he writes: 'The floors of the principal caves are covered with considerable depths of bat guano, whilst the smaller chambers ramifying from them are almost filled with it, making passage between almost impossible or very difficult.' This suggests that Carne may have actually crawled between the two main caves. We will never know if he was the first to traverse between the two.

Carne (1916) also indicates that quarrying of the limestone for lime production had been undertaken for some considerable time, as there were extemporised lime kilns in the vicinity which had been used to supply lime to Inverell. Comments by Raggatt and Booker (1940) suggest that the transport costs made it uneconomical to use the limestone for lime burning or cement making, other than being sold in the immediate local area. 'Up till the coming of the railway to Inverell, wagons bringing supplies from Armidale back-loaded with lime from here, possibly for mortar' (Kenny 1983).

Reserve R51476 for Recreation and Quarry, was notified on 19/5/1916 and incorporated Mining Leases 1 & 2 to mine for phosphates (guano) (Macintyre–Allawatta Parish Map 1901). In the same year H.E. Minehan commenced mining the phosphate and it was subsequently continued by L. R. Merry (Raggatt and Booker 1940).

Then on the 1918 edition of the parish map it shows the bulk of Reserve R51476 being transferred into R53809, with the caves still contained within the original



Ashford Map: UQSS Down Under, *13(3): 113*

Mining Leases ML 1 & ML 2, which were within R51476. (Macintyre–Allawatta Parish Map 1918).

Possibly the earliest photographs of the cave entrances were taken by H. Roberts. The two images show the Eastern Cave main entrance as it looked prior to modification by the phosphate miners. They were published on unnumbered pages after 146 & 150 in *The Limestone Deposits of NSW* (Caine & Jones 1919).

Leonard Merry leased 'the caves area from 1925 to the 1950s, then it went to a man called Gibson, who did nothing with it and so it reverted to the Lands Department, thence to the Ashford Shire and Inverell Shire Councils' (Kenny 1983).

In 1934, Professor I.G. Edgeworth-David did a survey of the Ashford Caves. He had mine mapping skills and at the time was working at the Ashford coal mine. His completed report was given to Leonard Merry (Kenny 1983).

On 24th August 1940, a group consisting of F.W. Booker and J. J. Harrison from the NSW Geological Survey and four others visited the caves to collect fossils for identification and to try and verify the age of the limestone (Raggatt and Booker 1940).

During World War II, supplies of phosphate from Nauru and Ocean Islands were cut off by the Japanese (both islands were occupied by them in August 1942). The phosphate deposits on the islands had been mined since 1919 to make fertilisers, ammunition and explosives. The Japanese occupation led to a search for alternative supplies around Australia. Ashford Caves was one of the sources identified, but it is unlikely that phosphate from here was used to produce ammunition or explosives for the war effort. In 1942, F. Booker completed a report on the 'Phosphate Deposits at Ashford Caves'. It was later published in the Department of Mines geological reports of 1950. Booker states, 'The caves have a very irregular bottom and are filled to depths ranging from a few inches up to 14 feet with cave earth. The surface layers of the cave earth have been impregnated with phosphatic material and some nitrogenous matter from the droppings of bats which inhabit the caves'. His findings indicate that tonnages of phosphate 'material available from the Ashford Caves, in comparison with Australian requirements, must be regarded as negligible' (Booker 1942). Two survey maps of the caves by the 'PH. Macintyre Co. Arrawatta', are reproduced with Booker's report. They do not show that the Eastern and Western caves are linked at that stage.

The Ashford Main Cave was sporadically mined for phosphate-rich bat droppings (guano) between 1916 and 1967. At least five different companies have undertaken extraction of the extensive guano deposits with varying degrees of sophistication (Nelson 1973). However, the excavation of the caves was very extensive in a quest to supply fertiliser for farming operations in the district. Two of the entrances had elaborate wooden rail systems installed into them so that trolleys could be used to haul the guano out of the cave. Today some of the timbers remain in a half-covered twisted heap at the western entrance.

In 1961, Ken Angel and Peter Dwyer, members of Kempsey Speleological Society, visited the two known caves at Ashford to study bats and undertake banding. Their report says, 'Ken dug his way through a tight squeeze-hole at the end of one cave system, only to find himself in the other!' (Anon 1961). This could be the first time that anyone had traversed between the Eastern and Western caves. This passage was certainly enlarged by the phosphate miners as Kenny (1983) says the mining of guano connected the two caves in about the 1960s when the remaining six feet of guano was removed (Kenny 1983, Anon. undated).

Between July 1960 and December 1963, Dwyer undertook an in-depth study of the eastern horseshoe bat *(Rhinolophus megaphyllus)* in north-eastern NSW, which included the Ashford Caves. He recorded the bat numbers, distribution and other data at intervals throughout the year and published his findings in *Helictite* (Dwyer 1966).

H A ROBERTS

Ashford Cave main entrance before guano mining, 1915

In March of 1966, Henry Shannon explored the Main Cave and made a grade 2 survey which showed the original two caves linked. The map, published in 1969, also shows mining equipment just outside the entrance of the original Eastern Cave entrance (Shannon 1969). The guano was mined as a source of fertiliser for local use up till about 1967, when it appears that the high cartage costs led to the downfall of the operation. Today the remaining reserves are limited.

The University of Queensland Speleological Society (UQSS) ran a number of trips to the caves from the mid-1960s. In 1968 they found a number of vertical shafts on nearby outcrops of limestone and explored them. The deepest shaft 'Sein Fein' (Sinn Fein Pothole in later publications) was descended to a depth of 60-70 ft, but each cave had little or no horizontal development. (Bourke 1968) On another trip Malcolm Pound reports that their group called into the Ashford Caves and opened up a new entrance into the roof of the Main Cave (Pound 1969).

On 10 October 1971, UQSS cavers completed a cave survey of the Main Cave to record 1769 feet (539 m) of passage. This included a new entrance and 80 feet of passage. They also completed a surface survey that was overlaid with the underground survey (Dann 1971). The group had started the survey on a trip to the caves over the weekend of 29-30 May 1971 and also took some multi-flash photos on this trip (Gillieson 1971). Their completed grade 5b map of the Main Cave appeared in the society's 1974 journal *Down Under,* Volume 13, No.3, p.113 (Gillieson 1974).

The road from Ashford to the caves area was formally gazetted on 12/7/74 and judging by the road plan number this means 1974 (Macintyre-Arrawatta Status Branch Charting map, 7 June 1937).

It was quite apparent that the local shire council saw the caves and the nearby steep gorges and waterfalls along the Macintyre and Severn Rivers as a tourist attraction and a chance to boost the local economy with the tourist dollar. This is reflected in a newspaper article of 1975 that shows a map of the Main Cave and reported that in recent weeks, holes had been seen on a reserve on the opposite side of the road to the caves and that private properties were also searched for caves. The author goes on to say that $5000 from a regional employment development grant to Ashford Shire Council was used to pay for cleaning out of the caves and erection of toilets and picnic tables at the reserve (Anon. 1975).

Roberts (1982) produced a proposal for the Macintyre Falls National Park and in his 1983 thesis on the vegetation of granite areas of northern New South Wales (Roberts 1983), broadly described the major vegetation types and dominant species.

During 1986 several of the cave entrances were fitted with tags by the NSW & ACT cave and karst numbering co-ordinator, P. Dykes. The tags are small squares of sheet aluminium stamped with the assigned cave identification number with the prefix 'AS' for Ashford. Then in January 1999 a further 19 cave and karst feature tags were installed by B. Howlett and D. Marsh (Howlett 2014).

The 1937 Status Branch Charting Map shows that the National Park was gazetted for the land surrounding the caves reserve on 22/12/1989 and R51476 was vested with the Ashford Shire Council (gazetted 25/3/1977).

Severn State Forest No 1002 No. 7, Ext'n was gazetted 11/6/1993 for the land surrounding the lease containing the caves. (Regional Charting Map, 26 August 1936).

Then Kwiambal National Park was dedicated in April 2000, following the acquisition of property leases, private land and incorporation of adjoining crown reserves (including Ashford Caves) into the new 1301 ha park. The 2004 'Kwiambal National Park and Ashford Caves Crown Reserve Draft Plan of Management', says that the 15 ha Ashford Caves Crown Reserve was at the time in the process of being reserved as a protected area under the National Parks and Wildlife Act (NPW). The class of protection chosen would determine if the land was to be added to the national park or as a separate karst conservation reserve. The NP draft plan treated the Ashford Caves Crown reserve as though its tenure were a protected area under the NPW Act rather than a Crown Reserve. Either way it would be managed under the provisions of the NPW Act (NPWS 2004).

Finally, the caves located on Portions 11, 12 and 19 were reserved under the provisions of the *Brigalow and Nandewar Community Conservation Act 2005* with administration vested in National Parks from 1/12/2005. There is a pencil note on the Regional Charting map to the extent that Portions 11, 12 and 19 were purchased by National Parks.

GEOLOGY AND PAELEONTOLOGY

The Ashford limestone outcrops over a distance of 10 km along Limestone Creek south of the junction of the Severn and Macintyre rivers. Much of the outcrop is located on the northern side of Limestone Road and trends generally north-south, dips steeply easterly and on average is 800 metres wide. The limestone is 'within moderately deformed and altered mudstone, slate, pyrite, lithic sandstone and slate of the Carboniferous Texas beds'. These rocks are almost entirely surrounded by Early Permian granite and are intruded in places by basalt dykes that postdate the deformation. The limestone contains an abundance of 'crinoid and coralline fossils that are poorly preserved, probably because of the combination effect of deformation and contact metamorphism' (Lishmund *et al.* 1986).

The cave development is limited by the low relief of the limestone outcrop. This Lower Carboniferous age limestone (about 330 million years old) is finely crystalline and of high purity (Lishmund *et al.* 1986).

'The main Ashford Cave is dominantly phreatic but may have been a stream cut-off of a meander spur at one stage in its development.'

However, there may have been some stream capture during its development as the horizontal epiphreatic cave system is located in a meander spur of a medium size creek and contains soil derived sediments.

'The northern wall of the main chamber follows the limestone — volcanic rock contact' (Grimes 1976). Much of the Carboniferous limestone was metamorphosed into marble as a result of heat and pressure as nearby igneous rocks were being formed. Carne (1916) describes the marble as varying in colour from light to dark grey, with occasional bands of pinkish and white, suitable for cutting and polishing.

'Four types of fossil bone-rich sediments have been discovered in Ashford Caves. While the age of these sediments is unknown, they are considered palaeontologically significant as they lie between the Late Tertiary deposits of the Darling Downs and Riversleigh areas in Queensland (15 to 1.8 million years in age) and the 30,000-year-old Quaternary deposits found at Wellington in NSW' (Karst & Geodiversity Unit 2011).

The Kwiambal National Park website reports that fossilised bones of ancient kangaroos and pygmy possums have been found in and around the caves, dating between 30,000 and 2 million years old which is within the Pleistocene Age. (NPWS n.d.)

For further details regarding the caves and access, contact the National Parks and Wildlife Service Tenterfield Office: phone (02) 6736 4298, or visit: http://tinyurl.com/yctntxx3

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Which bag is the best for caving?

Clare Buswell
FUSSI

IF YOU ARE new to caving and/or are in the hunt for a new caving pack, then here are a few ideas that may help you make a decision.

What you end up buying really is a matter of personal choice combined with the type of caving you do the most and the dollars you wish to part with.

As cavers know, caving bags get everything thrown in them and at them. They are dragged, rolled, kicked, sometimes thrown, taken for swims in underground rivers, get covered in mud, clay, sand and are hauled over sharp rocks.

As a consequence, they are not up there in the fashion stakes and many of us use anything that will do the job. However, caving packs carry your lifeline to safety: the gear needed for the caving you are doing: SRT gear, warm clothes, first aid kit, rope, spare lights and batteries, piece of monocellular foam rubber, camera, survey gear, lunch and chocolate etc.

So here are some choices ranging in price from the K-Mart special or the Op shop cheapie, the Aldi waterproof single shoulder strap daypack through to dedicated caving packs.

THE K MART SPECIAL AND THE OP-SHOP CHEAPIE

Cost: somewhere between $5-15.

If you buy one of these, you may need to make some modifications. Any outside pockets made of mesh type material, which in the bag's non-cave life, hold such items as drink bottles, should be cut off. In the cave environment anything in them will undoubtedly fall out.

This will leave you with the shoulder straps, a main compartment, an outside pocket that zips up, and a handle or loop at the top so you can pass it on to people or place a karabiner on which to tie a rope.

Sometimes these bags are waterproof, but I wouldn't stake my life on it. The lifespan of such a bag depends on how you treat it, the way in which it is made and from what material. Very early daypacks were made of good quality canvas which was waterproof.

The modern-day versions, made of nylon with a waterproof coating that usually flakes or is scraped off during use, has seams that can be welded and/or stitched together. They are cheap, practical and because of their size, good for non-ropework trips. Importantly, these bags are sealable, in that the main compartment usually zips up so nothing can fall out and the dirt and mud can't get in.

I find that these packs work well almost anywhere and, being cheap, are a good option it you don't want to spend lots of money. The compromise is that the zips will fail and holes will develop in the material reasonably quickly — not that most of us care, if we cave mostly in dry caving systems.

THE ALDI SINGLE SHOULDER STRAP PVC DAY PACK

Cost: $20

I have not much experience with this pack, except to note my bias against single shoulder strap type packs. I simply find them uncomfortable to wear. Having got that out of the way, cavers make use of them.

They are relatively cheap, seams are welded and the polyester is a reasonably heavy weight, but not as heavy as that used by Petzl, Aspiring or Beal bags.

Like most of the packs reviewed here, the bag is narrow and thus fits through things easily. As for space to carry all your stuff, these cope OK.

The bag is waterproof with a folding or roll-down top similar to that found on canoeing bags and the like. They last quite well, with reinforcing on the side handle and where the shoulder strap is attached to the base of the bag.

The supplied carry strap is the same as those supplied with most duffel bags and is easily replaced with something more caver-friendly. There are no bottom or top grab points. The fold-down top has a plastic 'D' through which you could place a karabiner and associated 'dog lead'. Just how much weight this plastic D holds is open to question.

The bag has a see-through panel which runs the length of the front of the bag, allowing for things to be easily located, and the back of the bag has a welded see-through pocket that is only accessible from the inside of the bag. How strong and long-lasting this material is, I don't know.

The Aldi bag, with a bit of modification, represent reasonable value for money depending on what sort of caving you do. Buying them is the issue, as Aldi seems only to stock them when the moon rises in the west.

DEDICATED CAVING PACKS

These include:

Petzl: Transport 45L, Portage 30L, Classique 22L.

Aspiring cave bags: various sizes.

Beal: Pro-work bags, 60L and 45L.

The range of these packs has improved greatly over the past 15 or so years, no doubt influenced by the burgeoning canyoning, window cleaning and arborist markets. They range in comfort, coming with or without waist straps and/or padded shoulder straps. Costs come in from about $100 upwards, depending on size and the amount of padding supplied in waist and shoulder straps.

They are designed to take the harsh treatment that caving can sometimes involve; being narrow, they can fit through squeezes. Both Petzl and Aspiring bags were designed by cavers.

These bags usually come with double closures allowing the pack to be extended, reinforced holes in the bottom (to allow water to drain out), reinforcing on all attachment points, grab handles on the bottom and sometimes on a side. The tops of the bags have strong loops for rope attachment. This is important if you are hauling gear up and down pitches.

All these bags are closed with drawstrings, are easily cleaned and quick to dry

Which bag is the best for caving?

CLARE BUSWELL

The K-Mart special

CLARE BUSWELL

Aldi single shoulder strap PVC day pack

CLARE BUSWELL

Aspiring caving pack

out. The Aspiring bags come with a high-density 10 mm foam pad and are generally white in colour, making them easily seen in the cave environment. Beal pro-work bags are black but have some bright yellow trim. Petzl bags are yellow.

Generally, the shoulder straps of these packs are made from seat belt tape and some women find that some of the manufacturers set them too far apart for a woman's build. This causes the straps to sit on the edge of the shoulder and not comfortably in the centre.

Beware. Few of these packs have lids, which means that they scoop up dirt, etc and leave open the possibility of things falling out.

All are well made, very durable and can take the beating cavers put them through. Unlike the K-Mart special and the Opshop cheapie, they have no zippers that over time clog up with grit and break apart, thus becoming useless.

They have good grab points and the designers have thought about where to place them, putting them on the same side as the shoulder straps so you can grab the bag with all the snaggy bits on that side. They are well made, long-lasting and used by cavers around the world.

What do I use? Well, a number of bags depending on what sort of caving I do. I have the homemade equivalent of the Aspiring/Petzl 40 litre bags, which I made from an offcut of a PVC tarp that trucking companies use. I had a friend with an industrial sewing machine stitch it up for me. It cost me $20.00 for the tarp, from which I made up three bags.

These get used as rope hauling bags due to their size. I also have an old daypack; it's about 16 years old and cost me $15 at the time. I have been trying to put it out of its misery for the past couple of years, but it just doesn't want to die.

What do I like about it? The shoulder straps are padded. It has a separate compartment which contains a piece of high-density foam rubber, which helps keep the pack rigid, and I can take it out and sit on it. This keeps the cold at bay and saves my skinny arse from the discomfort that comes from sitting on lumpy rocks.

It fits all my gear, folds up and now has the odd drainage hole in the bottom to let the water out! Importantly, it is a straight sack, so the top of it is not curved and closed with a zip.

It is closed with a drawstring and has a lid over it. This means that things can't fall out and sand and mud don't get in.

Enjoy hunting for a cave bag that works for you, as one size does not fit all.

American Caving Accidents

Interesting reading and some safety reminders

Cathie Plowman
NC

THE December 2019 issue [77(12)] of the USA's National Speleological Society's monthly publication, *NSS News,* is devoted to caving accidents that occurred in 2017 and 2018 and this feature seems to be a biennial edition of the magazine.

As the editor notes, this is not all accidents, but those accidents and incidents that have been reported to the editor of American Caving Accidents.

Having commenced reading, my first musing was do we have a standard reporting procedure for cave accidents and incidents (including 'near misses') in the ASF that cavers are widely aware of? I was not aware of one and neither were the two long-time cavers I asked.

After some hunting on the ASF website, I found a link to a reporting form (and a new acronym) under administration and then under Cave Safety, Leadership and Risk Management (SLARM). I wonder how many ASF members know of the form and when it should be used?

The NSS accidents are split into three categories and there are reports from each category for each of the two years, with descriptions for each incident, summary tables and maps.

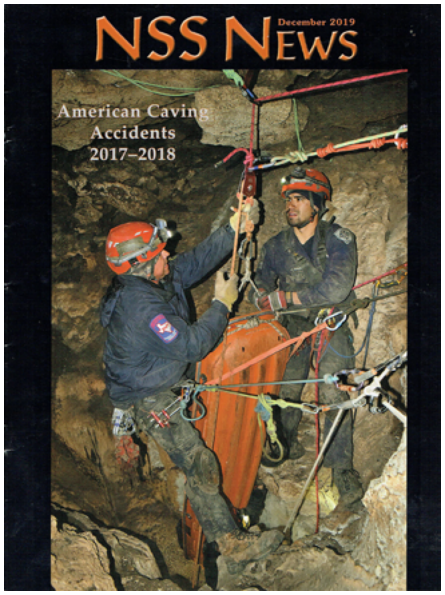
The categories are:

i) caving accidents and incidents;
ii) cave diving accidents and incidents; and
iii) caving-related accidents and incidents.

I did a quick summary of the 2017 caving accidents and incidents to see what might be of relevance to Australian cavers. Of great difference to the Australian situation are the vast areas of readily accessible caves in the US, often with large populations living nearby.

This is reflected in that of the 27 reported incidents ten of them involved 'non-cavers', i.e. no formal club or experience, mobile phones being used as 'flashlights', people lowering themselves down handlines and not being able to ascend them and people getting lost in caves.

Some were thrilling *Boy's Own* adventures with narrow escapes as caving parties just 'happened' upon stranded or lost cavers when on a trip. Six other incidents were outside the USA in varied parts of the Americas.



Of the five fatalities, one was a death on a guided tour, three were of non-cavers swimming in caves and the fifth was a highly experienced caver abseiling off the end of an un-knotted rope (being fed from a bag) and falling 25 metres, the take-home message here clearly being that ropes need to be checked and rechecked.

From reading the reports I'm reminded that the 'bleeding obvious' can and does happen and no one is immune from a mishap. Reminder lessons include:

- Long-hair needs to be contained;
- Carabiners and D-rings etc. need to be checked;
- You can injure yourself when you 'leap' from a rock, so it is generally best to lower yourself down;
- Use handlines rather than take risks – injuries happen;
- Always keep your helmet on while in a cave;
- Very handy to have ibuprofen (Nurofen) in your kit, as a lot of aches, pains and 'minor' injuries were seemingly resolved with this medication, allowing trips to proceed without further incident;
- New and inexperienced cavers may need guidance and assistance regarding 'tricky' moves and need to be closely observed;
- Dead trees that have long been used as 'safe' anchor points will eventually give way;
- Very experienced cavers can still have issues. To quote from one report by caver Terry McClanathan where an accident resulted in a caver suffering a skull fracture and hospitalisation: '[two cavers] can claim over a century of experience between us in thousands of caves, some of which are among the most challenging in the country. Was it just our time? Treat the simplest cave with the same respect that you would a difficult one and be just as careful on your multi-thousandth cave as you were on your first'.
- Larger groups have potential for 'losing' people. One alarming incident was a Sunday trip for a university caving club where 12 people split into two groups. When departing the cave, the gate was locked, no head-count was done and the cavers made their way home in three different cars with some cavers swapping to a different car for the home journey than the one they arrived in. The trip leader noted that he travelled to the cave with five people and left with four. On the following Tuesday the caving club was alerted that a student who had been on the trip had not been seen by roommates or family since the previous Sunday. Subsequently the caver was located just inside the locked gate of the cave, where he'd been for 60 hours trying to get a signal on his phone, licking moisture off the cave walls and while hungry, thirsty and scared, thankfully unhurt;
- Two other incidents are reminders of potential issues if cavers have an injury/illness or are slowing:
  - A caver sustained a coccyx injury early

in the trip but ascertained that he could continue and a second injury (finger fracture) was sustained on the rope ascent out, the caver reporting that he was in pain and had become tired and cold due to pain from the coccyx injury. (The pain after fracturing my own coccyx was excruciating. Best avoided.)

- A caver became overheated, dehydrated, tired and slow from wearing a wetsuit when he had been advised by the leader not to. When exiting, the rest of the party went ahead, the tired caver became lost in breakdown, stopped to rest, fell asleep and when he awoke was too exhausted to move. It was four hours after he had last been seen by anyone else before it was realised that assistance might be needed and a further seven hours before the weary caver exited with assistance.

What has all this got to do with *Caves Australia?*

We can learn from considering the experiences of others in our field.

Things can, and do, go wrong especially when inexperienced, wet, cold, injured, tired, dehydrated, or a combination and any caver could get blasé and take things for granted.

As a result of reading the magazine, I will ask my caving colleagues if they know the procedure for incident reporting. I didn't when I started writing this.

Are Australian cavers generally aware of the importance of reporting 'near misses'?

Would there be benefit to Australian cavers from having an occasional *Caves Australia* feature covering accidents and incidents to add to our safety consciousness?

Perhaps have a conversation on these points in your club and send some feedback to the club rep email group.

Back to *NSS News.* While accidents and incidents reported under cave diving is self-evident, you might be left wondering what are cave-related accidents and incidents?

These were a mixed bag: several were dogs falling into caves, sadly with sometimes fatal results.

Another was where a wheelchair-seated resident of a nursing home managed to fall into a sinkhole behind her nursing home. Thankfully, while undisclosed, her injuries were not fatal.

And there was the group of three visitors stranded in a faulty elevator at Carlsbad Caverns.

Besides being thought-provoking re cave safety, the magazine certainly made for interesting reading and reminded me how easily things can go wrong.

Comment from the Executive

AS THE Executive member responsible for reviewing the ASF Policy, Codes and Guidelines, I started a review a couple of months ago of the ASF Risk Management policy and Cave Safety Guidelines and it is now in the "editing and contributions by others" phase. This covers reporting of accidents and incidents.

In tandem with the review, the Executive appointed a new Safety, Leadership and Risk Management (SLARM) commissioner at our May 2020 meeting and this is a good time to welcome Rafid Morshedi, a member from Sydney University Speleological Society. With our new commissioner we look forward to a reinvigoration of this area of ASF business. One of the roles of the SLARM Commissioner is to maintain a register of all cave accidents and compile summaries of these for publication in the Federation's journal, *Caves Australia.* Historically, many accidents have not been reported to the SLARM and Cave Rescue commissioners. The accident form can be found on the ASF website at https://www.caves.org.au/administration/commissions/cave-safety-leadership-risk-management-slarm

We learn from mistakes, unfortunately often our own and hopefully, more easily, from those of others. Reporting, publishing and having discussions around accidents and incidents should be an important part of any activity, with caving high on the list of those that benefit from constructive discussion and dissemination of information.

— Janine McKinnon

Introducing Rafid Morshedi

ALAN PRYKE

Hi *Caves Australia* readers.

I'm Rafid, the new SLARM commissioner. I've been caving with the Sydney Uni Speleological Society (SUSS) for a number of years — mainly pushing horrible and tight leads at Jenolan but mixed in with some trips to Tassie, NZ etc.

Records about near misses and accidents help us make caving safer and also make for some interesting reading.

I'm looking forward to the new role with the principal aim of gathering and disseminating information regarding caving accidents and near misses that have occurred in Australia.

To achieve this we will be taking the following steps:

- Review of current ASF policies and procedures relating to accidents;
- Creating a new reporting system for clubs and members of the public to report incidents and near-misses;
- Collating and publishing near misses on a regular basis to ensure lessons learnt are disseminated to other clubs;
- Review of club journals to add in historical incidents and near-misses.
- Look out for more news in future *CA* articles.

Happy caving *—Rafid Morshedi*

A brief introduction to the Cave Diving Group (ASF-CDG)

THE ASF Cave Diving Group (ASF-CDG) is a Special Interest Group within the ASF for our cave divers. It became official after it was ratified at the 2000 ASF Council meeting after initial approval at the 1998 ASF Council meeting.

It didn't just pop spontaneously into existence, of course; cave divers had been exploring, documenting, mapping and undertaking many other related activities within their respective clubs and peer groups since the mid-1950s, prior to the official formation of the Cave Diving Group within the ASF.

Historically, formal training was not a requirement for cave divers until the Cave Divers Association of Australia (CDAA) introduced a cave diver training system in 1989.

Before this new cave divers would be introduced to the cave environment and later assessed by experienced cave divers. However, this new training in South Australia did not cover the cave conditions for sump diving that the ASF cave divers were finding in other parts of the country.

As a result, the Sydney University Speleological Society (SUSS) organised for British cave diver Rob Palmer to come to Australia and conduct some training.

The first sump diver course (IANTD) was run in November 1993 with a second sump diver course (TDI) following in May 1995. Both courses were conducted at Jenolan Caves.

Cave diving within the ASF has moved forward, and grown, since those early days. The Cave Diving Group currently has members from across the country who undertake many joint projects aimed at extending our knowledge of our water-filled subterranean world.

Projects can take many forms including exploration, surveying and mapping, documenting, conservation and supporting many areas of the cave-related sciences. Think of all the things a caver would do in a cave, only underwater with a finite amount of air to breathe while doing them.

RIC TUNNEY

Janine McKinnon exploring Lawrence Rivulet, Tasmania

The ASF-CDG is a collaborative and collegiate group and mentoring new members is one of our core aims. Also, we are often joined on our trips by visiting overseas divers.

The current ASF-CDG Commissioner is Rod OBrien. Rod is a trip leader with the Sydney University Speleological Society (SUSS) and is one of Australia's leading cave diving explorers.

He began diving in 1980 and is employed as a commercial diving supervisor, a job that has taken him around the world. In May 1994 Rod was a member of the Technical Diving International (TDI) dive team that introduced the use of Trimix for technical diving in Australia.

Rod is also a member of the NSW Cave Rescue Squad and the Australian Sump Diver Rescue Program and in 2015 received the prestigious Jeff Butt Award of Distinction for Cave Exploration from the ASF.

In 2018 Rod published his book, *Australian Cave Diving-New South Wales*, which comprehensively covers all aspects of NSW cave diving.

For information on CDG activities or membership contact:

Rod OBrien

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A Cautionary Note on the Value of Bat Guano Deposits in Caves

Danielle Cordani and Marlin Tuttle

Reprinted from NSS News, *April 2020*

BAT GUANO has played an important role in human history, from the extraction of saltpetre for gunpowder during the American Civil War to the harvest of natural fertilizer. Not surprisingly, this rich substance boasts yet another use as a window into the past, but only if left undisturbed[1].

Intact accumulations are goldmines of scientific value. In addition to supporting entire ecosystems of life found nowhere else, guano deposits contain invaluable records of past conditions. These records sometimes date back thousands of years, revealing changes in climate, vegetation, pollution, and much more[1-4].

In a recent study published in the *Journal of Paleogeography, Paleoclimatology, Paleoecology,* a team of researchers analyzed a 129 cm long guano core preserved in a Jamaican cave[4]. Led by PhD student Lauren Gallant, the team traced a detailed history of accumulating atmospheric pollutants, changes in plant life, and evolving industrial and agricultural practices. The far-reaching impacts of human activity were traced over 4300 years. They even detected the introduction of synthetic fertilisers, the onset of nuclear weapons testing, and the Industrial Revolution.

But what makes guano such a uniquely powerful environmental indicator?

Clues about the past are frozen in glaciers, buried in sediment beneath oceans and lakes and recorded in tree rings. These natural archives carry biosignatures, such as isotopes of carbon and nitrogen, that allow scientists to view fluctuations in temperature, precipitation, and the chemical composition of our environment[1-4]. Bat guano is an especially attractive medium for paleoclimatologists because it can provide longer-term records than tree cores and, unlike glaciers, is found on almost every continent[1]. Gallant and her team found a better record of environmental contaminants in guano than in nearby lake sediments[3]. Especially in tropical regions, caves can provide shelter from fluctuations in heat and humidity that degrade these historical records. In fact, in many places, bat guano may be the only proxy available for scientists to reconstruct the past.

Cave-roosting bats are typically colonial and can consistently deposit substantial quantities of guano year after year. It is often laid down in a series of identifiable strata, each layer representing a distinct time period[2]. These layers carry information about environmental conditions and the flora and fauna bats consumed[1-3].

Insect bodies contain carbon ratios indicative of the plants they feed on. Insectivorous bats then pass those ratios through their faeces into guano deposits[5]. The same follows for fruit and nectar-eating bats.

Because these ratios vary among plant communities, Gallant suggests they may provide critical information about long-term changes in climate and/or agriculture[3]. For example, C3 carbon ratios are found mostly in forests and in wheat, rye, and oats. C4 ratios are found in arid climates or crops such as corn, sugarcane, or sorghum, and often correspond to periods of drought and deforestation[3,5].

Several researchers have used guano cores to document the large proportions of agricultural pests consumed by bats[4-6]. In Jamaica, Gallant and her team found a shift towards C4 plants that correlated with increased sugarcane production, suggesting bat suppression of sugarcane pests[3]. As bat populations worldwide experience stress from habitat loss and human activities, such evidence supports arguments for conservation.

To serve as historical indicators, guano deposits spanning even a few years can prove helpful, but they must remain intact. Unfortunately, as a result of human extraction and careless disturbance, few remain[1,3]. Those that do should be carefully protected. Systems are needed for identifying, reporting, and conserving undisturbed guano deposits. Such information may be used to preserve potentially important deposits and the bats that contribute to them. Careless footsteps can destroy hundreds or even thousands of years of invaluable records.

Next time you encounter a guano deposit, afford it the same respect as a rare speleothem. Strictly limit disturbance by walking around them or sticking to a single trail that will cause the least damage.

For more information, please visit our resource titled 'Finding, Protecting, and Restoring America's Historic Bat Caves' at MerlinTuttle.org

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