

AUSTRALIAN

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CAVER



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Coming Events

In particular, this list will cover events of special interest to cavers and others seriously interested in caves and karst. A similar list in the ACKMA Journal will give more attention to meetings of specialist scientific interest. Both of these lists will be just that: if you are interested in any listed events, contact Elery Hamilton-Smith on: elery@alphalink.com.au.

If you plan to visit North America or Europe, we can provide details of the many local-regional meetings there.

2003

Nov 29 Tasmanian Speleological Liaison Council meeting, Deloraine (see notice inside).

2004:

Jan 24-25 ASF Council Meeting, Mittagong, NSW (see notice inside under News Items).

Feb 14-21 Brazilian National Speleological Congress, Tandil.

May 1 NSW Speleological Council Meeting, Wee Jasper. Megan Pryke 02-9524-0317.

April 14-16 Australasian Bat Conference, Toowoomba, Qld.

May 12-17 XI International Symposium on Vulcanospeleology, Azores.

May 25-30 Karstology — XXI Century: Theoretical and Practical Significance, Perm, Russia.

May 23-28 Cave Presenters Workshop, Mole Creek.

May 29-30 ACKMA Annual General Meeting, Mole Creek.

Sept 13-18 TRANS-KARST: First International meeting, Vietnamese-Belgian Karst Project, Hanoi.

October ? Dwight and Mary Deal hope to run the Karstlands Tour of South-West China, which was scheduled for 2003 but wiped out by the SARS epidemic.

October 10-16th Limestone Coast 2004: International Conference at Naracoorte and Mt Gambier; (will include the final meeting of ICGP 448 and a workshop on RAMSAR Subterranean Wetlands. See notice inside under News Items, page 4).

October 16 NSW Speleological Council Meeting, Sydney. Details later.

And Looking Ahead

2005

Jan 2 - 8 25thASF Conference, Dover, Tasmania (see page 19 and separate flyer in this issue) Preliminary details: Arthur Clarke 03-6228-2099.

Apr. 10-17 ACKMA Conference, Westport, New Zealand.

Aug 21-28 14th International Congress of Speleology, Athens, Greece.

2007

January 26th ASF Conference, South Australia, celebrating 50 years of the Australian Speleological Federation. Start planning now.

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Editor: Geoff Crossley

44 Pridham Street, FARRER ACT 2607

Phone/Fax: (02) 6286 1113

Mobile: 0417 437 931

Email: gkcrossley@bigpond.com

Production Manager: Joe Sydney

Email: jsydney@choice.com.au

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President:	John Dunkley
Senior Vice President:	Jay Anderson
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* Contact Joe Sydney for rates.

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COVER: Abrakurrie cave (6N3) – Nullarbor, WA.
Approx. 150 flashes/30 minute exposure!
Ross Anderson (WASG)

Layout and design: Jacqui Fry

News Items

ASF Council Meeting January 2004

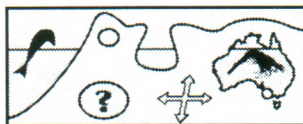
The annual Council Meeting will be held in the VRA Hall, Bessemer St, Mittagong (between Bowral Road and railway line), commencing at 12 noon on Saturday 24 January, 2004 and continuing if necessary on the Sunday morning. A barbecue will be organised on the Saturday evening. Full details with member clubs in December, or see web-site.

"Limestone Coast 2004"

<http://caves.saveproddies.net/index.php>

Closing workshop of IGCP 448 and First International Workshop on RAMSAR Subterranean Wetlands.

ASF is co-sponsoring and assisting with organisation of this important



international conference, centered on Naracoorte, which will emphasise relationships between earth sciences and bio-sciences, between scientific understandings and human activities, and the implications for rehabilitation of karstlands.

The Convention on Conservation and Sustainability of Wetlands was agreed in 1971 at a meeting in the Iranian town of Ramsar, and has since become generally known as the RAMSAR Convention. It has worked to further the conservation and effective management of wetlands, recently recognising the significance in this context of caves and karstlands as ecological niches.

The event is set for 10-16 October, 2004 and further details will be advised as planning progresses. For further information at this stage, contact ASF Vice-President Nick White (nicholaswhite@netspace.net.au), Sue White (s.white@latrobe.edu.au), or conference convenor (& ASF Life Member) Elery Hamilton-Smith (elery@alphalink.com.au).

Introducing the Tasmanian Speleological Liaison Council

Recent developments in the Tasmanian caving scene have lead to the formation of a Tasmanian Speleological Liaison Council. This is a forum for discussions between members of Tasmania's four caving clubs, namely; Southern Tasmanian Caverneers, Northern Caverneers, Mole Creek Caving Club and Savage River Caving Club. Whilst there are similar bodies in other states, the fact that only two of these clubs are affiliated with the Australian Speleological Federation has meant that we have decided not to constitute ourselves under the auspices of the ASF. In fact we have no constitution at all.

Meetings are informal affairs held three times per year at a central venue in the Deloraine Hotel. So far we have been meeting for a counter tea and then we start the Business Meeting. Minutes are kept and these are circulated, with the Minutes Secretary for the Meeting becoming the Convenor for the following meeting. The next meeting will be held Saturday 29th November with dinner starting at 6pm. Clubs are restricted to two delegates each which offers a meeting of manageable size. So far we haven't really

www.caves.org.au

had to vote on any motions as such, our actions being determined more by consensus decision making. The greatest formality is that we do have a letterhead, a mailing address at the Northern Caverneers post office box and Dave Butler acts as the Executive Officer, clearing and redirecting correspondence.

Main Agenda Items include the upcoming CaveMania conference scheduled for January 2005 and the organisation of fieldtrips. Management issues at Mole Creek are a perennial issue. At present the Mole Creek Karst National Park Management Plan is scheduled to appear in November. There has been a recent Legislative Council Enquiry into Conservation Issues on Private Land which involves many of the Mole Creek caves. There have been access disputes with a number of land owners in the area and we hope that the united front offered by the TSLC will precipitate a satisfactory resolution. Recently Kubla Khan made it to the headlines and the issue of its management reverberated around the Ozcavers email forum. Realistically the matter of Kubla Khan, access and management, is part of a much broader issue.

We hope that by having enlightened discussion in our forum we can be seen as a credible and representative voice for caving in Tasmania and thereby make a positive contribution to government and other agencies, to our clubs and ASF regarding all aspects of caving, long into the future.

Stephen Bunton

President, Southern Tasmanian Caverneers

Current Convenor TSLC

Ph: (03) 6210 2200

Centenary Medal for Bob Kershaw

Congratulations to the Chairman of ASF's Risk Management/Cave Safety Commission, Bob Kershaw, who was recently awarded one of the Australian Government's much-delayed Federation Centenary Medals, the citation reading: "*For service to the community through the New South Wales State Emergency Service*". A member of Illawarra Speleological Society and Operations Manager for the Bullita Cave project in the Northern Territory, Bob was appointed our Risk Management expert because of experience gained in the SES.

International Society of Subterranean Biology – membership invitation

The International Society of Subterranean Biology, formerly called the Societe Internationale de Biospeologie (SIBIOS), has recently been re-organized and is now fully "international" (meaning no longer largely French or European). All of us are working to make this a truly international society. We now have memberships from Brazil, Australia, Japan, India, USA, Korea, etc. We have also started a new journal titled "Subterranean Biology," which hopefully will begin publication late this year.

We need to get more Australasians (Australia, New Zealand, Oceania, etc.) involved in this organization. At the moment only about two of us from Australia belong and have been active recently (Arthur Clarke and myself). I am on the Council and on the editorial committee of the revamped journal, now called

"Subterranean Biology". Once the journal gets moving, it will be a good place for publication of papers dealing with all aspects of cave biology, including anything "subterranean". We want to develop this into a respected journal that represents all aspects of subterranean biology.

Anyone aiming to become a regular member of the Société Internationale de Biospéologie / International Society for Subterranean Biology has to simply send a request for candidature either to the President or to the General-Secretary, or to any member of the Council of the Society (Bill Humphreys in Australia).

The new candidate is invited to send his request either via an application form published in the newsletter or via simple mail or e-mail. The new candidate is invited to send his complete address, telephone, e-mail, and the topics related to subterranean biology in which he is involved via snail mail or e-mail. The new candidate must be supported by two proposers (sponsors, godfathers), members of SIBIOS (Arthur Clarke and Bill Humphreys in Australia). The candidature is registered by the General-Secretary and forwarded to the members of the Council. The candidate is accepted after evaluation by the Council during a meeting of the council or by e-mail. The new member is thereafter invited to send a subscription to the Treasurer.

For further information contact me at bill.humphreys@museum.wa.gov.au. More details can be found on the Society website: <http://www.fi.cnr.it/sibios/main.htm>.

Bill Humphreys, WA Museum

Progress on the Gregory Caves Project, Northern Territory

The 13th CSS Expedition to Gregory National Park, Northern Territory, in July located and mapped over 5km of new passage, bringing the surveyed length of Bullita Cave to half a tape's length short of 93km. Much of this year's exploration was in an area earlier dismissed as being unlikely to yield significant passage, and some of it was of less than walking size, to the annoyance of some. There are well over 8,000 survey stations and, because of the network maze nature of the cave, more than 1,200 loops in this complex survey.

Water had destroyed an automatic camera 3m above the floor, set in 2002 in a remote part of the cave to capture photographs of floods; at least we now know how deep the floodwaters can be during the wet season! A fortuitous convergence on several days of geologists, geomorphologists and hydrogeologists exchanged views and advanced understanding of the origin of the caves and tufa deposits.

The total surveyed length of all caves in the district, including some completed by TESS, and earlier by some visiting British cavers, has now passed 150km.

Other karst and cave features in this remote part of Australia are gradually coming to light. From a chartered light plane, some of the group GPSed another 'skydiver' hole (collapse doline) north-west of Wave Hill, adding to several known from the Newcastle Range, south of Timber Creek. Subsequent research pinpointed reports of karst collapses in the Montejinni Limestone near Top Springs, and 3 more sinkholes close to the Buchanan Highway which will be investigated in 2004. These remote, semi-arid karsts clearly have potential for exploration.

John Dunkley

Australian Speleological Abstracts

Abstracts of all significant speleological material published in Australia and the whole world are available from the Swiss Speleological Society. A CD covering the years 1988-1999 costs 120SwFr, while the Abstracts for 2000 (a total of 5,263 abstracts) come as either a hard copy (255SwFr + 21Fr post) or a CD (25Fr + 2Fr

post). The 2001 volume is expected to be ready by March 2004. Go to www.isska.ch/bbs for full details, prices & order form. Highly recommended for all with a serious interest in caves and karst anywhere in the world.

Marsupial giants emerge from prehistoric caves

Carmelo Amalfi

Source: Sydney Morning Herald 26.5.03 p7
<http://www.smh.com.au?articles/2003/05/25/1053801277479.html>

May 26 2003

A new horned kangaroo, giant marsupial lions, birds and a wolf-sized Tasmanian tiger are just some of the latest cache of fossils unearthed in caves on the Nullarbor Plain.

The superbly preserved specimens were collected by a Western Australia Museum team of palaeontologists and cavers who were washed out of the area by rains a week ago.

The expedition leader, John Long, who visited the site last year, said this trip had yielded animals new to science.

"This time the focus was on finding some of the rarer things, such as complete skulls of these strange kangaroos.

"Last year we found mostly juvenile specimens. Now we have bigger ones, and probably three more species of kangaroos".

Two more fossil specimens of thylacoleo, Australia's biggest mammalian predator, were unearthed, adding to the eight skeletons identified last year.

The lion-like predator, which could stand nearly a metre and weighed about 250 kilograms, had a pair of retractable thumb-like claws to disembowel or drag prey up trees. But a reconstruction of one of its feet has revealed for the first time that all of the lion's digits were retractable, not just the thumbs.

More skeletal material of the world's biggest kangaroo, Procoptodon goliah, was found with the remains of bandicoots and birds.

No human remains were found on either trip to the caves, which were at least 200,000 – possibly 500,000 – years old. Dr Long said the prize of the Nullarbor fossil specimens included a horned kangaroo: "It is an adult specimen with a very peculiar bulbous nose."

(This discovery updates the paper presented by John Long at the ASF Conference in Bunbury in January).

Do you like the revamped Australian Caver?

We recently purchased new software that has greatly enhanced our ability to produce Australian Caver in an attractive format. It's the same software that is used by professionally produced publications such as Choice magazine, and is rather sophisticated. As you can imagine, It has taken me quite a while to learn how to use it — one reason for the delay in this issue appearing.

Your comments and suggestions on the legibility, layout, font and content of AusCaver are welcome, provided you're polite and constructive. See my editorial contact details on page 3.

Geoff Crossley, Editor

Caving: Risk Management; Dreams and Visions

(Editor's Note: This is the full text of Dr O'Brien's Opening Address to the 24th Biennial Conference of the Australian Speleological Federation Inc. at Bunbury, WA, January 2003, of which a summary appeared in Australian Caver 158. The talk and the text were based in part on draft portions of a pending autobiography entitled "Cave and Moon" (publication details not yet finalised). Among other reminiscences, Dr O'Brien takes us back 50 years this month to describe one of the great sagas, indeed folklore of Australian cave history: the Yarrangobilly incident of 1953).

Brian J O'Brien, PhD, FTSE
Inaugural President 1956-58,
Australian Speleological Federation Inc.
Photographer unknown, from the author's collection

1 THE GENERATION GAPS

I started caving in 1951 in my First Year at the University of Sydney, and ended really active caving in 1958, when I went to the Antarctic. So for this audience of active cavers, I first have to convince you that I know that times have changed, and that there are generation gaps.

For example, Fred Stewart and I were very poor and students, without a car for our first 4 years of caving. So it was hitch-hiking plus walking to find a cave. This meant that food, camping and caving supplies were limited to what you could carry, say, 30 kilometres or so through the bush. Not for us your modern 4-wheel drive, air-conditioned Range Rovers.

So in the midst of scarcity of resources, we developed our own Code of Ethics, unwritten. These days some United Nations group would have hundreds of conferences costing billions of dollars and call it all "Sustainability. Indeed, the word "Development" is now so politically incorrect that one cannot speak of "Sustainable Development", the catch phrase of the Rio Earth Summit only 10 years ago.

Take care that caving bodies do not over-regulate. Our Code of Ethics was commonsense.

For example, one day we would have only one hard-boiled egg to share for lunch. The fellow who cut the egg then put one piece in each hand behind his back. The other fellow chose "Which hand?". If the cutter had not cut exactly in half, he might get more or he might get less. If he got more, his mate got less. So obviously we automatically cut the egg in half. The "hands behind the back" routine was our only self-regulated control mechanism, much more efficient than having salaried inspectors and legislated Regulations. And no-one could ever cut a hard-boiled egg EXACTLY in half, depending on which end the yellow bit had slid to.

In our day, this was a logical way of risk management. Commonsense is now out of date, the victim of the "Me" generation, Dr Spock outputs, and decades of plenty. Australia and private organisations seem overflooded of regulatory controls. But intellectually, if folk are sensitive enough, you can detect or make a simple bridge over Generation Gaps that makes sense, can provide the best of

both "sides", old and new, and offers a new possible hope for the future.

My favourite example of this kind of generation gap spans from my Grandmother Nana Hoban to my Granddaughter Steffie. Obviously, I am in the middle.

One night in 1957 I wheeled Grandma Hoban out to the backyard of our home in Sydney and tried to show her weary eyes and mind the magic, man-made star called Sputnik 1 that whizzed on schedule across the star-pricked velvet night she had seen unchanged for 87 years. Nana grew up in Tamworth, read by the light of one candle, and left school aged 12 to become immediately a country teacher, until she married a bossy farmer at 18 or so. Despite my exultation at Sputnik 1, she just shook her head and said "It's not right. It's not right."

About 40 years later, I was carrying my half-asleep eldest grandchild, Steffie, aged 5, out to her mother's car after a family dinner. It was the usual clear Perth night. The full moon was low on the horizon, so full and bright you felt you could reach out and touch it. We said our usual "Hello, Mister Moon", as I had indoctrinated first our children then their children.

It is always good, I told them all, to have a friend in the sky, on whom you could rely when the rest of society was behaving irrationally. The first word one grandbaby could say was "Moon", pointing a chubby arm up, one daughter assured me once.

This night I was feeling nostalgic and whispered to little Steffie, all warm and snug in my arms:

"You know, Steffie, Grandpa has six experiments up there on Old Man Moon." My eldest grandchild merely said softly and sleepily, "That's nice, Grandpa", and, becoming alert, slid out of my arms to play with Algernon, the cat.

2 DREAMS AND VISIONS

For several years, I felt hurt and sorry for myself for such a "Put-down" response from my granddaughter Steffie to my wonderful achievements — 6 experiments on the moon. I wanted continued Congratulations, not playing with the bloody cat.

Then one night a few years ago I gave an after-dinner talk to a Melbourne annual conference of about 300 engineers. Chatting to young and old as we wandered around before dinner, I realised that Steffie was correct. She did not mind me having Dreams of past achievements. She thought that was "Nice", using the word lovingly.

In Joel, chapter 3, verse 14, is one of my favourite quotations, which has very deep significance

and which, unfortunately, is too often ignored by Australians, young and old and in-between like me.

*"Your old men shall dream dreams,
Your young men shall see visions."*

The same verse begins

*"Your sons and your daughters shall
prophecy"*

but with the present quality of the media plus political correctness in Australia only the frightening prophecies – the "bad news" – will be published, while the prophecies of joy, other than sexual delights, are ignored. So I will focus here only on Dreams and Visions, not Prophecies.

With the wonderful clarity and uncluttered purity of a young child's mind, Steffie had instinctively known that what she wanted and was most interested in was her *Future, not the Past*. I had done only what Grandparents are expected to do, prepare for the future. She wanted new Visions before her. She wanted to come to know how to create HER Visions and to fulfill them so that she and other Grandchildren could have their own Dreams. She wanted, instinctively but unvoiced, to then add her Dreams to my old ones and pass them all one to her own Grandchildren, to help them see new Visions and enjoy them with their own Grandchildren.

Old engineers in my Melbourne audience spoke mostly about the past, the bridges they had built, the roads, and machines which are now part of our present reality. They wanted Thanks and praise, but only old engineers praise old engineers. Many of them had leading roles in the Snowy Mountain Scheme, whose 50th anniversary we had celebrated a few weeks earlier. The Snowy Scheme transformed Australian demography and built our multicultural nation. It was built largely by "Displaced Persons", men who had been shooting and bombing each other only a few years earlier in Europe and Russia. Would the Snowy Scheme be approved now? I think not.

Many of the old engineers at this dinner were forgetting the youthful vigour and often political incorrectness with which they had turned their old Visions into realities, now become Dreams. Many had no new Vision at all, in the true sense. Many were suspicious of new Visions, and wary of new ways of solving old problems.

On the other side of the Generation Gap, the young engineers might have some Visions. But many had little experience or lateral thinking as to how to turn those Visions into reality, which in turn could become their own fulfilled Dreams in the future.

So what each of us and Australia as a whole needs so desperately is a multi-generational synergy, a combination of Dreams and Visions, a sympathetic understanding that bridges across all generation gaps.

Speleology is an ideal opportunity to achieve such synergies, as you will hear in later presentations.

It is a staggering achievement that a Conference of such quality will be held nearly half a century after a few of us gathered in Adelaide in 1956 for the first big Nullarbor trip and the creation of the ASF.

Since Joe Jennings lay on his back in a Nullarbor cave in 1956 and gazed for hours at the roof, the ASF has bridged over 30,000 years of Australian history and pre-history. Since Henry Fairlie-Cunningham set fire to his flame-throwing flashlight to create bright, blinding mushroom clouds of magnesium oxide, the real Diprotodon has revealed more real

bones that walked and lived and loved maybe 10,000 Diprotodon-generations ago.

I congratulate heartily the organisers and contributors, and indeed the whole assembly. CONGRATULATIONS to those who know they deserve them.

3 RISK MANAGEMENT

I notice the special full session on Risk Management. I plead with ASF organisations not to become as overly zealous and regulatory as Governments are, even though I recognise the problems of insurance and litigation. Way back in the less-litigious days of the early 1950s, I investigated getting insurance cover for speleos. The best policy I could get was at a premium of 1 pound (\$2) per person per weekend, for a recoup of \$100 per death per person. I did not investigate the rates for broken arms. We never took out caving insurance, but simply accepted responsibility for ourselves. There was one particular SUSS character, however, overly fond of gelignite for "clearing" squeezeholds, and if he was going to Jenolan, I went to Bungonia.

Risk management, such as the national policy of the Precautionary Principle foolishly but currently applied by Federal and State legislation is a killer disease, an enervation of epidemic proportions, which is politically correct. Only a very few dare speak about it in a commonsense or even technically accurate manner, drawing attention to the economic caveat on its application placed on it by the United Nations Framework Convention on Climate Change, but omitted in Australian laws and policies. I try, but get little support. (See Dr B J O'Brien *Risking Australia's Future with the Precautionary Principle*, Academy of Technological Sciences and Engineering, *Focus*, 114, Nov.Dec.2000, also www.atse.org.au/publications/focus/focus-obrien2.htm). Younger scientists, seeking to become established, know that the bulk of government grants are given only to True Believers, politically correct, so that rigorous and vigorous scientific debates are not encouraged.

Quite separately, there are today many and varied scandals about failures in Risk Management. There are issues of corporate governance, which is also Risk Management for massive billions of dollars in events like Enron, HIH and many others. On a smaller scale, lifetime smokers sue tobacco companies. There is a Sydney surfer who found that the naughty sea had moved a sand bar so that when he dived in, he broke his neck. Unable to sue the sea, he sued the local Council. There is even a movie about the Man who sued God.

A tourist is taken by a crocodile in the Kimberley, and the Canberra-based Minister promises to erect a warning sign everywhere in Australia where a crocodile is or might be. Obviously he did not consult Treasury. Even so, recently, a crocodile who could not read killed a tourist who also could not read and walked past such an official warning sign into the water.

Who has a "duty of care" when you enter an unexplored cave these days? I'm glad that my caving was done when such a question was never even thought about.

The most magnificent example of Risk Management I ever encountered was with Apollo 13. I had 2 experiments on Apollo 13 to be placed

ASF CLUB CONTACTS

HILLS SPELEOLOGY CLUB LTD

[http://www.hills
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MACQUARIE UNIVERSITY CAVING GROUP

[http://www.geocities.
com/Area51/2844/
index.html](http://www.geocities.
com/Area51/2844/
index.html)

NEWCASTLE AND HUNTER VALLEY SPELEOLOGICAL SOCIETY

<http://nhvss.org.au/>



SYDNEY UNIVERSITY SPELEOLOGICAL SOCIETY

[http://www.ee.usyd.
edu.au/suss/index.html](http://www.ee.usyd.
edu.au/suss/index.html)



WESTERN AUSTRALIAN SPELEOLOGICAL GROUP (INC)(WASG)

[http://wasg.
iinet.net.au/](http://wasg.
iinet.net.au/)



CHILLAGOE CAVING CLUB (CCC)

[http://www.chillagoeca
vingclub.org.au/](http://www.chillagoeca
vingclub.org.au/)





Fred Stewart in 1953.

on the moon, but they burned up over the Pacific when the landing on the moon was aborted. I was in Mission Control in Houston at the time. The Moon was at full light, and as I walked through the clear but humid night back to my rented apartment, I knew that somewhere between me and the Moon were three desperate but skilful explorers.

The three days of frantic and desperate actions at Mission Control and in the spacecraft inevitably brought recollections of my 3 days lost in the dark at Yarrangobilly. One stark contrast was that almost everybody in the world knew the position of the Apollo 13 astronauts, and the Mission Control group and support groups worldwide were desperately but knowledgeably working for their rescue. In my case at Yarrangobilly, I did not know if Fred had got out of the cave. If he had not, nobody would be searching for us for many many days, if ever. So I had to assume that nobody knew I was lost, and therefore I had to try to get out by myself. I assure you, there is an immense difference between being lost yet knowing that people are trying to help, and being lost not knowing if anybody is looking for you.

If you want to understand Risk Management then I recommend you see the movie of Apollo 13. It could not hope to cover all the contingencies, but it does show the improvisation which went far beyond any of the vast and complex Risk Management Plans that already existed. It is the only movie that remains a Thriller even though you already know how it ends.

Risk Management, and people who sue anybody they can for injuries resulting from their own actions, taken under their own free will, must recognise that accidents can happen, and Nature is unpredictably variable. The Tourism Minister who wanted signs warning against crocodiles did not realise there would be a crocodile who could not read or a tourist or tourist guide who would not read. There are many other more substantial reasons requiring a review and overhaul of insurance and damages litigation. Accidents happen. Accidents happen most often in the home. But a risk-free world would be a sad and dreary place.

I can only hope that the threatened species known as commonsense is a powerful voice for change. But my hope is not strong, even in this wondrous country where once self-sufficiency was routine, bolstered by unfettered mateship being the unwritten law.

For example, it pains me to see ant-like lines of people, linked together and dressed in uniforms just as if they were convicts, paying to climb the Sydney Harbour Bridge. Their ears are bombarded by a spruiking overseer, their eyes directed on command, they cannot take photos, their forced march moves to a clock-driven turnstyle, and they move when given the command to move. All in the name of Risk Management and risks of litigation. When Fred Stewart and I climbed to the top of the Harbour Bridge up to the red light back in the 1950s, we did so at midnight and it was great fun. Nobody bothered our free spirits at all.

So we stood there in the wind and wonder of the night, not talking but immersed deep inside ourselves at one with the wonders of the sky, the city and the harbour, while the busy cars and trains and ferries did their own things far below, in a different universe.

4 THE YARRANGOBILLY INCIDENT

Some may wonder how I can speak about Risk Management after myself getting lost in a cave for 3 days, alone and ill-equipped. I will leave you to judge.

But my main reason for discussing "The Yarrangobilly Incident" is that only recently after I began collecting material for an autobiography did I realise how much incorrect and nonsensical writing had been published on the subject by others in the caving literature. Most was hearsay third-hand or worse. I have received some apologies, but I heard yet another myth in mid-December to the effect that the ASF was established mainly to "prevent" such incidents. That is absolute nonsense.

Indeed, this is one of the more dangerous bits of nonsense for caving in Australia, because it could lead to over-regulation zealotry. The ASF was created for reasons of sharing information, talents and comradeship, not regulations. Our care for the environment was innate and an essential and automatic instinct. There were a few exceptions, but not many, and they tended to leave the scene quite quickly.

The Yarrangobilly Incident did excite nationwide interest amongst the media, but as I recall, we only started the idea of a national organisation a year or two later, when more groups we had not known about wrote to SUSS.

"The Yarrangobilly incident" was simply that I got lost in the previously unexplored and wild East Deep Creek Cave at Yarrangobilly, near the Snowy Mountains, for about 3 days, without light except for the first 8 or perhaps 10 hours. Estimates of the numbers of people in the half dozen search parties in the cave and bush varied between about 35 and 50, with up to about 5 groups in the cave.

My long-time good mate Fred Stewart and I had often explored Yarrangobilly on many trips, discovering and exploring many caves previously unknown. We mapped a few large ones and made some fluorescein tests of the Eagles' Nest Creek. We had to hitch-hike from Sydney and walk in, so supplies were always critical. It could get very cold, but we were young and fit.

On our trip in December, 1953, over the first day or so we had completed our mapping of one of the Eagles' Nest Caves, down near the tourist Caves House. Then we moved camp up to the plateau where little or nothing had been explored, although Trickett had mapped and named a few cave entrances.

We left most of our gear at the new camp, but wanted to make a quick reconnoitre of both the West and the East Deep Creek Caves, to see which one was worth doing a proper exploration the next day. Neither had ever been explored.

We were travelling lightly. Normally each of us carried two lights, a carbide hand-lamp to give a wide hemisphere of diffuse light and a helmet torch to provide a searchlight beam of stronger, more concentrated light but covering much less area. But for quick reconnoitres, we were as usual anxious to conserve our supplies. So that afternoon I wore a black beret and carried only a carbide lamp. Fred wore his helmet and its torch, but carried no carbide lamp. We wore no watches, and rarely did in caves, because they were too expensive to risk, scrambling in rocks and water.

We spent about half an hour in a quick look in the West Deep Creek Cave. Then we walked through the lovely but rugged Yarrangobilly bush to East Deep Creek, where it splashed steeply and scrambled among the boulders to disappear underground. We separated to explore, as we often did, to cover twice the volume of tumbled rocks. We used a prismatic compass while mapping caves, but one would obviously be useless in the tumbled rock mazes of either Deep Creek cave.

Some people seem to find it strange that Fred and I were separating and rejoining, again and again, but that is the way we explored in a maze of rocks, searching for a break through to a cavern. Besides, even in a cave with caverns and tunnels and not merely a 3-dimensional maze of rocks, you have to get lost to be an explorer. It is getting unlost that is the real trick. Rather like science.

In the East Deep Creek, down through the maze of fallen rocks that made an entrance, I found a way into a great big new and lovely cavern. I was entranced at the pure white crystals glittering in my lamp light, but when I climbed back up into the maze of cold, muddy rocks, I could not find the critically small entry way out again. I was lost, quite thoroughly.

Fred got out first after about half an hour, after finding only more of the maze of rocks, and no cavern. He went back to look for me briefly before going a few kilometres to Caves House for help, leaving me a note which I still have. My gratitude for his actions then and later have (literally) my undying gratitude.

I emerged about 75 hours later with one of the five or so search parties at 5.30 pm on Thursday, 17 December. For all but the first 8 hours or so, I tried to find my way out in the dark, listening for the East Deep Creek or any running water. The problem was that I did not know if Fred had got out. Hence I did not know if anyone was looking for me.

There is an infinite difference between being lost yet comforted by knowing for certain that people are searching for you, and being lost not knowing.

In the first you can have Hope in others. You are not really lost, just temporarily misplaced.

In the second you have only yourself and what you are. You have only yourself and your memories. Fortunately, I knew a fair amount of poetry, and books I had already read, whose fragments in memory saved my sanity. I also knew a moderate amount of "good" music, which helped. I neither spoke the poetry nor sang the melodies, because I quickly found that any such noise only emphasised and exaggerated my being alone.

In the cave the essential truth I found was that ultimately each individual is absolutely alone. I was as alone as is possible to be on this planet because I did not know if anyone was searching for me.

When I accepted that I was lost and my yelling



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The position is available from 1st February 2004. Application forms are available from the Graduate Centre, The University of Adelaide, and should be submitted with a detailed CV by 15th December 2003. Further information is available at www.adelaide.edu.au/graduatecentre/scholarships/postgrad/pgcurrent.html or contact Professor Andrew Austin (andrew.austin@adelaide.edu.au or 08 8303 8240).



produced no response from Fred, I turned the carbide lamp very low. I decided it was better to have a dim light for a longer time than a bright light for a short time. There is no right or wrong general answer as to whether this was sensible.

So I was lost in the vast underground jungle of rocks, caverns and twisting passages, and glorious sparkling limestone formations of what we called the East Deep Creek cave. The name of the unexplored cave and the location of its entrance were all that was known as that day began. Nobody had ever reported going into the cave. My older brother Terry has never been in a wild cave, yet 40 years later he gave the most vivid and evocative description of the wilderness of the East Deep Creek cave.

There were half a dozen search parties and about 35 to 40 men searching the bloody place for almost



Mouth of the unknown cave where the Daily Mirror reported I was lost.

3 days, and they could never even find each other except at the bloody entrance.

I spent three days alone in that cold place where there is no day or night but only eternal darkness. My carbide lamp light lasted for the first six or eight hours, or maybe ten. I turned its water flow down until there was a mere bubble of light. I walked slowly over and around big rocks. I came to a sheer drop, and hooked the lamp in the roof while I climbed down. Even with two hands free for climbing, I lost my grip and fell about 10 feet, on my bum.

I could not climb back or reach my lamp again, so I took off my boilersuit to swing it by a trouser leg and knock the lamp down. When I hit the lamp, the bubble of light burst but the lamp stayed in place, in the dark, where it hangs to this day, despite my later trips to find it.

I was in total darkness. I knew there was a 10-foot cliff on one side. Was there another 10-foot drop nearby, or perhaps even 30-foot, unseeable?

Earlier and deeper down I had discovered beautiful white crystal caverns and pure, still pools so clear you did not know they existed until you stepped in them. No human had seen these beauties before. That lower part of the cave had some order and structure.

Where I was really lost it had become a wild cave. In many parts it was totally disordered.

Over thousands of years the roof had fallen again and again, producing many tilted mezzanines of boulders and rocks of all sizes. The cave was a multi-story three-dimensional maze of rocks. If you went around one side of a big rock, you were likely to reach a different location than if you went around the other side, or over the top, or wriggled underneath if there was room.

I had no food and no companion. I did not know whether Fred had managed to get out so that somebody else might know I was lost and they might come searching. I yelled out from time to time, but no answer came. My calls were deadened as they thudded into the tangled rocks and muddy cavern. There were no echoes in that cave, only sullen rocks and mud.

I listened for the whisper of the underground creek that might lead me to the surface and the lovely bright-lit sky.

I held my breath from time to time, so that its noise would not prevent me hearing the waters of that creek, or even perhaps a faint call from Fred, that very precious "Coo-eee" of the Aussie bush. It is a bit tricky holding your breath while your entire body is shivering violently. The temperature was in the low 40's Fahrenheit, although it was a brisk Snowy Mountains summer outside in the sun, and frosty at night. Shivering was a whole-of-body experience, draining my energy even while I rested, and the muddy rock was an eternity of chilling cold. I heard my heart beat. How I wished my heartbeat was not so loud. It doesn't go "Pitter Pat" as I had read in books. My heart went "Whoosp Whoosp", an unwanted background noise as I listened in the tomb-like silence of that cave.

When I sat to listen after I had given a couple of yells, I would first hold my breath, then hold my boilersuit out free of my chest, to reduce the effect of my heart pulsing the fabric. My sight was useless, but I still had hearing.

In the eternal dark and eternal stillness, I was

alone with the Bogeyman, and he certainly was no help. When my breath was still, and there was no sound but my beating heart, the Bogeyman came near, on every side. He came closer after I had finished calling out.

In my older years, I often read that youth of 19 years of age, as I was, commonly feel that they are invulnerable, with eternal life. I assure you that was certainly not the case for me. I had to try to find my own way out. Cave exploration the hard way, in total, absolute darkness and isolation.

I had to move, a non-trivial problem in that jungle of rocks, tumbled together in three-dimensional chaos. There were big holes of empty air between big boulders, and falling in the dark is not funny. Falling in the light, as I had just done, was not funny either.

So moving had to be done while sitting down and sliding. Many years later I called the technique "sitz-bumming", when I helped my wife or little children come down a steep rock face using 4 or 5-point contact with solid earth, 2 hands, 2 feet and the bum.

At Yarrangobilly I chose sitz-bumming, because there was no floor but a lattice of rocks and nasty holes between rocks, sometimes very deep holes. If I stood up and walked in the dark, and one foot went down a drop, the rest would likely follow. So I did not stand up too often.

Instead, I sat and reached around me to find a loose rock. When I could feel one small enough to hold, I would throw it in a direction of choice. My only compass in the total darkness was where my legs were pointing. If it took a few seconds before I heard the rock hit the ground, I would not be going in that empty direction. I would feel around for yet another rock and then try yet another direction.

After all, I knew my Physics and the equation for calculating how deep a hole was by counting the number of seconds it took a falling rock to hit the ground. In the first second a rock falls 16 feet, about 5 metres, a nasty enough fall. Two seconds would mean a fall of about 64 feet, or 20 metres, a seriously nasty, crippling or fatal fall onto rocks, unless I bounced a few times on the way down. Definitely not nice.

The sounds I really did not like at all were a series of sounds, like a rock bouncing down from one boulder through a new hole on to another boulder.

Thrown rocks are very insensitive substitutes for eyes. Imagination makes holes in the darkness. Progress was slow. Progress was also not measurable because in the darkness a pair of hands was not sufficient to identify a landmark, or even find it again. I sitz-bummed on, feet always first, with my clinkered boots searching preferably for horizontal, or an upwards slope, room to advance.

For one long time, after perhaps 24 hours, maybe twice that, I sitz-bummed myself in the total darkness slowly into a sloping tunnel, where the roof got lower and lower, and the sides closer and closer. My light had gone out long before. I had also used up the few matches I had kept dry under my beret. With the last match I had set alight the tassel of my cap, and it flared most wondrously but so bright it blinded me from seeing anything useful. Now I was in eternal darkness.

Finally the roof came so low that I had to lie flat on my back, feet first on a moderate downward slope



Mouth of the real East Deep Cave.

that went I knew not where. I was now stuck in a tunnel, sloping down. I wanted to go up, not down.

In that tunnel was the only time in about 74 hours when despair captured me totally, because I grew to feel it was my tomb. Lying on my back, I could reach by touch the walls to the left, to the right and overhead. The clinkered heels of my boots were dug in, scratching at the slope to stop me sliding further down into the black unknown. I shivered noisily, desperately cold, with no kind of warmth except shivering.

I had no way to learn how far that tunnelled tomb stretched down beyond my boots, because I had no room to sit up or even twist and throw a stone beyond them.

So when I did manage to find a small loose rock I did not throw it. Instead I scratched a very short last will and testament in the muddy rock roof in easy reach just a few inches above my face. It was my first last will, and the shortest.

Writing with a rock in the dark focussed my mind to construct a will with as few letters as possible. The powerful and beautiful brevity of the King James Bible or Shakespeare's plays and sonnets will never be achieved again, since Megahertz word processors replaced the quill and papyrus, or a rock on a muddy cave roof.

How long I stayed in that tube I cannot know, my whole body shivering almost rattling in pain from the cold. But then I decided that I would not die just there and then. I wriggled back upwards, using elbows and heels of boots. I had more black space for my body, and more unspoken poetry to refresh my mind.

More sitzbumming. An occasional call out into the darkness, just in case someone was searching. An occasional pause to hold my breath and listed for that blessed creek, just in case no-one was searching.

Scratching a will was also quite silly of course. It might even be considered Black Humour.

Even if my body had been found, nobody would have thought to look above it, even after my body

ASF CLUB CONTACTS

CAVING CLUB OF VICTORIA (CCV)

<http://home.mira.net/~%7Eccv/>



NATIONAL UNIVERSITY CAVING CLUB (NUCC)

<http://clubs.anu.edu.au/clubs/NUCC/>



SOUTHERN TASMANIAN CAVERNEERS (STC)

<http://www.tesa.com.au/stc/>



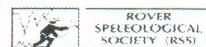
UNIVERSITY OF SYDNEY SPELEOLOGICAL SOCIETY

<http://www.utsss.org.au/>



ROVER SPELEOLOGICAL SOCIETY (RSS)

<http://rss-caving.mine.nu/rss/>



UNION INTERNATIONALE DE SPÉLÉOLOGIE (UIS)

<http://rubens.its.unimelb.edu.au/~pgm/uis/index.html>



had been dragged out of whatever sort of tunnel I was in. Nor would anyone think to decipher crude and ragged scratches of each letter in the rock and the mud, written in total blackness without the power to make any corrections or connections.

But I suppose it was the thought of love that counted, as it does so often. I also suspect that it was the physical action of facing the finality of that last will and testament which caused me to say when I finished scratching, "Bugger it, I'm not staying here, and I won't die yet."

So I kept moving and then stopping, moving and stopping. I stopped to listen for that nice little Creek that leads up to that bloody sunlight. I moved to listen from a fresh spot.

The only humour I found in the cave was in my mind. It was in the poetry that saved my sanity, my beloved Belloc, Keats, T.S. Eliot and Macavity the Cat (long before "Cats" became a fashionable musical), even Ogden Nash and his tree. Other times I conjured up companions from Shakespeare and Chesterton and all those like Winnie the Pooh who have problems. "A Bear likes honey. Buzz, buzz, buzz. I wonder why he does." Beauty helped. Images of the Aussie bush just outside, of campfire smoke floating up to the starry roof of the cathedral of tall nighttime trees in moonlight.

I wanted the Southern Cross, and the two Centauri. Even Omar Khayyam and "Awake, for Morning in the Bowl of Night has flung the Stone that Put the Stars to Flight" – not bloody likely here.

My eyes had nothing to see. My ears heard only my own life elements. My physical senses were useless or dulled by the freezing cold. But my mind was intensely active. Alone, I was not lonely. Thank God for memory. My eyes had once read books and poetry. My ears had once heard wondrous melodies. Now my memory read and listened again, and again. But I did not speak or sing aloud.

Mixed with the awkward sitzbumming, I also knew throughout that, down somewhere below me, free of the jumbled rocks, was a magical mix of purest white cascading crystals and pools of still water so clear you could not see it unless you stepped in it with muddy boots. And I had discovered it all. I, just Me.

So, in the dark, I slid further on my bum, picking up and throwing a rock in the direction my legs were

pointing as my only compass. If there was silence for a second or two, I swiveled my legs to a new direction, and threw another rock, and so on. It made for slow progress, with no landmarks to mark real progress. No tunnels, no formations, and no features recognisable by touch alone.

A real compass would have been useless in the top 3-dimensional maze of rocks where the roof had fallen in over previous millennia. Fred, Laurie Bishop and I went back later to try to find my lamp. We took 400 feet (about 130 metres) of string to about where I thought the lamp might be. After scrambling and wriggling through and up and down the rocks, we had laid out all the 400 feet of string. So I left Laurie at the end of the string and explored further within earshot, with no success. Returning to Laurie, we then spent about an hour looking for the string, because Laurie had wandered just a few metres. It was a real wild cave in that area, with rocks of all sizes jumbled in a 3-dimensional maze, with plenty of gaps of unknown depth between many of them.

The search party of five that found me consisted of my old mate Peter MacGregor of SUSS, Mr Finney of the NSW Tourism Bureau, and three members of the Canberra Alpine Club, Jack Leslie, Dick Pickering and Jim Webb.

They had laid a paper trail "to stop ourselves getting lost", but we all got lost again on the way out. We did not stay lost. The difference this time was that we all had lights, and we stayed together. We were not exploring, simply getting out. I helped Mr Finney over the occasional awkward bit.

I was found about 900 feet into the cave. We took well over an hour to cover those 900 feet, that being the nature of the East Deep Creek cave.

I apologised for being a nuisance, because about 70 people had been searching. But the Snowy bushmen were used to accidents.

One very fine bloke gave me a big chunk of his wife's fruit cake, lovely and sticky and very heavy. He poured me an enamelled tin mug of black tea thick with sugar.

Then he gave me a ride on the back of his horse to get up to the road and a car to Cave's House and my family. I had not realised how weak I was until I could not swing my leg over the horse's back. I could get my foot into a stirrup, but not swing my leg over. Wordlessly, we shook hands, he gave me a hoist, and I rejoined the world.

I've been back to the East Deep Creek cave a few times, once to show my then-fiancé Avril the crystal cavern. Since she has now been my wife for 43 years or so, I guess there was no long-term damage. My lamp is still there, so far as I know.

Reverting to the issue of Risk Management in a brief analysis of the Yarrangobilly incident, clearly we were equipped for what we intended, but were tired at the end of the university exam period and our previous caving and walking.

Fred was bigger and stronger than me, but there is little point to such personal comparisons. The rocks were rocks and various distances apart, but all was fairly straight-forward scrabbling.

We had caved as a pair for 3 or 4 years before and a few years afterwards until university absorbed us totally. The fact that I had the wide-angle but weak carbide lamp rather than Fred's strong, directional head lamp may have helped him. It certainly hindered

Media interest switched underground, away from the Queen's tour!

me in looking for a way out of the top, muddy-walled cavern that met into the crystal chamber. Being effectively one handed did not help me, but there is no real "excuse" for what happened. Nor do I intend to try to offer "excuses", although I am happy at trying to analyse useful lessons.

A real fact is that we should have had a routine agreement for the first one out of any cave where we got separated to leave a note at the entrance. Fred had left one, which I still treasure. But after the first two days of searching the cave, the police and the bushmen were fairly convinced that I had got out of the cave before Fred, and got lost in the bush or fallen down another hole. The speleos and Fred knew how well I knew the Yarrangobilly plateau, and concentrated the search on the cave itself. But the intensity of their search was necessarily weakened. There was an understandable desire also, for the police and bushmen to search familiar, daylight environments.

The press delighted in the nearby limestone formation nick-named "The Tombs". Over their beers at Caves House, they speculated seriously whether Fred had murdered me and left my body in The Tombs. Fred was a quiet young man, always taciturn and with few words, which is one of the reasons we were such good mates. But he was under enormous strain, and the police were responding to the press gossip. Only my Dad's intervention prevented the speculation being given some official status. Although Dad had never met Fred before, he knew the man-boy quickly.

The press coverage was mostly atrocious, as if each reporter collected any anecdote he or she could. In fact, many articles, even headline front-page stories, read as if they were written at the bar by somebody who had not been near the correct cave. I gave no interviews, so any quotations in the press were inventions or third-hand at best.

If anyone wishes to study the facts, the first thing to do is a suggestion similar to that made by Shakespeare's Dick the Butcher: "*The first thing to do is kill all the reporters.*"

5 CONCLUDING COMMENTS ABOUT YARRANGOBILLY

Some months after "The Incident", a perceptive [female] speleo asked me whether I was glad that I was alone or would I have preferred to have companions while I was so lost.

I immediately, and subsequently, confirmed that



The successful rescue party

I was glad I had been alone, apart from the issue of having a brighter torch to try to get out.

In the dark, no matter how close the Bogeyman came, I was able to focus on my mental and physical state alone. That would have been difficult with another person or two, no matter how closely bonded and how much I trusted someone like Fred. I could not have resolved the writing of my will except through being alone. The poetry and music and my recollections had to be allowed freedom to dance and skip through my mind without necessarily verbal utterance to someone who necessarily would paint the words on a different canvas of different backgrounds and different memories. Throwing exploratory rocks in the darkness would have introduced a different dimension of danger.

If Fred and I had stayed together, we could have explored only half the volume or less. We may never have discovered the crystal palace, to draw others back.

More important for me personally, I may never have experienced such an epiphany elsewhere.

I continue to be grateful to my peers who subsequently elected me the first President of the ASF.

But I don't think I would recommend to any one a repeat performance, particularly not knowing if anyone was searching. Three days of exploring a wild cave in darkness is a trifle long.

To my caving mates, including the new ones I found when they found me, and to the police and local bushmen, I can never repay them for the simple gift of life.

One unexpected bonus gift was a lifelong one. Having faced an unseen Death, alone, I have never

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Brian with one of the Snowy Mountains horsemen who helped in the search.

feared him since. Instead, and conversely, every new minute of life, even now 50 years later, is a bonus. Not earned, but much valued. And the world and its people are amazing and wondrous to behold. I pity those scientists who plod along in life, not finding magic and joy in their discoveries. I hope that teachers share such magic and joy with their charges.

TIPS & SAFETY

from Cindy Cheattiz – US Caver
http://pw1.netcom.com/~cheattiz/self_rescue/past.html

A broken finger can be splinted simply by padding it and taping it securely to the finger next to it!

An irrigation syringe can be made from a small zip-top plastic bag and a safety pin. Pour water into the bag, seal it shut, puncture the lower corner with the safety pin, and squeeze the bag.

Almost all cave rescues involve long term (over a few hours) care of a patient. Good psychological care of an injured caver becomes a critical factor for a successful rescue. Keep your patient calm and allow them to participate in their rescue. This gives them a feeling of control and allows them to utilize their limited energy toward the rescue instead of toward panic and immobilizing fear.

6 FOUL AIR

I don't want to end on a note implying that the Yarrangobilly incident was the only magical experience or epiphany that cave exploration brought me, when I was so young and still stretching the envelope of my invincibility. So I'll conclude just with brief comments about foul air and underwater exploration in those primitive early days in the 1950s.

As you know, in some caves you can get ephemeral pockets of foul air, of excess carbon dioxide. In the fifties, most cavers who encountered foul air in a cave, and found their carbide lamps flickering out or matches refusing to light, while their own breathing became painful panting, simply turned and went somewhere else. Nothing was known in any of the Australian or international reports or books we could find. People just regarded foul air as a hazard, and left.

For Fred and me, him a medical student and me a physics student, turning from the unknown was simply not a thing we did.

Somehow, through Dennis Bourke, a much more senior medical student and SUSS member, we learned that Professor Cotton was interested in foul air. I think he was researching men's breathing gear for high-altitude balloons. Since he was famous for inventing the G-suit, or "anti-gravity" suit, that helped fast-turning Spitfire pilots in the Battle of Britain, he was a Big Wig at the University of Sydney.

More important, he would give Dennis who would then give us small, half-pint or so glass bottles with ground-glass stoppers. He would fill them with salt water, tightly stoppered. We would find foul air,

empty out the water with a ceremonial flourish, swirl the now-empty bottles around most scientifically to fill them with foul air, put the ground glass stoppers back, and eventually give a bundle of them to Dennis, safely back at the University of Sydney. He presumably gave them to the Professor, whom I never met, and after a week or two Fred and I would get a typed out analysis of the percentages of oxygen, nitrogen and carbon dioxide.

Before we started all this, both Dennis and the Professor via Dennis, told us that laboratory experiments had proved that humans could survive concentrations of carbon dioxide of up to 30 per cent. We were even shown the medical textbook of the day with this claim.

What the learned ones failed to tell us, or perhaps did not know, was that such laboratory experiments were in a laboratory tank "atmosphere" where the other 70 per cent was pure oxygen. What nobody at first appreciated was that, in a cave, where there is increased carbon dioxide there is a corresponding decreased concentration of oxygen. So you do not get only carbon dioxide poisoning, you simultaneously suffered from oxygen starvation, which is why a match will not burn. Not for us a 70 per cent rich oxygen supply, like the humans in laboratories.

So it was that we disappointed Professor Cotton at first, because we found it very tough finding carbon dioxide concentrations much above 6 per cent, and living to tell about it. When questioned, we responded with undergraduate Aussie bluntness "If he wants 30 per cent bloody carbon dioxide, he can find it himself."

But we developed a methodology of exploring foul air, first of proceeding until carbide lamps went out if you moved them, and matches would not light, while our breathing rate increased. Then we would switch our electrical head lamps on, and proceed very swiftly as far as we could, suffering sharp headaches and gasping for breath, breathing very fast.

We would generally separate by this stage, drawing a shortened match to see who would take the really, really final sample that day. One also tends to lose short-term memory, and all in all, it could get a little risky by about 6 per cent. Actually, we only turned back once, along an extension of the Drum Cave at Bungonia, which had a 140-foot (45 metres) initial tube-like drop at the start, and a waterfall, great for foul air. We got to the end of a passage at the bottom, and came to about a 10-foot (3-metre) drop, which we knew well and normally could scramble up.

We were sensible and drew short match to decide who would go over the drop for what we knew in our hearts had to be the last sample that day. Fred went over, did his thing with the bottle and then tried to get back. He could not, and I was so affected by the foul air by then that at first I frankly was not interested in Fred's problems. We both had splitting headaches. Finally I thought of taking off my boilersuit, and holding one leg while Fred grabbed an arm, and I pulled. We got back okay, but later decided that 6.5 per cent or so of carbon dioxide was enough.

However, we achieved, so we were told, world leadership in the field of foul air. I understand that later generations from ASF have gone even further into larger concentrations.

7 UNDERWATER DIVING IN CAVES

We also pioneered underwater diving in Australia, using one of the tourist caves at Jenolan. Our first effort was with a garden hose and a giant bellows somebody had "borrowed" from the Medical School. Dennis Bourke was involved again, and because Fred and I were still feeling a bit angry that the text books were wrong about foul air, we democratically agreed that Dennis would go in first.

I, the physicist, had "invented" a copper wire signalling system for Dennis. Something like "One ring" means give me more air, "Two rings" mean you can stop pumping, and the like. But I was not a chemist, and my bare copper wires simply short-circuited in the underground Jenolan River, ringing the bell all the time. So we removed the signal from Dennis because of the noise. Ben Nurse and I went "point", as they say on military expeditions, paying out the garden hose to Dennis as he went upstream and underwater into the blackness. We were the smallest and lightest in the team, and the larger fellows like Fred and Jim Tasker pumped the bellows as hard as they could when I called out instructions or Ben Nurse did.

Then the hose stopped going forward as smoothly as we thought it should, so I decided we had better pull Dennis back. It was as well we did, because by then he was a little blue – the hose had kinked and no air was getting through.

The next trip we used a bloody great and very heavy electric pump, and an improved garden hose. But it wasn't very successful either, so we decided there were other fun things to do.

Later on, they had invented scuba diving gear, much too expensive for us at University. Ben Nurse got together with the Sydney Underwater Explorer Club, but that is Ben's story to tell.

8 CONCLUSION

We also carried out other experiments, including direction-finding with VHF radio in co-operation with the amateur Radio Society of Sydney. That was great fun, but when they triangulated on me as being poised about 100 feet (30 metres) above the middle of the Blue Lake, well outside any caves, we realised there were some real problems to fix before it could be reliably used in Search and Rescue. Quite apart from a speleo having to lug around a great big "walkie-talkie" in those days, the signals were obviously being greatly distorted by the wet, cavernous and cracked limestone.

I studied the chemical composition causing after-glow of helictites, the lingering glow in some after a flash bulb was used. And we explored various other parts of the sciences of speleology, while others improved the caving gear. They developed new tools and instruments and flash guns like Henry Fairlie-Cunningham's flamethrower called the Diprotodon. It threw powdered magnesium measured by the pound (half kilogram) past a lighted flame, and was a very awesome device indeed.

But mostly we discovered new caves, and explored. We wandered through the bush and countryside. We camped. Through long and beautiful nights, in rain, snow or open starlight, we solved the problems of the Universe across campfires and through innocent mugs of tea, when nobody had to

speak and nobody chattered simply to make noise or hear his own voice.

The fifties were the Days of Innocence, before Flower Power and other, wilder, often sadder times of the Sixties. Student demonstrators rarely threw anything, perhaps a small bag of flower or water, or a rose, and then mostly in good humour. We felt many things passionately, but respected each other. The worst thing a policeman could do was to take off his badge, so you could not take his number. They were the days before the mobile phone, oh rapturous days. They were the days when you could hitch hike anywhere in perfect safety, apart from the occasional drunk with poor brakes on his truck. You could meet the wondrous range of people all around Australia, when the truckies were all great and friendly friends, being taxed into poverty by government rail subsidies and road taxes. You changed truck tyres, and a mob of trucks would stop to first check their trucky mate was okay. Then these giants of men would offer laughing advice, sometimes lewd, while drinking straight from large bottles of beer, and enjoy in a friendly way the inefficiency and weaknesses of university students. But among them, you could find more practical wisdom, thoughtfulness and friendship than you rarely found from begowned aloof Professors on campus.

You could get a ride in Victoria with the Benalla undertaker who had "buried the last of the Kelly's", and in New South Wales with the Tumut pastor driving a Holden up the winding dirt road through the Snowy Mountains faster and more dangerously than Jack Brabham in his heyday.

The pastor told Fred and me, as he raised clouds of dust and drifted in that tilt the first Holdens had round one sharp corner, "Don't be so scared. I have a private arrangement with God. If He wants the people to pray to Him in Tumut at 9am sharp every bloody Sunday, and in Kiandra at 11 am sharp, then He can bloody well concentrate on me in between."

With a short prayer before entering a cave, and one of thanks on coming out, that would be enough for a pretty good Risk Management programme for speleologists.

I wish you all such happiest of days, and declare this Conference open. ■

About Brian O'Brien

Dr O'Brien was born in Sydney in 1934 and graduated BSc (Hons) and PhD in Physics from the University of Sydney. After a brief period as Deputy Chief Physicist with the Australian National Antarctic Research Expedition in 1958-59, he joined the faculty of the University of Iowa before an appointment as Professor of Space Science at Rice University from 1963-68.

From 1971-77 he was the Foundation Director and Chairman of the Environmental Protection Authority of Western Australia, later becoming Managing Director of Brian J O'Brien and Associates Pty Ltd, and founding Greening Australia (WA).

Brian was Principal Investigator for 6 experiments on the Moon, 4 complete satellites and 9 satellite rocket payloads. His awards include the NASA Medal for Exceptional Scientific Research and Fellow of the Australian Academy of Applied Sciences and Technological Engineering.

President of SUSS in his university days, he was the inaugural President of the Australian Speleological Federation from 1956-58.

Slippery When Wet

Cave diving in New South Wales Pt 2

Cave diving by members of ASF over the years has reached new depths. Keir Vaughan-Taylor, an ASF member and cave diver of SUSS sheds light on some exhilarating dives between 1995 and 2003. In Australian Caver 159 Keir shared with us the excitement of finding new underwater passages at Jenolan, and the heartache of leaving unexplored passages till next time. His account continues with accounts of exploration at Wombeyan, Yarrangobilly and Cooleman.

Keir Vaughan-Taylor

Those on more than three trips: Ron Allum, Dave Apperley, Paul Boler, Jason Cockayne, Ian Cooper, Mike Curtis, Jarn Hodson, Phil Maynard, Iain McCulloch, Rod O'Brien, Greg Ryan, Richard Taylor, Keir Vaughan-Taylor, Ian Vickary, Dave Walton. Alan Warild

Continued from AC159

2. Wombeyan

Phil Hill dived Glass Cave years ago before he moved to Tasmania and the stories of what he found are told and retold. The story gets better on each hearing and it is best not to interrupt during such tellings. It was said that underwater Glass is enormous! Alas! It isn't.

Underwater Glass Cave starts at an impressive lake perhaps 8m across on the surface but the cross section shrinks as it descends. Each chamber section decreases in size and finally it pinches out. The underwater journey downwards has to be fairly zippy because the silt that is unavoidably dislodged from the moment of entering the water at the surface, forms a cloud that rolls down the slope as a wave. Once it envelops the diver the day's playing is pretty much over.

In two out of three trips that we did I was unable to pass an above water squeeze right near the entrance that once years ago had been so easy for me. I've lost 6 kilos since then so maybe I'm back in the game again.

Under the surface about 6 metres, at the edge of the obvious terminating chasm is a side passage that was never explored very hard. It appears at first inspection to end in a room. A clue should be apparent from the alluvial gravels spread across the room in an embankment.

Rod examined this upper room more closely and found a squeeze. A tunnel surfaced in a little chamber with a soaked sandy beach. Some distance across the sand, through an arch, too low to squeeze a flowing stream could be just seen glittering in the beam of Rod's dive lights.

Glass Cave is therefore an artefact of a mystery stream's overflow and would only take an inflow in high water. Where that water goes is another curious question.

On a future trip back into the underwater high level passage of Glass, a little excavation of the sand could gain access to the stream passage. The question at this time is "Which stream will we find?" We are fairly sure it will turn out to be the River Cave stream known to flow in a cave at the bottom of the hill.

Glass Cave is said to have a dye traced connection to River Cave but I haven't looked up the papers that

may have been written about the experiments. Such a connection would have only been found during times of high water.

I had a perception that Glass was perched high on the top of the hill but this would suggest the lake in Glass is the top of a water column supported a considerable distance above the flowing river below. This is not likely but with caves you can never make a rule about their formation before an example breaking the rule turns up.

We had a number of discussions about the relative heights of the caves. The upper dry passages of Glass do in fact drop a long way down the hill before reaching the water. Al's watch altimeter indicated the surface water levels of Glass's lake and the River Cave water were about the same. There is nothing quite as comprehensive as a good survey but at this time, no-one is stepping forward in energetic enthusiasm and some people have actually stepped back.

In my opinion the new stream has to be River Cave, perhaps an upstream section never seen before or maybe it connects to a known section but the low arch is insignificant enough not to be noticed on those cold River Cave immersion trips.

River has a tight entrance and a tight squeezing vertical rift requires a ladder to drop safely into the stream passage.

After reaching the ground floor the stream-way is almost immediately present. Venturing upstream requires wading and then lying in water to squeeze under overhangs and then it requires crawling, lying and squeezing and so on.

On a recent SUSS trip, Al Warild climbed into his wet suit and made his way upstream as far as is possible by air breathing mammals. He said it ended in a juicy diving sump that looked inviting. It is funny no one has described this sump in this manner previously.

3. Yarrangobilly

Over Easter 2001 our group visited Yarrangobilly and dived all the known major resurgences. Each dive was a one-person investigation since the journeys to the dive sites were sometimes fairly long and two persons gear is harder to carry than one. I was sick the whole time up there. I was stricken by a cold, but a cold so severe that one symptom was a persistent worry that the disease was in reality a diabolical bacteria developed in a CIA laboratory in the war against subterraneanism.

We investigated the main Yarrangobilly resurgences. The Eagles Nest resurgence is a long

walk down 300 vertical metres to the Yagby River but has substantial flow. We checked the resurgence immediately under the tourist caves, then the Copper Mine outflow and finally Mill Creek Swallet.

Coppermine is one of the main drains into the Yarrangobilly River sporting a lively water flow. A short distance down the Yagby River is a large dramatic cave entrance called Tricketts Cave. The entrance has a group of stalactites bend and gnarled in the strong winds that flow through the entrance. The cave has a nice chamber but no way into the mountain has been found. Tricketts is likely to be the more ancient resurgence of Copper Mine. Both caves should connect into a large cave in the mountain but no one has ever found a way. The dive into the entrance of Copper Mine quickly snubs out.

Eagles Nest is one of the best caves at Yarrangobilly rating as the second deepest on the Australian mainland after Mammoth at Jenolan. The lowest point in Eagles Nest Cave is at Deepest Dig where a small stream disappears through the cracks of a very muddy room.

The resurgence should be an excellent diving prospect except for the bushwalking prospect packing the whole cave diving kit down to the Yarrangobilly River. Although the Eagles Nest Resurgence trip takes a whole day, Al's dive only lasted a couple of minutes. He was unable to find a way on and silty dive was just inconclusive. The resurgence is just upstream from where the Yarrangobilly River passes through a natural arch and surrounded by spectacular pinnacles of limestone outcrop. The arch is almost a cave in that the dark zone is dark enough to make stubbing your toe and falling into a log jam a real possibility. I'm keen to go back and try another dive. I'm sure the group would be keen to experience walking back up to the mountain plateau with all that gear. The trip is especially arduous when infected by exotic tropical diseases.

Jason took his turn to dive in Mill Creek Swallet. Mill Creek Gully is on the left side of the tourist caves as you face the Yarrangobilly River. Mill Creek Cave captures all the water from the gully and in a good rain that must be a lot of water. The cave has a nice entrance chamber from where begins descending marble stream passage. Alas the beautiful passage is all too short, and breaks out into a muddy chamber filled with flood debris. No doubt the watermarks on the wall show this cave sometimes seriously floods. Crawls lead to more crawls and then to rift passage and climb down chimneys. Basalt rocks speak of the volcanism that metamorphosed the limestone into marble, which in places is scarlet red.

It's a sporty cave and at the bottom is a very promising sump. Sure enough the sump turns this way and that and sports three air chambers along the way to the end which is blocked by a rocks packed like a door into way should the a way on.

We returned this year to fully explore and survey this one lead. If time permitted we intended to check out Coleman Plains which is nearby. Rod discovered new line in the early stages of the dive. Pirates! Ahhhh! Fairly brazen for this group to do a dive trip in a National Park so close to rangers and tourists. I wonder if they did it at night? Rod removed their non-indigenous line and re-laid our own all the way to the end of the tunnel. Here is what looks like a phreatic loop where the passage descends to a depth of approximately thirty meters, turns almost horizontal but is then blocked by rocks packed into an upward going tunnel. You can pull rocks out of and there is a cascade of stones that falls out from a stack once held firmly in position by the force of past flooding water. Not too much holding them in position now and this is still a good lead.

I had heard a rumour that a group of cave divers had this great lead in Mill Creek Cave but I had said that no way would anyone in this group know about Mill Creek.....Maybe you mean Murray Cave at Cooleman. Some years ago I met a group of cave divers at Blue Water Holes at Cooleman Plains. They were diving Murray Cave and were fairly excited by the river flowing in the back of the cave. This would have to be part of the main underground river coming from the imaginatively named River Cave. The Murray Cave descriptions show River Cave and Murray in the same vicinity but there is no mention

of any river in Murray. This would be because the maps were drawn from times when it was possible to pass the sumps during a drought.

For some reason the Mill Creek intruder's line only extended two thirds of the way along the possible passage. A reel with more line on it was tied to the end. It appears that they did not complete the exploration that was possible. Maybe they only had small bottles and were only making a reconnaissance dive.

When we survey underwater one person holds an end of a survey tape against some prominent feature while the other person swims off to find another feature with a "line of sight" between the two survey locations. The survey usually follows the guideline and Rod removed the existing line and replaced it with our own line but rigged with the object of using the line as an aid for the survey as well as general navigation. Of course there is no sight along the line and as Rod would say, "this is a journey into the Twilight Zone". The line holder gets to lie motionless in a dim watery glow holding the tape waiting for two solid pulls from their partner signalling to drop the tape and make your way along the guideline to your dive buddy and be shown the next survey point.

Floating inactive gets to be very cold and there are times when the two definite tugs on the tape are not a signal but just the tape playing leapfrog tricks on the protrusions and crevices in the tube. The desire to move on is in conflict with the need to be sure the tugs are not a false signal. If you are fooled by a false tug, and then catch up with your dive buddy he/she will then send you back again to somehow find the previous prominent survey feature. This is not always very easy. Fortunately this doesn't happen very often.

Al and I surveyed 100 metres of passage, mostly underwater. The air chambers have just enough of an out-of-water floor — call them chambers — rather than air bells, providing welcome relief to the survey since the energy expended climbing out of the water in full diving kits generates noticeable body heat. Small passages enter the air chambers in the roof but these are difficult and unlikely leads. There is no evidence of foul air.

Jason made the last dive of the day intending to dig at the rock stack at the end of the cave. You could see at the entrance sump what Al and I had done to the water with all our wriggling during fastidious measurement. Jason made his way to what must have been the very end of the cave but completely forgot to do any digging at all.

All the helpers were off caving somewhere and the gear for all four divers had to be transported up the escarpment to the parking lot near the tourist cave entrance. That was fun.

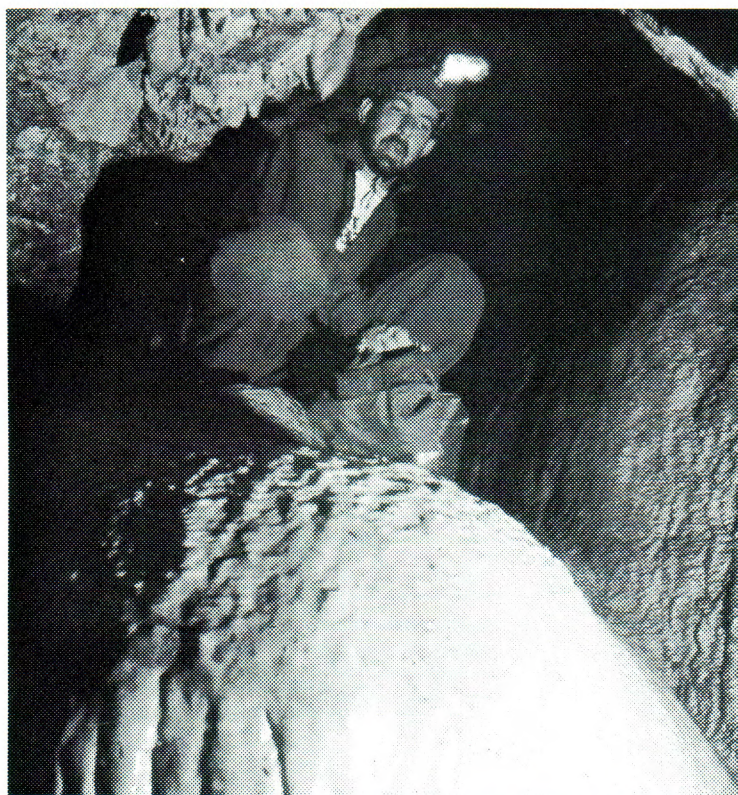
After a number of trips to Mill Creek, SUSS have completed a comprehensive survey of the Cave. With the underwater component and the map completed, we passed our survey to Chris Norton who has now drawn up and published the full map of Mill Creek.

This Easter (2003) our permit to dive in Mill Creek was declined. We wanted to pull out the rocks in the upgoing passage at the end and perhaps gain an entry to a cave system adjacent to the tourist's caves. There is a change of management at Yarrangobilly and the evidence of cave piracy has the National Parks Service concerned. Ironically this Easter, the cave diving pirates were in Mill Creek again. Uhhh no honour about respecting other people's leads!

4. Cooleman

We hiked off the track at a turn-off some kilometres before the Blue Water Holes. We intended to dive Murray Cave. Al and Jason were to leave their gear nearby and do another dive the next day in Glop Hole Pot and River Cave. It's a few more kilometres on from Murray. I notice on the map there is a much shorter route that we might try next year.

Thirty years ago leading identity in the National Parks and Wildlife, Andy Spate, lost a caving ladder into the lake at the bottom of Glop Hole Pot. He asked that if we should find it he would like it back please. In 1966 digging out caves was more acceptable than it is now however Andy as part of the group to discover Glop Hole pot would not have been part of the excavations even then.



Greg Ryan descending the flowstones in Glass Cave at Wombeyan.

Correction

AC159

Diver following guideline picture in underwater tunnel – photo by Mark Spencer

Joe Jennings says in *Helictite* (Oct 1969) that virtually the whole drainage of Cooleman Plain in Kosciuszko National Park gathers to feed the Blue Waterholes. This fabulous campsite marks a large river coalescing from sand and rock fissures. The river runs along the limestone hills but too soon turns into the cliffs forming a sheer 60m high canyon.

After a few kilometres half the river dives into Whitefish Cave cascading down a rift passage ending in a sump. The other half of the river discharges over a series of drops and waterfalls. From the top of the waterfalls kilometres and kilometres of limestone are calling. There are two leads to be examined near these cascades but this will be for another time. Most of the water emerging at Blue Waterholes passes through River Cave some kilometres away and is likely to form other such stream passages along its course

At the campsite at Blue Waterholes some years ago cave divers I met there spoke of steams in the back passages of Murray. This had to be part of the River Cave stream. If River's river was definitely there, and then it would be worth looking for leads in Murray, Glop and River Caves. The thought of those little known sumps in the first section of Murray turned over in my mind.

In the great drought of 1968 SUSS penetrated Murray's first sump and produced a more or less adequate map that is presently used as the cave gospel, if you believe in that sort of thing. There are side passages in the first section of the cave, which are missing from that map. One passage leads to a couple of undocumented sumps that appeared to me unsavoury. Unfortunately these sumps are not altogether hopeless leads. One nearby passage is blocked by an extreme squeeze that breaks out into daylight making a lesser-known second entrance to Murray cave. I think this entrance was dubbed "Patrick's Retirement". I'll leave that story for the campfire.

The first 100 metres of walking passage dips and presents an elliptical sump, scalloped, beautiful and enticing!

For divers this first sump is spacious but short. The water level would not need to fall by very much to get through without scuba. With a stout rope tied off at each end of the sump and a stout heart, it could be done as a breath hold. One person possessed has told me with maniacal look in one eye that they have done it! This is not generally a good idea because there is a couple of dyke like obstructions along the way and there is some potential to come a cropper.

The black formation-free passage is in contrast to the passage beyond the water barrier being decorated in hundreds and hundreds of pure white straws and draped in calcite formations, crying for their lost kindred in the first half of the cave.

Along the way is one obvious pure white stalactite hanging in the centre of the passage, bearing pencil signatures from 1902-1903. There is a 1968 inscription carved by an individual from SUSS. I can only comment that attitudes were different in 1968 and ASF didn't have that code of ethics in those times ... although I think SUSS did.

Trip reports document three sumps along the route. Actually there is one sump, a swim through and a duck under. After the first sump there is 50 metres of decorated passage, which then dips down a mud embankment where the sound of running water heralds the swim through. This is a beautiful underground stream passage of roughly the same volume and cave type as the stream in River Cave. Stumbling down the mud embankments into the triangular slot the swim through quickly becomes a clamber up and in a pond where a flow emanates from a fissure in the right hand wall. It was all very stirred up by investigations by my companions. Bother! I had wanted to stir it all up!

There is more walking passage, a duck under and more walking passage that abruptly stop at a rock pile. You can penetrate the rock pile along the original stream passage where a collapse changed the course of the river to a more devious and constricted path. Following the existing water flow leads more deeply into the rock pile and comes almost to the same spot. Potential leads here are few. There is a dodgy climb and I doubt there is a way on from this area at all. Mind you I will visit and give it another go one day.

Mounted on the rocks is a PVC container with a book to sign. Aside from some goody two shoes track marking persons there are some familiar names including Bruce Stewart, Justin Wilkinson and Phil Hill. Phil did one of the first exploration dives in Glass cave at Wombeyan however there was no mention of visiting divers since 1985.

The track marking was in the form of red and white twisted telephone wire that in flood had torn from its anchors and wrapped itself thither and yon. We removed the detritus, returning the cave to a more natural state.

Murray Cave is an overflow passage. When the river at the back builds to be big enough the water rises and flows back out of Murray's entrance and into the normally dry valley. The river in the last section of Murray must be the River Cave stream, which during drought was not present when, visited by dry cave explorers. During these times how much water is present in River Cave and what leads can be exposed.

What a fine day it had been and we returned to Rod's vehicle after this great dive experience.

I needed my mobile phone, which was in a pack, lodged right up the far end of Rod's Utility Truck. Wriggling over all the gear I managed to kick the fuel line on the compressor and the fuel started pouring everywhere. I gave up on the phone and wriggle back to the compressor and blocked the fuel flow. Rod came up to complain at me for getting fuel over all the gear. Just after I'd jumped off the back of the truck the whole back end went up in flames. I stared for a section at the ball of fire in the back and could only say, "Oh Shit we've got a problem. We've got a problem! We've got a problem!"

Paralysis dissolved as a shout went up "Get the gear out off the truck". Someone rolled the roof off and many hands reached into the flames lightning quick and grabbed packs and threw them onto the ground. The flat top truck was soon emptied except for the compressor sitting on the back of the truck burning like Alexandria's Lighthouse. Attacking the burning packs first we tried smothering the flames with one of the empty packs but the petrol was not to be smothered. The burning packs on the ground set fire to the grass, expanding our situation.

Beating on the grass with the empty packs extinguished the grass fire. Non burning packs were separated, whence everyone began beating on the petrol burning packs. This seems to be effective as one at a time each pack was extinguished. We started to win.

With the packs now smouldering on the ground more or less not burning, we turned our attention to the compressor. Its metal handles were just cool enough to drag it off the truck with flames still burning from the fuel tank. The stopcock had never really

shut the fuel off properly and with the fuel line burned through, the leaking fuel was feeding the flames. Relentless flailing on the compressor by everyone snuffed out the flames enough to wrap the fuel cock with a half melted cave pack and the flames went out.

The cave packs and my backpack were melted and charred but the contents were mostly okay being protected inside the packs. Containerisation is your friend.

A National Parks Ranger drove past with a friendly wave. We smiled and waved back with friendly smiles forming a line to block the landscape of charred grass.

My mobile phone was melted blackened and charred. The buttons were almost okay after picking off the melted pack plastic. To my surprise the unit still worked once in range of a telecommunication tower. Blackened, bubbled and distorted, my cell-phone still operates. It is a personal statement symbolising my lifestyle and perfectly matching my other accoutrements and accessories.

My beloved Sue had a different appreciation of art however, and she bought a new mobile phone case.

Postscript

Over Easter of 2003 hundreds of metres of new passage was found in the Yarrangobilly area. There is presently argument in the group about whether to publish anything about the new finds because of the problem with uncontrolled piracy.

In the speleo world a secret is a temporary thing but you never know the secret may die with us in our old age and the younger generation will go on caving trips trying to find the lost cave of SUSS. There won't be any signatures on the wall though. ■

November 28, 2003 6:01AM

Man dies while cave diving in Suwannee

By DOUANE D. JAMES Sun staff writer

Source: <http://gainesvillesun.com/apps/pbcs.dll/article?AID=/20031128/LOCAL/31128009/1007>

Jerry Duwayne Beets of Texas drowned during a visit to Little River Springs.

A day before Thanksgiving visit to Suwannee County ended in tragedy for one family when a Texas man drowned while cave diving. Jerry Duwayne Beets of Watuaga, Texas, died Wednesday afternoon while visiting Little River Springs, located on the Suwannee River near O'Brien, authorities reported.

"He was on his way out where they found him, but he had just run out of air," said Suwannee County Sheriff's Deputy Tommy Roberts, the first officer called to the scene after Beets was reported missing.

Roberts explained that Beets, 42, likely became disoriented when trying to find his way out of the cave. Beets was with his uncle, Kane Overfield of Colleyville, Texas, 46, in what was supposed to be an 80 minute dive.

When Roberts was called Beets was already 45 minutes overdue to leave the cave. The two were on their way out of the cave when the "scooter," diving equipment with a cylinder and propeller, silted the water and cut off any visibility.

Overfield told authorities he was able to find the permanent nylon line divers leave as backup to find their way out during such zero-visibility situations. But while Overfield escaped the cave, Beets did not follow him.

A team of four rescue divers could not find Beets on their first attempt. On their second try, a diver found Beets 2,100 feet in, but upside down in a position where it looked like he possibly was headed out, Roberts said.

Overfield also told authorities that Beets was an experienced diver who had been in Little River Springs several times before.

Beets was visiting Suwannee County with his wife Amanda, 32, and Overfield.

It's Coming!

The 25th Biennial Conference of the Australian Speleological Federation

2nd-9th January 2005

PO Box 198 North Hobart, Tasmania 7002

The frenzy has started! The venue is booked, the fieldtrips organised, the caves are rigged and the beer is cold. Cascade Pale Ale of course!

Tasmania is certainly "The Caving State". It has this country's deepest caves, some of its longest caves, certainly the most sporting, the prettiest caves and even the latest in tourist cave developments. The format of the conference includes presentation of papers covering every aspect of the sport and science of speleology, as well as field trips, scheduled meetings and an interesting range of competitions and events to liven up proceedings.

We would like you to attend CaveMania. Better still be presenter of either a paper, a workshop or a poster. Enter the Photographic Competition, the Map Competition or the Cave Surveying Competition. Enjoy the Artshow or just be one of the hundred interesting cavers, speleologists and cave scientists who will make CaveMania such a great event.

Situated at Far South Wilderness Inc. 5 km south of Dover in southern Tasmania. Accommodation is in 6 berth dormitory cabins. Camping is available at the Dover Caravan Park or there is a range or upmarket accommodation in the vicinity by own arrangements.

Papers and presentations will normally be of 30 minutes duration. Abstracts and Papers will be published in a volume of Conference Proceedings. Preferably these will be submitted in electronic form.

Closing dates for Abstracts — 31st September 2004. Deadline for Papers will be the opening date of the Conference. Late submissions will not be included.

For further information on Papers — Albert Goede: Albert.Goede@utas.edu.au or Arthur Clarke: arthurc@southcom.com.au

Further information on registration and bookings — Ric Tunney: rtunney@tassie.net.au

Stephen Bunton Convenor: sbunton@friends.tas.edu.au
(w) 03 6210 2200 (h) 6278 239



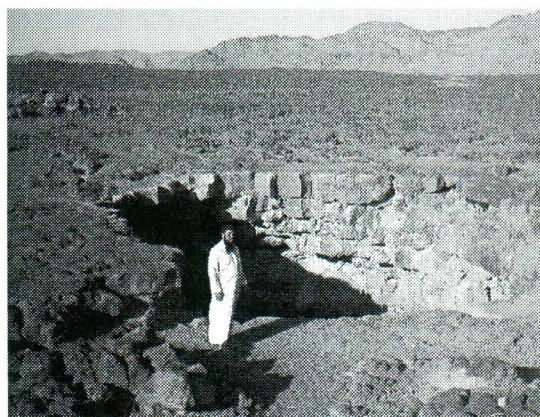
Helicopter Rescue at Um Quradi Cave

(A geologist with the Saudi Geological Survey (SGS), John Pint has a particular interest in the caves (primarily in lava) in some of the most wildly spectacular desert scenery on earth. The incident described below occurred early in 2003. Photos are by John Pint and Mahmoud Al-Shanti)

A serious accident is frightening enough in itself, but if it takes place in the middle of nowhere, it suddenly becomes a thousand times more serious. This lesson hit us hard in February when we nearly lost one of our colleagues, Saeed Amoudi, in the barren wastes of Harrat Khaybar lava field.

It all began when Jamal Shawali, the black-bearded head of the Medina Earthquake Monitoring Station, sent us a CD full of cave pictures he had taken somewhere in Harrat Khaybar. Since we are already working on a report on Khaybar as the most promising cave area in Saudi Arabia, we jumped at the chance to see Jamal's caves and on February 24, 2003, drove off to Medina.

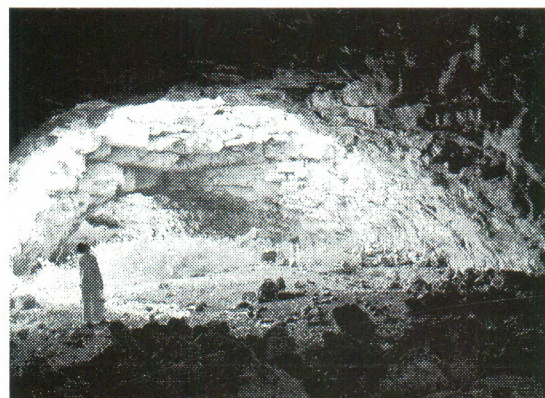
Jamal invited us to spend the night at the SGS (Saudi Geological Survey) camp, but we declined because of the health risk posed by small fibers of rock wool, which blow all around the area. Of course, when you breathe this stuff, it stays in your lungs for the rest of your life, like asbestos. "We prefer to camp under the stars," we said and off we drove to the cave, which Jamal said was only seventy-two kms away. Well, 150 kms later, we found ourselves winding our way through desolate lava beds in total darkness, wondering how Jamal was going to find this cave without driving right into it. "Didn't you say it was 72 kms away, Jamal?" "Yes, of course... by GPS," he replied with a twinkle in his eye, proof of how quickly we are all acquiring "satellite vision."



Jamal at one of the two vertical entrances to Um Quradi Cave.

At last, the meandering finished and we were standing at the edge of a black hole about eight meters in diameter which you could definitely fall into with no problem. This was Um Qaradi cave, a place we are likely never to forget. A brisk wind was blowing and it was getting cold. Jamal showed us two more entrances to the cave, one of which was horizontal. Soon we were carrying our boxes, bundles and bags down into a flat spot some twenty meters inside the cave, which, of course, was pleasantly warm. A quick walk showed us the cave was only a hundred or so meters long and about 14 meters

wide at most points. It was a lava tube, but instead of exhibiting the usual smooth surface, the walls and ceiling looked chunky and deteriorated. No lava stalactites were to be seen anywhere and it could be that the entire inner layer of the original tube had long ago spalled off. Under one of the two ceiling collapses, someone had planted two palm trees. At the far end of the cave, the floor is moist and nearly reaches the ceiling. Jamal said the cave continues beyond this point and we planned to check it out the next morning, but that was not meant to be..



Typical wide arch of lava cave

The distance from ceiling to floor was only about four meters, suggesting that we were standing on many meters of accumulated sediment. Digging deep might reveal lava levees and fallen bits of the original ceiling, not to mention archeological finds and a few million years of pollen deposits.



Tea time inside cave.

That night, few of us slept peacefully. I had nothing but nightmares and in her dreams, Susy saw pale, sober-faced individuals telling us over and over to get out of the place.

By the light of the next morning, we could see that the area just outside the cave's horizontal entrance had once been covered with buildings. The outlines of ancient walls are clearly marked by blocks of basalt.

As we were relaxing after breakfast and speculating over the reasons why none of us felt

comfortable in this cave, Saeed Amoudi went out to get a few helmets in preparation for surveying the cave. "They're in the metal box on top of my car," I told him.

A few moments later, we heard a distant cry. I went out of the cave to investigate and saw Saeed lying on the lava just near my vehicle. I called to him and when there was no response, I shouted to the others: "I think we have a problem!" .. When I reached Saeed and saw his face covered with blood and his leg twisted unnaturally, and blood spattered everywhere around him, my heart nearly stopped, because I had imagined he had simply slipped and fallen while walking. But apparently he had tumbled from a standing position on the roof rack, perhaps pushed by a sudden gust of wind. It was a long distance to fall, and all the worst to land on rough, volcanic rocks.

We applied compresses to Saeed's deep head and leg wounds and felt for broken bones. Although we could feel none, his cries of anguish every time we touched his leg, made us suspect a fracture at least, so I looked around frantically for something that could serve as a splint and ended up using a rolled magazine. ... Next we covered Saeed with blankets and used a tarp to make a sort of tent that would shield him from the wind, which blows so relentlessly across these flat lava fields. Here Susy took over, talking to Saeed and encouraging him. "His hands were icy at the beginning," she recalls, "but after they built the tent, he slowly warmed up."...

This situation looked deadly serious. Saeed was alive, thank God, but barely conscious and obviously in deep shock. By then everyone was around him and, hands trembling, we began to apply the various



Susy keeping vigil over Saeed

procedures we had been taught during our First Aid and Cave Rescue course in Lebanon. It was much harder to do those things under the stress of a real accident, of course, but I was especially struck how very difficult it was to THINK clearly. Obviously it is better to have things like splints, cloth triangles, etc. ready for use, avoiding the need for improvisation, which doesn't come easy under stress.

At this point, we realized how foolish we were not to have bought a speleo rescue stretcher or at least built a simple one of plywood. We had no safe way to move him, for example, to the inside of a Land Cruiser. However, the serious possibility of internal injuries and broken bones told us to forget

about transporting Saeed over those rocky tracks. "Jamal has friends at the Civil Defense in Medina," said Mahmoud. "We're going to call for a helicopter." Well, at least for this we were well equipped. We had a satellite telephone with us — exactly for emergencies like this one — and we could give them the exact GPS coordinates, without which they could never have found us in that endless lava rubble...

Less than 45 minutes later, we could hear the chopper approaching, a big twin-engine Kawasaki, and in nothing flat Saeed, accompanied by Mahmoud and Jamal, was on his way to Medina's King Fahad hospital.



The helicopter arrives

The rest of us packed up and returned to the SGS earthquake camp. After a few hours, we were relieved to learn that Saeed had no broken bones (Mahmoud insisted on x-rays of every inch of his body) and his head and leg wounds were being stitched up. Later, in Jeddah, CAT scans would verify he had no internal injuries. That afternoon, Saeed was released from the hospital. He had stitches on his face in two locations and still couldn't walk on his leg despite pain-killers. Apparently the wound had gone all the way to the bone. But he was alive and even joking about not missing the next cave trip.

We spent the night at the SGS Medina camp, despite the certainty of inhaling rock-wool dust and enjoyed countless cups of tea thanks to Jamal's attentive assistant, Naheel. On one occasion, Susy helped out by pouring the tea for me. I told her, in Spanish, to give me only "un poquito" as I felt I was already swimming in tea. But Naheel noticed the half-empty cup and then carefully explained to Susy how to do it right and I got my full portion after all.

The following morning we drove back to Jeddah, all of us touched by this near tragedy and resolved to be better prepared the next time.

And now, I want to express the heartfelt thanks of all of us, especially Saeed, to our First Aid instructor, Joe Zaidan of the Spéléo-Club du Liban. A big SHUKRAN to you, Joe!

TIPS & SAFETY

from Cindy Cheatliz — US Caver
http://pw1.netcom.com/~cheatliz/self_rescue/past.html

Replace a lost filling by melting some candle wax from your rescue candle. Let the wax cool until it is soft and pliable, and stick it into the tooth. Smooth it out with your finger, bite down on it, and wipe away the excess wax.

If you don't have enough pulleys for your haul system, a carabiner may be used as a poor substitute. Expect losses in efficiency of 50 percent or more.

As a person's blood pressure starts to drop, the pulse will disappear from certain areas of the body. First, the pulse will disappear from the feet. Next, it will disappear from the wrist, then from the neck. Prior to blood pressure dropping, the pulse rate will usually increase. A change in pulse is a clear indication that the patient is experiencing distress.

A Tribute to "Toopy" 1948-2003

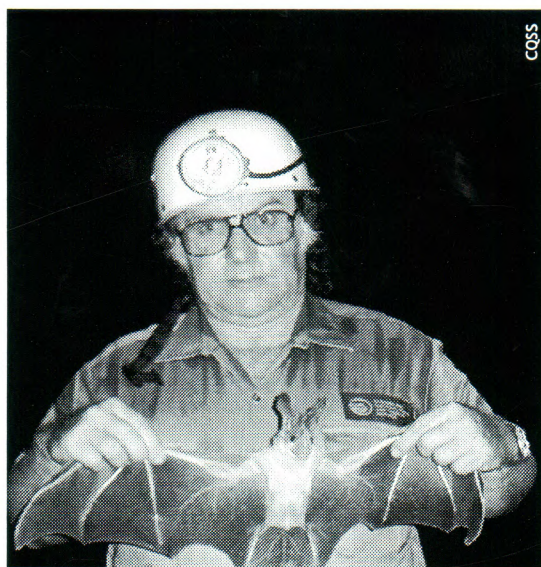
John Toop (Toopy) was born in Brisbane on the 7th of May 1948. He studied at the University of Queensland, where he completed a science degree with first class honours, receiving a University medal. During his post graduate studies he became interested in caves and bats and in 1970 joined the University of Queensland Speleological Society to pursue these interests. At that time, the organization was involved in the exploration and documentation of the caves of Mt. Etna and Limestone Ridge. UQSS were also spearheading the campaign to stop the mining of Mt. Etna, an issue in which John became heavily involved. Caving and the Mt. Etna dispute had a great influence on John's life. While caving at Mt. Etna John began documenting a colony of the rare Ghost Bat and in 1975 received a National Government Grant to further these studies. He moved to Rockhampton gaining employment with the Queensland Parks and Wildlife Service where he remained until his untimely passing. He also joined the local caving club, the Central Queensland Speleological Society.

His employment with the Service wasn't all plain sailing as his reports on the Ghost Bats were to become pivotal to the historic and long running Mt. Etna Conservation Campaign. As the campaign intensified John soon found himself in a difficult and often compromising situation, being a member of the caving club, heavily involved in conservation issues, and an employee of National Parks. At the time, it was almost as if these two arenas were paradoxical. One may have had the misconception that we were each fighting the same fight, but unfortunately, the Government of the day fully supported the mining of Mt. Etna, which would have eventually lead to the destruction of the Ghost Bat colony and the caves that he had spent many years of his life studying, documenting and writing reports and guidelines for their preservation. This caused John great stress and angst. Through Ministerial intervention, John was effectively forced to disassociate himself from the caving club and its members. Although he reluctantly resigned from the club, he continued a strong association with its members who regarded John as a patriarch. Whenever there was a problem and there were many at the time he was always there with advice, support and direction.

Despite all of the conflict John continued to work and lobby for a National Park. Mt. Etna and Limestone Ridge are now encompassed within Mt. Etna Caves National Park, for which John's work was instrumental in its formation. He wrote the first management guidelines for the Mt. Etna Caves National Park and his work within Nationals Parks has seen him involved in the management of other caving areas throughout Queensland.

John was widely acclaimed and respected for his bat research. He was considered the foremost authority on *Macroderma Gigas*, the Ghost Bat. In 1999 he was bestowed the "Certificate of Merit" from the Australian Speleological Federation for his dedicated and tireless work into caves, bats and cave conservation.

www.caves.org.au



John Toop with ghost bat, ASF Conference, 1999.

John was also actively involved with the population and burrow activity monitoring of the northern hairy-nosed wombat, an endangered species, known only to occur at Epping Forest National Park. He improved the burrow marking system and the data collection methodology for estimating burrow activity as an indicator of population size. He searched out and found a number of new burrows, and ensured that the stock proof fence around the park remained effective. He followed up historical sightings of wombats in Central Queensland and retained a keen interest in what was happening with wombats.

Another of John's great passions was fishing, however this went much further than merely "wetting a line". His personal interest in and knowledge of fish was used widely in the execution of his duty. He was involved in the barramundi fish ladder redesign project for the Fitzroy River Barrage. Toopy can be rightfully proud of the part he has played in protecting Central Queensland's wildlife and wild places, which included such aspects as the bats, caves, wombats as well as the islands and reefs of the Great Barrier Reef Marine Park.

Sadly, on Sunday 21st of September 2003, John suffered a heart attack from which he did not recover. John is survived by his wife Pauline and two sons, Alan and Andrew. John will be sadly missed by all who knew him.

We have all been searching for a farewell. Some words from John Baldwin, a long time friend of John's at the Great Barrier Reef Marine Park Authority.

"We may not have always agreed with your argument, but we never questioned your knowledge and passion!"

The bats will fly softer but safer tonight for your passing.

Rest easy Toopy."

*By members of
Central Queensland Speleological Society /
Queensland National Parks and Wildlife Service*

Lightning Safety For Cavers

John Gookin — US Caver

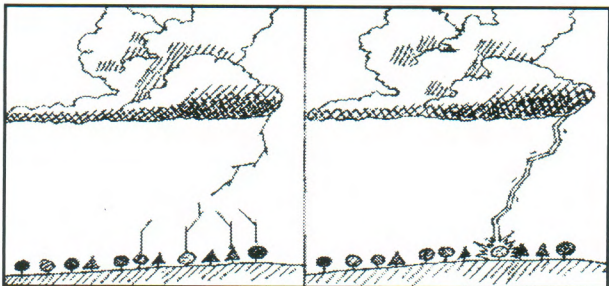
All photos supplied by John Gookin and Dave Bunnell

Numerous cavers have been shocked by lightning. The serious injuries have been near cave entrances, especially when metal cables, cable ladders and wires were being used. Cavers walking on the surface, to and from caves, are generally at greater lightning risk than they are while caving. In general, it is much safer to be well inside a cave than on the surface during an electrical storm. But some cave **entrance areas** appear to be even more dangerous than other places on the surface.

One proviso: Non-cavers often call small overhangs "caves." Small overhangs are especially dangerous. Lightning tends to flash over surfaces, and it easily jumps the gaps of these small pseudocaves, especially when rain water is running. Humans offer better paths for conducting electricity across those gaps. Be sure to tell non-cavers that cave entrances are dangerous during electrical storms, so they will get the message that these "caves" are poor places to be in a thunderstorm.

Real cavers who are underground probably won't even know that a thunderstorm is outside unless someone gets shocked, or unless the water level starts to rise from rain, or unless you are exiting the cave and hear the thunder rumbling at the entrance.

Cavers as far as a mile underground have been shocked by lightning. Those standing in water seem to get shocked more. People standing in water on the surface have been shocked through the water, at the same long distances from strikes. Touching the cave ceiling while standing on the ground will increase your potential to conduct current. But cavers well within a cave don't seem to get more than uncomfortable (or slightly debilitating) shocks. It's the cavers in the entrance pits, on cable ladders or near other metallic lines, that tend to get seriously hurt by lightning. Wet ropes hanging in an entrance can be as dangerous as cables, but have only been observed as lightning conductors in the mountaineering accident data (not in caves, yet.) Metal handrails into show-caves need occasional gaps in the metal to avoid channeling lightning strikes to everyone holding that railing in the cave. These gaps should be feet long, not inches long, and the railings should be well grounded near the surface. Plastic bridges between railings should be in dry locations.



Left: A stepped leader moves down in 50 steps and multiple streams rise from tall objects near the leader. Right: A single stroke from a tree is the most obvious point we see.

First, a leader moves down from the cloud in 50m steps. When it is close to the ground, it attracts "streamers" from the closest objects.

Second, when the leader connects with the closest streamer, the big "return stroke" travels along its path.

Caves would only tend to attract a strike if they had an elevated conductor, like a tree or a column of ionized air, up high where they would connect with more leaders.

Do caves attract lightning?

Some caves definitely get struck more often than others. This has been well documented in the Pyrenees. This has also been documented via geomagnetic signatures in lava tubes. But why some caves get struck more than others is open to debate. If you don't care why some caves might get struck more than others, skip to "lightning safety guidelines."

Caves tend to be exhaling highly conductive air in the afternoons when lightning tends to strike. Diurnal cave breathing is well documented, but exhaled cave air flows downhill and tends to stay together like a river of air (you can feel it.) The high conductivity of cave air was documented decades ago. This needs further examination by analyzing the cave air itself for ions and by looking for electrical fields above exhaling cave entrances.

Look at Dave Bunnell's photo of Wolf River Cave to see normal cave entrance air movement. Cool dry air is seeping out of the cave below the fog layer. Dry air is actually heavier than moist air: this is counter-intuitive. And cool air is heavier than warm air. At the thermocline between the cave air and the warm moist surface air, fog forms when the cool cave air condenses the moisture from the warm surface air. If a storm was approaching, the dropping barometric pressure would suck huge amounts of cool air out of the cave. A turbulent storm could mix the air more. Some people who study caves and lightning think this air helps attract lightning to caves that breathe a lot of air.

But another important factor to observe in this photo is that the local stream is dropping into the cave. This is a wet spot in the well-drained karst terrain. Eventually this stream connects to the water table, providing an excellent grounding. These diving streams are excellent conduits for charge to move in or out of the Earth. This charge coming out of the Earth helps develop the "streamers" that help blaze the trail for a significant lightning strike, and it helps channel ground current from a strike. Cavers have been standing in water a mile underground, and been shocked through the stream of water. Observers at the cave entrances have documented that sometimes the lightning repeatedly strikes an entrance, to shock the cavers underneath. But other observers at cave entrances have noticed that sometimes lightning hits far from the entrance, and still shocks the cavers in the water underneath. The distant strikes that shock cavers are probably connecting to the

LIGHTNING SAFETY



cave stream via some other stream passage, not via the same entrance the cavers used.

When lightning strikes, it emits powerful surface arcs above the ground surface and ground currents under the surface. Most victims are killed by ground currents. Any long conductors, like cables, wet ropes, metal handrails, or streams, tend to channel that ground current as it travels into the Earth. This factor may not make caves *attract* more direct lightning strikes, but it may channel the energy of nearby strikes into more caves.

Dale Green is an amateur geophysicist who has been studying lava tubes. While mapping the magnetic fields around lava tubes in Idaho, he has found that the magnetic disturbances caused by lightning strikes are concentrated around entrances of tubes that blow air. These strikes can be detected because intense currents from lightning magnetize the lava and completely alter any previous magnetic field. Away from entrances, lightning strikes were found to be very sparse and randomly placed. The cause for this entrance concentration is unknown but may be due to moisture in the exhaled air. If this seems like a weak scenario, consider that the main place most houses receive direct lightning strikes is through furnace exhaust vents.

We can actually start looking at real lightning strike data at cave entrances in the US (lower 48 States) and much of Canada from the National Lightning Detection Network (NLDN.) The NLDN is run by Vaisala Global Atmospherics Inc (VGAI). To see a real time map of lightning in the US for the past 2 hours, go to www.lightningstorm.com. VGAI sells detailed lightning data to anyone who wants it and they can produce color-coded maps showing strike concentrations for specific areas. If you get struck and want to know whether it was a hot strike or a cool one (they can vary from 1-200kA) VGAI can use your exact time and location to tell you more about "your" strike. If you think a local cave is lightning prone, you can hire them to tell you if that location is really a hot spot.

Discussing theories of why some caves are more lightning prone than others is an academic exercise that may eventually help us predict relative risks in certain caves. But it is factual that some caves are more lightning prone than others. When the locals tell us that a certain cave is lightning prone, we should be careful around these entrances by minimizing our time of exposure during storms.

Lightning safety guidelines for cavers

- Time your caving trips to avoid thunderstorms.
- Avoid cave entrances during thunderstorms.
- Avoid long conductors during thunderstorms.
- Avoid water, and touching the wall or ceiling if near the surface during a storm.
- Drop into the lightning position if a lightning hazard exists.

Additional Lightning Safety Guidelines for People On the Surface

- Seek a modern building, car or safer terrain if you hear thunder.
- Avoid high ground if you hear thunder.
- Avoid relatively tall trees if you hear thunder.

The Lightning Position

Assume the lightning position when at risk. This will reduce the chances of getting a direct strike and it may reduce the other effects of lightning, but it offers no guarantees. Some scientists argue that it barely helps protect you; others argue that it is much more valuable because the data says that no one in this position has ever been hurt. This position includes squatting (or sitting) and balling up so you are as low as possible without getting prone. Wrap your arms around your legs, both to offer a safer path than your torso for electrons to flow from the ground, and to add enough comfort that you will choose to hold the position longer. Close your eyes.



Get in the lightning position to reduce risk. Squat or sit, ball up, put feet together, and wrap your arms around your legs.

While the prone position is lower, being spread out increases potential for ground current to flow through or across you. Keep your feet together so you don't create potential for current to flow in one foot and out the other. If you have any insulated objects handy, like a foam pad or a soft pack full of clothes, sit on them. Avoid backpacks with frames since the frame may concentrate ground current. Don't touch metallic objects. You won't get a warning that a strike is imminent because the lightning event from cloud to ground and back occurs faster than you can blink an eye, so stay in the lightning position until the storm passes. The lightning position reduces the chances of lightning injuring you as badly, but is no substitute for getting to safer terrain or structure if it is immediately available. If you are concerned enough to assume the lightning position, you should have your group dispersed at least 50 feet apart to reduce the chances of multiple injuries.

Ground current may spontaneously trigger your leg muscles to jump while in the lightning position, so take care to avoid being near hazards when you drop into this position.

Summary

Cavers are probably at greatest risk walking to and from caves. But cave entrances offer dangerous spots where we need to exercise a high level of caution, moving past them quickly just like when passing under potential rockfall. Inside caves, we are only at moderate risk when near the entrance or

TIPS & SAFETY

from Cindy Cheatliz – US Cover
http://pw1.netcom.com/~cheatliz/self_rescue/past.html

Carry a set of non-latex (vinyl, Nitrile, polyblend, etc) surgical gloves in your medical kit. They create instant "clean hands" for dealing with wounds.

Create a makeshift sleeping bag from a couple of plastic garbage bags. Loosely fill the garbage bags with clothing, dry leaves, papers, etc. Tie or tape the bags shut to prevent moisture from soaking down the contents. Place one filled bag over the patient, and the other below.

in the water. Deep in a cave, on dry ground, we are probably safer than anywhere on the surface.

Having said all of that, the leading experts in lightning injury epidemiology say that lightning safety is about 2/3 intelligent behavior and 1/3 luck. Following lightning safety guidelines can eliminate 2/3 of the lightning injuries in the world.

Cavers aren't just cavers: we are outdoorspeople. Knowing how to behave intelligently when lightning threatens can help us in many other activities. Studying up on lightning safety guidelines for other activities we participate in can help us make more informed decisions wherever we are.

Resources

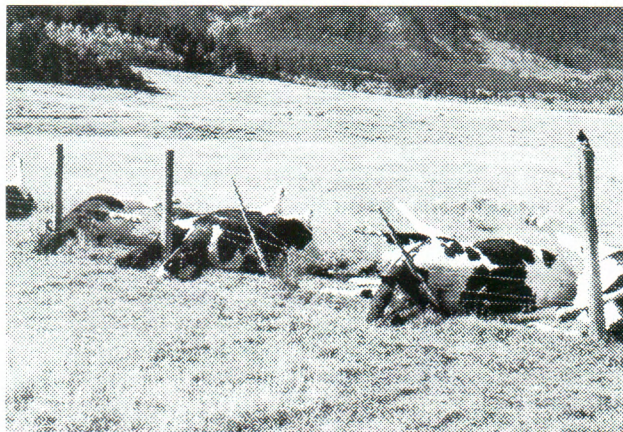
- Learn more about **backcountry lightning safety** at <http://www.nols.edu/resources/research/pdfs/lightningsafetyguideline.pdf>
- Learn more **general lightning safety guidelines** at www.uic.edu/~macooper/faq1htm.
- Health professionals can learn more about **lightning injuries** in Mary Ann Cooper MD's "Lightning Injuries" chapter in Paul Auerbach MD's *Wilderness Medicine: Management Of Wilderness And Environmental Emergencies*



Wolf River Cave entrance.

- Sports enthusiasts can see the NCAA lightning safety guidelines at http://www.ncaa.org/sports_sciences/sports_med_handbook/

This picture of Wolf Creek Cave shows cave air exhaling, just like it tends to do during a mid-afternoon thunderstorm. Cave air is highly conductive of electricity compared to normal air on the surface. Streams are also highly conductive. The exhaling air and the sinking stream may be related to the fact that some caves seem to attract lightning.



Cows struck by lightning.

These cows made three fatal mistakes.

- 1) They were in an open area during a storm, exposing themselves to a direct strike.
- 2) They were near a long conductor, which probably channeled high voltage down from a hillside strike.
- 3) They naturally had their legs spread far apart (about as far apart as a person lying down), providing significantly more voltage to one leg than the others, which drove ground current in one leg and the others.

(John Gookin is Curriculum Manager at the National Outdoor Leadership School (NOLS), 284 Lincoln St. Lander, Wyoming, WY 82520-2848, USA, or john_gookin@nols.edu, phone 307.335.2264 or fax 307.332.8811. This article was reproduced by permission from <http://www.nols.edu/resources/research/pdfs/lightningsafetyguideline.pdf>) ■

The Desert Caves of Saudi Arabia

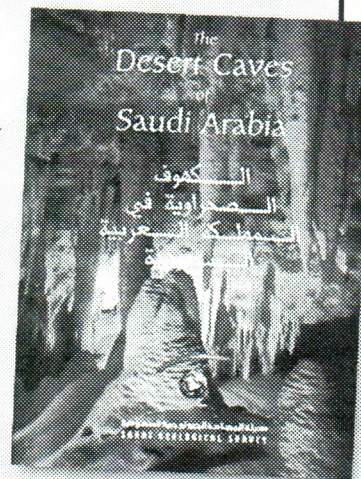
John Pint and Maher Idris

John Pint is an active speleologist employed by the Saudi Geological Survey, which sponsored this chronicle of twenty years of underground exploration, photography and adventure deep below the stark deserts of Saudi Arabia. In this hardback volume of 120 pages of carefully chosen photographs and text both in English and Arabic you will be exposed to the author's ruminations over the joys and woes that eventually gave birth to a new book. As John says:

"Anyone who has read one of the reports that Susy and I, and others, have written on what happened during our years of exploring Saudi caves will realize that these anecdotes would add up to a great deal of material, some of it more related to culture than speleology, some of it

humorous, some of it a bit irreverent and most of it far removed from the technical style of report-writing favored by geologists. The aim of SGS in producing a cave book, however, was basically to demonstrate — in a dramatic and visual way — that Saudi Arabia has caves (a fact unknown to most of the world) and that many of these caves contain beautiful, delicate formations which are going to be destroyed or removed unless somebody does something to protect them (a fact that has not yet impacted the decision-makers of the country)"

The book is available for the equivalent of about A\$60 through Speleobooks (www.speleobooks.com) in the USA and Tony Oldham (tony.oldham@virgin.net) in Wales. A quick check revealed no outlets in Australia.



Dabbling with Datums — AGD & GDA

Andy Spate

I have some worries...

New Zealand and Australia adopted two new geodetic systems a few years ago and maps are becoming available using the new systems. A geodetic system is a mathematical representation of the shape of our Earth in our part of the world. Most of you will know that the Earth is not spherical but is a knobbly pear shape. There are also the problems with papering a 'sphere' with rectangular sheets of paper.

The new Geocentric Datum of Australia (GDA94) and the New Zealand Geodetic Datum (NZGD2000) are essentially the same and are virtually identical to the World Geodetic System (WGS84) adopted by the USA in 1984. This latter is the system with which Global Positioning Systems (GPS) "think" — although they can be adjusted to the bewildering array of geodetic systems used around the world. Examples (which we will never use!) include:

Afgooove, Anna 1 Ast '65, Astro B4 Soral, Astro Ben "E", Bellevue (IGN), Campo Inchspe, CH-1903, Chua Astro, Corrego Alger, Gandajika Base, Gux 1 Astra, Hjorsey 1955, Hu-Tzu-Shan, ISTS 073 Astro, L.C. 5 Astro, Mahe 1971, Merchich, Nhrwn Masirah, Qornog, Sapper Hill '43, Schwarzeck, Zanderij

Why should this worry us? New topographic and geological maps are increasingly replacing older maps based on the new systems in New South Wales at least, and from the Commonwealth's Geoscience Australia (a new department made up of the former Australian Geological Survey Office and the Australian Land Information Group... both formerly other names... sigh...). This will have happened — or will happen in New Zealand and other Australian states. Almost all of the maps we are used to in Australia are based on either the Australian Geodetic Datum 66 (AGD66) or its twin brother AGD84. These are identical for all usual purposes. New Zealand used NZGD49 in the past. So what's the worry about this?

A geocentric datum has its origin at the centre of mass of the Earth. Until now Australia and New Zealand used different datums with their origin about 200 metres from the Earth's centre. Thus the new systems are based on an origin about 200 metres northwesterly of the earlier datums so the cave whose location you have located using AGD66 will appear to be located about 200 metres northwest when plotted on a map based upon GDA94 or NZGD2000. Thus it becomes necessary to keep track of which system you are using so that your records are specific records — and not frustrating clues for future generations. You will need to state which datum you are using on maps and all records of grid references or latitudes and longitudes that you use. Managers and speleologists may need to inquire of each other the datums used if these are not explicitly stated.

Conversion to the GDA will be most noticeable on mapping products. With the geocentric datum, the map projection and mapping grid zones will remain the same. The borders of maps will have the same latitude and longitude but will be in slightly different positions on the ground. *This means detail on existing maps cannot be joined with corresponding detail*

on maps under the new system. The impact of this 'displacement' will be greater on large scale maps (e.g. 1:5,000) compared with small scale maps (e.g. 1:100,000). The 'displacement' across Australia will be up to 210 metres — northeasterly.

In the January 2002 and January 2003 bushfires

AN IMPORTANT WARNING!

THERE ARE MAJOR DIFFERENCES BETWEEN GDA94 AND AGD66/84 COORDINATE SYSTEMS.

Remember!

- The AGD coordinates use a local datum, while the GDA coordinates use geocentric datum.
- The two datums use different shaped ellipsoids.

As a result, the AGD and GDA coordinates for the same point differ by approximately 200 metres (between 120 and 180 metres in both easterly and northerly directions).

NOTE: This is the case for map grid coordinates as well as geodetic coordinates. The map grid coordinates for a point are directly related to the geodetic coordinates of the same point. If the geodetic coordinates change due to the adoption of a different datum and/or spheroid, the map grid coordinates will also change. **THE ADOPTION OF A NEW DATUM CHANGES EVERYTHING.**

Note: Both UTM and latitudes and longitudes are affected. Boundaries will not change and the position of a point will not change — only the numbers that reference them. Maps using different datums will not adjoin perfectly.

in New South Wales, perfectly usable maps were available using AGD66/84 on one hand and GDA94 on the other. One AGD66 map had a sticker stating it was GDA94 when it wasn't! The consequences of such an apparently trivial 200 metre "error" meant that fires were falsely reported on the wrong side of control lines, real-time fire maps were confused and, in, at least one case, a helicopter sent to uplift an injured firefighter was not able to find the victim for an unnecessarily long time. It was not critical — but it could have been.

I had a personal experience a month or two ago when I and a few other Canberra cavers were walking along river with many topographic features easily recognisable on both the ground and map... But my GPS locations didn't fit! I was using the wrong datum on my GPS. On one occasion we were standing by a river but the GPS put us on top of a hill!

Your users' manual will tell you how to change your machine to fit the maps you are using. The GPS will easily convert for you as well. Remember that AGD66 and AGD84 are identical for our purposes as are GDA94 and WGS84 — but the latter are about 200 metres approximately northeasterly of the older datums.

Why were these expensive and potentially confusing changes made? Globalisation is the short

answer. With the speed of movement around the world, multitude of datums, increasing use of GPS units by very many sectors of the community and a number of other, more technical reasons, it becomes necessary to standardise geographic datums. See the various websites for further information.

There is much more information about these changes and the geodetic systems available on the web through the home pages of your state mapping agency. The main agency in Australia provides vital information via <http://www.icsm.gov.au/icsm/gda/index.html>

An informative (and free!) CD is available from Geoscience Australia. The CD contains a video, information sheets and conversion methodologies. Rules and methods for conversions are also available via the websites but these can be very daunting – better let your GPS or mapping program do the job.

Speaking of mapping have a look at www.ozixplorer.com for a very useful and inexpensive Australian -created mapping/plotting package. It is not a Geographic Information System (GIS) but has some very useful features. These include the ability to georectify (precisely relate a map to a grid system) scanned plans, maps and aerial photos. Beware of radial and other distortion with the latter. Maps produced with Oziexplorer can be exported to ArcView and other GIS programs.

So, in summary, Geographic datums *have* changed and we need to take account of this in day-to-day operations involving map reading and to ensure that our records of cave and other locations are adequate for future use.

And yes, datums is the correct plural in this instance! Sorry for all the abbreviations.

Addresses for further information – and the great CD – is Geoscience Australia, ICSM, P O Box 2, Belconnen ACT 2618 (ph. 02-6201-4292) or your state mapping authority.

KARSTFLASHKARSTFLASH

Exclusive to Australian Caver Issue 161 Australian attempts world record depth! Cavex – August 2003

Read about the exciting push to take the world's depth record back off the French led all international team including Al Warild, Australia's legendary caver!

Hear about the organisational problems within a country torn by civil unrest, crossing borders in the night and the final push into Voronya cave on the Arabika Massif, Abkhazia.

Read all about it in Issue 161!!

CAVE BOOKS NOW AVAILABLE

Wee Jasper Caves (James, Martin & Welch)

We have located a limited stock of this essential guide with comprehensive maps and cave descriptions, 45pp.

\$15.00

The Caves of Thailand (John Dunkley)

Following a recent bulk order from the USA, there are only 15 or so copies left. 2,000 cave descriptions & locations, 53 photos, 124pp. Includes free 12pp update.

\$15.00

The Management of Soluble Rock Landscapes: An Australian Perspective (Kevin Kiernan).

The only text on cave and karst management in Australia, this book is part of the required reading for the Karst Management course at Charles Sturt University. 61pp.

\$15.00

Australian Karst Index 1985. (ed. Peter Matthews)

Only 3 reprints are available of parts of this mammoth volume listing details of all known caves in Australia over 6,600).

\$44.00

(non-members **\$49.00**)

+ *post* (from ACT varies from \$5.50 to \$9)

Also available reprints of the NSW listing, 92pp inc. references, over 2,000 caves.

\$15.00

Karst of the Central West Catchment, NSW: Resources, Impacts and Management Strategies (Dunkley & Dykes, 2000)

All original copies were distributed to landowners and managers, but we have some strictly limited reprints. 103pp, 24 photos. Available with photos either in black & white (*inc. postage*) or colour (only 2 left) (*inc. postage*)

\$25.00

\$39.00

Proceedings of 23rd ASF Conference, Bathurst (ed. Cathy Brown, 2002)

200 pages, over 80 photos & maps, maybe free CD if you ask nicely!

\$25.00

A Bibliography of Jenolan Caves Pt 1: Speleological Literature (*postage \$1*)

\$5.00

A Bibliography of Jenolan Caves Pt 2: non-Speleological Literature

(*postage \$1*)

\$5.00

Either of the following books free with other orders over \$50 (while stocks last – first in first served), otherwise price as marked:

Papua – New Guinea Speleological Expedition NSRE 1973 (Julia James)

69 pages, numerous maps & photos

\$5.00

Caves & Karst of the Muller Range (PNG) (James & Dyson)

150 pages, numerous maps & photos, colour covers, only a few copies left of this massive report on one of Australia's most famous expeditions in search of the deepest cave in the world

\$12.00

POSTAGE: unless indicated otherwise, add \$3 for first & \$1 for each additional item.

HOW TO ORDER

Please address orders to:

Dick Heffernan, 11 Parer Street, Scullin, ACT 2614
and list your requirements clearly. Please make cheques payable to Australian Speleological Federation Inc.

Book Reviews

Beneath the Cloud Forests — A History of Cave Exploration in Papua New Guinea

Howard Beck.

Published 2003 by Speleo Projects, Switzerland.

ISBN 3-908495-11-3. 352 pages, hardback.

(The Australian (wholesale) distributor is Macstyle Media: www.macstyle.com.au, and it will be on sale in various "outdoor" shops for RRP \$ 79.95 AUD (Hard Cover)).

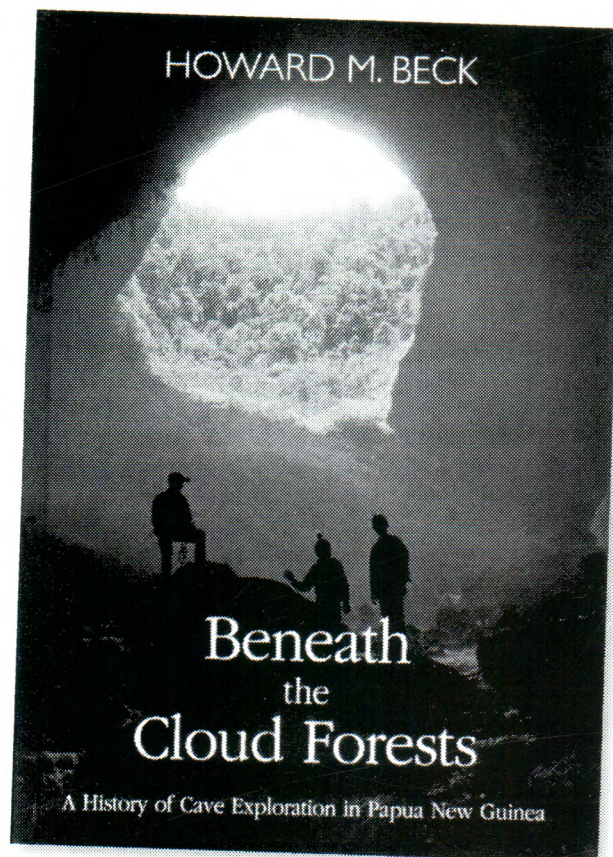
Reviewed by Ken Grimes, Hamilton:

This book recounts, in dramatic style, thirty years of cave exploration in Papua New Guinea. More specifically it narrates the activities of 29 international expeditions between 1965 (the Star Mountains expedition which barely got underground!) and 1998. There is also some mention of smaller exploration trips by local cavers, and reconnaissance trips ahead of the main expeditions, and a brief postscript for 2000-2001. The reader will recognise the names of many Australian and New Zealand cavers that were involved, along with resident PNG cavers that have since moved to Oz or NZ. The caves explored were up to 54 km long and 1178 m deep, some with enormous collapse doline entrances big enough to fly a helicopter inside (as happened on several occasions!). Many of the caves were major white-water systems that taxed the explorers to the extreme — there was one death and many near-misses.

Beck lived and caved in New Guinea for several years and took part in a British cave expedition. As well as drawing on the official expedition reports and his own experiences, Beck has sought out a wealth of anecdotal information from many of the cavers involved. One suspects that he has taken journalistic licence in supplying dialogue and other details of the action, but the overall stories appear quite accurate. The style is emotive and gives a strong feeling for the conditions met by the cavers, both underground and in traversing the steamy jungle above. It also brings out the excitement and danger of exploration in roaring river passages and systems that can flood at short notice.

However, the book is best read a chapter at a time with frequent rest breaks. The over-dramatised style tends to become tiresome and one needs relief from convoluted purple passages such as "Through rising vapours he had perceived a dim vision of another world — or was it a nightmare more akin to an abyss than hell itself?" (That being Beck's version of Lex Brown's first, aerial, view of Nare doline — p.167).

The book has some excellent photos (both B&W and colour) taken by a variety of cavers, including its author — though it took me a while to spot the credits which are hidden in fine print against the upper edges of the photos! These include many spectacular doline and cave river pictures, action caving shots and also quite a lot of photos of wildlife and of the local people, who must be the world's leaders in the art of body decoration.



There are 30 surface and cave maps. These are good quality, though of necessity lacking details given the large size of the systems. They have been redrawn in a consistent style for the book by Beck, but, sadly about one third have no credits at all to the original surveyors or compilers, and for the rest many of the credits are frustratingly brief. The map of Ora Cave (credited to D.Gill) is quite inaccurate in parts, Beck would have done better to use the original map, by Lex Brown, published in the expedition report in *Niugini Caver* 1(2).

The five page index lists mainly names of cavers and places, as you would expect — but is a bit idiosyncratic as to which pages are referred to e.g. you cannot use it to track all activities of a particular caver.

As a historical work, alas, it ignores much of the non-expedition cave exploration, and says little about the inhabitants' views or uses of the caves. But its main weakness is the lack of any documentary backing. The book has only 22 publications listed in its so-called "bibliography" — and those include some quite general books such as Sweeting's 1972 book "Karst Landforms". It does not even list all the expedition reports.

In summary: an excellent (if exhausting) read for cavers but disappointing for serious speleologists or historians. Nonetheless, Beck has done us a major service in bringing together into a single book the otherwise difficult to access stories of the various PNG cave expeditions.

Reviewed by Stephen Buntton, Hobart:

I was lucky enough to have participated in two expeditions to Papua New Guinea, Atea 78 and Mamo 82. After the Atea 78 trip it took two years to compile a report of that expedition's achievements and then a further two years to plan the return. The successes of the Mamo 82 expedition were so numerous, that a report of that expedition never eventuated and only a short magazine article was published in the French journal *Spelunca*. This was a great pity and a disappointment to many of the 59 Mamo 82 participants. I can now, finally rejoice in the fact that the story of this expedition has been written up, as a significant chapter of *Beneath the Cloud Forests*.

Documenting the achievements of just one caving expedition is a difficult feat but in this magnificent volume Howard Beck has recorded the highlights and achievements of over thirty expeditions, a significant number of them Australian.

Beneath the Cloud Forests is a most comprehensive publication which spans the last forty years of cave exploration in Papua New Guinea. This timespan, in particular the late seventies and eighties, represented the greatest period of cave exploration on the planet. More of the Earth was explored during this time, than at any other time since the heroic era of polar exploration, during the beginning of the 20th Century. Significantly this publication places the exploration of Papua New Guinea's caves in context with cave discoveries made elsewhere at the time.

Exploration in Papua New Guinea was initiated in search for the world's deepest cave. The climax of the book is concerned with the exploration of Muruk Hul the deepest cave in the Southern Hemisphere and the incredible first 1178m deep through trip, which was made by Australians Greg Tunnock, Al Warild and Mark Wilson.

Beneath the Cloud Forests is a magnificent book. It is well laid out with numerous maps and an incredible number of spectacular photos which convey the size, nature and excitement of PNG's caves. The narrative is certainly exciting and well written, accurately conveying the close shaves and adrenaline-filled moments which characterised this type of exploration. Caving in Papua New Guinea was certainly a highlight of my caving career, a career which, by comparison, seems to have limped along ever since.

Howard Beck has also managed to demonstrate in an understated manner, the development of caving techniques over that time period. Many of the things we now take for granted in our caving adventures were not a feature of the Australian Muller Range expeditions. These were carried out before the widespread use of Petzl Crolls and Stops, 9mm rigging – with rebelay, extensive use of bolts, cordless electric drills, GPS receivers and Laptop computers with cave survey reduction programs. (One of the reasons the Mamo 82 report never eventuated was the fact that there was not a printer with sufficient memory to plot out the thousands of survey legs in the 54 km of cave passage in Mamo Kananda.) I couldn't help but thinking how much we might have achieved if we were armed with this modern day technology.

Actually it probably wouldn't have made such a difference. The achievements of these expeditions were made as a result of the guts and determination of the participants. The main obstacles were the nature of the forest and the caves themselves. Howard Beck was a driving force on a number of expeditions and his book does justice to describing these hardships. The only thing missing was the smell of the jungle, the deafening sound of the water and the constant risk of footrot or other infections, although the author does his best to constantly reminding us of these.

I had been waiting twenty years for this book; I was not disappointed. It's a gripping read.

John Gillett.

Writers Club Press, San Jose 2002,
ISBN: 0595220576. US\$16.95

Reviewed by David Mercer, Melbourne

John Gillett is a UK-based, retired chemical engineer who, at the age of 65 is still an active speleologist. For the record, he is also a fluent French and Spanish speaker, an expert in the wines and cheeses of those countries, a swimmer who soon will have notched up 1000 miles in the pool, and an accomplished artist, whose wonderful sketches punctuate the text of this book. He started caving in northern England during his army service in 1958 and has followed his leisure hours' passion more or less continuously for over forty years. The last trip detailed in the book was to the recently opened Notts 2 in Yorkshire and was accomplished in February 2002. By today's standards John took up caving comparatively late in life but he introduced his daughter to the sport before she was a teenager and by the time she was 15 she was accompanying him on some arduous trips in Britain and the Pyrenees.

This gem of a book – which could easily have been entitled *The Joy of Caving* or *The Zen of Caving* – is an autobiographical account of a sample of around twenty carefully chosen caving trips that the author undertook in that period. The book is written in such an engaging way that it could be enjoyed equally by cavers and non-cavers. This places it in the tradition of highly readable caving books such as those written by the likes of Cecil Cullingford, Norbert Casteret or John's late friend of his Cambridge University days, David Heap.

One chapter is also devoted to an astonishing 1986 canyon descent in the Pyrenees - the first descent of the 1200-metre deep Canyon de Sadum, now closed to the public because it is home to a family of Pyrenean bears. Of the chosen "vignettes", ten feature English, Welsh and Irish caves. There are also descriptions of four French trips (two to Pierre St. Martin) and one each to caves in Yugoslavia, the United States, Belgium, Spain and Czechoslovakia. I suspect that early on in his caving career the author got into the habit of writing an account of each trip soon after its completion. There are rattling good stories of each expedition including details of the caves themselves, the fellow-cavers, equipment used and food consumed. I particularly enjoyed the account of a sumptuous barbecue in the company of French cavers that followed a perfect trip in the Grange Mathieu in the Jura Franche Comte.

It is hard to pick out individual chapters from such a rich diet but for those wishing to dip into one or two chapters for a taste of what is on offer I would recommend starting with Chapter 17 "Three thousand feet up, three thousand feet down". This is an account of an incredibly well-planned weekend traverse of a pre-rigged Pierre St. Martin done from Britain in 1984 using a light plane. This trip was planned a year earlier following John's successful leadership of an expedition to the Gouffre Berger. I would also recommend dipping in to Chapter 21 which describes another epic caving through-trip, this time with a group of Belgian cavers in the challenging Sima Cueto to Coventosa system in Spain.

Whether the author is writing about very long and arduous expeditions in France or Spain or relatively short trips closer to home in Britain (OFD is a particular favourite), his enormous enthusiasm for his chosen pastime is there on every page. The book is a sheer delight. Buy it for yourself and then pass it on to your non-caving friends. They will end up with a much better understanding of what makes passionate cavers tick.

Cave Mapping - Sketching the detail

A guide to producing a useful cave map

by Ken Grimes,
Convenor of the ASF Cave Survey and Mapping Standards Commission
December 2000

SURVEYING and SKETCHING

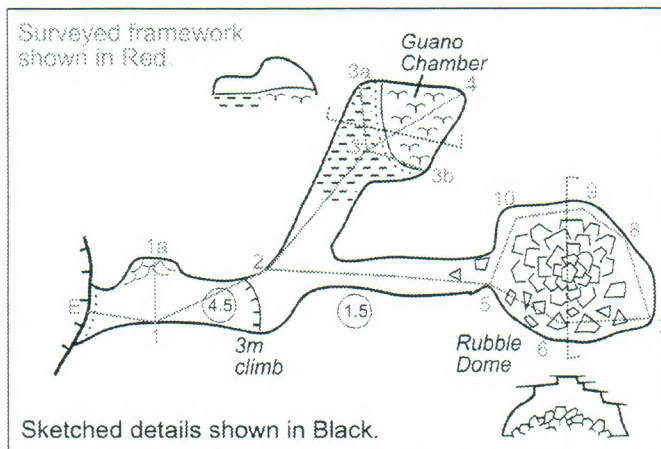
Surveying and Sketching are two distinct and complementary operations.

Surveying involves measuring a control framework through the cave using tape and compass.

Sketching involves drawing the walls and other detail to scale, using the surveyed framework as control.

When the two processes are combined, they produce a Map. Unfortunately many cave mappers tend to concentrate on one to the detriment of the other and so produce a sub-standard map.

This set of posters concentrates on the sketching side of the mapping operation.



WHAT are the AIMS of the Cave MAP?

Unless your map has a special purpose you should try to cater for **most** of the following:

- ◆ **Description:** What does the cave look like?
- ◆ **Navigation:** How to get through it, pitch details, etc.
- ◆ **Scientific:** Indicate features of interest.
- ◆ **Engineering:** Possible connections, relationship to surface features, hydrology...
- ◆ **Artistic:** Show off your drafting abilities!

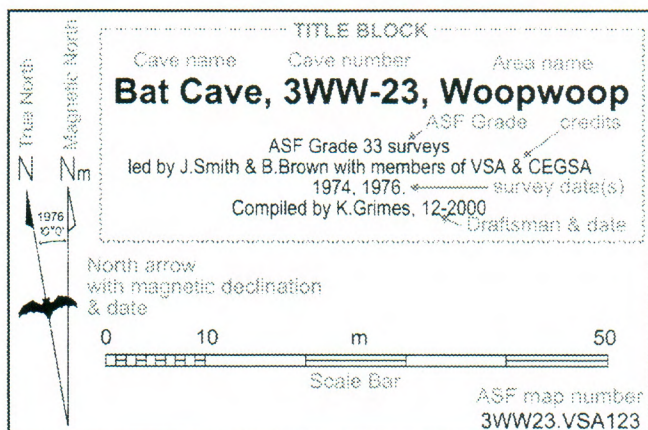
COMPONENTS of a CAVE MAP

As well as the actual map (the **Plan** view) there should be **cross-sections** to show the shape of passages and a side view (**long-profile** or **projection**) to give an idea as to the different levels of the cave and how these connect.

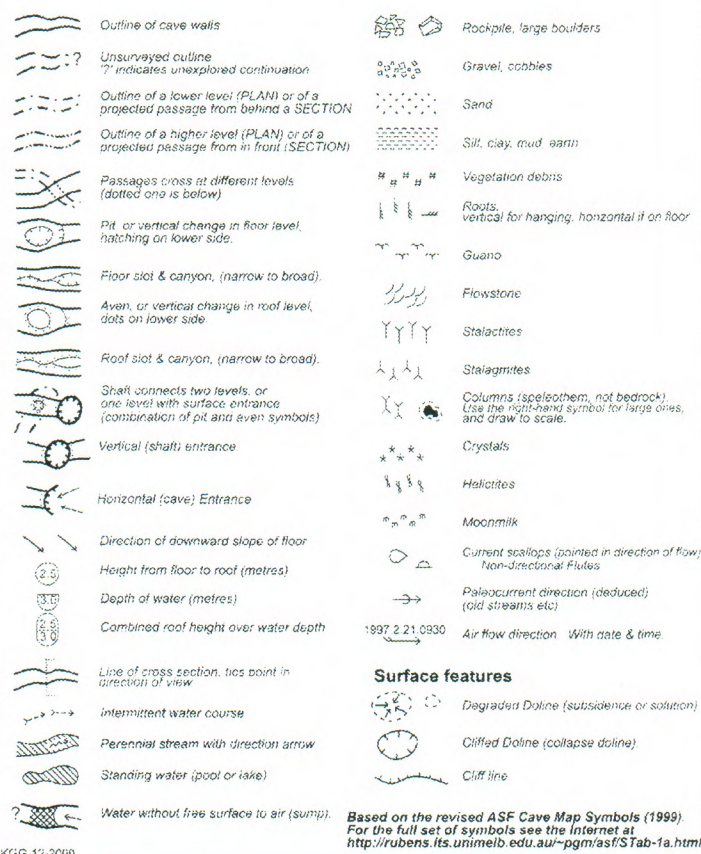
The Map should include

- ◆ **Walls:** Generally drawn in a heavy line
- ◆ **Cross-sections & Long-profiles**
- ◆ **Topographic details:** floor and roof steps and slopes
- ◆ **Contents:** Water, pretties, sediments, biology, etc.
- ◆ **Surface features:** at the entrance and elsewhere, dolines, streams, property boundaries.
- ◆ **Navigational and rigging:** comments, marked trails, etc.
- ◆ **Special features:** stairs, paths, excavations, etc.

Other essential items are shown in the box below.



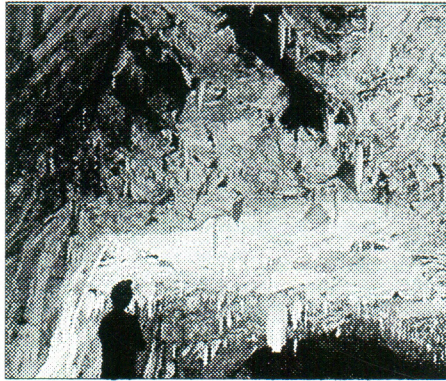
COMMON SYMBOLS USED IN CAVE MAPS



Cave Mapping - Sketching the detail

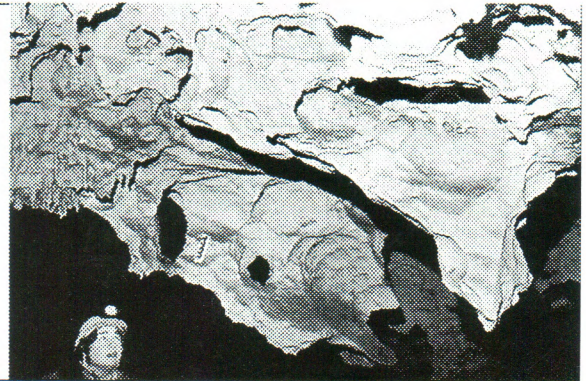
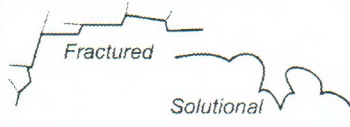
Some features that deserve sketching

KGG 12-2000



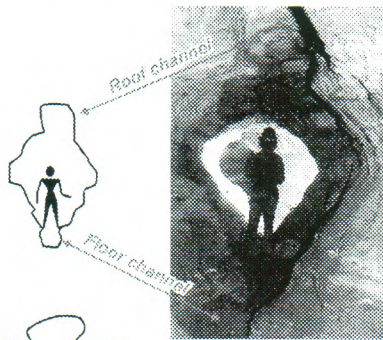
When drawing walls, show the true shape - all its bends, alcoves and bulges. Straight wall sections are rare and significant when we do see them.

Distinguish between angular fractured surfaces and solutional surfaces - which can be smooth, cusped or honey-combed ...



Keyhole passages, and other systematic enlargements and reductions of passage width are useful clues to prior water flow and levels.

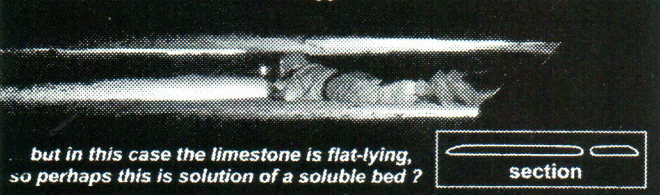
Narrow areas suggest rapid incision, while wide areas suggest a stable water level.



However in flat-bedded limestone variations in solubility of beds may also play a role.



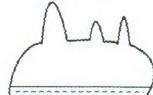
Normally a slot like this would suggest solution at an old water-table ...



The classic key-hole section indicates incision into the floor by a stream.



Bell-holes in the roof are interesting features that are worth noting (as a roof step in the Plan, or shown on the section)

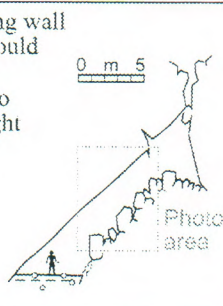


Vertical or inclined fissures may indicate joint-control of cave development.



The planar hanging wall in this chamber could be a fault.

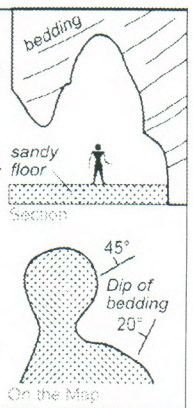
So I was careful to show it as a straight line.



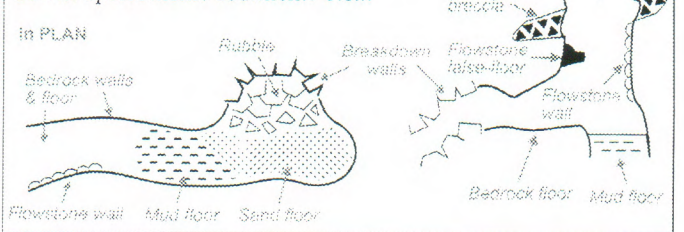
Bedding is not usually as obvious as in this photo, and may be hard to pick from jointing.

However, you should try to show any planar structures in the rock as these commonly influence cave development.

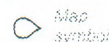
In section show the apparent dip in the plane of view. On the map use a dip symbol.



Show the nature of the wall and floor material; both on the plan and in section. Is it solid bedrock? breakdown? speleothem? sediment? etc...



Scallops and other features can show the direction of water flow in the past.



The asymmetry of the scallop shows the direction of flow. The size is inversely proportional to flow rate.

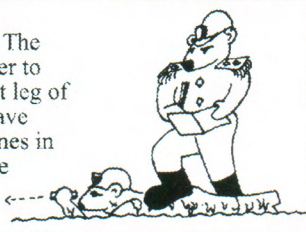
Cave Mapping - Sketching the detail

Hints and Tips

KGG 12-2000

◆ The Sketcher is Boss!

The sketcher should be in charge. The surveyors must wait for the sketcher to finish before moving on to the next leg of the survey. The sketcher should have them measure additional control lines in chambers etc to give control for the sketching.



◆ Carry the following...

- A spare pencil (or two) and some way to sharpen them. I prefer soft 2B leads, but some people like harder ones. Ball-points don't like damp paper.
- A spare protractor-ruler.
- A small 3 m metal tape for quick measurements of roof height, passage width etc.
- Gloves etc to keep your hands clean
- Some way of keeping the book clean.

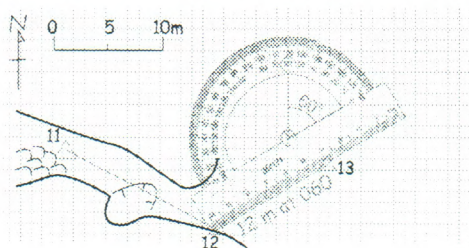
◆ Your Notes & Sketches:

- Some people prefer loose sheets of graph-paper on a clip-board, changing sheets whenever they get muddy.
- Others prefer a bound notebook. If you go for books use many small ones rather than one big book, so if you drop one down a pit you will not lose several years notes!. A durable cover with replaceable inserts is best.
- Either way be prepared for the mud - get waterproof or at least resistant paper. The *Rite-in-the-Rain* notebooks (rag paper) are good for normal caves. For very wet caves some sort of plastic sheet is better.
- Sketch and note **everything** you intend putting on the final map. Do not rely on your memory!
- Generally sketch the wall first, then detail, then sections. However in a large room it might be easier to sketch local detail first, then work your way out into the room (adding extra survey points as you go).
- Don't forget the sections. Note their location on the plan, and the view direction.
- Don't forget the ceiling features.
- Include written descriptions of anything of interest. Even if these do not go on the final map, they can be put in the accompanying report.

◆ Sketch to scale in the cave.

Use a ruler and protractor to lay out the survey lines (with rough adjustments for inclined sights) and use those as a guide to sketching. Check that the result looks right - if not, has someone made a mistake in a reading?

Draw a scale-bar and north arrow on each page for reference.



◆ Study other people's maps.

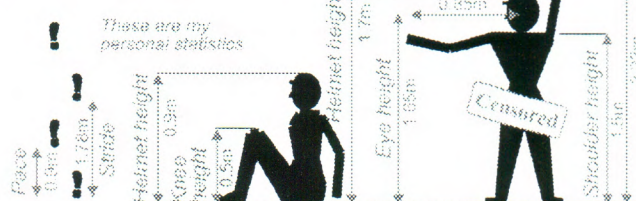
Especially of caves you know. Are they good or bad - and why? Note how they handled various problems. Copy their good points and avoid their bad ones.

◆ At Junctions

If starting a new survey be sure to sketch enough detail at the junction to overlap with the previous sketches.

◆ Calibrate your body.

Pace & Stride length, eye-height, head-height (standing and sitting), hand-span, etc...

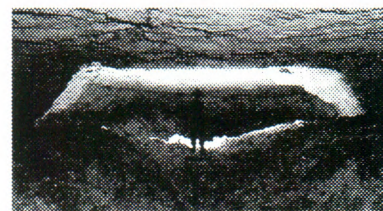


◆ Practice estimating length & heights.

e.g. guess the tape distance before it is read out. Most people tend to exaggerate heights - allow for this.

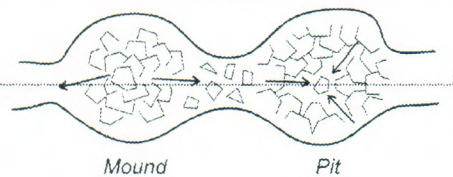
◆ Visual aids:

When sketching cross-sections, put someone with a light ahead of you. The shadow edge will assist your sketching. The broad beam of a carbide light is best! You can also use the height of the person as a guide to scale. A tape laid out on the ground is another aid.

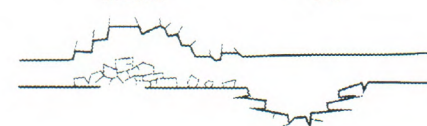


◆ Rubble

When sketching rubble, try to indicate the slope by use of overlapping block symbols.

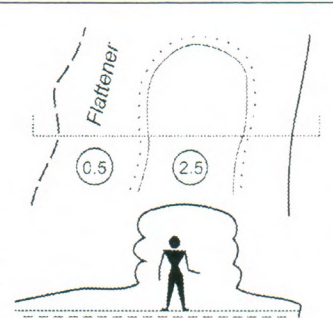


Slope arrows will also help.



◆ Draw the outermost wall.

Where there is a closer 'visual' wall with narrow slots extending beyond it, use roof and floor steps for the near wall and the solid line for the far wall. A cross section may help the reader work out what is happening. Hard-to-see far walls in slots should be dashed.



◆ The Survey

- Avoid long survey legs. If you do use them, lay the tape down and use it as a reference while sketching down the passage.
- Sketch in the natural features used as survey stations (large boulders, stalagmites, ...)
- Learn how to triangulate to locate remote points, or estimate heights of large chambers.
- On expeditions it is best to **Survey In**. Coming out you may be too tired, or running late.

A commented example of a well-drawn cave map

A local grid was provided to help locate features described in the accompanying report.

Originally published in
The Sedimentary and morphological
Development of the Borenore Caves
by R.M. Frank, in *Helictite* 11(2), pp 27-44, 1973.

Note systematic
labeling of sections
and profiles.

The North arrow is
Magnetic.
But the local declination
is not indicated.

Note the use of small
arrows, or 'tics' to indicate
the direction of view

Surface features
and shallow caves

Surface
hollow

High-level cave.
Would an offset
have helped?

The main profile T-P1
has been picked out in
green for easy reference

BORENORE TUNNEL CAVE

Title
we would now also give the
ASF cave number "ZBN-25"

A useful symbol where it is not
obvious that pillars exist.

Special symbols - this
map accompanied a
report on the sediments

List of symbols
used

- | | | | |
|--|--------------------------|--|---------------------------------|
| | Upper level passage | | Limestone Pillar |
| | Cliff face | | Breakdown |
| | Vertical drop | | Flowstone |
| | Surface feature (doline) | | Limestone wall determinable |
| | Stream course in cave | | Limestone wall not determinable |
| | Stalagmite | | Cave earth undifferentiated |
| | Recent river sediments | | Ancient river sediments |
| | | | Soil (see profile) |

text should never be
smaller than this

Scale bar

SURVEYED BY R. FRANK AND
P. DANIEL, 1968

C.R.G. GRADE 8&D

MINERS DIAL AND STEEL TAPE

General Notes:

- * This is a good example of the combined use of Plan, Profile and Sections to produce a useful picture of the cave form in all three dimensions.
- * At this scale (1:1000) it is not possible to show much of the floor or roof detail.
- * Showing the surface features and high-level caves is useful - but care is needed to avoid confusing the view of the main cave map.

Credits and survey grade etc.
Should also indicate Club, or
affiliation of author.

Add an ASF
map number

Note that T-P1 is a "developed
profile", that has been unfolded to
show the shape of the main
stream passage.

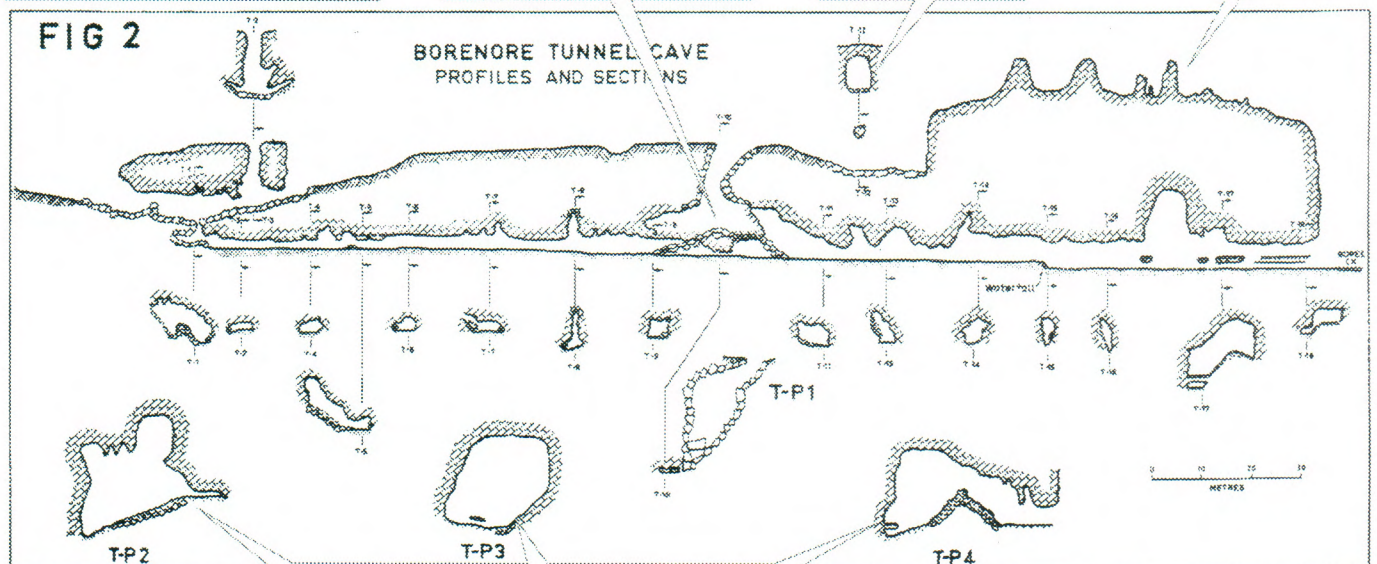
He is trying to show a
section of cave that lies in
front of the main profile -
with mixed success!

This section is
essential to show
that a bridge is
involved.

The surface features have
also been sketched and
included in the profile

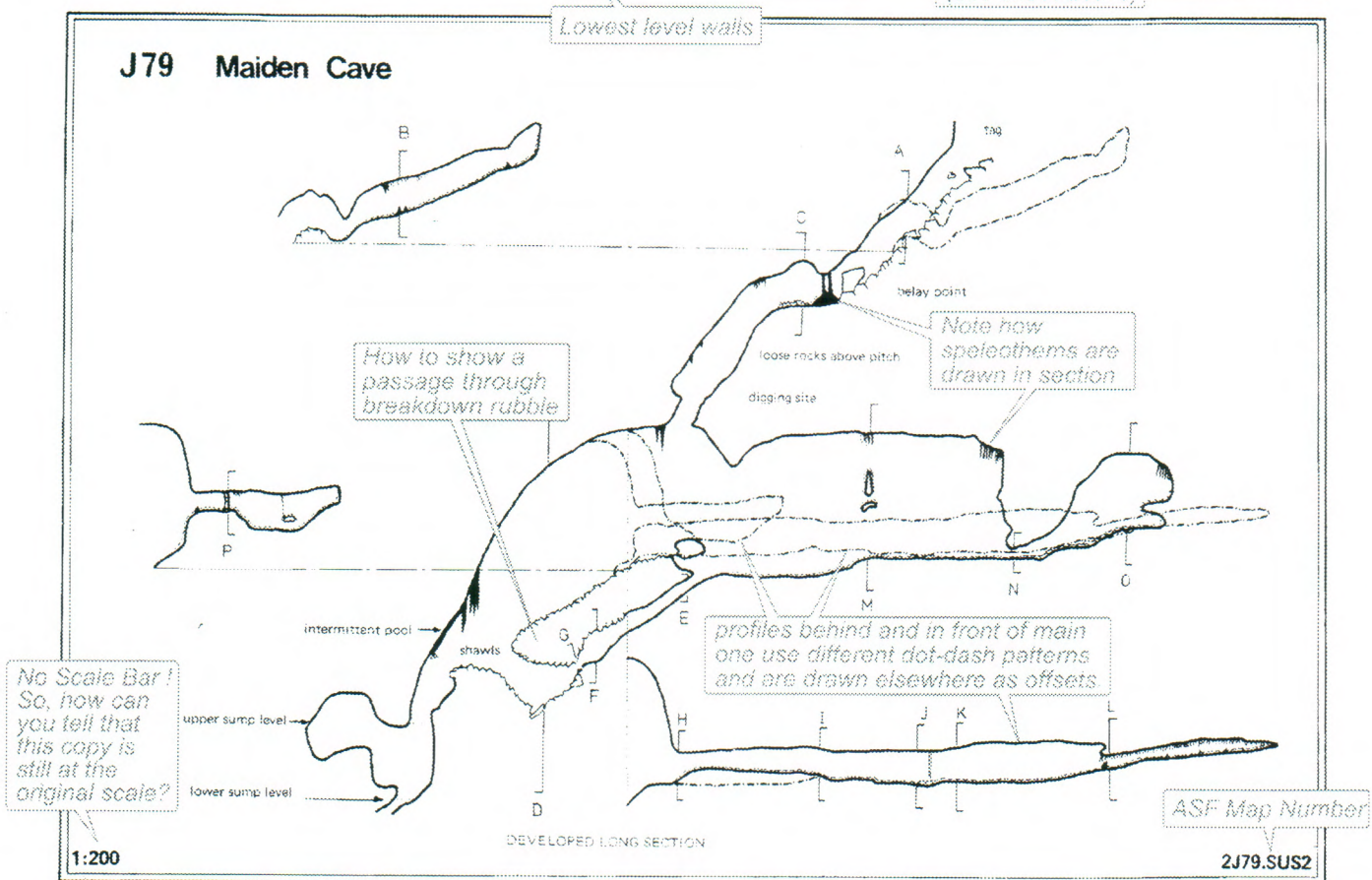
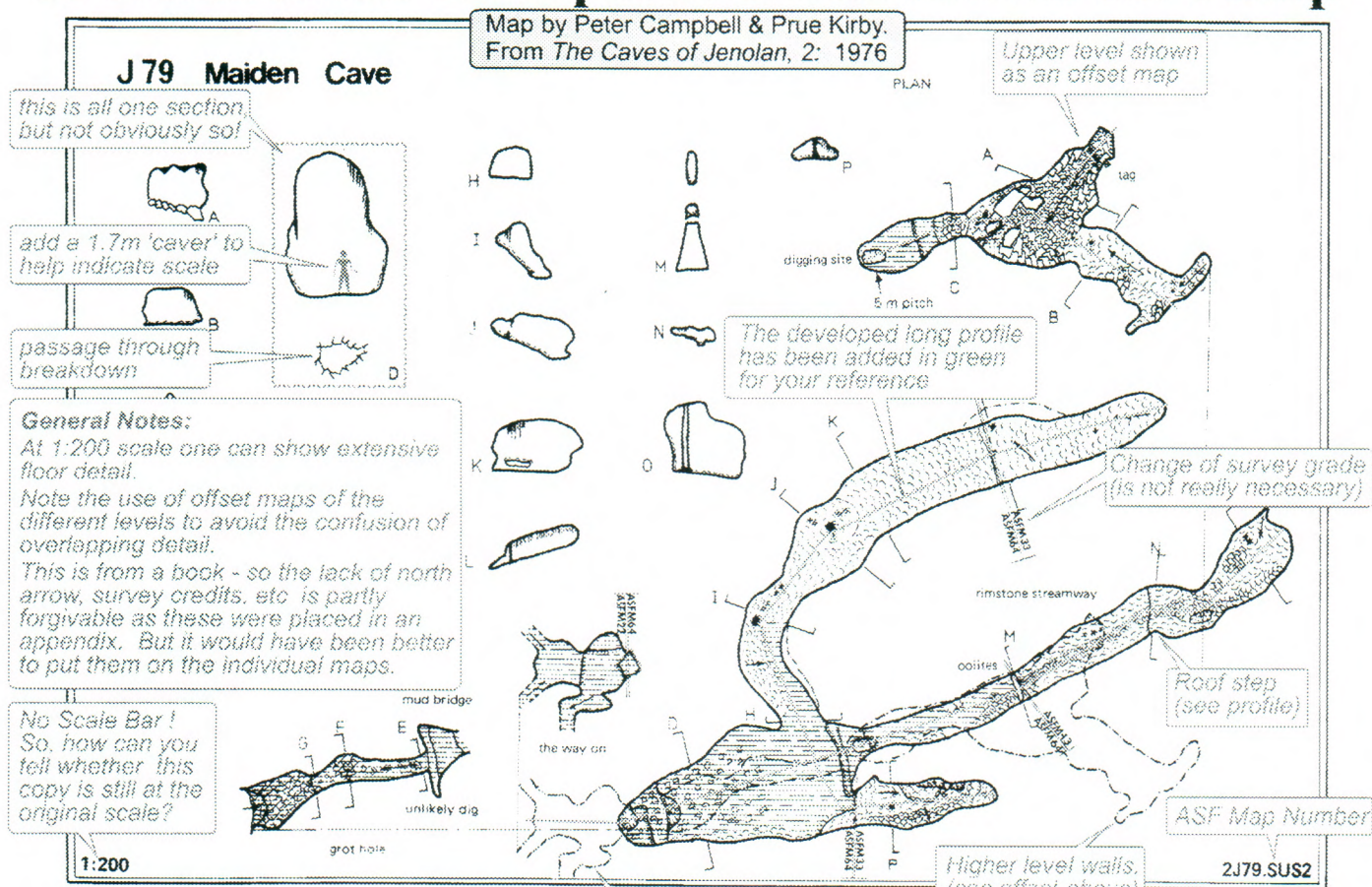
FIG 2

BORENORE TUNNEL CAVE PROFILES AND SECTIONS



These three profiles would have been better
placed together with lines indicating where
they cross each other.

A commented example of a well drawn cave map



General Notes:

* These are the long profiles that go with the map above. They are an essential step in showing the three-dimensional form of the cave and its different levels.

* Note, the profiles are "developed" ones which follows a zig-zag path (shown in green) that has been unfolded in the plot.

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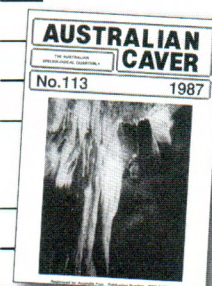
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