



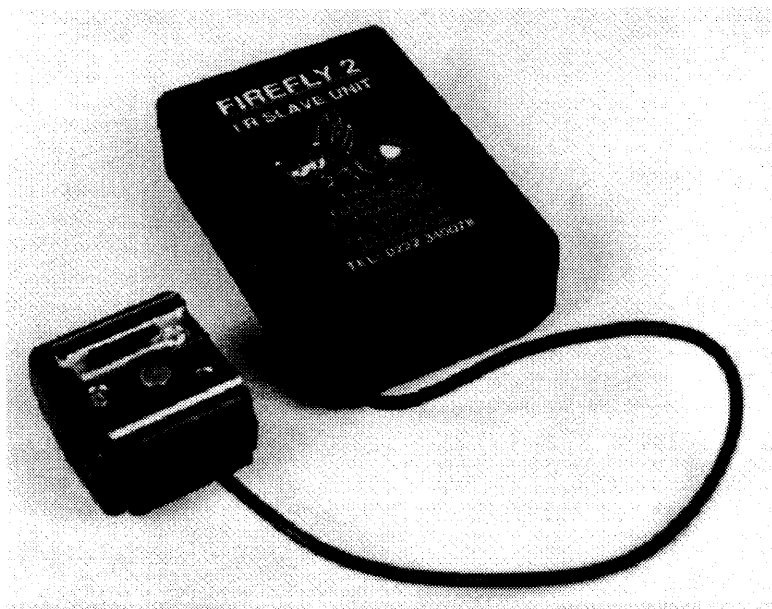
AUSTRALIAN CAVER

Nakani '98
New Zealand '99
OAM for Norm Poulter

No 147

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Nav 99 - A rogaining-type event, N.S.W.

16 October

NSW Speleological Council meeting - Venue TBA

8th-12th September

4th International Meeting of Cavers in Moravian Karst - Jedovnice, Moravian Karst, Czech Republic

2001 January

23rd Biennial Conference of ASF, Sydney, NSW

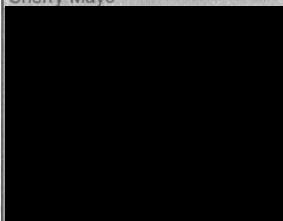
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2001 July International Congress of Speleology, Brasilia, Brazil



**Australian Caver Issue No 147
May 1999**

Editor
Sherry Mayo



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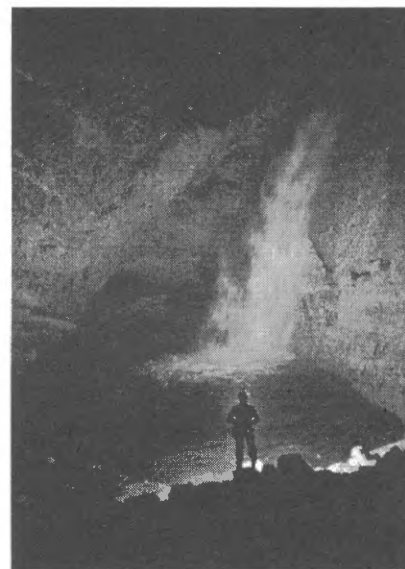
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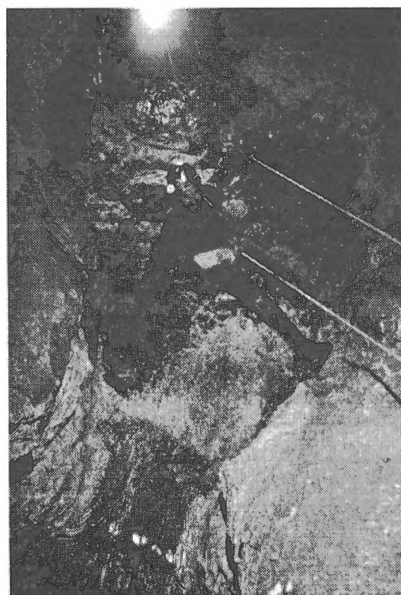
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Cover photo: Greg Tunnock on one of the many "interesting" spots of "flood proof" rigging in the top of Arcturus (see article p21)

Editorial

This is my first issue as the new editor of Australian caver, and to start with I'd like to say a big "thank you" to Dean Morgan for his terrific efforts as editor over the last couple of years. I only hope I can maintain Dean's high standards.

One thing that made editing this issue easier was the large number of articles sent to me on a wide range of topics from cave exploration to surveying and ASF policy.

I'm sure everyone will be pleased to see the item on the award of the OAM to Norm Poulter. Norm's work in cave conservation is well known to ASF members, but it's great to see him receive the wider recognition that he deserves.

Finally I would just like to remind readers that Australian Caver is an ideal place to air your views or tell great caving yarns, so don't be afraid to send in your contributions, no matter how small.

Sherry Mayo

NEWS & NOTICES

Cave & Karst Publications Available

Publications available from Elery Hamilton-Smith at Rethink Consulting,

Hamilton-Smith (ed.) : Celebrating the parks : Proceedings of the First Australian Symposium on Park History. Rethink 1998. (\$35.00)

Helictite Vol.35.

Watson et al. : Guidelines for Cave and Karst Protection. IUCN/WCPA 1997. (\$15.00)

Cheques should be made payable to Rethink Consulting P/L.

All payments in Aust. Dollars, please.

Australian Diving Technology Conference

The OZTeK99 Australian Diving Technology Conference and Rebreather Forum is pleased to announce the inclusion of four of Australia's leading Underwater Medicine Professionals as speakers at the April 24 & 25 conference as well as the release of tickets for sale.

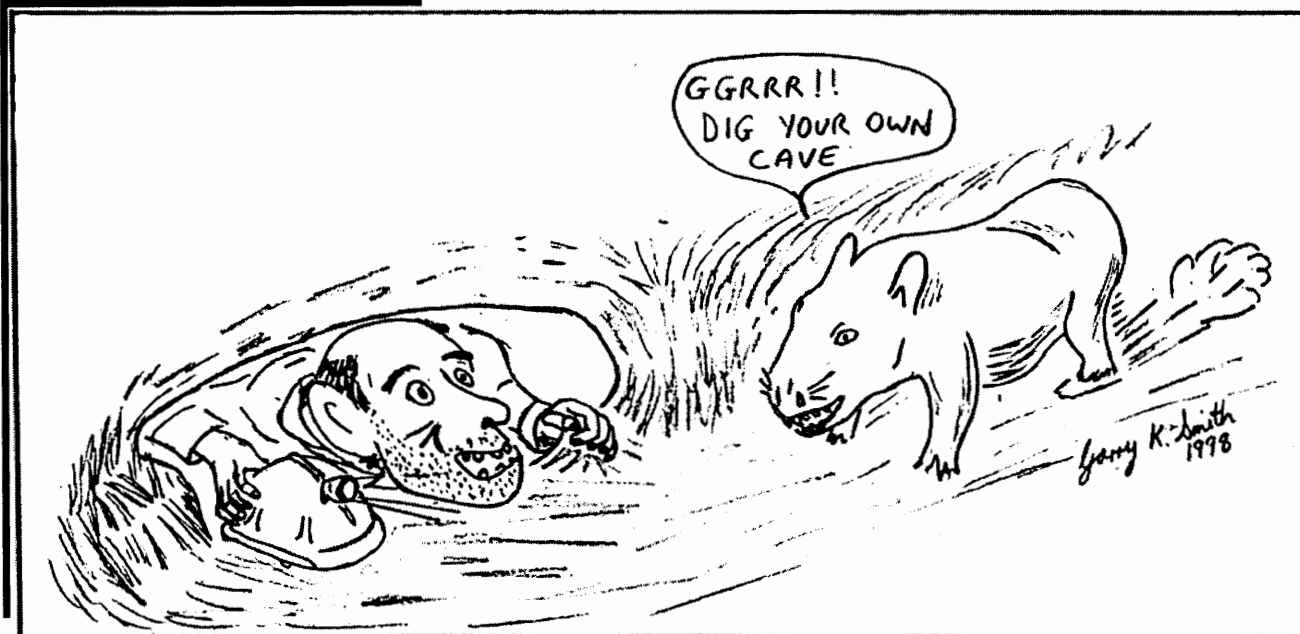
The April conference is a unique opportunity to meet and listen to some of the leading pioneers and explorers in the world of technical diving. This will be the first time ever that both the two world SCUBA depth record holders Nuno Gomez, of South Africa, and Jim Bowden, of Zacaton Mexico, will appear together and discuss their 975

feet / 300 metre dives. In addition Anne Kristovitch, also of the Deep Project at Zacaton, Richard Pyle, Deep Reef explorer of Hawaii, Bret Gilliam, President of TDI, Chris Parrett, author of Abyss Advanced Dive Planner, Peter Readey, Steam Machine's CCR PRISM designer, Jurgen Tilman, Draeger Germany, and others will ensure that OZTeK is the Technical Diving event for 1999.

Held at the Australian National Maritime Museum at Darling Harbour Sydney on the weekend 24 - 25 April tickets are limited to no more than 240 and are already selling fast. Full conference ticket packages are available for \$150 for both days. This includes Saturday & Sunday conference & forums, Saturday evening lecture night, access to exhibition area & museum, access to pool for try-dives and morning/afternoon teas & lunch on Saturday. Discounts apply to current TDI and SSI Instructors and CDAA members (5% off list price) and also to TDI members attending the TDI Asia/Pacific Members Forum being held on the Thursday and Friday prior to OZTeK (10% discount).

A full speakers' schedule will be published early February and all queries for tickets or accommodation packages associated with OZTeK and/or the TDI Asia Pacific Members Forum should be directed to:

Richard Taylor Director-TDI Australia & New Zealand



Kempsey Area Update

by Philip Holberton, Secretary KSS
Yessabah

The main activity at the moment is rehabilitation of the quarry. This is

under the care of a committee of National Parks, Dept. of Mines and David Melcann (the quarry company) plus community representatives. I am a member of this, both as representing KSS and because I am on the NPWS Advisory Committee for Port

Macquarie District. Stabilisation of the benches was supposed to start in March, with the company providing the machinery to do the work. A plan for revegetation is being prepared, to start once the quarry faces are safe. In some places revegetation can spread out from patches of existing native flora, in others introduced weeds (especially lantana) will have to be controlled before native species can be planted.

Port Macquarie District NPWS are also working on a Management Plan for the Nature Reserve. I am on the subcommittee for this. KSS seem to be building a good relationship with this District (unlike Armidale - see below). Two of their officers attended one of our meetings to get to know us. KSS have given them our thoughts on access. There is no urgency about this as at present there is no access for anyone: the official access to the Reserve is through the quarry which is still under lease to the company. The theory is that when rehabilitation is finally completed to the satisfaction of all parties, the quarry will be added to the Reserve.

Stockyard Creek

In the last round of new National Parks, the Castles Flora Reserve was taken over as part of Willi Willi NP. The Reserve was set aside by State Forests in about 1987 and managed very satisfactorily by them: they did nothing and there was no restriction on caving. Now I suppose all the NPWS rigmarole will start, with management plans and permits. The only ray of hope is that Willi Willi NP is managed by Port Macquarie District, not Armidale.

Kunderang

We are engaged in long-drawn-out and very unsatisfactory negotiations with Armidale District NPWS over a plan of management for the Kunderang Karst System which is now within the Macleay Gorges Wilderness Area. They say they will soon send us a Draft Licence Agreement for Use of

the Caves. We do not know what they mean by a licence, all previous correspondence has talked of permits, which is the term use in other NSW karst areas under the control of NPWS. If we do not get any satisfaction from them, we will submit a full account of the negotiations for publication in Australian Caver, as a warning to other Clubs.

Cable Car for Jenolan?

The Jenolan Caves Reserve Trust announced in February that its preferred option for transporting future visitors to Jenolan was a cable car system. The announcement was made at a press conference in Sydney at which ASF was represented by Executive member Angus Macoun. If given the go-ahead the cable car would be built and operated by the private sector and cost about \$12-15 million. Depending on the route chosen (and an environmental impact statement will be required as part of the process involving public consultation and a viability study), one of the two access roads to Jenolan would be closed. Attending the April meeting of the NSW Speleological Council in Sydney, General Manager Ted Reedy described the proposal and assured the meeting that special consideration would be given to the need to maintain access for speleologists

UIS Cave Rescue Commission Update

The meeting of the UIS cave rescue commission was held as part of the UIS Congress in Switzerland in July 1997. Among new appointments to the Commission Grace Matts of Australia was made Second Vice President.

The main issue discussed was the lack of communication between countries about Cave Rescue, and the availability of rescue services to expeditions in remote areas.

It was decided that a worldwide network of regional co-ordinators be set up to promote closer links between the commission and field rescue organisations.

In order to assist expeditions to remote areas, the commission is also maintaining a list of forthcoming overseas expeditions. In many cases the most appropriate rescue assistance for such expeditions will come from other expeditions in the locality. Thus the maintenance of a comprehensive list should help to reduce response times in the event of an accident

Caving expeditions from all countries are requested to notify the commission of: the proposed location and dates; contact details of the organisers and a local contact;; the equipment available; and the number of experienced cavers that could provide assistance in the event of an emergency. Expeditions should also find out from the Cave Rescue Commission which other expeditions will be in the same area at the same time. Information should be sent to:

Bruno Delprat, 71 rue de Strasbourg, F94300 VINCENNES, FRANCE, (Tel/fax: +33 1 49.57.02.05 email: fdelprat@pop3.club-internet.fr) For further information about the UIS Cave Rescue Commission contact



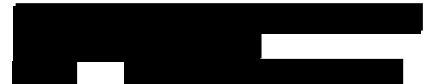
NSW Speleo Council - New Executive (April 1999)

The Speleo Council Meeting held in Sydney on Sat 17th April saw the election of a new Executive. Contact details are:

Chris Dunne (President)



David Bennett



Cathy Brown



Chris Norton



Jodie Shoobert



CDAА purchases Tank Cave access

The Cave Divers Association of Australia has bought a narrow strip of land permitting access to Tank Cave for \$15,000. Suitably qualified cave-divers will be able to purchase annual permits from the CDAА.

Honours for Norm Poulter

Heather Jeffries

At an investiture ceremony on March 26th, 1999, the Governor of WA, His Excellency Major-General Michael Jeffery presented Norm Poulter with the Order of Australia Medal, for his services to the environment, principally through his work with the Speleological Research Group of Western Australia.

Norm has received many accolades, both in recent times (including the ASF Edie Smith Award in 1999) and also in the past for his work in Speleology, however recognition of his work at this level is perhaps the highest distinction for Norm and it culminates many years of his on-going work for caving and conservation.

To quote from the Investiture information book, Norm is

"An amateur scientist whose interest in speleology began in 1965, taking photographs of the caves in NSW, and he became further involved from a working holiday, visiting caves in Tasmania and South Australia in 1970. He moved to Western Australia in 1972 and joined the Speleological Research Group of WA (Foundation Member). He currently serves as the Vice Chairperson, SRGWA and has also served as President and in various other Executive positions. In the 1980's, Mr Poulter initiated the first of many annual leave trips to clean up the lake of Weebubbe Cave. The cave conservation and restoration work he has

done, particularly in the Leewin-Naturaliste Ridge, is well known, and the Department of Conservation and Land Management (CALM) recently opened the Calgardup Cave he worked on. A collector of cave fauna for scientific research, he has found and named a number of new species. (He has) developed a track marking system to aid conservation, keeping cavers to marked tracks to protect delicate formations. (He has) served as a long time member of the Cave Management Advisory Committee, Department of Conservation and Land Management".

Of course, in this short paragraph it is impossible to list all of Norms credits. Much has been written about his works in the past, in various forms. Suffice to say, in the history of the ASF, there have been less than a handful of OA recipients, and any such award (and the recognition which goes along with it) reflects admirably both upon Norm, and upon the Federation he represents.

The ASF congratulates Norm Poulter O.A.M.

Norm gives us his own thoughts on receiving the award...

During the course of the Cave Man's Dinner held at the culmination of the 22nd. ASF Biennial conference in Yeppoon, Queensland, [Jan.1999], President Peter Berrill presented Henry Shannon and I with the Edie Smith Award.

For me - it was an enormous emotional shock as - although I had periodically entertained the notion that it would be "nice" to receive such an accolade, I never thought that my contributions to speleology were worthy of such a prestigious award when compared to previous recipients such as Peter Matthews, Albert Goede or Barry Loveday, to name but a few.

There was however, another reason for my emotional display at the time, I had recently learnt that I was also to receive an Order of the Australia [medal] for my "... services to conservation and the environment ..." in the forthcoming Australia Day Honours List [26 Jan. 1999]. Respect [for the Edie Smith Award] and protocol prevented me from revealing this at the time.

To the best of my knowledge, only three speleologists have previously been nominated for the Order of Australia, Joe Jennings [1984], who unfortunately died during the nomination process, Don Matts, and Anne Atkinson of Undara [lava caves] Queensland.

Peter Berrill's's citation made mention of my conservation work carried out in the Leeuwin-Naturaliste Ridge and Nullarbor Plain as well as my photographic contributions and fauna discoveries. Just as it took teams of people to nominate and process the awards - so too - most of the achievements attributed to me have been the result of teamwork, made up of people inside and outside speleological societies from all over Australia.

I could not bring myself to accepting either award without acknowledging their contribution - the awards are their recognition as much as mine.

Thank you one and all.

Norman Poulter OAM



ASF Conservation Commission Report

(Report to ASF Council Jan 1999)

Tasmanian Co-Convenor - Arthur Clarke

1. Forested karst areas in Tasmania:

- As a direct result of the Tasmanian Regional Forest Agreement (RFA), there has actually been a slight increase in the level of reservation for karst in Tasmania; however, some important karsts on public land remain unprotected. Some karst areas such as Mt. Cripps, which were formerly in land designated as a Recommended Area for Protection (RAP), have been put aside in various reserve categories referred to the Public Land Use Commission (PLUC) for consideration and such areas could be subject to mineral exploration or mining. (The Mt. Cripps karst area lies adjacent to a mineralised zone with a working mine.)

- The present RPDC (formerly PLUC) inquiry into areas reserved under the RFA - recommends tenure classification and management for 97 areas earmarked for reservation including karsts; final recommendations report will be released late 1998. Cavers and karst land managers have forwarded submissions relating to protection of karst values at Mt. Cripps and the nearby Vale of Belvoir, a glacio-karst area with 12 known caves and other karst features (recorded in the ASF Karst index as "Lake Lea".)

- Shortfalls in the RFA. Despite their cave fauna significance, some karst areas (including Junee-Florentine) were excluded from consideration for reservation, because it was considered that a similar range of cool temperate cave species (or genera) were adequately protected in other reserved karst areas or National Parks in Tasmania. The RFA process failed to address the lack of continuum in karst reservation at Mole Creek, where public (and private) lands lie between the ten (10) separated parcels of reserve land that compose the existing Mole Creek Karst National Park.

- Private land - mechanisms to effectively protect karst values on private property remains a significant gap in Tasmania's karst management framework, both in terms of recreational impacts and land use activities generally. Significant areas of karst with caves on private land include Gunns Plains, Loongana, and Mole Creek. Although private landowners are being encouraged to adopt the

principles of karst protection, detailed in the Tasmanian Forest Practices Code, caves are still being impacted by inappropriate land clearing, tree felling, dumping practices, in-filling of dolines, disposal of effluent from piggeries and dairies and the misuse of fertilisers and pesticides.

- Welcome Stranger Cave (in Junee-Florentine karst): this cave was gated by Forestry Tasmania (FT) several years ago, with appropriate cave visitor signs installed inside the entrance. The cave gate was broken into earlier this year and has been subsequently repaired by Forestry. Incidents such as this, suggests that FT may need to consider processes to ensure effective ongoing management of caves under its jurisdiction.

- Forested magnesite karst in Arthur-Pieman region of NW Tasmania. Two separate areas: the Savage River and Keith River magnesite karst areas are both currently being proposed as mining sites to supply ore-rock for magnesite metal production. Based on present knowledge of caves, it appears that the significant portions of the karst can be protected by a few small reserves, but this concept has not yet been agreed to. The PWS Karst Officer for Tasmania (Ian Houshold) and a carbonate rock geologist from the Tas. Dept. of Mines (Clive Calver) have been seconded to perform a study of the magnesite karst geology, geomorphology and hydrology. A private operator is still licensed to "extract" mineral water from the warm springs beside the Arthur River.

2. Cave classification in Tasmania

- Moves to develop a cave classification process were initiated by Forestry Tasmania with support from Tasmanian Parks & Wildlife Service in 1996; this process, which would facilitate a more strategic framework for cave management in Tasmania, should be continued.

- A karst sensitivity classification system for protection of caves in forested regions of the Junee-Florentine karst, was recommended by Rolan Eberhard during his detailed (1994-1996) study of the Junee River and Florentine Valley karsts. With

detailed maps of the area, Rolan designated the karst areas into high, medium and low sensitivity zones. Forestry Tasmania has allocated some of these karst sensitive areas under the auspices of its Management Decision Classification (MDC) system, so that the majority of the high sensitivity zone areas have been given MDC protection status as areas which means these areas will not be subjected to logging and will also be treated as informal reserves in the CAR ("Comprehensive, Adequate and Representative") reserve system. Most of the karst within Rolan's proposed medium sensitivity areas have been designated as special management zones under Forestry Tasmania's MDC system.

3. Cave management issues:

- Rehabilitation of Hastings (Newdegate) Cave. Once described as the most degraded tourist cave in Australia with broken light globes, redundant wiring, old staircase timbers, clay, "blue-metal" gravel and concrete slabs dumped "out-of-sight" and in the cave streamway, rehabilitation of the cave has now commenced. Tens of tons of rubbish have been removed from the cave. Arthur Clarke has been employed for a short term (3 week) contract to search for cave fauna amongst the old staircase timbers removed from the cave and prepare an inventory of the invertebrate fauna.

- Exit Cave Management Plan. Although not yet finalised, a preliminary draft of the Exit Cave management plan is expected to be released in late 1998. The PWS Karst Officer (Ian Houshold) has advised that the cave will be available to credentialed cavers for some Limited Access Cave trips during the 1998/1999 summer period.

4. Bolt laddering in caves - changes to the ASF MICC and Code of Ethics:

- This issue does not specifically relate to the placement of bolts at cave entrances or pitch-heads. The practice of bolt laddering in caves is used as an artificial climbing aid involving the placement of a series of bolts in roughly vertical line on a cave wall or aven, to enable exploration of

Please, not another 'Main Cave'!

higher levels of the cave. Despite the concerns by some cavers (including SUSS) about not placing restrictions on cave exploration activity, the response to the article in *Australian Caver* #144 has indicated to me that there needs to be some specific mention of bolt laddering in the MICC, along with recommendations plus some addition to the ASF Code of Ethics.

Recommended change to the ASF Minimal Impact Caving Code (MICC): I would propose that we basically adopt Rauleigh Webb's recommendation to cover the exploration of vertical leads (under "New Cave or Extension Explorations"), including some minor additions and the bracketed section.

"7. In the exploration of vertical leads a number of alternative exploration techniques may be used: free climbing, aid climbing, balloon rope placing, scaling poles or bolt laddering.

All of these techniques have an impact on the cave or may be eliminated for safety reasons. In particular evaluate the possible impact (structural and visual) on the cave wall

and its approach surrounds, plus the impact of the transportation of equipment to the site prior to undertaking the vertical exploration. If bolt laddering is to be used as an aid climbing exploration method, ensure that:

1. The minimum number of safely placed bolts and hangers are used in the exploration;

2. the majority of bolts are removed at the completion of the exploration;

3. as described in the ASF Code of Ethics, relevant karst land managers are advised of this exploration method and condone the bolt laddering technique."

• Recommended changes to the ASF Code of Ethics (under "Section 2. Toward Landowners and Management Authorities"):

Add a new sub-section "2.3" and re-number all other sub-sections, so "2.7" becomes "2.8", (OR add to the end of "2.2") the following sentence:

"Where cave parties propose to

undertake exploration activity in cave reserves or private lands - where that activity may be deemed to have an impact on the cave or its environment (e.g., blasting or bolt laddering), the caving body to which the cavers belong should seek specific permission from the relevant cave or karst land managers before blasting or bolt laddering activity is undertaken in those specified caves."

At the end of Section "3. Towards Caves", an additional sub-section "3.11" should be added"

"3.11: The aid climbing technique of bolt laddering cave walls should only be deployed when absolutely essential or as a last avenue of exploration when all other in-cave and surface exploration leads are exhausted and then only with permission of the landowner and/or management authority and the society committee, and only after the assessment of the environmental impact."

Arthur Clarke (October, 1998)

Please, not another ...Main Cave...!

(or Interesting names for interesting (and other) caves)

by Prof. Gordon G. Grimsley Corinda Armchair Speleological Association

Did you know that the ASF's Australian Karst Index lists sixteen *Main Caves*, eight *Bat Caves*, etc., not to mention an array of unnamed *H-53s* and such like. However, it also lists a range of highly imaginative names, so if you are trying to think of a good name for your new cave the following list from the *Gazetteer* in the Karst Index may help give you some inspiration.

For example, you can name your cave after its memorable contents - but we already have a lot of *Snake Pits* and suchlike, so be specific, as in *Red-banded Tree Snake Cave* (8K-24) or *Yellow-footed Rock Wallaby Cave* (5F-33); or provide a full inventory as in *Bone, Stone and Bottle Cave* (5Y-16); or elaborate on the matter, as in *Acrobatic Python* (4MP-150), *Wombats Walk* (3EB-3) and *Wombat Mansions* (2WJ-6). And if you are still not quite sure **WHAT** the content really **WAS** think of *The Cave with the Thing that went Thump* (4E-5, hereinafter referred to as *TCWTTTWT*). If the contents are unmentionable you can resort to euphemisms such as *Hic Spelaeum Coprolorum* (4E-20) and *Mother-in-Law's Breath* (2A-37). Another possibility is to provide some locational information: Names like *Middle of the Road Cave* (5U-95) or *Cave near Sixth Tee* (2J5D-4) not only help you find them, but also provide a warning about possible entry hazards!

A bit of alliteration, rhyme or rhythm in the name always helps (though I am not sure that *Alliteration Cave* (4CH-161) is quite what I meant by that): try *Diggins Diggings* (3J-37), *Gobble Gobble's Grovel* (4MP-2), *Eeny Weeny* (4J-14), *Bitch of a Ditch* (3EB-49), *Larynx Labyrinth* (4J-10), *Morning Maze* (4CH-281), *Pitta Patta Pot* (7JF-353) and *Wendy's Wanderings* (4CH-247). But you will have to be really

inspired to beat some of the great imaginative names such as *Dark Side of the Moon* (4CH-37), *Knock on Wood* (6KP-3), and *Pearl of the Diadem* (6MR-1)

Probably the most intriguing names are those that appear to tell a story: *Lone Shoe Cave* (2W-203), *Never to be Seen Again Cave* (2WJ-131), *Paveys Plunge* (5U-94 - not the infamous Andrew Pavey, but the local farmer who was driving his tractor at the time ...), *Peters Nowhere Cave* (4MP-15), *Piglet, Help! Help!* (4E-17), and of course *TCWTTTWT*.

Finally, do not be worried if your name seems a little long; Peter Matthews kindly expanded the Name field of the Karst Database in order to accommodate *TCWTTTWT*, which is the current holder of the length record, and I am sure he will be happy to oblige again (just don't tell him I sent you!!!). Mind you, I have not yet succeeded in getting the VSA to register my proposed name of *Cave in which Christopher Robin led an Expotition to the (magnetic) North Pole* for 3H-51 (you see, it is this lava tube which has this magnetic rock right where you want to put your survey station ...). Letters of support should be sent to the Records Keeper, VSA, GPO Box 5425 CC, Melbourne, 3001.

REFERENCE:

MATTHEWS, P G (Ed.) 1985: Australian Karst Index. Australian Speleological Federation, Sydney. see section 11 for a gazetteer

NOTE to EDITOR: "Expotition" *IS* the correct spelling (see your Christopher Robin User Manual).

VSA on Mount Owen, New Zealand 99

by Peter Ackroyd

Shit! The whole immense slab I was standing on had rotated and moved down the scree slope. It was big enough for me to feel momentary motion sickness as it moved. I carefully eased sideways off the edge of the slab and stepped onto smaller scree, which slithered and ground its teeth at me. The whole slope was teetering on its limits.

I was about 50 metres down a brand new cave on the northwest flank of Mount Owen, New Zealand. The other three members of the VSA advance party had looked at the razor sharp "Spaniard Grass" infesting the steep climb up to the ridge and had headed elsewhere. Now, here I was, playing dodgems with three tonne lumps of rock.

The entrance pitch had been straight forward enough. Finding the route beyond that had not. Finally, after some blind leads in some not so nice places I was onto the best lead so far. Scree was everywhere in the cave and, although there was a good draught, I feared I would find it issuing from an impenetrable pile of rocks, as I had in the lower pair of shafts I had examined earlier in the day.

However, this cave felt like a goer. I had already found a small upper alcove containing what I thought may be Moa bones. I had also tried a shaft which initially looked good, but which I then found I could bypass and so save some precious rope. I had skated along another scree slope which had ultimately pinched out. Now I was on this one, trying not to be crushed.

Climbing down a small scree "waterfall" I came to a tiny hole at its base. One wall was reasonably solid, if you ignored the cracks, but elsewhere was a sea of sliding rocks leading to this one little plughole. Removing my pack, I eased myself into it, very slowly. A cascade of rocks now was something I didn't want. Moving as carefully as I could, I saw that the hole continued, through an even smaller aperture. It was too tight but the frost shattered slab of rock blocking my path soon yielded to a few, very carefully, aimed blows. The draught was howling past me.

Pulling my pack after me and wearing the inevitable rock slide that accompanied it, I eased through my "Dug Out Squeeze" to find that my legs dangled in mid air. After a little more .

istance they touched down on a ledge. Now through the squeeze, I could see the passage continued and was opening up. The adrenaline booster cut in right there.

Carefully sliding down the new scree slope, I came to a pitch. It was only about 6 metres and I still had my push rope with me. I rigged it from some dodgy-looking brecciated cave fill and descended to yet more scree ...and the distant murmur of running water. This was more like it!

Taking my time, despite the desire not to, I snow-ploughed down the scree to arrive at a near vertical drop. I had no more rope. To one side I could see a thin ledge with some handholds. Shouldering my pack I stepped over thin air and stood on the ledge. Below was another ledge with a sheen of water. I found I could climb down a series of similar ledges for seven metres, "The Staircase". The limestone here was clean and sharp. It is a re-crystallised Silurian limestone (known locally as marble) with an unfortunate habit of being interbedded with a poor quality muddy limestone.

The rock turned to crap in the last two metres of the climb causing a couple of interesting moments as mobile handhold followed mobile foothold. Eventually, so many of the really loose bits had come away that I could finish the climb and reach a narrow, flat floor of old sediment.

The stream I had been hearing was now in front of me. Instead of trickling

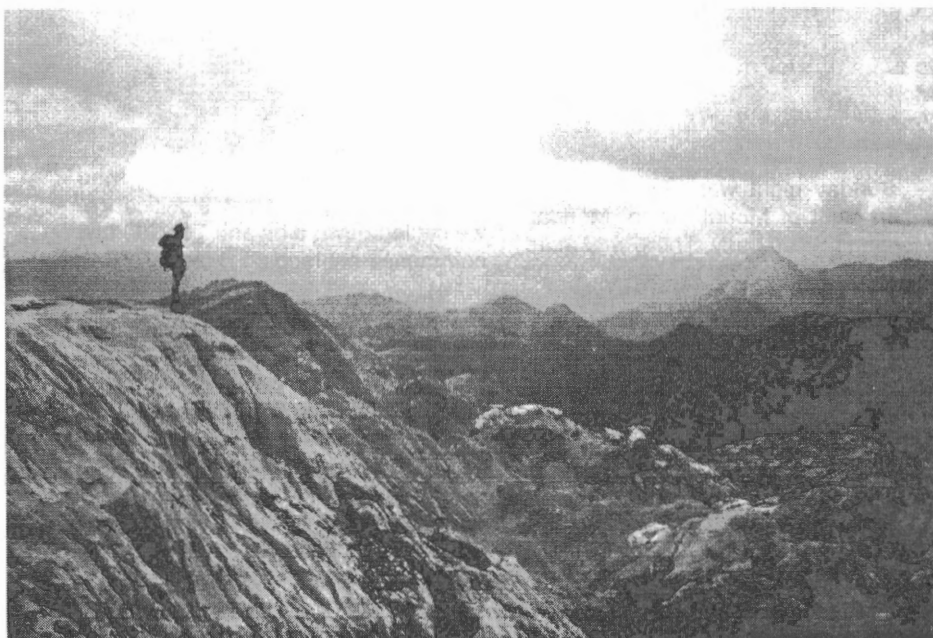
down clean limestone it was gurgling down a slimy, black, muddy limestone slippery-dip. Avoiding the treacherous stream bed as much as possible I traversed across the sediments, descending all the time, to reach another sediment bank with the stream disappearing behind a gap in it. Continuing in the same direction, and finding myself at the top of a large chamber, I reached a second stream.

Descending a couple of overhanging climbs, I reached the bottom of the chamber where a third stream joined. Heading towards a hugely inviting black hole at one end of the chamber, I arrived at the top of a pitch of about 10 metres. The stream, now somewhat more than a trickle, cascaded down it. The rock was clean again. I had a huge grin on my dial. I had no more rope.

I tied a marker tape to an obvious anchor point with the date on it -- 2nd January 1999 -- and started to survey out. At the entrance I attached a New Zealand number tag, NO-604.

Later that night, in my tent at our camp on the northwest flank of Mount Owen, I was snuggled in my sleeping bag with midnight fast approaching. I had a set of reduced survey figures and a freshly drawn map in front of me. It looked like a goer. It was already 85 metres deep. I decided to call it Viceroy Shaft.

Our expedition had started the day



View to north from Mt Owen - photo Peter Ackroyd

after Christmas, 26th December 1998. I had been planning the trip since August. Now it was actually happening. At Melbourne airport I met up with two others in the vanguard of the Victorian Speleological Association's expedition to New Zealand, Dick Clarke and Dale Appleton. With us we had 80 kilograms of excess baggage -- caving gear packed in seven bright orange "Pitch Black" cave packs. I also had a letter from the airline allowing us to take this mountain of orange on board for free.

Arriving in Christchurch, New Zealand, at 1.30 am, we jumped into the hire car we'd arranged and headed for a backpackers hostel. The next morning was a blur of shopping and picking up carbide and a map of Bulmer Cavern we'd arranged through Lindsay Main of the local Canterbury Caving Group. We also met briefly with other members of the group including Jon Terry who had thought he may join us, until he cut his foot quite badly the day before our arrival. Jon asked me to tag four known caves on northwest Mount Owen on behalf of the New Zealand Speleological Society (Worthy, 1997).

Sunday night was spent camped within sight of Mount Owen. Monday morning started early. There was more shopping to be done in Nelson, a 200 kilometre round trip, and all the boxes of food and material for a five week stay on the mountain had to be packed and taped up in preparation for the helicopter flight.

Several New Zealand cavers, who were on a separate ten day trip into new Zealand's longest cave, the nearby Bulmer Cavern, arrived for our shared helicopter at about the same time. The helicopter arrived and efficiently whisked first the New Zealanders, then Dick and me, up the mountain. What a magnificent way to see karst!

Dick and I set up the camp on the mountain at the base of "Hill 1763" with its rearing buttresses of limestone. The camp was at an elevation of 1,470 metres. A permanent spring emerged from the base of this hill. It was a good camp. It had to be -- we were going call it home for the next five weeks.

I set up the 45 metre long dipole antenna for the mountain radio. A volunteer group runs a weather and emergency service for trampers and others in the rugged areas of New Zealand. It was our only contact with the outside world. The scenery was

magnificent. The areas that weren't bare limestone were covered in a dense tussock grass, up to a metre high. On the slopes we met with the dreaded Spaniard Grass -- a nasty, sharp plant that grew in clumps with spiky flower stalks up to two metres high. We were well above the treeline; the views went on for ever. Most of the scenery was karst. Over the saddle to our southwest was an immense doline and grike field. Disappointingly, the many holes to be found there were blocked at between 5 and 20 metres depth. Scree and frost shattered rock were the culprits. After a day of madly scrambling around the dolines and finding nothing of great significance, we settled down a bit and I decided I'd commence my tagging duties.

The next day, Wednesday 30th December, dawned mistily, turning into light rain. Dale, who had kindly remained behind, was accompanying our fourth member, Eric Lenser, up the mountain this day. Cave tagging was proceeding when two figures appeared on the distant horizon. Dale and Eric arrived in camp tired from a strenuous walk. Eric had a 30kg pack! They put up their tents then promptly fell into them. Dick and I cooked a meal and delivered it to them in their tent

The last day of 1998 dawned fine but windy. Dick showed Dale and Eric the karst field over the saddle while I completed tagging the remaining two known caves in the area. When planning for the trip, I had read the only two trip reports for the area and had purchased and studied the topographic maps. As a result I arrived at the conclusion that the treeline was the best place to seek open and going caves. That afternoon Dale and I headed up and over the ridge for the treeline.

At first I could see only good examples of surface karst -- bluffs, cliffs and dissected spurs. Then I spotted, in the late afternoon light, what appeared to be three large shafts in one of the spurs. I dropped down the steep spur for a better look. They looked good. I relayed this exciting news back to Dale, then, back in camp, to Dick and Eric.

That evening, on the mountain

VICEROY SHAFT (NO-604) Mount Owen, New Zealand

Surveyed: P J Ackroyd
Assistant: R Taylor (for 300m streamway)
Dates: 2nd-24th January 1999
Grade: ASF 32
Drawn: P J Ackroyd, March 1999
Map No: NZ NO-604. VSA 353

to Royal Dining Hall
(fossil series)

Prince (11m)
Princeling (10m)
Chancellor (14m)
Vice Chancellor (6m)

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Association Inc.

radio, we learned of a bad accident that had befallen one of the New Zealanders, Kieran McKay, about 5.5km inside in Bulmer Cavern. The New Zealand Speleo Society rescue team was in full swing.

The early hours of New Year's Day were windy. Tents were being stressed to their limits. By 9.00 am the wind had dropped to only 30kph. A helicopter flew into camp. Oz Patterson from the NZSS rescue team told us how things were going with the rescue and asked if we would be around for the next few days if we were needed. We assured him we would. He flew off. There were many helicopters in the air that day.

Dick, Dale and Eric headed out of camp. I had a few chores still to do and once finished I headed off for the

three shafts I had spotted yesterday. I soon found the others. Dick and Eric were at a fine vantage point on the hillside looking down at the shafts and watching Dale fight his way through the thigh deep, dagger pointed Spaniard Grass tussocks towards the lowest gaping cave entrance. I struggled through the Spaniards to join him just as he reached the entrance.

We soon found it to be a collapsed remnant of a shaft which had subsequently been joined to the nearby second shaft entrance. I ducked my head under one low section and detected a draught. There was a passage there but it needed digging. I changed into caving gear. Dale left me to it -- you don't come to New Zealand to dig! Dale, Dick and Eric went for a Spaniard Grass free walk to the ridge above Bulmer Lake.

Down in the choked lower shafts I commenced to dig into the draughting fill. I progressed several metres but the passage became lower. I lost enthusiasm. I extracted myself, logged the position on my GPS then set my sights on the third shaft gaping at me from up near the top of the spur.

Struggling the seventy metres up the steep slope towards it was not pain free. The Spaniards were everywhere. Eventually I reached the lip of the shaft. I was carrying a short length of rope so I rigged it, dropped to its limit and looked around. It was a real cave! I got a good GPS fix on it and a couple of photos in the afternoon light before returning to camp via the top of the spur.

The next day Dick, Dale and Eric prospected a little to the north, where there were no Spaniards.

I returned to Viceroy Shaft

the end of only the first week of our five week trip.

Sunday 3rd January dawned fine and sunny. Dale, Dick and Eric had a change of plan. For them the day was to be a rest day.

I loaded my pack with four ropes and walked to Viceroy. I re-rigged the first and second pitches to save rope -- I wanted to maximise every metre I carried. I quickly descended to the point reached the day before -- the head of "Revelation Pitch" (10m). Drilling a bolt and backing up to a natural bollard, I descended. From the pitch I followed the small stream of about 0.2 litres/sec, but only a few metres downstream I reached another pitch.

This was an awkward short drop created by the wedging of boulders in a fissure above the waterfall. After some trial and error, and a difficult bolt placement, I ended up using two of my short ropes to get the thing rigged. Once down the 8 metre deep "Techno Pitch", I shot down a narrow rocky stream passage, ducking under a wedged boulder, to reach a tall chamber. A larger stream (0.8 litres/sec) joined my little stream from the east.

I thought I should check the inlet stream first so I followed the tight inlet passage, necessitating some rock relocation, for 20 metres to a constriction. I returned to the main (downstream) route and found it was increasing in size to be a comfortable two metres wide and ten metres high. Descending some sporty climbs and cascades I soon arrived at a short pitch -- a nuisance pitch as I only had one long rope left in my pack. I rigged "The Knave" (5m) from two handy nubbins on the right wall, as far out of

more rope, I marked the limit of my day's exploration with a tape with the date written on it and commenced surveying on my way out.

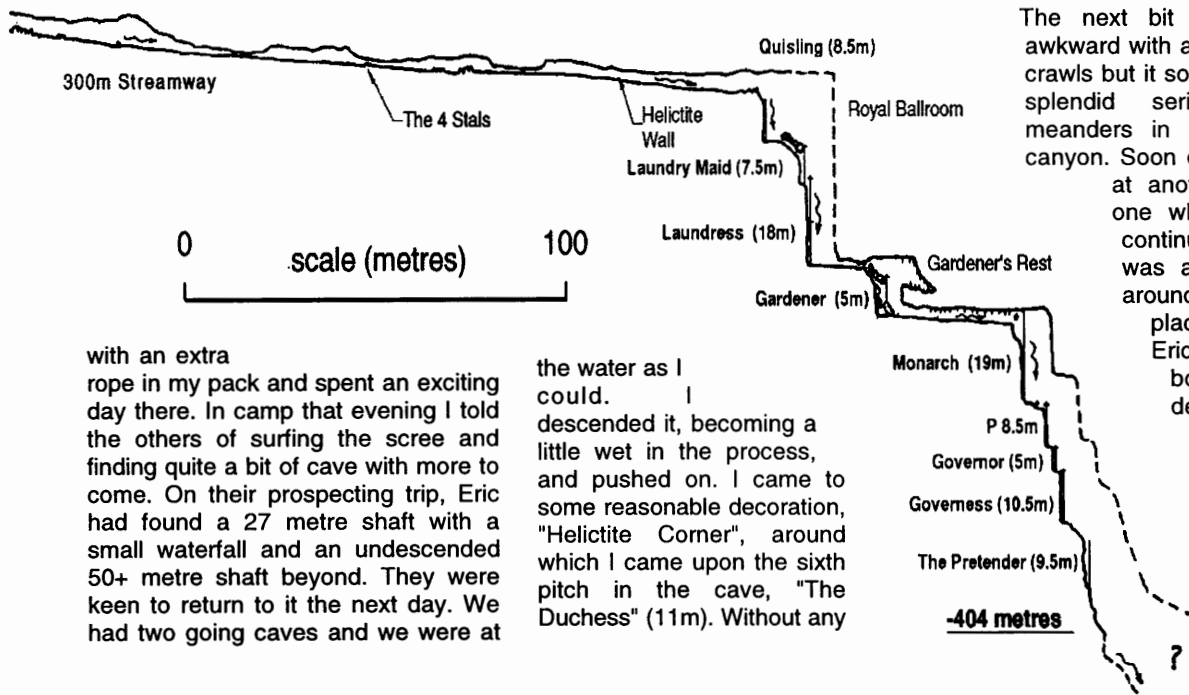
On my way out of the cave the primary anchor on the second pitch (Dodgem Pitch) decided to add to my stress levels by fretting away a little, showering me with shrapnel. Protected by my Joe Brown helmet, it caused me no serious concern. I emerged from the cave an hour before sunset to do battle with the Spaniards, and the bloody steep hill, before arriving in camp at 9.00 pm only to find everyone else in bed! However, Eric got up to rehear the communal meal, for which I was very grateful, and to hear my news on Viceroy Shaft.

The next day was fine so I decided it was my turn to have a rest day. I joined Eric and the others at his shaft, now numbered NO-605. It was in the top of the main spur immediately to the north of Viceroy's spur. While the other three descended the first pitch and proceeded to bolt the second, I drew up the results from my second day's survey of Viceroy Shaft.

After a time three heads emerged from Eric's shaft. None of them had felt keen to descend the second pitch, estimated to be 50 metres. They left it rigged for another day. A bit of a reconnaissance was made of nearby features before we all returned the couple of kilometres to camp.

I showed around my map. Viceroy Shaft was now 165 metres deep. Eric was interested in joining me for a push trip the next day. Leaving camp with two ropes each, we made good time to my limit of 3rd January. I rigged The Duchess (11m) from two natural anchors above and out from the pitch head. Unfortunately The Duchess is splashy and getting wet is inevitable.

The next bit of passage was awkward with a few low, bouldery crawls but it soon opened up to a splendid series of twisting meanders in a hard limestone canyon. Soon enough we arrived at another waterfall, but one which had a ledge continuing beyond it. I was able to follow this around a corner to a nice place to install bolts. Eric and I placed one bolt each and we descended "The



with an extra rope in my pack and spent an exciting day there. In camp that evening I told the others of surfing the scree and finding quite a bit of cave with more to come. On their prospecting trip, Eric had found a 27 metre shaft with a small waterfall and an undescended 50+ metre shaft beyond. They were keen to return to it the next day. We had two going caves and we were at

the water as I could. I descended it, becoming a little wet in the process, and pushed on. I came to some reasonable decoration, "Helictite Corner", around which I came upon the sixth pitch in the cave, "The Duchess" (11m). Without any

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Prince" (11m), observing on the way down a large opening in one wall of the canyon. Landing dry, on the far side of the waterfall's plunge pool, I took off my pack and bridged part way up the pitch to the gaping opening. I found a series of open passages and pitches, all quite dry and windless -- a fossil series. It was a good place to have lunch.

Returning to the main cave, we arrived at another pitch, "The Princeling" (10m), which we rigged on bolts. Beyond its plunge pool was a fine series of sporting cascades and climbs before the rock changed character all too soon and we were back into a narrow fissure in thinly bedded, friable, muddy limestone which ended in a pitch in the same material.

I eventually rigged "The Chancellor" (14m) from a bolt I placed in a tiny bit of solid limestone whilst hanging out around a corner. This enabled me to rig the rope out of the waterfall. Descending this pitch caused another type of fall -- protruding pieces of rock simply fell off at a touch.

The bottom of The Chancellor was cold and draughty. The way on seemed low and wet. It was getting late. As we'd used up all our rope, we left. We reached the entrance just after sunset. Already I was noticing that after a few trips down the cave there was no longer a serious problem with the scree. Everything that was going to move had already done so. The cave was now estimated to be over 250 metres deep. We returned to camp and crashed.

The next day dawned fine and sunny, but windy. Dick and Dale told us that the day before they had walked to the nearby Granity Pass Hut to familiarise themselves with the route. They suggested it was a four hour round trip. This route was to be our way out at the end of the trip so I intended doing the same at some time, once the volume of virgin cave had diminished to a more manageable level.

They had heard on the mountain radio that the weather was going to deteriorate so had made the decision



*The Prince" (pitch 7, 11metres), Viceroy Shaft, Mt Owen, New Zealand.
Photo: Paul Brooker, 24 Jan 1999*

to get off the mountain for three days. They were going to walk to the other hut in the vicinity, the Branch Creek Hut, two or three kilometres to the northwest of our camp, on the Fyfe River. There they would sit out the predicted bad weather.

Eric decided to join them. I remained behind to look after the camp. The first thing I did was anchor the communal food tent to a bloody big rock using a bolt. If there was going to be a storm I didn't want our food stocks to be out in it. I then carried out some more mundane camp chores

The next day dawned fine and sunny, but with strong winds. I repaired the storm guys on my own tent then late in the morning set off for the three kilometre walk to Bulmer Lake -- the bivvy site used by the Bulmer Cavern team. Travelling across the rugged karst on the mountain was slow, even allowing for the diversions one tends to take to look at inviting black holes. I went via the top of "Hill 1732", a prominent hill to the south west of Bulmer Lake, for some spectacular views of the karst.

I arrived at the Bulmer bivvy in the early afternoon to find a solitary person

in camp, Alwyn Smith from Christchurch. The 70 rescuers had all left earlier that day or the day before. Alwyn described the rescue in detail -- a mammoth task with a successful outcome. Kieran's injuries had not prevented him from largely rescuing himself. I left Alwyn at 5.00 pm and arrived back in camp in perfect weather at 7.30 pm, just in time for the radio sched.

The next day was very wet and windy.

Saturday 9th January dawned. The rain had stopped. I washed some gear and cooked a huge meal of chilli beans for the expected return of the troops, who arrived on schedule and consumed a fair proportion of them. On their way back they had come across a "Big Cave" in the toe of a spur within 500 metres of the Branch Creek Hut. They had been unable to explore it for more than fifteen metres or so because they encountered a steep climb up a small waterfall.

Early the next morning we all trooped over to Eric's shaft. We descended

the first pitch of about 27 metres then the second of about 55 metres to arrive at a low, draughtless dig. A small parallel shaft which could be pendulummed into from the second pitch led to an impenetrable rift. The estimated depth of the cave was 90 metres.

The next day we climbed the nearby Mount Owen (1,875m) and shot off some film.

On Tuesday 12th January the majority were going to stay in camp. With more rope in my pack I was at the entrance to Viceroy Shaft by mid morning. Heading down slowly, I reached my previous limit at the base of The Chancellor and pushed on into the low streamway. I soon arrived at a short pitch in very poor rock. I rigged this from a pair of high natural anchors and slipped down the "Vice-Chancellor" (6m), barely avoiding the plungepool and a drenching. The stream passage continued down a series of prettily marbled cascades. Then, the nature of the cave changed.

Up to this point it had been a classic vertical stream cave -- pitch after pitch, usually short, with waterfalls. Now the cave became quiet.

The stream was a silent travelling companion as I wandered down a spacious cobbled passage. I passed some inlets on the right, one in particular looked promising. I passed some good decoration -- flowstone and straws mixed with plenty of helictites. There was some silt about. I felt the cave was heading for a sump but the passage continued at a comfortable walking size until I unexpectedly arrived at a pitch in rotten rock. It looked to be about 15 metres. I looked around for anchors. There were none, but then, I had no rope. I tied off a dated marker tape and paced the distance back along the stream passage -- 300 metres. I then commenced to survey from the base of the Vice Chancellor, finding an open bypass to the base of the Chancellor in the process, to connect to my survey of 3rd January at the head of The Duchess.

Up at dawn to cook porridge for everyone, I had planned a day of washing and survey drafting. Dale, Dick and Eric planned to prospect the spur north of Eric's cave. They returned at 4 pm having found very little. I'd cooked an enormous dish of dahl with basmati rice. One thing we had determined from the outset was that the food should be of good quality.

Dale wished to walk out to Granity Pass Hut then continue on to the townships of Nelson and Motueka before heading back home to Australia. Dick and Eric decided to join him for a few days of rest and recreation on the tourist beaches and then return with Eric's brother, Mike, who was due to arrive in six days' time. Granity Pass Hut was our planned departure route at the end of the trip so I thought I would take the opportunity to accompany the other three, all of whom had walked the route at least once before.

We packed and set out in poor visibility caused by rain and mist. Heading east over the karst in such conditions was not particularly easy but we were making reasonable progress till my right leg disappeared from under me. I had dropped into a small, grass-obscured fissure and wrenched my back.

I soon lost sight of the other three. Visibility was down to 30 metres. I plodded on in the rain for a couple of hours looking for "a lateral moraine, like a railway embankment". I never saw it. I later discovered it was more than 30 metres off the spur I was following and was therefore effectively invisible in the conditions. I continued in the right direction along a rough creek bed, knowing the hut was on a creek. I eventually reached a point

where the creek bed was no longer viable as a route. It had turned into a narrow limestone canyon with five metre drops. I checked the map. I was not far from the hut. Painfully, I climbed straight out of the canyon and reached a limestone ridge on the other side of which I thought the hut should be. I heard a call. A little the worse for wear I had made it. The next day we separated. Dick, Dale and Eric headed for the fleshpots of Nelson.

Returning to the VSA camp, via a slightly different route and in much clearer conditions, I found a draughting vertical cave with three entrances in the Nuggety karst basin. Not having serious caving gear with me, I marked its position and kept going. Back in camp I noted that about 75mm of rain had fallen. The spring was flowing strongly. I tidied up and did some camp chores, like digging a new toilet pit. That evening I watched a spectacular thunderstorm on the west side of the range. Barely a drop fell on the camp. Paul Brooker and Roger Taylor should be soon arriving. They had arrived in Christchurch that day.

Sunday 17th January dawned fine and sunny. In readiness for further exploration once Paul and Roger arrived, I carried some ropes to Viceroy Shaft and stored them in the entrance area. Expecting heavy traffic soon, I also replaced the 9mm rope on the entrance shaft with a 10mm rope. I took the opportunity to check a minor limestone spur to the south of Viceroy Shaft but found nothing of great interest. That evening a thunderstorm broke directly overhead -- an impressive display.

The next day, feeling confident that Paul and Roger would arrive, I left a note for them and set out to explore the draughting cave I had found on my way back from Granity Pass Hut. I placed a few bolts on three pitches to discover that the cave's draught emanated from a rubble choke. I surveyed out and tagged the cave: NO-502, VicTim Pot. It was 60 metres deep.

I returned to find Paul and Roger in camp. I warmed up my Mexican bean mix which in turn warmed us. They had missed the rather obscure turn-off up Bulmer Creek and had instead walked up a very steep spur to Sunrise Peak, carrying minimal water because they had expected to be on a creek. In hot conditions they eventually arrived at a tarn in Castle Basin where they camped. That morning they had walked to the VSA camp. They had brought up some fresh food, a letter from my wife, a letter from Dick's Mum, and a heap of enthusiasm. The next day dawned beautifully. It was quite

warm. There was no shade. Paul and Roger sorted out caving gear and then we all went prospecting down to the treeline, north of NO-605.

The following day was a day for exploring deep caves. Paul Roger and I departed for Viceroy Shaft with a load of rope each. I picked up the ropes I'd stored in the entrance a few days before and we started down the cave. By 2.00 pm we were at the limit of my previous exploration, at the head of the troublesome "Quisling" (8.5m). The rotten rock created some difficulty but a rough and ready rig had us at the bottom and into a large chamber, "The Royal Ballroom", from which I looked out over a rockpile, into a waterfall and a wonderful big black void.

A tieback to a large boulder and a bolt I placed on a rock spanning the drop allowed most of the waterfall to be avoided, at the cost of some awkwardness. We agreed that at this depth awkwardness was preferable to freezing coldness. I descended the "Laundry Maid" (7.5m) to land on a tiny, spray lashed ledge. Trying to keep out of the water was futile. It was cold and draughty. The wind-chill alone must have been several degrees. I placed another bolt, tied on a new rope and descended into the misty depths. The rope was too short and it was starting to hang directly in the 1 litre/sec waterfall. It needed another rope length and another bolt to take it out of the water. No-one wanted to do it. It was freezing.

Instead, we went to explore some of the inlets in the 300 metre streamway. One of these had a small stream. Roger and I climbed up into it and followed the narrow passage. It led, via a series of short climbs, to a soaring aven.

We reached the entrance at 9.15 pm, after being underground for almost 12 hours. In the dark we struggled up the hill back to camp. Dick, Mike and Eric had arrived from Granity Pass Hut and were already in bed. We cooked a meal and fell into our tents.

At dawn I cooked a big load of porridge. There were plenty of takers now. Roger and Eric were going to check a cave found by Dale near NO-605. Paul, Dick and Mike went off to explore the "Big Cave" found near the Fyfe River during their earlier trip down there. Roger and Eric reported a cave which went for two pitches of 10 and 15 metres that led to a third, undescended pitch of 30 metres. There was no draught and they were not confident it went any further. The climb in the "Big Cave" was ascended to extend the cave to 25 metres whereupon its draught seemed to come from tiny, impenetrable holes

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between the bedding. In the evening cloud descended to below camp level. Visibility was reduced to 15 metres or less.

The next day, Friday 22nd January, was to be another trip to Viceroy. I did the usual porridge thing then set off for the cave. Paul and Dick were going in a little way to push the main stream inlet that I had followed up for only 20 metres and to attempt to climb an aven near it. Eric and Roger were due to arrive a little later to cruise down the cave tidying up some of the exploration style rigging then to assist in surveying the 300 metre stream passage and beyond.

I set off for the bottom, pausing only to put a location tape on station 33, next to the aven Paul was thinking of climbing. Once I reached the Quisling, I spent some time rearranging the troublesome rigging on the rotten rock. In the end I bypassed the whole problem by running a wire trace over the trouble spot and re-rigging the rope as a rebelay from it.

I then descended to the Laundry Maid and re-rigged it to make life easier. Finally I was able to reach "The Laundress", the last pitch, left semi-rigged from two days previously. With the water crashing around me I rigged a new, longer, rope. I hung out over the pitch to place a second bolt at the head to get the rope out of the water as far as possible. I then descended it, only to find the water sprayed out to engulf the rope about half way down. I debated with myself, briefly, whether to forget about it and continue with the exploration but I soon realised the danger in that course of action. The water here was freezing. Coming back up the pitch would put one right in it. Any problem on the rope at that point could be lethal.

Hanging out in my harness as far as I could involved having my legs fully immersed in the waterfall. It was the only way to position myself to get a bolt into the place I needed. Even then it was marginal. I held myself in position with my toe tips. Placement took quite a while. I was pretty cold when I'd finished it. Tying the rebelay I found, thankfully, the rope was out of the full force of the water.

I was now shivering uncontrollably, but the urge to look just a little further was stronger than the discomfort level. The bottom of The Laundress was also the bottom of the Royal Ballroom. A huge blackness soared above and behind. Ahead was only a small, low tunnel down which all the water was gurgling. Crouching, I went into the tunnel finding after a few metres that it turned sharp left through a narrow slot. Enlarging the slot allowed me to

follow it, straight into a thigh deep pool of freezing water. Bridging above this I was able to gain access to an old talus chamber filled with sediment and decoration. The water streamed down through the talus to crash to the floor via a waterfall. That was not the way to descend.

I hunted around until I found a block with a couple of handy stalagmites to rig from. I tied in to these and descended "The Gardener" (5m) into a cold draughty chamber. The stream flowed into a narrow canyon-like passage. I followed it for 25 metres to another pitch. I used up the last of my rigging and the last rope in my pack to descend it. I was left hanging in mid air half way down a fine 10 metre diameter shaft. I called the pitch "The Monarch".

I returned to the base of The Gardener, surveying as I went, only to find the rope gone! Then I heard the tap, tap, tap of a bolting hammer. Eric and Roger had arrived and hadn't liked my two stal rig. The rope eventually reappeared and I ascended. Neither of them wanted to go down any further so it was time to go. Eric had one more rebelay bolt to place on The Gardener, so with help from Roger, I continued to survey out.

Eric caught us up at the head of The Quisling. We still had the 300 metre streamway to survey. Eric wisely kept heading out. Roger and I completed the survey along the streamway, connecting to my last station at the base of the Vice Chancellor -- a total of 59 stations for the day.

We arrived at the entrance a few minutes after midnight. I had been underground for 14 hours. I was a little fatigued. We groaned up the hill back to camp for a quick meal and a long collapse.

The next day was a rest day. I transcribed survey data and Roger dug another toilet pit. Everybody did a lot of resting and eating in the sunshine. Roger cooked a fine meal and we all hit the sack by 10 pm, ready for a big day on the morrow.

Sunday 24th January was the last practical day for a trip into Viceroy Shaft. We had to prepare for the helicopter and allow time to wash all the caving gear at the Owen River to avoid problems with Australian Customs on our return. (They don't like you to have dirt from other countries on your gear.) Almost everyone was going into the cave. Dick had decided the cave didn't agree with him after he'd had a couple of "interesting moments" in it two days previously and Mike was still suffering from blistered

feet arising from his walk up the mountain.

The plan was for a combined photo, exploration, survey and derig trip -- easy really. Paul and I arrived at the cave with our model, Eric. Our Pitch Black expedition packs were loaded with photo gear and extra ropes. We descended, flashing as we went. Roger caught us up at The Duchess. He continued down.

We continued burning film and filaments to the end of the 300 metre streamway, after which things were going to get wetter so we packed away the cameras and dropped the next four pitches to find Roger sitting shivering at Gardeners Rest, in the talus chamber. He had put a longer rope on The Monarch (19m) and had descended it to find a wet pitch almost immediately after it, Pitch 16 (8.5m). He'd placed two bolts on it and rigged it with his last rope then had come back out. He tried to envelop himself in a plastic garbage bag but didn't seem to be able to warm himself. Paul wasn't keen to go down any further and proceeded to put his garbage bag over himself to retain body heat. Eric and I went down to the limit of exploration with our last ropes.

While Eric stayed at the base of The Monarch in a slightly sheltered spot, I descended Pitch 16 and saw that the next pitch was just as wet. There was a shortage of anchor points but I hunted around until I found a natural bollard. A difficult-to-place bolt on the lip allowed me to descend "The Governor" (5m). Immediately after was another well washed pitch. Another bolt, placed while immersed in the stream, allowed "The Governess" (10.5m) to be dropped and then for some cascades to be followed to yet another pitch visible through the spray and the mist. I had now run out of rope in my pack. Eric said he was feeling mighty cold. I convinced him to come down the two short pitches I had just rigged. He did so, handed me the rope he carried and left for a warmer climate, back at Gardeners Rest.

With the last rope in my hands I again hunted about in the poor rock for a rigging point that would allow me to get down to the black space beckoning me from below. I finally settled for a couple of dodgy natural anchors on the right hand wall. They would keep me out of most of the water. I abseiled "The Pretender" (9.5m) to find myself on the edge of another drop. This one could be free climbed with care. I went down it, then another, easier climb to arrive at a real pitch. It was almost free-climbable, but at this depth and on my own ...perhaps not. Beyond the pitch I could see a 20 metre high

canyon, 2 metres wide, descending a set of cascades around a corner. I could see at least another 12 metres of cave depth, leading on into the unknown.

I tied a dated piece of flagging tape to a protrusion and commenced the survey back out, derigging as I went. By the time I returned to Gardeners Rest, three and a half hours had passed. My pack was bulging with over one hundred metres of rope and all the associated rigging. I was going to hate that pack.

Paul and Eric, thankfully, were still waiting at Gardeners Rest. Roger had not been able to rewarm himself so had taken the only sensible option. He had taken some of the photo gear and had headed out.

The three of us slowly extracted ourselves, me grunting and cursing at my pack in the front and Paul and Eric derigging at the back. A total of fifteen pitches were derigged to leave only the four entrance pitches still rigged. Now all three packs were bursting at the seams and we were still not out. Taking it carefully, we emerged from Viceroy at 12.30 am. It had been a big day.

Mike and Roger derigged the final four pitches the next day, giving Mike a chance to see a portion of the cave. I did more survey data work and sorted ropes with Eric. The expedition was winding down.

We had been extremely lucky with the weather. The last two weeks were picture perfect -- fine and sunny -- sometimes too sunny as there was no shade on the mountain top and the

sun seemed to burn the skin easily. The wind, which had been troublesome earlier in the trip had all but disappeared. We enjoyed it while we could. We had one more day before the helicopter arrived. There was a relaxed time of washing, packing and eating. I did more drafting of the survey. In the evening we carried out last minute preparations. The plan was for Eric and Mike to ride with the helicopter to help unpack the net and then run the gear back to the Owen River campsite. The rest of us were to walk out via Bulmer Lake and Bulmer Creek, on the south side of the mountain.

At 9.30 am the buzz of a Hughes 500 approached. A flurry of activity and Mike and Eric were up and away, leaving the remaining four of us standing with our day packs. We started walking to the south in fine sunny conditions. We had lunch at Bulmer Lake and then tried out the descent along Bulmer Creek. What a spectacular walk, especially while carrying light packs. The walk follows a huge limestone gorge for much of the way and can only be described as unforgettable.

We eventually joined the Owen River and splashed back and forth across that for a few kilometres before a little white parked car hove into view with Eric waiting for us. We called on the farmer on the way out to thank him for allowing us to use his back paddock, then made our way to the pub and campground at Owen River. There was an important word there, pub. We made full use of it. For a couple of days we washed ropes, drank beer and fought off sand flies.

Safety Tip - SRT Ropes

We hired a second car from Nelson. We packed everything up, made a donation of the leftover food to a charity in Motueka and left for Christchurch, doing a wee bit of touring on the way. In Christchurch we took Lindsay Main and his wife Alice to dinner. Jon Terry was out on the coast somewhere so was not available. On Sunday 31st January everyone except Mike and Roger left for Melbourne. Mike had another month of seeing the sights in New Zealand and Roger was there for a few days of walking. The trip was over except for the indelible memories.

I have attempted to tell the whole story of the trip but clearly there are parts of it that I wasn't involved in. Hopefully, those who will record their experiences. I would like to thank our sponsor, Pitch Black of Melbourne. They supplied all of our expedition caving packs at no cost to ourselves. The packs proved able to handle the worst conditions imaginable. I would also like to thank many New Zealander cavers, in particular Lindsay Main and Jon Terry. They gave us useful advice and assistance in the lead up to the trip. The expedition was a fantastic success, made better by the jocularity and good humour of those who made up the team. We intend to see where the caves that were not bottomed, end up -- perhaps next year.

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Safety Tip - SRT Ropes

Between 1987 and 1989, the National Caving Association (UK) rope test officer, Owen Clarke, conducted exhaustive tests on 27 different types of caving rope. His conclusions, presented to the 12th IUS Congress held in Switzerland in August 1997, are important to vertical cavers. Some of his recommendations may be thought unusual by some, but I find they accord well with my own experiences.

Selection of ropes

Owens tests indicate that ropes with stiff outer sheaths are best for long life. Brands to go for are Edelrid, the 1987 version of Bluewater II, PMI and the French rope Joanny. The diameter of the rope you select depends on many factors but if you wish to have a significant margin of safety, go for 10mm or greater.

The lighter 9mm ropes should be only used if you are confident you know how to rig ropes free of abrasion points. The ultra-light 8mm caving ropes offer no margin for error at all and should only be used by highly experienced SRT cavers.

Care of ropes

Owen had some very clear things to say

about washing and storing ropes. Always wash ropes after use, but only in plain water. Detergents drive the dirt into the rope's core. Avoid using bristle brushes for the same reason. Owen recommends using a plain nylon pad. Personally, I use nothing but my hands while cleaning my ropes.

Ropes should be dried away from UV light and stored on wooden pegs or similar. One rope had a 10mm rust spot on it. When tested it broke at this spot during its first drop test.

Falling on SRT ropes

The basic message here is don't! However, as we all know, circumstances sometimes are such that a fall must be held on an SRT (ie static) rope. Owen's tests show that for short falls (around 2-3 metres) about half the energy of the fall is absorbed by the rope while the remainder is taken up by the knots in the rope and the cavers harness and body. Thus a short fall, such as may be suffered due to a slip at the pitch-head, is not too severe.

If lead climbing, it is imperative that dynamic rope be used as in these circumstances a fall can be quite severe.

Age of ropes

Owen found that age was not a big factor in the residual strength of caving ropes but that the level of care of the rope was.

Well cared for ropes of 10 or 11mm diameter still rated as very good to excellent in a number of cases despite being 10 years or more old.

I would like to insert a word of caution here. After a rope passes the ten year mark, a sample piece should be taken from its centre and that piece should be able to pass a series of FF1 drop tests before it can be regarded as safe to continue to be used.

If a rope is obviously damaged or is known to have been used in harsh conditions, the tests should commence at five years of age.

You should keep in mind that a caving rope may be expensive to replace, but at least it *can* be replaced

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Should Speleological Societies and the ASF have a Population Policy?

Norm Poulter OAM

Speleological Research Group Western Australia Inc. First published - Cave Queensland 22nd. ASF Biennial Conference Yeppoon, January 1999

During June 1999, the world's population is expected to reach and then surpass 6 billion! Is this achievement something to be proud of - or a further sign that humanity's arrogance is overlooking the fact that it is seriously overtaxing the planet's delicate ecosystem? Is this fact a result of recent calculations? No! It has been known since the early 1970's [or earlier] that the world's population would attain this figure somewhere around this period - and few at the time [or since] seemed interested in what the consequences could mean.

It took at least 100,000 years for global human population to reach two billion. In 1800, world population stood at 1 billion. Now, just on 200 years later, we are 6 times that number and poised to grow at an even faster rate unless fertility rates can be lowered. It took 130 years [1800-1930] for world population to grow from 1 to 2 billion but then a mere 30 years [1930-60] to increase by another billion. Since 1960, we have been increasing at the rate of almost a billion every ten years. But that ratio is set to change dramatically.

What has all this to do with speleology? Should we collectively "buy into" a potentially divisive debate that would be seen by many as being well outside the aims and objectives of a speleological society or federation? I believe we should, as, whether we like it or not, population pressures DO have an effect on caves and karst regions!

I would hazard the guess that in none of the recent environmental "battles" fought on behalf of karst regions has population pressure been cited as an argument against a particular proposal. Indeed, one of the most enduring arguments against destructive development, at least in regional areas, is the perceived greater benefit to be gained from increased tourism. Then, if the battle is miraculously successful - work often begins to curtail [or prevent] tourist development! Why? Because too many tourists can easily degrade or destroy the very features they go to marvel at!

Limestone is one of the most useful commodities exploited by modern humanity. It has either directly or indirectly played a part in the provision of all goods and services that we utilise in everyday life. Glass to paper - food to housing - steel to fuel.

Most, if not all our environmental problems are population driven - again, either directly or indirectly. A short but incomplete summary could include;

- mining Mt. Etna [Qld.], Colong, Yessabah [NSW] Exmouth [WA, Ida Bay [Tas.]
- forestry Mole Creek, Junee/Florentine [Tas.]
- urbanisation Yanchep/Wanneroo, Pinjarra/Mandurah [WA]
- agriculture .. Nullarbor, Leeuwin-Naturaliste Ridge [WA], Naracoorte [SA] and Pike Creek [Qld.]
- tourism virtually all karst areas.

Now, while Australia's population has been increasing, membership of the ASF has declined. In 1965, I seem to remember that the ASF, through its associated societies, had a membership of about 800, higher than it did in early 1998 - although I hear that membership has recently risen to be close to 1000. However, at the same time, the

popularity of eco-tourism [involving caves] and adventure caving has increased many times over since the introduction of those activities.

Many, many years ago on an ABC radio series by Dr. Paul Ehrlich where Australia's population was mentioned, he alluded to conclusions that could be drawn by various demographers [study of births, death, disease & conditions of life in communities] using the same statistics. He stated that in relation to food production demographer "A" said, Australia [provided we stopped or curtailed food exports] could support a population of 30 million while demographer "B" agreed that due to our water resources, Australia could indeed support a population of 30 million - provided half of them lived in Tasmania - where most of Australia's water resources are located! Now, Tasmania is currently struggling to support a population of half a million [despite former Premier Rundle's best efforts to double the population], so what would they do with an extra 14.5 million people and where would they house them?

Australia's population currently stands at approximately 18.7 million but the federal government anticipates the population to "peak" [given the current trend in births, deaths and immigration] at or about 23,000,000 by 2020. Former Prime Minister Malcolm Fraser is on record [with others] that we should aim [indeed have a "duty" to aim] for 50,000,000 over much the same time span. This is in direct contrast to what the general public seem to prefer - that is, a lower population. Dr. Tim Flannery of "The Future Eaters" fame is on record several times over saying that Australia should have a population of about 12,000,000 in order to maintain a sustainable environment. This call has been echoed to a slightly lower degree [9,000,000] by Professor Harry Recher [Environmental Management, Edith Cowan University].

In today's "politically correct" and "Hansonite climate", any voices raised [even on environmental grounds] objecting to Australia's directionless "policy" of limitless [population] growth, have been immediately branded racist or worse by religious, political, some ethnic and special interest groups, which includes the "immigration industry". I use the term immigration industry because that is what it has become, complete with lobbyists, specialist lawyers, consultants and publicity machines, feeding on people's fears, aspirations and prejudices but often supported by religious, ethnic and media groups. It is often a neat but vicious circle!

I would mention at this point that due to the perceived isolation of Western Australia from detailed information about current environmental issues on the eastern seaboard - and visa versa - this paper attempts to highlight problems existing in Western Australia, problems that quite probably mirror similar instances existing in the rest of Australia. I also think it fair to acknowledge my membership of "Australian's for an Ecologically Sustainable Population Inc." [AESPI]

According to the Western Australian government, Perth's population of 1.1 million will double within the next 16 years. The current Liberal Government seems quite proud of this forthcoming increase although such an event will place enormous strains on already scarce water and food resources, not forgetting such infrastructure as roads,

transport, sewerage and energy. Conveniently forgotten in all this euphoria is that the majority of Western Australia's lower coastal strip is dune limestone- a very friable rock. Some years ago, it was fairly common knowledge amongst some domestic reticulation contractors [45-50% of Perth households have their own bores] that drill holes often broke into subterranean cavities. Caves exist near central Perth and in the banks of the Swan River. This is not to suggest that some sections of Perth's older suburbs are about to collapse into the ground in the near future but - [the possibility is there].

Where karst areas exist close to centres of population, pressure is being placed on those regions by urbanisation. As Perth urbanisation expands, especially to the north and south - extensive karst areas are being steadily encapsulated and sub-divided. The city of Wanneroo, which includes Yanchep, has extensive shallow and highly friable cavernous regions. Indeed, WASG and SRGWA were instrumental in postponing development in one Wanneroo region during early 1997. Postponed! The council only placed a 10 year moratorium on the proposal, after which it could well be resurrected. There were indications that the developers and council were not about to highlight the fact this was a known cavernous region - a risky undertaking in today's "public liability" and litigation-prone climate. I might add that the urban sprawl is less than 2km from this region. South in Mandurah, caves already exist within the city limits with more karst regions set for development in the medium-term. Urbanisation of karst areas brings its own problems and concerns as evidenced by the mad scramble for explanations that took place in Mt. Gambier during 1997 when unexplained subterranean noises were heard, noises later attributed to "water-hammer" in pipes undergoing increased use due to maintenance work elsewhere in the district. Quite a humorous incident in hindsight - but a genuine cause for the "jitters" at the time.

Much of the water that supplies the Perth metropolitan area and Goldfields regions now comes from underground sources [commonly referred to as "mounds"]. Due to the current fickle nature of the winter rains, the dams of the Darling Scarp are rarely capable of supplying the year-round demands expected of them. This has resulted in increased reliance on the little understood water mounds. To the north of Perth lies the Gnangara Mound, a mound that extends into the limestone regions of Wanneroo and Yanchep. As Perth's population has increased, so have the demands placed upon the Gnangara [and southerly Jandakot] Mound. When inviting public comment into the proposed northerly extension of the Gnangara Mound during the early 1980's, the water authority estimated that they would lower the watertable in the Yanchep National Park region by half a metre -enough to dry out most of the [stream/lake] caves. Their solution to this "dilemma" was that the Department of Conservation and Land Management [CALM] should cut down half of the nearby pine plantation - a solution once flatly rejected by CALM. In more recent times, the Court Government announced plans to indeed remove half the trees in order to establish an enormous park. Work has yet to start. In the meantime, the caves of Yanchep are drying [the lake and stream in the tourist cave (Crystal) has all but disappeared] and the unique fauna therein placed at extreme risk. As the water table drops, many of metropolitan Perth's surface lakes have been drying out, resulting in a loss of surface species and habitat for both resident and migratory water birds. During the latter part of last century and early this century, many lakes were simply filled in. In recent times, councils resort to spring and summer pumping to keep the lakes "full".

Western Australia's premier tourist region is the south-west, an area that includes the highly popular Leeuwin-Naturaliste Ridge, an area that currently receives about 1,000,000 visitors a year. The Ridge also contains some of the state's most spectacular caves such as Easter-Jewel, Crystal, Strong's and Labyrinth to name but a few. For more than 20 years, speculators have been trying to turn parts of the Ridge into another Surfer's Paradise - helped along by the development of the hotel, surfing and wine industries. The traditional dairy and forest industries are in decline. Areas that were once State Forest are now National Parks. Where once excessive groundwater extraction could possibly be blamed on the dairying activities, now it should be placed mainly at the feet of the burgeoning population of incoming residents, tourists and wine industry. -although, to be fair, the region has also suffered from loss of "average" rainfall in recent years. Several caves have already suffered loss of water. The lakes of Jewel have disappeared while the lakes of Easter have dropped alarmingly. The stream in Strong's has all but disappeared, the root mats, so important to the troglobitic fauna, has dried and died in many sections. Is all this attributed to population increase or natural evolution? Other stream caves such as Crystal, Calgardup and Lake appear quite healthy with no apparent drop in water level or flow.

About 1.5 days drive north of Perth lies the town of Exmouth, near the tip of Cape Range peninsula [North West Cape], a karst area with important links to the Gondwana era. Exmouth was largely created to service the American naval communication base and nearby part-time RAAF base. Over the years, the agriculture, tourism and prawning industries gained a foothold. Following the introduction of enhanced satellite technology, the Americans moved out of Exmouth - creating a huge employment vacuum. Rather than let the town "downsize" [electorally unpopular], proposals were canvassed to help maintain the town - increased tourism to the nearby Ningaloo Marine Park and Cape Range National Park were put forward along with plans to quarry part of the Cape Range itself. The quarry has already figured in conservation issues within the ASF - at least one cave has already been damaged.

In the past, reliance on "technological fixes" is often cited as a means of accommodating increases in population. Advances in technology can be a double-edged sword. The "green revolution" only served to allow nations to over-extend their population at the expense of the environment. The new generation of genetically-engineered crops are more chemical-reliant than their predecessors [for yield] and have the ability to plunge user nations into deeper debt and environmental degradation without solving the underlying cause - over-population.

In a primary and secondary industry sense, one by-product of advances in technology is to create further unemployment through displacement of jobs. The tendency of transnational and local companies to relocate their operations into countries where safety and environmental laws are "softer" and labour costs and conditions lower does nothing to help Australian's burgeoning population either. In short, advanced technology is very good at putting people out of work - especially those on the lower socio-economic scale.

How is population increase encouraged in Australia?

1. lack of a population policy,
2. immigration,
3. tax incentives [child allowance],
4. sales tax on contraception/birth control items,
5. political/business/media "boosting",

Should ASF have a population policy?

6. religious instruction.

What are some of the consequences of population increase?

- a. less arable land,
- b. land degradation,
- c. water degradation and loss,
- d. loss of native species,
- e. social unrest.

Some impacts of population growth on Australian karst regions have been:

1. introduction of permit systems, fees or loss of access,
2. degradation of caves, decoration, fauna [surface and troglobitic],
3. degradation of caves caused by inappropriate land management practices in [cave] catchments [which may be outside cave reserves] - siltation, deforestation,
4. lowering of water tables due to pumping, irrigation etc.,
5. surface and sub-surface vandalism,
6. creation of eco-tourism/adventure caving by non-speleological groups or expansion of existing organisations,
7. increased crime - theft and vehicle break-ins - a small problem maybe but it occurs nonetheless,
8. mining.

Humanity in general currently refuses to admit to, and limit its growth -contrast this with Australia's continued push to control the population of perceived "pest" species such as the kangaroo, dingo, wombat and fox to name but a few! Are we just following the crowd by not admitting that we really have a human [population] problem instead?

We cannot shamelessly say that population increase is a "third-world problem", predator nations such as the USA, Japan and Australia consume resources at a higher per-capita rate than that of the third world, not only our own resources but the resources of other countries as well.

As has been said on numerous occasions in the recent past, many of our environmental problems will not be solved until we address and solve the population problem. Australia, right now, needs to enact a humane population [control] policy while there is still time for it to be socially and mutually acceptable. Australia should not bury its head in the sand until it becomes necessary to adopt "inhumane" measures such as those that have been imposed [legally or otherwise] in nations such as India, Singapore or China and certainly well before Nature enacts its own forms of population control.

The ASF and its member societies should seize the initiative by formulating a population policy and lobbying the federal, state and local governments and media to enact one also. A small step has already been taken in this regard by Premier Carr of NSW who recently said ".....Australia must begin to think of itself as a country with a population problem. Let's throw away for all time the notion that Australia is an empty space, just waiting to be filled up. Our rivers, our soils, our vegetation won't allow that to happen without an enormous cost to us and those who come after us." [Carr 1997] This was followed by Professors Ian Lowe of Griffith University who said "If we are to be a civilised country in control of our destiny, we need to have a strategy for stabilising the human population." and "... a restraint on the clearing of small areas of bushland could be considered as treating a symptom, whereas having a population policy could be considered as treating the underlying cause."

[Lowe 1997]

The purpose of this paper was to stimulate discussion [without prejudice] and perhaps launch the ASF into the forefront of [specialist group] environmental thinking. I hope that I have done that without ruffling too many feathers. In concluding I would quote a United States Cree Indian saying: "Only when the last tree has died, the last river has been poisoned and the last fish has been caught will we realise that we cannot eat money."

POSTSCRIPT - This paper was submitted during September 1998 for inclusion in the conference papers, scheduled at that time for publication prior to the ASF Conference in January 1999. Events precluded publication until after the Conference.

Since the time of writing, information released by the Australian Bureau of Statistics [ABS cat. #3101.0] showed that Australia's resident population for the year to March 31, 1998 grew by 1.2% [221,900] to 18.71 million. This in turn represented a migration intake of 100,200 coupled with a natural increase of 121,700.

The Bureau's "Population Projections 1997-2051" [ABS cat.#3222.0] revealed that even if Australia could get its net overseas migration down to 90,000 and fertility rate to 1.75 [it's currently higher than that] our resident population in 2051 would be 26.4 million and rising, more than 3 million higher than Immigration Minister Ruddock currently states.

Prior to the 1998 election, the Labor Party implied that it favoured a population policy but it now seems to prefer an increase above the current 1.1%. If Australia's growth rose to 1.3%, our population would rise to 37 million by 2050.

To lend weight to my arguments listed above, I would urge readers to consult Mark O'Connor's book "This Tired Brown Land".

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C-56, Corkscrew Cave.

Darren Brooks

Early Explorations

In 1974, Roger M. Scott journeyed to the Cape Range and set about checking the locations of known caves, most of which were poorly located due to working with maps of a large scale and the many small, insignificant cave entrances, and also found and explored about ten new features. One feature he recorded next to the Charles Knife Rd had a small horizontal entrance, in itself unusual for the Cape, but which soon turned into a typical small Exmouth type cave. Narrow, vertical and with a high level of CO₂. To date not one trip has been undertaken without encountering distressing levels of CO₂ in this cave.

An excerpt from Rogers original report describes the cave thus... *there is an obvious collapse 20 yards South of the road. In the south side of this collapse is a horizontal entrance 2 feet high by 5 feet wide. This leads under a solution pipe in the roof to a 20 foot pitch. Then occur two separate climbs of 8 feet in a solution tube 3 feet by 4 feet. A 40 foot ladder pitch led to a chamber with a flat, damp, gravel floor. The small passage leading from this was not entered due to bad air.*

It can be seen from comparing the report with the map that the explorers reached the point at the base of the 9m pitch. For the sake of clarity it must be explained that I have recorded the two 8-foot free climbs as three

climbs of 3.7m, 2.6m and 1.3m respectively. In 1984 Tom Porritt explored the cave and pushed it a further 5m from the bottom of the 9m pitch through an awkward, narrow, horizontal and low passage to the head of an estimated 15m pitch, actually the 11m pitch. Once again CO₂ was the reason for the halt of the exploration.

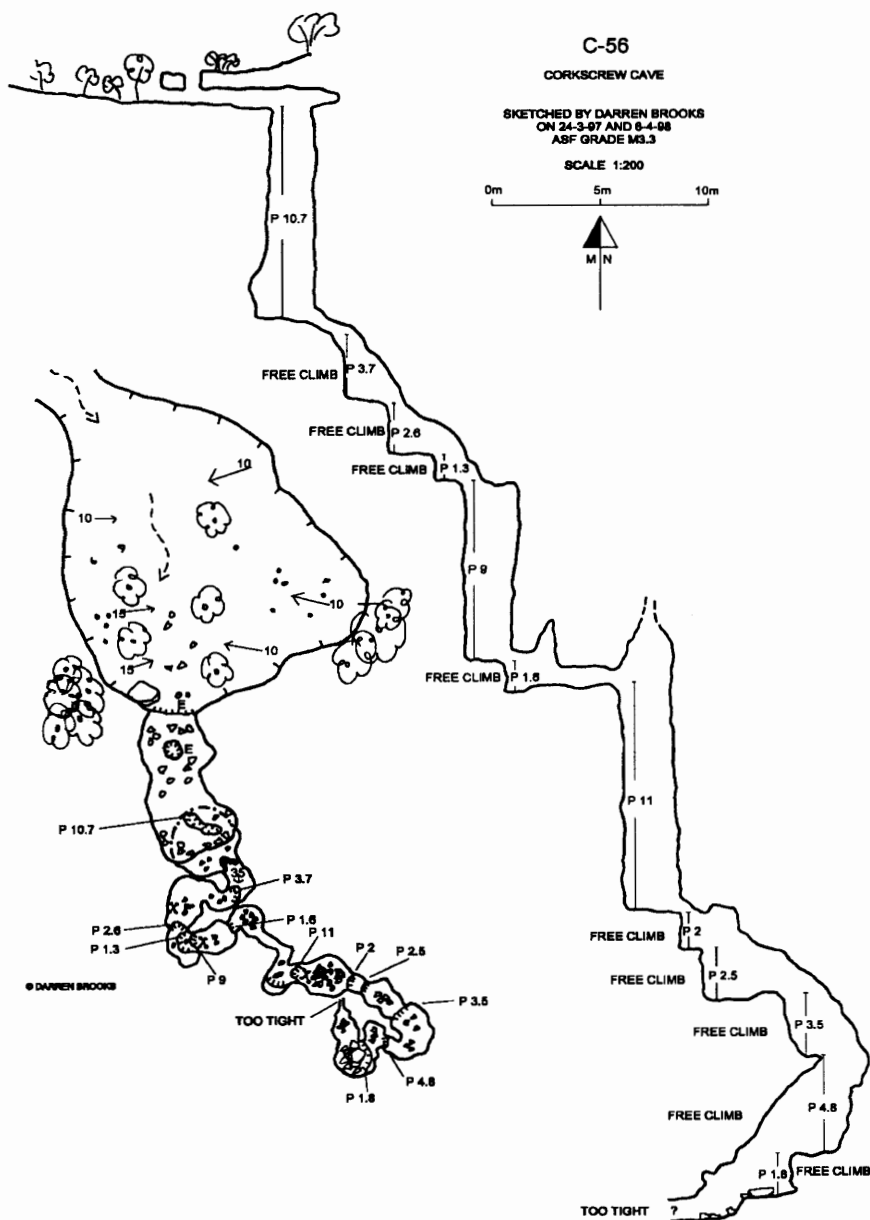
The name of the cave is attributed to Brian Vine after a trip to the cave some time around 1985.

In 1989 I entered the cave during the course of the WAM expedition and found a floor at the bottom of the two free climbs to the head of the 9m pitch. At that stage I was unaware that the cave had been explored much farther and wasn't that keen to be where I was anyway due to a high level of CO₂. In 1990 I returned to the cave and once again found the floor of the cave to be at the same point as the previous year. Yet again the omnipresent high level of CO₂ was encountered.

Several years later I obtained copies of the expedition reports authored by Scott and Porritt and noted that the cave was deeper than I had found on my own forays into it.

Recent Explorations

I finally returned to Corkscrew Cave, in the company of Ken Cameron, in March 1997. To my surprise, as I still expected to find a floor where I had encountered it on previous trips into the cave, but which had disappeared completely, leaving a narrow but navigable pitch head, we pushed the cave down to the point where Tom Porritt had ceased his own explorations back in 1984. Here we found a mud coated semi-chamber at the head of the 11m pitch. Riggging in this area was difficult due to poor quality rock and a lack of obvious natural anchors. With this pitch rigged I descended to the bottom to find a rocky floor with a small vertical hole in the floor on the opposite wall. I took a quick look in here with my torch, as the CO₂ was so high I couldn't get a descent flame out of my carbide lamp. Ken didn't descend the pitch as I was on rope in a flash and racing to get above the CO₂. (*Racing to get above CO₂ basically means one step and then 10 or 20 breaths, one step etc*) Near the top of the pitch the air felt a



Corkscrew Cave

little better but then the unstable looking rock eventually *proved* itself unstable when a large chunk pulled out of the wall along with a tricam, sending a chunk down onto my hand and several other pieces whistling past my ears and down to the bottom of the pitch.

On the 6th April 1998, it was decided that it was high time for another push into the unexplored recesses of C-56. Ken and I, accompanied by Paul Brooks, Rod Williams and Terry Gee made the trip up Charles Knife Rd to the entrance of the cave. Ken and I made a fast trip to the previous point of exploration at the bottom of the 11m pitch. From here I descended the small hole in the floor at the base of the far wall. Once through this constriction the shaft opened out a bit and the going got easier, so much so that I realized the way below was probably quite an easy free climb. Unfortunately I also encountered a rising level of the ubiquitous CO₂. I realized for the sake of my own safety that it would be better to stay attached to the rope and feed it through my descender as I went down. This would at least make it easier to recover my body if anything went wrong!

Several climbs, 2m, 2.5m and then 3.5m led to a short horizontal section

where the passage did a U-turn and dropped 4.8m and finally 1.8m. At this point I was in a small chamber which led under the area of the 11m pitch and seemed to peter out in an impassable narrow joint. Because the high level of CO₂ made it hard enough drawing the sketch, I didn't bother examining the joint, which at any rate meant going down another metre or so. I felt I was pushing my luck as it was and just wanted to get out. Plus I was at the end of my tether, literally, and didn't feel at all inclined to leave the rope behind, not even for just a few metres of walking.

An uncomfortable ascent up the climbs resulted in an even more uncomfortable wriggle through the constriction at the bottom of the 11m pitch. Flagging energy levels and the inexorable tug of gravity made for an unpleasant exit from the lower regions of the cave.

Thus, the cave has *probably* been explored to the farthest humanly navigable point.

Troglotauna has been recorded from the cave but the fauna is poorly known. The list below is of fauna collected in 1989 and 1990 by Brian Vine, Darren Brooks and Angus Humphreys. (Data courtesy of Bill

Humphreys and the W.A. Museum)

Earthworm, (Oligochaeta: Haplotaxida)

Slaters, (Malacostraca: Isopoda)

*Millipede, *Stygiochiropus communis* Humphreys & Shear (Diplopoda: Polydesmida: Paradoxosomatidae: Australiosomatinae: Antichiropodini)

Mite, *Ornithodoros gurneyi*

*Spider, *Janusia* sp. 2 (Arachnida: Araneae: Ctenidae)

*Micro-whipscorpion, *Draculoides vinei* (Harvey) (Arachnida: Schizomida: Hubbardiidae)

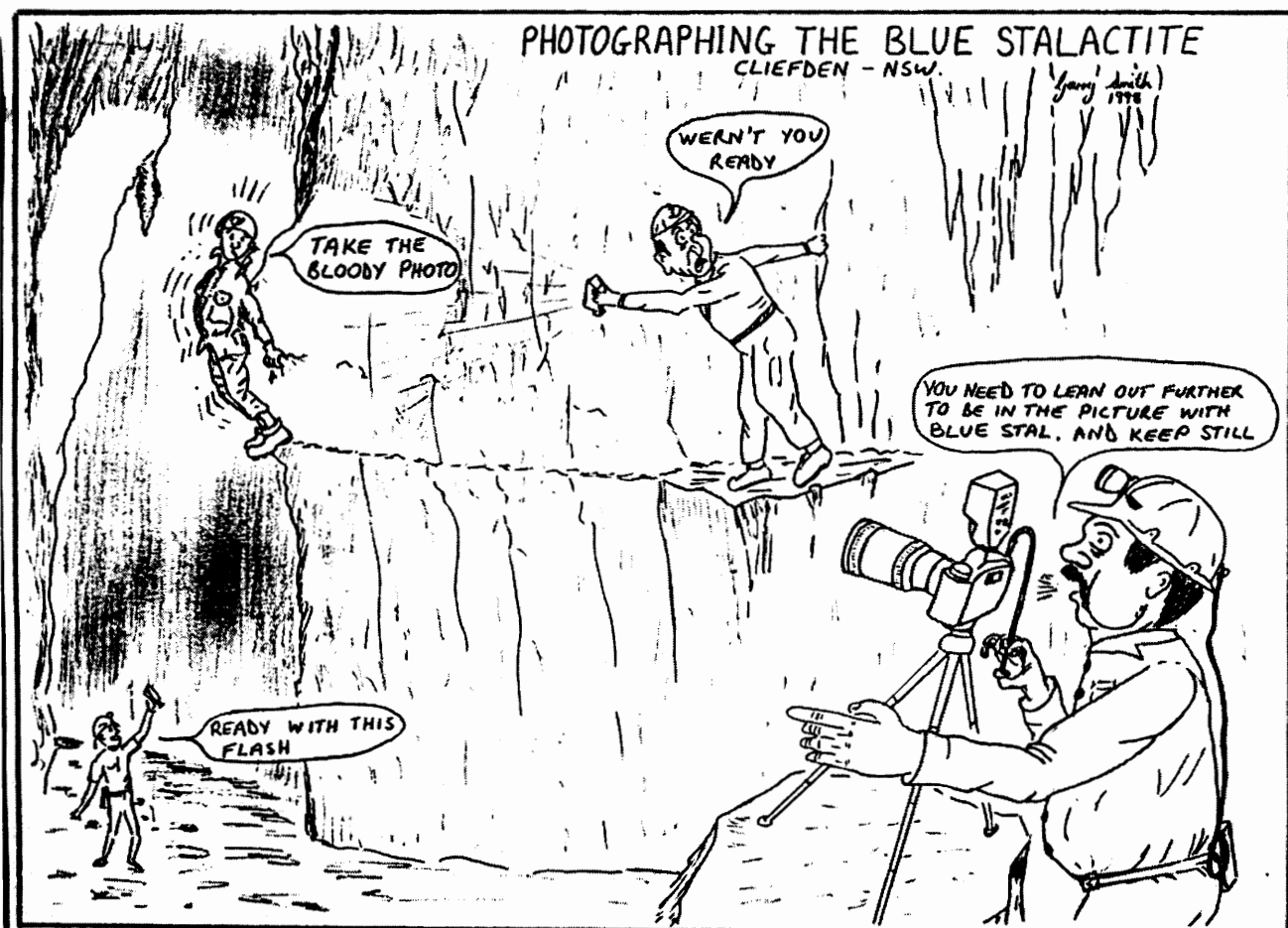
Springtails (Collembola)

*Blind cricket, *Ngamarlangua luisae* Rentz & Su (Insecta: Orthoptera: Gryllidae: Nemobiinae)

Reduviid bug *Centrogonus* sp. (Insecta: Hemiptera: Reduviidae: Stenopodainae)

Dentary (Vertebrata)

Those marked * are endemic to Cape Range.}



New & Changed ASF Cave Map Symbols

Compiled by Ken Grimes
(Convenor, ASF Survey and Map Standards Commission)

Introduction

It was late in 1996 that I first got involved in the debate concerning an International set of cave map symbols. Philipp Haeuselmann (otherwise known as Praezis) was convener of the UIS (Union Internationale de Speleologie) group that was thrashing out the symbols. He communicated with me by email and we exchanged views. The first public discussion in Australia was at the ASF Conference at Quorn in April 1997 where I displayed the proposed UIS symbols, and some suggestions of my own concerning their relative merit versus our own ASF symbol set. I placed a discussion paper and links to the UIS proposal on the ASF web site in 1997. There was minor feedback and I passed on a final set of Australian proposals to Philipp for discussion at the UIS congress, in Switzerland, in August 1997. I gather the debate was fairly noisy, but several of our Australian suggestions did get adopted. The final list constructed at the congress was then circulated for voting by the various country representatives. This voting took place in 1998. I "abstained" on Australia's behalf because of some perceived inconsistencies among the UIS symbols, and conflicts with our existing ASF symbols. The vote at the end of 1998 was strongly in favour of the final set of symbols.

The next step was for us to decide whether we would change our Australian map symbols to match the UIS standard or "go it alone". Adopting new symbols would obviously cause some confusion during the transition period. However, there are also obvious advantages in modifying the ASF standard to conform as closely as possible with the new UIS standard - at least for those of us that look at overseas maps, or who expect that our maps may be looked at by people from the rest of the world. Also some of the UIS symbols were intrinsically better than ours - i.e. more logical, easier to recognise or easier to draw.

This was discussed at a workshop at the ASF Conference at Rockhampton, in January 1999, where about 40 cavers discussed each conflicting symbol in turn and agreed to accept some of the UIS symbols but also to retain some of our own. We also discussed proposed changes to some other symbols in the ASF set. The present report summarises the decisions made at that meeting.

Note that although the matter is now nearly completed, I am prepared to listen to any final discussions from those of you who did not take part in either of the ASF workshops (1997, 1999) or the internet communications centred on the pages placed on the ASF web site. But any argument for changes will have to be fairly strong to

override the existing consensus shown at the 1999 ASF conference.

A full discussion of the new symbols and those that we voted to retain is available on the ASF web page at:

<http://rubens.its.unimelb.edu.au/~pgm/asf/STab-1N.html>

and the full (modified) ASF symbol set can be seen at:

<http://rubens.its.unimelb.edu.au/~pgm/asf/STab-1A.html>

The old ASF symbol set can be seen in the Australian Karst Index (1985) on pages 18-13 to 18-17.

The diagram accompanying this report shows a list of common cave map symbols included in the ASF symbol set, including all those that have changed. A brief discussion of those that have changed is given below.

The UIS Symbol List

The full UIS Map Symbol List, as accepted in 1998, can be viewed on the internet at:

<http://www.gis.univie.ac.at/strv/strv/leute/andi/caving/cave-symbols/english.html>

For additional information on the UIS symbols please contact Praezis (Philipp Haeuselmann) at praezis@mpi.unibe.ch.

or via Snail-Mail at:

Philipp Haeuselmann.

Haldenstr. 32

3014 Bern, Switzerland.

Existing ASF symbols that have been retained

At the January workshop we decided to retain the following existing ASF symbols, even though they differ from the UIS symbol.

Ceiling Form (Roof Step) - The UIS symbol differs from the ASF symbol, being similar to that used for a floor step -but has a dashed base-line with tics rather than a continuous line with tics. I argued against this as I felt that the UIS symbol is too similar to the symbol for a floor step -which could cause confusion. At the 1999 Rockhampton ASF Conference there was a strong agreement to stick with the existing ASF symbol. However, the ASF symbol for a roof canyon has been changed to bring it into conformity with the roof step symbol (see accompanying diagram).

Clastic Sediments -Sand, Mud, Vegetable debris - The UIS standard uses a single symbol (a pattern of dots) for all types of sediments. In contrast, the ASF has three symbols: Sand, Silt/mud/clay and Vegetable

debris. This is a useful distinction, and one that can be easily made by non-geologists (sand is the stuff that rubs your skin off, mud is the finer slippery stuff that sticks). At the 1999 ASF Conference we agreed to retain the three ASF symbols.

Flowstone - The UIS symbol (a set of dashed lines) is similar to that commonly used for a mud floor in Australia -and is also the standard symbol used for that material on geological maps and diagrams. At the ASF 1999 conference we agreed to retain the existing ASF symbol.

Moonmilk - The current ASF symbol is similar to the UIS one, but on ours the legs are closer together (no snide remarks please), and for us it is probably better as it is less likely to be confused with our symbol for flowstone.

New UIS symbols that will replace old ASF symbols

Roof Height and Water Depth - The new UIS symbol for passage height is a number (metres) inside a circle. Probably best placed outside a narrow passage, but in a big chamber several symbols can be scattered about inside it to show variations. The UIS does not define a symbol for water depth, but the common usage overseas is a number inside a semi-circle, as shown on the diagram.

Guano - The new UIS symbol is shown below (I think it is meant to be a "gamma" character):

Stalagmites, Stalactites, Columns - ***This is a major change.*** The UIS standard uses a set of three conformable symbols shown on the diagram. They make a logical set, and one that is much simpler than the existing ASF symbol set. Large stalagmites and columns can still be drawn to actual scale and shape using the prior ASF symbols.

Flowing Water, Pool, and Sump. - The main difference here is that the UIS system uses a diagonal hatch for both flowing streams and standing pools, differentiating them by adding an arrow for streams. It uses a diagonal cross-hatch for sumps. This differs from the old ASF symbols only in the orientation of the hatch lines. We decided to adopt the new UIS symbols, but retain the ASF arrow for intermittent streams.

Current Scallop & Flutes in general. - The new UIS symbols have an advantage over the old ASF one in that they add a version for the case where the flow direction is not obvious.

Direction of air flow - The new UIS proposal uses the standard meteorological wind arrow, but always has two tails. This seems more consistent than the old ASF arrow.

Paleo-current direction. - The UIS and ASF symbol lists both have symbols for current scallops, which indicate direction of the deduced water flow. But during the discussions Australia suggested a need for a general symbol for all old flow directions, which is not linked to a single method. This could be used for flows deduced

ASF Cave map Symbols

from scallops, flutes, imbricated gravels, rippled sediments, etc. and even for flow directions of lava in volcanic caves!

Other New or Modified Symbols for the ASF list

In addition to the changes to provide conformity with the UIS standard, several other changes were debated at the 1999 ASF Conference.

Convex and concave changes in slope of floor or roof. - Nobody seemed to be using these symbols and they were difficult to read and could be confused with other symbols. So at the 1999 ASF conference we decided to remove them from the ASF list. In most cases a simple slope arrow will substitute, perhaps coupled with a line to mark the actual break-of-slope. Such things are generally better shown by use of a long-profile.

Entrances (Horizontal and Vertical) - I was not happy with either the UIS symbols or the existing ASF ones. Both lacked consistency, and partly ignored the existing symbols for pits, cliffs and roof steps (which are the essential parts of any entrance). At the 1999 ASF Conference my suggestions were accepted, and the new symbols are shown on the diagram.

The new ASF symbol uses a cliff symbol to outline the vertical face of the entrance coupled with a roof step symbol to indicate the "drip-line" where the cave passage takes off. Floor slope arrows are added where the entrance is not vertical. To distinguish an entrance from a shaft connecting two levels or any other situation that uses cliff or floor step symbols a heavier line thickness is used for the entrance cliff line (one that is even heavier than the cave wall lines). Suggested line thicknesses (pen sizes) are: 0.5mm for entrances, 0.35mm for cave walls, and 0.2mm line width for all other detail.

Tree Roots - The UIS has no symbol for tree roots, but unfortunately the old ASF symbol clashes with the new UIS symbol for a stalactites, so had to be changed. At the 1999 ASF Conference several suggestions were made, and we settled on the symbol shown here. It can be drawn vertically for hanging roots, or horizontally for root mats on the floor.

Roof and Floor Slots and Canyons - The ASF symbol for a roof slot has been changed to bring it into conformity with the roof step symbol. Wide canyons

are shown with the standard symbol (line with dots on low side) but narrow slots are shown as a single central line with dots on both sides. A similar approach is suggested for floor slots and canyons.

Degraded doline - The new symbol, as discussed at the 1999 ASF Conference, uses standard slope arrows, with an optional dashed line for the upper break-in-slope where that is well defined. For very small hollows, where there is no room for arrows, use the dashed line on its own.

Cliffed doline - The old version conflicted with the old (and new) symbols for a doline + cave entrance! The new version uses the standard cliff symbol of topographic maps.

Cliff line - The old version was not in conformity with most topographic maps, which use a symbol similar to the ASF floor step. The new version uses the standard topographic symbol: a line with ticks on the lower side.

Conclusion

There is, of course, no law that says that an Australian cave mapper has to use the ASF symbols, and I must confess that I tend to use some variants that are not strictly ASF (e.g. I use a simple dash pattern for mud, rather than the ASF dot-dash, and have done so on the accompanying diagram because that pattern is built into my CAD program and the other is not!). However, it makes life easier for people looking at your maps if the symbols on it are common ones they are familiar with. If you do decide to use your own symbols, or to stick with the old ASF symbols, please add a reference list to your maps showing, and defining, all the symbols used (both old and new). During the transition period when maps with both old and new symbols are in use it will be advisable to do this on all maps, even those that do stick to the new symbols.

COMMON SYMBOLS USED IN CAVE MAPS



KGG 3-1999

Nakani 98

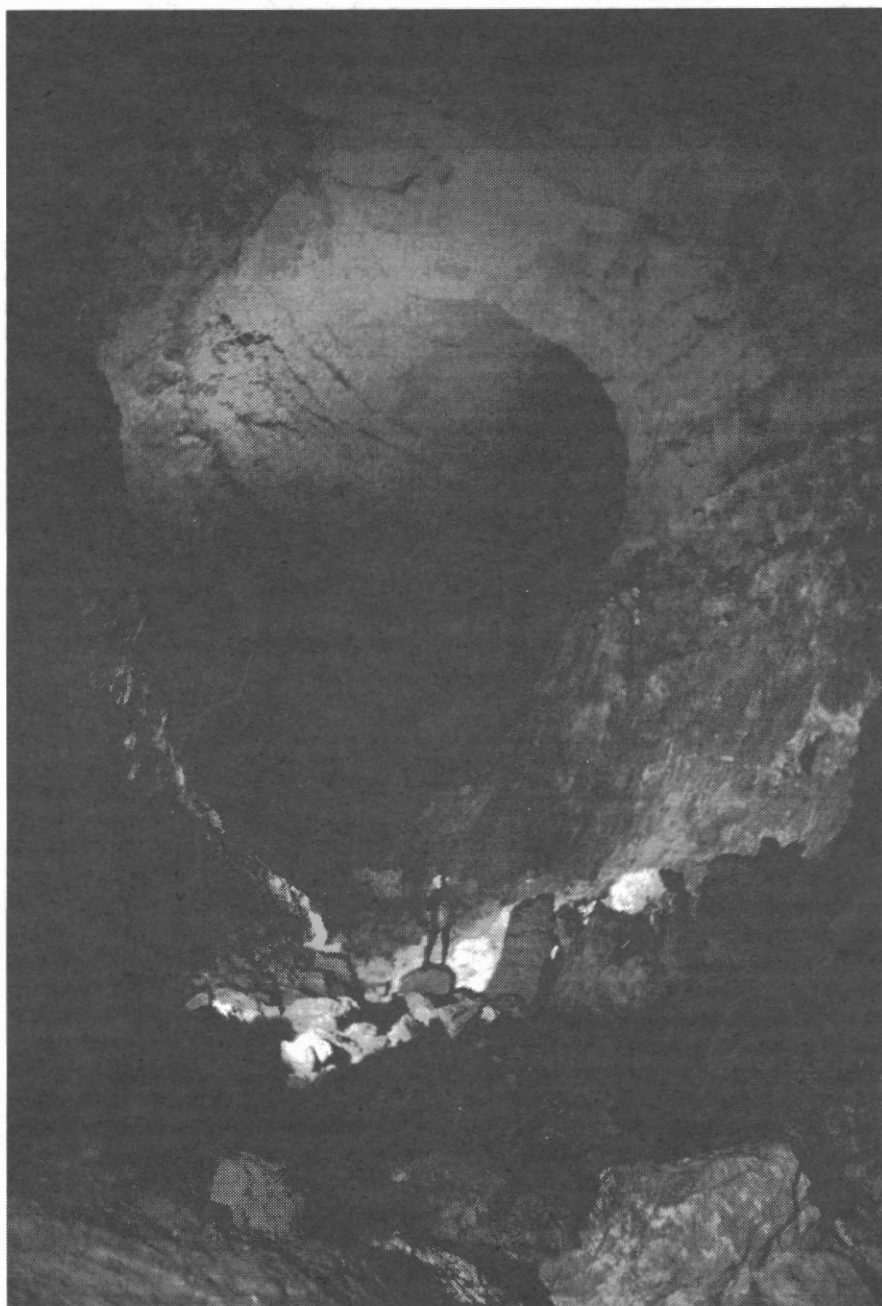
Text & photos by Al Warild

if we could get a a few days extension on our less expensive airfare and came out with a free ticket. There was however a catch: I had to visit Kavakuna Cave (I d only wanted to go there for 20 years), and report back on the logistics of adventure tourists getting to the place. Sometimes (just sometimes) things work out ridiculously right.

So, in the few days as the rest of the gang were arriving we 3 Aussies went for a walk in the rainforest. From the coastal village of Pomio, and climbed up to 300 m and the village of Rolangi 3 houses, a house boy (hut for men s business, and for visitors to stay in), and an old logging company barracks. Even at this moderate altitude, the air was refreshingly comfortable compared to the stifling humidity and heat of the coast.

Next morning we were off for a day trip up the next 300 m and 5 km to Kavakuna with our local guides. The first half hour is through re-growing logging devastation, then its into the virgin forest. The loggers didn t want this part, the trees are too small. In a few hours we were at the site of the 1979 French base camp and we could see something apart from trees. Walking in rainforests has lousy views, so when you see more than about 50 m, you call it a view . We had just climbed up a hill and could see a bright area ahead, and the roar of water below. Kavakuna has a 300 m deep doline entrance punched into the jungle. Fortunately it s one of the few big caves in the area where the doline has anywhere gentle enough to climb down without tackle just.

As you descend the trees get smaller and you can see more. The headwall above the cave rears up to a 150 m high cliff. By the time the trees get to 2 m tall and thin down a bit, you



Large passage at the bottom of Arcturus cave

realise that you ve been underground for some time. Below on the left is a

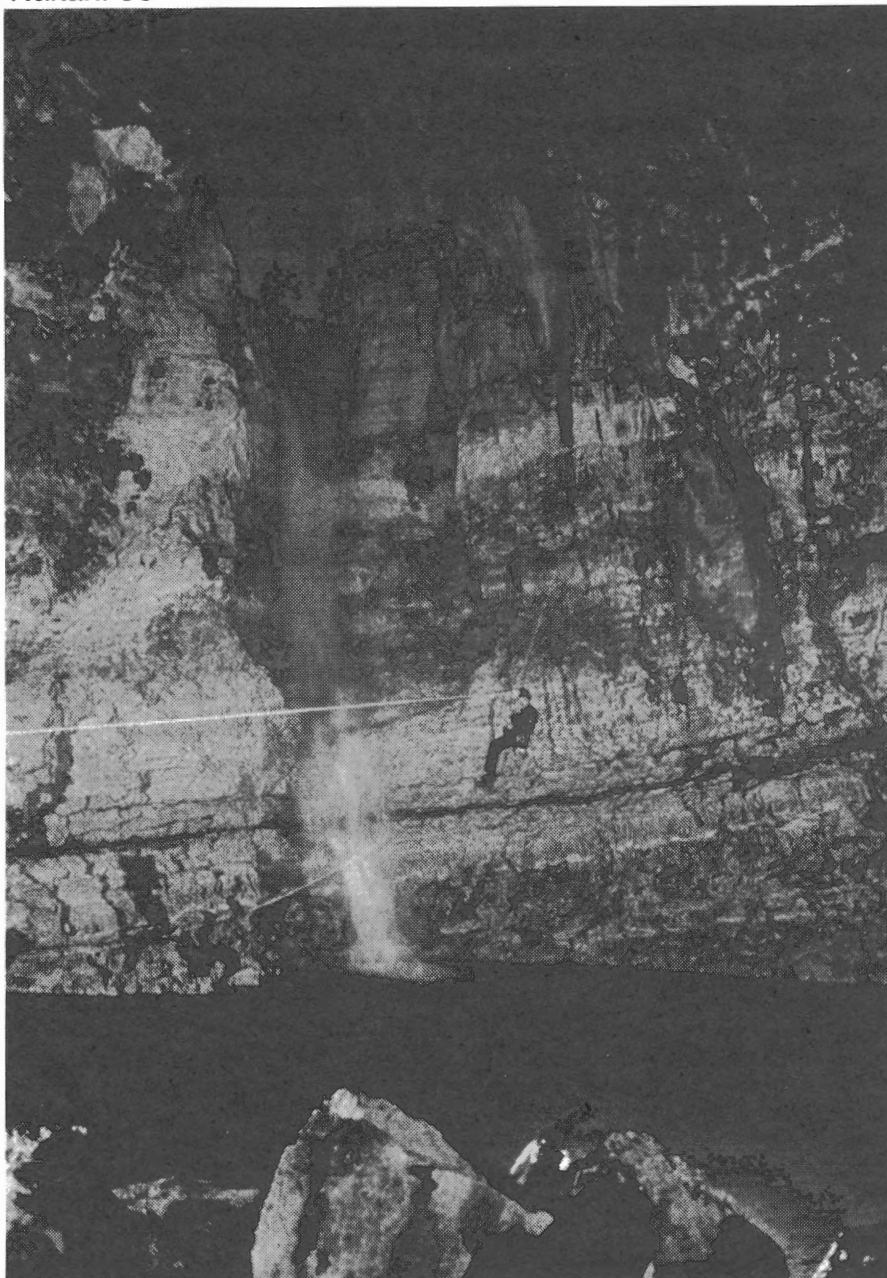
twin waterfall crashing onto the foot of the rockpile. Straight ahead, a river emerges from under the boulders, and the combined flow heads off into the darkness. When you get there you find that the

river sumps into a 15 m diameter sump pool a great churning mass of whitewater. Might leave that one to cave divers of the future.

At the top of the twin waterfalls is about 3 km of passage, so we took a quick look, then got on our way home. The suffering you have to go through for a free air ticket sometimes.

Back at Pomio you can swim in the idyllic tropical lagoon. Then again there s the puk puk story. Last expedition Jean-Paul saw one big enough to swallow him whole. The locals will tell you there are no puk pucks around





The tyrolean to cross the pool at the bottom of the Puits du Viscont, around -250 m in Muruk

Pomio. Occasionally one swims across from the swamps on the other side of the bay, but the don't live in Pomio. Perhaps they just pop over for dinner. Of course there are little ones at the back of the lagoon, but the kids frighten them. We took to only swimming in the river, which, having not long come out of a resurgence was a bit cold for puk puks (we hoped).

With everyone in town it was time to sort the gear, order the helicopter (no easy task in a town with no phone, and often, no working radio), and get the expedition under way. Things had been a little delayed because cyclone Justin had knocked down a lot of trees across the track. So many trees that Jean-Paul had to make two attempts at finding base camp set up 3 years before during the Hemisphere Sud expedition.

There were a few trees down on the way to Kavakuna, but nothing, not even a visit to a logging camp could have prepared us for the destruction. The once grand forest had been almost clear-felled by the cyclone. the wind had ripped all the leaves off the trees, and probably 30% of them had been blown over. Everywhere above 1000 m seemed to be destroyed. A year on, regrowth was taking hold. All the usual good stuff like wild raspberry and similar nasty prickles

During Hemisphere Sud we'd explored Muruk down to the end of our ropes in two going leads at 1000 m+ down. I missed the final push trips, so I HAD to get back. Muruk is easily the best sporting cave anywhere and after this expedition would also be a through trip.

The Nakani 98 expedition was the

follow-up to the Hemisphere Sud expedition in 1995. This time there were 25 of us - 19 from France, 2 from Belgium, 1 from Spain, and 3 Australians.

Without doubt it was a great trip, and just about everything went really well, even if it was the most expensive trip any of us had been on.

Because there were so many of us, we split into 3 camps:

6 people were dropped into the forest with enough food for 2 weeks, to find and explore Haricot (Bean) cave, so called because of its shape on the air photo;

6 people to Mara camp, the last reasonable camp site above the Berenice resurgence. They'd start rigging their way down to the entrance, then up the cave;

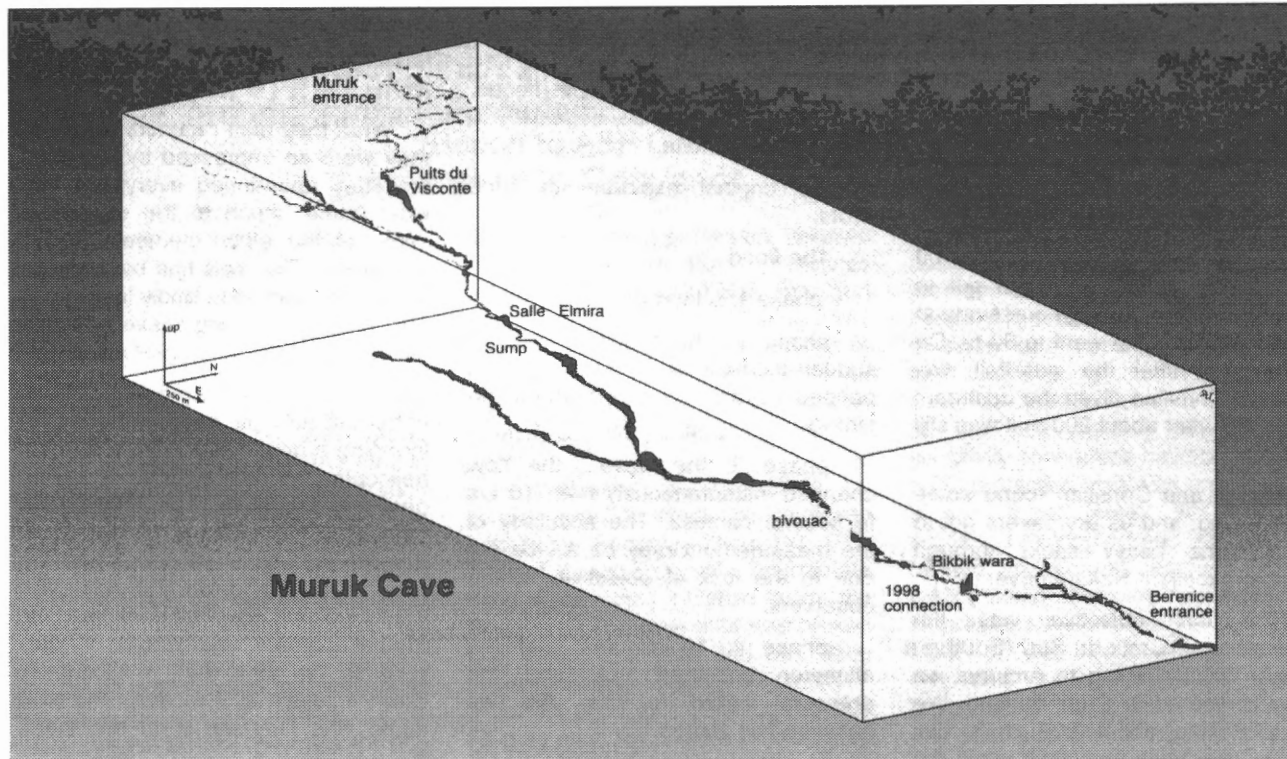
12 people to Muruk base camp. We'd start rigging down to the previous end point;

1 person, who appeared to have come on the wrong expedition and didn't make it up from the coast.

Our first objective was the Muruk Berenice through trip: in Muruk at ~1365 m asl and out Berenice at ~250 m asl. The real depth is probably 1128 m, but we couldn't do a good surface control.

The 12 at Muruk spent 10 days rigging down the cave to the -640 sump as well as looking for the odd new cave in the demolished forest. Fortunately for 6 of us, the first push was so weighed down with camping gear that they couldn't carry enough rope for the connection. Logistics were difficult because we had to dive a sump at 640 m, then bivvie at 800 m. The effort of getting gear down there meant that we worked as groups of three (that's 6 dive bottles and all the paraphernalia that goes with cave diving).

So we (Greg, Mark and Al), got to do the second push trip. We went in on the morning of the 24th of January and dived the sump, then went on to the bivvie. Seeing as it was early we went to the bottom for a quick look and rigged all the rope we were carrying down one of the most spectacular streamways we'd ever dreamed of. Picture 2 cumecs of brilliant blue-green water dropping down a 15 m pitch into a lake. From there Muruk goes quiet for a while and you have to swim through a low airspace of about one metre (remember, this IS New Guinea). At the far end of the lake, the current starts to pick up, and so does the roar



of the water. Time to grab hold of the side. Bik bik wara pitch is even more spectacular than the last one. It drops another 15m, but instead of being a straight drop it does an S, so you drop down the first part on the inside of the curve with all that water arcing out behind and above you, and hoping its still a nice day outside. A traverse, then down back with the water again. That night we got to a dry bypass that didn't look like it flooded too often.

Next day we took the last of our rope and were ready to use all of it. You soon run short of rope rigging tight lines almost the full length of the cave. Along the walls and roof as much as possible and occasionally dropping down to float along the gentler parts and getting out before the next waterfall. Fortunately, this section is an inverted keyhole shape, with an easy bridging width at the top, flaring out to 3-4 m wide passage full width with deep raging water below. After running out of rope at around midnight we decided to climb along as far as we dared and met the team coming upstream from Berenice doing the same thing.

We swapped over so that we could do the through trip out the bottom while Bernard, Michel and Enrique went out the top. So, after collecting our guide, Helene, we began traversing the remaining length of Berenice, which is a great trip in itself. Most of Berenice is a rushing streamway 3-5 m wide and usually 50+ m high, and most of it

on rope. Just about every type of traverse you could imagine swinging from anchor to anchor, then descend a short rope, cross-over and climb up to the opposite wall, back down again to a taut horizontal traverse with your bum a few centimetres above the water. Occasionally you get a rest. Sure must have been fun putting this lot in. Closer to the entrance the slope levels out and to save rope you climb along the wall up to your waist in the water. The current is still strong enough to carry you away, so you don't

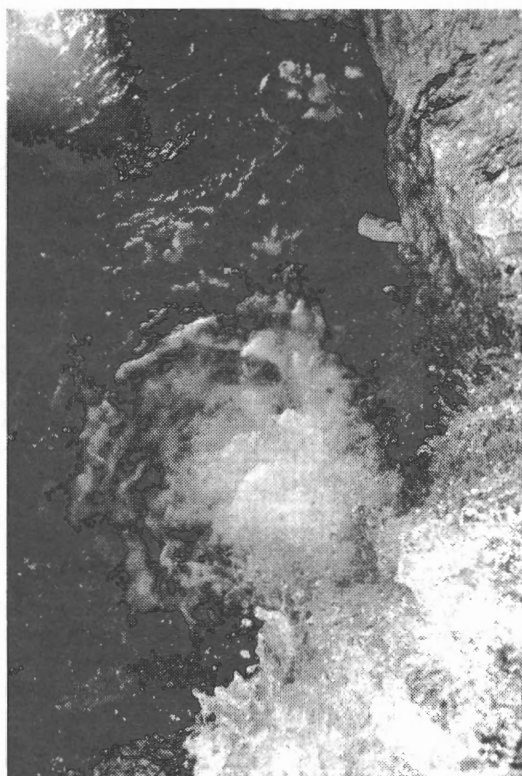
fall in. Somewhere way up above the bats are returning and disturbing the swiftlets that are about ready to head out for the day. Time sharing accommodation Niugini style.

We got out to the giant porch entrance overlooking the gorge at dawn after 20 hours on the go, and about 44 hours after entering. Two packets of noodles between the four of us to celebrate, then start 1200 m climb back to camp. The first 400 m is prusiking up the gorge wall from tree to tree. Then an easy walk to Mara camp.

After a leisurely meal, that is, jam in as much rice as you can, we continued the climb. It took us all day and we dragged ourselves into camp just on dusk, half an hour after the through-the-cave group. More food and we finally got to bed after 34 hours.

The next objective was a dive at the bottom of Arcturus. But we had to get there first. Only 3 km away, it took us 3 days cutting to get there, then a couple of road improvement trips so that we had a fast track that only took 1 1/2 hours to get along. Along the way we found Andromeda cave, a classic small meander to a couple of nice pitches, a gushing streamway, and the inevitable sump.

Back to Arcturus, and Buldo (short for the bulldozer that he is), Enrique and Monica rigged down part of the day in the middle of one of the regular deluges. This made for some interesting rigging down this relatively small classic alpine style cave. At one point a carbonate



Mark Wilson climbing a waterfall in an upstream lead in Muruk

charged stream enters and the passage becomes all but choked with bathtub sized active gours. At around - 200 m things change with a 120m pitch into a vast 30 m diameter passage. Around a couple of corners and you've walked further in 5 minutes than you've travelled in the previous 2 hours. Also around the corner is a 400 L/s waterfall entering. Michel got to dive downstream through one sump to a second sump that went to 30 m. On a later trip after the waterfall was climbed, Christian dived the upstream sump, but after about 200 m it was still going.

Michel and Christian found some good diving, and us dry cavers got to carry some heavy sacks through another excellent Nakani cave.

The last objective was the exploration of Croix du Sud (Southern Cross) Cave. Getting to Arcturus was easy compared to Croix du Sud. We were making about 800 m a day cutting new track and even when the track was in, you could only get along it at about 1 km/h. You get amazingly accustomed to walking along telegraph pole sized logs suspended several metres off the ground in the rain with a bushknife in one hand. Croix du Sud was 4.5 km or a days walk away (2 minutes by helicopter). The entrance is a 20 m deep swallow hole at the end of a (usually er... occasionally) dry

streambed. The entrance and bottom of the entrance pit is littered with tree trunks from the frequent floods. Definitely a scary place, especially in such a rainy climate.

The original explorers in 1988 wrote:

The flood

- phase 1: a loud drumming sound

-phase 2: 10 seconds later, a sudden increase in air pressure, ears popped, eyes stung and breathing strange

-phase 3: the wave... the flow changed instantaneously from 10 L/s to several cumecs. The accuracy of the measurement may be a little out due to the lack of objectivity of the observers.

-phase 4: 10 minutes later the altimeter bottomed out, and the pressure began to rise. Are we between two sumps.

-phase 5: after about 15 minutes the altimetre returned to its initial position, to our relief.

-phase 6: 2 hours waiting and the flow is back to 200 L/s. We stop the observations and get out of this horrible place!

The exploration of the most promising cave on the plateau was stopped because we only had

equipment to rig to -s00 m...and the passage continued 4 m wide and 5 m high...

What they didn't mention was that they were so impressed by the cave that they abandoned everything and went home, much to the disgust of some of the other members of the expedition. That was fine by us, it isn't every day someone kindly leaves you the most promising cave on the plateau

After 5 days of track cutting, 2 days of helipad building, and another day of lounging around waiting for a delayed helicopter, we finally got some caving gear and cautiously took off down the cave as fast as we could. As expected, it's littered with flood debris and log jams all the way down. Full sized tree trunks washed down 50 m pitches and around corners you wouldn't think possible. We got to the 8 m flood pitch, down it, down a 5 m drop and to a sump. Shit. Day one of ten and that's it.

The next day Christian and Jean-Paul dived the sump. 20 m long, 1 m deep, still in with a chance, then around the corner to sump 2. A big, deep monster, and not enough dive gear to tackle it.

em tasol

Al.



Entrance to Kavakuna looking out from the sump at -350 m (if you can call a 15 m diameter churning pool of white water a sump).

Time to Change the Code of Ethics

Sydney University Speleological Society

Introduction

At the 1999 ASF Council Meeting, it was resolved to review the ASF Code of Ethics and Conservation (CEC) and Minimum Impact Caving Code (MICC). This submission discusses the need for change, and puts forward an alternative model.

Why review the Codes?

Most cavers are generally happy with the existing CEC and MICC. They seem to be working, in as much as no-one has pointed out any glaring deficiencies. Why, then, did the Council Meeting decide that a review should take place?

During 1998, the Federation investigated the issue of bolt laddering, and whether any modification was needed to its codes and guidelines. In its submissions on the issue, an edited version of which was published in Australian Caver 1, SUSS took a broad view to the question. Rather than confine its comments to bolt laddering, SUSS approached the issue by addressing the adequacy of the CEC and MICC to adopt to changing trends in cave exploration techniques. SUSS identified what it believed was a deficiency in the codes - an overly prescriptive approach that focused on regulating particular activities without consideration of those activities in the context of the cave environment. SUSS proposed inserting a series of provisions in the MICC relating to new cave and extension exploration that it believed were worthwhile and would have a positive conservation outcome whilst avoiding the problems of overprescription.

At the 1999 Council meeting SUSS's ASF Councillor was approached by many people who indicated support for the views in SUSS's submission. Several people suggested that in the light of SUSS's comments an overall review of the Codes was warranted. Several delegates expressed their sympathy with the aims of the amendments but were concerned that the terminology was not in keeping with that of the MICC. Accordingly, it was agreed to review both the MICC and the CEC.

Purposive or Prescriptive?

This submission builds on the approach adopted in the SUSS submission on bolt laddering in advocating that ASF adopt a purposive, rather than prescriptive,

approach to the two codes under consideration. That is, rather than attempt to dictate to cavers precisely what they must and must not do, the Codes should aim at guiding cavers to make their own choices about appropriate behaviour in each of the myriad of circumstances that may present themselves in a cave.

This approach is a significant departure from the current CEC, which is almost uniformly prescriptive in nature, but is not foreign to ASF and is in fact in line with most modern environmental impact assessment procedures.

A good example which demonstrates the difference between prescriptive vs non-prescriptive codes is the contrast between the different versions of ASF's Cave Diving Code of Practice. On the topic of consumption rules, the 1988 version set out that generally the "thirds rule" should be followed, but when using propulsion vehicles or in less than ideal conditions the following rules should apply:

3.1.2 Penetration with inflow current: 1/4 rule.

3.1.3 Penetration with diver propulsion vehicles: 1/4 rule.

3.1.4 Penetration with less than favourable conditions eg. silt or restrictions: 1/4 rule.

3.1.5 Penetration with more than one of the above (eg. 3.1.2 and 3.1.4): 1/5 rule.

3.2.1 If buddy diving, where divers are using single volumes (1.2.2), then each diver must allow an adequate reserve for their buddy. (Consider that the buddy may have a greater consumption rate than the diver.)

The new version of that Code just adopted in 1999 replaces those prescriptive standards with a statement that the "thirds rule" should be followed, but:

"this will vary depending on the cave, visibility, air chambers or other entrances, current, propulsion method, isolation, buddies, distance, equipment configuration, breathing mixtures, or experience."

It can be seen that using far fewer words, the new Code not only gives the individual diver much more discretion as to the consumption rules to be followed, but also in fact covers more situations, and plays a valuable

educative role in informing divers of the large range of factors that they should take into account when determining what consumption rule to use.

The MICC is also a non-prescriptive document. Many people appear to misunderstand the MICC, proceeding straight to the numbered sections and encountering statements like:

"If it is necessary to walk on flowstone in a cave remove any muddied boots and or clothing before proceeding OR DON'T PROCEED!"

Taken on its own, this statement seems to say that ANY flowstone must be walked over with boots off. But what about irrevocably muddied flowstone, you may ask? What if taking the boots off would make no difference? This is, however, not a flaw in the MICC, because the introductory section contains the following important rider to the entire MICC:

"The following practices may be modified depending on the type of cave being visited. It should be stated that we are discussing here a code which will ensure that cavers have a minimal impact on the cave they are visiting. In many instances the practices may not apply as the impact that cavers have, may be minuscule, compared to the impact of flooding of the entire cave, for example."

SUSS believes that a recognition such as this that the same activity can have a different impact is a vitally important ingredient for any code relating to conservation. However, the current MICC only goes part of the way. It recognises that the measures set out in the MICC do not necessarily apply to any particular situation; however, cavers are given no guidance as to how they should assess any particular situation. It was this deficiency which the amendments proposed by SUSS at the 1999 council meeting attempted to address.

Of course, in some instances there may be activities that cavers think should never be carried out in caves in any circumstances. Examples that come to mind include leaving human waste in caves, or smoking in caves. It may still be appropriate to retain some element of prescription for these particular cases.

The Element of Trust

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A key objection to purposive rather than prescriptive standards is that they seem to involve a greater element of trust. If it is up to cavers to determine the limits of their own actions, who is to say they will not deliberately push the limits when it suits them?

In SUSS's view, this ignores the reality of the situation. Any Code depends on some degree of trust to be followed. The question is merely the nature of the trust. In a purposive code, cavers must be trusted to determine whether or not a provision should apply in any given case, and then comply with it. With a prescriptive code, cavers must be trusted to follow the prescribed steps. There is just as much element of trust in both steps.

SUSS contends that the nature of trust involved in a purposive code is of more value, in a conservation sense, than that involved in a prescriptive code. To see why this is so, consider for a moment this rather broad generalisation. Ethically speaking, cavers can be grouped into three groups: those that do the right thing; those that would do the right thing if they knew what it was; and those who are not likely to do the right thing even if they do know what it is. The habits of the first and third groups are unlikely to be changed. But the maximum conservation benefit will be achieved by educating those in the middle group, so that they join the first group.

From an educational point of view, a prescriptive code is not terribly useful. Those in the middle group will follow it, without much idea of why they are doing so. They learn little about what is valuable in caves, how to recognise it, and how to preserve it - instead, they merely learn "If you want to do activity X, take steps A, B and C", where those steps usually involve something administrative like getting the manager's permission or obeying permit conditions rather than taking positive conservation steps. On the other hand, a purposive code points towards a final outcome, indicates several potential ways to achieve that outcome, and makes cavers think about which is appropriate. The second group recognise that they have been entrusted with fulfilling a conservation goal, are given tools to

use to fulfil it, and must set about the task of figuring out the appropriate solution. They learn about the interaction of different elements in the cave environment, and how to resolve problems of conflict. They recognise the trust put in them, and, being prepared to do the right thing, set about finding out how to do it.

Accordingly, far from being anti-conservation, placing trust in people to work towards the objectives of a purposive code is far more likely to achieve an overall increase in awareness of conservation issues than placing trust in them to follow the rigid provisions of a prescriptive code.

Two Codes - Better than One?

This review brings an opportunity to consider whether there is a real need for two separate ASF codes both relating to conservation.

The separation is in part a historical accident. ASF has long had a CEC, and the latest version was adopted in 1992. The MICC was adopted in 1995, and there has never been formal consideration given to the amalgamation of the two documents. However, the MICC states that it is to be "used in conjunction with" the CEC.

In our view, there is little purpose in retaining two separate codes. A single code is more desirable, but with two key roles. One role would be to set out the various principles to be followed by cavers (similar to the CEC); the other role would be to give some practical examples of how those principles may be implemented.

Language of the Code

At the 1999 Council Meeting, comment was made on the "easy to read" style of the MICC compared to the CEC. Several members expressed a preference for a more 'familiar' language to be used rather than 'legalistic' terms. If the Codes are to be rewritten to be less prescriptive, it would be easier to adopt a more friendly tone that may make them more palatable to cavers, making communication of their message easier.

The revised single code is about the same length - 2000 words - as the

original CEC and MICC combined, but we believe it contains significantly more information and concepts.

Management Authorities

Specific mention should be made of the role of management authorities currently contained in the CEC. Generally, the conditions and wishes of management authorities should be taken into account and complied with by cavers. This is reflected in the current CEC, and in the draft. It should be emphasised that it is always open to managers to impose additional requirements on cavers to those included in the CEC.

However, as Henry Shannon has commented, management authorities may sometimes be unsympathetic to caves, and the interests of conservation may dictate that activities should be undertaken contrary to managers' wishes. Examples that spring to mind are conservation-related actions within quarry lands, such as the occupation of Speaking Tube Cave at Mt Etna, clandestine surveying trips to assess the extent of quarrying at Yessabah and dye tracing from Bender's Quarry above Exit Cave. All these actions would be technically in breach of the CEC as it exists at present, but had beneficial conservation results. It would be appropriate for any new code to recognise this lest managers be able to accuse cavers fighting conservation battles of breaching their own code of ethics in the process.

Conclusion

SUSS proposes below a departure from the current style of the CEC and MICC. However, it is designed to address the problems with the current code identified by many. Extensive explanations could be provided as to why particular approaches have been adopted in each case; however, we have not done so save for the general comments above.

No doubt many suggestions will be made as to how the draft code below could be improved. People will think of more impacts that should be listed, or better forms of expression. SUSS would be happy to hear them.

Draft Code of Conservation and Ethics

Protecting caves

Caves can be fragile and delicate places. Damage done in caves can be irreparable, and many sorts of activities can cause damage. Protecting caves is up to you. When visiting caves, take the time to consider the impact you

are having, and how you might minimise it.

Moving through caves

1.1 Cave in a manner responsible to the cave environment. Take particular care to avoid damage to speleothems, sediments, biota and

other natural phenomena.

1.2 Look around you. Recognise delicate formations and learn how to avoid damaging them. Some examples are:-

- Drip Holes/glop holes
- Stream Sediments
- Paleo soils
- Soil Cones
- Crusts and false floors
- Crystals
- Flowstone
- Cave Pearls
- Asphodilites
- Bone material
- Potential Archaeological sites
- Cave Fauna
- Coffee & Cream
- Tree Roots

1.3 The more people in a party, and the more equipment you carry, the more damage you may cause. Consider whether a trip for your purpose is appropriate in the cave you are visiting. Limit your party size to the number necessary to achieve the purpose of your trip. Four persons is a small but safe party size.

1.4 Move along routes that will reduce impact:

Don't transfer mud from one place to another.

Use a single track. If there is a marked route, keep to it. If not, mark a new track if appropriate. Don't wander about the cave unnecessarily.

Be aware of delicate decoration on the walls, roof and floor, and avoid hitting them with helmets, cave packs or other equipment.

Mud sediments can be valuable too. Select routes to minimise erosion of deposits.

Consider whether you are disturbing wildlife such as invertebrates or bats. Avoid passing through sites where your presence may disturb or endanger these creatures. In particular, maternal or hibernating colonies of

bats can be badly affected by nearby cavers.

1.5 Make the caving party work to avoid impact:

Watch each other, and help others through the cave. Experienced cavers should stay near novices and assist them, not rush ahead.

Warn each other of possible impacts and dangers.

Take your time. You will notice more, and be less likely to damage the cave or yourself.

1.6 Protect rigging points and other sites of localised impact with packs, cloth or rope protectors.

1.7 Go caving with someone who knows the cave, and where sensitive areas are.

2. Taking things from or leaving things in caves

2.1 Try to leave the cave environment as near as possible to the way it was when you entered. You may need permission to leave things in or take things out of caves.

2.2 Things not to leave in caves

a) Unnecessary markings like signatures or direction arrows on walls - use removable track marking instead.

b) Rubbish, such as food scraps, human waste. Take containers to carry such things out with you. If you have to eat food, eat over a plastic bag to catch crumbs.

2.3 Things only to leave in caves where appropriate

a) Scientific measuring instruments or other materials (remove on completion of experiment)

b) Signs, track marking or fixed rigging gear

used to ensure safety or minimise impact of future visits

c) Inconspicuous survey points or other markers (like entrance tags)

d) Safety equipment (like caches of supplies in long caves or caves where entrapment is likely)

2.4 Things only to take out of caves where appropriate

a) Specimens for scientific purposes (like water, mud, rock, bones or fauna). Take the minimum needed for study.

b) Historic items (like old tourist fittings or archaeological items)

2.5 After leaving a cave you may need to wash your boots and overalls so as not to carry mud and fungi into a different cave.

3. Activities in caves

3.1 When doing anything in a cave, consider: why you are doing it,

what damage you may cause to the cave, and whether the impact on the cave is acceptable given the likely outcome.

3.2. Activities that are unacceptable in caves include:

- Smoking
- Drinking alcohol
- Throwing or sculpting mud
- Deliberately disturbing fauna without good reason
- Vandalism - breaking formations, defacing the cave

3.3 Some other activities are described in the table below.

Activity	Possible impact	How to minimise impact
Camping	Extreme disturbance of campsite High potential for dropping waste	Don't camp unless necessary for safety, or to achieve a speleological or conservation purpose.
Using explosives	Deposit of chemical residue Percussive blast effects on fauna Damage to rock	Consider the environmental impact and whether another technique could be used. Discuss with the cave manager and your fellow cavers, including your Society committee, and get their approval.
Air or water tracing	Deposit of chemical residue	Use a biodegradable tracing agent. Consider which possible method could be used with the lowest impact. Discuss with your fellow cavers including your Society committee and get their approval.
Excavating or enlarging passages or entrances	Changes the cave meteorology, which can have a major impact on fauna and cave processes Damage to rock	Use the minimum modification necessary. Consider other possible techniques. Consider what the possible effects might be. Discuss with your fellow cavers including your Society committee and get their approval.
Affecting water flows (including sump levels)	Can change the cave meteorology and other cave processes.	As above.
Installing permanent rigging	Visual and physical impact. Some metals can corrode.	Try to use natural anchors. Don't install anything purely for recreation, only for safety or to minimise impact. Leave as little as possible in the cave. Use non-corrosive materials.
Temporary rigging	Can cause high impact on anchors over time if the same rigging point is used often.	Protect rigging points and other sites of localised impact with packs, cloth or rope protectors.
Traversing biologically or geologically sensitive areas	Damage or disturbance to biota or geological phenomena.	Select your route with care. Keep to the trail, or mark one if necessary. Remove boots or muddy clothing, or change clothes in clean areas.
Transport of equipment	Bulky and sharp equipment may damage rock and formation.	Minimise equipment carried. Wrap equipment in padding to avoid scratching walls. Carry carefully.

4. Exploring

4.1 There is a lot to think about when selecting the technique to explore a new cave or section

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of cave. Balance the likely gains of the exploration, and the methods you use to explore, with the impact you will have. Each situation is different. Here are some matters to consider:

- Am I likely to discover new information about the cave, including new passages?
- Is there an alternative route I could take?
- What technique, or combination of techniques, may be practical and safe while minimising impact?
- What can I do to minimise impact of future visitors (track marking, fixing permanent rigging)?
- Should I do anything to remove signs of exploration?
- Should I consult the cave manager or Society committee and get their permission?

4.2 Some possible exploration techniques that may have a significant impact on a cave are listed below. Note the possible impacts, and consider the suggestions in 3.3 above.

- Camping
- Using explosives
- Excavating or enlarging passages or entrances
- Draining sumps
- Installing permanent rigging
- Passing through geologically sensitive areas (formation, brittle rock, sediments)
- Passing through biologically sensitive areas (invertebrate or bat habitats)
- Carrying large amounts of equipment (diving gear, scaling poles)

4.3 Some things you may want to consider

before beginning your exploration are:

- Do you have surveying materials to survey any discoveries?
- Do you have trackmarking materials to mark a new track through a sensitive area?
- Have you checked to decide if a route can be by-passed?
- Are there likely to be biological/microbiological processes to be investigated in the new area? Should you bring an expert along? Should you collect samples in this pristine environment?

4.4 Don't make all the above decisions on your own. In the interests of the cave, discuss the above matters with others in your party. Consider whether you need to consult the cave manager or Society committee, especially before undertaking any high-impact activity.

4.5 Any new information about a cave should be shared in an appropriate way, such as by publication in your Society newsletter and informing the cave manager. This stops other people from repeating your work, and lets everyone have the benefit of what you have done without adding to impact.

Respecting other cavers

5.1 Make reports on your caving honest and accurate. Don't sensationalise or exaggerate.

5.2 Acknowledge any contributions made by other people. This may include previous work, information people have given to you, or physical assistance.

5.3 Co-operate with other cavers. Respect their right to pursue their own activities without interference; and when visiting an area frequented by another society be considerate of any requests they make.

5.4 Conduct any disputes in a restrained and responsible manner.

Respecting the rights of cave managers and landowners

6.1 Landowners often do not manage the caves on their property; and cave managers often do not own the land where the caves they manage are located. Consider whether you need the landowner's approval as well as that of the manager for any action you may take.

6.2 Treat landowners and managers with courtesy and respect.

6.3 Get any permission needed before entering any property or reserve. Comply with whatever restrictions are placed on you.

6.4 Leave things on land as you found them, except if instructed otherwise. This includes gates, stock, crops, equipment and landscape features.

6.5 Don't impose on others. Be as self-sufficient as possible. Have your own water and supplies.

6.6 Respect a landowner or manager's decisions as to how to protect caves. Leave gates in place, reblock entrances that were blocked, and leave open entrances that are open. If you think different protection is needed, discuss it with the landowner or manager.

6.7 Activities affecting landowners/managers and their land

The activities below could all affect a landowner or manager, or be of concern to them. They will all usually require permission - consider whether you need it. Of course, some landowners or managers may require you to get permission.

Activity	Points to consider
Blocking an entrance, surface digging, blasting	Consider the effect on any stock or vegetation. Also consider the impact on the cave (see above). Will there be any runoff? Blasting can have a major impact and should be approved by the landowner, manager and your Committee.
Installing a gate or other structures (fences etc)	Why do I need to put up this structure? Is this the best way of achieving my means? Is there a better place? If placing a gate make sure: i) keys are accessible both on-site and in a way accessible to cavers. This may mean leaving a key with a landowner/manager and keeping another for your Society. Always keep copies in case one is lost. ii) People can easily find out where to get the key. iii) There is a clear policy about who should be given the key.
Publishing information about caves	Who will read the article? Is it being published in an appropriate place? What is the landowner/manager's attitude? What is the likely effect of publication going to be on the cave? Publishing surface location information should be treated with particular care, as it could dramatically increase visitation.
Camping on a property	Do I need to camp here? Is there a recognised campsite nearby? Can I camp off the karst catchment? Observe recognised codes for minimal impact camping, removing all rubbish. Keep fires manageable and observe fire restrictions.

6.8 Unsympathetic cave managers

Occasionally caves are managed by unsympathetic people whose actions are likely to destroy caves or seriously damage them (eg mining companies). Encourage these managers to adopt a more responsible attitude

to the caves in their care. In extreme cases, it may be in the interests of long-term conservation of the caves to take some steps to preserve the caves without the approval of the landowner or manager, or even contrary to their wishes. This should only be done if no

other conservation avenue seems practical and negotiations have been exhausted. It is strongly recommended that you get support from the ASF or the State Speleological Council before taking such steps, if at all possible, and consider any legal implications.

SPELEO SYNOPSIS

No 25

January -- March 1998

by Peter Ackroyd

AUSTRALIA

CEGSA News 42(3) (August 1997)

In this issue, cave artist, June MacLucas, gives us an insight into the trials and tribulations, and the joys, of creating artworks inside some of Australia's premier caves.

CEGSA News 42(4) (November 1997)

Extracts from the first systematic recording of caves and karst features in the Nullarbor Plain are contained in this issue. In early 1955 two teachers from Kalgoorlie, Keith Quartermaine and Harry Wheeler, formally started exploring and documenting caves, blowholes and dolines and gave them QW numbers. In addition they recorded rockholes which were given another series of numbers -- RH numbers. In total they recorded over 500 features on the Nullarbor between 1953 and 1976. Their third trip in 1955 was when they started to sketch and number the features they found.

JSSS 42(1) (January 1998)

In this issue Greg Middleton regales us with tales of adventure in a report on an expedition to the northern limestone of Western Madagascar.

CEGSA News 43(1) (February 1998)

Contained in this issue is an article on caving in Thailand (dated 1988) and an obituary to Harry Wheeler who, in association with Keith Quartermaine, formed the QW speleological society in the early 1950s.

Helictite 35(1&2) (1997)

This special issue records important non-photographic images, mainly engravings, of caves originally published in the 19th century. The images are catalogued by State and indicate, where known, the present location of the original artwork.

NEW ZEALAND

NZ Speleo Bulletin 179 (September 1996)

A short, sharp story about the surveying of Kiwi Cave, a 700 metre long, tight and tortuous cave in North Taranaki, is the lead article in this issue. A list of New Zealand's longest and deepest caves is followed by the story of a 1980s entrapment by flooding of three cavers in Profanity Cave near Westport. After that 66 hour ordeal, a New Zealand search and rescue organisation was set up by cavers. This flows into a story about the surveying of Profanity Cave over many trips. A map is included.

EUROPE

Grottan 4-97 (December 1997) (in Swedish with English summaries)

In this issue there is an item on paleoclimate studies using 500 stalagmite samples from caves in South Africa and Tanzania. There is also an article on anthropological studies carried out in a cave in Finland in which stone tools from Homo erectus were found.

Descent 139 (December 1997/January 1998)

This issue is mainly devoted to a summary of the BCRA conference held in Bristol in September 1997. There are several eulogies for Rob Parker, a well known and respected cave diver who drowned in a flooded cave in the Bahamas on 17th August 1997.

Cave and Karst Science 24(2) (1997)

This issue contains articles on measuring the effects of decomposing rats on cave invertebrate populations, a summary of a conference on climate change based on the karst record in Canada and several papers and discussions on definitions of karst and pseudokarst.

Regards 30 (1997) (Belgium)

This journal from the Belgian Speleological Union contains an introduction to the karst of Germany, a report on a trip to lava caves in Japan and articles on Belgian caves including Han-sur-Lesse.

International Caver 21 (1997)

This issue has the usual broad mix of articles from around the world. We read about the opening of a significant cave in a quarry in Lebanon -- it was covered over by quarrying operations in 1969. A history of cave exploration in Poland from 1190 to 1900 is followed by a report on a 1997 caving expedition to three national parks in Central and North Thailand.

The Totes Gebirge region in Central Austria is a high, rocky limestone plateau. On it, there are several deep caves and the exploration of some of these is described. The deepest is DÖF Shacht at -839 m.

A 1997 expedition to the Dos Aguas region in Mexico re-explored and mapped the 4.7 kilometre long stream cave Cueva Grande de Puerto Hondo.

Caves & Caving 78 (Winter 1997)

In this issue we read reports of caving expeditions to Picos de Europa in Northern Spain (1996), to Romania (1996) and to Cuba (1997). A summary of the "Hidden Earth '97" conference is also included.

Descent 140 (February/March 1998)

A new cave in Dentdale (Northern England) called Nirvana is estimated to be over one kilometre in length. This issue has a report on its discovery and exploration. Also included is

a report of a trip to the Altenbesik Cave in the Taurus Mountains (Turkey) followed by a thought provoking article on self rescue from caves and how successful they can be.

AMERICAS

NSS News 55(9) (September 1997)

This issue is devoted to reports and stories from the expedition in early 1997 to Gunung Buda in Northern Sarawak, Malaysia.

NSS News 55(10) (October 1997)

A description of the exploration of El Volcán, a 372 metre deep cave in Northern Mexico, is the lead article in this issue. A summary of the events at the 1997 NSS convention in Missouri is also included.

NSS News 55(11) (November 1997)

This issue has descriptions of some caves in Saudi Arabia and a listing of the caves in Tertiary limestone near the town of Archer, Florida.

NSS News 55(12) (December 1997) Part II

American Caving Accidents, 1994 & 1995.

This invaluable review of caving accidents in America has been published after some delay. For 1994 there were 77 reports of accidents of which only one was a fatality, caused by a rockfall.

In 1995 there were 56 reports of which two were fatalities. Both of these appear to have befallen "flashlight" cavers. One was a solo caver who did not leave details of where he was going and then ran out of light underground. His mummified body was found 20 months later. In the other incident, two inexperienced people, one without a helmet, abseiled down a waterfall pitch. They were ill-equipped for ascent and one died of hypothermia in the waterfall.

In 1994 there were ten cave diving deaths and in 1995 the number of drowned cave divers was eight.

Nittany Grotto News 44(2) (November 1997)

This issue contains full clinical details of two separate cases of people who died from rabies in the USA in 1996. In both cases the Silver-haired Bat was implicated.

O Carste 10(1) (January 1998) (Brazil)

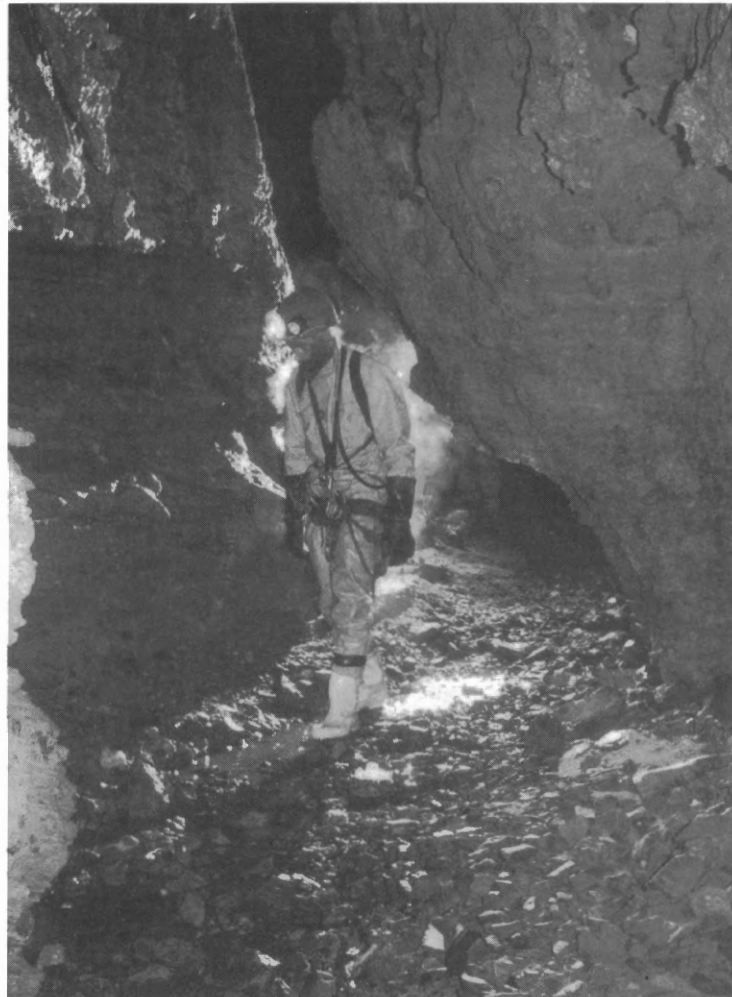
Stories of cave adventure, great photos and very high quality printing mark this magazine. In this issue there is also a report of a biological study of Brazil's wet caves and articles on underwater exploration.

NSS News 56(1) (January 1998)

A 1997 expedition which explored and surveyed several caves in the Santa Cruz Mountains, Guatemala, is the main article in this issue.



Eric Lenser admires decoration in Viceroy Shaft, Mt Owen, New Zealand. Photo: P J Ackroyd,



Eric Lenser in 300m Passage in Viceroy Shaft, Mt Owen, New Zealand. Photo P.J. Ackroyd.

Viceroy Shaft

Peter Ackroyd in Viceroy Shaft, Mt Owen, New Zealand. Photo Paul Brooker.



Mt Owen New Zealand

Eric Lenser descending entrance pitch (9m), Viceroy Shaft, Mt Owen, New Zealand. Photo P.J. Ackroyd.

