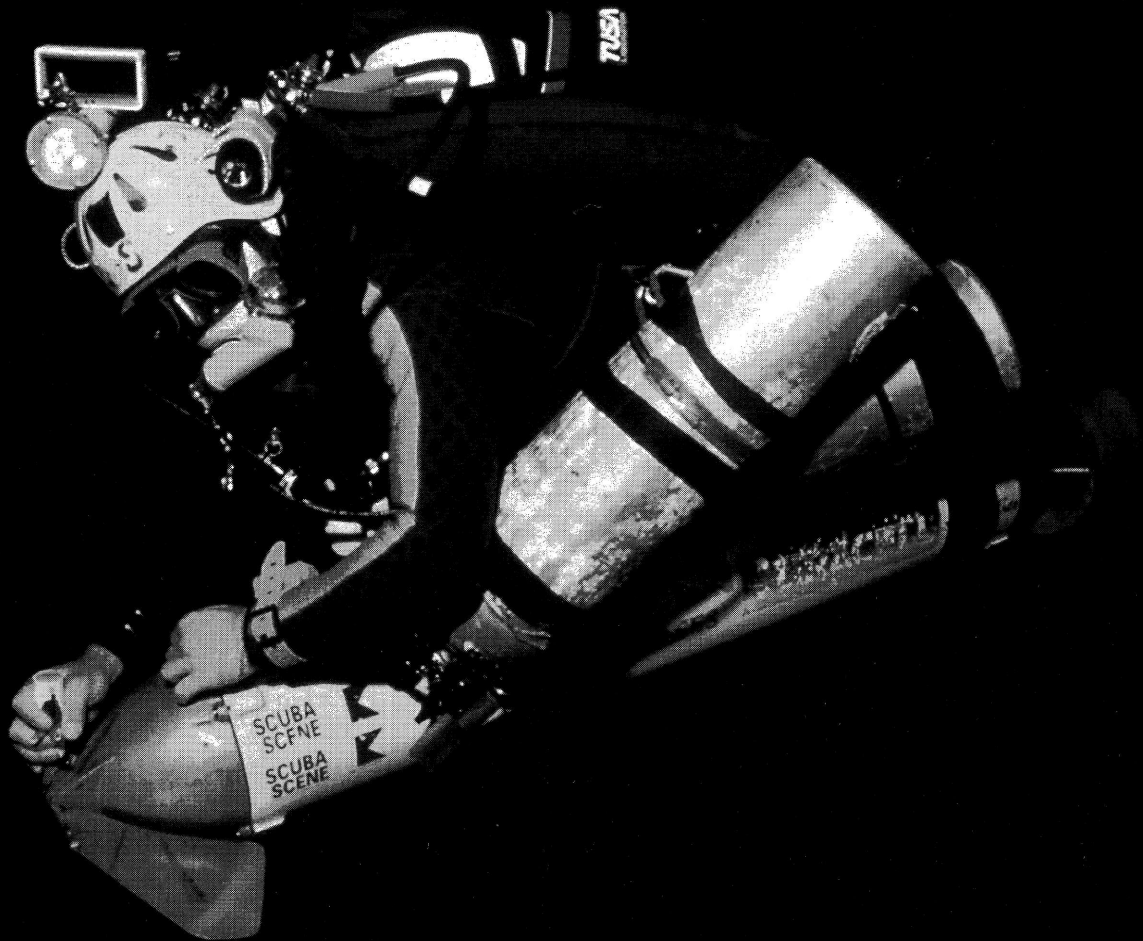


Australian Caver

No 143
Feb 1998

Journal of the Australian Speleological Federation Inc





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Back: Photo Gallery - all photos by Lucinda Coates

Editorial

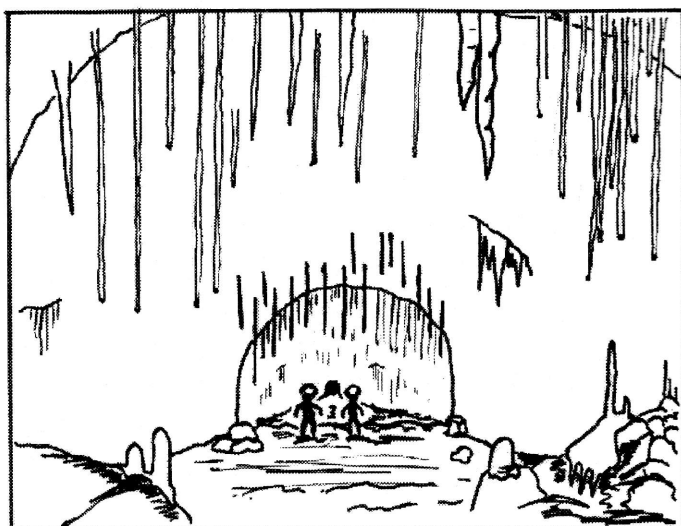
Some of you may detect a different hand at work behind this issue of Australian Caver. That's because Dean is taking a short break due to family commitments, leaving me as temporary editor. Dean has done a great job in breathing life back into Australian Caver, and that made it easy for me to do my job since I was sent plenty of great articles for this issue. They range from serious exploration to the fun and frivolous, and I hope you enjoy reading them as much as I have. Dean will be back in the saddle from next issue so any items for future issues of Australian Caver should be sent to him.

On a different topic, the A.S.F. council meeting was held in Melbourne recently. Unfortunately this was too late for a full report in this issue of Australian caver, but I can pass on some highlights which are outlined in the box on the right (thanks to Chris Norton for passing on the details).

One item from the ASF meeting that I found particularly interesting is the one year moratorium on bolt laddering. Readers of Australian Caver may remember an article I wrote about NUCC's extension in Drum Cave at Bungonia which was reached by a bolt-ladder climb (*no 140*). Under the current moratorium this exploration would not have been possible. This highlights an apparent conflict between conservation and exploration that last reared its head in the similar debate on digging. However, without exploration there would be precious little to conserve; and, while we can't undo the damage done to "old" caves in less conservation-minded times, we have the opportunity to take much better care of new finds so that cavers can continue to see them in good condition for years to come.

Whatever the final outcome of the bolting discussion is, I personally hope that any code of conduct isn't so restrictive as to have a stifling effect on cave exploration, or worse, results in people ignoring the code altogether. Whatever your own opinion, you can make sure your voice is heard by contacting Arthur Clarke, who is seeking comments on this issue on behalf of ASF - and don't forget that The letters page of Australian Caver is also a forum for your views.

Sherry Mayo (acting editor)

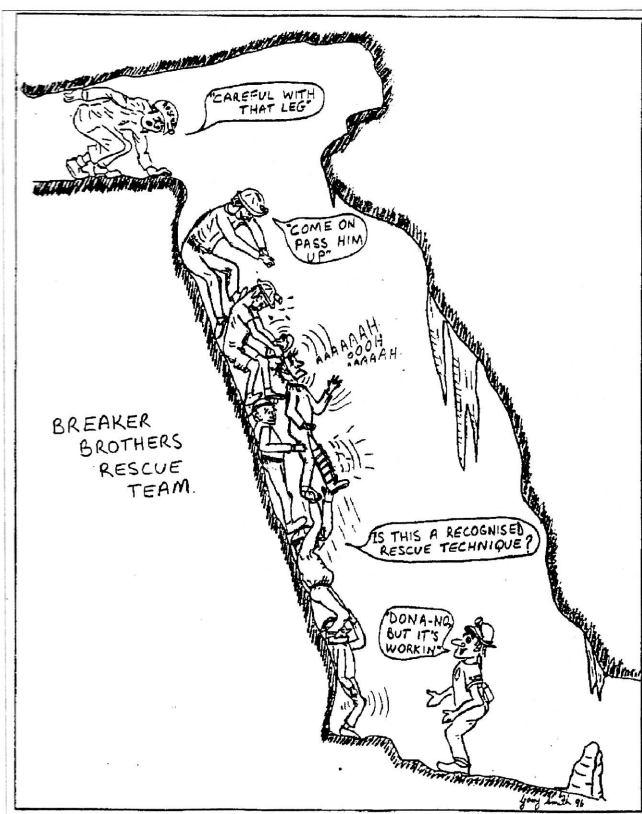


'I tell you what, wouldn't it be fun in here with a volleyball!'

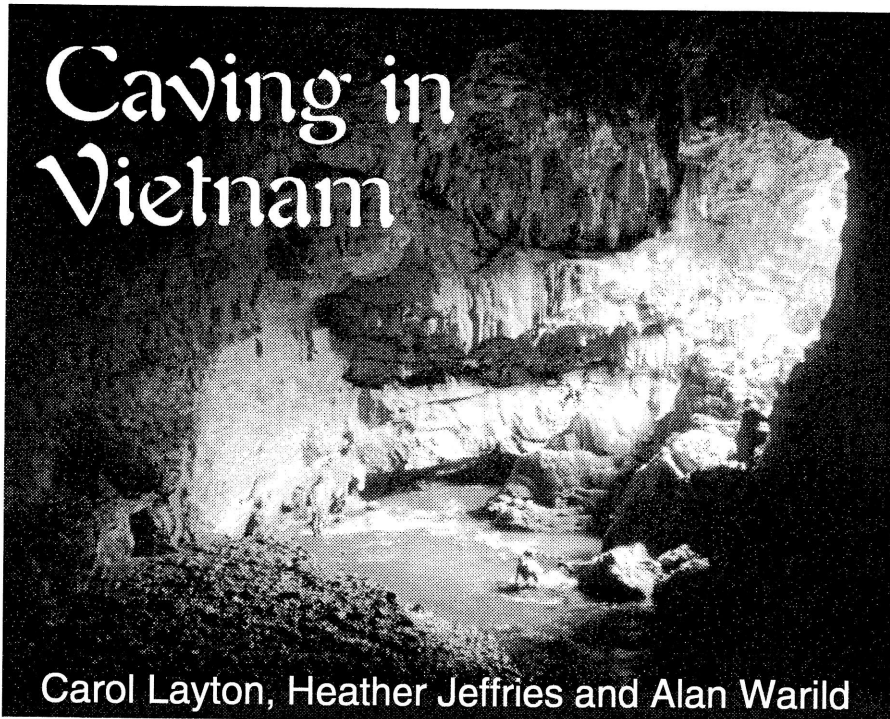
+++Late News+++

ASF Council Meeting - A very brief summary

- The new administration handbook has been completed and it was suggested that the commission concerned be wound up. The handbook's media policy section was amended to remove some ambiguity in the drafting.
- An update on the cave leadership scheme was given and the complete cave leadership document was distributed.
- Clubs were requested to provide information about any environmental projects they are, or have been, engaged in as this would enable the ASF to apply for environmentally targetted government funding
- It was noted that it has been a long time since there was a major update of ASF's Karst Index database. Clubs were asked to ensure that they were keeping data up to date, and to send data to Peter Matthews using the data sheets in the present Karst Index.
- It has been proposed that the ASF form a cave diving body to represent cave divers in access negotiations, as the existing CDAA is not considered to be sufficiently representative of Australian cave divers. Some draft amendments to the Cave Diving Code were also circulated - these and the draft Free Diving Code will be sent to clubs for comment soon.
- Cave safety was discussed with new proposals being made for the safety guidelines relating to foul air. A decision was deferred until the new proposals had been more widely disseminated (see page 28 for details of these proposals).
- Changes were agreed to the ASF fee structure to address concerns of university clubs at the new higher fees. These clubs have many transient members who will now be able to join ASF at a reduced rate but won't receive Australian Caver.
- Cave conservation concerns about the technique of bolt-laddering were raised. A one year moratorium on bolt-laddering was agreed upon during which views would be sought from clubs by Arthur Clarke on the desirability of a bolt-laddering code.
- The treasurer indicated that the ASF's finances were now under control following a period in which they had been in a poor state. It was requested that an income/expenditure report be circulated to corporate members within 3 months.
- Outside the meeting, a draft membership card was circulated for comment. Clubs who have any suggestions on what information should appear on a membership card should contact Angus Macoun with their comments.



Cartoons: above - Garry Smith
left - Steve Bunton



The streamway in Hang Mau Due 1 (Boil Before Drinking Cave)- AW

The minibus bounced wildly along the thin strip of rough bitumen shown on the map as the major highway north-west of Hanoi. The horn blasted again. Chooks, bicycles, dogs, pigs and little old ladies scattered in all directions. Carol delicately removes a size 8 hiking boot.

"C'est quoi ?a?"

"Merde"

"Merde??"

"Oui, merde"

"MERDE!!, MERDE!!, MERDE!!" (plus look of absolute horror on Bac's face)

Excuse the French but our government supplied translator speaks Vietnamese, Russian & French, but stuff-all English. It is next to impossible to get a Vietnamese driver to make a piss-stop, but find a speck (well okay, a glob then) of shit on the bottom of a boot and the minibus stops like it has just hit the back of a parked semi. (Must remember that trick). Several people busting for a piss-stop quickly exit into the rice paddy.

What a great idea, caving in Vietnam. Not too many places left to find great new caves, let alone go on an expedition to a country where the government wants you to find caves and is willing to supply local help to do it. We should have known better. When we got to the Hanoi airport the immigration officials couldn't seem to see our visas - we would have to get new ones, step this

way please. Not all of us needed a new visa, just some of us.

The '97 trip to Vietnam was proof that all the good trip preparation can come to nothing. Wayne and Heather put a huge effort into sending all the required information and more to Hanoi only to find that nothing had been arranged before we arrived.

The problem was that they do things very differently in Vietnam - a good appearance is everything, actually being cooperative is unimportant. Vietnam is your worst nightmare of how a communist country doesn't work. It is so tied up in contradictory rules and regulations that in retrospect, it's surprising we got into any caves at all.

After only four days in Hanoi (that's about three too many) we were on our way to Ha Giang (pron. harzan). Twelve cavers, three "translators" - Bac, Truong and My, and three drivers. Not bad, only 1/3 hangers on.

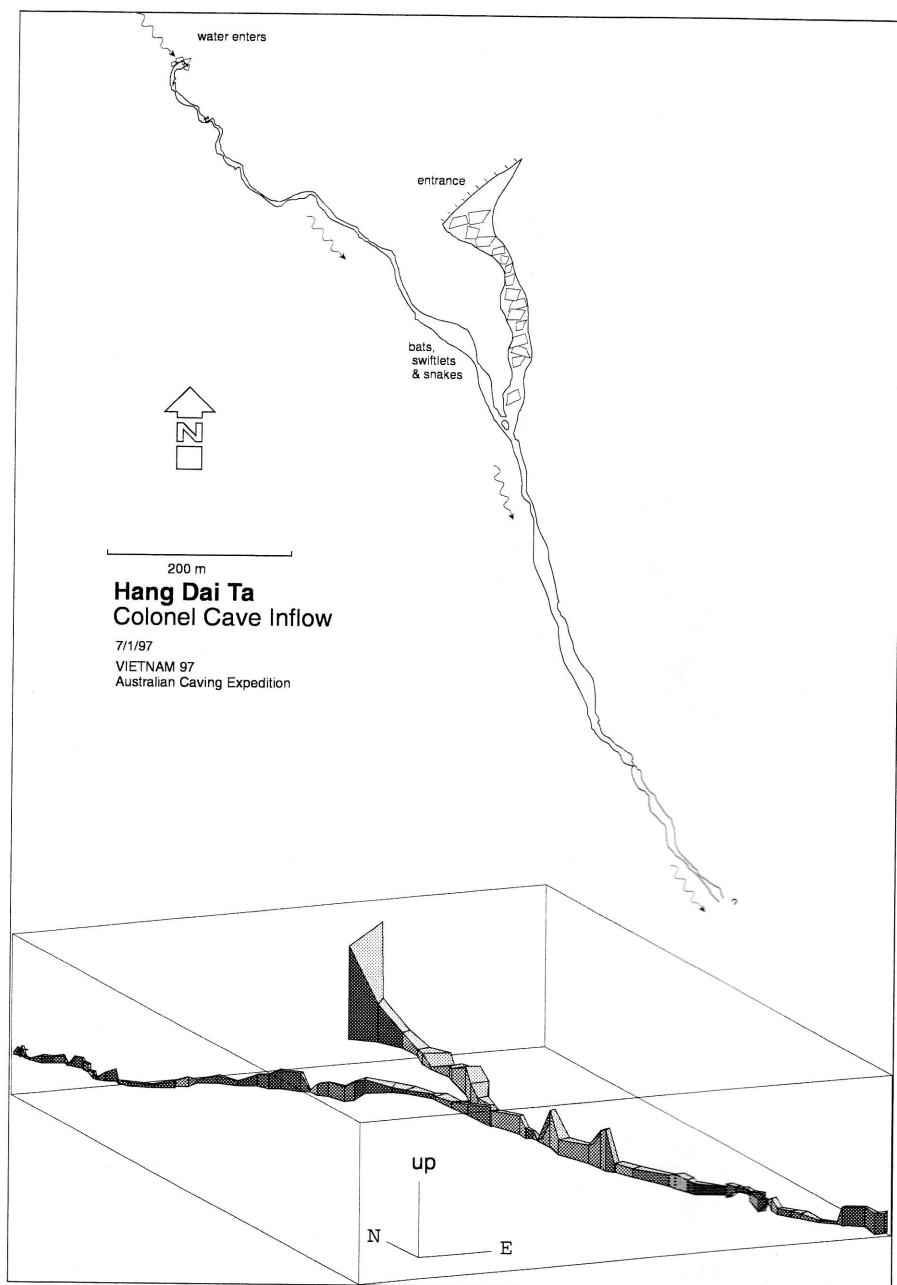
Our hosts and translators, were all from the Vietnam National University, Hanoi, Department of Geography. It was their task to cut through the maze of red tape so that we could pursue our goals, although a lot of the time we got the distinct impression they were carrying rolls of red tape secreted up their sleeves in case we got too close to any good caves.

Ha Giang Province is the most northerly province of Vietnam, up by the Chinese border. Fortunately the frontier has been quiet since 1975 when the Chinese figured that the Vietnamese had been so beaten around by the Americans that they'd be easily overrun. This sort of thing has been going on for the last 2000 years. Not surprisingly there is no love lost between Vietnam and



Every girl and her pig shows up at the Dong Van market each Sunday - AW

Caving in Vietnam



China. They are some of the most overtly racist people I've met.

In Ha Giang we were greeted as honoured guests. this involved being very formal, drinking bad green tea, and not understanding much at all of what was going on. We were assured of every assistance in reaching the caves and had permission to travel anywhere in the province.

The first objective was the large resurgence that Wayne had spotted two years before. It went about 50 metres of swimming and another 50 metres of dry high levels and was called Hang Dai Ta (Colonel Cave). The other caves were old dead holes through karst towers. Not at all interesting. Still the inflow

to Colonel Cave looked really good on the topo map.

There was no road marked to the area but a small track wound through the jungle heading straight for our cave. Our professional driver knocked the jeep out of gear and turned the engine off to save fuel as we bounced down the steep slippery mountain track. Dave tried to jump out but we held him in. Jon's GPS said only 2 km to go as we rounded the corner and the military post (couple of shacks in the jungle) came into view. Damn, but the 15 year old lieutenant in the plastic sandals seemed friendly enough and didn't offer any bad tea. After a little negotiation on Bac's part we were given a guide.

Pointing to a rusting mound of old munitions our guide warned us to keep to the track. We headed off toward the cave trying to walk in the guide's footprints, but soon realised that this was a major thoroughfare. The inflow to Colonel Cave is a 50 metre hole with a dry stream bed dropping into it at the bottom of a 150 m high cliff. We took advantage of the situation, whipped out our Mini-Mags and clambered on in. Nice cave, nice stream, nice breeze, nice snakes on the wall (the kiwis didn't know about snakes so they didn't see them). Now to get back with some real caving gear.

Back at the military post the captain was not impressed - how dare we cross the unmarked line 4 km back down the road without his permission. How we could get his permission without crossing the line I'll never understand. The only contact the post had with base was for someone to walk and hitch into town 18 km away (we kindly offered Mr Captain Sir a lift). After a day's hanging around permission was indeed granted to cross the line but 12 cavers in the cave at once seemed a bit of overkill. We decided to split into two teams of 6 each and work on alternate days until the cave was finished.

But which six? Manfred and Sabina announced that in Germany cavers were very specialised. They were specialists in pushing caves but knew nothing of surveying, so they could push the best leads and the other four could follow on behind surveying. We set them straight (and threw in a free surveying lesson) and the two groups managed 1.6 km of survey on an overnight trip with downstream still going strong. Plenty of big passage, good draught, clean water and swimming with the catfish.

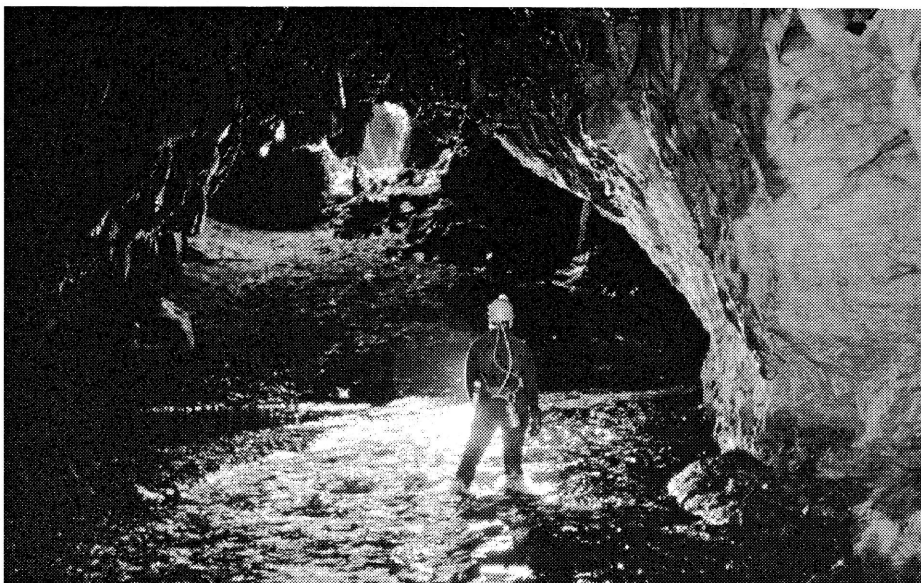
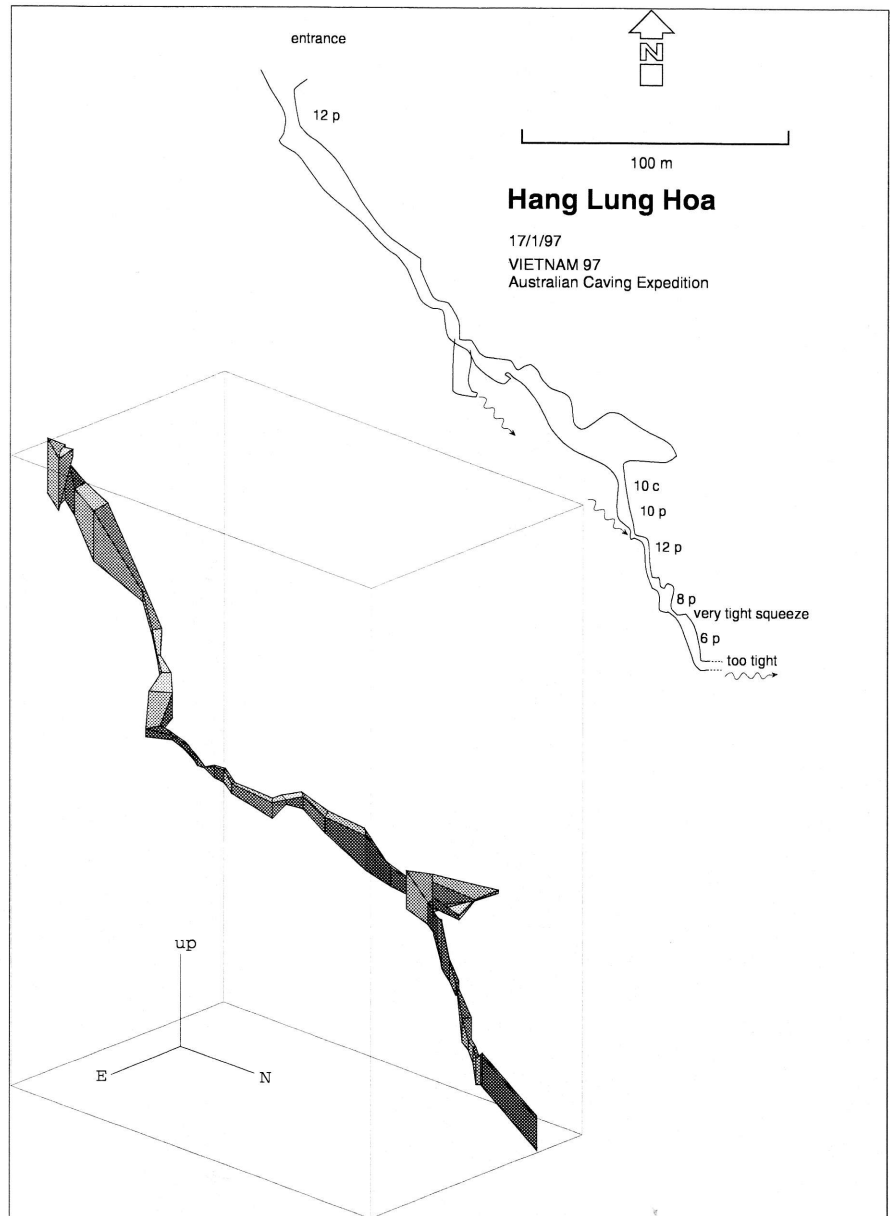
Meanwhile 'B' team got prepared for their overnight stint but the jeeps didn't return. The professional drivers had decided that they didn't want to work any more that day. We hired a local 4WD and went on in. On arrival we found that our permission was no longer suitable. We needed permission to sleep in the cave, permission to take photos, permission to map, permission to explore. Another day wasted back in town but eventually we even got permission to breathe. Back up the slimy road, but somehow the name of the cave had changed in our absence. Our permit was suddenly wrong (how silly of us to turn up with such an obviously wrong permit). We got totally pissed off, rescued our gear, and pissed off.

Objective two was the high remote town of Dong Van.

Dong Van is perhaps 160 km from Ha Giang through some spectacular karst scenery and takes about 10 hours in an ancient Russian 4WD minibus with no glass in the windows down one side, and the comparatively smooth Russian Landcruiser - no similarity to the real thing beyond the mudflaps.

We planned to spend at two to three weeks exploring the karst regions of Dong Van District, and went armed the usual dubious permission from the President of Ha Giang Province. Once in Dong Van, permission for the district was limited to only 5 days exploration, furthermore, we were only allowed to explore around the Dong Van township (rather than Dong Van district). With a bit of pushing we were allowed to explore caves directly on either side of the road. Part of the problem was that Bac and Truong really wanted us to tell them how many caves we were going to find, where we were going to find them, and how long we'd need to explore each one. When we couldn't give them the information, I suspect that they just made something up.

Despite these restrictions we got to check out many cave entrances in spectacular tower karst, but most of the caves choked after the entrance chambers. At least we were compensated by the scenery as well as seeing the comings and goings of the hill tribe peoples. They found us intriguing and often children and adults would gather around us to see what we were doing.



Looking out the outflow entrance to Hang Mau Due 2 - AW

Near Ti Phin, we started down a somewhat unappealing hole but at least it had the interest that someone had fallen down it a few years previously. The man with the old sugar sack asked if we could collect his presumably dead by now relative. 40 metres below we picked up as many of the loose bones as we could find, threw in a few dog bones to bulk him up a bit, and hauled him on out. As we brought the bag up we were a bit doubtful of the reaction of the villagers - just about everyone was there - but instead of sombre faces there was a seething, laughing mass, all elbowing and pushing to get a look in the bag.

Probably the best cave we found in Dong Van was Hang Lung Hoa. What

Caving in Vietnam

you do on a push trip is often not recommended practise. Hugh had a little peek down the entrance pitch which turned out to be a 20 m "abseil" on a 15 m tape. Perhaps it was his New Zealand training but the rest of us used rope.

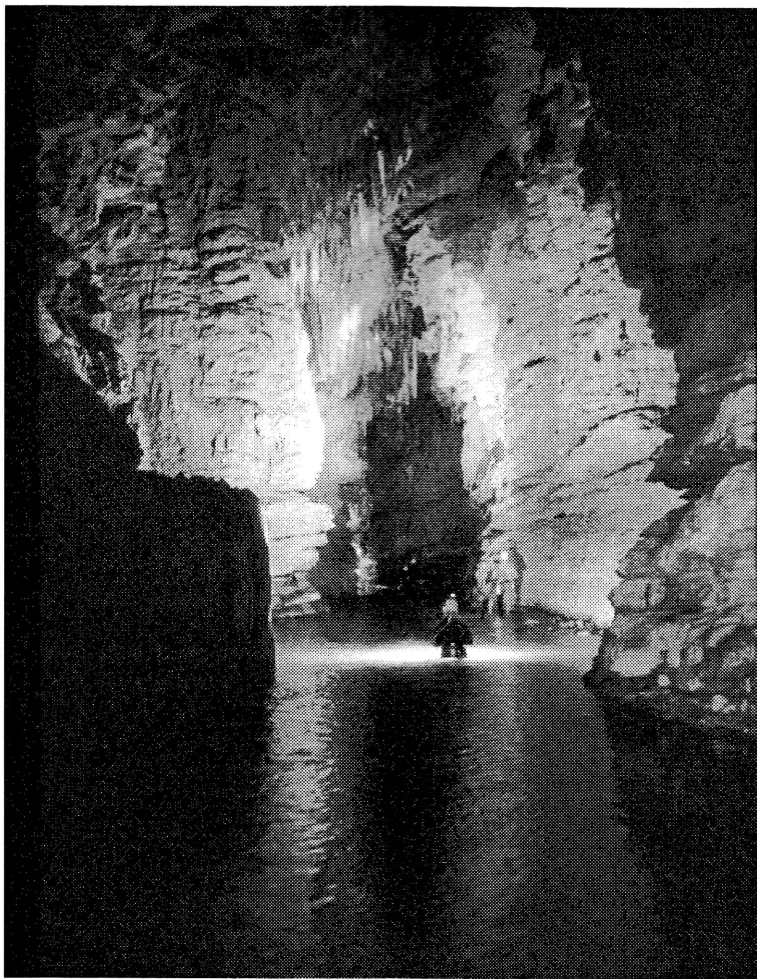
After the entrance pitch it continued down a series of climbs and small pitches in a rift. We thought we might have a decent cave finally so went in as two groups. One to push and one to survey from the entrance down. When the cave croaked the push team would survey back. Hugh, Heather and Brian made up the survey team and Al, Jon and Carol were in the push team. The push team with three full bags of rope abseiled one six metre pitch past the last known point - to a tight rift.

But, could it be made passable? Through a small hole in the rift, the passage continued. A light breeze floated on past us and down. "Let's make the hole bigger" said Carol. Al looked dubious but faced with the alternative of surveying out to meet the other team there was little choice. The three of us took turns with the bolt hammer to chip away at the limestone. We hammered just long enough to let the surveyors catch up and enjoy the show, then Carol peeled most of her gear off so as not to damage her caving suit, and Heather started cursing because she had no film in her camera. As expected, the cave croaked anyway.

After seven days we had to go. All the other locations we had been promised suddenly became impossible for one reason or another so we pulled back to Yen Minh, a town half way back to Ha Giang. As usual we were given rooms in the official government accommodation which in this case was a mix of new buildings and others with the floor at the same level as the water table. At least the officials were friendly and rather than giving us permission, they dispatched an observer to sit in the bus

all day and "watch" us. We found out later that this was so that there was no need to actually record our visit, and therefore nobody had to take responsibility for us being there.

The first day out from Yen Minh we passed by a couple of spectacular stream cave entrances, and to our surprise, we were actually allowed to go in them. The first one Hang Mau Due 2 (Two Buffaloes and a Girl Cave), went about four metres until the 0.5 cumec stream sucked in under a wall, however the outflow cave above it, Hang Mau



The streamway in Hang Mau Due 1 (Boil Before Drinking Cave) - AW

Due 1 (Boil Before Drinking Cave) had a pleasant 550 m streamway before it popped out of the hill again. The last "decent" cave was the outflow to Hang Mau Due 2. It was different to anything else we'd seen. A rockfall near the entrance meant that this once large passage was dammed up and the cave required 350m of swimming with no where to rest in its 450m length. Along the way the incoming trickles were noticeably warm, and who knows what was floating in this dark water, after all, the river did drain the town.

Ban Vang Cave (Grogan Gulch) is right beside the road and in a land with far fewer toilets than people, every hiding spot is utilised. Fortunately Ric was particularly altruistic that day and spent 15 minutes shovelling turds away from the entrance pitch which ended up measuring 25m. Even after Rick's cleanup we stepped carefully didn't want to think too much about what that mud really was or touch anything we didn't have to.

Things took a turn for the better at a large chamber containing magnificent mud (no really, it was mud) covered rimstone pools. Above a certain level, the pools were pristine. A 3m climb further on led to a series of chambers beautifully decorated with many formations and crystal pools. Probably the best tourist cave potential if the local economy could afford the logistics of developing it - and stop using the entrance as a toilet.

As a caving trip it bordered on disastrous but as a cultural experience it was, well at least a very different place to visit. Spectacular karst scenery, lack of hygiene, the people - especially the hill tribes that speak their own dialects and have their own distinctive style of dress, the gross toilets along the way, and the suspect food and water. We drank lots of carefully bottled water with hops and alcohol added. Tiger beer and local 'rocket fuel' was the order of the day. We

managed to get hold of a cheap guitar which several people were able to play. Some of us tried hard to sing in key and some simply didn't bother. The camaraderie was brilliant.

Expedition Members:

Heather Jeffries, Wayne Tyson, Ric Brown, Brian Vine (SRGWA); Carol Layton (SUSS); Hugh Fitzgerald, Jonathon Terry (NZSS); Al Warild, David Barlow, Liz Canning, and for a short time Manfred & Sabine.

Caving Definitions - A Glossary of Terms

by Max Meth

It was good to see the definitions given in AC142 p24 by David & Sharon Gwillim and Lucinda Coates. This follows on from AC134 p15-16 by Garry Smith and Pat & Geoffery Hyde.

It is essential that cavers keep up to date with terms in common usage, so I offer a few more. Some of my terms are based on a list by Ed Bailey in CEGSA NEWS of May 1972 p5.

COLLOQUIAL TERMS

ANCHOR - A heavy rock, tied to the end of a rope, which is then dropped down a pitch to ascertain the depth.

BAT - The sound heard when a flying mammal flies overhead and excretes on one's head.

BEDROCK - At the cavers dinner, the last dance of the evening before everyone leaves to go home.

CAVE SURVEYOR - A person who takes the time to accurately measure a cave passage, but has no idea of the passage of time.

CRAWL - On a caving trip, the method used to get breakfast in bed, especially on cold & wet mornings.

CRAWL - What cavers do when they don't have access to a cave that they wish to visit.

FLOWSTONE - Cavers affectionate name for Florence Stone, who in 1611 invented Stones, 'Green Ginger Wine'.

FOSSIL CHAMBER - A place where elderly cavers can play cards and watch TV.

GASTROPOD - A pocket of foul air encountered in a cave when one is too close to the caver in front.

POTHOLE - A marijuana mine. (more common in the 1960's apparently)

RIFT - In caving, a chasm that develops between a married couple, because only one wants to go caving every weekend.

SOLUTION TUBE - What the caving trip leader wishes for when faced with a serious dilemma.

SPELEOLOGY - The art of spelling.

SPELEOTHERM - A caver that on becoming lost, is now hot and bothered.

STALACTITE - A POW (Prisoner of War) camp for captured troglodytes from which escape is impossible.

STALAGMITE - A POW camp for captured troglodytes, from which escape might be possible.

STUCK - A serious problem for a caver. Prevents movement until a 'six' has been thrown. A set of dice is therefore essential in the emergency kit. Note that an emergency dice made of a sugar cube is pretty useless, as it is difficult to keep your lumps dry in most caves.

THEODOLITE - Sometimes menaces cavers, and is greatly feared and shunned by them. Actually it is a harmless religious troglodyte.

TRACE - If you drop the ladder or the trace down the cave entrance it may disappear without trace.

Well, having disposed of the serious bit, I have time for a little trivia.

It seems that a glossary of caving terms was given by J N Jennings in the AUSTRALIAN KARST INDEX, 1985, in section 14, pp1-13. The forerunner of this list appeared in the SPELEO HANDBOOK, 1968 pp15-19 and was first compiled in 1960 by Jennings. Both the above books were published by the ASF (Australian Speleological Federation incorporated).

We are now indebted to Arthur Clarke for an update of this list, with some original terms redefined and many new ones added. Arthur's list appeared in the ASF publication PROCEEDINGS OF THE 21ST BIENNIAL CONFERENCE, 1997 PP87-92. Arthur's list was titled KARST BIO-SPACE A GLOSSARY OF TERMS and it omitted some 'non bio' terms.

A complete listing of definitions of caving terms is now required. One that combines Arthur's updated definitions AND Jennings original list with other new terms added.

I think it is also worth repeating some points made by Jennings in 1985:

1) Jennings stated that his list of terms does not purport to be comprehensive, and for more complete collections of terms he gave details of 4 overseas publications that each contained a caving Glossary.

2) Jennings acknowledged the help received from other cavers in compiling the list, and pointed out that there was not agreement on all the terms included, nor on their definitions.

3) And somewhat cryptically, Jennings remarked, "Some terms which have markedly conflicting and confusing usages (in) Australia are omitted as the best deterrent to their further employment here."

But Jennings did not list the terms that he considered conflicting and confusing. And now there is perhaps no way of knowing which ones he meant. But here are three contenders:

FORMATIONS - Synonymous with DECORATION or SPELEOTHEM. This is the term in universal use by the general public and the mass media for cave decorations. Often this term means solely stalactites, and to a lesser extent, stalagmites.

FORMATION - Synonymous with KARST GEOMORPHOLOGY. *Curiously, Jennings did not define either MORPHOLOGY, GEOMORPHOLOGY, or KARST GEOMORPHOLOGY.* The use of the word FORMATION to describe the process by which the cave itself was formed, MUST BE discouraged, because it is too similar to FORMATIONS which are the cave decorations.

CAVES - Synonymous with CAVE. The use of the plural term CAVES for the singular CAVE is in universal use by the general public, eg 'we went to the caves', and 'it was raining so we sheltered in the caves' when in fact only one cave was involved. The plural usage is OK, eg "Most Australian CAVES are formed in limestone" is quite correct.

These 3 terms should not only never be used by Speleos, but also, their use by the general public should somehow be discouraged. And, by being omitted from the previous glossary, it does not appear that their usage has reduced. They are still in common usage by the general public, and by some cavers.

Caving Glossary

It is my opinion that it is better for these terms to be in the caving glossary, with a note that they are NOT recommended to be used.

More trivia: I have actually seen the term SPELEOTHERM used in a 'serious' article, when the writer actually meant SPELEOTHEM. (But I can not locate the reference just now). Of course I am seeking a SPELEOTHERM. A natural hot spa in a cave would be just the thing to find at the end of a tortuous crawl.

Here are a few definitions of terms that are of interest, that are not in either Jennings, or Clarke's lists. Some of my terms come from a "Dictionary of Geological Terms" 1957 by the American Geological Institute, New York.

ARMCHAIR CAVER - An experienced caver who now rarely if ever goes caving, but offers advice to those that do.

AVEN - A dome or vertical hole in a cave roof, that does not reach the surface and (usually) does not have any passage leading from it. cf Blind shaft.

CAVES - This term not to be used. The objection is the use of the plural when only 1 cave is implied. Use CAVE, or better yet, name the cave. eg 'we went to Big Cave' is OK, 'we took shelter in the CAVES' is NOT OK. 'Many CAVES contain a streamway' is OK.

CORALLINE - Limestone having the structure of or composed of corals, as, coralline limestone.

DOMESYNDROME - The tendency for cavers to go to the known end of a cave, especially when without due regard for the cave itself nor for its contents, and merely to be able to say 'been there, done that'.

FORAMINIFEROUS - Limestone that is composed chiefly of the remains of Foraminifera, a subclass of Sarcodina, unicellular (mostly microscopic & marine) animals that secrete tests (hard coverings) of calcium carbonate.

FORMATION - This term not to be used. Use KARST GEOMORPHOLOGY, referring to the creation of a cave. The term FORMATION is generally confused with FORMATIONS, which also should not be used.

FORMATIONS - This term not to be used. Use DECORATION or SPELEOTHEM. This term FORMATIONS is generally confused with FORMATION, which also should not be used.

KARST GEOMORPHOLOGY - The scientific study of karst landforms (both surface and subterranean) and the processes which contribute to their development.

OOLITE - A type of rock, often calcareous which grows by radial or concentric means around a nucleus. cf Kankar.

I am maintaining a glossary of caving terms that currently lists over 500 terms.

My list currently includes:

- All the terms from the Jennings list of 1985 with some of them redefined.
- Additional terms from Rauleigh Webb, Arthur Clarke, and a few others as well as some from myself.

In particular, I do not at present have a definition for the following terms: ANTHODITE, FROSTWORK, HELIGMITE, PIT, STANCE,

STATION, STEGAMITE, SUBJACENT KARST, SWIRLHOLE, SYNGENETIC KARST, TAFONI, TAPE, TOWER KARST, TRACER, TRAVERSE, VAUCLUSIAN SPRING, VERMICULATION, VERTICAL ANGLE, WATER SINK, WATER TRAP.

A complete listing of the glossary will be supplied to anyone interested, via mail or email.

A worthwhile revision of the glossary will not be possible without the cooperation and help from cavers.

I AM SEEKING COMMENTS FROM CAVERS:

- 1) AS TO THE SUITABILITY OF THE TERMS THAT ARE INCLUDED
- 2) AND OF THEIR DEFINITIONS.
- 3) SUGGESTIONS FOR ADDITIONAL TERMS TO BE INCLUDED (or deleted).

SUCH COMMENTS CERTAINLY NEED TO BE ADDRESSED BEFORE ANY THOUGHT OF PUBLICATION OF AN UPDATED LIST.

Comments are invited.

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Mail PO Box 622 Ceduna SA 5690
E-mail maxmeth@arcom.com.au

Max G Meth

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Cartoon by Steve Bunton



CHARGING & MAINTENANCE OF MINER'S CAP LAMPS & OTHER BATTERY TYPES

(How to make your Batteries Live Longer.)

By Gary Whitby - Publicity Officer - 'Newcastle and Hunter Valley Speleological Society'

Miner's Lamp Batteries

The Miner's lamp battery is a 2 cell (4 Volt) Wet Cell Lead Acid design. Constant Voltage charging rate is 4.8 V to 5.0 V (2 x 2.4 V). At this voltage sufficient gassing of the plates occurs to ensure mixing of the electrolyte and a maximum capacity. A lower voltage of 4.6 V (2 x 2.3 V) may be required if trickle charging for long periods. (more than a couple of days) Always monitor the battery during charging (and trickle charging) to ensure it is not overheating and make sure the cell vents are not blocked. If possible try to limit charging current to approximately 0.5 Amps. If fast charging the maximum charge current is 1.0 Amp.

Some tips for extending the life of your Miner's lamp battery are as follows:-

- DO NOT completely discharge the battery - stop using the battery when the lamp starts to noticeably dim.(3.5 V or 2 x 1.75 V per cell)
- DO NOT leave the battery in a discharged state for long periods of time (no more than a day or two) - try to recharge the battery as soon as possible.
- DO NOT leave a battery on charge for excessively long periods (unless trickle charging) - once gassing starts allow approximately 6 hours for full capacity to be reached. Current will generally decrease to less than 50 mA depending on the age of the battery.
- DO give batteries a top up charge at regular intervals (once a month should do) - also top up charge just before going on a caving trip.
- DO use only distilled or pure water for topping-up electrolyte levels (do not use tap water) and only top-up levels when the battery is near full charge.

A circuit diagram for a Constant Current -Voltage battery charger, on which voltage can be adjusted to charge both Miner's lights and Lead Acid Gel Cells, is shown in this issue. It will automatically limit charge current to approximately 0.5 Amps. When the gassing value of 2.35 V per cell is reached charge current decreases, due to battery back-emf, to finish less than 50mA.

Lead Acid Gel Cells

These batteries are fully sealed and are usually 6 V (3 x 2 V) and 12 V. Constant Voltage charging rates per cell are similar to those for the Miner's Lamp battery although correct charging rates are usually marked on the battery case. If charging

rates are not marked then charge at 7.2 V to 7.5 V (3 x 2.4 to 2.5 V) for 10 to 14 hours.

Tips for extending battery life are the similar to those for Miner's lamp (except for adding electrolyte). Sealed Nickel-Cadmium Cells (NiCad) Cell voltage for all NiCads is 1.25 V. Charge rates for NiCads vary depending on the Ampere/Hour rating of the cells. Charge rates are usually marked on the cell.

AA 600mA/h normal charge rate - 15 hours at 50 mA, fast charge rate 4 to 6 hrs at 120 mA.

C 1400mA/h normal charge rate - 15 hours at 120 mA, fast charge rate 4 to 6 hrs at 300 mA.

D 1400mA/h same as C size cell. (same mA/h rating)

Some tips for extending the life of your NiCad battery are as follows:-

- DO NOT completely discharge the battery - stop using the battery when the lamp starts to noticeably dim.(1.0 V per cell) This will reduce the chances of an individual cell Reverse Charging.
- DO NOT leave a battery on charge for much longer than the specified charge rate.
- DO try to discharge a NiCad battery down to 1.0 V per cell before recharging - this will stop the battery developing what is known as Memory Effect.

Alkaline, Carbon-Zinc, Lithium & other Dry Cell Disposable Batteries.

(Energizer, Duracell, etc. AA, C and D sizes 1.5 V also 4.5 V). These types of battery are used in Petzl style headlamps and are as stated DISPOSABLE.

- DO NOT waste your money on so called "GREEN" Rechargers for Alkaline batteries (they don't work effectively because Alkaline batteries are not designed to be recharged). If you want to be "GREEN" and also save money buy NiCads or other batteries marked as Rechargeable.

Alkaline batteries generally have 3/4 the life span of Lithium batteries and Carbon-Zinc less than 1/4 the life span of Alkaline batteries. At this point in time Alkaline batteries are the most cost effective of the Dry Cell Disposable type batteries, especially if you use high drain Halogen globes in your headlamp.

This article first appeared in NewCaves Chronicle

The Travels (and Travails) of Vic Tim, a garden Gnome from WA (With Brief Gnotations on other WA Gnomes of Gnote) Part II: Margaret River, and a Gnome Ignominiously Hung - by Lucinda Coates

In our continuing gnostalgic saga, Vic Tim gnext made his appearance in Ceduna, SA, en route to the 18th ASF Conference to be held at Margaret River, WA. Again the gnotorious Derek Hobbs (MUCG) was a key player, this time joined by Mick Playford and Paul Kite, off for their first taste of an ASF Caving Conference.

A photo was taken of gnome-fishing off the jetty at Ceduna - Derek tied some red rag around Vic Tim's throat and used him as bait. Another photo was taken of the gnome posing on the very tip of a rock on the top of the Escarpment, overlooking Gnullarbor Homestead. Vic Tim also visited Wee Bubbie cave. Cave divers, on emerging, asked Derek, 'Is that a gnome under your arm' - gneedless to say, it was.

At the conference, Rauleigh was giving a lecture on stegamites, the strange geomorphological formations discovered in some Gnullarbor caves. As he was defending his discovery against some scientific doubt, this was a very serious affair. It was held in a lovely theatre, steepbacked, with a stage. The audience quietened down in anticipation. Rauleigh was just about to launch into it when suddenly the lights went out and the theatre was plunged into darkness. After a tense moment, a spotlight shone just above Rauleigh: what had been vacant space just moments before was gnow, most horribly, full of Vic Tim, suspended from a rather well-tied gnoose, and blindfolded with a white kerchief. Into the stunned silence burst an ear-piercing shriek from Fran (Rauleigh's then girlfriend): 'Somebody's hung our gnome!'

Who were the gnavish perpetrators of this vile deed? The roof of the theatre had some handy holes in it, and up one of these lurked the gnocuous Pat Larkin. He had judged the length of Vic Tim's rope to a gnicety, such that the gnome fell from the roof the required distance (ie just above Rauleigh's frantically waving hands, whilst being tantalisingly close). Clive, the lighting technician, was on spotlight. Derek had tied the blindfold, and Pat the gnoose. Fran had been primed to deliver that earth-shatteringly horrified scream. Pat had his work cut out, continually pulling Vic Tim just out of reach of Rauleigh's ever-more-desperate lunges.

Vic Tim was part of Brendan Ferrari's team for the occasion of Speleosports. The other part of the team was a garden gnome Brendan had gnicked from a gnice old lady's garden. As Rauleigh was going around the course, Brendan placed Vic Tim where Rauleigh could reach him - but only by disqualifying his team. Gneedless to say, whilst his team fumed, Rauleigh retrieved Vic Tim and hid him in his car. Gnaughty Fran gave the key to Derek, but the gnome was gone - Keir had already broken in.

[As an aside, Clive was, for some doubtless good reason, hit over the head during Speleosports with the old lady's gnome, thereby breaking its pedestal. Plaster gnomes are obviously less robust than cavers' heads. Brendan carefully glued the pedestal back on, and returned it to the old lady, with apologies and lots of chocolate.]

Meanwhile, at the Conference Dinner, Rauleigh accused Derek of gnome-gnapping. 'I don't know where he is!', cried



Victim - a gnome of gnote - photo Rauleigh Webb

the innocent (for once) Derek. During the slide show, the gnoctambulatory Vic Tim was sitting on the pedestal on the wall by Keir's table. As the lights went back on, Rauleigh once again showed his complete lack of decorum in his attempts (thwarted, of course) to regain possession of the gnome. As a point of interest, another cave versus cement mining case was on at the time of an ASF conference - that of Yessabah. A comment made concerning it made mention of one Keir Gerard Coat-Hanger Vaughan-Taylor....

[N.B. During this same conference, another (Gnomadic') gnome was gnapped. Derek hid a little gnome in Rauleigh's carbide collection, and the large one between the garbage and the fence. When Clive went on tour with the Australian Ballet, the large gnome (1m high) was strapped to the front of the truck. He was taken into the film studios, and got into one of the scenes from where, presumably, he has gone on to fame, glory and fortune.]

Stay tuned for Part III of the series: where Vic Tim, in the custody of Flash, travels far and wide.

Lucinda would like to hear from anyone who has had an encounter with VicTim. Phone 02 9888 5686 (H), 02 9850 9684 (W), 02 9850 9394 (FAX), email lcoates@ocs1.ocs.mq.edu.au

Cocklebidy

Alpine Style

by Stefan Eberhard

Imagine a large tunnel filled with water. Beams of green light strip away the darkness and reveal the grand architecture stretching away into the distance. The water is crystal clear and the sculpted white rock is displayed in intricate detail. Blocks of rock lie haphazardly on the floor, undisturbed since they fell from the roof thousands of years ago. The fragile skeletons of ancient sea creatures, as old as the rock itself, protrude from the walls. Imagine - as if in a dream - that you are suspended weightless in the inner space of this tunnel. You are relaxed, breathing easily, and "flying" through the tunnel which twists and turns before you, constantly changing in size and shape as you obediently follow its contortions.

The silence is broken only by the crash of air bubbles escaping from your regulator, and the reassuring metallic whine of the scooter motor. The powerful light held by your companion following behind casts a gigantic moving shadow onto the wall ahead. The phantom image becomes blurred, mirage like, as you cross the boundaries between water layers of differing density. The tunnel seems to go on forever. You lose touch with time and distance. The raw elements of light and dark, water and rock, noise and motion react vigorously to overwhelm your senses. Euphoria envelopes you.

Scootering through Cocklebidy is not always so much fun. I recall an occasion on my most recent trip there when I was controlling the scooter and towing

Tim Payne behind me, but the length of the tow strap was a bit short so that Tim's bulk tended to rest upon my legs. This meant that I couldn't lift my fins above the wash of the scooter propeller, nor could I use my fins to stabilise myself. I found this situation extremely irritating and the urge to kick Tim in the face was becoming almost overwhelming. As we sped along through the underwater tunnel I became so preoccupied with this thought that I failed to notice - until too late - the wall of the cave looming rapidly toward us. When we hit there was an alarming explosion of escaping gas and I was convinced that the end was near because I could hear and feel my precious air supply draining into oblivion. Amidst the noise and confusion Tim had the presence of mind to quickly turn-off the tank valve which had been knocked open in the collision. In cave diver speak, this was a 'crash and burn' situation. The incident had not been life threatening as it turned out, because I was carrying plenty of additional air supplies. Nevertheless, the 100 Bar pressure of valuable air that got wasted in those few

seconds was a sobering reminder of the unforgiving environment in which we had chosen to play this game.

Our game was an 'alpine style' approach to reach the end of Cocklebidy Cave. Alpine style is a term derived from mountaineering. The concept essentially involves a small team carrying the bare minimum of equipment and climbing fast to reach the summit of the peak. Moving fast and efficiently in the mountains means that you are exposed to the natural hazards for a shorter period of time and therefore have a greater chance of survival, so long as everything goes according to plan. Climbing alpine style contrasts with the



Tim Payne with scooter - photo Stefan Eberhard

Cocklebidy - Alpine Style

traditional "expedition style" approach which involves sieging a mountain with plenty of back-up resources in the form of large numbers of climbers stocking intermediate camps and installing kilometres of fixed ropes for retreat in case of bad weather or accident.

In the unpredictable mountains, bad luck can strike anyone at any time no matter how good, or careful, a climber you are. The difference doing it alpine style versus expedition style is that if you get into trouble you are much more reliant upon your own resources. This may seem like stacking the odds against yourself, but for many climbers this is an acceptable risk. Doing it alpine style helps preserve the challenge by keeping climbers and mountain on a more level playing field. The great sense of satisfaction and personal achievement which goes with pulling-off a successful alpine style ascent is reward enough in itself. A more tangible benefit to the lightweight approach is that it is logistically easier to organise, and sometimes cheaper.

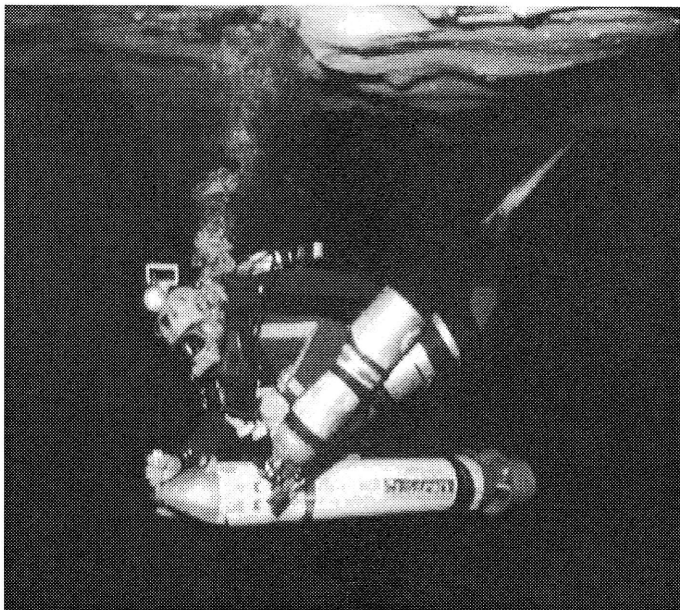
Cocklebidy Cave consists of a single, straight tunnel more than 6 kilometres long, of which more than 90% of it is underwater. From the entrance lake the first sump is about one kilometre length to the air-filled Rockfall Chamber. Dive gear must be transported over the Rockfall Chamber to the second sump which is 2.5 kilometres in length. The second sump leads to another air chamber named Toad Hall. Dive gear must be carried across Toad Hall to reach the third and final sump which is 1.8 kilometres in length. The shallow depth of water in Cocklebidy (usually less than 15 metres) means that decompression is not a serious problem.

The first tentative dives into Cocklebidy began in 1972, but the end of the cave was not reached until more than a decade later. As the divers pushed further into the cave they needed more air tanks, but to help them carry these extra air tanks they needed other divers, who in turn needed their own air supplies, and so on. The immense quantities of air required for long duration dives of this type necessitated the development of special techniques and equipment such

as underwater sledges which could be loaded with extra air cylinders and equipment and then pushed along by the divers. The prototype sledges were unwieldy devices which had a disturbing tendency to become overly buoyant as the divers drained the air from the tanks lashed to the sledge. On one occasion, a long distance into the second sump, a disaster was narrowly averted by piling rocks onto the sledge to restore neutral buoyancy. As the length of the cave grew, so too did the logistics expand exponentially. In much the same fashion as a Himalayan expedition, the pyramid of support gradually extended further inwards to allow one, or just a few, fortunate divers to reach the end.

Ever since being a sherpa diver on the

The Australian expedition following on the heels of the French involved 14 divers, four sledges and 80 air tanks. It took two weeks to do a single major push which involved establishing an advance base camp in Toad Hall. In gung-ho style, Hugh Morrison snatched the world record back by pushing a single tank in front of himself as he squeezed a further 200 metres beyond the end of the French guideline. The end of the cave was not visited again until 12 years later, when Chris Brown extended the passage another 20 metres. Techniques had evolved somewhat in the intervening period so that the 1995 expedition exploited the use of scooters, but still required six support divers, two sledges, and 60 air cylinders.



Stefan Eberhard in Cocklebidy - photo Tim Payne

1983 expedition I had secretly harboured the desire to do an alpine style trip to the end of Cocklebidy. Despite the legacy of large-scale expeditions at this site, I knew a lightweight trip was possible because that was how the French did it when they scooped the prize of exploring the third sump, right from under the noses of the Australians. Francis Le Guen and his team of four other divers arrived at Cocklebidy in September 1983, just one month before a major Australian assault was due to take place. The French had an advantage with their underwater scooters, and over a six week stay they did two epic pushes, claiming afterwards to have reached the end of the cave 1.6 kilometres into the third sump. At the time this feat represented the longest cave diving penetration in the world.

I believe there will always be a place for both expedition style and alpine style approaches in cave diving and mountaineering. There are of course, all manner of gradations in between these two styles, but the fashionable approach has tended to be away from the big expeditions and towards smaller groups. Both of the big cave diving expeditions I've been involved with - the 1983 and the 1995 Cocklebidy expeditions - were thoroughly enjoyable and rewarding experiences for me. On these trips I learnt a great deal about diving techniques, and I also learnt a great deal about people, because expeditions tend to bring out the best, and the worst, in people. I wouldn't swap these valuable life experiences for anything.

Tim and I would not have contemplated our alpine style trip without the experience and invaluable knowledge of the cave we gained from previous expeditions. No amount of planning, technical expertise, or sheer bloody-mindedness would have got us through otherwise.

Thus it was in 1997 that Tim told me, "You need six tanks, two scooters and an attitude."

"But what if my scooters fail?" I asked him.

"Then I'll give you one of mine," he replied.



Tim Payne diving in Cocklebidy - photo Stefan Eberhard

"And if that scooter fails too?" I countered.

"Then I'll tow you out on my other scooter", he retorted, "and in the unlikely event that all the scooters fail we'll still have enough gas to fin out! Now, ...I have a spare scooter you can buy."

"Can I test drive it first?" I queried.

"Sure." Tim replied.

"OK, if it gets me to the arse end of Cocklebidy and back I'll buy it - if it doesn't you can go and retrieve it yourself," I said.

"It's a deal."

I found Tim's confidence somewhat disarming, but encouraging nonetheless. The crux of doing a long penetration into Cocklebidy Cave is lugging the heavy dive gear across the air chambers. In my opinion the greatest hazards lie, not in the flooded sections, but in the Rockfall Chamber and Toad Hall where there are loose and treacherous rockpiles. Nevertheless, I confess to

feeling a bit vulnerable out there in the middle of the second sump, with the nearest air space more than a kilometre either way, with just Tim and his bloody scooters my only companion and lifeline.

Underwater caves are a much more predictable environment than the big mountains and I don't consider our trip to have been at all bold. It certainly wasn't epic - we were both surprised at how easily everything came together. We did one set-up dive to the Rockfall Chamber, had a rest day then went for it. I helped carry Tim's gear over Toad Hall to the third sump - with twin back-mounted tanks and one stage tank he scooted almost to the end of the known cave and explored a couple of side passages on his way back. We exited the cave after 18 hours underground. We had another 'rest' day then retrieved gear from the Rockfall Chamber. We were back on the road having being on site for one week. I would argue that our dive involved less risk than attempting to climb a glaciated mountain, and I certainly felt much safer in the cave than I do driving in my car.

Cocklebidy is no longer the Everest of underwater caves, although the comparison may have been appropriate in those heady early days when it was the longest cave dive in the world and the end was nowhere in sight. To reach the end of Cocklebidy these days is no big deal, but it's no picnic either - it takes years of training and experience, lots of gear, and lots of money. It helps too, if you've got a rat in your belly making you do it!

Our trip was not alpine style in the pure sense because our strategy relied upon an initial dive to the Rockfall Chamber to set up gear for the big push, and afterwards, a clean-up dive. The next challenge in Cocklebidy is self-evident. No set-up dives this time - just walk in, swim to the end of the cave then walk back out with the gear you've got on your back - that would be one hell of a trip. With the rebreather equipment that is readily available nowadays, such a trip is very feasible.

HELICTITES - What are they?

By Garry K. Smith

This form of speleothem is usually thin with twists and turns, giving the appearance of defying the law of gravity. The term "helictite" was first used by Dolley, C.S, in 1886 and is derived from the Greek word "helick", meaning to spiral.

Helictites may vary in diameter from less than 1 mm up to 15 cm and their length may vary from a fraction of a millimetre up to a reported 4 metres. They may combine with a straw or branch at any angle or thicken at the tip and form unusual shapes like butterfly wings, bell or hook. Another unusual variety looks like a pearl necklace and is called a "beaded helictite". It consists of tiny 0.5 to 2 mm diameter beads of aragonite along its length. However the most common form of helictite is reasonably thin and uniform in diameter with twists and turns through all angles. A helictite that grows upward from the cave floor is sometimes called a "heligmite".

Helictites can be classified under four general headings:- filiform, beaded, veriform and antler. They are usually composed of calcite or aragonite, however they have been known to grow less frequently from gypsum, anhydrite and some other minerals.

1. **Filiform** (thread-like) are generally less than a millimetre in diameter. They may be flexible and appear like hair filaments.

2. **Beaded**, consist of 0.5 to 2mm in diameter beads of aragonite arranged in a rosary-like or spiral fashion. They may be branched or spiral.

3. **Veriform** (worm-like) are the most common. They may spiral, branch, thicken or combine with straws.

4. **Antler** have straight stems which may branch and appear like antlers. These are helictites with a monocrystalline structure and there has been no rotation of the crystal axis during growth.

The method by which these speleothems develop has been a contentious point for many years. However the generally accepted theory is that helictites form from seeping water issuing from a minute opening. It appears that a porous rock face (usually covered with a thin carbonate coating or crust) is required for the beginning of helictite growth. A small hole (pore) may be forced through the crust by hydrostatic pressure allowing solution to escape. This minute amount of solution de-gasses, thus giving up carbon dioxide and causes the deposition of a carbonate film around the pore. The moisture also evaporates at the same rate as it is being replenished. Because the seepage is so slow that a drop of water does not form, gravity does not affect the shape. Another words there is never enough water emerging at the extremity of the

formation for gravity to overcome surface tension and get control of the water movement.

Carbonate continues to be deposited around the pore and the helictite begins to grow out from the wall. The feed solution may remain under hydrostatic pressure or it may revert to being drawn through the minute hole by capillary action. The growth rate is influenced by such factors as:- seasonal rainfall, ground water uptake of carbon dioxide and a number of other factors. However, hydrostatic pressure and capillary action either separately or combined are the key factors which control the growth of helictites.

Because all the solution evaporates at the tip, impurities are deposited along with carbonate crystals as well as stacking of wedge-shaped crystals, cause the helictite to spiral or

branch. To a certain extent other factors may influence a helictites shape. These include:- air flow, evaporation, impurities in solution, intracrystalline seepage and water supply. Capillary canal enlargement may occur by dissolution during wet periods. This will increase the amount of water supplied to the helictite tip, so that a straw may form on the end of the helictite. In 1987 came the first reported finding of helictites which grew under water. Although rare their discovery prompted the classification of helictites into two main categories:-

Subaerial and Subaqueous. Subaerial - meaning formed in contact with air and involves de-gassing and evaporation of the feeder solution.

Subaqueous - meaning formed under water. Several mechanism causing deposition have been suggested by a number of authors however it still appears to be a contentious issue.

All helictites have one thing in common, regardless of size, they grow by the calcite solution being fed to it's extremities along a tiny central capillary canal measuring between 0.008 and 0.5 mm diameter. This microscopic canal runs approximately central to the axis, but tends to favour the convex side of each curve. Some helictites may have secondary canals which radiate away from the central canal to feed solution to the outside, thus increasing the diameter. The grow rate and shape of helictites is a relatively complex issue and a large number of mechanisms may be involved at any one time, therefor the debate over helictites will continue to be a fascinating subject for years to come.

The main reference for this short article was:- (Cave Minerals of the World, editions 1 & 2). For further reading on this subject, one cannot go past this excellent publication.



Helictites - photo by Kevin Harris, courtesy of the Boston Grotto website

News from the Newcastle and Hunter Valley Speleos

PRESIDENTESS'S REPORT

June to December 1997

[First appeared in NewCave Chronicle]

Well, as 1997 is drawing to an end, it is again time for me to write an inspiring article for our magazine, on the life and times in NHVSS this last half year.

Firstly I'd like to welcome our new club members, newly elected committee/executive (AGM in August) and to all the people who have attributed to the livelihood of the club during 1997. An active member base, whether its writing articles, going on trips, attending club meetings etc, is essential to the welfare and continuance of our club. Thanks to everyone for your involvement. On that note, after years of waiting our club T-shirt has come to a NHVSS shop near you if you haven't already got one. Without the support of our publicity officer (my hubby) and support of our members, it would still be on the drawing board. Now you can all wear your shirt with pride, and help promote NHVSS & speleology to the general public. (Don't blame me if someone stops you in the street and asks what Newcastle Hunter Valley Speleological Society does or is !!)

NHVSS has again scored well in the publicity stakes. A most notable achievement being the setting of a new Australian/New Zealand Cave Diving depth record of - 103metres. This was achieved by two divers David Apperley (a NHVSS member) and Richard Taylor in January 1997 in the Pearse resurgence in New Zealand. On the diving scene, two of our members Frank West and Jarn Hodgson have set up shop as Newcastle Cave & Technical Divers at Swansea, just across the bridge. So if you want to get into Scuba or cave diving we have experts within our ranks. For all those who missed the last "trip" of the year, get yourself out there check out the Petzl gear in their shop and try out the indoor cave, its great squeeze practice!

Photos of and by NHVSS members have again made the limelight, with Garry Smith's efforts being the most

mentionable. Several of Garry's photos were selected for publication in the 1997 reprint of Cave Minerals of the World. He has also had photos and articles published in Australian Caver and Underground Photographer, a UK based magazine. His articles on histoplasmosis and CO2 hit the world wide web and can be viewed at the ASF site, WA site, and one even in America! Not to be outdone by his father though, Michael Smith scored a front cover of Australian Caver, and yours truly can be seen on the front cover (1cm x 1cm but still the front cover) of Underground Photographer, thanks to a photo by Garry Whitby.

A caving calendar for 1998 is included in this magazine with some exciting trips planned for next year. The highlight being the trip to Tassie in January, no doubt several pages in the next magazine will be dedicated to that. In the first half of the year we intend on caving at Gloucester, Jenolan, Wee Jasper, Timor, Kunderang Brook, and might even run a canyoning trip for something different. At time of writing this report, several dates still require the relevant permits and therefore are indicative only. Also trips may be planned on the spur of the moment so to avoid missing any caving, make sure you attend the meetings. Please remember to contact the trip leader and put your name on the trip list if you are interested in participating.

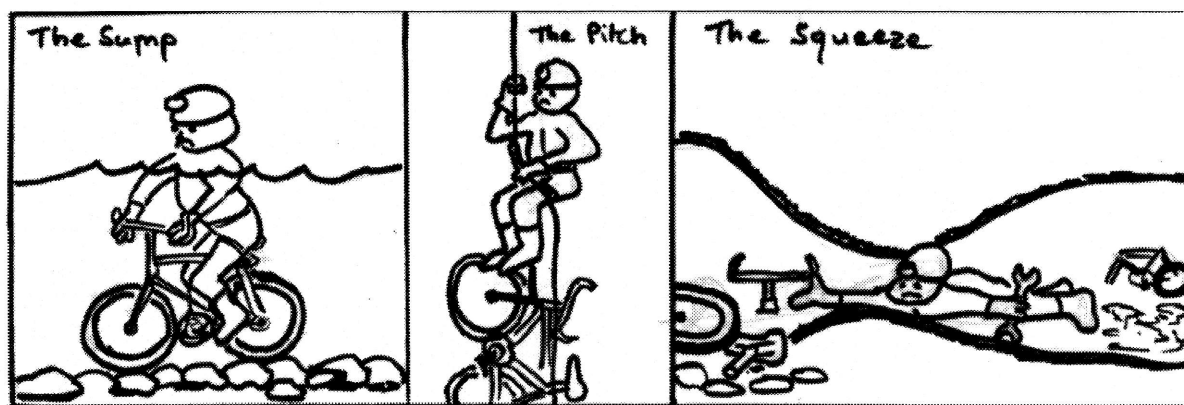
Lastly a special mention here to our Chief Trip leader Garry Smith who again has organised and lead lots of trips for us during 1997. Without his wealth of caving knowledge we could be combing the hillsides for hours looking for entrances and be the blind leading the blind (so to speak) in the caves without his guidance and leadership. A Safe & Merry Christmas and New Year to all. See you underground in 1998

Jenny Whitby

President (ess)

P.S. My spell check program doesn't like speleo words, but has now been updated. If I had followed its spelling suggestions we'd be carvers (cavers) from Newcastle Hunter Valley Serological (Speleological) Society going on trips to Glucose (Gloucester), Genoa (Jenolan) Gendering (Kunderang Brook) and cantoning (canyoning) next year! These computers put a different slant on things if you let them!

Cartoon by Steve Bunton



Tommy completes the first mountain bike descent.

A KILOMETRE DOWN IN MEXICO

by Al Warild



Greg Tunnock on the connecting pitch between Nia Nga'co Nita and Nia Quien Nita. The rope going up to Perro Perdido is hidden just around the corner to the left.

The aliens don't frighten the local indians, but they do have them well and truly baffled. If they woke pre-dawn to see the wandering lights descend from the hills towards their primitive village, there'd be no panic. They see enough of these aliens, these gringos locos, to know not to fear them. They see them set off daily in their strange suits and gum boots, with their helmets fitted with a third eye and sacks full of rope. They see them enter the caves of their jungled backyard to emerge hours, sometimes days later laden with nothing to show for it but exhaustion and hunger. No gold, no precious stones, no treasure. Bugger all...

Well that's how the *Inside Sport* journalist saw it anyway.

After ten years and six expeditions to the Chilchotla side of the Sierra Mazateca; after the countless bolts, topofil thread and drowned compasses; after the bruises, broken bones and caña hangovers, you'd think we'd finally get it right. Well, we did.

Apart from the almost complete lack of sponsors - no one wanted to pay us for a holiday in Mexico - everything ran like clockwork. A pleasant couple of days helping Diana carry bug tubes around Lechuguilla (and having a little chuckle at people who make a big thing about Boulder Falls), then it was south

towards Oaxaca. We scored a green light at the customs post and didn't even get caught for any bribes on the long ride to Tehuacán. The cuota (toll) roads may be expensive, but they sure have made a difference to long distance travel in Mexico.



Looking north across Zongolica village. We lived in the house just above and to the right of the obvious buildings (the school). Sonconga is about 1/4 of the way up the hill between the village and the camera. Nia Quien Nita is at the bottom of the huge doline at the foot of the big hills in the middle distance. Nga'co Nita is out of the picture to the left towards the top of the sunlit ridge which cuts across the centre of the photograph.

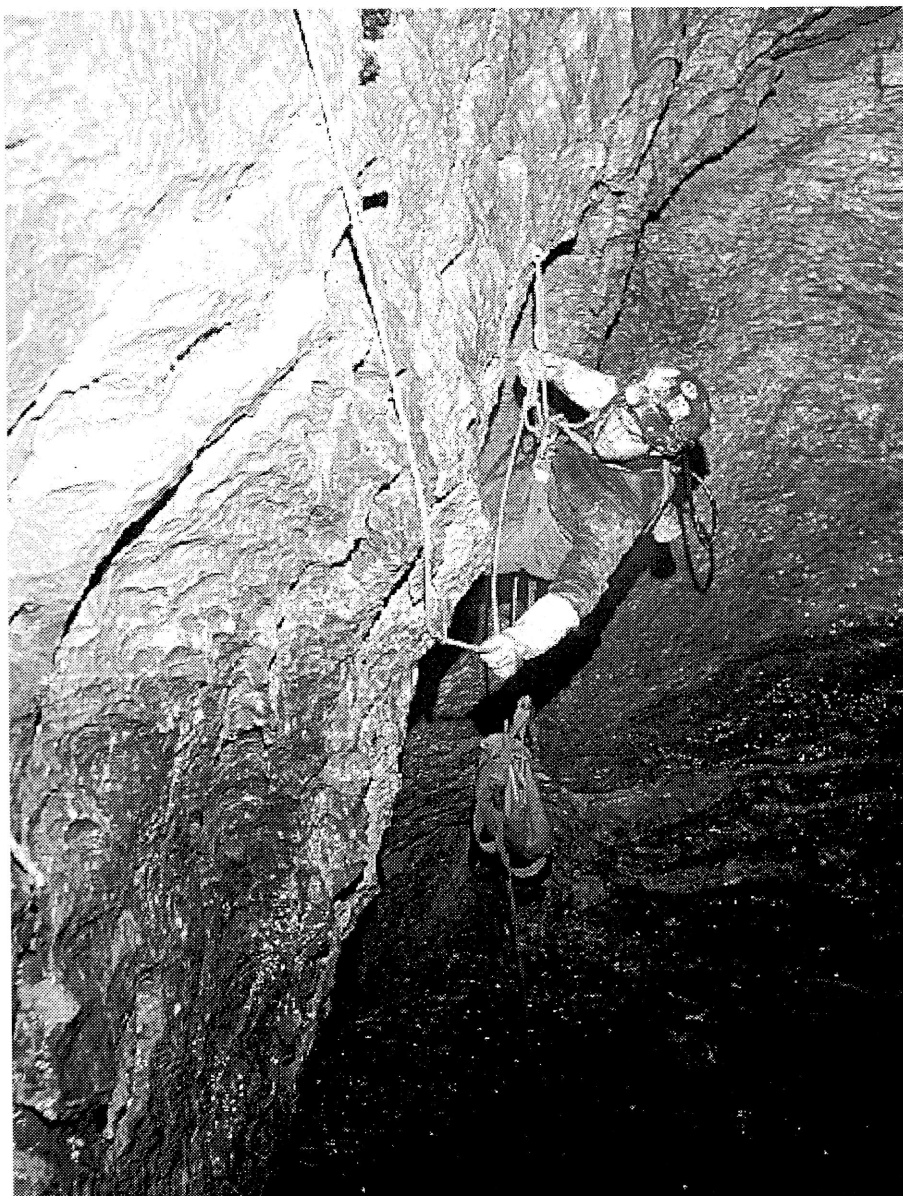
Our group of 10 Australian cavers moved in on Zongolica for the sixth time with three objectives:

- Push Sonconga (Klub Cave) from 946 m to somewhere beyond - 1000 m.
- Finish off Nia Quien Nita (Dead Dog Cave) and try and find a higher entrance.
- Have a good time.

Our first objective was to re-rig Sonconga down to the 946 m sump then dive through and find the master system which surely lay beyond. In preparation we borrowed a couple of small (ok, tiny) tanks. The little one looked like a thermos flask and held 60 breaths (count them!) but at only a metre or so underwater it would last a good 10 minutes. More importantly, it and its larger brother were small enough for us to carry down the cave.

Sonconga is one of those uncompromisingly sporting caves typical of Zongolica. 946 m deep in less than 2 km traverse length. You don't get to walk far between pitches, but you sure get pretty good at technical ropework and prusiking. The upper reaches are nothing special but below the Mierda Meander at -450 metres the cave is clean, wet and wonderfully vertical.

We had rigged Sonconga twice before - once on exploration and a second time to check leads and try and free-dive the sump - so we had it pretty wired and got to the bottom on the third rig trip without ever running short of rope.



Stefan on Flying Saucer Pitch, the most spectacular section of Sonconga.



"That's where I came out" - Greg Tunnock on the other side of the Unsealed Siphon.

The idea was to have a go at the drafting sump-bypass lead left by Rolf in 1987 before lugging dive gear down there. Getting people to drag tanks down a cave, sit around getting cold and bored for hours, then carry them back out again can strain any friendship. Greg and I tried a climb which went to some horrible mud-covered chambers and tubes. After a few hours we grovelled back out of the lead without a sump-bypass, but at least we knew where the air was coming from - a series of small holes in a mud-caked rockpile. No hope of digging, but we had scuba gear this time and it looked like we'd have to use it.

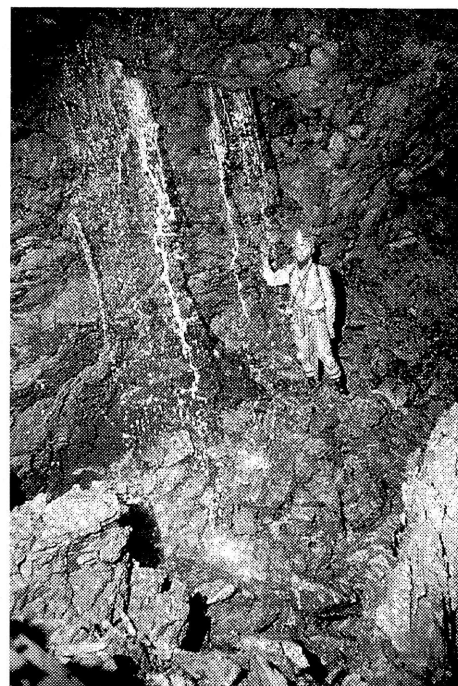
None of us had done a dive at this depth before and suddenly 946 m was

A Kilometre Down In Mexico

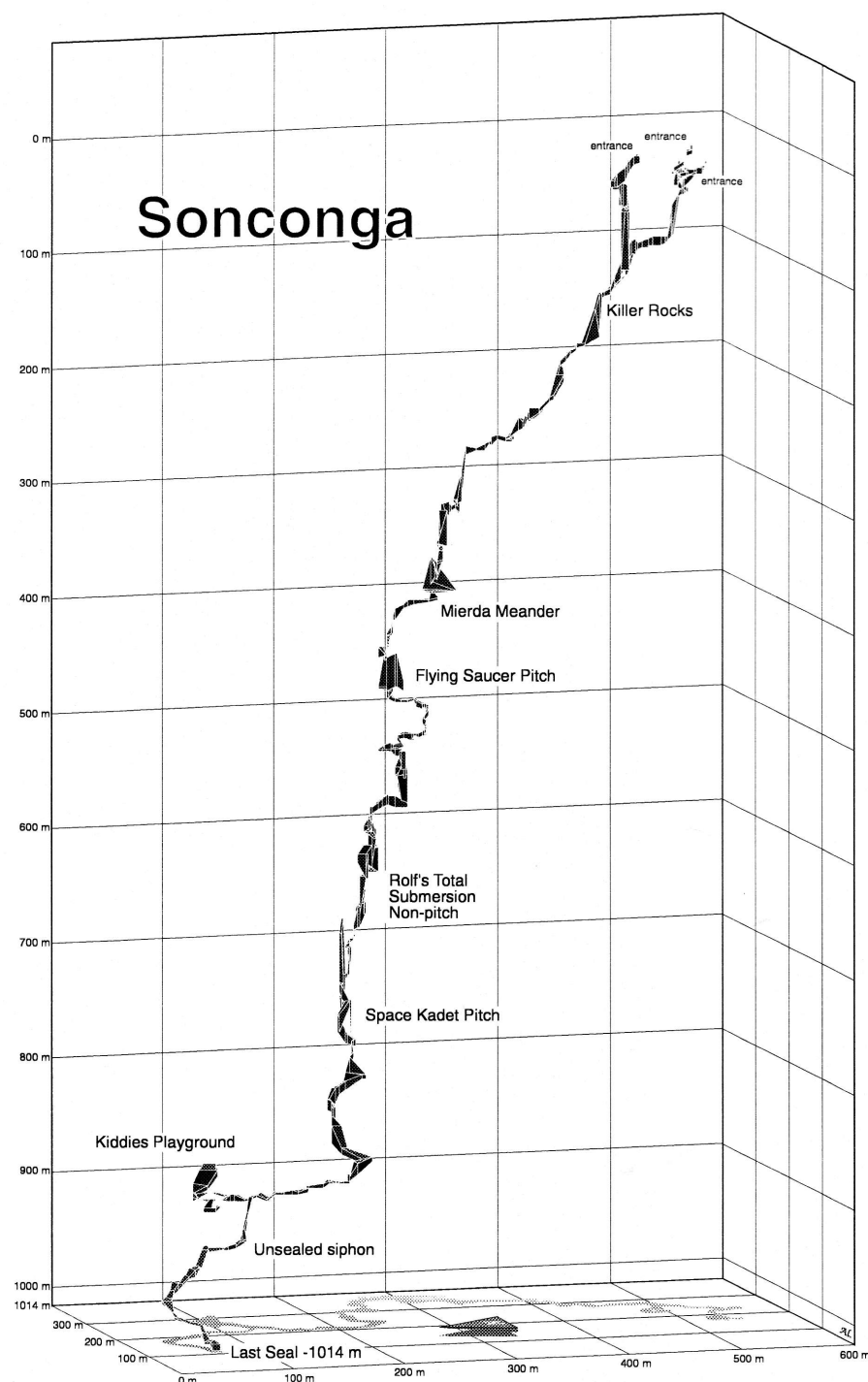
a really long way down. Jason remarked that it was 17 times deeper than he had ever been before. Oh well, nothing like getting in at the deep end. The plan was for Greg to dive through with the dual tanks and set the line. He would then return and we could free-dive through. This of course relied on the sump being short, straight forward, and shallow. To encourage this, we had a 30 m dive reel, so if the sump was too

long it would be left to the time when Zongolica has its own caving club.

Greg dived the small but nice clean sump and laid out line for only about 30 seconds. This was real hopeful, as we had no easy way of supporting a major series of push trips beyond a serious sump. He returned with a story about a gushing stream canyon on the other side, and half his line left. 15



The stream re-emerging into the large dirt floored chamber at -850 m in Sonconga.

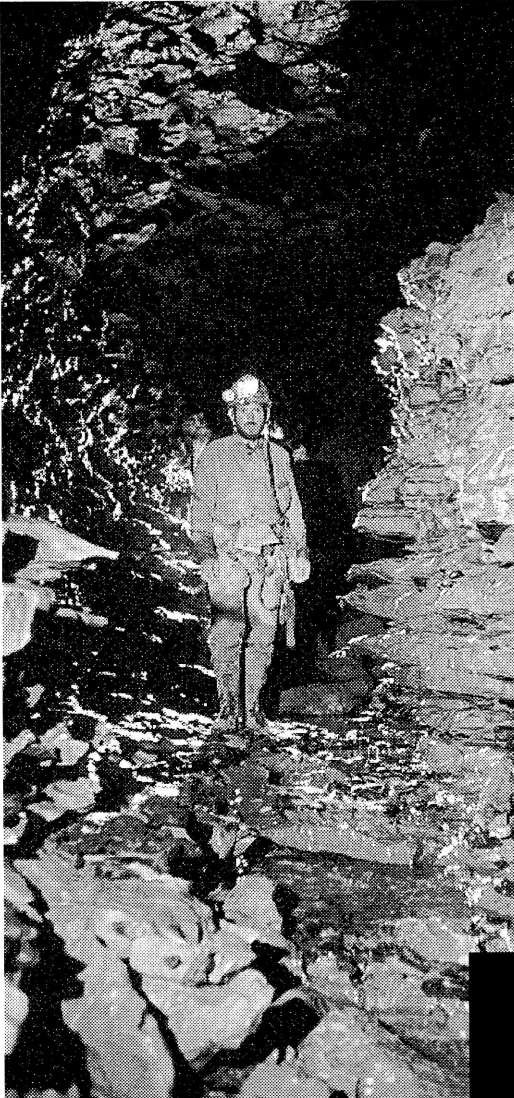


Sonconga - the new passage explored was the stretch from the 'Unsealed Siphon' to the 'Last Seal'. (Yes, the reference to seals is an in joke, you see, the locals thought we were taking seals from the caves and selling them...).

metres is a long way to free-dive so Greg put a rope in and I took the thermos flask. The support team sat around trying to amuse themselves eating pasta out of plastic bags but eventually left for the surface.

On the other side was the roar of water once again. We organised the dive toys out of the way, took an altimeter fix and set off down. The stream dropped out of the steep canyon into a silent bouldery chamber. Only -40 m so far. The rocks got muddier and muddier and after a delightful 45° mud pitch (you'd get down easily, but you'd never get up), was sump 2, a larger, silty pool with no flow, and definitely beyond our technology on this trip. The altimeter said 90m, but you can never trust them. We surveyed back checking for leads on the way and got the hell out of there, derigging the sump as we went. Back through the sump, Mark was the only survivor. He'd put a lot into Sonconga and even if he didn't have a wetsuit, or like diving he sure wanted to know how it went. We started the long climb out for the last time around midnight, only 27 pitches and 900 m of rope to climb. The top one of course is the longest.

Back in the house at 9.30 am, the survey added 68 m. Not a world's N^o1, but with 1014m, at last we'd cracked 1000m. Sump 2 is only about 10 metres above the level where several other caves in the area end, so we didn't hold much hope of any more depth.



Greg Tunnock between the razor blades but this time horizontal ones, in the stream heading towards Perro Perdido and the connection with Nia Quien Nita.

You can't do deep trips every day so in between Sonconga trips we found Nia Nga'co Nita (Top Dog Cave). Nga'co is about 130 m above the entrance to Nia Quien Nita (Dead Dog Cave), a cave we'd found in 1985 and pushed bit by bit to 767m over several trips, but never really got into because of its low altitude entrance. We began dreaming of two 1000 m holes on the one expedition.

Now while Nia Quien has a nice entrance pitch, it also has some nasty cave coral, a few delightful squeezes where the tiny stream trickles down your legs as you wiggle through or the dust blows in your eyes, and is generally unaesthetic. Nga'co on the other hand is an excellent cave with a nice little stream in it and only one place

where you have to remove your pack. Nice comfortable meanders with small pitches interspersed with some bigger drops, like the Avalanche Poodle (Avalanche Poodle - a north american ski safety device. If you suspect unstable snow, send the mutt across first), a 170 m pitch series, the top 40 m of which was lined with lovely razor blades. You can see and throw rocks all the way down. This lands in a streamway at about -500m which hoots on down dip heading who knows where. Nga'co was going so well we wanted it to miss Nia Quien and go all the way on its own. The Nga'co team left off looking down a 25 m pitch to a big pool and stream canyon.

Meanwhile, Shane, Jason and Roger whipped on down Nia Quien and had a look in Perro Perdido, the hot lead left two years before. They dropped one more pitch and the stream went almost straight into a rockpile. Upstream it came down a pitch into a nice green plunge pool. The Nga'co survey was a few hundred metres behind, but it

sure looked like the two dogs were about to meet.

Greg got the 'honour', and sure enough, around the corner from the last drop in Nga'co was a rope hanging down from the blackness, but at least we got to do the first though trip. The new system had suddenly jumped to just below 900 m deep and nearly 7 km long.

The only worthwhile lead remaining was the long, horizontal 'Snoopy Flies Aeroflot' passage. It headed off away from the rest of the cave, presumably going towards the resurgence. This place was a long way from home on a rushed trip a few years back and not really well looked at. We found some pathetic little leads, but the only one which had a hope was right at the end in 'Goofey Gets It'. Not the most appealing place on earth, but definitely a going lead. I suspect that Rolf and Steve, the only other cavers to have gone there, simply chose to not see it. Lots of nasty tinkly brown coral led to a mud-lined old stream canyon. One of the worst places we'd found in Zongolica but it did overtake the previous deepest point (Lassie meets a semi-trailer) before it ended. 'Que perro tan



The stream passage at the bottom of the Avalanche Poodle.

A Kilometre Down In Mexico

feo' (What an ugly dog) was the last nail in Dead Dog's coffin. At 906 m and 7.15 km we were only a little sad that the dog was finally dead, but mainly relieved that such a horrible passage had ended.

During our six trips to the area we had never found the time to look for the resurgence to the caves. As far as we knew, water just flowed in and disappeared. On the last possible day we had to look, we did a trip down the Rio Petlalpa gorge passing to the west of Zongollica and found a truly magnificent canyon complete with lethal amounts of water, some great jumps and rather too much rubbish, but no resurgence. Proof. The water just flows into the caves and disappears.

The score card from five weeks in the field: 3982 m more length and 1158 m more vertical added to Zongollica, another 1000 m deep cave for Mexico, and a good time had by all (well, all except Steve who got pneumonia and went home early). Who says we emerge with nothing to show for our efforts.

The final achievement though, must have been when a Mexico city traffic cop stopped us for a bribe and after



Canyoning in the Rio Petlalpa, the presumed resurgence zone to the NW of Zongollica. We found no resurgences along the river even though the caves all head towards it.

some argument, called me a mierda, kicked the side of the van, and left us alone.

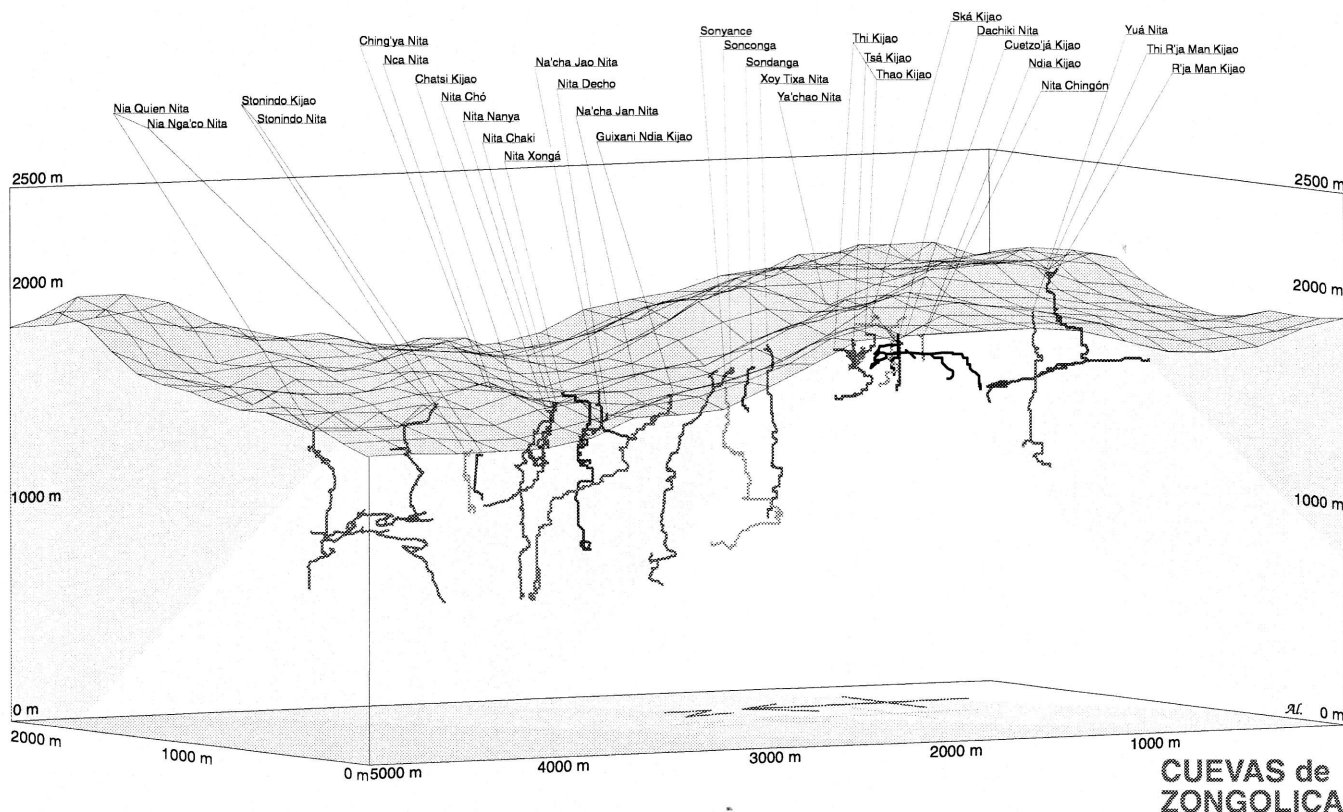
Thanks to all those cavers who have played a part in the exploration of the Zongollica area, to the people of Zongollica who have hosted their very own band of 'gringos locos' over the past 10 years, to Ken, Diana, Ziggy and Fritz who have looked after us so well in Albuquerque, to the Australian Geographic Society who have given us

financial support on several occasions and Inside Sport for forcing Steve, Mark and Greg to drink free beer, paraphrasing the conversation, then paying for the privilege.

Expedition members:

Steve Carrick, Dave Dougherty, Steve Keenlyside, Carol Layton, Jason Moule, Roger Taylor, Greg Tunnock, Alan Warild, Shane Wilcox, Mark Wilson.

Maps and photos by Al Warild



Cave/surface plot of the caves we found at Zongollica from 1985 to 1996. The village of Zongollica is situated between Nita Xonga and Nita Chó.

Escalade '97

by Lucinda Coates

It depends on your point of view, really. Some call it a celebration of mountain sports, Australia's largest gathering of competitive rock climbers - I call it a gathering of crazies, silly people who can't handle going in caves. This is the third time Escalade has been held - at least during the first time, in 1993, they had one talk out of the many talks, slideshows, movies and so on about caving. It was worth attending just for that one talk, since it was given by Al Warild, God of Caving.

I guess I still enjoyed this year's circus of speakers, trade displays, the photographic competition and, of course, the National Sport Climbing Championships - the arcane mysteries of climbing, hmm... if for no other reason than that I was indulging in another favourite pastime of mine - that of photography. Yes, suddenly I was one of those elite persons that get to hang around on the photographers' platform, perched in the heights of the Pyramide textured-panel wall-with-roof-overhang.

There was definitely some good stuff at this year's festival, especially from the female rockclimbers. Australians Abby Watkins and Vera Wong gave a personal account of speed climbing, recounting their record-breaking one-day ascent of The Nose on El Capitan, Yosemite Valley, California. Bobbi Bensman, one of the top female climbers of the US, gave an inspiring slide presentation in celebration of women and climbing. Lydia Bradley, New Zealand mountaineer, gave a challenging talk and slide show. Not to be outdone, Steve "Shapooi" Schneider, supreme showman, gave what was, basically, a slide autobiography on speed climbing - this guy has done some amazing stuff, including three BIG walls (aka: bloody huge cliff faces) in one day.

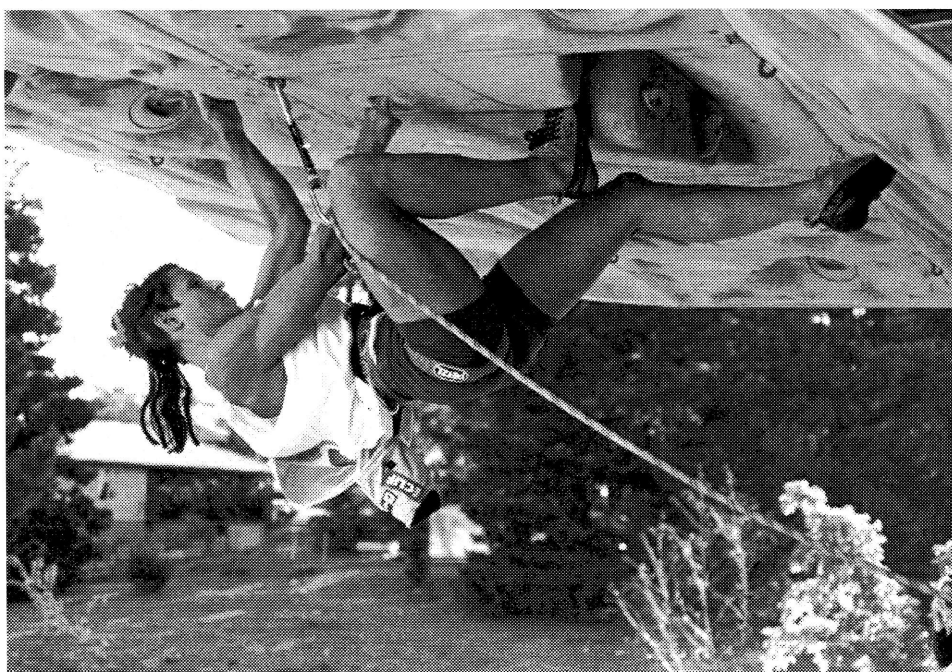
As to the climbing comp, results were:

| | | |
|---------------------------------|--------------------|--------------|
| Jrat Under 15: | Christy Spiten | Tim Hood |
| Jrat Under 17: | Carlie Happ | Peter Foster |
| Sportwool Gym Cup (team event): | Penrith Climbing | Centre |
| Escalade Windstopper Masters: | | |
| First | Silvia Fitzpatrick | Rob LeBreton |
| Second | Abby Watkins | Matt Adams |
| Third | Bobbi Bensman | Mark Baker |
| Rok Ratz Speed Climbing: | Abby Watkins | Andrew Bull |

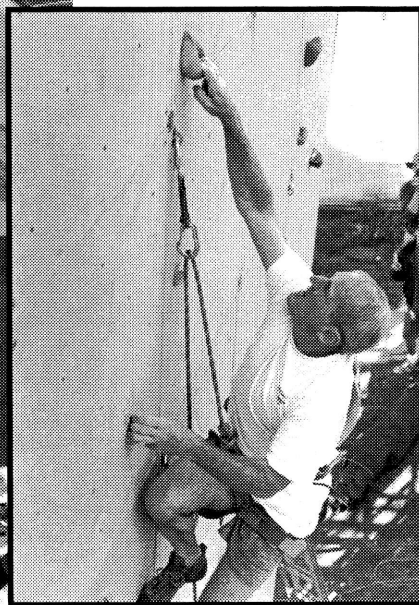
Regarding the latter: I'd never seen a speed climbing competition before. It was exciting and fun, because it was fast - moving - not just when the competitors were bouncing up the wall (sorry, that's the only way to describe it!), but there weren't the long gaps between each competitors' climb that exist in "normal" climbing comps. I took lots of pictures: one of my favourites is of Dr. Dave Roots, founding member and current patron of Macquarie Mountaineering Society (our "mother" club, many years ago). He must have been good then (you know, before the invention of techno-climbing gear - just dunlop volleys and grit), because he's still pretty good now!

It was quite an eye-opener, watching some of Australia's (and overseas') top climbers in action. There were a few spectacular falls - Sylvia took a big swing and almost got brained on the photographers' platform (oops!). In fact, I'm surprised photographers are tolerated - everyone else had huge flashes on their cameras, and were practically in the climbers faces. I guess if you're focussed on the task in front of you, minor distractions like a thousand suns exploding in your face just don't rate. The best fall was from a young guy climbing under an overhang. He failed to clip into a necessary quick draw and, when he fell, swung right smack-bang into the wall. I'm not sure about him, but I could see daylight through the wall!

I personally think all climbers are crazy - a screw loose, a sandwich short of the full picnic, a couple of pineapple pieces shy of a Hawaiian - I mean, not only do these guys climb, they do so in wide open spaces, surrounded by air and sunlight - give me a cave any day!



Left: Bobbi Bensman
Below: Dr Dave Root



Photos
L.Coates

The Great MUCG-Up

A One-Act Play for One Person

Chris Norton

Translated from the Cliefden Hut log book by Lucinda Coates

Trip Leader: Chris Norton

Date: 16 August 1997

Non-participants: Ken Anderson, Tim Moulds, Liz Peterson and Antony Sprigg.

SCENE 1: *Cliefden Hut, 1am. Enter CHRIS NORTON, under contract to MUCG for the weekend.*

CHRIS: What ho, lads! In bed already?
Strange, no fire.. no food.. no light.
The hut doth look like the Marie Celeste
Perhaps they fled in fright.
They're out there now in cold and fog.
A-shivering in the night
But enough of them! I'm off to bed –
I'm sure they'll be all right.

Exit CHRIS to sleeping quarters.

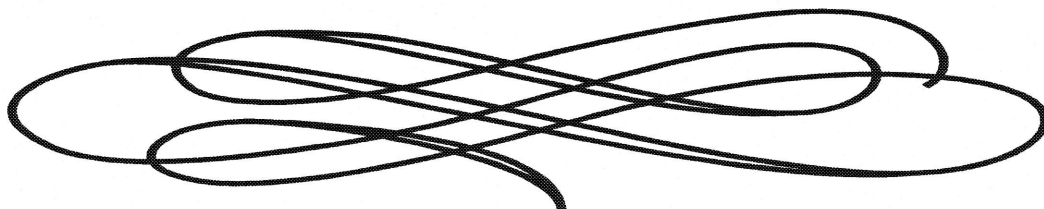
SCENE 2: *Cliefden Hut, 7am. Enter CHRIS.*

CHRIS: 'Tis morning now, and still no sign –
Where are those four MUCG-Rakers?
'Twas to've been a popular trip;
Don't tell me there were no takers.
The room is chill; I'll set a blaze -
Warm things with glowing embers.
But still my mind distracted is -
Where are those darned MUCG-members?

TONY (PROPERTY OWNER) (Voice off):
In Bilpin, mate. They did a head gasket. They ain't coming.

CHRIS: Confusticate! And Dang! And Blast!
No caving this weekend.
I'll seek me out the thermal spring.
And a while there I'll spend.
Then back to Sydney town I'll go –
Through mountains I shall wend,
'Til I return to my front door,
My journey at an end.

Historical Note: This tragicomedy, based on real life events, was first performed at Cliefden Hut on 16 August 1997 to a disappointing audience of three dogs and 150 sheep. CHRIS was played by Jack Nicholson; TONY by Bryan Brown. This piece is dedicated to Antony Sprigg and his fellow MUCG-Rakers. Any similarity to the work of Samuel Beckett is strongly denied.



BOOK REVIEWS

Surveying manuals reviewed by Ken Grimes
 Images Below reviewed by David Gwillim

"ON STATION, A Complete Handbook for Surveying and Mapping Caves" by George R. Dasher (1994)

This is an excellent book on the mapping of caves; covering everything from the surveying and sketching of detail within the cave, through the mathematical reduction of the survey data into a usable form, to the design and plotting up of the final map. It covers the full gamut of practical, theoretical and philosophical aspects of cave mapping, including an excellent review of the instruments and tools used, the common problems encountered and possible solutions. Although Dasher is the main author he acknowledges significant input from others, e.g. much of the chapter on Computers is written by another caver.

The book is in three sections:

- 1: Collecting the Raw Data (in the cave)
- 2: Data Management (mainly data reduction)
- 3: Drafting the Maps.

In addition there is a comprehensive set of appendixes, and the endpapers are a set of cave map symbols used in the USA.

Section 1 (Collecting the Data) has 11 chapters and fills nearly half the book. It starts with an overview of the basic principles, then discusses the instruments and methods used to measure the lengths and angles in the cave, and the all-important sketching of detail, and note-keeping. Then comes a useful chapter called "tricks of the trade" which not only covers tips for difficult shots, vertical shots and ceiling heights, but also philosophical questions such as "where does the cave begin", what is the "length" and "depth" of a cave, and the naming of caves. Another chapter covers the management of large cave survey projects that continue for years with numerous contributors. This includes a discussion of land-owner relations, an important factor if you hope to keep coming back to the cave. The final chapter deals with locating caves on the surface - using maps, GPS, and radio-location. Some of this is US specific (USGS map projections, finding North from Polaris),

Section 2 (Managing the Data) covers the activity once the surveyor gets back home. The first chapter involves the methods of reducing the length, bearings and vertical angles measured in the cave to a set of co-ordinates (North, East, & Vertical) ready for plotting. The alternative of plotting directly using a protractor and ruler is also described (and the disadvantages pointed out). Computers are not mentioned at this stage - this chapter is aimed at the "computer-disadvantaged". The next chapter discusses the types of error that can occur (random, systematic and blunders), how to check for them, allow for them, and fix them. It then gets a bit mathematical with a discussion of loop closure methods, but finishes with the necessary warning that mathematical closing of loops only makes the error less obvious on the map and is no substitute for not making them in the first

place. Then comes a chapter on Computers. This covers not only the data-reduction to co-ordinates and closure adjustments, but also data management in general and the use of CAD software for the production of the final map. This is a rapidly changing area and the author (and co-author) have wisely stuck to generalities and avoided the specifics of particular software packages. Unfortunately there is no help given about the essential step in transferring sketched details to the CAD program (via scanner, digitiser, or other methods).

The final section deals with Drafting The Map. This starts with a short chapter on the tools used in manual drafting (CAD has already been discussed in the Computer chapter), then gets into the design problems of representing a 3-D cave on a 2-D sheet of paper and the various solutions, map symbols, and artistic conventions that are used to do this. There are lots of useful map fragments illustrated here as examples of different approaches to the problems.

That completes the main text, but next comes 90 pages of appendixes. First we meet the "standard" US cave map symbols - THREE sets of them!! The USA suffers from a lack of standardisation in this area. The sets included are those used by the NSS, the AMCS and the MSS - I gather there are several other sets also in use that did not make it into this book! Australian cavers should concenter themselves lucky that we have only a single (ASF) set of map symbols in use.

Other appendixes provide: a short cave survey program (suitable for adaption to a hand calculator or BASIC on a computer); the CRG and BCRA survey grades (the Australian ASF grade system is similar to these); A glossary of terms; A short bibliography; and finally, most useful of all, a set of 28 complete cave maps (by 12 different authors) together with Dasher's comments on the good and bad points of each map. This is one of the best parts of the book. The maps show a variety of cave types and a variety of ways of depicting them on paper. Unfortunately, some of them have been over-reduced to fit on the pages and one needs a magnifying glass to see the detail. There is also a comprehensive index.

The figures (about 185 of them) are well drawn and relevant and are supplemented by a variety of photos, though many of these are artistic rather than useful.

STRONGLY RECOMMENDED.

"ON STATION, A Complete Handbook for Surveying and Mapping Caves" by George R. Dasher.

Published 1994, by the National Speleological Society, 2813 Cave Ave, Huntsville, Alabama, 35810-4431, USA. (Online catalogue at <http://www.caves.org/nssbook/nssbook.html>)

ISBN 1-879961-03-2

Hardback, Quarto, 242 pages.

\$US17.00 (about \$A26) + postage from USA (surface mail is \$US11.00). (NSS members get a \$US1.00 discount)

"The Art of Cave Mapping" by K.C. Thompson & R.L. Taylor, (1991)

This is also a good book; not as fancy as *"On Station"* in its production, but with good text and illustrations and a bit cheaper.

After an introduction which covers the purpose of mapping, the uses of the maps, and an overview of the methods, it moves into details. First, Measuring Systems covers the linear and angular units used (degrees, mills, etc.) then we learn about distance and angular measurements (the methods and the instruments), then the location of inaccessible points by computation from bearings and vertical angles (i.e. triangulation). Exercises in calculations are given, with answers, and also practical exercises are suggested (such as determining your pace length and measuring useful body dimensions). Chapter 7 on Mapping the Cave is the key chapter and is very well done; covering the role of each member of the team, the protocol used within the cave, types of notebook and other gear, placement and numbering of survey stations, note-taking, and sketching methods. This is summarised at the end with a list of the actions taken in surveying a single leg of a traverse. The following chapter covers Problems in Surveying Horizontal Caves. This is a list of problems and tricks. I expected a following chapter on vertical problems, but that was an unexpected omission.

The book then discusses errors and accuracy, before moving into the Drawing Up of the cave map. This is a big chapter, with details on the drafting instruments, and the techniques used in manual drafting of a map - first the draft version, then the final inked in version. A chapter on Computers has some useful references to books containing source code for BASIC programs for various aspects of data computations, but is naturally a bit out of date in its lists of specific software.

The book then has specialist chapters on advanced techniques: plane table, stadia, theodolite, electromagnetic induction (radio location), a useful short section on using cameras and rotating lights/lasers to record accurate cross-sections, surface location (mainly astronomy, but also GPS), underwater surveys, and geology. The last of those (geology) is a useful summary of the geological features that should be noted and measured because they can give clues on cave development etc - as well as hints about possible undiscovered passages.

Appendices contain: Map Symbols (a concatenation of the NSS, MSS and BCRA symbols), Trigonometry (terms and formulae), Answers to the exercises, a bibliography and an index.

There are numerous useful line-drawings to illustrate the text, and also 13 example cave maps are scattered through the book as page-fillers at the end of each chapter.

RECOMMENDED

"The Art of Cave Mapping"

by K.C. Thompson & R.L. Taylor. Published 1991, by the Missouri Speleological Survey, as Volume 31, numbers 1-4 of "Missouri Speleology". (reprinted, 1997).

Soft back, Spiral bound Quarto. 185 pages.

\$US12.00 (about \$A18.50) + Postage from the USA. Available from NSS bookshop (see address above).

"An Introduction to Cave Surveying" by Brian Ellis, (1988)

This small booklet is a cut down (but also updated) version of the authors earlier (1976) book on "Surveying Caves". It is

aimed primarily at the beginner surveyor, and as such it does a good job. However it lacks the depth and breadth of the other two books. There is nothing on the use of computers.

The book starts off with an introduction to the aims and overall principles of mapping a cave. It then discusses accuracy and grading systems (the BCRA system is reproduced in full). Next it describes the instruments: compasses (mainly SUUNTO), clinometers, the topfil, tapes, notebooks and other equipment. It lacks any warning of the two-eye problem when using SUUNTO compasses, but does warn about using the correct (left) scale on the SUUNTO clinometer. A section on errors distinguishes between gross errors (blunders), systematic errors, and errors specific to particular instruments; then describes how to calibrate an instrument to determine its systematic errors.

We then read about the survey team and the duties of its members; how to survey the traverse line and how to sketch the detail; and finally how to note it all in the book without mistakes. Note a point of potential confusion here: Ellis recommends recording passage dimensions (distance from survey station to left & right walls, ceiling and floor) for the finishing ("TO") station of any survey leg. By contrast the American books recommend recording this info for the Starting ("FROM") station! Personally, I think recording it for the TO station is more logical as that is the point one is thinking about at the time, however the American convention seems to be getting established in some of the computer programs. One can avoid the problem by using a notebook layout (the second example on his Fig 7) that puts station info on separate lines alternating with lines containing the actual survey leg info (length, bearing etc.), but that still leaves the possibility of confusion when transferring the data to a computer database with a predetermined structure.

A short section on calculating station co-ordinates follows, with elementary trigonometry and a discussion of misclosures and adjustments thereto. He then discusses the parts of a cave map: plan, elevations and sections; and the procedure for plotting first the traverse line, then the detail. Only a small set of commonly used map symbols are illustrated. The book finishes with comments on the layout, lettering and publication of the final map.

There is a brief bibliography (somewhat dated by now), but no index (hardly needed in as small a book as this). Diagrams are sparse, but useful.

SUGGESTED FOR BEGINNERS

"An Introduction to Cave Surveying"

by Brian Ellis.

Published 1988, by the British Cave Research Association, as "Cave Studies Series No 2". ISBN 0 900265 07 8

Soft back, A5, 40 pages.

#UK2.00 (about \$A5.00) + Postage #UK2.00 (making about \$A10.00 in all). Obtainable from: British Cave Research Assoc., 20 Woodland Ave, Westonzoyland, Bridgewater, SOMERSET TA7 0LQ, United Kingdom.

WHICH TO BUY?

Brian Ellis's small booklet, "An Introduction to Cave Surveying", covers the full range of topics involved in basic cave surveying, but lacks the details provided in the other two books reviewed here. It is aimed at a beginner surveyor, and has

the advantage of being cheap and compact. Beginners could carry it with them on a trip and read it at the campsite in the mornings while waiting on their elders to finish their third cup of tea. However, it lacks the detailed discussions, hints, diagrams, and examples provided by the other books, and I would only recommend it to one who is strapped for cash.

It is a pity I am reviewing the other two books together, as it forces me to choose between them. In fact, both are excellent value.

"*On Station*" is a more sophisticated production: hard bound and professionally typeset with photos. On the other hand "*The Art of Cave Mapping*" is a simpler spiral bound book, with no photos. But *The Art* is cheaper, and many of the photos in *On Station* are more decorative than useful, and in their place *The Art* has quite useful line drawings.

Both books give detailed and comprehensive instructions and tips for both novices and experienced surveyors. I felt that *On Station* was slightly better in its description of the survey instruments and their uses. Both books are good in the important sections on sketching of detail, and the overall team procedure within the cave. *The Art* has a whole chapter (6 pages) on electro-magnetic induction methods, against only two pages in *On Station*. *The Art* also has a brief chapter on underwater surveys, and one on the recording (and importance) of Geological features. *On Station* has the excellent appendix of example cave maps with notes; *The Art* has cave map examples scattered through the text, but these lack annotations and are generally not linked to the adjacent text.

Each book has areas not covered by the other or covers them in a different manner, so the two books compliment each other to some extent and for a club library there is a case for buying both. For an individual who can afford only a single book, *On Station* probably provides better value for money.

The best way to order these books is direct from the NSS or BCRA (see addresses above) using a credit card that works overseas (MasterCard, Visa). If you don't have a card yourself find someone in your club who does. If you want to order

via your local book shop, quote the ISBNs, but you may have to pay more that way.

Ken Grimes

"Images Below"

by Chris Howes

Chris Howes is a first rate cave photographer. His masterly control of light is second to none and has earned him international recognition and a Fellowship of the Royal Photographic Society. He is also a capable writer and is the publisher of UK caving magazine *descent*. It was therefore with glee and considerable anticipation that I took possession of my copy of *Images Below* to discover his secrets and hopefully improve my own cave photography.

In 1987 Howes published "*Cave Photography, A Practical guide*", a short "how to do it" manual which instantly became the standard cave photography text. It remains even today probably the best beginners manual with its easy to read format and concise instructions. *Images Below* takes up where *Cave Photography* left off.

At 268 pages *Images Below* is far more comprehensive and goes way beyond a beginners text. The basics are covered in great detail with the first three chapters devoted to the selection and care of equipment and the next three to basic lighting using single and multiple flash. The book then extends the horizon with details on close up photography, alternative lighting, expedition photography and introductions to underwater, stereo (assisted by ASF member David Stuckey) and video photography. The last section covers composition, assessment of photographs and storage of slides and prints.

The level of detail is extensive, from building your own flash bulb trigger to modifying the DX coding on a film canister to fool an automatic camera. Special information boxes are used in the text to illustrate a point or to provide technical details. The 450 superb photographs, tables and graphs ably illustrate all the techniques covered. It is unlikely that any experienced cave photographer would not benefit by reading this book, the images alone justify the purchase.

The level of detail is both a strength and weakness. The text is a difficult read. It does not flow and some sections of the book are very laboured and bogged down in detail. The many information boxes also serve to break the flow and are often annoying. However *Images Below* is unashamedly a manual so perhaps I am expecting too much.

Images Below is without doubt the most comprehensive English language manual on cave photography available. It is a must for every club library and active cave photographer.

David Gwillim

Images Below - A Manual of Underground and Flash Photography
Author Chris Howes
Wild Places Publishing
ISBN 0 9526701 1 9



Cartoon by Garry Smith

SPELEO SYNOPSIS

No 24

May - December 1997

by Peter Ackroyd

AUSTRALIA

SUSS Bull 36(4) This issue contains a lot of diving news. In NSW, the Jenolan Underground River is being dived upstream towards Mammoth Cave. A team of Australian divers recovered Dave Weaver's body from the Pearse Resurgence (New Zealand). Weaver had drowned deep in the cave in April 1995 and it was not until David Apperley and Richard Taylor visited the site in January 1997 that his body was recovered from 85 metres depth. On the days following the body recovery, they dived the Pearse Resurgence using trimix breathing gas to a depth of 103 metres. The cave seemed to level off at this point and head in the direction of the Nettlebed System.

Informatics Bulletin 5, July 1997 This is the newsletter of the UIS Informatics Commission. In it there is a proposal for an international cave data exchange format for electronic data and an overview of karst documentation in Austria.

EUROPE

Descent 136, June/July 1997 This issue contains an obituary for cave diver Rob Palmer who drowned during a dive in the Red Sea in May 1997. The 1996 cave accident summary for the UK is also in this issue - only one caving death (a bad fall) and 13 other serious incidents (ie. resulting in injury). Dr Peter Glanvill gives a rundown on possible diseases one can contract while caving. In the letters page we learn that the Gouffre Berger in France can only be visited if each caver has a certificate from his or her national caving body testifying that the caver is "capable of executing the exploration of Gouffre Berger". This new requirement is apparently in response to the deaths of two cavers in the Berger in July 1996 during a freak flooding event.

Grottan 2-97, 1996 [In Swedish - English summaries] This issue has two articles on caving in Morocco.

Cave and Karst Science 23(3), December 1996 This issue contains articles on: carbon dioxide in Congo Cave, South Africa; recent karstification in Northern Ireland; "hidden" shafts and the epikarst zone in Italy; mineralogy of speleothems in Romania and their paleoclimatic significance.

Descent 137, August/September 1997 In this issue there are reports of cave divers finding Bronze Age human remains in a cave, a report of a caving trip (won in a competition) to Le Vercours in France and an expedition to Vietnam in March 1997. There are many tributes to world renowned cave diver, Rob Palmer who drowned during a pleasure dive in the Red Sea in May 1997.

Caves & Caving 76, Summer 1997 The high grade survey of the 59 kilometre long Ogof Draenen in South Wales (UK) is described in this issue. To date the project is about 80% complete. An expedition by Oxford University Caving Club to the Picos de Europa mountains in northern Spain resulted in a connection between two known caves and revealed further prospects. In Slovenia, a team of British and local cavers connected three main caves to form the 281 metres deep System Migovec. A British team examined the karst of the eastern tip of Oman - a dry plateau with striking caves. Continuing the work of an American team who visited the area in 1987, the 1997 team connected several caves to create the 11.5 kilometre long Selme System.

International Caver 20, 1997 This high quality magazine, edited and produced as a labour of love by Tim Stratford in the UK, is now the longest surviving international caving journal. This issue contains a history of the exploration of Sardinia's 34 kilometre long Codula llune System. This is followed by an expedition report from the 1997 trip to Vietnam and a report of a trip by two Belgian cavers to Southern Jamaica and the 2.2 kilometre long Potoo Hole they explored and surveyed. The second deepest cave in the Balkans, Slovacka jama has been surveyed to a depth of 1,000 metres. The cave is in Croatia and contains a pitch in excess of 213 metres and a couple more over 100 metres (194m and 170m). A 1996 expedition to find caves in a hidden valley in Sarawak (Malaysia) resulted in several new caves being discovered. One of these, Bridge Cave, is 6 kilometres long.

Cave and Karst Science 24 (1), April 1997 In this issue: the development of the Derwent Gorge, Derbyshire; seaweed dependent fauna in a cave on the Isle of Man; development of Shapour Cave, Southern Iran; a review of the sedimentation and subsequent archaeological excavation of Kent's Cavern, Southern Britain; an occurrence of the minerals mirabilite and thenardite in Pollarafrat, Northern Ireland.

Descent 138, October/November 1997 The news of Rob Parker's drowning during a cave dive in the Bahamas, extensions in the bottom of the Gouffre Berger and the news that the 60 kilometre long South Wales cave, Ogof Draenen, is headed for a world heritage listing application are all in the first pages of this issue. What follows is a review of the use of GPS and palm-top computers in caving, more reminiscences from Len Cook - this time about caving in France in 1955, and a brief summary of the recent UIS congress in Switzerland.

Caves & Caving 77, Autumn 1997 News from around the UK includes the discovery of bear bones, including a skull, in a cave in Ireland. However, the lead story in this issue is the discovery, by a surveying party, of a well decorated section in the 60 kilometre long Ogof Draenen. This section, the Cantankerous Surveyors Series, contains needles, anthodites and helictites. Also in this issue is the story of searching for, and finding, caves below the Gobi Desert. Being arrested by the security police is just one of the hazards of caving there. The 1997 expedition to Vietnam is described and lavishly illustrated in the last story of the issue.

AMERICAS

NSS News 55(2), February 1997 This issue features a story on the exploration and documentation of several lava caves in Hawaii.

Journal of Cave and Karst Studies 59(1), April 1997 This issue contains articles on mineral mining in Mammoth National Park caves in Indiana, the discovery of a native American in a Rocky Mountains cave - he died in the cave 8,000 years ago, excavation of buried cave deposits in Guatemala and Mexico, Mayan cave art and a list of selected abstracts from the 1995 NSS Convention.

O Carste 9(2), April 1997 This magazine is the official organ of the Bambui Caving Club in Brazil. This issue features the Peruaçu Valley which contains some very spectacular karst. Other articles describe life forms living in guano.

NSS News 55(4), April 1997 This is part 2 of the annual conservation issue and it describes the efforts to clean and protect caves in the USA's south-west - mainly Lechuguilla Cave.

NSS News 55(5), May 1997 A technique for monitoring bats in Carlsbad Cavern (New Mexico, USA) using infrared photography is the lead article in this issue.

NSS News 55(6), June 1997 The lava caves of New Mexico's (USA) El Malpais region features in this issue. They are large diameter (3-5 metres) lava tubes on a plateau 1,800-2,400 metres above sea level and often have ice formations in them. In the technology column, the British made FX3 caplamps are reviewed.

O Carste 9(3), July 1997 (Brazil) This special edition describes a caving expedition to the western part of Brazil. Of the caves found, one was over four kilometres long and contained lakes up to 250 metres long. Elsewhere in this issue there is a review of a Brazilian made acetylene generator similar to the 'Fisma' model, a summary of the 8th international symposium on biospeleology held in Morocco in April 1997 and a description of the exploration of Centeneria Cave _ a 450 metre deep, 3.25

kilometre long quartzite cave in Brazil. It is the world's longest and deepest quartzite cave.

NSS News 55(7), July 1997 The lead article in this issue covers the exploration and mapping of Lilburn Cave (California), a 25.6 kilometre long 3-D maze in strikingly figured marble. In the 1970s Yorkshire Pot in the Canadian Rockies was explored to a depth of 390 metres from an altitude of 2,400 metres. The cavers could work only by camping in the cave. In 1996 a dedicated band of cavers returned to clean all refuse from the cave, including that to be found in the cave's 'WC'.

Journal of Cave and Karst Studies 59(2), Aug 1997 This issue contains an in depth article on the development and morphology of Kazumura Lava Cave in Hawaii. There are also reports on

caves in southern Italy, an unusual gypsum "nest" found in a cave in Turkmenistan and an archeological examination of three American civil war saltpetre caves in Kentucky.

O Carste 9(4), October 1997 (Brazil) This issue describes the 71 kilometre long Toca de Boa Vista in the north of Brazil.

NSS News 55(8), August 1997 A brief report on the survey of the underwater Peacock Springs Cave in Florida leads this issue. The history of Ohio Caverns, a show cave in Champaign County, Ohio is next and then comes a lengthy report on the 1995/96 and 1996/97 seasons' explorations in Sistema Purificación in South Mexico.

The Way We Used To Cave...

This old caving photo was recovered from the smouldering ruins of the NUCC hut which burnt down recently. It looks like cavers weren't overly concerned about conservation in days of yore! Can any reader identify the cavers or the cave?



It's Time to Update the ASF Safety Guidelines

By Garry K. Smith

Secretary - Newcastle & Hunter Valley Speleological Society (NEWCAVES)

In 1997, I presented two papers at the ASF Biennial Conference on 'Foul Air and The Naked Flame Test'. These were the culmination of considerable literature researches and my own experimental work on the question of a simple test for foul air in caves and the effect of foul air on the human body. The findings prove that the simple 'Naked Flame Test' as used by many cavers to measure Carbon Dioxide (CO₂) concentration is totally inaccurate. This highlighted an inadequacy of the present ASF Cave Safety Guidelines, which were adopted in 27th Jan. 1990 (Australian Caver No. 123, P.9). It would appear conclusive that the flame test is measuring primarily the Oxygen (O₂) concentration and that the CO₂ is elevated to an unknown concentration. The extinguishing of the naked flame is essentially indicating an atmosphere which could be hazardous or life threatening. Please refer to the following articles for more information on this subject.

Naked Flame Tests for CO₂ in Limestone Caves & The Effect of CO₂ and O₂ on Humans.

Published in the *ASF 21st Biennial Conference Proceedings 1997*, Pages 40-52.

Caves, Carbon Dioxide And You.

Originally published in 1993 "*Australian Caver*" No. 133, Pages 20-23, Revised in 1997 and republished in the *ASF 21st Biennial Conference Proceedings 1997*, Pages 35-39

Unseen Danger Of Foul Air & The Flame Test. By Garry K. Smith

Published in "*Australian Caver*". No. 141, P.13-16. June 1997.

A motion on behalf of the NHVSS to amend the safety guidelines was circulated along with the agenda prior to the ASF general meeting in January 1998. Michael Lake (ASF Safety Convenor) in consultation with me proposed a few amendments to the motion. After some lengthy discussion we reached agreement on what should be changed and included in the safety guidelines. At the meeting the motion was not adopted as it was felt that many ASF members didn't have sufficient time to consider the motion. Since the meeting I have contacted Mike Lake and Evalt Crabb (Codes and Guidelines Review Adhock Committee) regarding the motion, and it was felt appropriate to include a copy of the proposed amendments in the Australian Caver so that members have ample time to consider them before the next ASF general meeting at which the motion should be moved.

The inclusion of updated information in the ASF safety guidelines is a matter which should be treated with urgency. Note that these proposed amendments make little change to the way we go caving, moreover they shed light on the question of safety when caving in foul air and allow you to make more informed decisions when the atmosphere is dangerous.

The ASF Cave Safety Guidelines (Section 9) to be rewritten as follows.

General Comments

Foul air is an atmosphere which contains greater than 0.5% CO₂ and/or lower than 18% O₂ by volume. Brief exposure to foul air will cause a rapid increase in the heart and breathing rates.

Prolonged exposure may have some or all of the following effects on party members:

- Increased heart and breathing rate
- Lack of attention to details
- Clumsiness
- Fatigue
- Anxiety
- Severe headaches and in some cases nausea

Exposure to atmospheres containing greater than 6% CO₂ and/or less than 11% O₂ can result in unconsciousness with prolonged exposure - leading to suffocation and death. These gas concentrations may vary a couple of percent, depending on the tolerance of the individual, however nobody is immune to the effects of foul air.

The above physiological signs are a good indication of foul air. The flame extinction test is a simple test which can confirm the presence of foul air which is dangerous to human life. The relative O₂ concentration by volume that will cause a flame to extinguish is approximately 15% or less. In general a low O₂ concentration which will not support combustion is associated with an elevated CO₂ concentration. An elevated CO₂ concentration is generally the most life threatening foul air scenario found within limestone caves.

The **flame test** can be undertaken by lighting a match or butane cigarette lighter or carrying a lit candle into suspected foul air. If the flame is extinguished, foul air is present. Where possible a butane cigarette lighter should be used to reduce unpleasant fumes emitted from matches burnt by people testing air quality in the confines of a cave.

- As soon as foul air is suspected, a test should be made by striking a butane lighter. If it will not remain alight, then the party should immediately begin to exit, but should NOT PANIC OR RUSH.
- If ascending vertical pitches, great care and thorough checking should be carried out to ensure equipment is properly attached.
- 9.4 If abseiling into a cave suspected of containing foul air the following procedures should be followed;
 - a) The first person down should use a trailing ascender held open or a similar device which will lock if the person is overcome by foul air. Alternatively the person can be slowly lowered by a single top rope.
 - b) The abseil or lowering rope must be able to be changed to a retrieval system in the event that the abseiler is overcome by foul air.
 - c) The first person down the pitch should have foul air experience. They should make regular checks by stopping and lighting a butane lighter every few metres of descent and communicate constantly with those above.
- 9.5 Beginners or other suffering fatigue and /or anxiety should be guided, watched and encouraged until out of the cave.
- 9.6 All cavers, and most particularly Party Leaders, should recognise the fact that exposure to foul air has an effect on a person's ability to function normally. The

likelihood of an accident is therefore greatly increased. All care and precautions should be taken.

9.7 Under special circumstances such as search and recovery operations, exploration and scientific work, it may be decided to enter into foul air deliberately. Under such circumstances the following is recommended:-

9.7.1 In mild foul air where breathing rate is up

- A CO₂ tester should be carried - if nothing else is available, use a lit candle or frequently test with a butane cigarette lighter. If the flame goes out - get out slowly.
- Cavers with no experience of foul air should be introduced to it gradually by an experienced leader.

9.7.2 In foul air where the flame test fails

Only experienced foul air cavers should enter these regions. In addition to the recommendations in 9.7.1;

- A CO₂ tester must be carried eg. a Draeger Gas Analyser.
- An "oxygen rebreathing" apparatus should be taken (one kit to four people). The rebreather set should go down the cave with the first person.
- In cave atmospheres containing greater than 6% CO₂ and/or less than 11% O₂, breathing apparatus (such as SCUBA) is necessary and all the precautions against equipment failure taken in mines rescue and cave diving should be followed.

CELEBRATING THE PARKS : A SYMPOSIUM ON PARKS HISTORY

Mt Buffalo

16-19th April 1988.

Extract from 2nd circular

It is now clear that the Symposium will be a great success, with speakers coming from throughout Australia, New Zealand, Canada and Great Britain.

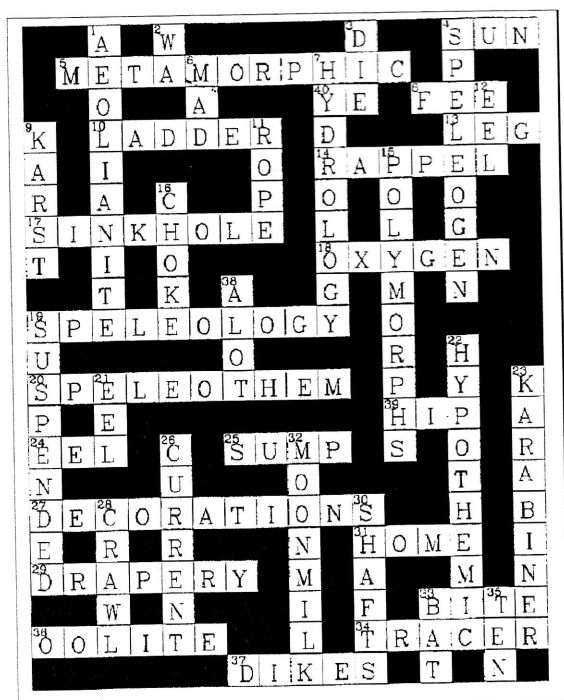
It will commence at 2.00 p.m. on Thursday 16th April, and close at lunchtime on Sunday 19th April. The program will include paper presentations, seminars on specific topics, and hopefully workshops to discuss aspects of the development of parks history. There will be at least one guided heritage walk on the plateau, and time for your own individual exploration of the beautiful Mt. Buffalo National Park.

Accommodation is available within the Chalet (which will be the venue for the symposium), but you may also book into

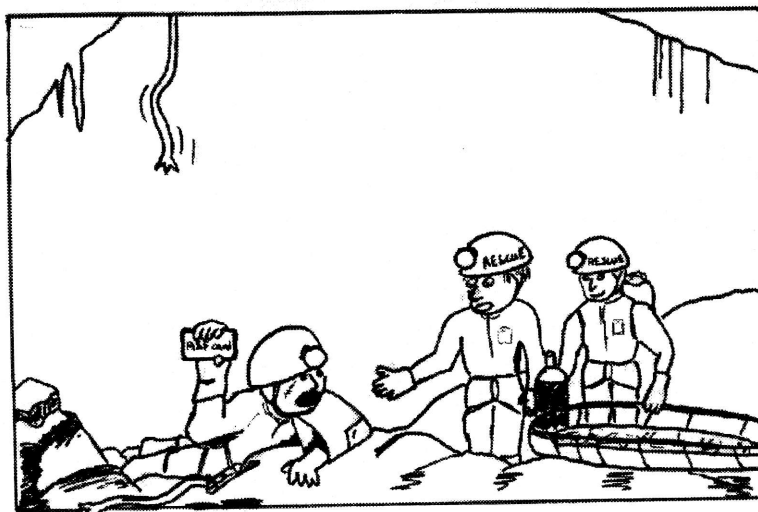
the lodge, camp at Lake Catani or make your own bookings in any of the nearby towns.

If you wish to present a paper at the Symposium, send your abstract to the address below. Abstracts, registrations and accommodation bookings should be sent to the convenor by 16th March 1998.

For full details and a registration form, contact the convenor, Elery Hamilton-Smith, at:
Rethink Consulting P/L, P.O. Box 36, Carlton South, Victoria 3053, Australia.
Phone 03 9489 7785 ; Fax 03 9481 2439
or e-mail <elery@melb.alexia.net.au>



Left: Crossword answers from last issue - Garry Smith
Below: Cartoon by Steve Bunton



"Asf Card, why certainly sir!"

SMALLS

SHORT NEWS ITEMS AND NOTICES

New World Caving Depth Record

According to unconfirmed reports, a team of french and british cavers have broken the caving depth record by exploring Mirollda Cave (through a sump!) to a depth of 1610m. The cave is in the same region of the Haute Savoie in France as the Réseau Jean Bernard, the previous record-holder, at 1605m. Due to the similarity in depth of the two caves, the survey of Mirollda Cave is eagerly awaited!

ASF Receives Two Government Grants

ASF has recently received two government grants. The first, for \$5010 was from the Environmental Restoration & Rehabilitation Trust of the NSW Dept of the Environment. The money is to be used for a rehabilitation and conservation project at Cliefden Caves.

The second grant of about \$2000 has been given for documentation of Karst features in the South East of NSW. A meeting to discuss this project will be held shortly in Canberra.

A big "thank you" goes to those who put in all the hard work with the grant applications!

Honours for Cave Researcher

ASF member, Frances Anne Atkinson, has been made a Member of the Order of Australia (AM) for her work in studying, and establishing protection for, the lava tubes & volcanic features of Undara in North Queensland.

Welcome to CCV

The newly formed Cave Club of Victoria was voted in as a corporate member of ASF at the January council meeting.

Caving in Irian Jaya, Indonesia/New Guinea

I've been living and caving in Irian Jaya province of Indonesia (Western New Guinea) for the last four years. Anyone who is interested in caving in Irian Jaya please feel free to contact me on my

e-mail address:

srhewat@netspace.net.au

or by post at : Robert Hewat, 6/400 Victoria Pde, East Melbourne, Vic, Australia

Drought Reveals Drowned Cave

Low water levels in the Burrunjuck Dam near Yass, NSW, have exposed Cave Flat Cave for the first time in many years. A cross section of the cave was published in 1834 making it one of the first caves to be surveyed in Australia.

ISS turns 35 years of age in February! Happy Birthday to ISS!

Ethereal CEGSA

CEGSA now has a website. While CEGSA has been quietly busy for more than 40 years, exploring the frontiers of South Australia and the Nullarbor, reports of our activities have tended to stay in dusty archives. CEGSA News, our quarterly newsletter gets out to many Australian clubs, but doesn't always get to individuals.

With the new website, we hope to let cavers know where we are, what we're doing and how to contact us. We hope to attract new members as well as visitors from interstate to help us continue to explore our underground frontiers.

The site contains a substantial portion of the latest issue of CEGSA News, a calendar of events, descriptions of caving areas, and some terrific photographs of local caves.

Please visit the site at:
<http://www.users.on.net/smilner/>

Steve Milner, President, CEGSA

CSS Address Change

Canberra Speleological Society (CSS) has a new postal address, effective immediately. Would all corresponding societies, newsletter distributors, donors,

sponsors and debtors please note the new address:

Canberra Speleological Society (Inc.)
PO Box 156
CURTIN
ACT 2605

Mail to the previous address (which is a private residence) will still get through, but the owner's mailbox gets very full and after many years of imposing on them the Society has decided it's time to give them a break.

MSS Address Change

Just a note that Metropolitan Speleological Society has changed it's mailing address to:

PO Box 178
THORNLEIGH NSW 2120

DeepTech Journal

DeepTech Publishers appoint new Australian & New Zealand Representative

With the announcement today by Technical Diving International USA Headquarters of a new Australian & New Zealand representative, Tech Publishing, the publishers of the technical diver journal DeepTech, have also appointed a new local distributor in TDI Australia & New Zealand.

The DeepTech publishers are arranging for TDI Australia & New Zealand to fulfil all current local subscriptions and will welcome submissions of work either directly or through their local representative. DeepTech issue 9 will be sent to all registered facility resellers and subscribers during January 1998.

Details of new or current subscriptions and Facility Wholesale pricing can be found by contacting:

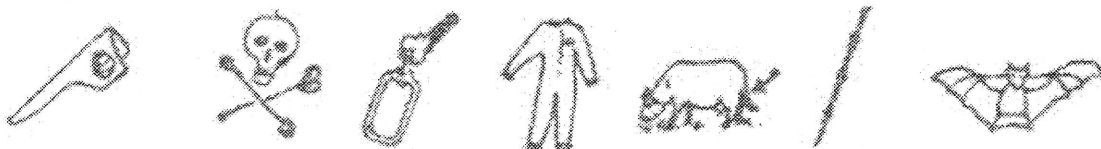
DeepTech Distributions/TDI Australia & New Zealand PO Box 529, Balgowlah, NSW 2093, Australia
ph/fax: +61 2 9958 3469
mobile: 0417 426 316

email: tdi_aust@compuserve.com

Subscriptions:

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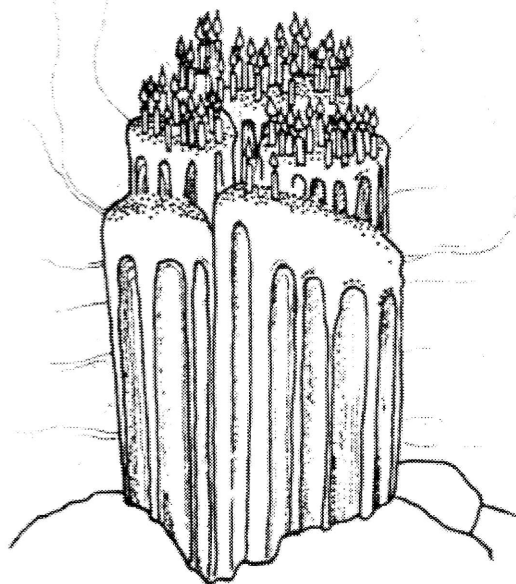
Sydney University Speleological Society



50th Anniversary Celebrations

1/5/98 - 3/5/98

1948



1998

VENUE: Caves House, Jenolan

Date: 1/5/98 - 3/5/98

- Come along and experience our 50th Birthday party!
- Stay in Caves House, or at economical lodge accommodation
- **Highlights include:** a formal dinner Saturday night at Caves House
- Cave Tours, in the Show Caves and Wild Caves of Jenolan, see Mammoth, Barralong (limited numbers), Wiburd's Lake Cave and more!
- Spectacular Multi-Media Presentation, presented by Mark Spencer and John Oxley
- Laser show by LaserVision
- Speakers including Jak Kelly, John Dunkley and Keir Vaughan-Taylor

And don't forget ... Speleosports hosted by SUSS at Sydney University, on Saturday April 18th, 1998

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(email) SUSS_50th@es.su.oz.au

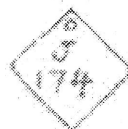
(www) <http://www.bounce.to/SUSS>

Our 50th Anniversary Celebrations are a non-profit event
any proceeds going to Caves Rescue & the Jenolan Bush
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Package Prices

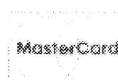
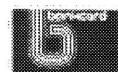
All prices are per person and includes Saturday's evening function cave, cave tours and entertainment. There is a \$7 discount for undergraduates. Accommodation prices are for Friday through to Sunday. EITHER return this form to PO Box 35, Holme Building, University of Sydney, NSW 2006; with either payment by cheque made out to Sydney University Speleological Society, or credit card order, by filling out the coupon below, OR book by phone and use your credit card; David Connard (Hm) 9968 3838 or Lorraine O'Keefe (Hm) 9922 3346, OR book at one of the SUSS General Meetings and pay by cheque, cash or credit card. The choice is yours!

| | |
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| Caves House Traditional | \$322 |
| Caves House Lodge | \$362 |
| Caves House Bunk | \$222 |
| Caves House Classic | \$422 |
| GateHouse Accommodation | \$110 |
| Evening function only, linen required | |
| Binda Bush Cabins (limited numbers) | \$92 |
| Bunk accommodation and doubles | |

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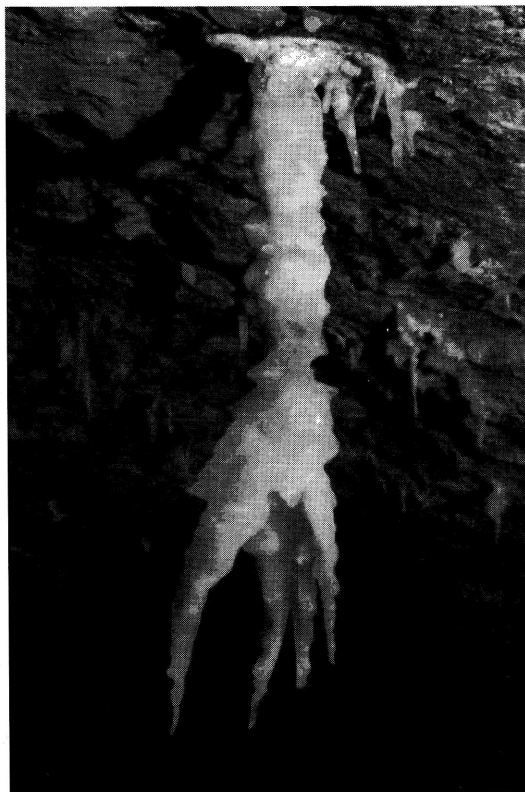
wildsports



WILD STUFF



UNIVERSITY
SPORTS &
AQUATIC
CENTRE



Gallery

photos by Lucinda Coates

Left: Halite straw, Main Chamber of Easter Extension, Mullamullang Cave, Nullabor, S.A.

Above: White gypsum, Thampana cave

Below left: Salt Cellars, Easter Extension, Mullamullang

Below: White Gypsum Stals, Thampana Cave

