

AUSTRALIAN CAVER

THE AUSTRALIAN
SPELEOLOGICAL QUARTERLY

No. 109

1986



EXECUTIVE OFFICERS

Please write direct to the Officer concerned

EXECUTIVE COMMITTEE MEMBERS

President	John Dunkley	3 Stops Place Chifley ACT 2606	062 81 0664
Past President	Ken Lance	PO Box 2338 South Hedland WA 6722	091 72 2153
Vice Presidents	Mike Armstrong	90 Gahans Ave Woonona NSW 2517	042 84 6829
	Ian Mann	28 Stephen St Lawson NSW 2783	047 59 1890
	Kevin Mott	3 Harcourt Rd Payneham SA 5070	08 42 2441
	Stuart Nicholas	7 Rupert Ave New Town TAS 7009	002 28 3054
Secretary	Terry O'Leary	PO Box 7 Beaconsfield NSW 2015	02 319 1930
Assistant Secretary	Guy McKanna	48 Vineyard St Mona Vale NSW 2103	02 997 3758
Treasurer	Lloyd Mill	11 Warner St Essendon VIC 3040	03 379 8625

CONVENORS OF COMMISSIONS

Administration	Miles Pierce	42 Victoria Cres Mont Albert VIC 3127	03 89 8319
Awards	John Dunkley	3 Stops Place Chifley ACT 2606	062 81 0664
Bibliography	Gregory Middleton	PO Box 269 Sandy Bay TAS 7005	
Cave Diving	Ron Allum	63 Hancock Rd Vista SA 5091	
Cave Safety	Judith Bateman	PO Box 230 Milsons Pt NSW 2061	02 929 0432
Cave Tourism & Mgmt Conservation	Eleroy Hamilton-Smith	PO Box 36 Carlton South VIC 3053	
International Relns	John Dunkley	3 Stops Place Chifley ACT 2606	062 81 0664
Library	Andrew Spate	2 Hoskins St Hall ACT 2618	062 30 2322
Newsletter Editor	Kerry Bennett	90 Gahans Ave Woonona NSW 2517	042 84 6829
Newsletter Manager	Ian Mann	28 Stephen St Lawson NSW 2783	047 59 1890
Speleohandbook	Peter Matthews	66 Frogmore Cres Park Orchards VIC 3114	03 876 1487
Survey & Mapping Standards	Ken Grimes	13 Dewar Tce Sherwood QLD 4075	07 397 3895

CONVENORS OF AD HOC COMMITTEES

Association	Darrel Warden	40 Chester Ave Baulkham Hills NSW 2153	02 524 2250
Beginners Manual	Mike Armstrong	90 Gahans Ave Woonona NSW 2517	042 84 6829
Cave Documentation	Peter Matthews	66 Frogmore Cres Park Orchards VIC 3114	03 876 1487
Jenolan World			
Heritage Nomination	John Dunkley	3 Stops Place Chifley ACT 2606	062 81 0664
Nullabor World			
Heritage Nomination	Adrian Davey	GPO Box 290 Canberra ACT 2601	062 47 3653
National Estate			
Karst Review	Nick White	123 Mannington St West Parkville VIC 3052	
Speleohandbook			
Papers	Evalt Crabb	PO Box 154 Liverpool NSW 2170	02 607 2142
Cave Convict	Philip Mackey	24 Drysdale Ave Frankston VIC 3199	03 783 4538
Speleomania	Stuart Nicholas	7 Rupert Ave New Town TAS 7009	002 28 3054
Speleotec '87	Ian Mann	28 Stephen St Lawson NSW 2783	047 59 1890
IUS Convention 1989	Guy Cox	180 Short St Balmain NSW 2041	02 818 1896

CONVENORS OF STATE SPELEOLOGICAL COUNCILS

NSW Speleological Council	Evalt Crabb	PO Box 154 Liverpool NSW 2170	02 607 2142
------------------------------	-------------	-------------------------------	-------------

MEMBER SOCIETIES & ASSOCIATED ORGANISATIONS

COUNCIL MEMBERS

ACT:

Canberra Speleological Society 18 Arabana St Aranda ACT 2614
Capital Territory Caving Group PO Box 638 Woden ACT 2606
National University Caving Club c/-Sports Union Australian National university ACT 2600

NSW:

Baptist Caving Association 90 Parkes St Helensburg NSW 2508
Blue Mountains Speleological Club PO Box 37 Glenbrook NSW 2773
Endeavour Caving & Recreational Club PO Box 63 Miranda NSW 2228
Highland Caving Group PO Box 154 Liverpool NSW 2170
Hills Speleology Club PO Box 198 Baulkham Hills NSW 2153
Illawarra Speleological Society PO Box 94 Unanderra NSW 2526
Kempsey Speleological Society 27 River St Kempsey NSW 2440
Macquarie University Caving Group c/-Sports Association Macquarie Uni Nth Ryde NSW 2113
Metropolitan Speleological Society PO Box 2375 Nth Parramatta NSW 2151
NSW Institute Of Technology Speleological Society c/-The Union PO Box 123 Broadway NSW 2007
Orange Speleological Society PO Box 752 Orange NSW 2800
RAN Caving Association c/- Douglas Ave Nth Epping NSW 2121
Sydney University Speleological Society Box 35 The Union Sydney University NSW 2006
University Of NSW Speleological Society Box 17 The Union UNSW Kensington NSW 2033

QUEENSLAND:

Central Queensland Speleological Society PO Box 538 Rockhampton Qld 4700
University Of Queensland Speleological Society The Union University Of Queensland St Lucia Qld 4067

SOUTH AUSTRALIA:

Cave Exploration Group South Australia Inc c/- Sth Australian Museum Nth Terrace Adelaide SA 5000

TASMANIA:

Northern Caverneers PO Box 315 Launceston Tas 7250
Southern Caving Society PO Box 121 Moonah Tas 7009
Tasmanian Caverneering Club PO Box 416 Sandy Bay Tas 7005

VICTORIA:

Victorian Speleological Society 6PO Box 5425 CC Melbourne Vic 3001

WESTERN AUSTRALIA:

Speleological Reasearch Group Western Australia PO Box 120 Nedlands WA 6009
Western Australia Speleological Group PO Box 67 Nedlands WA 6009

ASSOCIATED ORGANISATIONS

Avondale Speleological Society c/-20 Avondale Rd Corranbong NSW 2265
Campbelltown Caving And Outdoor Group PO Box 281 Campbelltown NSW 2560
Chillagoe Caving Club PO Box 92 Cairns Qld 4870
Mount Isa Cave Explorers PO Box 2328 Mount Isa Qld 4825
Macarthur Caving Group PO Box 537 Campbelltown NSW 2560
Newcastle And Hunter Valley Speleological Society PO Box 15 Broadmeadow NSW 2292
North West Walking Club PO Box 107 Ulverstone Tas 7315
North Queensland Speleological Association 1 Boden St Edge Hill Qld 4870
Papau New Guinea Exploration Group c/-6 Francis PO Box 1824 Port Moresby PNG
Scout Caving Group South Australia c/-44 Fullarton Rd Norwood SA 5067
Top End Speleological Society c/- PO Jabiru Nth Territory 5796

AUSTRALIAN CAVER

THE AUSTRALIAN
SPELEOLOGICAL QUARTERLY

No. 109
ISSN. 0313 - 413

1986
Formerly A.S.F. Newsletter

CONTENTS

Cocklebidy, Australia — Ron Allum.....	2
Karst Index.....	4
Speleosports Speleomania — Rosie Mann.....	7
Water Tube Levelling — N. T. Smith.....	10
Letters.....	14
Editorial.....	15
Invitation to Visit the Classical Karst Caves of Yugoslavia in 1986.....	16
Tid-bits from Overseas.....	17
Expedition — Australia '86.....	18
Summer University at Mammoth Cave.....	19
Down Under All Over.....	22

All articles, reports, tests, photos and reviews are welcomed for publication.

These may be sent to:-

EDITOR: Kerrie Bennett
90 Gahans Ave
Woonona 2517
Ph. (042) 846829

**AUSTRALIAN SPELEOLOGICAL
FEDERATION INC.**
P.O. Box 388
Broadway, N.S.W. 2007

NEWSLETTER

MANAGER: Ian Mann
28 Stephen St.
Lawson 2783
Ph. (047) 591890

DEADLINE FOR COPY

All articles should be submitted to the editor by the end of

FEBRUARY

MAY

AUGUST

NOVEMBER

If you find writing a chore, why not phone the editor directly???

COVER PHOTOGRAPH

*In the Basements of Honeycomb (M-41)
By P. J. Ackroyd.*

The opinions expressed in this journal are not necessarily those of the A.S.F. Inc. or the Editor.

COCKLEBIDDY , AUSTRALIA

Worlds Longest Cave Dive.

by Ron Allum

Cocklebidy Cave is seldom visited by anyone. It lies 200kms west of the West Australian border on the vast Nullarbor Plain. On the eve of an Australian cave diving expedition to this remote area when plans were well advanced a French expedition of five led by Frances Leguen arrived in Adelaide, also to dive Cocklebidy. September and October 1983 saw two major diving assaults on what is already, undisputed the world's longest cave dive.

The French team was well equipped having received financial backing from several sponsors and professional in their ways (eg Frances Leguen - professional photographer, writer). They were experienced, having many cave diving breakthroughs to their credit and were lured to Australia by the magnitude of Cocklebidy Cave. They first went to Mt. Gambier to check equipment, their technique was to use scooters, high pressure steel and fibre glass tanks, dry suits and a determination to push Cocklebidy to further its known length. This highly successful team added 1,550 metres in a single dive to the existing 4,300 metres as explored by the Morrison, Rogers and Allum Team of September 1982. When news of their dives filtered through to the Australian team via a press release to the media, prospects that we would make a significant impact on their attempt were unlikely. We spoke to Frances and Veronica Borel on their return to Adelaide before our expedition was due to leave. Cocklebidy Cave generally has railway tunnel dimensions however over the last 550 metres its cross sectional dimensions decrease to something less than one metre in diameter at its end. To quote Frances - "it is unfortunate for the cave and for the Australians but the cave has ended at 1,550 metres past "Toad Hall". The

only hope of continuation lies in the numerous side passages, in particular, a fifty metre long side passage that appears to close off in a loose rock pile 1,000 metres past "Toad Hall".

The Australian's dive plan was based on streamlining past techniques of pushing sleds using man power to assist in the set up for the final assault. To combat physical fatigue and possible decompression sickness from the long arduous dives we planned to have warm food and sleeping provision at "Toad Hall" (a 250 metre long air chamber 4,050 metres into Cocklebidy Cave).

The team including divers from West Australia, South Australia, Victoria and Tasmania gathered (with a huge pile of equipment including 86 aluminium tanks, 3 compressors and 4 especially constructed underwater sleds) at the entrance to the cave on Saturday October 8th, 1983. After a night's sleep to recover from car journeys of up to 2,400kms the work began in earnest. Everybody became sherpas carrying heavy loads down the steep 200 metre rock fall to the lake's edge.

Monday 10th saw the first dive when the sleds were loaded, each with their bouyancy chambers full to compensate for the 45kgs of air contained in the 14 tanks. Four sleds were pushed by divers wearing triple tanks and others using twin tanks accompanied them for the 1200 metre dive to the first rockpile chamber. Here 56 tanks, 3 sleds and ancillary equipment were carried over the 100 metres long, 20 metres high rockpile to a lake at its northern end. Fourteen divers in all took part in this dive including Chris Brown, Dennis Thamm, Paul Arbon, Peter Hudson, Charlie Tang, Stefan Eberhard and Robert Galliot. Two of the six waterproof containers (1.7 metres long, 150mm diameter PVC sewerage pipe with "O" ring screw ends) to transport food, extra batteries, sleeping bags and communication equipment were heavier than they should have been. When checked they had

leaked; fortunately the contents were not damaged but needed removal from the cave to dry out wet sleeping bags etc. Three sleds were loaded with 14 tanks, the remainder were assembled as triple sets. The divers returned to the south lake for the 1,200 metres dive out.

Tuesday 11th saw tired bodies from the previous day's work and now with spent tanks to fill and sleeping bags etc. to dry out Tuesday became a rest day. A measure of the cave's length was made on the surface to enable a surface party to later accurately plot "Toad Hall" and establish communications when the divers reached this point.

Wednesday 12th with all last minute preparations complete the three push divers Simon Jones, Graham Morrison and Philip Prust entered the cave at 9.30 a.m for a planned three day duration. Divers Peter Stace, Brendon Griffin, Leister Jerman and George Navas supported this team carrying the four extra tanks and water proof containers. The dive commenced at 10.30 a.m., an hour later the first rockpile chamber was reached and extra equipment was carried over the rockpile. With the three sleds fully loaded and the six triple sets assembled the three push divers and three support divers left for "Toad Hall" at 3.00 p.m., each pair pushing and breathing air from the sled, the triple set on each diver's back was an emergency supply (i.e. the sled could be ditched at any point, the divers then being able to return to the first rockpile chamber being self-contained). Meanwhile the other divers at the first rockpile chamber returned to the surface. At 6.00 p.m. a signal was transmitted from "Toad Hall" for the surface party to locate. Despite using a powerful transmitter (approximately 20 watts) and a high gain receiver, the equipment had a range of only 200 metres through the 70 metre thick limestone above "Toad Hall". The signal was located at 8.00 p.m. and voice communication was established shortly afterwards, an electrical storm, strong winds and threatening rain made surface conditions inclement, meanwhile the divers were settling down in a comfortable 25°C for a hot dinner and a comfortable night's sleep.

Thursday 13th, 23 tanks, 1 sled and 3 diving sets were carried over the 250

metre long, 20 metre high rockpile in "Toad Hall". The sled was loaded with 14 tanks, some set up as singles to explore the narrow side passages (as reported by French divers) and 3 triple sets, one for each push diver. The dive began shortly after midday, the white nylon line laid by the French divers one month before was followed to the first side passage at 1,000 metres. The sled was parked on the roof of the passage by inflating its buoyancy chambers. Hugh removed his triples and put on a single tank from the sled, all three divers moved along the slightly smaller side passage hopefully to find a way past the rockpile. Unfortunately, Hugh found it to be impenetrable. Hugh replaced the single to the sled and put on his triple set. We continued north along the main passageway. At 1,300 metres the sled proved too massive for the narrowing passage and it again was parked. Hugh took a single from the sled and the three push divers continued using triple sets along the main passageway. At 1,460 metres a small triangular squeeze was negotiated, our triples touching the roof and our stomachs on the rock below (this being the limit of the first French dive by Eric Leguen). Hugh removed his triples and put on the single, all three divers then continued to the end of the French line at 1,500 metres (this being the limit of the second French dive by Frances Leguen) where the passage narrowed, Peter and Ron stopped by the size of their triples. Hugh removed his single tank and pushing it in front of himself he negotiated a tight section, laying new line as he continued, extending the length of Cocklebidy Cave by 240 metres, having to stop only by his limited air supply which was quickly consumed by Hugh's anxiety in the narrow passage. Peter and Ron waited for Hugh's return themselves watching their air supplies for that very long twenty-two and a half minutes. The divers, elated by extending the cave's length returned along the passageway to the sled. As 3mm polypropelene line was laid from "Toad Hall" by the push divers the thin white line left by the French was reeled in and removed from the cave leaving the more suitable type a fixed line. The divers moved back along the main passage to return to "Toad Hall". Four hours, twenty minutes were spent on the dive before we saw the lights of the anxious support divers waiting our return. We surfaced after the required decompression stop had been made. A scheduled communication at 8.00 p.m. to a large audience

including press reporter Bernard Margraith conveyed the news of the breakthrough. With thought of the divers suffering dehydration from breathing dry air and having already consumed most of the water supplies (the cave water is too salty to drink) a request for copious quantities of water should be available when we reach the first rockpile chamber. Liz Wright and Leister Jerman fulfilled this request by making a special dive that evening should we decide to come out early. While the push divers lay idle to avoid decompression sickness the support divers moved the equipment back across "Toad Hall". After a long day we lay on our sleeping mats for a second night at "Toad Hall".

Friday 14th we woke early for a scheduled communication at 6.00a.m. With only the sleds to load we indicated to the surface party we would start our dive out at 7.00a.m. and the communication equipment was then packed. The estimation of time to get underway was incorrect which left a support team of ten divers waiting at the first rockpile chamber for a very anxious two and a half hours. The delay resulted in ensuring all six divers had access to adequate air for the return journey and having full tanks in triple sets for any emergencies if required. Also the sleds having mainly empty tanks required extra weighting with rocks tied to the sleds' frame.

The first sled left "Toad Hall" at 9.30 a.m. and did not reach the first rockpile chamber until midday. During a three metre decompression stop the sleds were unloaded and most of the tanks, being empty, popped to the surface like corks. An amazing effort by the fresh support divers saw the 60 tanks, 24 regulators, 3 sleds etc. moved by a human chain back across the first rockpile chamber. A few hours later saw the first sled starting the dive to the first lake where this incredible journey started. By 6.00 p.m. all the gear was back to the lake and the divers filtered out of the cave.

Saturday 15th with full support from everybody on the expedition the final extraction of gear from the cave began. Local sheep station owner from Arrabiddy, Peter Brown with family, followed the expedition's progress with keen interest. They arrived Saturday and voluntarily assisted with carrying of heavy dive gear from the cave. With the last of the dive gear out, a carton of cold beer from the station vehicle helped quench the thirst of all involved. Later that afternoon and early evening saw a mountain of diving equipment that emerged from the cave along with compressors and camping equipment disappear into motor vehicles and trailers. The invasion on Cocklebidy Cave is over, more of its passage revealed but its end still out of sight.

* * * * *

Karst Index Now Available

The long-awaited "Australian Karst Index 1985" (alias Speleo Handbook 11) is now available. A weighty tome of some 492 A4 pages, it has been automatically produced from ASF's new computerized Karst Index Database.

The contents include details of all known Australian caves and karst features (6639), details of 2400 cave and area maps and 925 references, an alphabetic list of all Australian cave names, longest and deepest, the five documentation-related ASF standards, a summary of the database system design, and an address list.

Because of the sensitive nature of the information, and a pre-requisite condition demanded by most clubs supplying the data, copies are available only to

ASF members, research institutions, overseas buyers, etc. Member orders can only be accepted via their society or club.

Member Price: \$25 plus post & packing.
Bulk orders: 5% discount for 5 or more.
 10% discount for 10 or more.

Order through your club, not direct.

Non-Member Price: \$A35 plus post & packing.

Post & Packing:

Australia: 1 copy \$5, 2-3 \$7, 4-8 \$8,
 9-15 \$12.

Overseas; per copy: Surface \$A7, SAL \$A15
 Airmail \$A24.

Orders should be sent to:

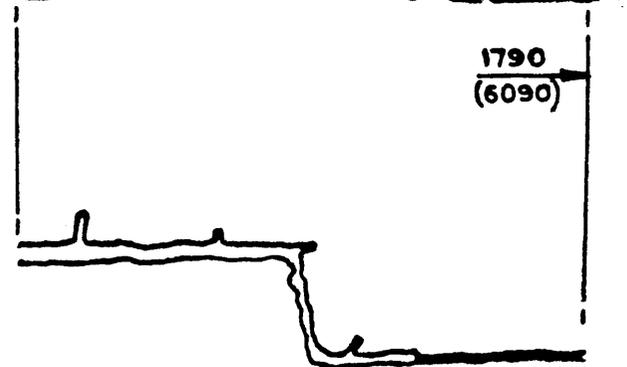
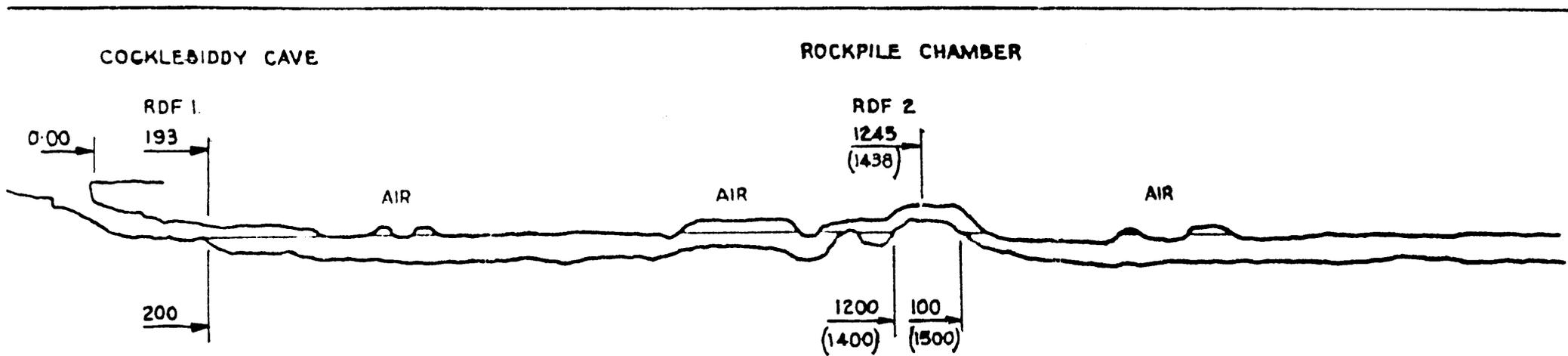
Mr. P. Matthews,

66 Frogmore Cres.,

Park Orchards, VIC. 3114.

Cheques made payable to ASF HANDBOOK.

Phone Nos: (03) 876-1487 H (03) 735-7105 W.



COCKLEBIDDY CAVE

NULLARBOR PLAINS - WESTERN AUSTRALIA

PLAN VIEW OF LONG SECTION

DRAWN BY ROBYN ALLUM 1983



SPELEOSPORTS SPELEOMANIA

by Rosie Mann.

A major event at the biennial conferences is the speleosports, enjoyed by most of us as entertainment of the more amusing kind. So there was general disappointment when we heard that speleosports had been cancelled at Speleomania. Phil Toomer and Ian Mann went for a wander around the grounds and two hours later a course for "fun" was under way with the able assistance of Chris Parr and his radio equipment.

The first drainpipe chosen had to be discarded as it gave the children a distinct advantage - no adults could get into it, let alone through it! The tyres also needed adjusting several times - 13 inches was a bit tight for many of the guinea pigs trying out the obstacle. There were eight obstacles in all, a description of which will now follow.

1. The first obstacle was a drain, supposedly a squeazy thing, but in this case it was big enough for C.A.S.A to carry Judith Bateman through on her sedan chair! Not really an obstacle perhaps, but a start for the teams to get a feel of the course (and to put them off their Guard?).

2. The "flowstone" (slippery thing) was a sheet of plastic on a slope and drenched with detergent. It was found to be a little short - those with long legs had no trouble at all negotiating it. Rapid evaluation produced an old door which lengthened it nicely.

3. Tinny scramble (noisy thing) - the idea here was to represent an area of delicate formation which must be accessed with as little damage as possible. Penalties were awarded for each formation broken. The V.S. Navy did a superb job of felling every 'formation' in sight as they hauled their gear by the most direct route - straight through.

4. Ladder (climby thing) through the trees. This obstacle had penalties awarded for unsafe practice. We were all impressed at the way that Emma Kavanagh went through this obstacle. She obviously didn't really want to do it, but she wasn't going to let the team down. Keep

it up Emma!

5.+6. Scrambly thing - this obstacle involved climbing up one side and down the other of the portico of the function room. It was a free climb and the 'feral children' showed us how it was done every day of the conference.

7. The bridge (awkward thing) provided much amusement when the koala (or was it a drop bear, Mr. Spate?) poured water from a teapot on the hapless V.S. Navy as they paddled through. The bridge had to be traversed underneath rather than over, and although there wasn't a penalty for walking through the water, most of the teams tried to avoid it by hanging in all sorts of manner as they crossed.

8. Tyres (gruesome thing) also had penalties awarded every time a bottom rung was touched (ie. - walking on the formation). The V.S. Navy did get through this obstacle - the raft went over the top, the packs through the formation, and the members on the formation. Maybe we should have awarded them a point or two for wearing wet-suit booties and sneakers rather than boots!

There were fourteen teams altogether, but since the course was a fast one, and the marshalls efficient in relaying messages of hold-ups, all teams went through in the afternoon without too much waiting around. Teams were to be four members or more with at least one member of the opposite sex -- penalties were awarded if these rules weren't observed.

The teams were:	Leader:
Been There, Done That	- Kevin Mott.
Carina Armchair	
Speleo Association	- Prof. Gordon G. Grimsley.
Central Queensland Speleo Society	- Clive Kavanagh.
Feral Female Child's Team.	- Alice White.
Mike, Elli, Bob, Derek.	- Elli McFadyen.
Nargun Busters.	- Craig Wilkinson.
Northern Caverneers.	- Rod Hart.
Speleo Research Group (1st @ 2nd generation).	- Norm @ Rob Poulter.



Badminton or
Beer.

Angels among the
Bullrushes?



"Tiptoe thru the
formations".

WATER TUBE LEVELLING

N.I. SMITH C.E.G.S.A.

How does one go about determining relative levels in a cave? Traditionally cave surveyors have used some form of clinometer, but this method, while usually adequate for reducing slant distances to horizontals for plotting a plan view, can give rise to quite large errors in the vertical component. For example, an angle read as 12 degrees instead of 10 would lead to an error of 0.685 metre in relative levels over a 20m leg (but only 0.133m in plan distance). A Suunto clinometer or a miner's dial (vertical circle) could be accurate to perhaps $\frac{1}{2}$ degree, but this would still imply an error of 17 centimeters. Such errors would accumulate rapidly and very little confidence could be attached to the relative levels of widely-spaced stations in a typical horizontal cave system. To top it all off, people often sight to a target such as a caver's helmet light sitting on a rock, and seldom measure accurately the heights of such targets or of the sighting instrument.

A much more accurate method is possible if the miner's dial telescope is equipped with a level bubble. An accurately level sight may then be made to a surveyors staff at the other end, whose reading gives the relative levels directly. Even better is an automatic level, an instrument which needs only to be roughly levelled by bubble, an internal "pendulum" coming into play to position the optics precisely horizontal. But in the cave situation these methods are fraught with difficulty. The passages may twist, necessitating many short legs for the sake of intervisibility. Or the roof may be too low to allow the staff to be stood up. Or the tripod. Or the lighting may be too poor for easy reading of the staff.

TUBES:

There is another way. If a long plastic tube almost full of water is open to the atmosphere at both ends, the two water surfaces will assume the same level. In this way, levels may be transferred from place to place in the cave with essentially no more error than that involved in reading the position of the flat part of the water meniscus.

The error is no greater over a long leg than a short one, and since intervisibility is not needed the whole system is satisfyingly immune to squeeze and crawls. The tube may go up and down in between the measuring stations - the middle may be much higher even than the water surfaces; all that is required is that the reduced pressure at the high point does not cause the walls of the tube to collapse or air to come out of solution. It is basically very simple, but several refinements are necessary to make a workable system. This paper describes experience with tube levelling in the Easter Extension of Mullamullang Cave, 6N-37. But a small portion of this enormous cave, the extension would rate as a rather large horizontal system in its own right (at least by Australian standards). Twisting and turning, low and uncomfortable, this cave tested the capabilities of the levelling system to the fullest.

In concept, two bods could just walk through the cave carrying an end of the tube each. Each person would place a thumb over the end to prevent loss of water in the event of the other's holding his end too high while moving. When ready, the two ends would be opened and each operator would make a mark on the wall at the level of the meniscus. Judicious lifting/lowering of the forward end would place the rear meniscus level with the previous mark, and in this way the level could be carried through the cave with no measuring required. To go up or down there would have to be intervening vertical measurements with a plumbob and tape. One might just get away with this to run a traverse around the wall of Abrakurrie, say. But what if the wall projects further at the bottom and the plumbob won't hang straight? Or if you want to go across the middle of a chamber and there's no wall at all? The obvious refinement is to stand a metre rule vertically at each end on the ground and read both scales at the meniscus levels. To get the difference in levels of two floors points one just subtracts one reading from the other. Since then each operator must carry both the tube and a rule, the last metre at each end of the tube may as well be permanently fixed to the front of the rule with 3 or 4 wire loops. This makes the simultaneous hold-

ing-and-reading problem much easier for those of us with only two hands. Of course, the scale should be visible at the side of the tube to avoid having to read it through the curved plastic and the even more curved meniscus, with the attendant refraction and parallax errors.

Now comes the quite interesting point that if the total amount of water in the tube is just such that both rules read 50cm, when placed side-by-side on a level floor, one gets the most flexibility from the system because the two stations can then differ in level by almost a whole metre before one meniscus is forced off-scale. A little playing with a pencil and paper will verify this. And if, further, each operator is equipped with a piece of wood somewhat longer than one metre, with a slot into which the bottom of his metre rule fits so that the rule is effectively extended by exactly a metre, the level difference can be up to two metres. (See diagram). In this way reasonably long legs can be run in fairly steeply-sloping passages provided that the roof height is sufficient for the extended rule to be stood up. We have found that an extension of more than a metre is virtually never usable, if only because one would need a stepladder (or at least a person with a strong back and shoulders) to be able to read the water level. A scribbled 4-digit number on the top of my helmet reminds me that someone once sat on my shoulders to read the level when I had the one-metre extender placed on top of a substantial boulder.

BUBBLES:

Now to the ultimate horror of the tube-leveller's nightmares, bubbles in the tube. Nothing would wreak more havoc to the hydrostatic equilibrium principle than a nice long continuous compressed air bubble. And what would add insult to injury would be finding such a creature hidden down in the folds of the tube halfway through a levelling traverse. With no way of knowing how long it had been there. And the only way to get the things out is to keep both ends open to the atmospheric pressure at a nice high point (like up on the house roof) and let the bubbles run upwards from the middle, working towards both ends simultaneously. Just try it any other way! It's extremely hard in a substantially horizontal cave. Bubbles must be prevented at all costs, and

to do this while pushing your tube end, metre rule and wooden extender through tight dug crawls with right-angle bends in the middle demands the use of taps. And not just taps at the extreme ends of the tube, because there must be air at each end of the tube, and it must stay there.

The accompanying diagram shows our (obvious, I suppose) solution to the bubble management problem. At each end there is a tap just below the lowest loop fixing the tube to the rule. Air is never allowed to enter the barrels of these two taps or the part of the tube between the two. In the extreme ends of the tube, beyond the top of each rule, is another tap. These taps should all be of the multi-turn variety. Those requiring only a 90° turn from "on" to "off" are too easily knocked. When the operators are crawling, climbing, resting and so forth, all four taps are closed. The section of tube between the two taps at each end contains half air, half water. The water sloshes around at random, but none is lost because of the closed top tap. When both people have reached their stations, each holds his rule vertical and shakes it around a bit so that all water including small drops moves down to the bottom. He then opens the top tap, venting the system to atmospheric pressure. In the next step, the bottom tap is carefully opened while the operator watches the water level. At first the levels at both ends will drop simultaneously as the tap barrels fill up, and then one end will start to rise while the other drops. The operators may, if desired, open their taps in coordinated fashion, but it is not strictly necessary because if at either end the level starts to get alarmingly close to one end of the rule, the operator simply closes the bottom tap again. The person at the other end will immediately know what is going on (and in fact should be taking the exact same action), because with the right amount of water in the system the level at his end will also be approaching the end of the scale. When this happens, and after the taps have been securely closed, the forward operator starts looking for a higher or lower point on which to place his rule, or possibly fits his one metre extender if the roof height allows. Another possibility if the forward station has proven to be too high, is that the other operator tries his extender. It is at this point that a bit of verbal communication helps, so what we have usually done is to work in teams of three, with a "booker" roving around in between the two tube operators, recording their readings and passing messages. He

can also assist the passage of the tube around corners and keep it clear of decoration, etc.

(As an aside, I must apologise to all those female cave surveyors out there for peppering this article with masculine pronouns, and in fact even underlining them. I don't intend to imply any gender - it's just the same old well-known inadequacy of the English language.)

EXTRAS:

The only other significant feature of our system is the use of small sheet aluminium baseplates (about 10cm square). Every time the forward operator establishes a new station he places a plate on which to stand his rule (or extender). This serves two functions - it prevents the rules digging into any soft floor material such as silt causing the second operator to use a level a few millimetres different from the one the forward operator established. Secondly, the baseplate shows second operator unambiguously where the station is, so that the booker doesn't have to wait to show him. (this doesn't always work perfectly - the plates are often in quite peculiar positions, down floor holes in rock piles, for example. Thus the booker can, if he keeps on his toes, save a lot of wasted time. The baseplate, however, reduces the reliance on memory enormously.)

It pays for someone to carry a plastic bottle of water just to top up the tube to the right level every now and then, a few drops being lost occasionally through the top tap. This (and all the water in the tube) should ideally be distilled water to reduce the likelihood of any density variations. Topping up one end with highly saline cave water is likely to lead to differences in the two levels, as the time taken for diffusion along the tube would be very large.

ERRORS:

What can go wrong? The design of the apparatus supposedly ensures that bubbles do not develop, unless something serious happens, like the tube coming off the tap. Even then, quick action can save the day if topping-up water and a funnel are available. Very small bubbles caused by air coming out of solution doesn't seem to cause any problems - if the water column remains contin-

uous the correct pressure is still transmitted past a tiny bubble adhering to the side. Nevertheless, it adds confidence if occasionally the two ends are stood side-by-side on the same baseplate to check that they read the same. There is the usual hazard common to any surveying, that a number may be wrongly recorded. And so of course the figures should be called loudly and clearly - saying "fiyiv" and "niner" etc - and acknowledged by the booker. One nasty fault is to forget recording the use of the extender. The operator must prefix his reading with a "one" digit in such a case. However, if the traverse is a closed loop such an error should be picked up as a mis-close of almost exactly a metre, and memory may thus be jogged. Much repetitive work may be saved by marking at least some of the stations with permanent metal tags.

It may be thought that, since one end always goes up as the other goes down, the booker could (mentally or otherwise) add the two numbers called (ignoring the whole metres for extenders) and always get the same figure (ideally 100), thus effecting a useful check. This is true to a certain extent, but only fairly gross errors are in practice picked up this way. For one thing, both bottom taps must be opened to the same extent each time so that their barrel capacities remain constant (it helps if operators are instructed to open fully), and for another, there are often trapped drops in the top taps which reduce the total amount read. Interestingly, the walls of the tube expand and contract in response to pressure changes in the water. In a "high pressure" leg (when the middle of the tube goes well below both ends) the checksum can be expected to be quite low, 10cm or more below the "normal", and the reverse also occurs if the middle goes high. Unfortunately the extenders have no effect on the checksum at all.

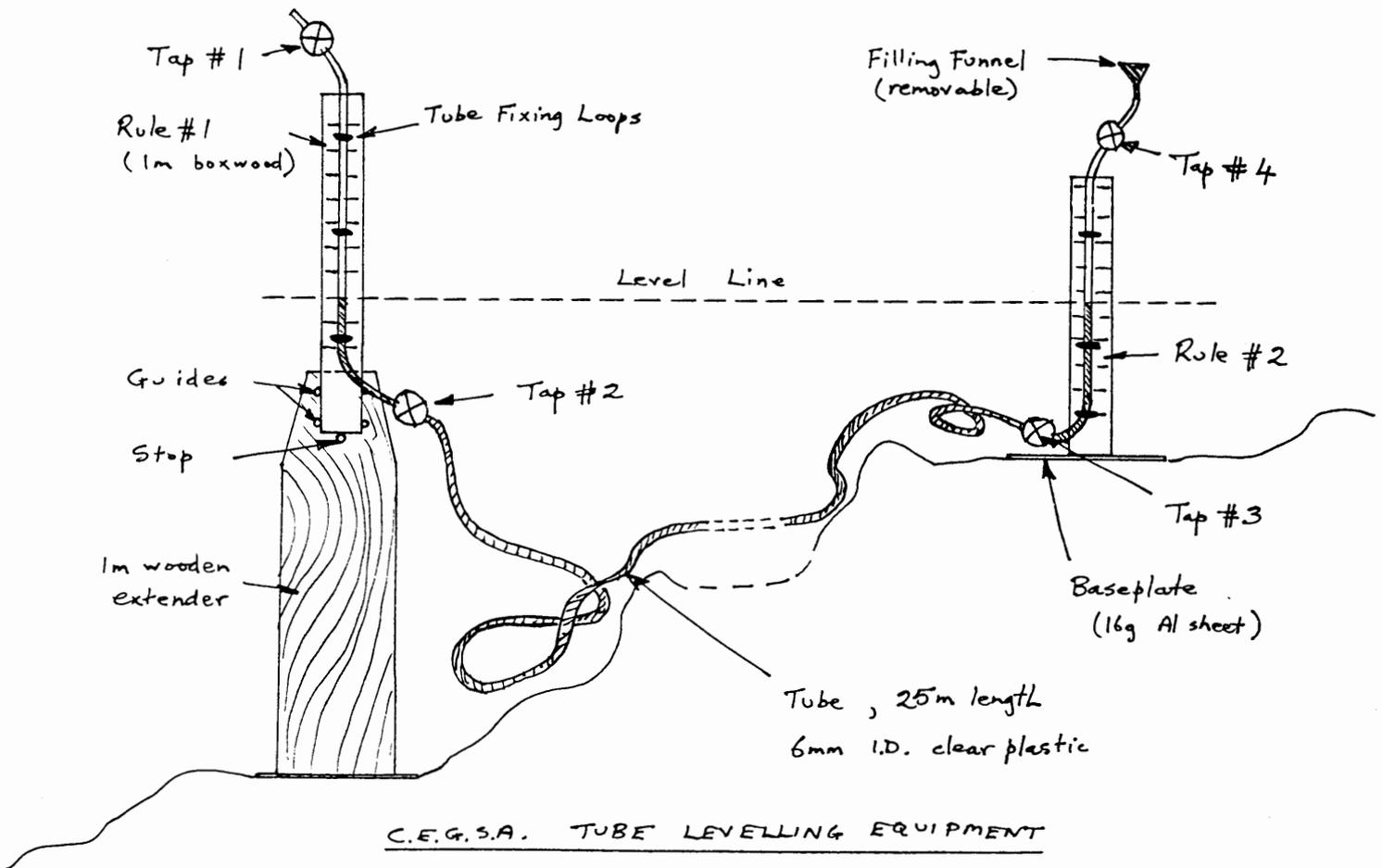
THE CARDINAL SIN:

A particularly insidious error is for one operator to forget to open the top tap. The water still seems to do the right thing, one end goes up and the other goes down, but the trapped air at the end either compresses or rarifies, and the two levels don't end up the same (even though the checksum is correct!). It is actually possible to detect this condition by closely watching the behaviour of the moving surface - it slows down too quickly and doesn't oscillate as much as it should - but after say 15hrs in the cave one isn't always attentive enough. So develop a ritual procedure and NEVER forget the top tap. (Incidentally, the water

oscillation is never very much; there is a lot of viscous friction in say 25 metres of 6mm I.D. tubing).

If no serious blunders are made, this method has the potential to be extremely accurate. There should be no difficulty in reading the position of the flat part of the meniscus to the nearest millimetre, so that a maximum error in a single leg of 2mm should still be pessimistic. Over a long traverse, the errors should accumulate as a 'one-dimensional random walk', so that the expected error would be of 2mm multiplied by the square root of the number of legs, e.g. 18mm for 80 legs. Even in the (extremely improbable) worst case when all errors are added in the same direction, we would have only 160mm for 80 legs, which certainly couldn't be called bad.

There is another possible source of error, which I haven't investigated. Some caves (Mullamullang is one of them) breathe air in and out to a significant extent. This implies that there must be pressure differences in different parts of the cave, and so there could be quite legitimate differences in the water levels at the two ends of the tube. Since atmospheric pressure is approximately equal to that of a water column 10m high, an air pressure differential of only 0.1% would cause a 10mm levelling error. Just how important this effect is I don't know. However, it would seem reasonable that if there is no detectable air movement, there would be very little chance of serious error.



LETTERS

A Damn Scout Replies

Dear Editor,
After reliving the mild agonies of the Rescue 85 recovery of a suspected spinal patient from Bungonia's Acoustic Pot, I turned the page of winter issue No. 107 to greet Bob Kershaw's exhortation: "Not those Damn Scouts Again!". I took a deep breath and feared the worst. Where is Wyambonia anyway?

As it turned out, Bob's parable was a constructive plea for the ASF fraternity to bite the bullet of community education. That is sound, pragmatic advice. There are lots of caves out there and lots of non-ASF cavers using them. Some of those caves despite your organised wisdom and ethics, have largely been stuffed. Some are still being stuffed. And yes, the Scout Association has supplied its fair share of destructive manpower.

I would like to think, though, that if Wyambonia still existed somewhere between Braidwood and Marulan, and if public access wasn't hindered by padlocks, permits, unpublished maps and proprietorial speleo societies, its future would at least be safe in the hands of our contemporary Venturers and Rovers. Brave words, I know, but I believe them to be true!

Since the '50s and '60s when so much havoc was wrought on our caves, society in general has embraced the concept of the finite natural resource. The ASF constituency should feel proud of its contribution to today's level of environmental consciousness. It's easy to forget the efforts of the Colong Committee and of people the likes of Warwick Counsell, who fought to keep Bungonia Gorgeous, yet for reasons obscure we cling to the stereotype of the Scouting culprit to explain all modern-day cave vandalism. In essence, that's just not fair.

Over the past ten years, particularly, the Scout Association in New South Wales has been at the forefront of youth organisations in training its members in the wise use of caves. With the help of expert speleologists we have developed detailed guidelines for self regulation.

Since 1977 caving has been restricted to our youth members aged 14 years and over. Regional committees, caving teams and advisors have been appointed across the State to train and qualify participants within a three-tier level of competencies and to approve all trips. Visits into caves are led by Party Leaders with at least 40 hours of logged experience in diverse systems, and strict rules exist for minimum party size, the ratio of experienced to inexperienced cavers and so on. Personal qualifications have to be renewed every two years.

The co-operation of ASF societies in setting up this system and in providing ongoing training has been invaluable. Scouting owes a great debt to people such as Bill Goddard of Vertical World, Philip Toomer and Judith Bateman of Caving Equipment, the Cave Rescue Group and speleos like Bob Kershaw from Clubs such as ISS who have been prepared to share their expertise and who continue to voluntarily go out of their way to help. Of course there are many skilled adult caving leaders and instructors within our own ranks too! I would estimate we would run between 20 and 30 of our own courses across the State each year. Any while I speak for New South Wales primarily, similar developments are occurring elsewhere. I note with satisfaction, for example, that Mike Woodward's Scout Caving Group in South Australia is now a bona fide Associate of ASF.

It is essential that Scouting be accepted within the mainstream of caving society even if, for constitutional reasons, we can't be a member of the ASF Council. Our people do a lot of caving - possibly a third of the total undertaken in the readily accessible cave systems of New South Wales. Given this high throughput, the amount of wilful damage that can be genuinely sheeted home to our Venturers and Rovers is minimal. When vandalism does occur our culprits are usually caught and censured. The more subtle non-wilful damage that people-pressure creates is a problem we must collectively tackle. Scouting's good standing with the National Parks and Wildlife Service and elements within the ASF umbrella provides opportunities for our cavers to assist

with community endeavours such as removing litter from caves and their surrounds, cleaning formations and helping cave survey parties. Just ask us!

Again, given the high volume of Scout caving and the inexperience of our younger members, the number of accidents requiring emergency service has been small. In recent years we have availed ourselves fully (over fully?) of cave rescue training courses to improve our level of self-help. Here too, a balanced perspective is important - I am aware of past instances locally and interstate where Scouting parties have effected rescues of well-connected cavers. I and a party of Venturers had on one occasion to assist two experts from a respected Sydney Club lift an exhausted companion from the bottom of Argyle Hole when their whizbang new SRT pulley system failed. We who were amateurs, who bided considerable time in the upper section of the cave while these later arrivals did their descent, and who spent many hours subsequently assisting in their rescue, were not even thanked when we emerged from a thwarted day's caving!

I guess my main message in all of this is that caving is something we share. ASF has been very good to Scouting over the years and, in turn, we have nurtured many future members of ASF. With positive support we recreational cavers will go about our interest in a safer, more considerate way, and with the same spirit of co-operation that is important to Bob Kershaw and other astute users of our common limited resource.

With kind regards,

Malcolm Wilson
ASSISTANT CHIEF COMMISSIONER,

YOUTH PROJECTS

THE SCOUT ASSOCIATION OF
AUSTRALIA (NSW BRANCH).

* * * * *

EDITORIAL

Well, this is the third and largest issue of "Australian Caver". We have some excellent articles covering such topics as cave diving Cocklebidy, cave surveying and Speleosports (can you recognize yourself in the photos?) from the last conference. If you missed out remember SPELEO-TEC '87 is coming. - join in the fun then.

The response to Australian Caver has been great and I hope that many more articles will be sent so our journal can be built up even further!! I must apologize at this point for the delay encountered with the last issue, especially to Norm Poulter whose article and request for help to clean up Weebubbie was so late that it was out of date. We have changed printers and hope they can produce the magazine faster than previously.

The Karst Index is now available and details of purchase are printed in this issue, along with details of cave visit to Yugoslavia and a Speleology School at Mammoth Cave, U.S.A. for those heading that way.

Watch for the photographs of early cave sketches in the next issue -- they are excellent!

There are now tidbits of information from overseas in the magazine - so look for them. If you have anything please feel free to let me know via letter or phone at anytime.

Kerrie Bennett.

P.S. We have now made it to a caving team with the birth of our second son, Geoffrey, in February. Watch out Speleosport teams - we're coming!!

(I'm the "token" female.)

Invitation to Visit the Classical Karst Caves of Yugoslavia in 1986

We noticed the interest of cavers and naturalists to visit the Classical Karst and its' caves. Cave instructors and members of cave rescue teams are available to help you. We propose some programs of easy access:

1. Basic Programs

1.1 Caves of Classical Karst

Comprise daily guiding into caves near Postojna which change in weekly cycles in July and August. The excursions start every day at 2p.m. from Museum at Postojna:

Monday: Predjama - 7.5 km of channels in these three levels under the famous castle.

Tuesday: Planinska jama - 6.5 km of enormous river channels.

Wednesday: Rakov Škocjan - karst valley with natural bridges and Zelške jame - 3 km of river channels and dripstones.

Thursday: Križna jama - 8 km of river channels with lakes.

Friday: Dimnice - 4.5 km of channels in more levels, dripstones.

The price of guiding is \$5USA/ per person for groups over 5 persons. For transport and borrowing of equipment contact us in advance. Booking - at least one week in advance. The program can change according to wishes.

1.2 Speleo week-end

Excursions on Saturdays and Sundays in July and August which start every Saturday at 10a.m. from Museum at Postojna:

5th-6th July: Lipiška jama - 230m deep dry cave with enormous stalagmites.

Vilenica - the oldest show-cave in the world. Divaška jama - 800m long horizontal cave with massive dripstones, accomodation: speleo-house or hotels

12th-13th July: Skocjanske jame with Hanke's Channel, the underground canyon. Martinska jama - 1 km long dry with dripstones, accomodation: camping or motel.

19th-20th July: Ravenska jama - the only cave with aragonite in Yugoslavia. Pološka jama - 11 km of erosional channels, accomodation: hotels, pastoral houses.

26th-27th July: Pekel - show cave in two levels, Logarska dolina - valley with waterfall Rinka, Snežna jama - 1 km long dry cave with moon-milk formations, accomodation: alpine cottage or hotel.

2nd-3rd August: Taborska jama - 350m long show cave with dripstones, Francetova jama - the smallest show cave, Kostanjeviška jama - 440m long spring cave with dripstones, accomodation: speleo-house, hotel.

9th-10th August: Kristalna jama - dry cave with big calcite crystals, panoramic visit of Bohinj Lake with the entrance of Brezno pri gamsovi glavici - the deepest pothole in Slovenia and waterfall Savica.

16th-17th August: dry valley Matarsko podolje with descent into blind valleys, Jeserina - 300m long horizontal cave with dripstones Medvedjak and/or Kreupljak - dry caves with dripstones, accomodation: alpine cottage, motel.

23rd-24th August: Majdena jama - 5 km of channels with loam and dripstones, Logaška jama 300m long cave with dripstones, accomodation: speleo-house, motel.

The price for guiding to speleo week-end is \$7,5 USA/ person for groups of over 5 persons and include also use of collective equipment. For borrowing of personal equipment and transport contact us in advance. Booking - at least two weeks in advance.

2. Combinations from base programs are numerous. We propose two:

2.1. Classical Karst in 9 days: with accomodation in student house, camping or hotels at Postojna, you can join base programs beginning with one speleo week-end and finishing with the following. In the mornings you can visit alone other curiosities: Postojnska jama, Lake Cerknica, Pivka Cave, castles Snežnik and Predjama, etc. Book as soon as possible and we'll make the proposal for your holidays.

2.2. Adriatic and Caves: We propose to cavers with families and groups composed of cavers and non-cavers. All proposed caves are less than one hour by car from magnificent coasts of Istra. So you can spend mornings on sunshine and afternoons in fresh karst underground. If you'll book enough early we'll organize your holidays.

3. To the DISCOVERY of Yugoslav Karst - excursion of 7 days with motor-coach, about 1700 km:
 1st day: Postojna - Plitvice (cave Lokvarka, lake with waterfalls, mills at Slunj).
 2nd day: Plitvice - Livno (caves Titova pećina and ledenica, the largest polje in the world).
 3rd day: Livno - Mostar (collapse dolines at Imotski Buna-one of the biggest karst springs).
 4th day: Mostar - Dubrovnik (Popovo polje, Vjeternica-cave).
 5th day: Dubrovnik - Cetinje - Dubrovnik (mausoleum on Lovćen, Lipska pećina - the longest cave in Montenegro).
 6th day: Dubrovnik - Sibenik (cave Vrenjaca, lakes on Krka).
 7th day: Šibenik - Postojna (Cerovačke pećine and Ličko polje).

Approximate price: \$175 USA/person which includes : guiding travel from Postojna, accomodation in hotels with breakfast. Participants must have own basic personal equipment. The exact price will be known to all who will book till 30th April. If it won't be enough participants, we'll give notice till 15th May.

4. Beside these:
 - guiding to about 150 caves at holidays, Christmas, New Year and Easter, etc.
 - school excursions, eg. at the end of scholastic year, excursions for students of geology and geography, with qualified guides to your wish.
 - speleological camps.

Let us know your wishes till the end of February, because we don't have enough qualified guides.

Payment: to bank account: Ljubljanska banka, splošna banka Koper, PE Postojna,
 Number: Operation: 52200-621-2005-203,
 ERC: 70170-3557-55

C/- Franc Malečkar
 Kolodvorska 1a
 YU-66230 Postojna, YUGOSLAVIA
 Tel: 067- 21346 (Morning).

* * * * *

Tid-bits From Overseas

Interested in Cave Rescue? - then you should acquire, read or photocopy (?) 3 articles published in NSS Bulletins that cover this most important topic.

1. SAFETY CONSIDERATIONS FOR DESIGNING CAVE RESCUE SIMULATIONS by Mike Fischesser in NSS March, 1985, pp 133 - 135.

This article examines the leader, objectives, planning, live patients vs dummies, peers, judgement and the debrief.

"The article was written to stimulate thinking on how to make cave rescue simulation safe. It does not teach cave rescue".

2. NUTRITIONAL CONSIDERATIONS DURING RESCUE by Elaine Hackerman, NSS, April 1985, p 160.

Discussion on body functions, fear and stress during rescue, and what foods should and should not be eaten by the rescued and rescuers in caves. Look forward to the juicy steak at the end of the rescue!!

3. FACTORS AFFECTING HUMAN PERFORMANCE IN THE CAVE ENVIROMENT by Dave Bunnell, Ph.D. , NSS, February, 1985, pp 114-116.

Do you know what A.M.S. is? No, it's not related to A.I.D.S.!! A.M.S. is Acute Mountain Sickness and will affect you above 9000 ft. This little known fact won't worry the majority of Australian cavers because they may not wish to become O.S. cavers.

However, D. Bunnell discusses energy requirements for short and endurance trips, water intake, and caving in hot and cold enviroments. An excellent article for ALL cavers to read and digest.

EXPEDITION:AUSTRALIA '86

Dear Sirs,

We are members of a Polish speleological expedition who within a rather busy itinerary of a planned tour of Australia want to get in touch and enter into co-operation with research institutes and artists agencies which might be interested in our activity and, if possible, with the industry. We have strong arms, open minds and lots of good intentions.

Since the funds at our disposal are less than spectacular, we will have to rely on the generosity of our hosts, be they private persons or institutions. In return, we can offer a presentation of films about Polish mountains, architecture and art as well as a series of films made by a professional film director, member of our expedition. As we still belong to the young generation of Poles, we will be glad to show the latest film by young Polish filmmakers and also a film made by an older member of our team during an expedition to the Himalayas. In the hope that our plans might be of interest to someone, we would like to do some research work with your teams of cave explorers and make a film of such a joint effort.

Starting in Sydney, our tour will take us along the southern coast to Perth and further across the desert to Alice Springs. For such a long journey we shall need a good Landrover able to accomodate six people and equipment. If the sponsoring institutions could afford it, we would like to have a transceiver installed in the vehicle to prevent getting lost in so vast a territory.

Since we are not familiar with the customary administrative requirements existing in your country, we would like to know whether an official invitation is necessary and, if so, whether it would be possible to receive one for the members of our expedition. We would also be happy if we could obtain in advance the necessary permissions for filming, cave explorations and collecting samples for scientific purposes as well as passes allowing us to get into reservations and national parks. We would like to have a chance of meeting Aborigines whose life, art and material culture are of special interest to us.

Hoping that institutions and private persons that might wish to help us will be able to do so, we remain,

Sincerely Yours,

Members of the Polish Speleological Expedition Australia '86.

The given periods may change:

1. Sydney: March 1st - May 1st
2. Canberra: May 2nd - May 14th
3. Melbourne: May 15th - May 21st
4. Adelaide: May 22nd - June 1st
5. Nullarbor: June 15th - August 1st
6. Perth: August 2nd - October 1st
7. Ayers Rock, Alice Springs: October 20th - November 1st
8. Cairns: November 7th
9. Townsville: December 1st
10. Brisbane: December 20th

More Tid-bits

HEADING OFF TO PERU? Then consider, if you're going to the region around the village of NINABAMBA, about 650 km. north from Lima, reading the article in CAVES AND CAVING, B.C.R.A., Feb. 1985 by C. Orrock.

"There is a lot more cave somewhere under Ninabamba, and much remains to be done elsewhere in this fascinating country".

WHAT ABOUT CANADA? An Anglo-Canadian expedition in 1984 had a 4 week trip in British Columbia in the Rocky Mountains and have provided some plans and elevations of caves mapped, e.g. White Hole.

SUMMER UNIVERSITY AT MAMMOTH CAVE

offered by

Center for Cave and Karst Studies

Western Kentucky University

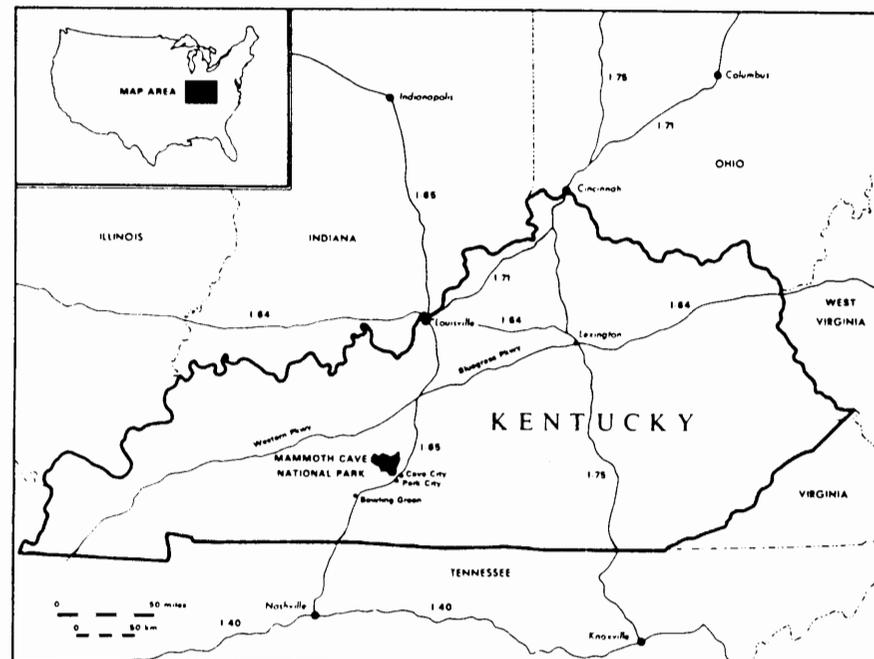
and

Mammoth Cave National Park

1986



Photo courtesy of Charles M. Keyser



Location of Mammoth Cave National Park. Map reproduced from: Palmer, Arthur N. *A Geological Guide to Mammoth Cave National Park*. Teaneck, New Jersey: Zephyrus Press, 1981. 196 pp.

**CENTER FOR CAVE AND KARST STUDIES
DEPARTMENT OF GEOGRAPHY AND GEOLOGY
WESTERN KENTUCKY UNIVERSITY
BOWLING GREEN, KENTUCKY**



The Center for Cave and Karst Studies is located virtually in the center of a karst landscape which extends from southern Indiana through central Kentucky and Tennessee into northern Alabama. Mammoth Cave, the world's longest cave, is located only twenty miles northeast of Bowling Green. The Center's objectives are to:

1. Promote research on all aspects of cave and karst studies, with an emphasis upon solving environmental problems associated with karst terrain.
2. Provide educational programs concerning cave and karst studies: a) undergraduate and graduate instruction; b) cooperative education program with Mammoth Cave National Park; c) sponsor seminars and scientific meetings.
3. Provide an effective center for compilation and preservation of scientific data concerning cave and karst studies.
4. Publish research reports entitled: "Cave and Karst Studies Series" and "Report of Investigations."

GENERAL INFORMATION

Western Kentucky University through its Center for Cave and Karst Studies in cooperation with Mammoth Cave National Park offers a series of one-week summer courses focusing on caves and karst landscapes. Some courses are available on a basic level requiring only an interest in the subject matter while others are taught on an advanced level and prior subject knowledge is assumed. Visiting professors have been chosen who are internationally recognized as authorities in their field and excellent teachers.

These intense field courses combine formal lectures with field observations and techniques. Some courses involve long and rigorous trips into rarely visited portions of Mammoth Cave while others are more surface oriented or less physically demanding. All students must be in excellent physical condition and should be prepared for 4-12 hours underground or in the field each day.

Students from all parts of the U.S. and several other countries have participated in the program during previous summers. The participants have included undergraduate and graduate students, professionals such as engineers and college professors, and individuals desiring an educational and exciting vacation experience.

State agencies, commercial cave owners, the National Park Service and universities have paid tuition for employees enrolling in these courses.

Students must be high school graduates and in good physical condition to register for courses. Enrollments are restricted in order to ensure small classes. Since some courses fill early, students are encouraged to register as soon as possible.

Students without the necessary prerequisites for more advanced courses may take the courses as workshops rather than for credit. Students auditing in the past have indicated that even though they may not have understood some of the more advanced concepts, the courses were very worthwhile experiences.

Professors often lecture in the mornings with subsurface and surface trips scheduled for afternoons. Special talks, slide shows or trips into the cave are often scheduled after supper. Other activities may include: 1) all-day trips into Mammoth Cave, 2) trips to Tennessee and elsewhere to view the caves and karst of other areas, 3) laboratory exercises and various field exercises such as dye traces of subsurface streams.

REGISTRATION, CREDIT, FEES

Students may enroll in more than one course. There will be a maximum and minimum number of students set for each course. If the minimum enrollment is not met, the course will be cancelled. A \$30 deposit and \$12 lab fee are required to pre-register for each course. The deposit will be refunded if the student cancels by May 15, 1986. Registration forms and all fees must be received by May 15, 1986. If a student cancels after that date, all registration fees will be refunded except for the deposit and lab fee which must be forfeited. Additional information will be sent upon receipt of pre-registration regarding course details and personal equipment needed. A pre-registration form is printed on the last page of this brochure.

Courses are accredited through the Department of Geography and Geology, the Department of Biology, and the Department of Anthropology, Western Kentucky University. Each course lasts six days at Mammoth Cave, and students receive three semester hours credit for each course. Students taking courses for credit will be required to complete an independent research project after returning home. The research projects will require an additional two weeks of work and must be mailed to the instructor for evaluation prior to August 1, 1986. Students not wishing to take courses for credit may take them as workshops instead, thus eliminating the independent research requirement.

Tuition for each course is as follows:

	Undergraduate	Graduate	Workshop
Kentucky residents	\$117	\$171	\$169
Non-residents	\$339	\$495	\$169

Tuition includes the \$30 deposit but not the \$12 lab fee which is required for each course. Each course will have a manual containing course outline, bibliography, maps, important journal articles and other information. Students may choose to have their manuals mailed to them two weeks prior to the beginning of their course. It is very important therefore that each registrant indicate the appropriate "mail/do not mail" section on the registration form and that he give an address to which the manual can be delivered. Because of time limitations, manuals will not be mailed outside the continental U.S. or Canada.

ACCOMMODATIONS

The headquarters for the courses will be the beautiful Onyx Meadow group campground located within the Park on Flint Ridge. This campground has been reserved exclusively for course participants and their families. The site has a large shelter with tables, fireplaces, water, and restroom facilities but it does not have hook-ups for travel trailers. Motel accommodations are available in the Park, but reservations should be made well in advance. Other lodging is available in Cave City, Park City and Bowling Green.

SUMMER SCHEDULE 1986

This includes the following topics:-

1. Karst Geology, May 25-31st, Instructor: Dr Arthur N. Palmer.
2. Historical Geography of Mammoth Cave, June 1-7th, Instructor: Dr Stanley D. Sides.
3. Speleology, June 8-14th, Instructor: Mr Roger W. Brucker.
4. Cave Archaeology, June 8-14th, Instructor: Dr Patty Jo Watson.
5. Karst Hydrology, June 15-21st, Instructors: Dr Peter Smart.
6. Cave Ecology, June 15-21st, Instructors: Dr Thomas C. Kane and Dr Thomas L. Poulson.



FOR ADDITIONAL INFORMATION CONTACT:

Nicholas Crawford, Director
 Center for Cave and Karst Studies
 Department of Geography and Geology
 Western Kentucky University
 Bowling Green, Kentucky 42101

Phone: 502-843-4979
 502-745-4555

Name _____

Address _____

City _____ State _____ Zip _____

Home phone _____ Business phone _____

Occupation _____

I wish to enroll in the following courses:

		<u>Undergraduate</u>	<u>Graduate</u>	<u>Workshop</u>
<input type="checkbox"/> Karst Geology	May 25-31	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Historical Geography of Mammoth Cave	June 1-7	<input type="checkbox"/>		<input type="checkbox"/>
<input type="checkbox"/> Speology	June 8-14	<input type="checkbox"/>		<input type="checkbox"/>
<input type="checkbox"/> Cave Archaeology	June 8-14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Cave Ecology	June 15-21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Karst Hydrology	June 15-21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Yes, I plan to stay at the reserved Park campground
- Yes, please mail my manual to me at above address
- No, do not mail my manual. I will get it upon arrival at the Park.

- Kentucky Resident
- Out-of-state

Tuition for each course:

	Undergraduate	Graduate	Workshop
Kentucky residents	\$117	\$171	\$169
Non-residents	\$339	\$495	\$169

Lab fee for each course is an additional \$12.00.

Enclosed is my check to the Center for Cave and Karst Studies for \$ _____
 (\$30.00 deposit for each course plus a \$12.00 lab fee for each course. Please send a separate check for each person registering.)

I understand that my deposit will be refunded if I cancel by May 15, 1986, but that my lab fees will not be refunded.

Send to: Nicholas Crawford, Director
 Center for Cave and Karst Studies
 Department of Geography and Geology
 Western Kentucky University
 Bowling Green, Kentucky 42101

DOWN UNDER ALL OVER

UQSS:

While 1985 has not been an overly hectic year for UQSS, members there have been on several successful expeditions. The Easter trip to Mt. Etna drew many members and was highly enjoyable. Quite a few other trips to this area have also been made, many for bat research purposes.

Membership this year was the best it has been for a while, but since local caves are scarce, only occasional trips to such places as Ashford and Kempsey have been made, and enjoyed, by those members who went along. Hopefully next year will be even better and busier.

Karen Woolley.

MSS:

Yes, MSS are still active albeit a bit slow to put pen to paper. Had we discovered an enormous cave or a prehistoric bone dig you would have heard from us by now.

We continue to concentrate on Abercrombie and Yarrangobilly as our project areas as well as Jenolan when we can get a permit. During the past year we have also visited Wyanbene, Church Creek, Walli, Wee Jasper and of course Bungonia. We have also held two field days.

1985 is the Society's 20th year and to celebrate we extended an Abercrombie trip to include a dinner at the famous Billabong Restaurant at Trunkey Creek. (for the uneducated Trunkey Creek is 15km north of Abercrombie Caves and approx. 60km SSW of Bathurst).

Next year we are planning our 21st birthday celebrations and will hold a special dinner. We are therefore looking for any ex-MSS members and would appreciate them contacting the Secretary for details.

At Abercrombie we continue to survey and collate information on the area, however unfortunately there have been no major discoveries. The well known "Bushie Dig" is still going after over ten years and 95 metres of crawling and digging (Is this a record?). We are currently producing a booklet for tourists visiting the Abercrombie area which will be on sale at the beginning

of December for \$2.50. Information in the booklet includes the early history and development of the area, the current tourist caves and their features, an area map, and a theory on the development of the Arch and associated caves. Two of our members who live in Trunkey Creek (you know where it is now) have compiled a data base for the area (which we may sell to the A.S.F.!) and all known caves with descriptions have been inputted. We have also started to collate information on Yarrangobilly which must be better than the ever changing manual system there.

The Society has two trips a year to Yarrangobilly, usually for a week to two weeks duration. We have recently completed surveys on a number of caves including Y48 and Y49 which are both relatively young caves in a stream sink. We have discovered a new section in both caves which form a physical connection between the two. Both caves however, are very unstable. We have also spent a lot of time in Y5 East Deep Creek. Even though this beautiful cave is locked with restricted access, some unknown person(s) obviously are not familiar with the logistics involved in viewing the areas of excellent formations and have left a trail of muddy marks. Luckily the damage is minimal for the area involved although one section of crystal stream has been trodden upon. If you are wondering why you haven't received a M.S.S. Newsletter for some time do not despair. The next issue will be published shortly.

Scott Macfarlane.

SCS:

The Society has in the past year been extremely active and successful in speleological activities.

We have investigated two new caving areas, the Mackintosh and the Corrina-Timbs Creek area, as well as performed many successful trips to already established areas such as the Cracroft, Ida Bay, Mt. Weld, and Mole Creek.

A number of factors have contributed to this boom, such as a Forestry Commission-National Parks-Heritage Commission funded study of the Mole

Crete Karst and associated logging problems. Many members were involved with assisting Kevin Kiernan with his study and much interest has been rekindled in many long forgotten caves such as Mersey Hill Cave, Rat Hole and Prohibition Pot. Survey work is currently being carried out in Mersey Hill and is revealing more and more passage every trip.

Of the new areas investigated, a report on the Mackintosh area appears in a previous issue of the Australian Caver. The Corina area has only been briefly investigated owing to its distance from Hobart (it requires a seven hour drive, one way - disgusting for Tasmanian Cavers). The caves looked at initially, were found by friendly Forestry Commission employees. Four caves were investigated and although very small are such as to fuel suspicions of bigger and better things in that area.

Work in the Cracroft area involved the discovery of a new passage in Judd's Cavern, two new caves, one of which has a spectacular 46 metre entrance pitch and links to Judd's Cavern. The second cave has a 17 metre entrance pitch which leads to three branches, two as yet unexplored pitches and approx. two hundred metres of partially explored passage. In a passage in Judd's Cavern the remains of a number of bats were found. This find excited speleologists and zoologists alike since bats in Tasmanian caves were previously unknown, due presumably, to the lower temperatures in Tasmanian caves. These bats have been identified as *Sptesicus Sagitula*, *Eptesicus regulus*, and *Chalinolbulus Morio*. Further work regarding these bats and surveys of the caves will be carried out as the rainy season abates. Surveys of the most recent work will hopefully appear in future issues of the Southern Caver.

Work at Ida Bay received a boost with the visit of keen S.R.T. man Tom Porritt (V.S.A., C.C.C.) and numerous trips by other V.S.A. stalwarts. Efforts by the above together with some input from the locals have provided us with one of the most superb dry vertical trips in the country. This cave, now over two-hundred metres deep with six, free-hanging pit-

ches, varying in length from six metres to forty-nine metres, is aptly called "the Milk Run".

Possibly what may be one of the most spectacular dolines in Tasmania was found by a recent trip to the rarely visited Mt. Wald. The doline is about thirty by sixty metres with a natural bridge across the middle and the depth varies from fifty metres on the high side to twenty metres on the low side. The bottom of the doline leads steeply to a sixty seven metres pitch followed by a thirteen metre pitch. Total surveyed depth of the cave is 235 metres, making it the eighth deepest cave in Australia. This new cave has been dubbed Arrakis because of the shortage of water in the campsite at the cave. Further details of Arrakis will appear in the next issue of the Southern Caver. The find has been a source of much optimism because conservative estimates of depth potential in that area are 350+ metres.

The long awaited Southern Caver index has just been completed and will be in the mail soon. Starting in February the long absent Southern Caver will reappear on a regular basis.

Phil Jackson.

MUCG:

Caving Report
Macquarie University Sports Association
Annual Report 1984:

1984 was an active and diversified year for members of the MUCG. There was an increase in the number of new members, most of whom were students. The interests of the club have broadened to include activities peripheral to caving encompassing all aspects of outdoor bush activities.

Caving areas visited throughout 1984 included Abercrombie, Bungonia, Cliefden, Colong, Jenolan, Northern Beach sea caves, Tuglow, Wee Jasper and Wyanbene. Liaisons with the Department of Leisure, Sport and Tourism, as well as the National Parks and Wildlife Service led to speleological works in 'restricted permit only' areas. The club was also actively involved in work with the NSW Cave Rescue Group, attending the Search and Rescue weekend in March in Bungonia.

Bushwalking, abseiling instruction, canyoning as well as social and caving activities with other speleo clubs such as the Caver's Annual Dinner and the

Caver's Annual Picnic featured on the year's agenda.

Publication of another edition of the club's magazine "Quaver" was welcomed, and together with continued work on the Caving Cottage and the dig at Bungonia, 1985 promises to hold more achievements in store.

1985 began with two extended interstate trips. In a combined O.T.C. and S.U.S.S. trip via Buchan and Mt. Gambier, eight club members spent four weeks exploring the caves of the Nullarbor and Kangaroo Island. On Kangaroo Island three new caves, Cider Cave K55, Giggle Pit K56 and Walk Thru Cave K58, were discovered, explored and maps published.

In Tasmania the club was represented at the biennial ASF Conference by the club's ASF Councillor and Secretary. Over three weeks club members joined members of groups from throughout Australia in visiting a number of caves at Ida Bay, Gunns Plains, Mole Creek and the Tasman Peninsula.

Closer to home, through the year there were caving trips to Bungonia, Tuglow and Wyanbene, walking trips in the Blue Mountains and Kosciusko, and a number of canyoning trips in the Northern Blue Mountains.

Featuring on the years calendar were a number of caving and social occasions with other caving groups including the 2nd Caver's Annual Picnic, organised by MUCG, which saw caver's from a number of groups, including four Victorians, gather for a weekend of caving and walking at Bungonia; the Cavers Annual Dinner; and Speleosports at Macquarie University in which one of the MUCG teams came second.

In addition to attendance at the Cave Rescue Weekend, the club organised a number of climbing wall days on the University Gym climbing wall, and at Oxford Falls. Club members also obtained First Aid Certificates at a St. Johns course organised by Macquarie University Sports Association. Unfortunately the club had the opportunity to put such training into practice when a member sustained injuries in a fall in Drum Cave, Bungonia. Credit for the smooth and efficient rescue must go to members of the Cave Rescue Group and Goulburn Police Rescue.

During the year two editions of the club journal 'Quaver'. were published. One of these was a special edition reprinting a number of trip reports, results of scientific work carried out, and maps originally published in the late 60's and early 70's when the caving group was a part of the Macquarie Mountaineering Society. Another special edition of 'Quaver' is planned for 1986, featuring a number of previously unpublished reports and maps. Also planned for 1986 is a collection of abstracts of all caving articles published in Sloth, the MMS Yearbooks and Quaver.

Finally in January 1987, club members look forward to the next biennial conference, to be held at Macquarie University.

David Hamilton.
Secretary 1984-85
President 1985-86

A big range of Paddymade bags -the choice is yours.



KIANDRA — compact! Mini size, mini weight with high quality and high comfort. Kiandra is a "3 season" semi-rectangular down-filled bag with ripstop nylon outer and cotton inner lining which ensures unlimited comfort. Able to mate with similar Paddymade bags. Kiandra's so small, ten will fit into an average size rucksack.



HOTHAM — versatile! The most popular Paddymade sleeping bag, perfect for every conceivable type of outdoor adventure. Hotham's box walls and high quality loft down, ripstop nylon shell and its ability to mate with similar Paddymades, make it the versatile, happy compromise sleeping bag.



BOGONG — the snow bag! The no-nonsense, no compromise winter sleeping bag. A versatile flat opening semi-rectangular bag, nevertheless is designed for truly cold conditions — perfect for skiers and climbers. Mates with similar Paddymades.



SNOWLORD — Everest conditions! The top-of-the-range tulip shape specialist sleeping bag. Designed for superior performance for major overseas climbs, extremes or high altitudes. Slanted walls, tapered ripstop nylon shell and boxed foot section make Snowlord the Ideal "expedition" bag for serious users.

PADDYMADE SLEEPING BAG COMPARISON CHART

MODEL	WEIGHT INC. STUFF SAC.	CONSTRUCTION	FILL WEIGHT	FILL	TEMP. RATING*	ZIP	SIZE IN STUFFSACK cm
KIANDRA	1.25 kg	Sewn Thru	500 g	550 Loft Down	5°C	Full Zip	30 x 17
BIMBERI	1.00 kg	Box Wall	550 g	550 Loft Down	-5°C	Side Zip	30 x 17
HIGH PLAINS	1.80 kg	Box Wall	1100 g	Featherdown	-5°C	Full Zip	34 x 23
HOTHAM	1.60 kg	Box Wall	700 g	550 Loft Down	-5°C	Full Zip	34 x 23
MELALEUCA	1.55 kg	Box Wall	800 g	550 Loft Down	-15°C	Side Zip	34 x 23
BOGONG	1.60 kg	Box Wall	900 g	550 Loft Down	-15°C	Full Zip	34 x 23
SNOWLORD	2.00 kg	Slant Wall	1100 g	550 Loft Down	-25°C	Side Zip	37 x 27

All bags fit people to 190 cm (6ft 3in) tall, bags to fit people 205 cm (6ft 9in) are available in most models.

*Temperature Ratings are a soft measurement — they represent an average expected performance level for a standard person although individuals will differ by up to $\pm 10^{\circ}\text{C}$. Paddymade reserves the right to alter these specifications without notice.



Paddy Pallin

Sydney: 69 Liverpool St. (02) 264 2685
Miranda: 527 The Kingsway. (02) 525 6829
Parramatta: 61 Macquarie St. (02) 633 3749

Outdoor Shops

Canberra: 46 Northbourne Ave. (062) 47 0949
Melbourne: 55 Hardware St. (03) 67 4845
Hobart: 32 Criterion St. (002) 31 0777