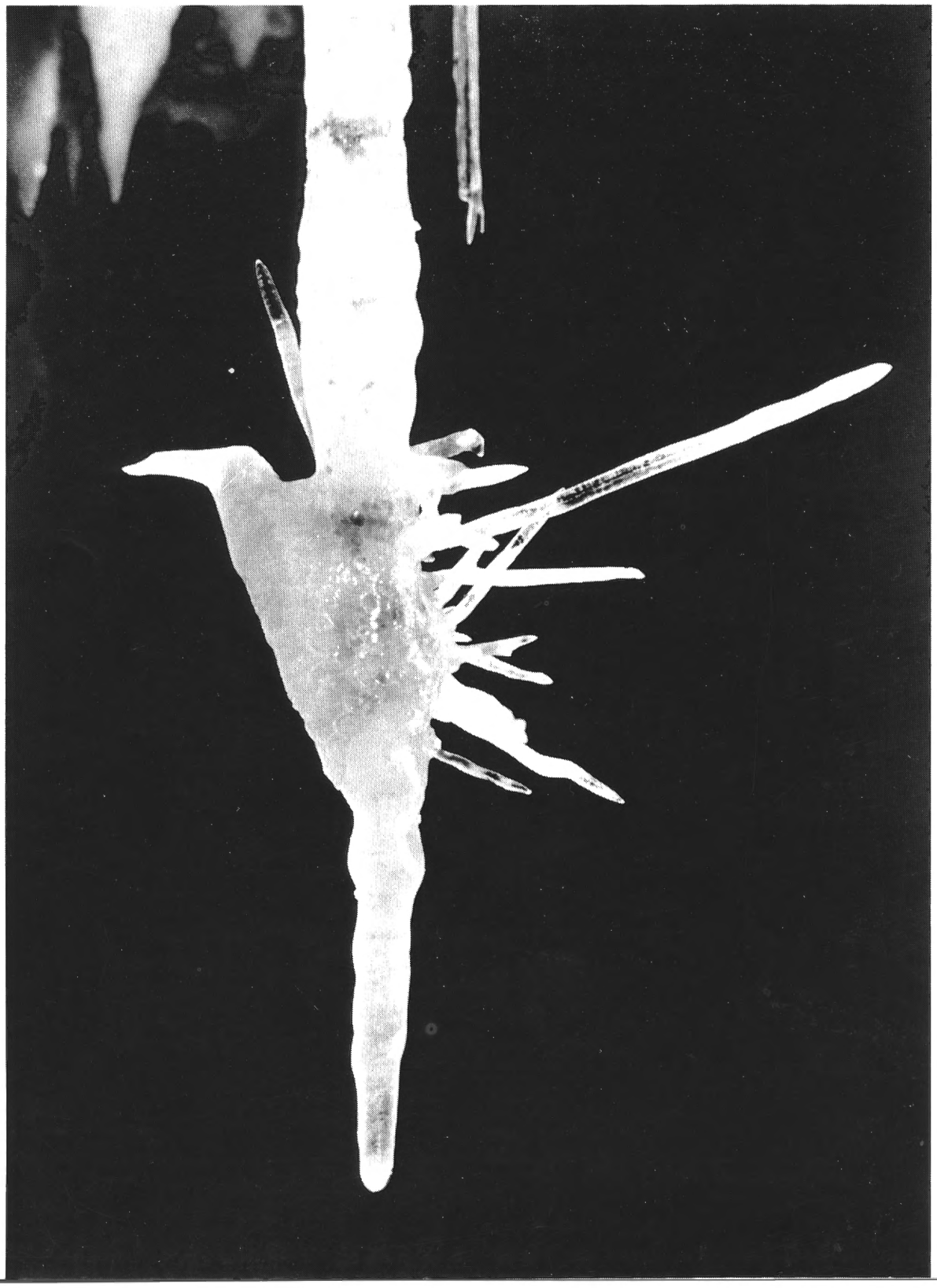
AUSTRALIAN CAVER

No. 137 1994

Journal of the Australian Speleological Federation Inc.



Earth, Water, Fire and Air

The Earthly limestone and the Water that dissolves them, the Fiery volcanoes and the hot Air at the conference itself.

VULCON CONFERENCE 1995

The 20th ASF Conference will be held at Monivae College, Hamilton, Western Victoria, commencing Monday, 2nd January and concluding Friday, 6th of January 1995.

Registrations are now urgently needed.

EXECUTIVE COMMITTEE MEMBERS 1994

President
Miles Pierce

Peter Kraehenbuehl

Membership Secretary
Peter Dykes

Senior Vice-President
Pat Larkin

Veronica Schuman

Executive Secretary
Karen Magraith

Vice-Presidents
Peter Berrill

General Secretary
Keir Vaughan-Taylor

Treasurer
Brendan Ferrari

AUSTRALIAN CAVER

Journal of the Australian Speleological Federation Inc.

No. 137 1994

CONTENTS

Front Cover Photo: "The Bird" - helictites on a stalactite, Easter Cave, Augusta W. A. Photo by Rauleigh Webb.

Back Cover Photo: "Tangles" - helictite on a straw, Easter Cave, Augusta W. A. Photo by Rauleigh Webb.

Australian Caver is Published by the Australian Speleological Federation Inc.

Editors: Chris Bradley
Cathy Brown

Printed by Empire Press, Students' Association of Flinders University, South Australia

Back copies of Australian Caver are available from Macquarie University Caving Group. C/- Sports Association, MACQUARIE UNIVERSITY, 2109. Contact: Lucinda Coates [redacted]

Printed on recycled paper.

Layout and Design : Produced on an Apple Macintosh SE/30 and LC575.

EDITORIAL

Firstly we must thank Clare Buswell for her effort over the last few years as Editor of this magazine. Clare has done an excellent job of producing a quality magazine. It will be difficult to produce a magazine of the same standard. Clare is still organizing the printing side of the magazine and we thank her for that.

The production of Australian Caver has now moved from South Australia to the Australian Capital Territory. Cathy Brown and myself offered to continue producing the magazine after a distinct lack of other volunteers. We feel that Australian Caver is a very important medium for communication throughout the caving community.

The ASF has decided not to proceed with an appeal regarding the Sellicks Hill dispute. Miles Pierce has written a short article which explains the situation.

Finally, if you haven't yet registered for Vulcon 1995, now is the time to do so. This is the 20th ASF Conference Vulcon, and the organizers have put in a lot of work to ensure that everyone attending will have a great time. If you have any queries or problems contact Susan White on
03 328 4154.

Chris Bradley and
Cathy Brown

Material for Australian Caver can be sent in many formats:

Disks: please send 3 1/2" Macintosh or IBM disks. 5 1/4"IBM disks can also be sent, but the 3 1/2" disks are preferable.

Software: If you don't use Word (IBM or Mac) or Claris Works, please send the files in RTF or ASCII format. Pictures should be saved in PICT format.

Please send a hard copy of the material with the disk so it can be checked with the electronic version.

Send to Chris Bradley
31 Archer St. Dickson ACT 2602
Internet: clb555@anu.edu.au
CompuServe: [100237,2753]
ph: (06) 247 6640

Send to Cathy Brown:
13 McDonald St. Chifley ACT 2606
Internet: cbrown@av.bmr.gov.au
ph: (06) 288 2819

Hand written and typed manuscripts must be double spaced.

Next deadline: end January

URGENT ! URGENT !

VULCON

Registrations for the 20th ASF Conference Vulcon at Hamilton, Victoria are now urgently needed. The organizers need your registration form to enable them to plan for the right numbers. The form is available from your club, from the Vulcon organizers or use the form in Australian Caver.

Pre Conference trip at Mt Eccles from 27 December to 1 Jan. Post Conference Trips to Mt Eccles/Byaduk, Codrington, Bats Ridge, Glenelg and the Lower southeast S.A. are being planned. Details are available in the brochure with your receipt after booking.

Public transport to Hamilton is readily available.

The conference will begin with an ASF Council meeting on Monday 2nd Jan and finish on Friday 6th Jan with the final council meeting. There will be the usual Speleosports, Cavemans Dinner (with international speaker), papers and photographic competition. The extra fun will be the Prussiking competition: The Kinnears Cup sponsored by Kinnears Ropes and a mid week trip to Byaduk.

Papers for the proceeding are urgently needed. Papers are to be sent to Vulcon 1995, 123 Manningham St, Parkville 3052, fax & phone 03 328 4154. Please contact Susan White if there is any problem or for any queries.

LAKE LEA REPORT

Apology

The ASF apologises for any offence taken from criticism of Michael Lichon's evidence to the Tasmanian Environmental Appeal Tribunal into Lake Lea Tourist Development in the report on page 16 of Australian Caver No.136. The report was prepared for the ASF Council Meeting in January 1994 and was not intended by the author to be published in the Australian Caver. Its publication was also some six months after it was written.

Although the Tribunal did not rule against the development proposal, it appears that conditions imposed by the Tribunal have since resulted in the project being set aside.

The following letter from the Tasmanian Conservation Trust puts their interpretation on the Tribunal outcome as well as responding to the report in AC 136. We also publish the findings made by the tribunal on Mr Lichon's evidence.

Letter to the Editor - from the Tasmanian Conservation Trust

The Truth of the Lake Lea Battle

I am concerned at the grossly inaccurate and defamatory nature of Arthur Clarke's report on Lake Lea, (AC 136, p16). It seems the fiasco lies in Arthur's reporting.

For a start, the true score is Conservationists 1; Developers nil.

Lake Lea lies within boundaries deemed by the Parks & Wildlife Service as appropriate for World Heritage inclusion. However the land around the lake and the Vale of Belvoir is unprotected, and some is subject to private interests. The State Government licensed the owner & developer to proceed with the effluent disposal aspects of a proposed Tourist development. Objectors to this scheme, including locals, conservationists, recreational fishermen, bushwalkers and cavers, coalesced under the coordination of the Tasmanian Conservation Trust. Contrary to Arthur's assertions, the Trust was not in receipt of advice or information from either Kevin Kiernan or Ian Household.

The Tasmanian Conservation Trust took a case to the Environment Protection Appeal Board against the developer's licence to operate scheduled premises, in particular the dumping of 54,000 l [litres?]/day of waste into the Vale River. In addition to the case presentation by the two Trust advocates, three witnesses were called to speak on specialist aspects of vegetation, stream ecology and karst respectively. The latter witness, Mike Lichon was duly acknowledged by the Appeal Board for his extensive expertise. This was despite the diversionary and scurrilous cross examination he had to endure. Arthur's spurious personal attacks on this witness are certainly unwarranted and counterproductive.

Rather than the Trust losing the case as Arthur suggested, the Appeals Board decision placed significant additional constraints on development; including a tripling of the base limit of stream flow under which sewage must be trucked from the site, requirement for vegetation surveys, and prescribing additional earthworks and site planning. The Appeal also presented itself as an expensive delay.
The Appeal Board outcome made the development proposition sufficiently unattractive such that the owner abandoned his plans and put the property up for auction. The disincentive for development, and sustained conservation campaigning resulted in the auction being cancelled due to lack of interest. We understand the Parks & Wildlife Service is now preparing a bid to return the land to the Crown for future protection.

Finally, Lake Lea has nothing to do with the Deloraine Council (now merged into the Meander Valley Council), but lies in the boundary of the Kentish Council.

This is one of the few recent victories for conservation in Tasmania.

Yours Sincerely

Michael Lynch, Director
27 July 1994

Tribunal Comments

The Tribunal made the following comments regarding Mr Lichon's evidence in its Reasons for Decision, handed down on 29 November 1993:

" In addition to Mr Collins' evidence the Board has had the advantage of hearing three expert witnesses called by the appellant. Mr M.

Lichon, a Bachelor of Science with Honours and a research officer expressed the concerns of the Mole Creek Caving Club about the proposed development. The main tenor of his evidence was that the proposed development should not be allowed to proceed until a complete knowledge of the flow rates of the Vale River and the nature of the karst system, including its fauna, is available. He admitted that, unless entry into the karst system is found that such knowledge may never be available. Despite his extensive expertise in these matters his evidence was coloured by his subjective view that the proposed development was unsuitable at Lake Lea and the Vale of Belvoir whatever the conditions are that might be imposed. "

HAVE YOU MOVED HOUSE ?

Send the new information to:

Steve Brooks
6 Kidbroke Pl
Westfield. 6112
Phone: (09) 495 1661

Make sure you tell him what club you belong to
or
if you are an individual member when you joined

POSTSCRIPT ON SELLICKS HILL

SELLICKS HILL QUARRY CAVE - COURT CHALLENGE

Miles Pierce

The Case mounted by the ASF Inc. and heard by Justice Bollen in the South Australian Supreme Court on 30 and 31 May, as reported in AC No. 136, was decided against the Federation. After considering advice from the Q.C. who represented the ASF, a second opinion from an independent Queens Counsel, plus costs esimates from our solicitors, it was decided not to proceed with an appeal. After negotiations, a settlement has been reached with the Defendants which waives the costs order made against the ASF by Justice Bollen.

It is regrettable that the earlier representations to the South Australian Government and the court challenge were unsuccessful. Avenues to obtain a stay of mining around the cave and require a physical assessment of it now appear to be exhausted. It is hoped, however, that at the least, similar conflicts will be better handled in the future in South Australia and that the Federation's court action has shown the preparedness of cavers to challenge decisions which adversely affect important karst heritage.

LIMESTONE CAVES OF SOUTH-EAST SOUTH AUSTRALIA AND WESTERN VICTORIA

Ken Grimes, Sue White, & Miles Pierce

GENERAL

The next ASF Conference, *'VULCON'*, is to be held at Hamilton, western Victoria. This review describes the 'soft-rock' caves of the Tertiary and Quaternary limestones of the region. It follows on from the overview of the volcanic caves of western Victoria that was published in the previous issue of the *Australian Caver*. For additional detail see the earlier reports listed in the bibliography.

Geological background

See Marker (1975) and Grimes (1994) for details of the geology and karst systems. The limestones fall into two groups, both relatively young: the Tertiary (mainly Miocene) limestones of the Otway Basin (Figure 1), and the younger Quaternary calcareous dune limestones of the Bridgewater Formation - a series of linear dune ridges that mark old abandoned coastlines and which overlie the older limestones and other rocks.

The *Tertiary limestones* were deposited in a shallow sea that flooded the region in the Oligocene and early Miocene (about 20-30 million years ago). For South Australia, Figure 1 shows the limit of these limestones for the purposes of modern cave development - they continue further to the north and west, but with a progressively thicker cover of non-calcareous sediments. In Victoria the Tertiary limestones extend northwards beneath parts of the Newer Volcanics, but again the karst potential is limited.

The limestone is relatively soft in the subsurface but develops case hardening and calcrete cappings on exposure. It is locally well jointed with a dominant north-west trend. The influence of both the vertical jointing and the horizontal bedding are exhibited in the cave passage forms. The Tertiary limestones are similar to those in the Nullarbor (c.f. Davey & others, 1992), and there are similarities in the cave styles also, though here we have none of the huge passage systems that occur in the Nullarbor.

The *Quaternary dune limestones* are a series of calcareous sand ridges which represent the coastal dunes of old shorelines that developed during an overall regression of the sea during the Quaternary (the last 2 million years). In South Australia they form linear north-west trending ranges, which extend northwards beyond the limit of the Otway Basin to overlie the sediments of the Murray Basin. In Victoria the distribution of the dune limestones is less regular, and east of Portland they are mainly restricted to a belt along the modern coast, though some older ridges (without karst) occur further inland. These Quaternary limestones are similar to those on Kangaroo Island, the Eyre Peninsula, and the coastal areas of West Australia. The dune ridges are now partly consolidated calcarenites (sandy limestones) and contain syngenetic karst features in which caves and solution pipes developed as the sands were being cemented into a limestone (see below). The dune limestone has well developed dune bedding in places, and shallow-angle medium to thin bedding elsewhere. It shows only minor jointing. Some caves are developed mainly in the underlying Tertiary limestones but have their entrances in the overlying dune limestones (via solution pipes, roof windows, or collapse dolines).

Syngenetic karst (Jennings, 1968; Pierce & White, 1977) is an important feature of the soft limestones of the province. In the calcareous Quaternary dunes some karst features have developed at the same time as the sand was being cemented into a rock. The main characteristics of syngenetic karst are the development of a cemented (calcreted) caprock near the surface, of vertical solution pipes, and of low, wide, horizontal maze caves either beneath the caprock or at the level of the adjoining swampy plains. The poorly consolidated nature of the rock means that collapse plays a very important role from an early stage. Solutional, subsidence and collapse dolines can occur on the surface.

Solution pipes are one of the most distinctive features of syngenetic karst. They are vertical cylindrical tubes, typically 0.5 to 1 m in diameter, which can penetrate down from the surface as much as 20 metres into the soft limestone. They can occur as isolated features, or in clusters with spacings as close as a metre or so. Many of the caves are entered via such pipes, and a traditional

CEGSA hobby is the digging out of sand-filled pipes in the hope of finding a cave at the bottom.

Syngenetic karst development is typical of the Quaternary dune calcarenites; however, the Tertiary limestone is also a relatively soft porous limestone, and consequently it also shows some of the features of syngenetic karst, in particular the development of solution pipes and calcreted caprocks.

Hydrology

The Tertiary limestone forms a major aquifer in the region. The Gambier Limestone has been referred to as one of the best aquifers in Australia. Much of the groundwater from the Mount Gambier area is discharged in major springs on the southern coast, and divers have entered caves below some of these. The interaction of uprising hot volcanic magmas and the groundwater in the limestones were responsible for the steam-driven explosions that formed the large crater lakes of the region such as Blue Lake at Mount Gambier, and Tower Hill crater near Warrnambool.

During glacial periods the lowering of sea levels would have caused a significant drop in the groundwater levels in the coastal parts of the region - as shown by submerged speleothems and mudcracks in some South Australian caves.

Dolines

The most spectacular surface karst features are the *collapse dolines*, especially those in the Mount Gambier area that extend below the water table to form *cenotes* (see Horne, 1984). These have formed by the collapse of large phreatic caverns. Figure 2a shows several typical cenotes and related features: in the Gambier region the watertable is lower and the collapse dolines have relatively shallow lakes (e.g. Hells Hole & Umpherstons), however, further south in the Schank region, the water

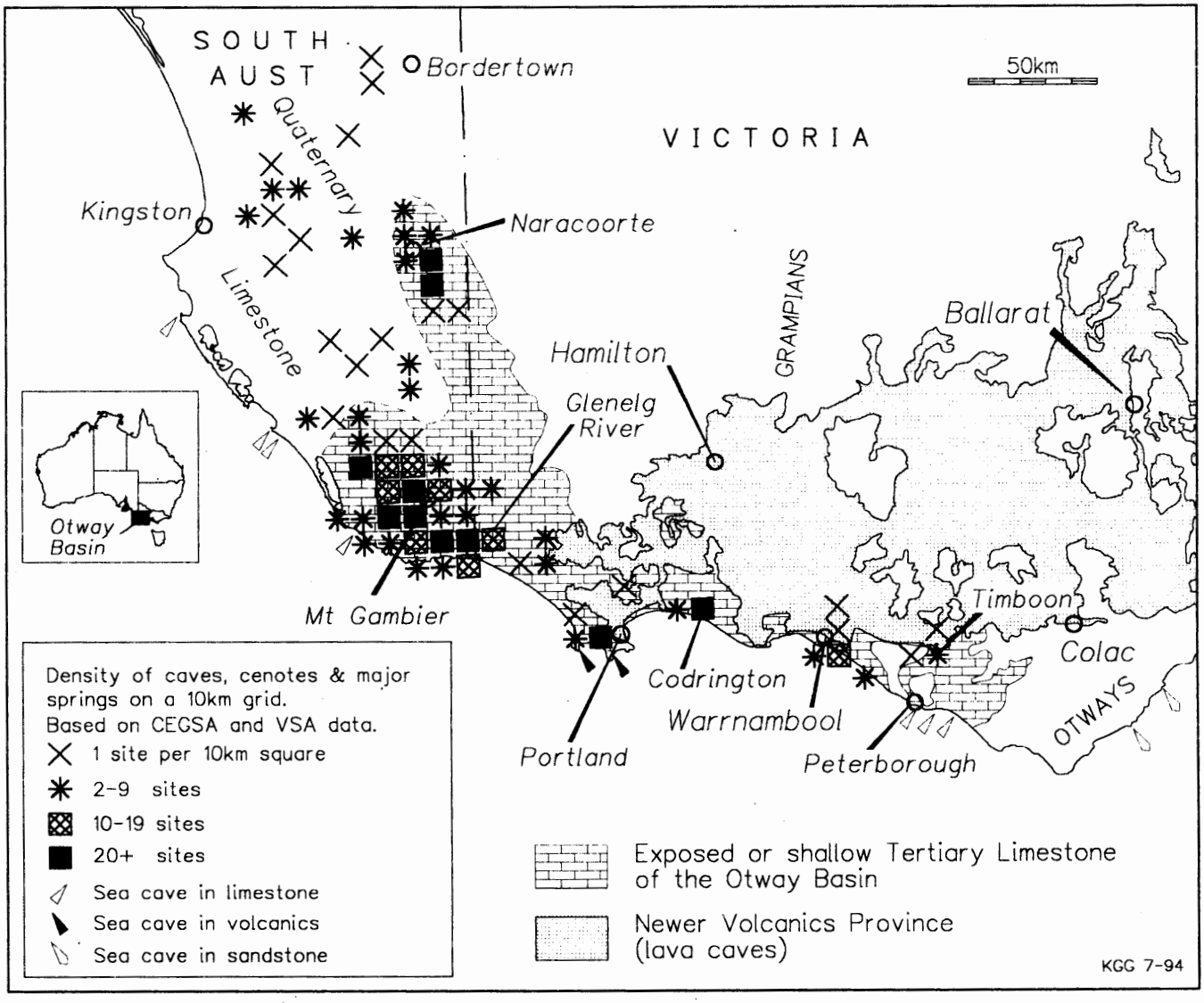


Fig 1: Distribution of Limestone caves of the Otway Basin region.

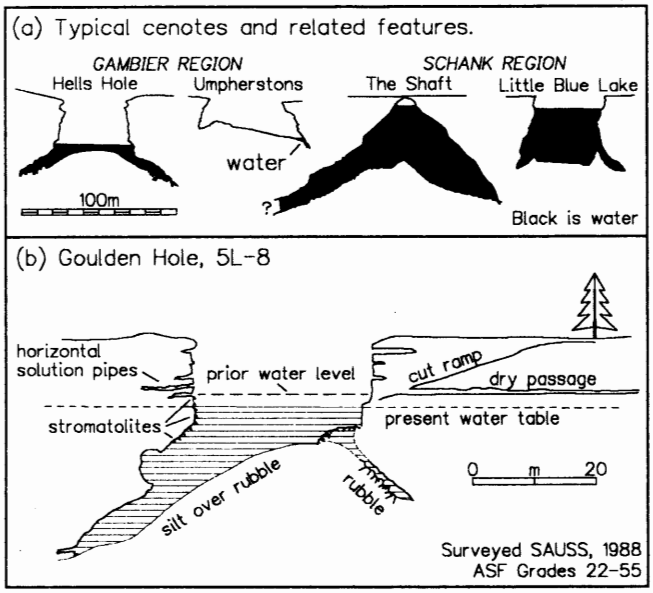


Fig 2: (a) Some typical cenotes & related features of the Lower South-east. (b) Detail of a cenote.

levels are higher and we find deep lakes (e.g. Little Blue Lake). The Shaft (Figure 2a) is an example of the situation before the roof of a large flooded collapse dome falls in to form a cenote - the present entrance is a small solution tube through which all the dive gear has to be lowered. An interesting feature of some of the cenotes is the existence of stromatolites: columnar or platey underwater calcareous growths formed by algae. These have been found as deep as 25m, and also extend 2m above the present water level - implying a higher watertable at some time in the past (Figure 2b).

Fields of shallow dolines and uvalas are extensive in South Australia and extend into the westernmost part of Victoria. Isolated doline fields also occur further east, e.g. northwest of Peterborough. These shallow hollows generally have sandy or muddy floors and rarely have cave entrances. Cave entrances are typically in collapse dolines, via solution pipes (which may have a small conical subsidence doline above them), in small outcrops of calcreted caprock, or in cliffs along streams or on the coast.

SOFT-ROCK CAVES

The caves in the region are dominantly phreatic in origin, i.e. formed by slow moving groundwater below the water table. The limited local relief means that vadose (stream

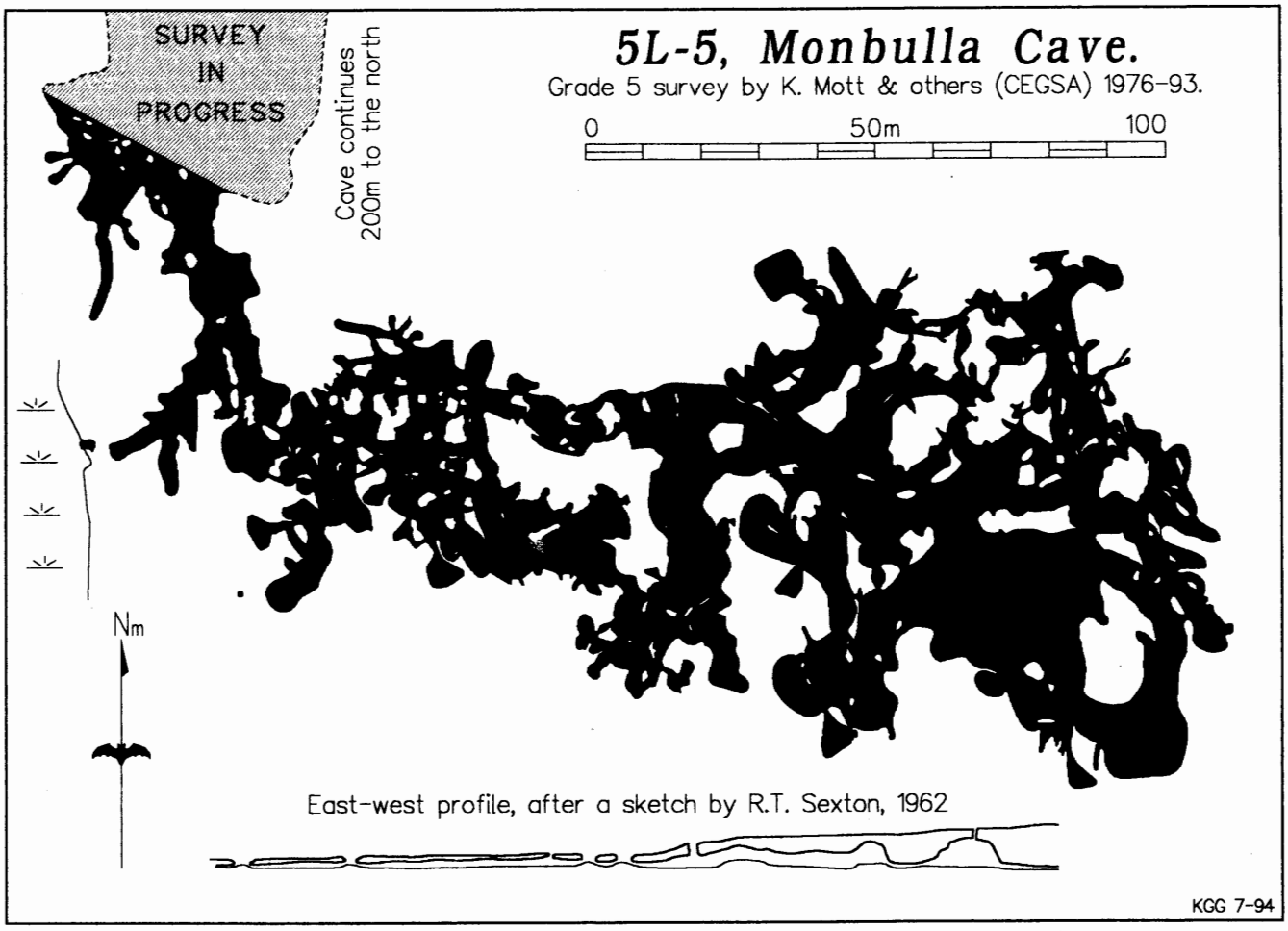


Fig 3: A typical syngenetic karst cave developed as a low maze beneath a caprock in Quaternary dune limestone.

flow) features are extremely rare in South Australia, but some vadose streams occur in the caves of the Glenelg River gorge in Victoria, and also further east in the Warrnambool and Timboon regions. Both joint and bedding plane control can be seen, but solution at temporary water-table levels can make the latter hard to recognise in this area of flat bedded limestone. Many of the primary phreatic caverns and passages have been modified by breakdown to form collapse domes and rubble filled passages.

Cave diving has demonstrated the existence of extensive underwater cave systems in South Australia, and it appears that in the southern part of the Lower Southeast area the bulk of the cave development may be below the present water table, though these passages would have been partly or wholly drained during the low sea levels of the last glacial period.

Typical syngenetic cave forms in the dune limestones are shallow horizontal systems developed beneath the caprock or at the level of an adjoining swamp. They have multiple entrances (often via solution pipes or the collapse of the surface crust) and an irregular outline of chambers, pillars and short connecting passages, generally with a roof height less than one metre throughout (Figure 3). The walls are often difficult to see (and map) as they are out of reach where the roof slowly drops to floor level. The older caves in the Tertiary limestone are similar but generally have larger chambers and passages, and also show better joint control, with many fissure style passages. Still pools may be partly covered by calcite rafts.

Speleothems are generally not abundant - a consequence of the frequent collapse. However, there are some spectacular exceptions to that rule - and these include some extensive and very delicate forms - especially clusters of long straws and soft deposits of moonmilk. Cave coral is well developed.

The generally horizontal development with soft sandy floors make the caves of the region easy to explore. However they are not without their challenges: tight vertical solution pipe entrances, unstable sand and rubble cones, confusing mazes, and extensive crawlways - not to forget the ultimate challenge of water-filled sections reaching to depths in excess of 80m !

CAVE BIOLOGY

There are two maternity sites for the little Bentwing Bat (*Miniopterus schreibersii*) - one near Naracoorte and the other at Warrnambool. Several caves along the Glenelg River host the (locally) rare Large Footed Bat (*Myotis adversus*). The cenotes and big springs contain an interesting aquatic fauna and flora (including funny little crustaceans called syncarids, and the stromatolites mentioned above). Seals occupy some of the sea caves near Portland. Tiger snakes are a common accidental fauna in many of the caves of the region, particularly in summer time. It is always advisable to 'knock before entering' to see if anyone is home.

The solution pipes form excellent pitfall traps and thus bone deposits of Quaternary age have been found in a number of caves (e.g. Wells & Pledge, 1983). The most important, and world famous, bone deposit is in the Victoria Fossil Cave (5U-1) at Naracoorte, but other significant sites have been found in both states, including some underwater bone deposits in the cenotes.

The Tertiary limestones in the Mount Gambier area have bands of flint nodules which make excellent stone tools. Evidence of aboriginal mining of flint is seen in several caves, as is also aboriginal art in the form of scratch marks and finger marks.

CAVE 'AREAS' WITHIN THE PROVINCE

Figure 1 shows the distribution of limestone caves within the Otway Basin. In South Australia CEGSA has split the karst province into two areas: the Upper Southeast (5U numbers) and the Lower Southeast (5L), reflecting the main cave concentrations around Naracoorte and Mount Gambier, though there are scattered caves throughout the region. In Victoria, VSA has one broad region (The Lower Glenelg, 3G) and a number of discrete areas - some of which are just local clusters of caves or surface features within or near to the Glenelg Region (e.g. 3CR, DD, KB & P). This makes it awkward when writing a review of the whole province as many of the 'cave areas' are arbitrary and not well balanced.

About 40% of the caves in South Australia are on crown land - State Forests and Conservation Parks etc. Many of the state forest sites are within pine plantations. In Victoria, the caves of the Glenelg area are mainly within a National Park or State Forest (pines), and those at Bats Ridge are mainly within a Fauna Reserve; however, most other areas are on private land. Both crown and private land sites suffer from rubbish dumping and filling in of entrances either deliberately or

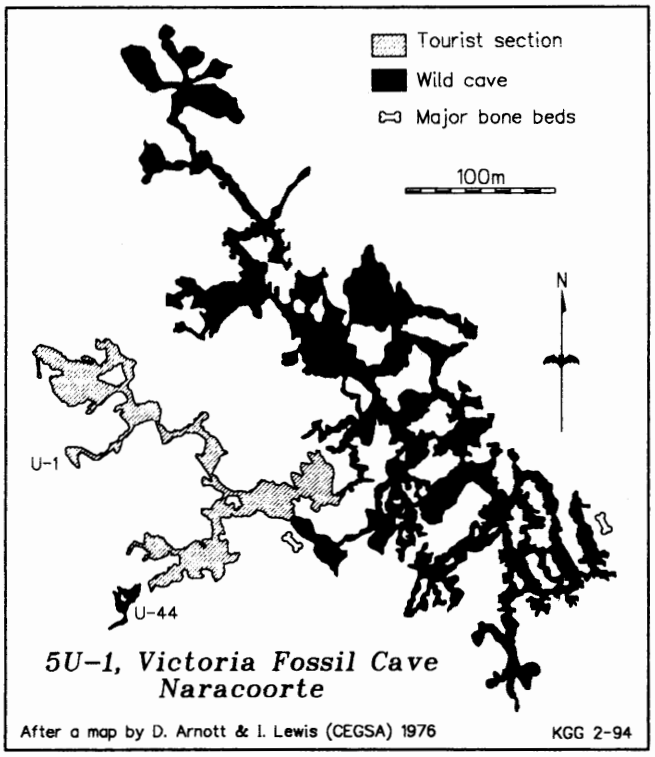


Figure 4: Complex of collapse chambers and low passages in Tertiary limestone

as a consequence of ploughing etc. In the past there have been pollution problems from cheese factories, timber mills, piggeries & dairies. Tighter government regulations are meant to control this but some problems continue.

South Australia

Outcrops of the Tertiary limestone stop a short distance north of Naracoorte, (Figure 1) and the few known caves north and west of there are in Quaternary dune limestones.

In the Naracoorte area we find caves developed mainly in the Tertiary limestones, but with some extending up into overlying dune calcarenites. The larger caves tend to be alternating areas of collapse domes and low, wide, phreatic passages (e.g. Victoria Fossil Cave, 5U-1, Figure 4), but some are branching collapse passages. Quite a few are entered via vertical solution tubes - the thinner tubes can be quite sporting, especially when you try to climb back out of them as there is not enough room to get your knees up. Where there are numerous solution pipes, most of them are sand filled and not visible on the surface, but they can be recognised from below by the sand cones spreading out from the cave roof (Figure 5). Many of the better caves, including those with the best decorations, are within the Conservation Park, and special permits are required, but there are also some quite good ones on private land for which entry permission can be obtained from the landowner.

Moving south, Monbulla Cave (5L-5), west of Penola, is one of the better known examples of a syngenetic cave formed in a Quaternary dune ridge. It is a confusing maze of phreatic chambers and pillars, mostly forming low crawlways, and extremely difficult to map (Figure 3, and see Mott, 1993). Kevin Mott is currently leading a neverending survey program in Monbulla Cave and will be looking forward to any assistance offered during the conference field trips.

In the Mount Gambier area we find a variety of cave styles (see descriptions and maps in Horne, 1993). Those developed in the dune limestones tend to be horizontal crawlways, and the larger ones form complex mazes - as in Mount Burr Cave (5L-69) and Snake Hill

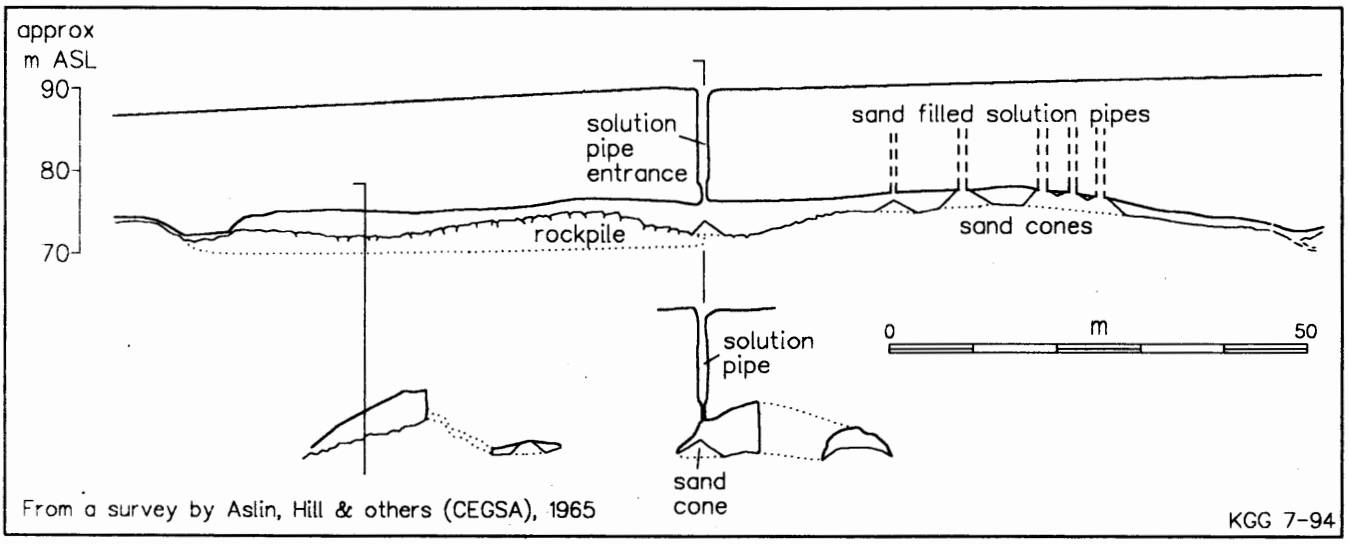


Fig 5: Profile of 5U-14, showing solution pipes & associated sand cones, as well as collapse modifications in a cave developed in Tertiary limestone.

Cave (5L-119). In the Tertiary limestones the smaller caves tend to be single joint slots or collapse chambers. The large systems may be joint controlled networks, such as Morgans cave (L-34) or the completely submerged Tank Cave (5L-230); or less regular systems of collapse domes, passages and phreatic mazes. Many of the deep caves here are partly or completely submerged (Figure 6), and the caves and associated cenotes and springs of this region form the mecca of the cave divers. Some of the better cenotes for surface viewing are Little Blue Lake (5L-9, Figure 2a), The Sisters (5L-43,44), Gouldens Hole (5L-8, Figure 2b) and Hells Hole (5L-40, Figure 2a) - but take care at Hells Hole, which has a dangerous, unfenced, edge. There are several collapse dolines within the city of Mount Gambier - Umpherston (5L-6) in a park next to the highway on the eastern outskirts is the largest, but has little associated cave (Figure 2a). Engelbrecht (5L-19) south of the highway near the middle of town has an extensive cave beneath it (Figure 6); there are guided tours of the short airfilled section, and the display area shows a video of divers in the more extensive submerged sections. The large collapse dome in this cave lies directly beneath the Princes Highway - drive gently!

Victoria

As we move eastward into Victoria the Tertiary limestones become variable in their purity, and only limited parts of the outcrop region show significant karst development. The main areas of Tertiary caves and karst are Lower Glenelg, Warrnambool and Timboon. Quaternary dune limestones host syngenetic karst and caves such as those at Bats Ridge and Codrington. In addition, there are the sea caves and associated coastal cliffs and collapse dolines, arches etc that are a world famous feature of the coast east from Warrnambool. The following text draws heavily on the more detailed descriptions in White & Pierce (1993) The *Lower Glenelg region* (3G, CR, DD, KB) has mainly linear joint-controlled fissure caves in Tertiary limestone. Many have solution pipe entrances that start in a surface layer of Quaternary dune limestone but extend down into the Tertiary (e.g. McEachern Cave, 3G-5). The river has cut a magnificent gorge up to 35m deep into an otherwise gently undulating limestone surface. Some of the caves are entered at the base of the river cliffs, and have out-flowing streams and vadose features (e.g. 3G-14). This is a good area for a canoe trip as well as for caving.

To the north near the Princes Highway, the *Cave Ridge* cave (3CR-1) in dune limestone has numerous solution pipe entrances in its thin roof of hardened cap-rock.

The *Portland* region (3P) is a broad miscellaneous region covering sea caves and isolated dune limestone caves, as well as the separately numbered areas of Bats Ridge and Codrington.

Bats Ridge, (3BR) near Portland, and *Codrington*, (3CD) east of Portland, are each localised areas of very dense cave development in dune limestone. These are typical syngenetic karst with low crawly mazes and lots of collapse. Bats Ridge has been well documented (e.g. White, 1984, 1989), but

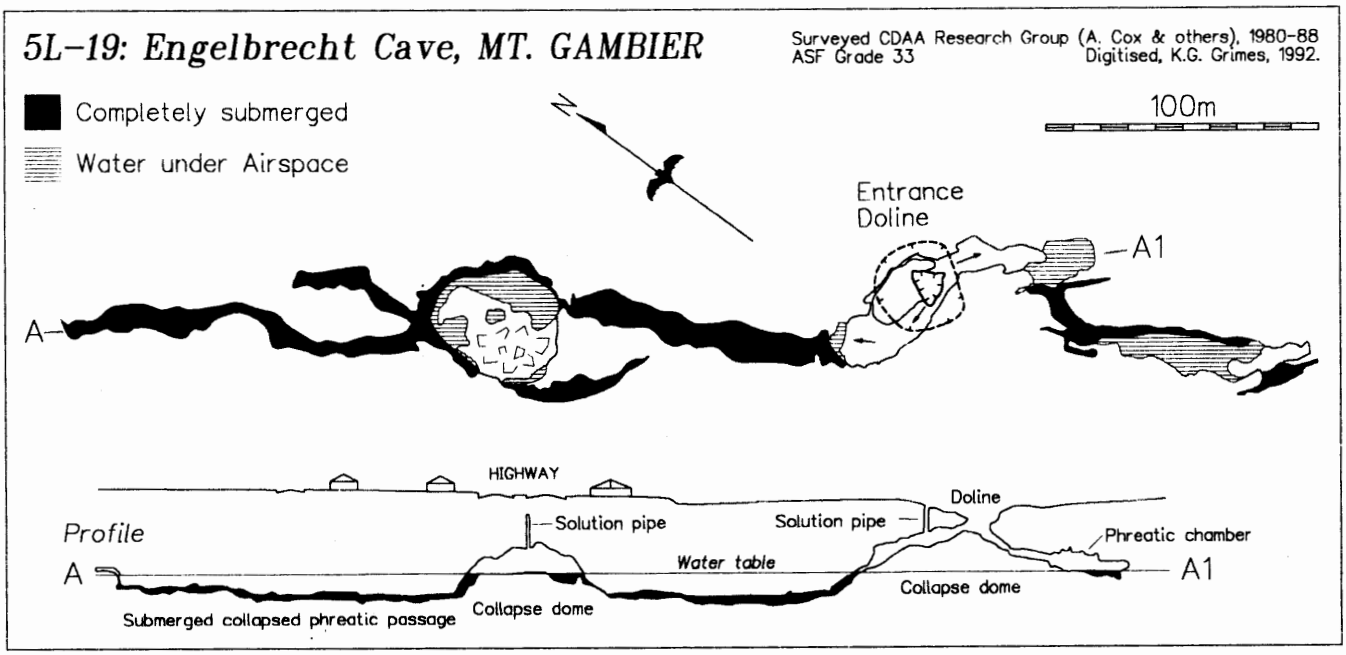


Fig 6: A typical large part-submerged, phreatic system with much collapse modification.

Codrington is a new area still being explored, and although surveying has started in some of the extensive maze systems no maps are likely to appear for some time - surveying assistance will be welcomed during the Vulcon field trips.

The *Warrnambool* area (3W) includes both Tertiary and Quaternary limestone karst, and also sea caves. An active stream occurs in one cave (3W-6). The caves are mainly collapse modified phreatic systems, with some joint control. There are also sea caves and related features in this area. Starlight Cave (3W-5) has its entrance in a sea cliff, but is a true karst cave, with two large bottle-shaped avens, 40 m high, one of which has multiple short solution tubes opening to daylight - hence the cave's name. The bat maternity site is in a sea cave - the worlds largest flush toilet?

Following the coast east from the Warrnambool area you move into the spectacular coastal scenery of the Great Ocean Road in the Peterborough area. The cliffs are in Tertiary limestone with some Quaternary dune limestone cappings. As well as the stacks, arches and gorges there are sea caves, and sea-modified karst caves, along with associated collapse dolines. Of interest in one cave (3SW-3) at Loch Ard Gorge are sand stalagmites: formed by cementation of sand below drip points, followed by the removal of the surrounding uncemented sand. The caves at Loch Ard Gorge also have historic interest - they were used for shelter by the only two survivors of the Loch Ard shipwreck in 1878.

Timboon (3T) is a small area near the eastern end of the Tertiary limestone belt. The caves occur in or near the deep valley of the Curdie River and are mostly small, but some are well decorated and several contain vadose streams.

CONCLUSION

This area of 'soft rock' caves developed on youthful, weakly consolidated limestones is quite different from the 'hard rock' indurated Palaeozoic limestone karsts of eastern Australia. The caves have an entirely different quality, characterised by cap rock effects, solution pipes, extensive low horizontal phreatic mazes, and extensive large flooded systems. The cenotes are unique within Australia and rival those of Florida and Central America.

ACKNOWLEDGMENTS

This report draws on the extensive exploration, mapping and documentation efforts of numerous CEGSA, VSA and other cavers over the last 30 years. In particular we thank Peter Horne and Kevin Mott for providing maps, and for commenting on the draft of this report.

BIBLIOGRAPHY

DAVEY, A.G., GRAY, M.R., GRIMES, K.G., HAMILTON-SMITH, E., JAMES, J.M., & SPATE, A.P., 1992: World Heritage significance of karst and other landforms in the Nullarbor region. Report to the Commonwealth Department of The Arts, Sport, The Environment & Territories.

GRIMES, K.G., 1993: Geomorphology of the South-east Karst Province of South Australia. *TASTROG 1993, 19th Conference, Australian Speleological Federation, Launceston, Conference Papers.* pp 59-71.

GRIMES, K.G., 1994: The South-east Karst province of South Australia. *Environmental Geology* 23: pp 134-148.

HORNE, P., 1984: Sinkholes of the lower south east of South Australia. *Proceedings 14th biennial Conference, Australian Speleological Federation,* Adelaide 1983: pp 123-132.

HORNE, P., 1993: *Lower South East Cave Reference Book.* Adelaide, privately published, (ISBN 0 9594383 9 4), 600pp.

JENNINGS, J.N., 1968: Syngenetic karst in Australia. in *Contributions to the study of karst,* Australian National University, Dept of Geography Publication G/5, pp 41-110.

LEWIS, I.D., 1976: South Australian Cave Reference Book. *Cave Exploration Group (South Australia), Occasional Paper* **5**.

MARKER, M.E., 1975: The lower southeast of South Australia: A Karst Province. *Department of Geography and Environmental Studies, University of Witwatersrand, Occasional Paper,* 13.

MILL, L., WHITE, S., & MacKEY, P., [Eds], 1980: Victorian Caves & Karst, A Guidebook to the 13th ASF Conference. *Australian Speleological Federation.* pp 65-82.

MOTT, K., 1993: Surveying Monbulla Cave. *Cave Exploration Group, South Australia, Newsletter*. 38(3): 59-61.

PIERCE, M., & WHITE, S., 1977: Quaternary karst at Bat Ridges, Victoria. *11th Conference, Australian Speleological Federation, Canberra, Proceedings*. pp 127-130.

PILKINGTON, G., MOTT, K., & NINNES, G., [Eds], 1982: Speleo-Vision Field Notes. *Cave Exploration Group of South Australia, Occasional Paper*, 6. pp 36-41 & pp 56-67.

SEXTON, R.L., 1965: Caves of the coastal area of South Australia. *Helictite*, 3(3): pp 45-59.

WELLS, R.T., & PLEDGE, N.T., 1983: Vertebrate fossils. *in* TYLER M J, TWIDALE C R, LING J K, and HOLMES J W (eds) 1983 Natural History of the South East. *Royal Society of South Australia, Adelaide*, pp. 169-176.

WHITE, S., 1984: Bats Ridge Karst Area - an annotated atlas. *Nargun*, 17(6): pp 42-68.

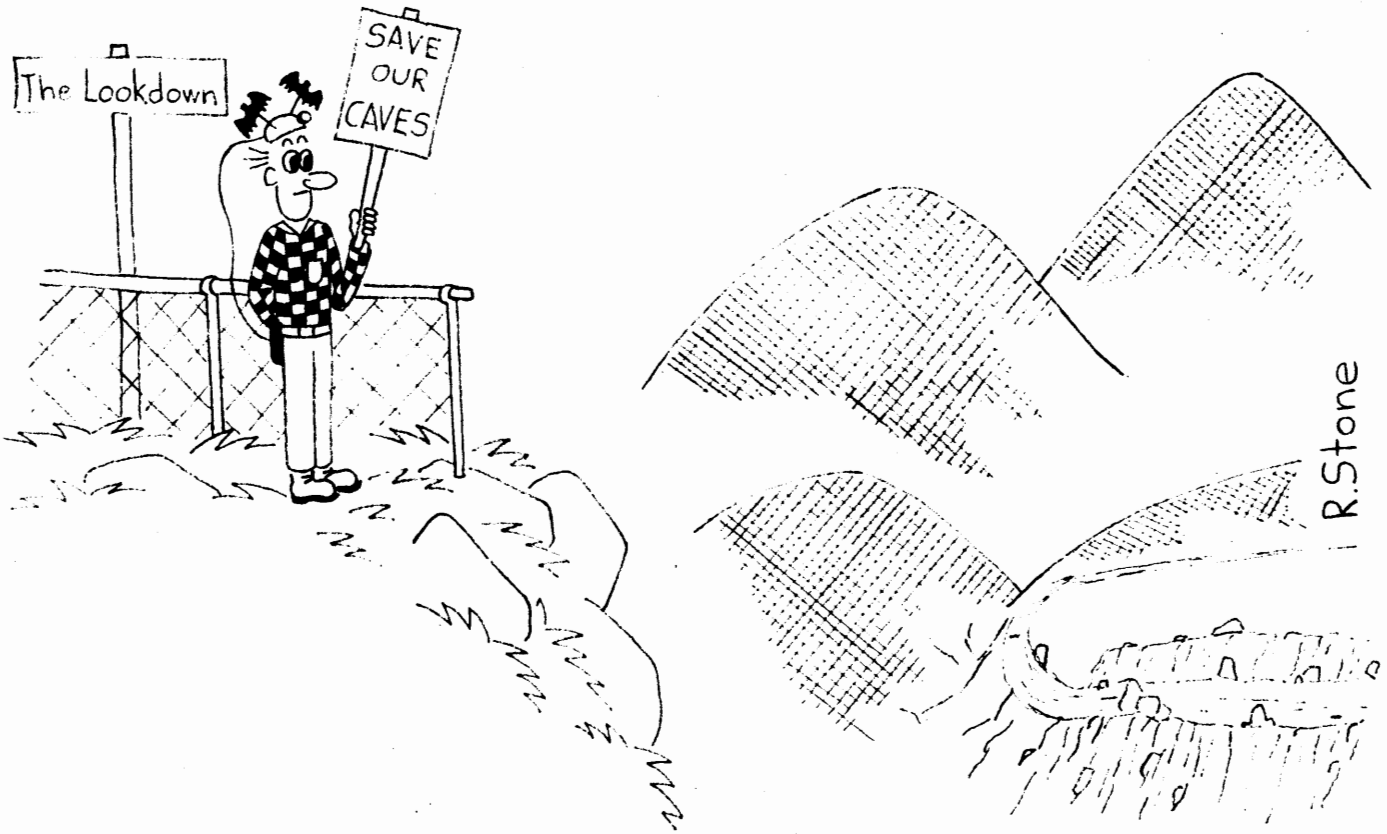
WHITE, S., 1989: Karst features in Pleistocene dunes, Bats Ridge, Western Victoria. *Helictite*, 27(2): pp 53-71.

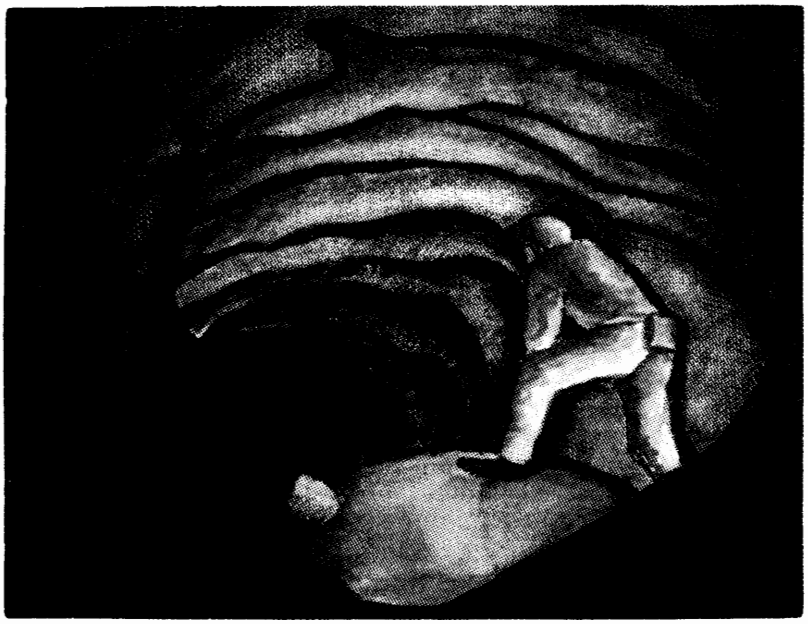
WHITE, S, & PIERCE, M. 1993: Soft Rock caving in Victoria. *TASTROG 1993, 19th Conference, Australian Speleological Federation, Launceston, Conference Papers*. pp 48-52.

----------oOo----------

The Art of Successful Protesting

(1.) Avoid the embarrassment of choosing the wrong venue.





INSIDE EARTH

Caves Beneath The Nullarbor

Paintings byJune MacLucas. Photography by members of the Cave Exploration Group of South Australia and other Australian cavers.

You are invited to an Art Exhibition.

INSIDE EARTH

CAVES BENEATH THE NULLARBOR.

Recent paintings by June MacLucas (Dip BFA & Member of CEGSA)

OPENING

9th December 1994 at 6.30pm

FREMANTLE ART CENTRE

1 Finnerty Street

FREMANTLE

Gallery hours 10 - 5 Monday to Sunday

Phone 09 335 8244

Exhibition includes recent and historic cave photography and videos by CEGSA and other prominent Australian Cavers.

Ken Boland	Steve Milner
Christopher Brown	Max Meth
Nicholas N Birks	Norm Poulter
Elery Hamilton-Smith	Mark Sefton
Kevin Mott	June MacLucas
Jim Cundy	Gary Woodcock

Historic photography by the late Captain J. Maitland Thompson.

Representing the Western Australian Museum : Bill Humphreys.

Videos by Greg Bulling, Tony Carlisle, Andrew Wight and Gordon Ninnes.

Exhibition curated by June MacLucas.

This exhibition was first seen at Prospect Gallery, Nailsworth, South Australia, 20 March - 10 April 1994.

INSIDE EARTH

CAVES BENEATH THE NULLARBOR

June MacLucas

"Subterranean caper" the title given by Adelaide art critic John Neylon in the Adelaide Review, May 1994 to the exhibition "INSIDE EARTH - CAVES BENEATH THE NULLARBOR", shown at Prospect Gallery, Nailsworth, SA March/April 1994, brings to mind something of a reckless nature. According to John Neyon this show has everything caving in the Nullarbor can offer. He once caved with the man himself, Captain J. Maitland Thomson (pioneer of Nullarbor mapping and caving), and mentions that "something about this teaming up of an artist with scientists venturing into unknown territory suggests a retake of the first European landings in Australia".

The combination of the two disciplines work well together, portraying humanity's sense of relationship to the dark unknown. An active metaphor for physical and psychic journeys, and an exploration of an unknown terrain, a subterranean environment in constant contrast with nature.

The work includes about 50 small paintings in shellac, wood dyes and oil, painted on 8x10" canvas boards. A reasonable size to enable travelling down caves with them upon ones back. Painted with an intensity of focus and rich colour. It also includes over 80 photographs and 3 videos (of underwater caves) by prominent Australian cavers, from South Australia, Victoria and Western Australia, exhibiting some of the most competent and exciting underground photography in Australia.

This exhibition will open at Fremantle Art Centre, on 9th December 1994 and will be in the main gallery until 8th January 1995. It will also open at Riddoch Art Gallery, the Community Gallery, 6 Commercial Road, Mt Gambier, on 5th June, until July 1995.

It is a rare exhibition, a first for Australia and one well worth a visit. If it is showing in your area do come and support those who have spent time, money and effort to put it together. Admission is free, your support is highly valued.

The Art of Successful Protesting

(2.) Be prepared to take risks.

Protecting Caves From People II

Norman Poulter

This article is adapted from the discussion paper "Track Marking in Caves"[V4] (1993) presented to a meeting of the Leeuwin-Naturaliste Cave Management Advisory Committee of the [WA] Department of Conservation and Land Management [CALM]. The discussion paper was in turn adapted from the paper "Protecting Caves From People" presented to the ASF TasTrog '93 Conference and modified following discussions with various Conference participants and cavers elsewhere in Australia. The main aim of this version is to acquaint readers throughout Australia with the latest developments of In-Cave marking since the TasTrog Conference. I wish to acknowledge the input of fellow Cave Management Advisory Committee (CMAC) members, especially Rauleigh Webb.

WHY?

A cave and its contents is a finite resource, generally quite happy to stay the way it is, subject to modifications by Nature. People, being the inquisitive and sometimes thoughtless creatures they are, can alter environmental patterns or destroy features and faunal regimes (this occurs through sheer weight of numbers although in caves damage can occur from surprisingly low numbers of people) - in a short space of time.

Perusal of literature from the early part of this century suggests that cave visitation, with a few exceptions, was relatively benign during this and earlier periods. With the upsurge of recreational caving since the late 1950's, damage in some caves has accelerated at an alarming rate. Long cherished features have disappeared while others became degraded and troglobitic regimes were placed under severe stress or threatened with extinction.

Although visitor safety is a consideration, caves also need protection (from the visitor). However it is no longer relevant to just "protect a cave". It has often become necessary to state what is being protected, examples being;

protection of fauna,
decoration,
special feature eg mud pavement,
sediments, soil cones, bone deposits,

OR maintain a cave or section of cave as near as possible, in its original pristine condition,

OR minimise further damage by restricting damage caused by human passage to one clearly defined area.

This paper therefore advocates the use of In-Cave Marking (in various forms) in conjunction with educational signs, practised with Minimal Impact Caving (MIC) in mind and the awareness that what maybe considered initially insignificant may subsequently be found to be of the utmost importance.

AN ABRIDGED HISTORY OF IN-CAVE MARKING

In-cave marking in the first instance was employed purely as a means to find one's way into or out of a cave with little thought to protecting the cave. Early in-cave marking usually consisted of string, piles of rock or candle/carbide soot on cave walls. Such methods led to confusion as these marks could normally only be understood by the people who made them and this led to a proliferation (of marks) as different parties made their own marks, leading to further confusion culminating with in-cave marking being associated with spoiling caves rather than protecting visitors.

During the late 1960's attempts were made to protect some sections of caves, usually areas of high decorative value, the most notable being the Chevelier Extn. in part of the Jenolan System (NSW) where I believe, flagging tape, artificial carpet, carpet protector and other methods were trialed. Route marking, mainly in the form of survey tape was employed in Tasmania's Kubla Khan Cave during the early 1970's to mark a path through a muddy section of the cave in order to keep visitors to one path and protect adjacent areas from despoliation - it did not work very well due to the difficulty in seeing the tape in the prevailing low light condition.

Track marking seemed to be all but forgotten during the late 1970's to early 1980's and was not resurrected to any great extent until the Northern Caverneers started to restore and track mark parts of Kubla Khan Cave in 1985 (Woolhouse 1985, 1988). This restoration work resulted in the first major appearance of SRGWA's reflective discs manufactured from recycled road signs and led SRG to acquire many more damaged signs from the WA Main Roads Authority and planning to produce discs

for 'sale' to all clubs in Australia while attempting to create a standardised approach. (Poulter 1987). Other control methods being trialed in Australia include that of "stringlines" by Houshold and Bell.

TYPES OF IN-CAVE MARKING

Track marking is a term that has been universally applied to many different forms of in-cave marking including:-

ROUTE MARKING

This is a desired trail employed by managing authorities and exploration parties to protect areas of caves and visitors.

It can also denote easier routes that are less obvious to future visitors.

Initial markers can be quite primitive in appearance eg rock cairns as laid down by exploration parties, until more sophisticated and visible materials are available

TRACK MARKING

Track marking in its present context, defines not only the alignment of a given route, but more importantly - the width. While in some cases a track may be defined by some form of side markers, in other situations it may be defined by way of a laid or elevated 'floor'.

BARRICADES

Barricades are more substantial control measures designed to denote NO GO areas and/or direction change while at the same time protecting features, including isolated features such as skeletons, and defining protection zones such as entire chambers or extensions.

WHEN TO ROUTE MARK

Route marking commonly follows a survey line initially put down by exploration teams but can be modified by subsequent visitors or management decisions. A marked route simplifies complex passages or rockpiles while at the same time minimises visitor impact on those areas.

Route marking can also be used to minimise visitor impact in regions known to be hazardous or inhabited by fauna, or areas containing delicate decoration.

Route marking simplifies visitation as well as potentially taking the least fragile route through a cave.

WHEN TO TRACK MARK

The reasons for track marking are similar to that of route marking except that not only is the position of the trail defined but also the width (fig. 1). The track width may be as little as a single foot to that approaching a metre or more.

Humans are social animals and it has been noted that where (cave) passage width confines exploration to single file transit - that is what occurs. Where passage width is less confined and unless track marking takes place at an early stage or all visitors are aware of their destructive potential and behave accordingly - people walk side-by-side, eventually disturbing the entire floor space. (Meth 1993) Therefore, where passage width is wide, track marking may be considered desirable merely to maintain some of the floor texture in its original condition.

In some instances it may be considered necessary to completely remove visitors from contacting the floor eg sheet plastic pathways across flowstone, elevated walkways across sand, mud, fauna regions. This action may be necessary not only to protect the immediate area but also to avoid carrying contaminants (on clothing, boots, equipment) to other, more fragile sections of cave.

WHEN TO BARRICADE

Whereas route and track marking is generally as unobtrusive as possible, barricades are usually intended to be more intrusive in an effort to protect sensitive sites, areas, passages and fauna from human impact.

Barricades on the one hand can be a simple "low key" fence or stringline, rock containment wall or sign. At the other extreme, they can also be in the form of a gate.

Fig. 1

"Poster hanger" markers developed by CEGSA for use on Nullarbor Plain.

WHEN TO USE

With the steady introduction of the concept of Minimal Impact Caving (MIC) into national speleological fraternities and the huge increase in recreational caving by commercial operators, corporations, casual groups and individuals, all forms of cave protection need to be instituted NOW.

HOW TO USE

There are no hard-and-fast rules as to what is to be done in a cave to protect it from (ill-informed) human interference or damage. What is done should be guided by common sense in addition to the desire to protect a cave environment as much as possible without destroying the "solitude or wilderness" effect. This "balancing act" may be difficult to achieve!

MATERIALS

In all instances, materials used in a cave should be non-deteriorating (or near as possible to that state), neat and (less so in the case of barricades or signs), as non-intrusive as possible. What material/s are deemed appropriate, neat and maintenance free for track, route marking or barricades in one cave or section of cave may be considered totally inappropriate in another cave or section of cave, depending on what is being protected.

'Non-deteriorating'

plastics ---- posts - chain - tape - sheet - carpet protector 'price tags' - reflectors - pipe - fishing line.
boulderous ---- rocks - cement
adhesives ----- Silastic (dry adhesion) - Monier M34 (wet adhesion)
steel --------- stainless steel

'Deteriorating'

metals -------- steel - (aluminium - reflective discs)
fibres -------- wood - paper

Why use plastic?

Plastic is one of the few materials that is basically unaffected by the cave's environment, an environment that is very aggressive to the two most commonly used materials, wood and steel. Conversely, plastic materials appear to have no effect on a cave's environment. PVC posts and chain, or track marking posts, may look 'out of place' in that they stand out like the proverbial "sore thumb" in relation to their surroundings but then again that is why they would be in that particular place, to designate where to go or stop. If a barrier or guide post looks neat and is functional then it stands a better chance of getting the message across and being adhered to. Despite the fact that PVC posts and chain is a relative expensive proposition, as it is a method that would be resistant to vandalism and decay, is lightweight and able to be fabricated in a workshop prior to installation trips or on-site, it presents a cost effective alternative to more traditional materials.

As will be discussed below, as the use of PVC pipes and fittings become accepted by visitors in caves, so the pipe size could be reduced to smaller diameters and thinner wall sections making them more attractive and less expensive to conservation groups and land managers.

CURRENT PRACTICE IN WA

Although plastic 'price tags' have been used as track marking in 'locked' caves for many years it was only at the beginning of the 1990's that plastic (barricade) materials came to be used in 'open' caves on a trial basis, in an effort to control the undesirable activities of ill-informed cave visitors perceived to be mainly members of the general public. "Price tag" track marking (as discussed below) in 'open' caves is now being considered.

REFLECTIVE MARKERS

Reflective markers have been used in caves on a spasmodic, ad-hoc basis ever since reflective materials were developed. The widespread use of reflective material has probably been restricted through not enough suitable material being readily available at the "right price" - preferably free! Reflective tape material attached to thin brass foil nailed to rocks served as survey stations in Mullamullang Cave (6N37) in the mid 1960's. Possibly due to the combined effect of electrolysis and salt action, by the late 1980's, most of these stations had decayed away. Aluminium backed reflective material employed as track markers in Weelawadji Cave (6E24) during the 1970's were by 1993, severely corroded, most likely under the acidic action of massive guano cones found throughout the cave.

In both cases mentioned above, if the material backing the reflective layer could be divorced from the damaging agent/s, the reflective material could fulfil its function for a considerable (if not indefinite) period before requiring replacement.

Round, aluminium backed reflective markers, as made by SRGWA, have been used in caves for many years with notable success, mainly in Tasmania and Western Australia. SRG now glues the discs to PVC "trackTags" (see below). They have also been mechanically held in angular plastic (poster hangers) strips (fig. 1) developed by the Cave Exploration Group South Australia (CEGSA) for use on the Nullarbor Plain

Plastic "road type" reflectors have been used in recent times in some caves but due to their relatively larger diameter (85mm), scarcity? and cost, have not proved popular although in parallel with smaller plastic reflectors commonly purchased from bicycle shops would have their own specific uses.

Colour coding

Reflective road signs come in 5 colours, red-yellow-white, the main colours, and the lesser colours of blue and green. Different technologies of manufacture and (surface use) environmental factors combine in relation to "STOP" and "KEEP LEFT" signs to cause some difficulties with product of their origin in cave situations.

SRGWA have developed a colour code for In-Cave Marking that has been adopted for use in caves managed by CALM. This code is: yellow leading into a cave and white leading out. As yellow and white appear similar under low-light conditions, a 4mm hole is punched in the centre of the yellow disc - appearing as 'black' when encountered. Red markers denote danger, caution or 'no-go' regions while blue indicates survey stations.

It is known that CEGSA recently used a similar system in Old Homestead Cave (6N83) with red leading into the cave and white denoting the way out.

A standardised colour coding system (in conjunction with explanatory signs) is desirable throughout Australia.

TRACK MARKING

It is not necessary that all in-cave markers be reflective so long as they are frequent and of sufficient contrast to be readily visible (and understood) in low light conditions. The one main advantage of reflective material is that even a small amount will reflect and therefore be visible (over a long distance) in relation to its surroundings under very low light conditions in stark contrast to non-reflective material which may require large amounts of light at close range in order to be discernable from its surroundings. As in-cave markers are likely to be used in large numbers (some 8000 have been used to date, mainly in Tasmania and WA) they and any mounting medium used, need to be as inexpensive and inert as possible.

POSTS

Where a preferred trail may be difficult to discern or partially obscured, such as soil, soil cones or rockpiles, markers may need to be mounted on posts, preferably PVC. These posts can be anchored by cement, cross pins or left un-anchored and depend entirely on the goodwill of visitors not to tamper with them. Posts can range from heavy duty 50mm stormpipe (fig. 2) to medium Class 18 - 25mm

Fig. 2

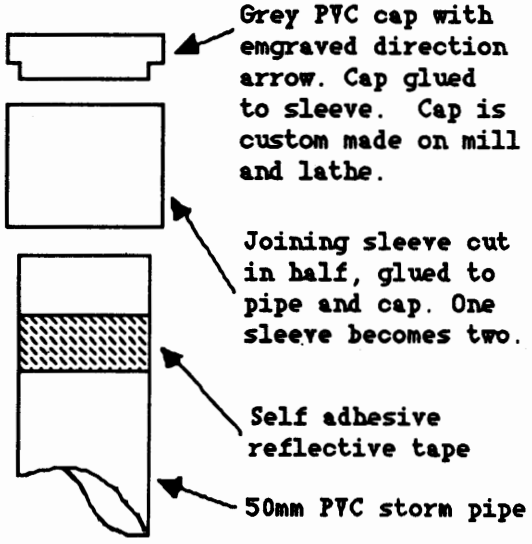
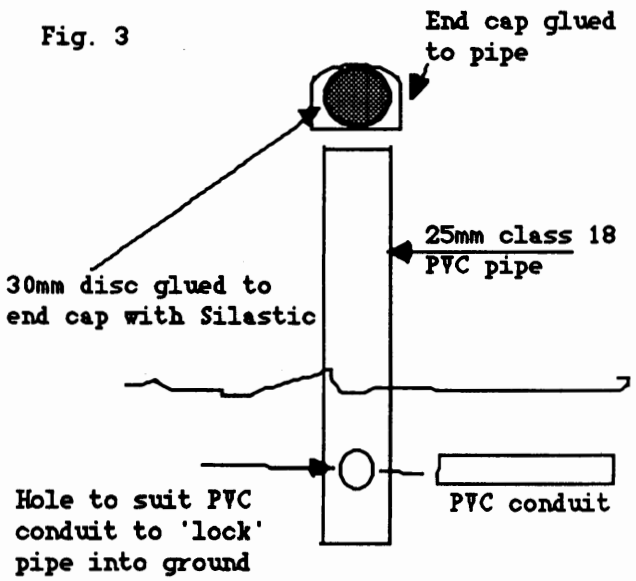


Fig. 3



irrigation pipe (fig. 3) to electrical conduit (fig. 4). Reflective material is provided either by self-adhesive tape around the periphery or curved markers glued on endcaps.

PRICE TAGS

Various types of white plastic price tags have been used as track markers over the years but not in large numbers probably due to the difficulty in obtaining sufficient quantities at a "reasonable price". There are two basic tag shapes available, the "T" and "Garden Pot" (fig. 5). Unfortunately, the plastic from which most price tags are made is usually quite brittle. The "T" shape is preferred due to its

Fig. 4

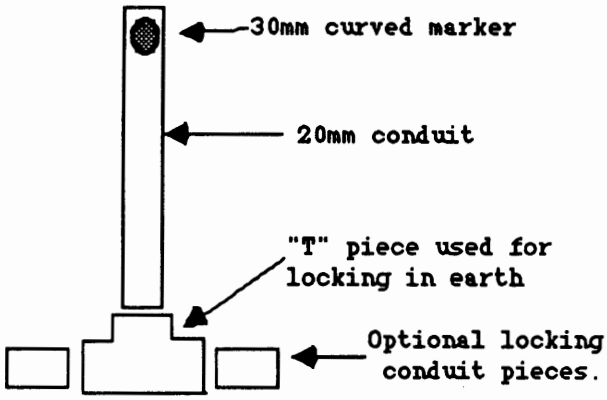
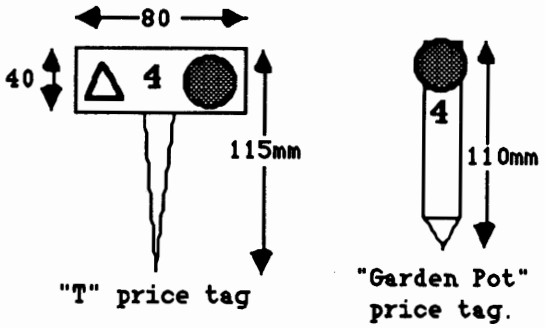
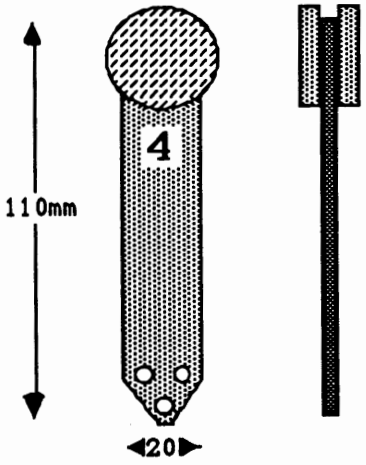


Fig. 5



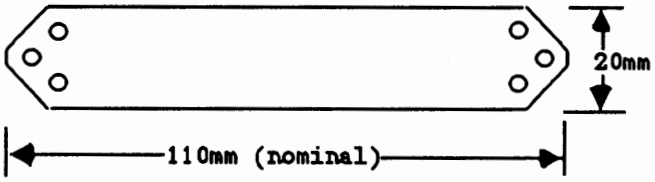
Commercial 'price tags' are usually thin, brittle and expensive.

Fig. 6



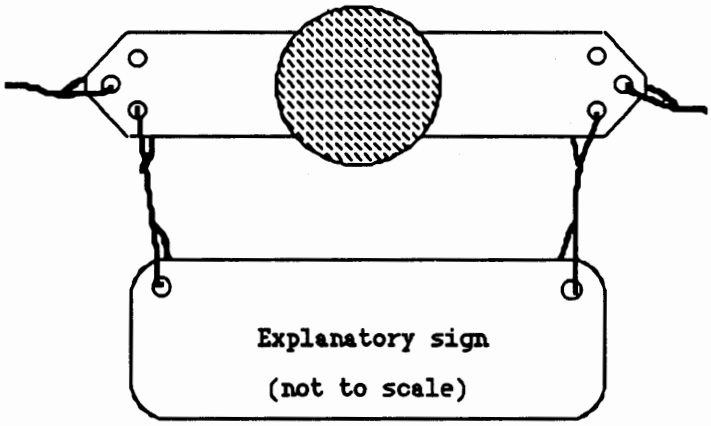
Grey PVC-SRGWA track marker

Fig. 7



SRGWA TrackTag

Fig. 7b



TrackTag used as stringline barricade

Fig.7a

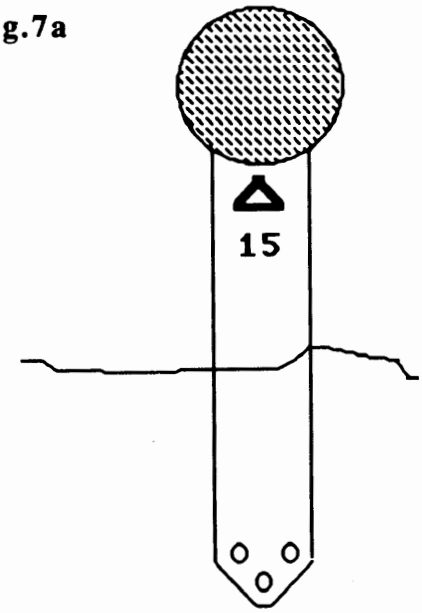
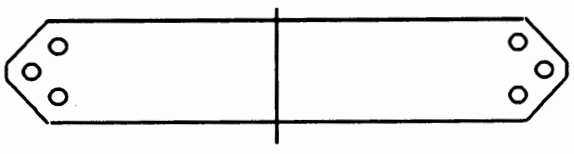
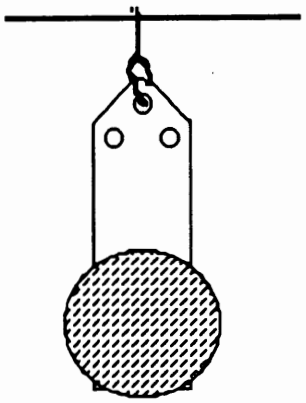


Fig. 7c



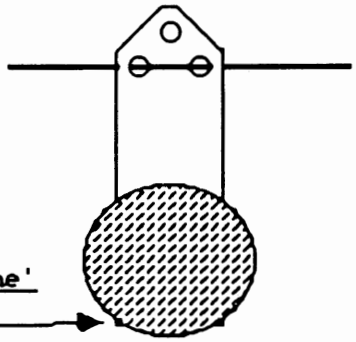
TrackTag to be cut in half for stringline use

Fig. 7d



Half TrackTag used on freebanging stringline

Fig. 7e



Half TrackTag used on 'in-line' stringline.

ability to easily carry survey information. However, recent investigations with a shopfitting supplier revealed that the smallest "T" tags sold in Perth for $1.20 each! From an aesthetic point of view, "garden pot" tags with reflective markers are less obtrusive. A less expensive and more durable alternative is self-manufacture from flexible PVC sheet. With the aid of grant money received in 1993 I purchased 2400 x 1200 x 1.5mm grey PVC sheets which yielded some 1300 - 110 x 20mm strips/sheet valued at 4¢ each. More recent grant money funded a die converting these strips into "TrackTags" (fig. 6).

Used in conjunction with reflective discs, TrackTags are quite versatile (fig. 7-7e). TrackTags markers can be wedged into cracks, between rocks or pushed into soils. A small area would be available under the reflective disc to carry survey information. When cut in half they can be used with the various hole configurations on stringlines (fig. 7c-e). When a red disc is glued to the centre of a TrackTag it can form a simple stringline barricade (fig 7b).

ENDCAPS

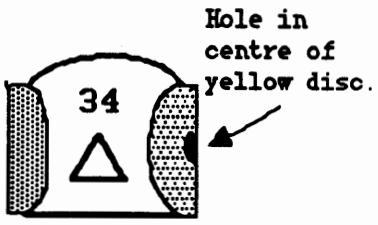
The use of PVC endcaps as stand-alone in-cave markers is very recent, the first use being in Mullamullang (Dec. 1992) and Thampanna Caves 6N206 (Jan. 1993). The 25mm endcaps utilise curved 30mm diameter markers (fig. 8) attached with silicon glue. The main advantage of endcap use is that they are free standing, can carry survey information and are multi-directional with the use of two or more reflectors or self-adhesive reflective tape. Their cost however, can be prohibitive, although a more economical alternative would be to use PVC 'pipe rings' ie short lengths of pipe.

STRINGLINES

Stringlines are relative newcomers to the cave protection armoury. As of early 1993, this author had seen two methods in operation, Exit Cave (7IB14) and Moondyne [adventure] Cave (6Au11).

Parts of the adventure section of Exit Cave had unobtrusive low-level lines using what appeared to be 2mm green (sash-cord) line strung between zinc-plated steel tent pegs. The stringlines were not accompanied by educational signage, hence the tourist operator was presumed to be responsible for visitor interpretation and compliance. Being about 100mm above ground level and of low contrast, the lines were difficult to see except where the visitor was in a crawling position, but even then, lines had been damaged - or is it that visitors to these sections were uncaring? Where stringlines had been trodden on with muddied boots, the lines blended into the surrounding terrain making them even more

Fig. 8



"Endcap" marker developed by SRGWA Survey Stn. 34

difficult to see. Some pegs had been pulled out. To avoid rust stains, these pegs will eventually need replacing by pegs made from stainless steel or reinforced plastic.

The stringline barricades of Moondyne Cave utilise heavy gauge nylon fishing line interspersed with self-adhesive reflective tape. Some lines were tightly strung approximately 300mm above ground level whilst others were waist high and above. The reflective material was randomly wrapped over the line in the approximate shape of a square. Like Exit, the only lighting is from the miners lights carried by visitors and guide. In contrast to the Exit stringlines, the Moondyne's stringlines, because of the reflective tape, were easy to see. Although the cave had only been open to the general public for a few months, the guides reported total compliance and favourable comments about the barricades. The main differences between the two caves is that Exit is long, wet and muddy while Moondyne is relatively short and dry. Both caves have crawls.

Another stringline used in a locked [non-public] Western Australian cave, apparently over a section of flowstone, has fishing lines suspended from the ceiling with reflective material hanging vertically downwards on short section of line.

Where unobtrusive, low-level stringlines are to be used without the presence of cave management personnel during 'tours', interpretive signs with area maps erected at the entry points should be considered essential.

SRG recently constructed a couple of medium-level stringlines using high contrast (bright green) Platypus Pretest fishing line (0.77mm 24kg $40/500m) utilising the newly developed TrackTag system in an unrestricted publicly accessible cave, Calgardup, and will monitor results.

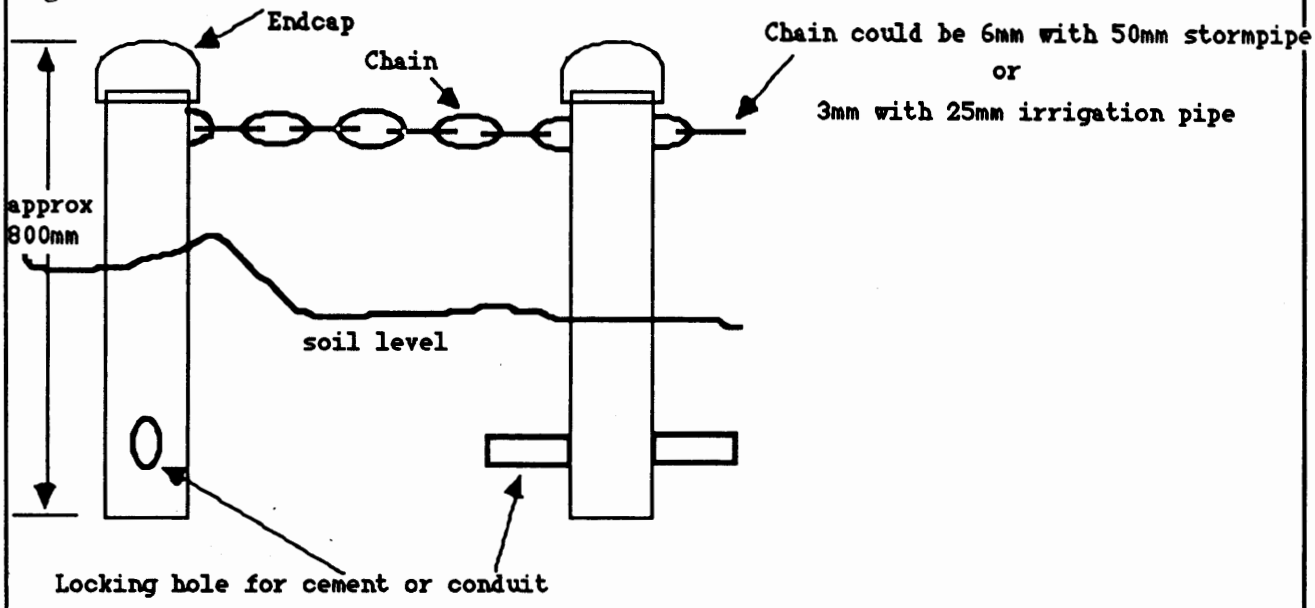
BARRICADES

As mentioned earlier, a barricade can be in the form of a simple fence, rock containment wall, stringline, sign or gate. The wall and gate are not being discussed here.

Post and Chain

Extensive use of PVC post and chain barricades is being trialed in three Western Australian caves available to the public under the Leeuwin-Naturaliste Cave Permit System, (Calgardup 6Wi49, Bride 6Wi24, Mill 6Wi59) to protect soil cones (from erosion), fauna and habitat, bone deposits and decoration and improve visitor safety. Anecdotal evidence suggests a high compliance with this method in uncontrolled caves although in the case of soil cones more obvious barricades are necessary to deter the more adventurous visitors.
The barricades used in the caves are 50mm stormpipe (5mm wall thickness) and 6mm plastic chain, the Calgardup posts set in cement while the Bride and Mill posts are anchored in soil and soil/rock matrix with the aid of PVC conduit crosspieces. (fig. 9)

Fig. 9



50mm stormpipe & 6mm plastic chain barricade

Choosing to use 50mm pipe was deliberate as its dimensions help to deter vandalism and reduce wear and tear from the rigours of high volume visitation. Fortunately, vandalism has not occurred and the barriers appear to have gained broad visitor support and more importantly, compliance.

Since compliance appears to be wide, it is now worth considering trialing the use of smaller and lighter gauge pipe (25mm Class 18 irrigation) and chain (3mm) which is less expensive. A medium-term goal will be the gradual replacement of post and chain barricade (depending on compliance) with stringline barricades in uncontrolled caves.

Sign barricades

Signs have been used as barricades in Victoria and Western Australia. In some sensitive Victorian caves, once a passage has been explored and mapped by members of the Victorian Speleological Association, if it is deemed undesirable to allow further entry by the VSA management committee (in the absence of land owner expertise or presence), a sign is placed across the passage informing visitors what is beyond and the reason for closure. SRGWA barricaded an entire passage system of Nurina Cave (6N46) in 1988 with a single "No Entry Please" sign to protect the ecosystem beyond. To date the sign has been found only once (by a Canadian caver in 1992) and complied with.

SIGNS

Signs play an important role in everyday life - in that they give out information where it is impractical for someone to repeatedly do so verbally. A sign is on the job all day, every day. There are numerous occasions where signs can play an important role in protecting caves, sections of caves, their faunal inhabitants or other natural features. In the past, signs have been written on whatever material was available and, left unprotected, have rapidly deteriorated although such signs do serve an important first step. However, those signs should be replaced by more permanent and better presented signs at the earliest opportunity.

Professional signs are expensive, take time to produce and more expense is incurred if the sign needs to be replaced or altered due to changed circumstances, vandalism or theft. Depending on the material/s used they can also be susceptible to a cave's harsh environment.

SRGWA has produced several inexpensive signs over the last few years (either typed or computer generated) drawn on ordinary A4 paper and then laminated. On completion of a 'master', copies made from it are trimmed prior to lamination to increase the laminated border area enhancing its resistance to a cave's humidity. After lamination, the sign is usually glued to a stiff backing board (PVC or Laminex) or used 'as is', depending on the circumstances. The completed signs can then be affixed to posts or rock walls using nylon sash cord.

Sign texts need to be brief yet informative and use (stylistic) maps when considered applicable. Signs should also carry the name and identifiable logos of the instigating and authorizing (management) body.

Laminated signs are quickly and inexpensively produced and just as quick to update or replace if damaged or stolen. A 'master' is kept in order to produce copies should they be required. If coloured signs are required, the new colour photocopiers produce excellent results.

Laminated signs appear impervious to humidity and, with suitable backing boards can be hung, nailed, placed or glued into a suitable position.

The oldest SRGWA laminated sign is a multi-coloured one placed in Calgardup Cave during mid-1990. Despite some attempts to remove it from its backing board in recent times, it is still in A1 condition. The reprinted history of Mullamullang's Dome visitation, transcribed by WASG and laminated by SRG, was repositioned outside the Dome in July 1991 while the (laminated) history relating to Mullamullang's 1 Mile Cairn was put in place during December 1992.

Multi-colour A4 photocopies cost $3.50 per sheet and laminating $1.50 at the University of WA's Media Services Unit making a coloured sign cost of $5/unit. Single colour A4 photocopies laminated signs cost $1.60/unit. Many poster shops, education units and businesses throughout Australia possess laminating facilities.

DISCUSSION

This then, is the state of play in Australia, with particular emphasis on Western Australia. We have caves, particularly in the Leeuwin-Naturaliste Ridge, south of Perth, where PVC posts with reflective route markers, PVC posts and chain, signs and track markers on price tags have popped up, seemingly overnight

sometimes. Is it all necessary? Are we merely trying to lead Australia out of the recession we had to have with a PVC and recycled aluminium led recovery or, as some may argue, engaging in visual pollution? Is a bit of "neatly placed" visual pollution better than a "wrecked" cave? In my view, after other alternative solutions have been exhausted, yes, although I would hasten to add that what is deemed appropriate, neat and maintenance free for track, route marking or barricades in one cave may be considered totally inappropriate in another depending on what is to be protected.

In relation to colour coding, should a standard be set? SRGWA has been laying out markers in three major caves with yellow leading the way into the cave while white indicted the way out. Should this practice be encouraged amongst other clubs? Red is a good colour to denote "No Go" or "Caution" areas while blue could be used for direction change or survey stations. Whatever system is established in a cave - it should not go in un-heralded, an appropriate sign should be placed near the entrance. This colour coding practice has been endorsed by CALM's Leeuwin-Naturaliste Cave Management Advisory Committee and has been accepted in other CALM controlled areas throughout the state.

In Western Australia, and no doubt elsewhere, speleologists are very much in the minority. Collectively, there are about 250 members of ASF affiliated speleological societies in Western Australia, ranged against casual cavers numbered in the tens of thousands of cave visits per year. Some of our very friable caves are suffering incredible damage. That damage is not confined to the Leeuwin-Naturaliste Ridge. The caves of the Nullarbor Plain are also suffering, Mullamullang in particular. Should we casually pass all that off as "normal wear and tear" as it has by some in the past? In-cave marking is but a small step in the on-going caver education, cave protection process.

Acknowledgements

Reflective 30 and 50mm discs were produced on a hand operated fly-press until late 1993, a blistering labour of love? My track marking project enjoyed the support of the Leeuwin-Naturaliste Cave Management Advisory Committee shortly after its inception. During 1992, Committee Chairman Neil Taylor (CALM), pointed me in the direction of agencies likely to issue grant monies. As a result I have been the recipient of several grants allowing the purchase of a power press and construction of dies to 'mass produce' reflective discs and PVC TrackTags.

I therefore gratefully acknowledege the following;

1. The Lawrence Labour Government (Minister Jim McGinty) "Social Advantage Initiave" - (1992-3) - $500
2. Minister for Environment, Kevin Minson and Chris Haynes, Director, National Parks & Nature Conservation Authority (1993) - $600
3. CALM - (1993-4) - $700
4. South-West Development Authority (1993-4) - $900
5. Minister for Transport, Eric Charlton for formal donation of damaged road signs 1994 onwards.

Bibliography

Bell P. 1993 Pers. comm. Augusta-Margaret River Tourist Bureau

Houshold I. 1993 Pers. comm. Tasmania - Department of Parks, Wildlife and Heritage.

Meth Max 1993 Pers. comm. Cave Exploration Group South Australia.

Poulter N. 1979 Restoration, Stabilisation & Gating of the Christmas Star Extension of Crystal Cave (Wi62) Witchcliffe WA. WACCON Proceeding of the 12th. ASF Conference, Perth; 10-14.

Poulter N. 1987 Trail Marking and Area Designation - A Standard Approach? Helictite 25 (2): 51 - 53

Poulter N. 1990 Boranup, Trip Report - restoration in Calgardup Cave. Caver's Chronicle Vol. 17 #2: 8-9

Poulter N. 1990 Crystal Cave, trip report - restoration work Caver's Chronicle Vol 17 #3: 4

Poulter N. 1991 Cave Rights for Troglobites. Cave Leeuwin. Preceedings of the 18th. ASF Conference, WA; 15-18,

Poulter N. 1991 Crystal Cave, trip report - restoration work Caver's Chronicle Vol.18 #3: 8-9

Poulter N. 1992 Track Marking in Caves. - Unpublished discussion paper to CALM's Leeuwin Naturaliste Ridge Cave Management Advisory Committee.

Poulter N. 1993 Protecting Caves From People Recent Advances in Reflective Track Markers, Barricades and Signs with a passing comment about cave number tags. TasTrog 1993 Conference Papers: 80-89

Poulter-Webb 1993 Track Marking In Caves (V4) - Unpublished discussion paper to CALM's Leeuwin-Naturaliste Ridge Cave Management Advisory Committee.

Watson Dr. J. 1994 Pers. comm. Regional Director, South Coast. Dept. of Conservation and Land Management

Woolhouse R.1985 Kubla Khan Australian Caver #108: 6-7

Woolhouse R.1985 Open Letter to Kubla Helpers. Australian Caver #108: 8

Woolhouse R.1988 Further Discussion on Track Marking Australian Caver #116: 6-8

SALES PITCH

My other papers pertaining to track marking have been accompanied with a 'soft-sell' commercial as to supply of materials, this article is no exception.

REFLECTIVE - white, yellow, red or blue

30mm	- flat	1¢ each or $1/100	NOTE THE PRICE REDUCTIONS!
	- 20mm dia. curve	2¢ each or $2/100	
	- 25mm dia. curve	2¢ each or $2/100	
50mm	- flat ...	3¢ each or $3/100	

CAVE NUMBER TAGS

30mm plain aluminium disc	1¢ each or $1/100
50mm - flat, reflective yellow	3¢ each or $3/100

TRACKTAGS

110 x 20 x 1.5mm grey PVC, pointed/holey ends	4¢ each or $4/100

Cheques are to be made payable to SRGWA - prices quoted do not include postage which is usually done by way of Australia Post COD.

Note: Limited stocks of:
Track Markers [yellow - white - red],
PVC TrackTags
Cave Number discs
will be on sale at Vulcon.

The Art of Successful Protesting

(3.) Know when it is time to give in.

Caving On The Internet Part Two

Chris Bradley

In my last article, I briefly outlined what the Internet was and described how to access relevant caving or bat discussion groups. That article was written in January 1994 and became out of date almost as soon as it was written. Since then the Cavers Digest has moved (as those who contacted me know) and a new Australian mailing list was founded.

The Cavers Mailing List (Cavers Digest) was previously maintained by John Sutter at Boston University. In March of 1994, Robert Hubley and Jim Olsen took over the Digest. The Cavers Digest is fully automated using LISTSERV and the archives are integrated into the WWW (World Wide Web) Speleology Information Server. The new addresses are:

To join, send a mail message to:
listproc@speleology.cs.yale.edu
with the following in the body of the message:
subscribe cavers-digest <your name>
eg: subscribe cavers-digest Chris Bradley

You will be sent an introduction to the Cavers Digest which explains how to submit articles, how to access archives and how to access the Speleology Information Server (SIS) on the WWW. You will also be asked to send a self introduction which will be included in the Cavers Digest. Send an introduction letter to:
cavers@speleology.cs.yale.edu

You should include information on your caving experience and interests.

Once you join the Cavers Mailing list, you will be sent a Cavers Digest on a daily basis. The Digest comprises all the mail sent to the forum.

The SIS can be accessed on the WWW via the "home" page at:
http://speleology.cs.yale.edu

Oz Cavers is a new all Australian mailing list and was started by Rauleigh Webb in February 1994. This has been very successful, but we need more members so, after you read this, join up.

To join, send a mail message to:
majordomo@osi.curtin.edu.au
with the following in the message:
subscribe ozcavers

BATLINE (Bat Research Information Exchange Network) is an unmoderated list using LISTSERV. This LISTSERV is located at the University of New Mexico.

To join, send mail to:
listserv@unmvma.unm.edu
with the following in the body of the message:
subscribe batline <your name>

To send submissions mail to:
batline@unmvma.unm.edu

I can be contacted on the internet, clb555@anu.edu.au, or via CompuServe [100237,2753].

SPELEO SYNOPSIS No 19

February - September 1994

Peter Ackroyd

AUSTRALIA

Southern Caver 57 (May 1994)
Southern Caving Society has been doing some good work over the last couple of years in Tasmania. In the Junee-Florentine area, JF-341 is set to be connected to *Rift Cave* [JF-34] with a horizontal separation of only 10 metres and a proven dye trace connection. At Ida Bay, the *Exit Cave System* [IB-8] has a new entrance, *Halfway Hole* [IB-136], discovered and surveyed by SCS. The 160 metre deep shaft series drops into the Western Passage in *Exit*. Also, Jeff Butt has produced a 3D line map to illustrate the spatial relationship between caves in the *Halfway Hole* area - a first for a caving magazine?

NEW ZEALAND

NZ Speleo Bulletin 9(167) (Sep 1993)
This issue contains more on the exploration history of *Exhaleair* in the Ellis Basin (South Island). It includes maps of the stream passages and photos of some remarkably shaped speleothems. Other articles cover sump siphoning at *Blue Creek Cave* (Wangapeka Valley) and an eight day search for caves in the rugged Culliford Hill karst, both in the Mount Owen area (South Island).

EUROPE

Caves & Caving 62 (Winter 1993)
Reports of minor extensions and small scale expeditions fill this issue. *Ibeth Peril Cave* (north England) has become a single system with a connection between *Ibeth Peril I & II*; a new route into *Gaping Gill* called *Foxholes* has been discovered, and gated; the results of two British expeditions to re-survey and extend the caves of Cuetzalen, Mexico, are summarised and a 1992 lightweight expedition to northern Turkey reportedly found some promising caves. This issue also contains a summary of the 1993 BCRA conference, held at Bristol, and a detailed article on how to modify a battery powered drill to make it suitable for drilling blast holes in caves.

Descent 116 (Feb/Mar 1994)
An eclectic mix in this issue commences with a look at *Smoo Cave* - the most northerly show cave in the British Isles. This is followed by an update on the 600 metres of new discoveries in *Carno Adit* in South Wales. Len Cook takes us up memory lane with his retelling of the first trip to the very end of Ireland's *Pollaraftara* in 1952. 'A week in *Mammoth Cave*' is juxtaposed with a report on an expedition to a derelict goldmine in Kyrgyzstan, in the former USSR.

Descent 117 (Apr/May 1994)
Caving news of a mainly domestic nature takes up the bulk of this issue, although the continuing reminiscences of 1950s caver, Len Cook, and a short report on cave diving in Japan are included.

Slovens" Kras 31 (1993)
This is the official journal of the Slovakian Speleological Association. There is a 1:500,000 scale karst geomorphology map covering the whole of Slovakia (eastern part of Czechoslovakia) in this issue, showing the locations of all known karst features.

Caves & Caving 63 (Spring 1994)
Expedition reports from Siberia, USA, Sweden, Austria, Northern Spain and Jamaica take up most of this issue. A cheap, home-made waterproof video camera housing is described by its inventor in the equipment column.

International Caver 8 (Dec 1993)
As usual, a well presented issue covering caving in the Philippines, the Ural Mountains (Russia), Cuba and Madagascar. There are two special items, one covering the new 1,355 metre deep cave found recently in Croatia, and a detailed description and photo portfolio of *Dan yr Ogof* in South Wales (UK). At the back is the regular update on what is happening in other parts of the world, including the longest and deepest list.

Descent 118 (Jun/Jul 1994)
An ice filled gypsum cave in the north-east corner of Russia makes for a spectacular lead article in this issue. We also learn of some deep lava caves in Hawaii, one of which is claimed to have a single pitch length of 263m. There are more reminiscences from Len Cook, a British caver active in the 1950s, and obituaries for cave divers Sheck Exley and Ian Rolland who drowned in separate incidents in April 1994.

International Caver 9 (March 1994)
A 1992 British expedition to North Vietnam,

an Italian expedition to northern Albania, a combined British/Mexican trip to survey *Sistema Cuetzalan* (25km) in Mexico, an expedition to Kanchaniburi Province in Thailand and a South African group's exploration of caves in Zimbabwe make this a truly international magazine.

Cave Science 20(2) (November 1993)
This issue discusses the Forest of Dean (UK) karst from the point of view of the inception horizon theory of speleogenesis. Other articles include the taphonomy of mollusc fossils in caves as a paleo-environmental indicator, syngenetic karst in South Africa, the effects of human impact on karst in Tasmania (Aust) and the caves of Tibet and Dashan (China).

Descent 119 (Aug/Sep 1994)
History is the theme in this issue it would appear. Jim Eyre's delightful recollections of caving in the Fountains Fell in the 1950s is followed by a report of smugglers' caves in Devon calcareous conglomerate and three obituaries which include quite a bit of historical information. There is also an article on a 1993 expedition to north-west Thailand during which the 2km long *Tham Seua* was explored and surveyed.

Caves & Caving 64 (Summer 1994)
This issue contains reports of an Anglo-Russian expedition to the Fisht Mountain (Northern Caucasus) in July 1993, a 3 month long British expedition to the Philippines in 1992, another expedition to Norway in 1993 and a lightweight trip to some caves in Nepal. There is also a report on canyoning in Majorca and an explanation of how to use tone separations to create special effects with cave photos.

International Caver 10 (1994)
This issue deals with caves in far flung places like the Yucatan Peninsula (Mexico), south-western Thailand and the icy gypsum caves of north-western Russia. There is also an account of a 10 day underground camp, pushing leads in the 32km long *Cueva del Tecolote* in Mexico, and a description of caves in Nepal.

USA

NSS News 51(12) (Dec 1993)
The lead article in this varied issue is a summary of the exploration and mapping of the *Fisher Ridge Cave System* in Kentucky. This is a 105km long cave with plenty of potential yet. Other articles cover the importance of karst springs in the early days of the settlement of Kentucky and the how (and why) of assessing cave wilderness values.

NSS News 52(2) (Feb 1994)
This is a special conservation issue and covers a wide range of subjects. Several articles concern the use of US laws to protect caves while others have a more international appeal, especially a thoughtful article on why cave classification systems are a poor starting point for the management of caves. On the more technical side there is a brief item on highly repeatable photo-monitoring systems for the recording of damage to caves.

NSS News 52(3) (Mar 1994)
The main items in this issue cover the need for an education program on bats in Mexico due to confusion there over insectivorous and vampire bats, and a summary of a cave rescue practice held in Puerto Rico.

Speleonics 20 (Feb 1994)
This issue is one for the techno freaks. It contains information on converting CB radios to cave radios using a commercially available printed circuit board, the calculation of likely interference effects from the use of RDF equipment, a probe to measure RF magnetic fields and a voltage regulator circuit for driving caplamp globes at a constant voltage. There are some book reviews and a rundown on the technical papers presented at the August 1993 NSS Convention.

NSS News 52(4) (Apr 1994)
The lead item in this issue is a summary of exploration of the exciting, and ever enlarging, caves on Vancouver Island, British Columbia.

NSS Bulletin 55(1&2) (Jun & Dec 1993)
This is a special edition of the Bulletin which covers several expeditions to Costa Rica in central America between the years 1988 and 1991.

NSS News 51(12) Part II - American Caving Accidents, 1992
Seven people died in caves in the US in 1992. Another caver died in an out of control abseil off the 800m high El Capitan cliff in Yosemite National Park and five divers drowned while cave diving.

NSS News 52(5) (May 1994)
This issue is dedicated to the memory of US cave diver Sheck Exley who drowned during a deep dive attempt in April 1994. There is a posthumous article by Sheck on his deep dive in *Bushmansgat* in South Africa in 1993. During that dive a depth of 263 metres was recorded. In the Techniques and Safety column an examination is made of Quebec

cavers' techniques and their approach to caving and caver education.

NSS Bulletin 56(1) (Jun 1994)
The etymology of the word 'moonmilk', Turkish caves in conglomerate, anthodites in West Virginia, the chemical composition of speleothems from New Mexico, two new gypsum speleothems from New Mexico, fungi in West Virginia and a pleistocene snake from a West Virginian cave make up this issue.

Georgia Underground 31(1) (Jul 1994)
This issue from the Dogwood City Grotto contains a personal report of a trip into the famed *Lechuguilla Cave* (New Mexico) and an expedition report from Oaxaca (Mexico). The Techniques column describes how to protect your Suunto compass and clino by dipping them in thermoplastic rubber.

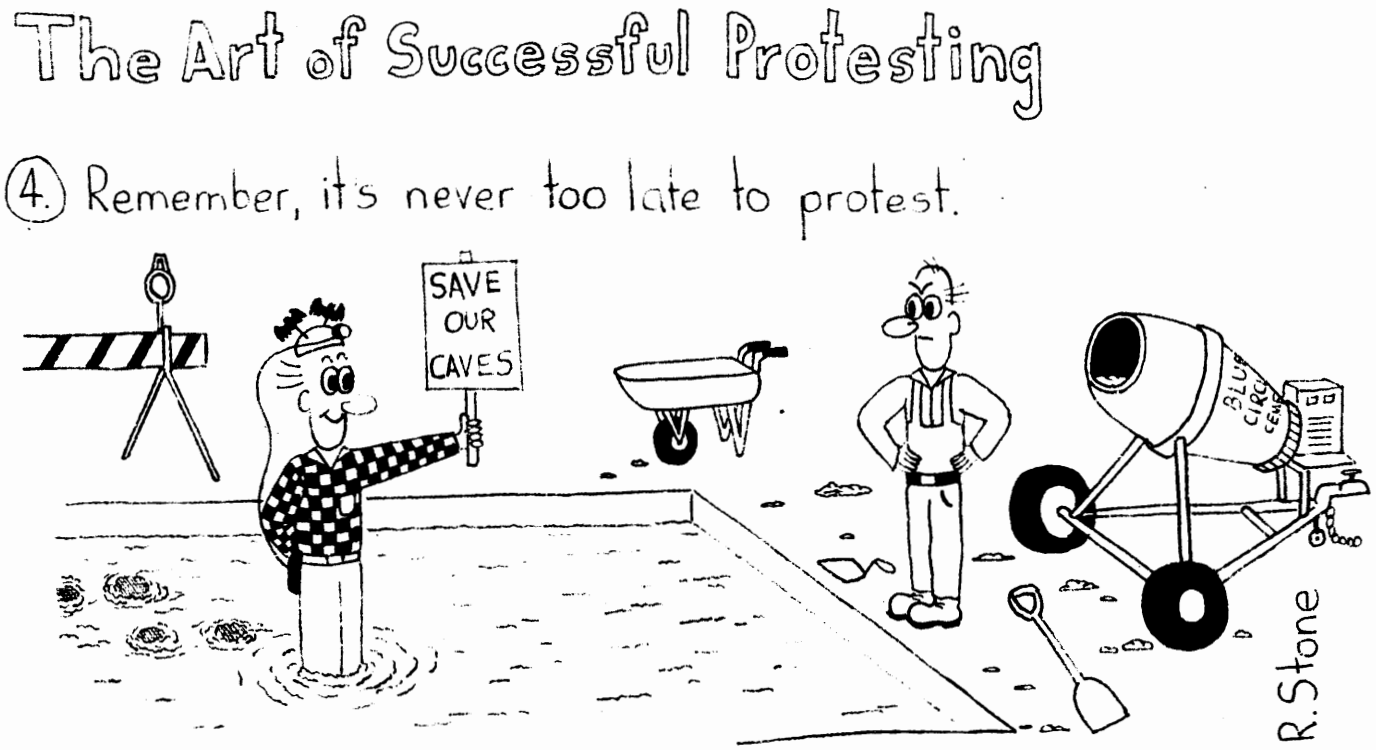
NSS News 52(6) (Jun 1994)
The main article in this issue describes the discovery and exploration of *Painted Rock Cave* in Alabama. This cave, discovered in 1991, is 160 metres deep and contains some nice pitches of around the 40-60 metre mark.

Some 1968 reminiscences by an American team who ran into 'difficulties' with the Jefe de Policia in Mexico make for some salutary reading.

Do We Have Your Correct Mailing Address?

If not then let us know by sending your correct details to:

Steve Brooks
6 Kidbroke Pl
Westfield. 6112
Phone: (09) 495 1661



REVIEWS

The Biogeography of Cape Range, Western Australia, edited by W.F. Humphreys, Perth : Western Australian Museum. Reviewed by Elery Hamilton-Smith.

This volume continues in that rather strange Australian tradition - that the best researched karst areas are likely to be the remote ones ! Bill Humphreys leadership in research has been recognised by speleo-biologists for some time, but in this single volume, he has gathered together an interdisciplinary collection of papers that has no previous equal in Australian cave science - and few in any part of the world.

In terms of a simple listing of chapters, 3 provide a review of the geology, geomorphology and palaeoclimate of the region ; 4 deal primarily with the surface flora and fauna ; 4 with the cavernicolous fauna ; and one with the prehistoric occupation of the region by Aboriginals. Thus, although interest in Cape Range has been generated by and is largely based upon the cave fauna, the research on that fauna has been properly contextualised within a comprehensive understanding of the Range. At the one time, the context furthers our understanding of the fauna, and the fauna furthers our understanding of the context.

The underground community is shown to be entirely complex and diverse, bringing together elements from various ancestral faunas. For instance, there are species which appear to be relicts from tropical rain-forest while others apparently owe their origins to the Tethyan Sea which once separated the continents of Gondwana and Laurasia. So some of the fauna is of remarkably ancient origin. Since the publication of this volume, Humphreys predicted the occurrence of *Remipedia*, and on the first attempt, they were discovered deep within the subterranean waters of the coastal shelf. These are crustaceans of very ancient lineage, previously known only from the Blue Holes of the Bahamas and the Canary Islands.

This is without doubt a very important book. Any caver interested in the application of research to developing a thorough understanding of a cave system would do well to read it. At the same time, it is only a beginning - there is much more still to do before we know all that can be learned at Cape Range.

Earth, Water, Fire and Air

OUR MOTTO SAYS IT ALL: The Earthly limestone and the Water that dissolves them, the Fiery volcanoes and the hot Air at the conference itself.

THE 20th ASF Conference will be held at Monivae College, Hamilton, Western Victoria, commencing Monday, 2nd January and concluding Friday, 6th of January 1995.

Being held in the volcanic heart of Victoria, Vulcon will naturally feature the unique caves of the area, and will be strongly volcanically oriented. There will however be ample time spent on limestone, with limestone caves at Bats Ridge, Codrington, Warrnambool and the Glenelg Area featuring in the program.

Anyone who has a love of caves, karst and caving will find that Vulcon is a "must see" event.

Conference Packages.

There are three conference packages available for Vulcon which cater for those who wish to stay on site with everything provided, those who wish to arrange their own accommodation and meals, and those who do not wish to attend the full conference, but visit on a day-to-day basis. Costing for each of the packages, as well as details of what each provides is included on the registration form itself.

Partners and Children.

A package is available for non-conference going partners and children. This package provides accommodation and meals for those who are partnering a conference delegate but who do not wish to attend the conference activities themselves. A discounted rate is available for children under 6.

Registration.

Registration will take place at Monivae from 10.00am Monday, 2nd January 1995. Total payment is required at the time of booking. Cancellation refunds are subject to the organising committee's discretion.

Childcare.

Child care facilities are available (subject to numbers) for those who wish to "forget about the kids" whilst at the conference. Child care is open to children under 10 years of age at a cost of $5.00 per day including lunch. All personal requirements (e.g., portacots, diapers, favourite toys etc) are to be provided by parents.

Caving Field Trips.

Pre-conference field trips will be held at Mt Eccles National Park. Details will be sent to delegates on receipt of booking forms. Field trips will be held from December 27th until January 1st.

Those travelling from Eastern and North Eastern states may wish to visit the Buchan area. There will be no official trips held there. It is up to individuals to arrange visits to these caving areas.

Post conference field trips will be held at Mt Eccles from January 7th until January 10th. Other areas may be used, details will be included in a mailout after booking forms are received.

A trip to local volcanic areas will form part of the conference.

Cavers Dinner.

The Caver's Dinner will be held at Monivae on Thursday, 5th January and will be a night not to be missed. It will be a three course dinner, costing $31 per person.

Photo Competition.

The viewing night for the photo competition is planned for Tuesday, 3rd of January. Details and application form will be included in the Information Booklet, which will be sent with your receipt.

VULCON REGISTRATION FORM

Each delegate is to fill out their own individual registration form.
Any non conference partners and/or children accompanying
are to be listed on one form.
Please tick boxes for any options you require and write in the spaces provided.

Please return to:
Vulcon Conference 1995
P.O. Box 506 Malvern,
Vic 3144

Name:_____Female____Male_____
Address:_____**Age:**_____
_____**Postcode:**_____
Caving Club:_____
Phone: (H) (0)_____ (W) (0)_____

I agree to have details listed in a Conference Mailing list. Yes ☐ No ☐

Monivae Package **$216.00**
All inclusive. Divided dormitory accommodation,
Conference package. All meals (except Caver's Dinner)
I am travelling as a: Single ☐ Family ☐ Group ☐
I prefer to be in a dormitory with:.....
$

Conference Package Only **$56.00**
Includes morning and afternoon tea, Conference registration,
(including papers). Meals and accommodation not included.
(For meals see Extra Meals)
$

Day Package **$20.00 per day**
Includes Lunch, Morning and Afternoon tea, Conference fees.
For meals, see Extra Meals. Please note that Lunch **is** included.
Conference papers not included. No. of days attending: ☐
Conference papers additional @ $25.00. No. of sets required: ☐
$

Non Conference Attendees **$160.00 each**
Partner and children over 6 yrs:
Accommodation and meals: x 4 at Monivae
Children under 6 years: $45.00 per child
Accommodation and meals: x 4 at Monivae

Please list partner and children's names (with ages) below.
1.....2.....
3.....4.....
5.....6.....
$

VULCON REGISTRATION FORM

Child Care. **$5.00 per child per day**
I require childcare: Yes ☐ No ☐ No. of Children ☐
Attending: Tuesday Wednesday Thursday
Names and ages of children attending:
1_____2_____
3_____4_____

$

Other.
Number of T-Shirts @$10.00 each. Small___Medium___Large___ X - Large___
Conference Tawny Port @$10.00 per Bottle_____
Number of stickers @ $1.00 each_____
Number of extra Conference Papers @$25.00 ea_____

$

Caver's Dinner.
Number of people attending Caver's Dinner @$31.00 per head:

$

Extra Meals:
Please indicate the number of extra meals
Breakfast: $8.00 ea. Lunches $8.00ea. (Included in Day Package).
Dinners $12.00 ea.
Tuesday:
Breakfast_____Lunch_____Dinner_____
Wednesday:
Breakfast_____Lunch_____Dinner_____
Thursday:
Breakfast_____Lunch_____Dinner_____

$

$

$

Special Dietary Requirements.
_____

Field Trips.
I intend to participate in:
Pre Conference field trips: ☐ Post Conference field trips: ☐

Transport During Conference. Needed ☐ Not needed ☐

Papers.
Are you presenting a paper? Yes ☐ No ☐

Total Due
Amount paying now. Minimum 50% required, outstanding balance due 1st November 1994.

$