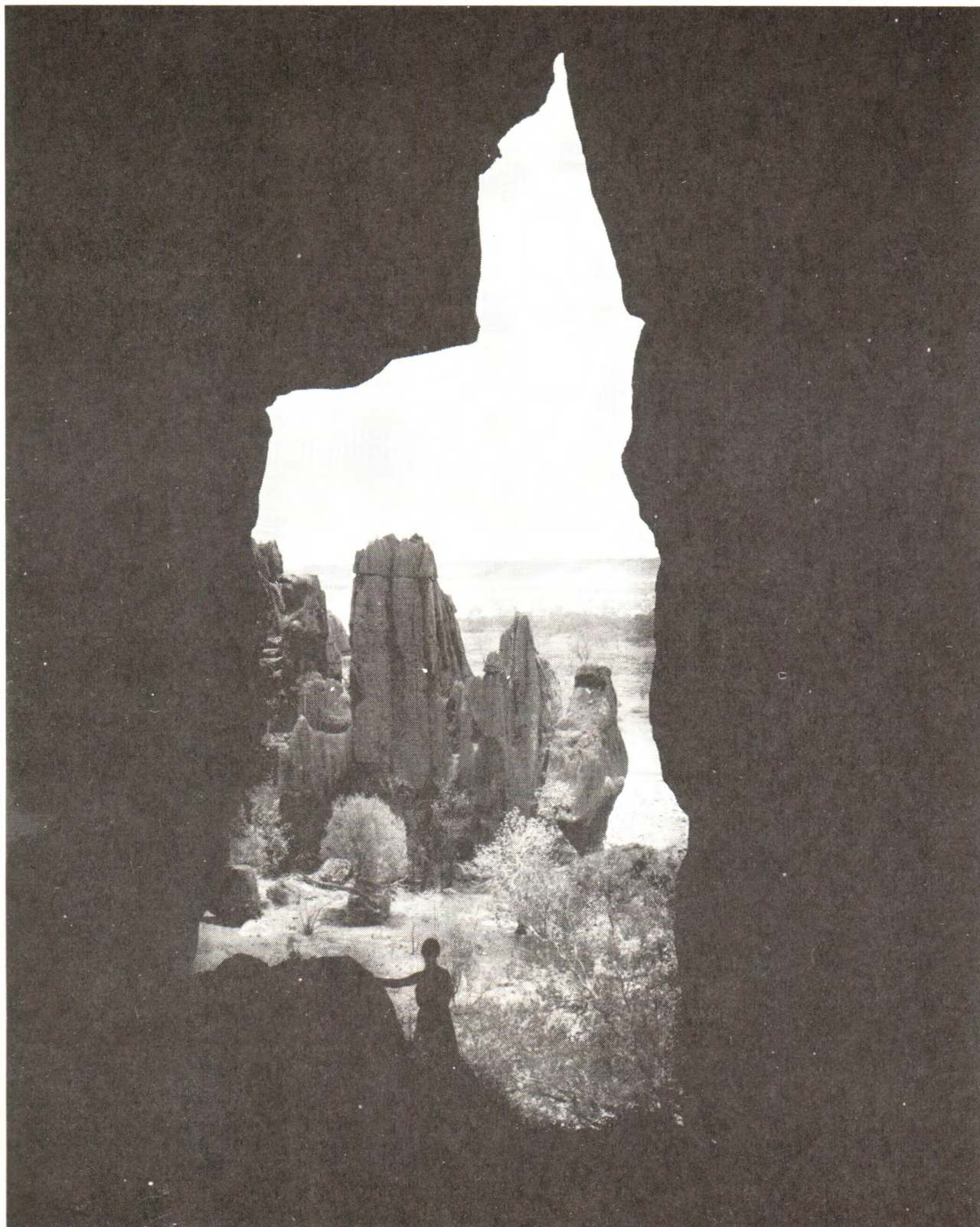


ASF NEWSLETTER

WINTER, 1981 No. 92



Kimberley, Western Australia — Photo by Simon Jolly

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NEWSLETTER
Winter, 1981, No. 92

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Some of the contents of this issue should be seen as linked together - Kevin's article on South-west Tasmania in association with the article on 'Tasmania's Caves'. In considering the issue in Tasmania, one should note that the NSS policy says that

It is the duty of every Society member to take personal responsibility for spreading a consciousness of the cave conservation problem to each potential user of caves. Without this, the beauty and value of our caves will not be long with us.

As members of ASF affiliated clubs are we doing any of this or just enjoying ourselves caving? I think we tend to the latter, and become frantic when an issue crops up. Admittedly, the Australian public will never be as aware of caves as an American one can be, but perhaps the ASF should have a definite policy of education. Some moves were made at the last Committee meeting along this line. What about a spate of letters to the editor on this issue! It should not be left to a few affiliated clubs.

The ASF Code of Ethics states

5. (a) They will not leave rubbish in caves; their own or other people's.

Read the report from Norm Poulter (SRGWA). This trip did a magnificent job in carrying out some rubbish from Mullamullang, but, initially the rubbish must have been left there by regular cavers! Perhaps future trips will go prepared to remove it.

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CAVES, MAN AND ELECTRICITY IN SOUTHWEST TASMANIA..

An update on the Lower Gordon situation

Kevin Kiernan

Tasmania's southwest. Today, valleys of dense rainforest dating from prior to the Gondwana break-up; broad button-grass plains; deglaciated mountains; deep gorges; valleys floored by limestone seldom, if ever, visited by cavers. But as the climate has oscillated between warmer and colder stages during Quaternary time the forests have alternately expanded over much of the area only to contract to riverine gallery refuges during the intense cold of the glacials, when the declining glaciers spewed forth torrents of turbulent milky-grey meltwater and leaden skies clung to wind swept and ice capped plateaux. A wilderness seekers paradise.

PREHISTORIC MAN IN THE SOUTH-WEST

Twenty-two thousand years ago, man had reached Hunter Island off the north-west coast. Twenty thousand years ago he had reached the Florentine Valley. He reached Tasmania by crossing the Bass Strait land bridge exposed by glacial low sea levels, and roamed a more open and windy environment inland where game animals abounded and he could move freely, withdrawing towards the coasts as the forests expanded. Man may not have reached South America much more than 10,000 years ago, but in Tasmania, he endured an ice age. But, within 72 years of the arrival of European man's settlement in 1804, the Tasmanian race had fallen victim to European man's violence and disease.

No early European explorers observed aboriginal man living in the dense rain forests of central western Tasmania, although there were tantalising possibilities hinted at by Surveyor Calder and George Augustus Robinson. In 1979, the Draft Environmental Statement appended to the Hydro-Electric Commission's proposal for a Lower Gordon development concluded that no archaeological sites occurred within the project area, and included a map which indicated the whole of inland western Tasmania to have been unoccupied.

CAVES AND ARCHAEOLOGY

With limestone areas of easy access close to the main population centres, there was little incentive for cavers to probe the more remote areas of the island. But, as wilder lands fell to the bulldozer, axe and dam, and the value of wild places became more appreciated, some attention was focussed on the threatened areas. Tasmanian caving was somewhat moribund and the task of checking what might be lost in the South-west fell largely to mainland cavers.

The proposed Lower Gordon development implied flooding large areas of limestone, and spurred a series of trips organised by the Sydney Speleological Society with only limited local assistance. By lilo, canoe, rubber boat, punt and jet boat, parties worked upstream through numerous rapids to examine some of the limestone along the sides of the rivers, which form natural highways through the region, but they seldom penetrated far inland. A number of caves were found and some named after the politicians who would decide their fate, occasionally to the consternation of the very conservative Tasmanian caving establishment, who remained aloof and disinterested in the conservation of the region. Increasingly, exploration of caves in the South-west was undertaken by unaffiliated cavers, often unrecorded.

Despite this limited search, the caves are already proving significant sources of archaeological and palaeoenvironmental information. In 1979, David O'Brien and Kevin Kiernan located strong circumstantial evidence of prehistoric man in the form of burnt and split wallaby bones in a cave on the Nelson River. These deposits were apparently of late Pleistocene age. Subsequently, Keith Corbett, and later Kevin Kiernan found surface archaeological sites in the Queen River valley, again within the supposedly unoccupied region. On the assumption that man had not lived in the forests, these sites were regarded as dating from prior to the return of the rainforest some 10,000 years ago, following the late Last Glacial stage. In January 1981, Rhys Jones from the Australian National University, state archaeologist Don Ranson and a party from the Tasmanian National Parks and Wildlife Service found some stone flakes on a terrace of the lower Denison River, and again presumed a Pleistocene age. This find received great publicity as it lay beneath the proposed waters of Gordon-Olga project, the Lower Gordon hydro-electric option favoured by the state government.

However, the tools occur in the upper few centimetres of a thick deposit of overbank silts of undoubted postglacial age, and it is the present writer's contention that they are very recent indeed. This implies that man at least visited the western valleys in recent times, despite the dense forests.

The most startling discovery came when a Tasmanian Wilderness Society party of Kevin Kiernan, Bob Brown and Bob Burton re-examined bone-bearing clay deposits in Fraser Cave on the lower Franklin River, which was discovered by Kevin in January, 1977. Far from being a fluvial or pit-fall deposit, as previously presumed, the bones were found to be burnt and split, and associated with an abundance of stone tools. For four years, cavers had walked straight past the evidence! A subsequent small excavation of about one square metre in the 100 square metre plus deposit reached a depth of 1.4 metres and revealed perhaps about 50,000 stone tools and an equal number of bones. Rhys Jones regards it as the richest limestone cave site in Australia, potentially one of the six most important sites along the western Pacific rim and equal in richness to the classic cave sites of France, which are still revealing fundamental information 100 years after their discovery. Radiocarbon dates are still not available and glib interpretations of age based on the

CAVES, MAN AND ELECTRICITY IN SOUTH-WEST TASMANIA (Cont.)

nature of the sediments would be unwise, but it is possible that both Pleistocene and Holocene occupation is indicated.

In the space of a few months, our conception of man in western Tasmania has been upended. While aboriginal man roamed the arid lands of continental Australia, his Tasmanian counterparts were living in the often incredibly dense, dank and wet rainforests of the western river valleys and were faced with a totally different set of problems of adaptation.

ELECTRICITY AND POLITICS

News of the archaeological discoveries was initially treated with disbelief by those in favour of flooding the wild western valleys for hydro-electric power, a situation compounded by the need to smokescreen on the site of the Fraser Cave discovery, to ensure against souveniring by rafters (or even deliberate vandalism) until steps could be taken to record and protect the most sensitive parts of the deposit. The situation was given added political significance when Prime Minister Fraser, who had expressed his pleasure at the original naming of Fraser Cave, responded to Kevin Kiernan after the archaeological find, expressing his interest and extending his best wishes for the project. Meanwhile, the Tasmanian Nomenclature Board was having kittens about the name of the cave, with which it did not agree, and the issue was raised on a number of occasions in State Parliament. But caves are obviously only one small part of the issue.

The discoveries undoubtedly have had public impact, with nationally circulated television coverage and press reports as far afield as Britain. Retaliatory response came from the pro-flooding politicians, chambers of commerce and even the retired former state premier 'Electric' Eric Reece, who fought so doggedly to destroy Lake Pedder, to satiate less than four years growth in electricity demand.

In 1979, Tasmania's Hydro-Electric Commission presented the state government with a proposal to dam the Lower Gordon below its junction with the Franklin. This would flood a massive area, including the valley bottoms which pollen from Fraser Cave, suggests have been of enormous ecological importance for millenia as rainforest refugia. Flooding would also eliminate the wilderness value of the region and inundate the lower part of south eastern Australia's last major wild river, the Franklin. A second project is proposed later for the upper reaches.

Last year, the state Labor government opted instead for the smaller Gordon-above-Olga dam further upstream on the Gordon River but which would leave the Franklin flowing free (for now) but still flood the stupendous Gordon Splits, Freedom Gate gorge on the lower Denison, the Nicholls Range caves and much more. But the Tasmanian Liberal Party and the Upper House of state parliament demand the full HEC backed Gordon-below-Franklin scheme. Among the members of that upper house are affluent farmers who are the descendants of the 'squatocracy', whose actions led to the spectacular act of genocide committed against the original Tasmanians, whose home they overran. The House in which they sit has already rejected the governments legislation.

In May 1981, the government proclaimed a wild river national park over the Franklin River and some adjacent country (including the Frenchmans Cap Park) to emphasize its commitment. This finally links the Cradle Mountain-Lake St Clair National Park to an extended South-west National Park, such that parkland now extends from Precipitous Bluff in the south to Cradle Mountain in the north. It totals around 763,440ha. But as for the Gordon Splits..... And over 250 square kilometres of the park consists of the surface of hydro-electric storage, which drowned Lake Pedder and is probably included to distort the figures.

The issue is at a stalemate, and might only be resolved by the Upper House rejecting the supply bills and bringing down the government. The power of the Upper House in Tasmania is such that it would not have to itself go to the people. It might be resolved by the next scheduled state election. In the meantime, inflation eats away at the proposal. The integrated Gordon-Franklin-King development would produce only 340 megawatts for a construction cost of \$1.36 billion. Gordon-below-Franklin alone would produce 180 megawatts for \$550 million. In justification, the HEC have produced figures for general load production, which, if continued for 50 years would imply demand ten times that of present generating capacity.

And in the meantime, the conservationists goal of no more dams in the South-West is temporarily in force.

POSTSCRIPT - RADIOCARBON ASSAY FROM FRASER CAVE

Charcoal from the basal occupation horizon in Fraser Cave has been radiocarboned assayed at $19,000 \pm 1100$ BP. To place this in the context of our present understanding of Tasmanian paleoenvironments, driftwood in silts immediately subjacent to outwash gravels of the Dante Glaciation in the central West Coast Range assays at $18,000 \pm 500$ BP (ANU 2533) (Kiernan, 1980). This represents the best date so far obtained for the Last Glacial maximum in Tasmania.

On face value, the date from Fraser Cave would imply man being present prior to the onset of full glacial

CAVES, MAN AND ELECTRICITY IN SOUTH-WEST TASMANIA (Cont.)

conditions in Tasmania and having to adapt to a sub Antarctic existence. However, the standard deviation on the date is high, and bracketting by two deviations gives a range of 16,800-21,200 BP. If the high standard deviation reflects contamination by younger organic material, its effect would be to produce a younger apparent date, that is the true age may be older than the assay result. Irrespective, Fraser Cave is clearly a Pleistocene site. Until now, literally, a small handful of ice age tools have been known from Tasmania. Fraser Cave contains tens of thousands or probably hundreds of thousands of tools.

Moreover, unlike most Tasmanian sites which indicate general foraging for food resources on the coast, the abundant bone material in Fraser Cave indicates specific targetting of marsupials and macropods in particular. Man probably stayed at the cave for brief periods while moving up and down the Franklin Valley, carrying with him exotic rock for tools, including Darwin Glass, an impactite from the Darwin meteorite crater in the tributary Andrew River Valley. In the little explored karsts of western Tasmania's wild river valleys, the implication is that other sites probably await discovery.

Here follows an extract from *Hansard*, House of Assembly, Tasmania, 24 May, 1981, pp. 6044, 6045.

2 April, 1981, pp. 6611, 6612.

NOMENCLATURE - SOUTH-WEST CAVE

Mr SANDERS - My question is directed to the Deputy Premier who, I understand, is responsible for the administration of the Nomenclature Board.

- (1) Is it a fact that Mr Kevin Kiernan recently discovered an archaeologically significant cave on the Franklin River?
- (2) Is it a fact that in common with Captain Cook, Abel Janszoon Tasman and other Tasmanian explorers, Mr Kevin Kiernan named his discovery after a contemporary existing political figure - to wit, Malcolm Fraser?
- (3) Is it also a fact that the Nomenclature Board has refused to accept the name of 'Fraser' Cave' because Mr Fraser still holds office?
- (4) If so, why has the Nomenclature Board broken with universally accepted centuries old tradition by refusing the name?

Mr SPEAKER - Is the Deputy Premier in charge of the Nomenclature Board?

Mr BARNARD - No, Mr Speaker, I am not. That question should appropriately be directed to my colleague, the Minister for Lands. I did not listen because I did not realise it was directed to me.

Mr SANDERS - Mr Speaker, I originally planned to address it to the Minister for Lands, but I asked who was the minister in charge, and he said it was the Deputy Premier.

Members laughing.

Mr Pearsall - Will the real minister please stand up?

Mr Groom - Does anybody know?

Mr SPEAKER - Order. If the honourable member for Denison requires an informed answer, I suggest he places the question on notice.

Mr LOWE - I suggest that that course be adopted, Mr Speaker.

Members laughing.

Mr SANDERS - Mr Speaker-

Mr Devine - That night off has done you the world of good, Norm.

Mr SANDERS - Can the Minister for Lands advise the House on recent developments in the continuing saga of the Nomenclature Board and Fraser Cave?

Mr LOHREY - The continuing saga seems to be more concerned with abstractions than with reality.

Mr Pearsall - Are you the Minister for this board? Have you found out?

Mr LOHREY - Yes. When the member asked me the other night -

Mr Pearsall - That is nearly as important discovery as the Fraser Cave, in fact.

Mr Gray - Probably more important, if the truth be known.

Mr LOHREY - for some reason I had it in my head that he was talking about the Signs Committee which is looked after by the minister in front of me. The Nomenclature Board does in fact come under my authority.

I understand it is the board's policy not to name features or places after living people. To me, the name 'Fraser' represents everything to which I am opposed. That geological feature is, of course, a very significant one -

Mr Cleary - We will call it 'Lohrey Cave'.

Mr Lohrey - and the symbol given to it by the Wilderness Society is not appropriate. I have written to the board asking for clarification of its policy. As much as I do not like the name - I think it is a horrible name - I think the person -

Mr Gray - I am sure Malcolm does not want to be associated with it, either.

Mr LOHREY - Well, he has written and said that he likes the idea and wants to be kept informed. There is a great big hole in the ground and they have called it 'Fraser'.

Mr Gray - He might be planning to bury you lot down there when you bankrupt the State.

Mr Polley - At least he doesn't go round biting people first thing in the morning.

Mr Gray - Climb back in your tree.

Mr LOHREY - Perhaps it is suitable. There are a lot of old bones in it and a lot of dirt; there is not much else in it, except a lot of history.

I have asked for clarification of the board's policy on this matter. It seems to me there are not many explorers left today; there are not many things left to explore. Caves are perhaps the only things left to be found and the people who find them should have the possibility of putting forward what they consider an appropriate name.

That has been the historic precedent. The islands and other features around Tasmania were certainly named by early explorers after living people, and the reason for that was of course political patronage. It seems to me we have moved away from that historic tradition perhaps because we have run out of things to find in terms of geological features. Caves seem to me to be the last things which individuals may discover and for that reason I think it should be the right of the discoverer to put forward what he considers to be an appropriate name, even though it might be a shocking name like Fraser.

I have written to the board asking for clarification of its policies and we will be holding further discussions along the lines which I have just mentioned.

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TASMANIA'S CAVES

Extract from *Tasmanian Year Book* #12, 1978 Edition. This section was contributed by the National Parks and Wildlife Service and the Tasmanian Caverneering Club.

Tasmania possesses some of the finest limestone caves in Australia. Four of these (Newdegate Cave near Hastings, Marakooopa and King Solomons Caves near Mole Creek, and Gunns Plains Cave on the North-West Coast) have been developed for the benefit of visitors and are protected and displayed by the National Parks and Wildlife Service. The State is also fortunate in possessing some of the best caves in the world, and in having them all reasonably close to main centres of population. Caves such as Exit, near Hastings, Kubla Khan at Mole Creek, and Khazad Dum at Maydena are renowned for their features.

The Caves

Newdegate Cave: Near Hastings, about 90 kilometres south of Hobart is the Hastings Caves State Reserve where Newdegate Cave is available for inspection and visitors may enjoy a swim in the recently refurbished thermal pool. Newdegate Cave has recently been connected to the State's power grid, replacing the old generator and the lighting is in the process of being replaced. This Cave has been delighting visitors since 1939 with its displays of stalactites, stalagmites and flowstone; a highlight is Titanias Palace. A kiosk at the site serves light refreshments.

The Marakooopa and King Solomons Caves: Just a few kilometres from Mole Creek, two caves are open for inspection - Marakooopa and King Solomons. Marakooopa has the attraction of a fine display of glow-worms and some large awe-inspiring galleries, while King Solomons boasts some exceptionally fine calcite formations. Both caves are set in reserves of natural bushland which further adds to the enjoyment of a visit. At King Solomons Cave a kiosk serves light refreshments

TASMANIA'S CAVES (Cont.)

in the summer.

Experienced guides at both Hastings and Mole Creek conduct cave tours on a regular timetable. The caves are lit with normal white lighting, enabling them to be seen in their natural colours.

Gunns Plains Cave : is located some 25 kilometres south of Ulverstone in the north of the State. Inspections are provided as required by a local concessionaire operating on a lease granted by the National Parks and Wildlife Service. The cave was formed by an underground river which can be viewed in part of the cave. There are also excellent displays of formations, including stalactites, shawls or curtains and massive flowstone.

Exit Cave: Sixteen kilometres in length, this is the longest cave in Australia and is noted for its immense chambers, spectacular glow-worm displays, delicate formation and sandy beaches. The D'Entrecasteaux River flows through part of this cave and has formed a relatively unusual feature- a river which divides on the surface and does not re-connect for some kilometres. One branch of the river disappears underground and emerges at the entrance to Exit Cave, near Ida Bay. It occasionally floods, stranding people in the cave. This cave is soon to become a State Reserve, protected by the National Parks and Wildlife Service of Tasmania. Although it is undeveloped, tours of part of the cave are conducted on Saturdays and Sundays from October to May, involving a walk of up to five kilometres, inside the cave.

Kubla Khan: at Mole Creek is also a long cave, but is famed for its incredibly rich formations. This cave also has a stream through it and, in fact, this slowed initial exploration. The effort involved in seeing this cave, which unfortunately is not open to the general public, is amply rewarded as one stands in Khan Hall looking at the 18m high stalagmite known as the Khan, or as one walks over the flowstone floor which is some 40 metres long and terraced gently up to a height of 15 metres.

Khazad Dum: (the name was borrowed from *Lord of the Rings* by J. R. R. Tolkien) at Maydena, is representative of the deep caves in this area. There are several other deep potholes within its vicinity, all of which offer a challenge to cavers. Khazad Dum is itself the deepest in Australia at over 320 metres. This cave offers an exciting but dangerous trip, with the distinct possibility of rain at the surface causing a flood.

Fauna

Tasmanian caves contain no known bat colonies but they have a rich and varied invertebrate fauna. There are cave crickets or wetas which emerge in the evening to forage for food and various species of beetle, some of them lacking eyes and adapted to a continued existence in total darkness. Further up the food chain is the harvestman, a very frail looking relative of the spiders but a capable hunter, able to subdue much larger wetas. A number of spiders are also common, most notably the large, black Tasmanian Cave spider, *Hickmania troglodytes*, which lays its eggs in a characteristic white, drop-shaped egg sac. And, of course, there is the Tasmanian glow-worm, *Arachnocampa tasmaniensis*, the larva of a fungus gnat, which suspends itself from the cave roof and ensnares insects attracted by its luminescence in sticky threads which hang beneath it.

The visitor, if patient, may see some of these interesting animals on a visit to a cave. None of them pose any danger to humans and a number are wholly protected under the *National Parks and Wildlife Act*.

Caverneering

Tasmania has the oldest caving club in Australia- the Tasmanian Caverneering Club- established in 1947 by Professor S. Carey of the University of Tasmania. There are now also two other active clubs.

Apart from the caves described above, there are other areas of spelaeological interest in the State- Mt Anne in the South-West National Park has an extensive area of deep shafts, including one with a clear drop of over 250 metres from the original ground level. This area has only been visited by fully equipped parties on a very few occasions, the last being in 1971. There is tremendous potential for new discoveries in this area.

The extensive limestone deposits of the lower Gordon and Franklin Rivers have been searched for caves only recently. Access is a serious impediment to exploration - canoes or inflatable craft must be used. Nevertheless, initial results have been encouraging and the prospect for further cave discoveries is excellent.

***** - * - * - *****

It was a tiny, shallow cave, not much more than a crack. She twisted around in the cramped space until she was kneeling with her back to the wall trying to melt into the solid rock behind her.

The cave lion roared his frustrations when he reached the hole and found his chase thwarted.

The Clan of the Cave Bear. Jean M. Auel.

BOOK REVIEWS

John R. Dunkley

Middleton, G. J. *Wilderness Caves of the Gordon - Franklin River System*. Centre for Environmental Studies Occasional Paper 11, University of Tasmania, 1979. Price A\$6.

In 1968, the first edition of *Speleo Handbook* said of the limestone on the Lower Gordon:

'Ten miles long, width unknown, dense vegetation. Cliffs along river accessible by boat. Visited only twice TCC 1959, 1961. Eight small caves known. Good potential.'

Of the Upper Gordon-Franklin system, it was said to be

'very inaccessible.....two small caves known'.

With plenty of very long, very deep and relatively accessible caves in Tasmania to hold attention, it might have been the next century before cavers bothered to explore the Gordon-Franklin area. Except that the HEC is proposing a dam or two, the combined impact of which would submerge virtually all the caves now known in the area.

From 1974 to 1978, five expeditions were organised by cavers from Sydney and Tasmania to extend knowledge of caves potential. Transport varied from Canadian canoes to rubber inflatable boats to jet boats. About 100 caves are now known, mostly quite small, with the longest being 520 metres.

Although the aggregate length of the known caves is rather less than two kilometres, the potential appears to be quite good. The limestone crops out along 30 km of the Franklin's course, some 19 km in a direct north-south line, and extends inland about a kilometre on each side of the river. Virtually no effort has been made to locate caves away from the river, but on the few occasions that parties have looked, they have been successful.

This paper makes no claim to be more than a preliminary report. While it is most unlikely that the Gordon-Franklin will produce the excitement of an Atea Kananda, or even another Exit Cave, it is clear from this book that worthwhile caves do exist, and that there must be many more in an area unique in Australia, and indeed the world. There are some 31 photographs and well over 50 maps to supplement the excellent documentation.

My only criticism is not with the book, which is an unemotionally well written, well illustrated and well produced case against the dam proposals. No, my gripe is with a minor part of the campaign strategy. Must we name caves after politicians? No doubt, Mr Whitlam is still remembered by some of us but he is no longer a member of Parliament. The same strategy was used during the Colong campaign and we are still saddled with over a dozen caves bearing the names of long-forgotten Liberal politicians. I question whether any public sympathy or longlasting publicity results from this, and it does one's image little good with the Geographical Nomenclature Boards.

James, J. M. and Dyson, H. J. (eds.). *Caves and Karst of the Muller Range*, Speleological Research Council, Sydney, 1980. 150pp., numerous photographs, maps and figures. Price A\$15.

Less than 15 years ago, CEGSA published its MullaMullang Expeditions book. It was the first real book on caving in Australia and along with *Caves of the Nullarbor* a year later, created quite a stir among the then fairly small numbers of cavers in this country. Over the years, the action moved away from the Nullarbor, to Tasmania and now to New Guinea. Expeditions to these remote and inaccessible places are now expected, as a matter of course, to justify their efforts with a worthwhile report.

In this regard, the 'Atea Book', as it is becoming known, sets entirely new standards. Atea 78 was outstandingly successful in many ways and for several reasons. It was meticulously well planned and executed. One kilometre of new cave was discovered for each of the 50 participants, with 30 km by itself, Atea Kananda became the longest cave in the southern hemisphere. The scientific accomplishment was equally impressive and reflected a high degree of professionalism.

This is a big book, with 150 pages, 20 chapters and 9 appendices by 26 different authors, 63 photographs, 53 maps including four large foldouts, 17 sketches, 20 tables and 127 references. About half the book is taken up with detailed cave descriptions. Names such as Penny Lane, Primrose Hill, Winchester, Loosey in the Sky (with Diamonds nearby) reveal something of the age and musical aspirations of the explorers, but there are more traditional appellations like Ooze Cruise, Sacking of Rome, Screaming Frog and Dumb Toad to delight the armchair caver as well. The second half of the book has ten chapters covering geology, meteorology, hydrology, surface geomorphology, water chemistry, clastic sediments, underground geomorphology, botany, vertebrate fauna and biospeleology. Finally, there are nine appendices dealing with finance, food, transport, medical, surface equipment, caving equipment, surveying, photography and a glossary.

Rauleigh Webb

Ellis, R. *Australian Caves and Caving*. Western Colour Print, Marrickville, NSW, 1980. Price A\$6.95

81 colour plates, 68 black and white, approximately 5.5 pages of text.

This 'coffee table' caving book is a collections of photographs by nine members of the Sydney Speleological Society. The individual photographs are not credited, but the photographers are listed on the inside front cover.

In general, the colour photographs are of good quality, but a large number of the black and white are lacking in quality. The layout of the book is good except for the lack of page numbers and there is no index. Its attempt to cover the caves of Australia is, I believe, quite poor. The number of photographs taken in each state clearly illustrates the lack of coverage given to several states: NSW 67, Qld 41, WA 17, Tas 8, Vic 4, SA 2, NT 1.

The book is clearly New South Wales orientated, with many major caving areas in Australia receiving poor or no coverage.

As the book is clearly aimed at the general public, I found the text to be sadly lacking. For example, on the page labelled 'BATS' the text states:

Bats are protected mammals and should not be disturbed. You are actually a visitor in their home and should not disrupt them in any way.

while the almost full page photograph above the text shows three people surrounded by a myriad of obviously disturbed bats! How can people be expected to follow the advice of cavers when the don't 'practise what they preach'?

The colour plates are good, but I'm not sure that they are worth the \$6.95.

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REQUISITES FOR CAVE SAFETY*

- (1) Don't cave alone. Desirable party size equals four. Large groups are also discouraged.
- (2) Each caving trip is to be under the control of a trip leader possessing qualities of responsibility and discipline necessary to ensure the safety of the party and the protection of the caves.
- (3) A suitable helmet (Australian Standard or equivalent) to be worn at all times.
- (4) Wear close, but not tight fitting clothes, e.g. one piece overalls.
- (5) Wear tough boots, heeled, and with 'Commando' soles. Do not wear flat soled sandals.
- (6) A first aid kit is to be carried at all times.
- (7) Two totally independent and reliable sources of lighting are to be carried by each person. Three are desirable, e.g.: Miner's light (or carbide), small torch or lamp, candle and matches in waterproof container. If you are carrying a carbide light, you should also have matches (in a waterproof container) and prickers - at least two.
- (8) Don't take anyone underground who is affected by drugs of any kind; this includes alcohol.
- (9) In the event of all persons going underground at the same time, leave some indication of whereabouts and expected time of return.
- (10) Ropes and tapes are not to be used for such purposes as car towing, rock lifting etc.
- (11) Dry out ropes and store in a cool place away from sunlight.
- (12) Do not uncap carbide lights in confined areas.
- (13) Carbide lamps are not reliable indicators of foul air (CO₂). Use matches or candles.
- (14) Internal combustion engines are not to be used underground, nor on the surface, where exhaust fumes may enter a cave.
- (15) Ensure that all cords used to carry whistles, lights, compasses etc., around the neck will break with a reasonable ease should they be caught in a slip or a fall. Chains, rings and bracelets can cause serious injury. Don't wear them on even a short climb.
- (16) A belayer should be experienced and have a failproof anchor.
- (17) A trip leader should ensure that no member of the party is coerced into a situation beyond his/her capabilities.

* Reprinted from *Down Under*, Volume 20, #1, by John Toop, originally appearing in *Down Under*, Volume 13, #1 (1974).

This 1981 revision and update by Greg Williamson.

NOTICES & NEWS

WACCON PROCEEDINGS

WACCON Proceedings are available from Rauleigh Webb at 60 Cobden St., Bayswater, W.A., 6053. The cost of the Proceedings is \$10 (including postage). Please make cheques payable to WACCON.

NIBICON PROCEEDINGS

Those participants at NIBICON should sent their address to Andrew Pavey, 45 Arcadia St., Glebe, N.S.W., 2037. Andrew needs an up to date address list. Andrew is trying to organize the Proceedings.

LONGEST UNDERGROUND PITCH IN AUSTRALIA?

Rumour has it that an SSS trip to Tasmania went to Exit Hill over Christmas- New Year, 1980-81, and continued exploration of Big Tree Pot, a cave near Mini- Martin, previously explored by Gordon Taylor and others (*ASF Newsletter* # 89). The SSS party descended the pitch and it was 115 metres, free hanging all the way. This makes it the longest underground pitch in Australia. It was blocked off at the bottom and could not be connected with Exit.

FOURTEENTH BIENNIAL CONFERENCE

The Fourteenth Biennial Conference of the Australian Speleological Federation will be held on 3-7 January, 1983 at Flinders University, Adelaide. The Conference proposes to have two aims as basis of discussion. These will be

1. Visual aspects of cave recording

- (i) This theme will cover all aspects of cave recording. Topics will be inclusive of photography, both in two and three dimensional, and their application in mapping, scientific and navigational activities in caves.
- (ii) Trends in cave mapping with the advent of computer plotting, alternative methods of depicting caves and holograms.
- (iii) Use of information retrieval systems, viz. microfiche, aperture cards and word processors.

2. Forecasting the future of Australian Speleology

- (i) How advances on technology affect speleology.
- (ii) Cave access and management in the coming decade. How past trends may affect the future.
- (iii) Population pressures on our natural cave resource.

CAVES AND ARCHAEOLOGY IN SOUTHWEST TASMANIA

A special issue of *Southern Caver* 12, #4. Price \$2.50 (including postage).

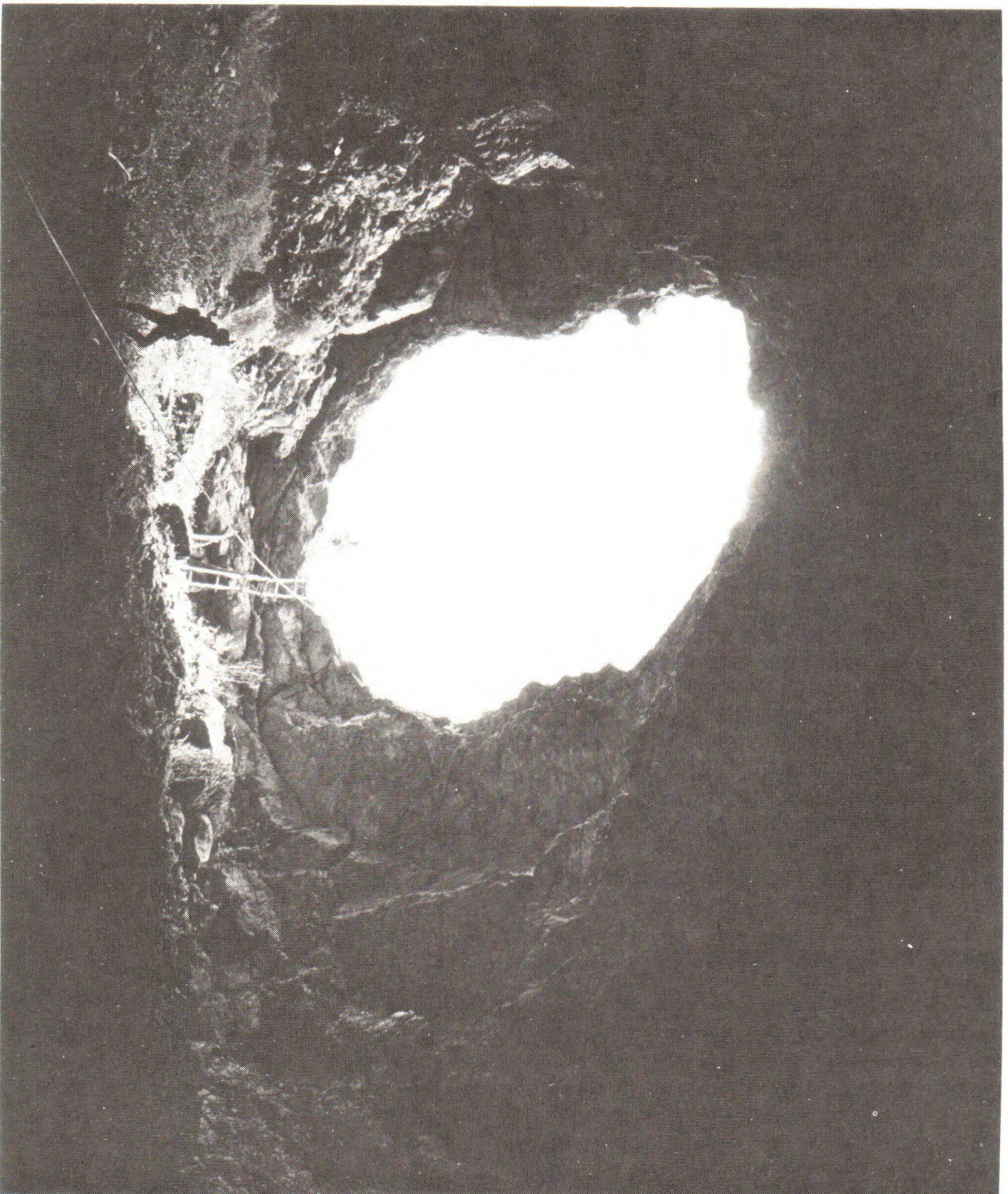
Articles by Don Ranson, Kevin Kiernan and Stephen Harris describe the discovery and initial excavation of Fraser Cave on the Franklin River. This cave, which would be flooded by the Hydro-Electric Commission's Gordon -below-Franklin scheme, has been described by Dr. Rhys Jones as 'one of the six richest archaeological sites in the Western Pacific' and being as rich 'in archaeological terms as the great classic caves sites of western Europe'.

Cave sites in the wild rivers region of southwest Tasmania now take on a new significance which will add another dimension to future cave exploration in the region.

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Entrance to Murrumbidgee Cave (N47) Nullarbor Plain, Western Australia

Photo by Poulter
Speleo Print • NH 3

REQUISITES FOR CAVE SAFETY (Cont.)

- (18) A safety line should be used in any situation where a fall could result in an injury. The trip leader should make the decision considering: (a) experience of the party (b) physical condition of the party (c) difficulty of the obstacle (d) difficulty of rescue if a fall occurs
- (19) Only one person at a time should ascend or descend ladders or ropes.
- (20) Prussick only on static ropes, belay only on dynamic ropes (climbing ropes).
- (21) Most members of a party should be experienced in knots and the use of climbing equipment on trips where such equipment is used. Where there is a shortage of equipment or experience, it is often best to use a ladder.
- (22) Care must be taken of ropes to avoid damage by abrasion. Do not stand on ropes, and make sure you use rope protectors.
- (23) Alternative means of contact must be used on pitches where voice contact is difficult. Use whistles.
 Whistle Code : one whistle means STOP
 two whistles means UP ROPE
 three whistles means LET OUT THE ROPE
- (24) Be careful not to burn ropes with carbide lights.
- (25) Take care not to dislodge rocks etc. down pitches. Call 'BELOW' loudly if you do. Avoid standing under pitches.
- (26) Take notice of weather conditions when entering caves which may take water.
- (27) Never climb, prussik or ascend ladders with a pack on. It becomes extremely tiring. There have been cases where temporary paralysis of the arms has occurred while laddering with a pack on.

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ASF CODE OF ETHICS

The Federation expects that the following code will guide the actions of members of ASF societies.

1. (a) They will, in reporting their work, avoid and discourage sensationalism, exaggeration and unwarranted statements
 (b) They will, in publishing their work, take particular care to acknowledge other people's contributions to the work involved, either as clubs or individuals, published work, personal communication or whatever.
 (c) They will be discreet in disseminating information that might endanger caves. In particular, they should not broadcast their knowledge of entrance locations or routes.
2. (a) They will treat guides and other officials of tourist caves courteously and respectfully.
 (b) They will endeavour to be courteous to the general public, but will defend caves from attentions of the uninstructed where this is deemed necessary for the protection of the cave.
3. (a) They will carefully observe the established rules of good camping conduct, especially in the removal and disposal of rubbish.
 (b) They will bury their faeces when camping in bush conditions but should avoid the catchment areas of caves.
 (c) They will not camp in any cave.
4. (a) They will have specific or tacit approval from the owner or guardian before entering private property or cave reserves.
 (b) They will follow normal procedures regarding gates on properties or reserves.
 (c) They will not, except in cases of dire emergency, presume on the goodwill of property owners in dry areas for supplies of water. Prior arrangements must be made.
 (d) They will take care to avoid interference with crops or stock.
 (e) They will, where a cave entrance has been blocked by the owner to prevent injury to livestock, reblock the entrance after use and will liaise with the owner to erect a fence or some other less offensive means to protect the integrity of the entrance.
 (f) They will not conduct any dig, on the surface or underground, without the express permission of the landowner, (or management authority) and their society committee.
 (g) The use of explosives is not encouraged. Any use of explosives should only be with the express permission of the landowner (or management authority) and their society committees.
 (h) They will not construct a gate in a cave without first obtaining the permission of the landowner (or management authority) and their society committee, and ensuring that permanent provision is made for the security of the keys.

ASF CODE OF ETHICS (Cont.)

- (i) They will not construct a gate in a cave without an accompanying sign explaining the reasons for restricting access, and the circumstances under which authorised visits are possible.
- 5.(a) They will not leave rubbish in caves; their own or other people's. Spent carbide, flash-bulbs, wrappings and other refuse must be brought out of the cave.
- (b) They will not disfigure caves by unnecessary markings. Survey marks should be small and inconspicuous.
- (c) They will take care to avoid destruction or disfiguration of cave decoration and any other natural features of the cave. Disturbance should be confined to tracks. In areas of clean flowstone floors, muddy clothing or boots must be removed and only clean clothing worn. Tracks should be rigidly adhered to. Helmets should be removed in the vicinity of stalagmite clusters.
- (d) They will not under any circumstances leave faeces in a cave; they will prepare themselves beforehand, or when underground, make provision for the removal of faeces.
- (e) They will take stringent precautions to isolate artificially introduced organic wastes from caves.
- (f) They will not smoke in any cave.
- (g) They will not carry out any tracing experiments in karst areas without having first carefully assessed the varying tracing agents and techniques available, and selecting only those which can be shown to present no danger of damage to the cave or the disturbance of flora and fauna under the circumstances of the experiment.
- 6.(a) They will, when visiting an area frequently visited by another club, do all in their power to co-operate with that club.
- (b) They will conduct disputes in a restrained and gentlemanly manner.
- 7.(a) They will behave responsibly in environmental matters.
- (b) They will endeavour to protect the caves of Australia.

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NSS* POLICY FOR CAVE CONSERVATION

The National Speleological Society believes: That caves have unique scientific, recreational and scenic values; That these values are endangered by both carelessness and intentional vandalism; That these values, once gone, cannot be recovered; and that the responsibility for protecting caves must be assumed by those who study and enjoy them.

Accordingly, the intention of the Society is to work for the preservation of caves with a realistic policy supported by effective programs for: the encouragement of self discipline among cavers; education and research concerning the causes and prevention of cave damage; and special projects, including cooperation with other groups similarly dedicated to the conservation of natural areas. Specifically:

All contents of a cave- formations, life, and loose deposits are significant for its enjoyment and interpretation. Therefore, caving parties should leave a cave as they found it. They should provide means for the removal of waste; limit marking to a few small and removable signs as are needed for surveys; and, especially, exercise extreme care not to accidentally break or soil formations, disturb life forms or unnecessarily increase the number of disfiguring paths through an area.

Scientific collection is professional, selective and minimal. The collection of mineral or biological material for display purposes, including previously broken or dead specimens, is never justified, as it encourages others to collect and destroys the interest of the cave.

The Society encourages projects such as: establishing cave reserves; placing entrance gates where appropriate; opposing the sale of speleothems; supporting effective protective measures; cleaning and restoring over-used caves; cooperating with private cave owners by providing knowledge about their cave and assisting them in protecting their cave and property from damage during cave visits, and encouraging commercial cave owners to make use of their opportunity to aid the public in understanding caves and the importance of their conservation.

Where there is reason to believe that publication of cave locations will lead to vandalism before adequate protection can be established, the Society will oppose such publication.

It is the duty of every Society member to take personal responsibility for spreading a consciousness of the cave conservation problem to each potential user of caves. Without this, the beauty and value of our caves will not long remain with us.

*National Speleological Society, Inc., Cave Avenue, Huntsville, Alabama, USA, 35810.

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THE TENSION DEVELOPED DURING A FALL ON A ROPE

Brian Carter

A lot of confusion has arisen over how a rope is able to hold a falling caver, and what tensions arise during the arrest. This article briefly describes how a fall is arrested and how to calculate the maximum tension developed during the arrest. The results show the importance of two rope parameters ; static stretch and maximum breaking load.

I would point out that this article contains nothing new, just a summary of a few well known facts.

Let us imagine we have a caver standing part way down a pitch (Figure 1). Our caver has foolishly allowed the rope to become slack by getting it snagged on a flake close to him. Suddenly, the flake gives way and our caver falls (Figure 2). After a short distance, the tension comes onto the rope and his arrest begins. After bouncing for a few moments he comes to rest, bruised but safe.

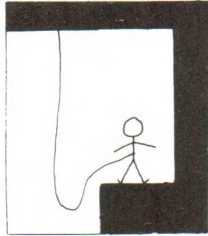


Figure 1 . Caver with slack rope.



Figure 2 . Caver falls

Now, let us consider these events again, but in terms of ENERGY, since it is the principle of Conservation of Energy which allows us to easily calculate the forces involved.

Just before our caver begins to fall, he has a POTENTIAL ENERGY due to his height, above some reference point, and the force due to gravity acting upon him. If this is hard to imagine, then think of the potential energy of the water in a reservoir of a hydro-electricity scheme. (Hardly an apt example considering some of the articles in this newsletter - Editor.) By allowing the water from this reservoir to fall to a lower level through a turbine, some of its potential energy can be converted into electrical energy.

From the moment our caver begins to fall, he begins to pick up speed. What is happening is that his potential energy is being converted into KINETIC ENERGY. Kinetic energy can be thought of as the energy contained in a spinning flywheel. Eventually, the tension begins to build up in the rope and our caver is quickly brought to a momentary halt. At this point, he has no kinetic energy, and a lower potential energy than he had before he began to fall. This 'lost' potential energy has actually been converted to STRAIN ENERGY stored in the rope. Strain energy can be thought of as the same energy stored in a clock spring.

What happens next is that our caver begins to travel upwards again, because the tension in the rope is now greater than the caver's mass. As a result, he begins to oscillate, and would do so forever if it were not for the fact that energy is continually leaked from the system in the form of heat arising from friction in the rope fibres and air resistance etc.

The situation described is summarised in Figures 1, 2, 3, and 4.

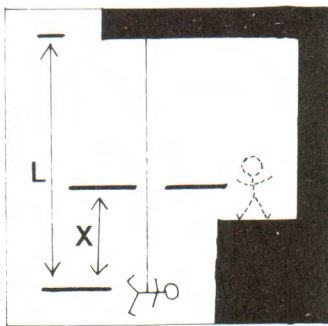


Figure 3. Tension just begins to come onto the rope.
(Fall ratio $\frac{x}{L}$)

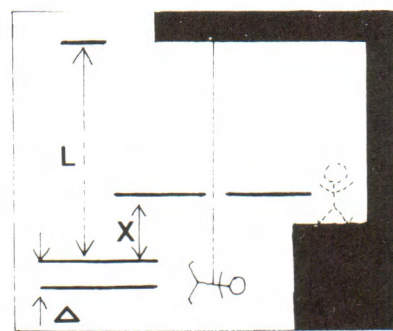


Figure 4. Caver momentarily comes to a halt at maximum rope extension before oscillations begin.

THE TENSION DEVELOPED DURING A FALL ON A ROPE (Cont.)

In the following section, we calculate the energies and tensions involved. Common expressions have been stated without proof.

If we take our reference point as being the lowest point to which the caver falls during the arrest, we can calculate that his POTENTIAL ENERGY BEFORE FALLING = $Mg(X+\Delta)$ Joules, where :- M = Caver's mass (kilograms).

g = Acceleration due to gravity (9.81 metres/second).

X = Length of slack in rope before falling (metres).

Δ = Maximum extension of rope (metres).

At the point of maximum rope extension, (Figure 4) we can calculate that the

MAXIMUM STRAIN ENERGY = $\frac{K^2 \Delta^2}{2}$ Joules, where K = Rope stiffness (newtons/metre extension).

Now at the point where we have maximum rope extension, the caver's kinetic energy equals 0, and his load in potential equals the gain in strain energy of the rope. Since we have chosen our reference point for calculating potential energy as the maximum extension point, the potential energy at this point is zero also. Hence:

$$Mg(X+\Delta) - 0 = \frac{K^2 \Delta^2}{2} \quad (1)$$

Now using the stiffness of the rope, we can obtain this equation in terms of the maximum tension 'T' in the rope.

Since:- Since: $\Delta = \frac{T}{K}$ by definition. Substitute in (1) gives:

$$T^2 - 2Mgt - 2MgKX = 0 \quad (2)$$

From which we obtain :-

$$T = Mg \sqrt{(Mg)^2 + 2KMgX} \quad (3)$$

Rope stiffness is not a commonly quoted figure, but we can calculate this from static stretch, which is often quoted. With static stretch of 'Y%', under the load of a typical caver, who has a mass, say of 80 kilograms, we can say that our rope of effective length 'L' metres, the extension will be :- $\frac{YL}{100}$ metres, and therefore the rope stiffness :-

$$K = \frac{800g}{YL} \text{ newtons/metre}$$

If we substitute in (3) we obtain the following expression :-

$$T = Mg + Mg \sqrt{1 + \frac{16000X}{MYL}} \text{ Newtons}$$

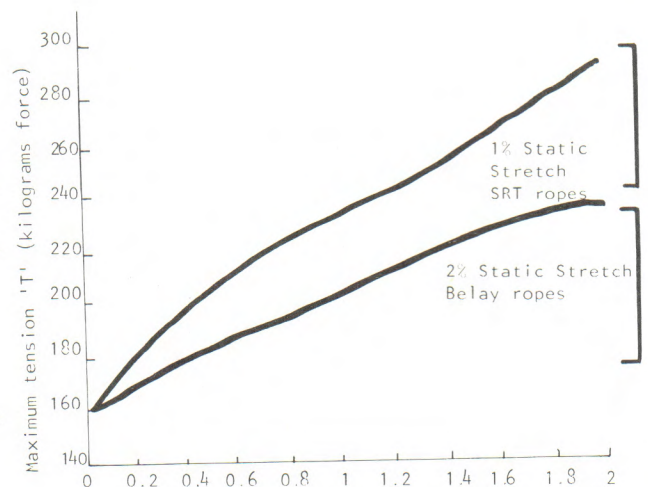
$$\text{or, } T = M + M \sqrt{1 + \frac{1600X}{MYL}}$$

If we plot this relationship for an 80 kilogram caver, we obtain the accompanying graph. Referring to the graph we can note the following :

1. Irrespective of rope static stretch etc., the maximum tension will be at least 160 Kgt for a falling caver mass 80kg.
2. With low static stretch ropes (SRT type) the maximum tension developed is considerably higher than for dynamic belay ropes.
3. The maximum tension developed should be compared with the maximum breaking load of the rope with due allowance for the weakening effect of knots.
4. The maximum tension developed is also the maximum force which is applied to the falling caver and all other equipment connecting him to the rope.

Reference

Montgomery, N. *Single Rope Techniques*.



$\left(\frac{X}{L}\right)$ Ratio of fall length to effective length of rope.

Graph to show the maximum tension developed in a rope during the arrest of a falling 80 kg caver.

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DOWN UNDER ALL OVER

News from around the Societies

- CCC Tom Robinson reports that CCC has issued 54 tags for caves this year already- 24 for Chillagoe and 30 for the Mitchell-Palmer area. The register now stands at Chillagoe 292 and Mitchell-Palmer 105. The latter does not include those of SSS in the Little Mitchell River area, which is part of the overall Mitchell-Palmer area. CCC has yet to relocate and tag these. Trip reports are still coming in, ranging from a composite type to a whole expedition. Everything goes into them, maps, survey details, everything. The reports are given a number for cross references in the Map and Survey Indexes. Tom bemoans the fact that groups such as the Mungana Cave Explorers didn't keep records in the 1900s-1920s, as this would save a lot of work now. Caving activity is at a low at the moment, as the country is still saturated by the 'wet'- 1250mm on the coast by February this year and Chillagoe well above average. The results of the limestone solution experiment will be interesting this year! Most of CCC are anxious to get to the Mitchell-Palmer area, so anxious that an attempt was going to be made (March) to reach the limestone belt by heading west from the Cooktown road, and over a maze of ranges. The Mitchell River was still high (March), and wouldn't be down until late in the year so another way was going to have to be found. The belt is some 80 kilometres from the Cooktown road.
- HCG Rik Tunny reports that club members have been active in several areas recently. Exploration has continued at Cooleman Plain with minor extensions in Cliff Cave and Frustration Cave. Easter Cave sump was dived and a line rigged for free-diving. The upstream sump was dived without success. Upstream River Cave sump has been penetrated to an air bell; a large descending water-filled passage continues and will be dived later this year. Several trips were made to Yarrangobilly and Tuglow Caves where the biology was examined and the caves photographed. During a two week trip to Tasmania, caves at Ida Bay, Maydena and Mole Creek were visited. Many thanks to the Tasmanian speleos for their hospitality. A trip in conjunction with SUSS and StGACT members to the Nelson area in New Zealand resulted in the discovery of three caves on Mt. Arthur; one cave, Stwyfe of Bwyan, was explored to a depth of about 150metres. Possibilities for new discoveries in this cave and the area in general are excellent. Other caves visited in New Zealand include Nettlebed, Greenlink and Harwoods Hole. One member attended the biennial conference in Melbourne. Generally the club members would like to see a move away from the university style conference and return to a camping/community hall venue nearer to a caving area. Most members would rather spend such large sums of money on caving rather than talking about caving.
- NUCC In November, 1980, all ASF affiliated clubs that had been active at Yarrangobilly and Cooleman Plain were sent a letter by the NP&WS, informing the clubs that they could no longer go caving in the area. The reason stated in the letter was manpower shortage in the Service made it impossible to properly supervise these areas, and that the matter would be reviewed in February, 1981, with no assurance of access at that time either. (This would have affected all clubs in Australia -Ed.) The NP&WS does have severe staff shortages. Several clubs directly concerned wrote to the Service. In December, 1980, the clubs received a further letter informing them that owing to staff replacements the permit system was back to normal. The letter also asked clubs for their comments on the Draft Plans of Management for the Kosciuszko National Park in reference to karst areas.
- SCS The most newsworthy aspect of the Tasmanian caving scene was the discovery by Kevin Kiernan of evidence of aboriginal occupation from Fraser Cave on the Franklin River. Kevin, Steve Harris and Greg Middleton were among those who took part in a subsequent expedition which excavated the cave deposits. Kevin, together with Bob Brown and Bob Burton, also visited the previously unexplored Goodwins Creek limestone area in Southwest Tasmania. Goodwins Creek itself was found to sink into a cave 300 metres long, and many other cave entrances were found. There was no time to explore these. There were more attempts to find new passage in Herberts Pot, but unsuccessfully. Nearby however, some talus exploration by Leigh Gleeson, Rolan Eberhard, Alex Terauds and Phil Jackson, resulted in discovery of 100 metres of commodious stream passage between Georges Hall and Dangerous Cave. At Ida Bay, Stefan and Rolan Eberhard joined with cavers from other groups in exploration of Big Tree Pot (IB 9). Later, the Eberhards discovered and surveyed the 42m shaft named Holocaust. Further attempts have been made to bottom Serendipity Cave in the Florentine. The present estimated depth of this cave is at least 200 metres but the prospects for greater depth are good. On 14 March, Stefan and Rolan, with Andrew Briggs of TCC visited the horizontal extension in Tassy Pot, recently discovered by SUSS. Stefan reports "the significance of the discovery was certainly verified with the negotiation of at least a kilometre of spacious decorated stream passage. Numerous side passages remain unchecked." Stefan's party discovered a further extension downstream encompassing

DOWN UNDER ALL OVER (Cont.)

some 150 metres horizontally and perhaps 10 metres greater depth.

SUSS Guy McKanna reports that SUSS has a new array of office bearers, the president now being Paul Greenfield. The active members of the society have been visiting various caving areas throughout the state gaining skills in varying conditions and also cleaning much rubbish from unrestricted caves. Efforts are now being rewarded by many new discoveries at Jenolan, with many enthusiastic younger members finding large amounts of new passage and caverns, as well as discovering some unique forms of decoration. At one stage it was said "where SUSS cavers go, new passage follows." Caving now centres at Jenolan with surveying and further exploration. CEGSA divers visited Jenolan once more, to help with the wetter side of things, only to find access to certain caves difficult owing to recent rains. However, the Imperial-Spider-Mammoth connexions appear to be close at hand.

SRGWA The Group is currently exploring the issue of affiliation with WASG owing to the low level of current membership Norm Poulter reports. Norm joined the Goede/Jennings Nullarbor Expedition (April-May) as did Adrian Davey. Some of the highlights of the trip was the discovery of what Joe Jennings believes to be the world's tallest halite stalagmite (2.5m) and the catching of three blind cockroaches from the Dome area of Mulla Mullang Cave. It would not be wise for anyone to attempt catching any more until the results of this collecting become known from the Australian Museum. Some rubbish was brought out from Camp One, leaving

- 2 empty square tins
- a large bowl half full of spent carbide
- 3 empty one gallon plastic bottles

Hopefully, this will be removed by the next trip there. The damage in Coffee and Cream section of the Easter Extension is steadily increasing as the amount of spent carbide in the cave is. Some of the much broken telephone wire was removed.

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UPS AND DOWNS OF HURTFUL CONFUSION

A hole was blasted through the mountainside at the Cango Caves, in the Cape, to provide a separate entrance to the caves for coloureds in terms of the Government's policy of maintaining 'vertical differentiation'.

Yet, in the terms of 'removing hurtful discrimination' the apartheid signs in the restaurant at the caves had been removed.

These actions were among many examples Mr Colin Elgin (PFP Sea Point) quoted in Parliament recently to illustrate his charge that the Government's 'contradictory policy of maintaining vertical differentiation and scrapping hurtful discrimination' had turned into a farce.

Taking examples from what he said was a 'very bulky file', Mr Elgin said that:

- (1) In order to get rid of hurtful discrimination, the apartheid signs were removed from the Cango Caves.

But, in order to maintain vertical discrimination, an official had ordered a coloured man, Mr Lofty Adams, to leave the restaurant.

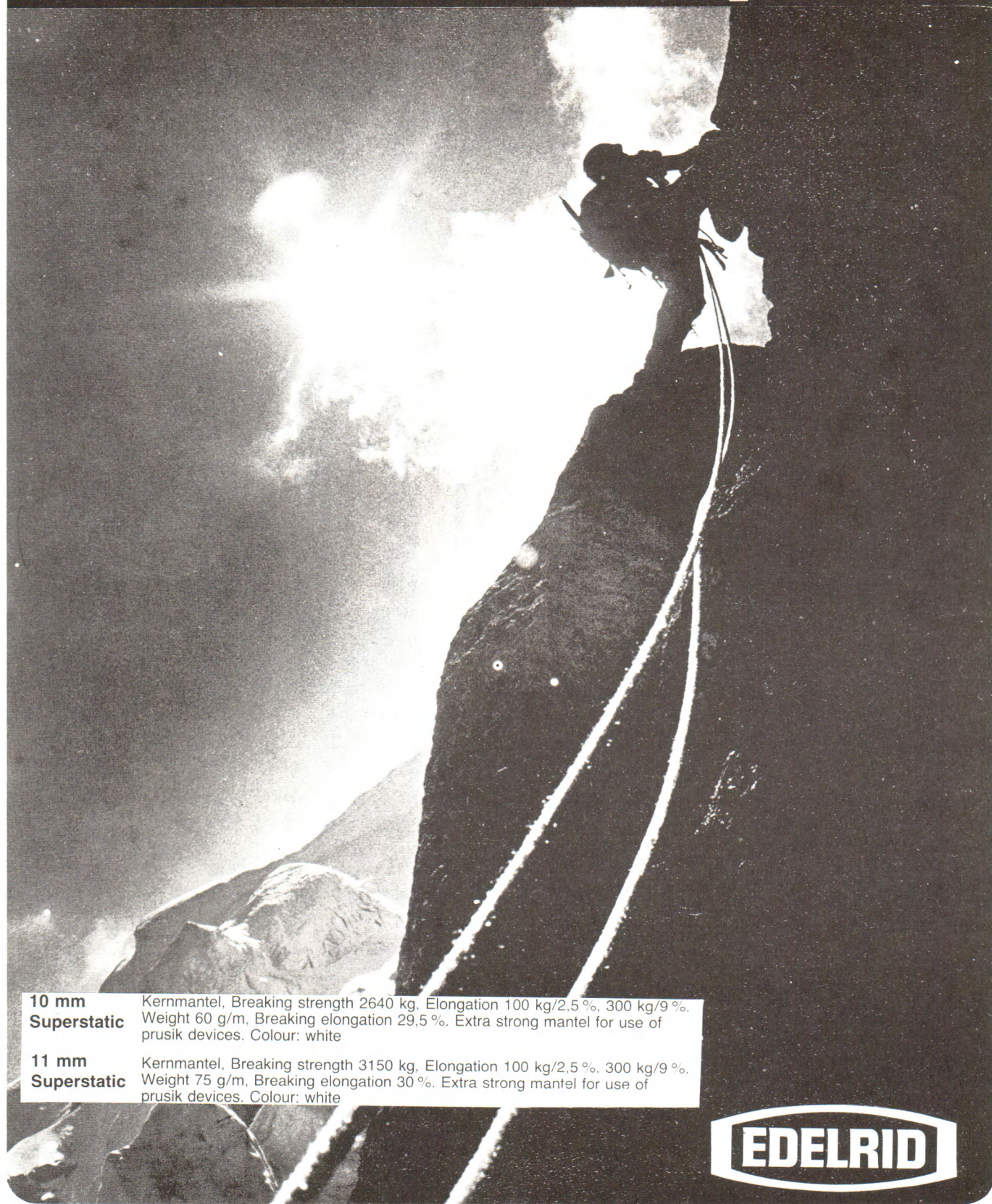
In order to get rid of the hurtful discrimination, the Government had apologised to Mr Adams and an official at the caves had been sacked.

In order to maintain vertical differentiation, they had separate parking areas at the caves for different race groups, organised separate tours to the caves and blasted a hole through the mountainside to create a separate entrance for coloureds.

Rand Daily Mail, Johannesburg, 2 February, 1981.

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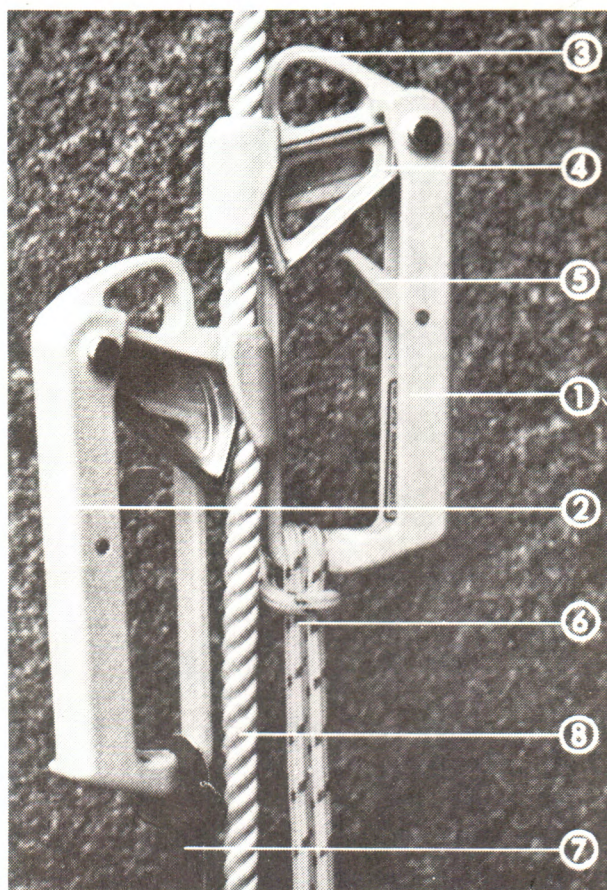
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