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NEWSLETTER

Punyelroo Cave
South Australia

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Number Thirty five - March 1967

A S F N E W S L E T T E R

AUSTRALIAN SPELEOLOGICAL FEDERATION

Cover . . . . . .

Punyelroo Cave (S17) is located in a cliff bank of the Murray River, a short distance from Swan Reach, (about 80 miles from Adelaide). It is a most obvious cave entrance and has been known since the earliest settlement days on the Murray.

The first reference to this cave appears to be an account of a visit there in 1881, by Captain Randell, published in the Adelaide Observer. Captain Randell was one of the first steam shipping traders on the river in the 'Ruby'. He has 'Randell's Rock' named after him as a feature in the cave.

The cave was formally described in the South Australian Naturalist in 1938 following a University Expedition, and was visited by the Cave Exploration Group of South Australia in 1955. The cave has been visited regularly since; it has now been mapped to C.R.G. grade 6 and this year it made the newspapers as the scene for several lost scouts.

For all the time spent by the various groups on the cave, it is still something of a mystery. For the hundreds of miles the Murray River has cut into tertiary limestones, there is only one substantial cave evident - S17. Naracoorte is the nearest major cave area in similar limestone but is 200 miles distant. The cave consists of over 3000 feet of level, joint controlled passages about 25 feet above average river level. There is no truth in the early native legend that the cave extended for 80 miles to come out again on the Murray at Overland Corner. It is all solution passages except past Randell's Rock where the cave develops into the usual collapse pattern the Naracoorte Group exhibits.

The cave is devoid of decoration but is popularly visited by collectors of tertiary fossils which abound in its walls.

The 1938 report seemed to suggest that the cave was developed by solution due to the drainage of a nearby swamp into the river, but it is now felt that it was formed by the river during flood overflowing into the banks. The problem of the cave origin has never really be resolved. -- A. L. Hill.

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S.S.S. CHILLAGOE EXPEDITION, AUGUST 1967

The Sydney Speleological Society is organizing an expedition to the Chillagoe district in North Queensland during August this year.

Chillagoe is situated 100 miles west of Cairns and consists of Tower Karst limestone of Devonian age. The limestone outcrops over a distance of 35 miles. Outcrops often reach heights of 300 feet above the valley floors

Three major projects are to be undertaken by the society: exploration, surveying and entomological studies.

The expedition is open to members of all societies.

HELMETS IN CAVING

by H. Dengate, U.N.S.W.S.S.

Although no deaths due to helmet failure have been recorded in Australian caving, it is time that the attention of cavers should be drawn to the types of helmet available, and to their actual powers of protection. The head is very much more vulnerable to a lethal blow than any other part of the body, and sudden acceleration of the head may cause severe brain damage at the very least. Even without brain damage, a depressed fracture of the cranium, or concussion, would be far more serious underground than on the surface.

It has been said that a really good helmet is not necessary, since any shock impact severe enough to render ineffective the sling suspension type helmet would break the neck. Dr. Snively of the Snell Foundation says that this is not true, since the neck is likely to be broken only if the impact is exactly at the top of the head, aligned along the axis of the spine, with the neck not bent. In the great majority of cases these conditions will not be met, and the head itself may be subjected to severe impact (even a severe side blow) with little probability of neck damage.

The Ideal Helmet

The ideal helmet for caving should give complete protection for the wearer against both falling rocks and the impact of other objects. Within reasonable limits this protection should be the same no matter what the angle of impact on the helmet. It should fit snugly, and be shaped to minimize twisting and rotation.

In addition to these, the helmet should be light, well ventilated, not too bulky, and should restrict neither vision nor hearing. It should have a secure, adjustable, quick-release chinstrap, and it would be useful if the helmet were a white or yellow colour so that it could be easily seen underground.

It should be noted also, that ribs on a helmet serve only to catch and concentrate forces developed from falling objects. Thus a suitably rounded surface is essential.

Types Available

There are two main types of helmet available in Australia, and these two shall be dealt with separately. The specially constructed and expensive type used by racing car drivers will not be treated, and the ex-World War 1 'tin hats', and those of pressed cardboard, offer so little protection that they can be ignored.

(a) Sling Suspension

This type is widely used by Australian cavers, and most of these are designed to meet Australian Standard Specifications for Industrial Safety Helmets (AS Z10), or for Mining Safety Helmets (AS M5).

Shock absorption is tested by freely dropping an 8lb. iron sphere through five feet onto the crown of the helmet. It is required that the hat shall not bottom at this load of 40 foot pounds as applied to the crown. (In 'bottoming' the crown of the wearer's head strikes the inner surface of the crown of the helmet.) Bottoming under severe loading results in extremely high accelerations to the head, with possibilities of attendant brain damage. Since this figure of 40 foot pounds represents a 2lb. rock falling only 20 ft. (or a 150 lb. man falling 3.2" onto his crown) it is apparent that bottoming will occur with almost any heavier rock, quite aside from any considerations of possible penetration. Both AS-Z10 and AS-M5 specify nly that there shall be a wearing clearance of not less than 1" between the top of the cradle and the shell.

Penetration is tested by dropping a 1 lb. steel pointed plumb-bob freely through 10 ft. onto the crown of the helmet The static measurement of the depth of penetration (including the thickness of helmet material) should not exceed 3/8", and no part of the assembled helmet should break away under the test. Thus the helmet is unlikely to break away under a shower of small rocks, but under a series of larger rocks could easily do so.

Assume then that we have a helmet built to minimum specifications, and that an impact takes place on the crown. If we suppose a 3 lb. rock falling 20 ft. it would cause the helmet to bottom on impact (using 40 ft. lb. of energy) and the remaining 20 foot pounds would be used for penetration, possibly resulting in a cranial fracture. Despite the assumptions above, it is obvious that quite a bit of damage would be done to the wearer. The helmets are not, of course, built to minimum specifications, but a leading Australian company in this field quotes a safety factor for shock absorption of 150% with no figures for penetration.

Considering the other ideals, this type has excellent ventilation, can be altered to fit most people well, is surprisingly light, and may be obtained in a variety of colours. Many are not supplied with a chinstrap, and the chinstraps, (when supplied) are generally inadequate. Retention on the head in the correct position is essential if the helmet is to deflect rocks. The shells are available in heavy plastic, which tends to split on impact, or fibreglass, which splinters on severe impact and so absorbs more energy.

Although the sling suspension type can offer some protection from impact directly on top of the head it is much less effective for the oblique blow which occurs more often in caving. For an oblique blow the sling suspension does not function to absorb energy, and is useful then only for preventing penetration of the skull.

(b) Crushable Liner

This type of helmet, as the name suggests, acts to absorb impacted energy by having the liner within the helmet collapse. With increasing thickness of absorbing material, energy can be absorbed at almost any level of acceleration, however bulkiness of the material and the cost, restricts this to reasonable limits. The American Snell Foundation, under Dr. Snively, has performed extensive medical research using instrumented dummies and human cadavers, and has set forward a set of requirements for helmets in various sports. The present Snell requirements are that the helmet shall take two blows, in the same spot, of 120 ft. lb. each, without transmitting to the

head an acceleration greater than 400g. (g is acceleration due to gravity) 400g. represents an object travelling at 60 m.p.h., stopping uniformly in 1/60th second, over a distance of $\frac{1}{4}$". This figure has been found to be the bare minimum for survival in car racing.

A crushable liner helmet of this type suitable for caving should give about half this acceleration for one 120 foot pound impact, but it would appear worthwhile to trade the second impact protection for a cheaper, lighter helmet which retains the high degree of first impact protection. It is worth noting that 120 ft. lb. is the energy gained by a 150 lb. man falling free for 10", or a 3 lb. rock falling for 40 ft.

Considering the other ideals, the crushable liner offers more first impact protection and more safety from oblique blows than the sling suspension and it gives the same choice of shell materials and colours. It is heavier than the other type, is poorly ventilated and is expensive, although the chinstraps are generally highly effective.

Some Comparisons and Suggestions

From the foregoing, the crushable liner helmet is obviously the more effective can be seen from the following falls, with the appropriate headgear is sufficient to produce serious injury:

TYPE OF PROTECTION*	HEIGHT OF FREE FALL ONTO CROWN	HEIGHT OF FREE FALL OF 6 LB. ROCK
Bareheaded	1.5 ft.	3 ft.
Sling suspension	3.0 ft.	6 ft.
Crushable liner	12.0 ft.	24 ft.
Best racing helmet	20.0 ft.	40 ft.

*Helmets to American Standard Association Specifications.

1. Some work could be done on actual values of common types of helmet in Australia, to determine the maximum values of shock absorption and penetration.

2. Individuals and societies should check their helmets to find whether or not the helmet has been used to stop a severe impact. It is important to realise that helmets of both types are partially destroyed during impact of a severe nature, since both the lining and the shell are irreversibly damaged in the energy absorbing process. The helmet must be replaced after severe impact.

3. Individuals should decide whether it is worthwhile to increase their personal safety factor and buy the safer type of helmet.

Bibliography

Australian Standards : M5 Mining Safety Helmets
Z10 Industrial Safety Helmets

Protector Safety Products Pty. Ltd.

Summit Vol. 12, No. 3.

ABSTRACTS AND REVIEWS

Swiss Cave Fauna by Pierre Strinsti. Published by the National Centre for Scientific Study in France, 1966. (In French).

This work, listing the cave fauna in Swiss caves can best be described by its list of contents:

- Physical Geology and Geology of Switzerland (14pp)
- Ecology of the Swiss Caves (24pp)
- Biography and Origin of the Cave Dwelling Fauna (33pp)
  (Listed by zoological groups: Isopoda etc.)
- Swiss Biospeleological Provinces (4pp)
- Speleological Catalogue (168pp)
  (This catalogue lists the fauna occurring in the various caves and the conditions under which they live; indexing is by district).
- Zoological Catalogue (203pp)
  (This catalogue lists the fauna by Group, Class, Order, and family etc., giving details of their occurrence, the reference to published data, and in what caves they occur).
- Bibliography (11pp)
  (This work is also published in 2 parts, in Annales De Speleologie Vol 21, Nos. 1 & 2, 1966. All but the last two chapters are to be found in No. 1. Also in No. 2 is a paper by C. Andrieux, "24 Hour Underground Climatological Observations".

The observations made are part of a year long study involving ".....a strict protocol of climatological observations and mensuration....". Interpretations are suggested but no conclusions are drawn. An earlier paper published by Andrieux - in Annales Vol. 20, No. 3 - is referred to.

-- G.R.W.

MISCELLANEOUS NOTES

Of interest to cave photographers is the latest modification to the Diprotodon Magnesium Powder flash gun. This latest model, the Diprotodon Hillii is described in the CEGSA Occasional Paper No. 4 "Mullamullang Cave Expeditions, 1966". Modifications made to the Diprotodon Hilli include: simplification of construction, reduction of size without loss of output and an improvement in the flow of the magnesium powder. The gun was used successfully on the recent Nullarbor Plain expeditions, the improvement in burning rate allowing the gun to be used for movie photography.

The improvements in the flow and burning rate of the magnesium powder appears to be in the use of a granular powder in place of the usual chip type.

CEGSA have quantities of the powder available to users of Diprotodons, the granulated powder being suitable for all past models.

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DOWN UNDER ALL OVER Edited by Kel Booth

CANBERRA SPELEOLOGICAL SOCIETY

Wyanbene.

Two trips to Wyanbene have seen the beginning of survey work in the new extension past the water crawl, and the "re-discovery" of the Corkscrew Chamber in the old tourist section.

The Ridge Mine Pot was descended. It was found that the water table had risen considerably as the lower sections were filled with water to a depth of three to four feet.

CAVE EXPLORATION GROUP (SOUTH AUSTRALIA)

Another trip to Mullamullang was made in January, 1967. The aim of this was to carry out further meteorological work and establish a link between Frank's Station in the main tunnel and the Easter Extension. The work was successfully completed and a CRG grade 5 survey now exists for this section.

At a venture camp, held at Naracoorte, scouts were given a comprehensive instruction course in all aspects of caving and cave exploration. The camp was held over a six day period from 1st. to 6th. January, 1967.

ORANGE SPELEOLOGICAL SOCIETY

Tuglow.

Four members of the society visited Tuglow Caves for the first time, the purpose being general caving and photography.

The Window Cave and Main Cave were entered, the Main Cave as far as the base of the 30 foot waterfall.

Difficulties were encountered on the fire trail track when leaving the area. Land Rovers with chains were just managing to negotiate the slippery conditions and other vehicles were forced to wait overnight for the track to dry out.

Cliefden.

The society has been involved in preparatory work for the coming A. S. F. Search and Rescue Weekend to be held on the 18th. -19th. March, at Cliefden.

Much of the Limestone well away from the main caving area has been visited so that boundaries to the search area can be determined.

WESTERN AUSTRALIAN SPELEOLOGICAL GROUP

South West.

As a measure of conservation, the Group has decided to restrict entry to Easter Cave to a maximum of three trips per year.

The Nomenclature System for the South West Caving Areas has been altered and a map showing the revisions is included in the Western Caver Vol. 7 No. 1.

SYDNEY SPELEOLOGICAL SOCIETY

Bungonia.

During January, parties under the leadership of Bob Holland, discovered and explored a further vast new section of the B4-B5 cave .xtension. The discovery consists of several hundreds of feet of passageways. The general directional trend is westward, toward (but still far from) the Efflux, and passes under several large surface dolines.

Exploration has previously been limited by the high CO2 level and period : re-siltation of the access passage, but a fall in the CO2 concentration, together with further recently gained knowledge and confidence in foul air caving techniques, has at last allowed a few intrepids to enter the section. The extended period of dry weather during 1966 has also been a big factor. In the past, the entrance to the extension has been blocked by water or silt for months, and even years at a time. It is considered that the dangers of sudden flash flooding, foul air and physical exhaustion are so great in this cave that two-way radio communications to the surface and reliable air composition measur _ equipment is absolutely essential for cavers to maintain any reasonable degree of safety.

Meanwhile, the Efflux excavation still roceeds foreward with the advent of some automation on the site.

Yarrangobilly

One major purpose of this January trip was to locate on the surface, several points in the Deep Creek caves with the Radio Direction Finding equipment. However, the caves (and the surface, too, for that matter) were flooded:- $3\frac{1}{2}$ inches of rain during one 8 hour period.

Billy's Creek.

A trip to this area requires a day's walk each way from the nearest road. Consequently, it is not visited often. The southern half of the limestone was explored thoroughly and the three small caves found were recorded on a detailed map of the limestone area. (See Stop Press Vol. 11, No. 2 pp21-22.)

Wombeyan

Surveying in the Bullio Cave has been completed and a start made on the survey of the Basin Cave.

Walli.

Experiments aimed at improving radio commun ations and direction finding equipment were conducted with promising results. Some photography was also undertaken in the Deep Hole.

Other trips of diverse natures were held at Wee Jasper, Cooleman, Bunyan and Cotter River. The society was also represented at the A.S.F. Conference Field Trips at Buchan and at the S and R practice at Cliefden Caves.

TASMANIAN CAVERNEERING CLUB

West Coast, Mt. Anne.

The reconnaissance expedition to Mt. Anne in the South West of Tasmania is reported to have been spent most successfully. A party of five entered the area in perfect weather and spent a day of surface exploration. The surface is extremely rugged with jagged quartz veins protruding out of the Dolomite. A very dense mountain vegetation covers the whole area.

A number of holes were located. One was estimated to be some 300 feet deep in one single drop. TCC has begun preparatory organisation for a full scale expedition to be held during the Christmas period, 1967.

Ida Bay, Exit Cave.

Two further trips to Exit Cave have yielded another mile of passages with more to be explored. The length of passages in this cave now stands at nearly three miles but the link between Exit Cave and Mystery Creek Cave remains undiscovered.

The survey of the main section of the cave has been completed, it being some 7500 feet in length. The end of the survey is only 1500 feet from the end of Mystery Creek Cave.

Several long 'straw' formations, estimated at lengths up to 20 feet have been found.

Of great interest is the discovery of a vertical shaft with a 15 foot long log at its base. Lighting showed the shaft to be extremely high. Two members of the club considered they could see a pin-point of light but this could not be confirmed. If it is so, then from the survey, the shaft would be over 700 feet below thw surface of the outside hill. An attempt will be made to locate surface holes in the vicinity of the shaft.

UNIVERSITY OF N.S.W. SPELEOLOGICAL SOCIETY AND METROPOLITAN SPELEOLOGICAL SOCIETY

Bungonia.

Several trips have been held at Bungonia by both societies. The UNSWSS trips being mainly to introduce 'fresher' members to caving. The MSS trips have been to their excavation outside the reserve and to the Drum Cave.

The Drum Cave was entered by a team of eight, four making the final descent and a support party of four. Field telephones were used from the base base of the entrance drop (134 feet) and two-way radio to the surface. Foul air was encountered but not in sufficient quantities to prevent the party reaching the known limits of the cave - an apparent siphon.

Jenolan.

MSS has made a further trip to Jenolan, visiting the Glass, Chevalier, and Frenchman's caves and the Temple of Baal.

Members assisted in sealing an excavation which had been made around the gate of the old tourist cave, The Alladin Cave, by mixing and hauling cement up to the cave entrance and pouring it into the re-filled hole.

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