MENDIP CAVING GROUP

THE JOURNAL

MENDIP CAVING GROUP

Patron: THE MARQUESS OF BATH.

JOURNAL

No. 2. FEBRUARY, 1960

Contents.

THE MARQUESS OF BATH.

His Lordship the Marquess of Bath has been kind enough to become the Group's Patron. We would like to take this opportunity of thanking him for this honour. We are also very grateful for his permission for the excavation of Coopers Hole and the interest and constructive help he has given.

.. .. ..

COOPER'S HOLE.

Situation:- Cheddar Gorge 469540 Height 141ft.

Even in the 12th Century Writers referred to a hole at Cheddar 'where is a cavity under the earth which, though many have often entered and there traversed great spaces of land, and rivers, they could yet never come to the end.' This hole is not now known at Cheddar unless - as suggested by H.E.Balch in his book Cheddar, its Gorge and Caves - it is Cooper's Hole. Further evidence that Cooper's leads to the underground stream is to be found. Before the road was tarred, lime-dust which was washed into Cooper's after heavy rain in the Gorge emerged at the spring head.

For many years the caving fraternity on Mendip has looked on Cooper's Hole with envious eyes. The late Marquess of Bath was, however, adverse to allow excavation to be carried out on his property and hence Cooper's Hole has remained an unknown quantity. In 1931-32, R.F. Parry carried out an archeological excavation at the entrance and reached a depth of 15' without reaching the cave floor but no actual cave excavation was attempted. In the early part of this year our Secretary applied on behalf of the Mendip Caving Group to the present Lord Bath for permission to excavate Cooper's Hole. His Lordship granted this, much to our pleasure and the envy of other Mendip Clubs.

Excavation started on March 14th when a pit was dug 6' by 2' and 4' deep. The upper layers consisted essentially of tins and broken glass and this made digging rather dangerous. It is surprising to note that during the whole time work has been carried out at Cooper's, no one has suffered badly from cuts.

A fortnight later - Easter Weekend - digging was continued in earnest. The trial trench had partially collapsed and thus it was decided to dig a ramp angled at some 20° to the road level. The direction of the trench was S.S.W.

The clay, earth, tins and broken glass were brought out on a sledge which Tony Crawford had constructed. This was pulled up in two ways, either by having several fellows pulling on a rope attached to the sledge or by having the rope through a pulley fixed to the wall in the entrance and attached to the front of the van forming a single Spanish Whip. The merits of these two methods were argued long and loud by their exponents resulting in each party using its own method. The trench progressed quickly and we were soon below ground level. About ten feet from the surface the soil was very fine and gritty.

Three of us were working at the face when the sides collapsed and buried me up to the thighs. Fortunately (for me) I was soon dug out and although it was not serious we voted to stop digging for that evening.

Below the layer of gritty earth was a thick layer of brown tenacious clay in which were numerous small pellets of black carbon presumably from the Charterhouse lead mines. In this clay we found bones, pottery and what we first thought were limestone axe-heads but subsequently found out that they were only natural stone chips. The bones were examined by Professor Sutcliffe of the Natural History Museum who identified them as modern! We had much better luck with the pottery. This was taken to the British Museum and there it was identified as Iron Age B from about 1 A.D. It consisted of several small pieces of black earthenware which had at one time formed the base, sides and rim of several pots. The pieces of rim were decorated with whirls and circles. All the pottery has been donated to Gough's Museum.

In the late spring and early summer we had a great deal of rain and this all flowed down Cooper's, at any rate it seemed so to us, since each weekend we were obliged to bail out two or three feet of water before we could carry on digging. This was usually achieved with large biscuit tins which we found. Unhappily these leaked a considerable quantity of water often ending in 'one up and two down'; when their contents did reach the entrance it was surreptiously emptied down the Gorge through the carpark into Cheddar! On one occasion some of the members were tired of bailing by hand and went to seek help from other sources. Their first port of call was the Fire Station but they could not help. Apparently unless they had first put the water there, they could not pump it out. However, they suggested Maunders, the Builders and so our three gallants set off for there. Here they borrowed a large bilge pump which emptied the dig in record time.

Progress was still fairly rapid although hampered by the water. We tried as much as possible to keep the trench between five and six feet high, but in May we came to a rock wall in front of us and so our direction changed along this wall. At regular intervals we found small curtains of calcite which had formed on the roof and wall. Soon we came to a calcite floor and so our head height was now reduced by necessity to four feet. The tunnel continued forwards, the roof and floor remaining very nearly parallel to each other. Digging was executed mainly with the entrenching pick since we were still in this layer of tenacious clay. It was removed either by rolling it into balls and passing it back from one person to the next or by using the sledge. This sledge having been built by Don Searle (Tony's had been worked to death). The disadvantage with the sledge was that it was very difficult to manoeuvre it.

At the onset his Lordship had said that we could dump our 'spoils' in the entrance to Cooper's and this we did, but as time went on, we found that we were filling this very quickly and by the end of May the whole of the entrance was practically [illegible] We had at the

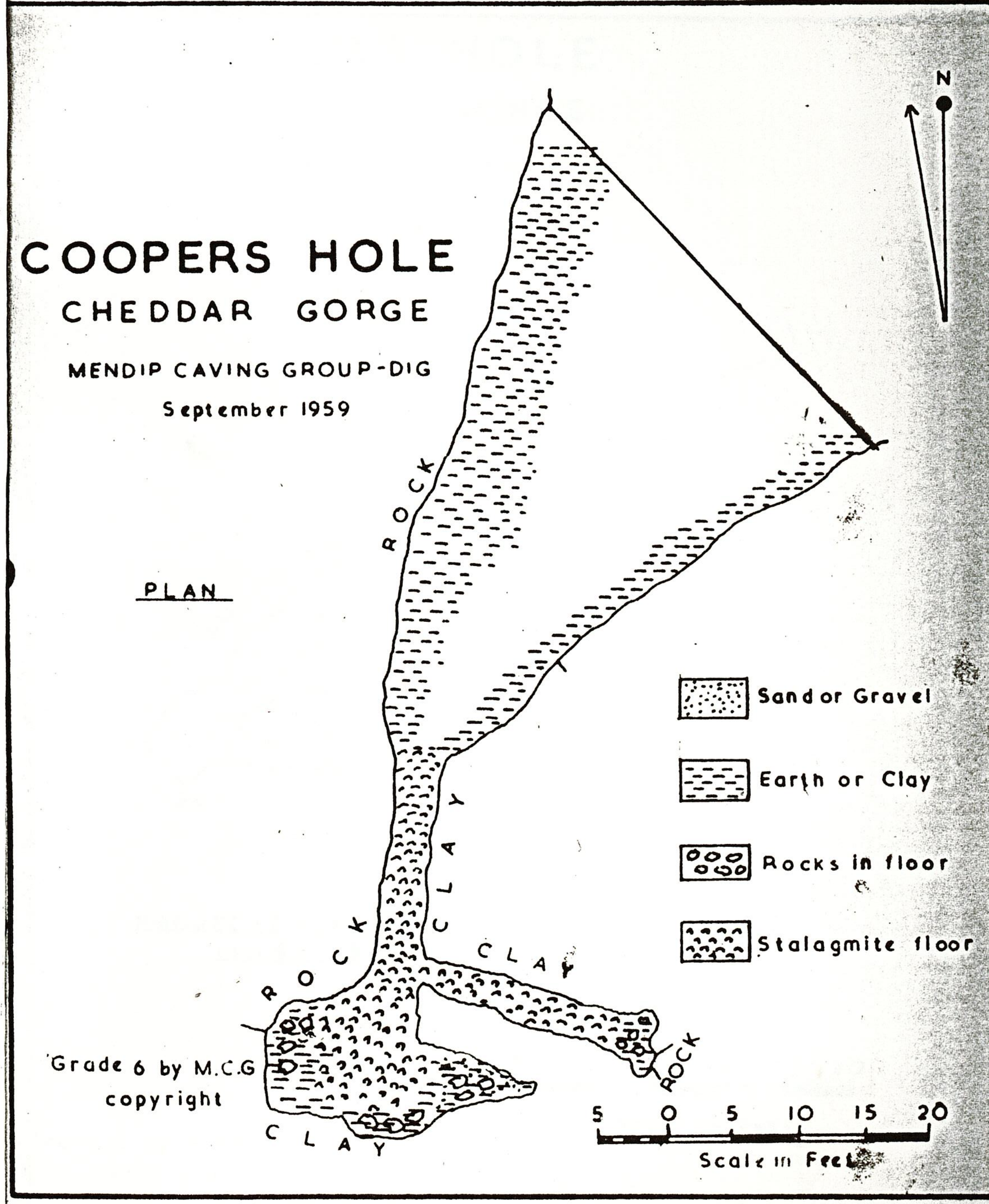
same time as obtaining permission from the Marquess also obtained permission from the National Trust to dump clay etc., on their property on the other side of the Gorge and this we were seriously considering doing. At Whitsuntide the Marquess inspected our progress at Cooper's and said that as the entrance now looked rather unsightly, he would arrange for the removal of the clay and would make the level of the entrance the same as our trench. This operation was carried out in July and immediately we started to fill the entrance in with more debris. During the period that the entrance was being cleared we tied the wire attached to the sledge to a winch used by the contractors and this saved a great deal of time and energy in hauling the sledge to the surface.

When we had been on the calcite floor for some time we found that the roof was sloping at a much steeper angle than the floor and the working height which had been comfortable was now reduced to little more than eighteen inches. We had wanted all along to dig in relative comfort for as long as was possible and so we decided to withdraw our steps and to strike off at right angles to the tunnel. This we did and in one weekend we dug eleven feet. This new tunnel which had a rock roof, calcite floor and mud walls was some two feet wide and four feet high. That weekend also saw the edge of the calcite floor and at first the roof appeared to drop down steeply but we soon discovered that this was merely a boulder that had become displaced from the roof and sagged a few inches. We circumnavigated this boulder and continued forwards but also downwards as well. Presently we realised that this tunnel would reach the far wall of the cave and to continue digging here would be getting no where rather slowly. Thus we abandoned this side tunnel and turned our attention once more on to the main original tunnel. Some members do however feel that this side tunnel will lead to the entrance but at present the air becomes very foul in there after only a couple of hours working. To arrest this would be to dig another passage from the entrance. This might have more than one result but as caves are caves, it would probably be a lot of work and energy expended for nought.

Work began again in the main tunnel in September. At this time we had dug out 95' and had reached a depth of 26½' or 114½ feet above sea level. The calcite floor here was found to be very soft and crumbly and quickly came away with the pick. It was not very thick either and soon the floor had been revealed to disclose more mud and clay. As the roof was so near, before any forward progress could be made, we had to dig down and again we reverted to our original practice of having a trench six feet deep (if one is going to be buried better do it properly).

The trench duly completed we again began digging forward, the clay that was dug out being passed forward and deposited in the abandoned side tunnel. At the present time (December) this new trench has been dug about 5' and the roof does seem at last to be levelling out, but we have had many false alarms like this before and so not too much hope must be placed on this.

Cooper's is still a subject of much

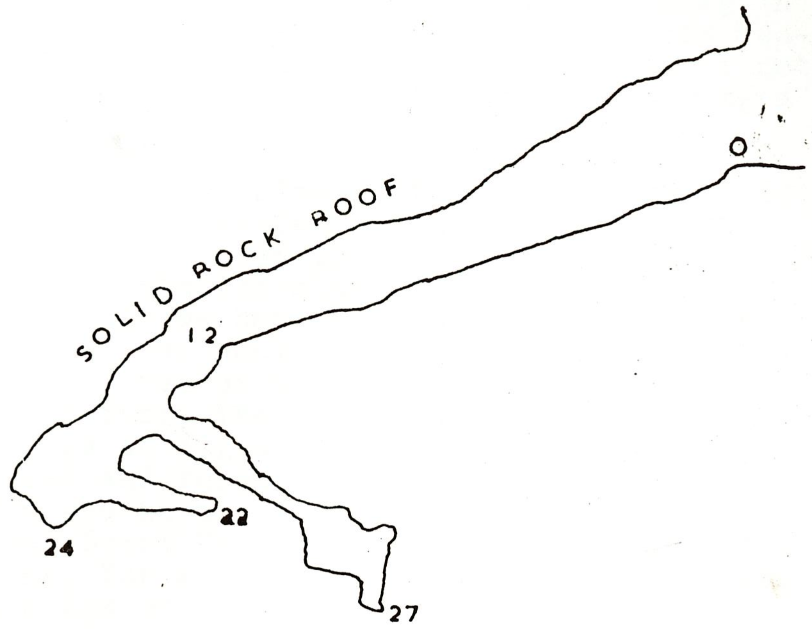


COOPERS HOLE

CHEDDAR GORGE

MENDIP CAVING GROUP-DIG

September 1959



PROJECTED ELEVATION

110° - 290°

Scale in Feet

Grade 6 by M.C.G.

discussion on Mendip amongst other clubs as well as our own. There does, however, seem to be apathy shown by some members and this must be dispelled at once. Members should realise that Cooper's is the most important dig on Mendip possibly in the whole Country at the present and whatever we find will give a 'yea or nay' to many theories propounded about Cooper's for many years. I feel sure that we shall break through into something in Cooper's in the near future and anyone on Mendip at that time and not at Cooper's shall not have that feeling of exultation of entering a new cave system.

In the last nine months a vast amount of work has been carried out at Cooper's. We have excavated over 100' of passage and removed many tons of clay and rubble. In achieving this we have had to rely on much outside help. We would like to thank all those who have given us assistance; in particular to our Patron, The Marquess of Bath for allowing us to dig and to Mr. Robertson for his interest and forebearance towards the Group. Others who have helped are the members of several Scout Groups, sundry members of R.A.F. Locking, The Mountain Club Stafford, together with a few other Mendip Cavers.

R. CHARNOCK.

MENDIP **July 4th - 5th 1959.**

Members Present:-

M.O. Cotter	A.J. Knibbs.
R.G. Knott	R.O.Charnock.

Visitors:-

G. Emery	J.Barker.
B. Ottewill	D.Dovaston.
A. Spain	P. Barker.

D. Mitchell.

Underground activities began during Saturday afternoon with a visit to Swildons Hole Upper Series. The party was led by Bob Knott and myself and included the visitors with the exception of Malcolm Cotter and Robin Charnock who arrived later in the day and Dave Mitchell who arrived the following day. We followed the long dry route down to the Old Grotto then continued down to the Water Rift and on to the head of the 40ft. Pot.

After a short halt for refreshments, we returned up the Water Rift turning off to follow the much depleted stream through the Active Stream Route. Slight difficulty was encountered at the 12ft. waterfall climb, the point at which Bob was forced to retreat due to his glasses becoming translucent instead of transparent. Accompanied by Arthur Spain, he returned to the surface via the Short Dry route.

The four of us remaining carried on

along the stream passage only pausing to sample the showerbath in a final rift before making our exit. The evenings activities included ladder climbing practice from the Beech Tree outside the cottage then followed the traditional pattern, although somewhat delayed.

On Sunday our energies were directed towards the Longwood Swallet/August Hole System. Two parties were arranged; Malcolm and myself leading a survey party into August Hole consisting of Barry Ottewill, Graham Emery, and David Mitchell whilst the remainder, under the leadership of Bob Knott, indulged in an exploration of Longwood Swallet.

The survey party, pausing only to ladder the first 10' pitch in Longwood and perform amateur acrobatics on the Fault Chamber Pitch of August Hole, made a rapid descent to the Stream Passage. At this point a slight detour was made to take a look at the first of the Upstream Chambers before pushing on to the end of the Stream Passage.

It was here that we established our point of origin and commenced our survey covering 135 feet of passage in 4 legs. Misting of the prismatic compass severely hampered progress and slowed down the proceedings in general. Before finishing surveying for the day Barry volunteered to climb up to a high level side-passage setting off a stalagmite flow of particular smoothness and freedom from hand holds. Having ascended a few feet the going became ultra-smooth, precipitating Barry down to the stream bed. A subsequent attempt by David was successful and the passage above us was described to have possibilities as a dig.

The stream was very low which enabled us to enjoy comparative dryness throughout the trip. The return journey was uneventful apart from the repeat performance of acrobatics at the Fault Chamber Pitch.

MIG.

A SURVEY OF GOATCHURCH CAVERN

The Cave of Goatchurch has been open for many years and has been visited by hundreds of cavers, although probably but few have explored its every passage.

Nicholas Barrington tells us in his 'Caves of Mendip' that the most accurate survey is to be found in 'Mendip Caves' (Balch). This survey we found to be very incomplete and, in places, inaccurate. Thus, it was that we set to work to produce a grade 6 survey of the cave.

Our team was composed of three, which number we found to be ideal. This consisted of a leader, who took the compass and clinometer readings, a recorder who noted all readings, besides setting up the sighting light on the second tripod, whilst the third man measured offsets and roof heights in addition to exploring the minor passages, with which Goatchurch is riddled.

We followed in the main the suggestions

outlined in British Caving although we found it a more practical proposition not to retain a constant tripod height, but to measure and record its height at each station. For this purpose we used a graduated plumb line. The best light for reading the instruments proved to be that of a candle.

The nature of the cave involved us in but few acrobatic feats. A ladder was used for simplicity on the Coal Shute and the Chimney at the end. The station set up at the end of Bloody Tight above the Terrace was extremely precarious, whilst going through the drain-pipe with helmet, compass, clinometer, tripod, measuring stick and end of tape, backwards, whilst taking readings was merely extremely awkward.

We aimed to work a six hour day underground with half an hour for lunch. Being Cavers the day started half way through and it was usually about 1 p.m. before we actually started work. Starting at the Old Entrance, the fact that after one day's work we could still see day light was undaunting though a little disconcerting. It soon became evident that if we were to complete the survey in the time at our disposal, longer hours would have to be spent underground. The survey was eventually finished after 5 days during which about 35 hours were worked. This made a total of 105 man hours which the time taken to draw the plan out etc., doubled. To anyone who believes himself possessed of an inexhaustable supply of that virtue patience, we thoroughly recommend this most enjoyable branch of caving.

May I now, treading in the steps of Boyd-Dawkins, Balch, Stride and Barrington, describe the cavern of Goatchurch thus:-

GOATCHURCH CAVERN

Total Depth 180feet   Total Length 2,420 feet.

The Cave may be reached by following the path up the Lower Twin Brook Valley until a wire fence is reached. Here take the left-hand path up the side of the Valley, passing the newer entrance on the left, a small hole under a low cliff. The old entrance is soon reached. This is a far larger opening which has been greatly reduced in size by artificial stonework placed there in the last century, together with a number of iron railings inside. All this in preparation for development as a show cave - a project which was later abandoned.

The cave descends in a series of steps with small passages going off on either side; the most extensive of which is the Badger Hole. At the bottom of the steps one finds oneself at the entrance to a richly decorated grotto. A passage on the right at roof height leads to a low long chamber. The way on is sharp left (North) down a steeply descending passage known as the Giants Staircase. After passing down several small potholes, the cave takes another sharp turn, this time westwards. The roof comes down now to three feet in places along this part of the cave that has been dug archaeologically. A fairly tight passage goes off at floor level on the right, known as Bloody Tight. This leads quickly down to

the lower series. All passages on the left now lead into the maze, which extends back under the Old Entrance. The Dining Chamber is entered, a chamber some 9feet in height and as wide, from which daylight from the easily accessible new entrance may been seen. Two passages leave the Dining Chamber to the North, the most easterly being the easiest route down the cave. The other is a very steep and slippery stalagmite slope known as the Coal Shute. It leads down into a very large chamber which descends and ascends very steeply. One part must go extremely near to the surface, whilst the lowest point may possibly lead to further passages if dug. Turning left at the base of the Coal Shute another maze is reached. Turning right and then left down the terrace, the other easy route is met and also the other end of Bloody Tight. The Boulder Chamber is now entered.

This is a long chamber some 16 feet high littered with large boulders, which give rise to many small and tight passages beneath. Three routes lead down to the Water Chamber; all through the floor near to the end of the chamber. Two of these passages, one of which is the Slide, meet halfway down. Leaving the Slide at this point a very beautiful Grotto may be entered with a sporting climb at roof height along a small passage. A hole in the floor provides a very difficult descent into the Water Chamber. Once at the bottom of the Slide the Water Chamber may be seen to be another steeply descending and ascending Chamber. To the North a passage stretches 65 feet and might provide a suitable dig. The Chamber also doubles back under the Boulder Chamber.

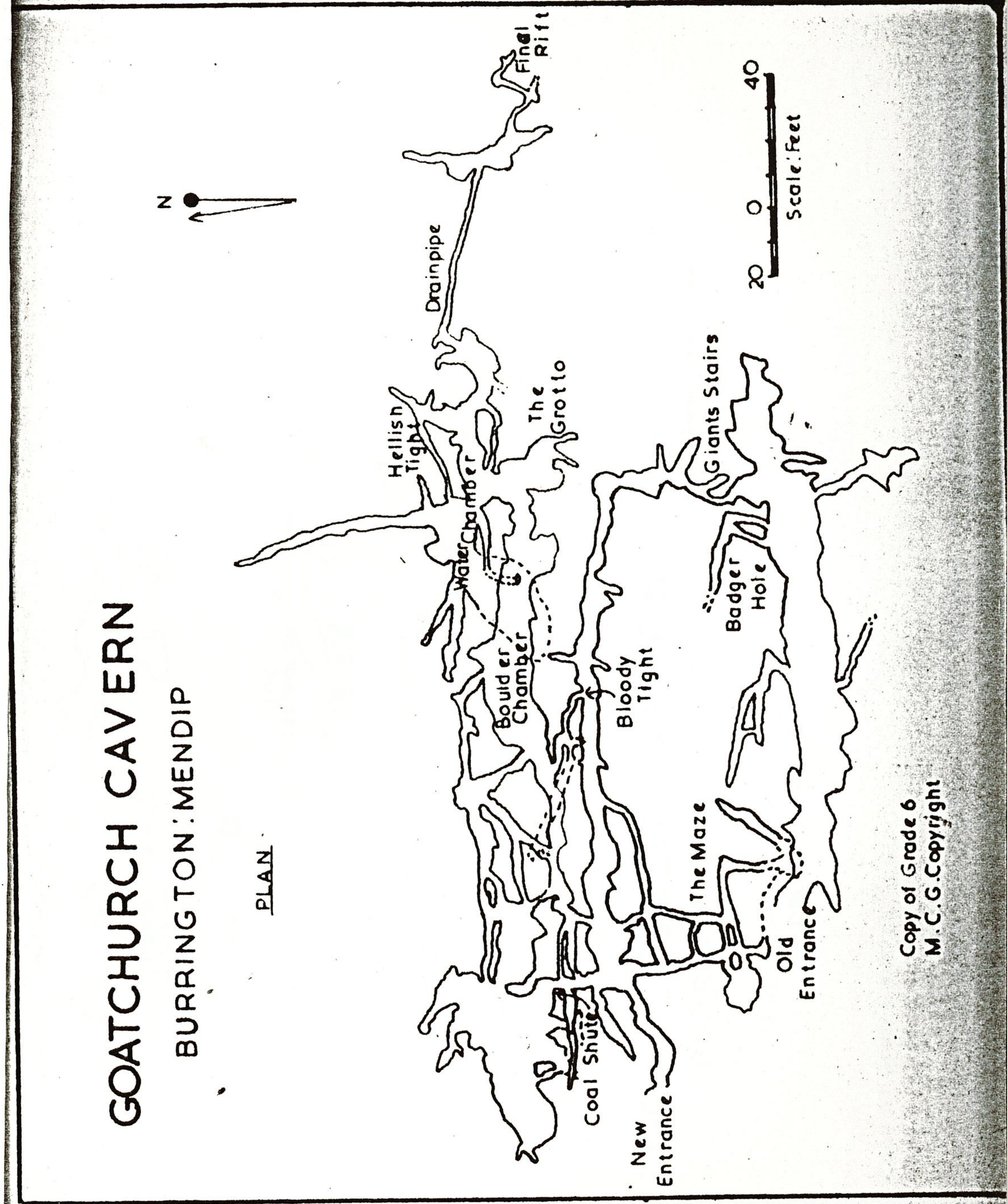
There are two ways out of the Water Chamber, one at the bottom of the Slide on the right, - this being the easier, and the other further down the eastern wall. The latter entails a very tight crawl and a steep drop and is known as Hellish Tight. Both lead into a small chamber from which a passage leads out over an awkward boulder into yet another small chamber. The way on is a tight crawl along a 39 foot "drainpipe." In one place it is only nine inches high. At the end the last chamber is reached. A hole in the floor at its lowest point may be descended for 13 feet to an impassable rift. In the wall, and opposite as you emerge from the drainpipe, there is a small passage at shoulder level. This may be followed for some 19 feet to a small chamber, just large enough to contain two people. Here the Final Rift provides a moderate descent, and a very difficult ascent. Another small chamber with a ten foot passage which becomes too tight to follow, marks the end of the cave.

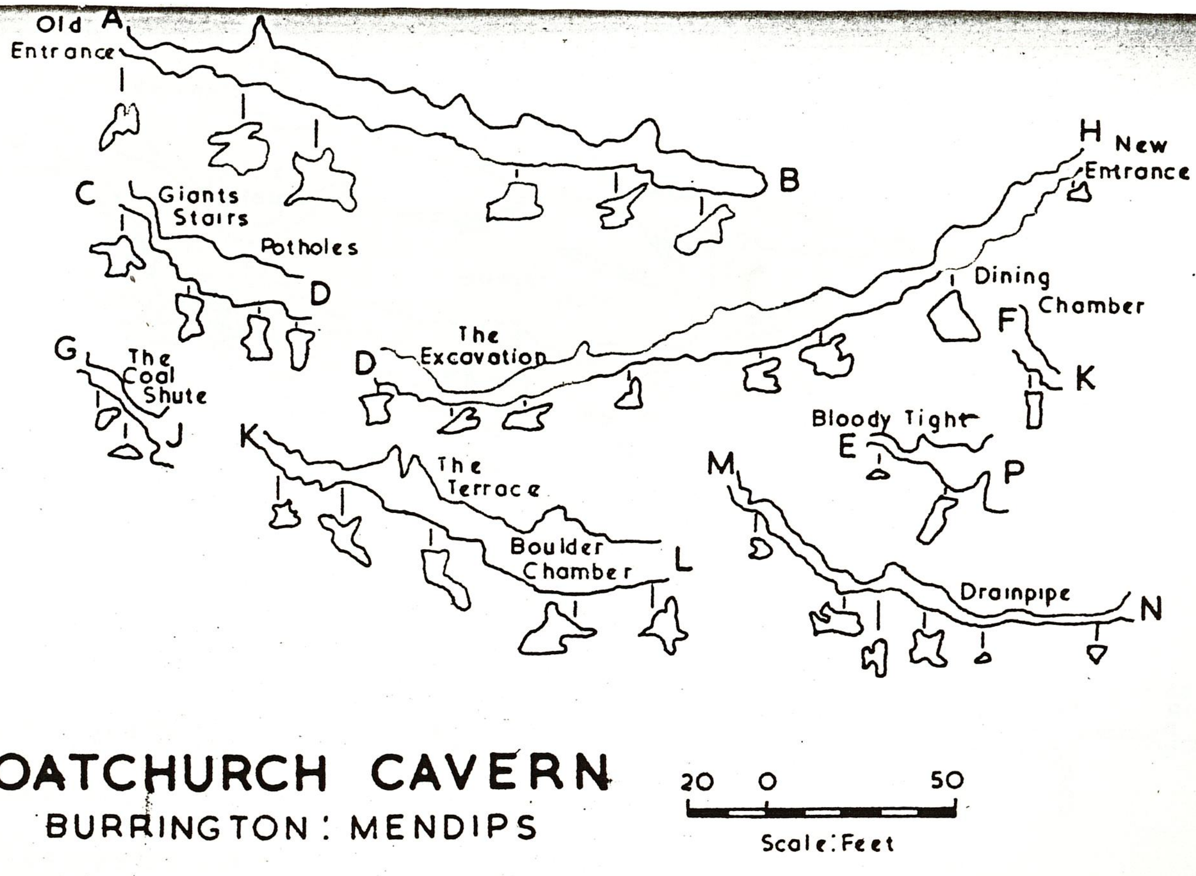
Equipment 20 feet of rope is useful for Coal Shute and 13 foot drop in final chamber.

Survey. Mendip Caving Group 6.

Editorial Note:- (Size - 20" x 30")

Reproduction of the survey may be obtained from the Editor, price 4s. 0d. for the three sheets. This includes post and packing.



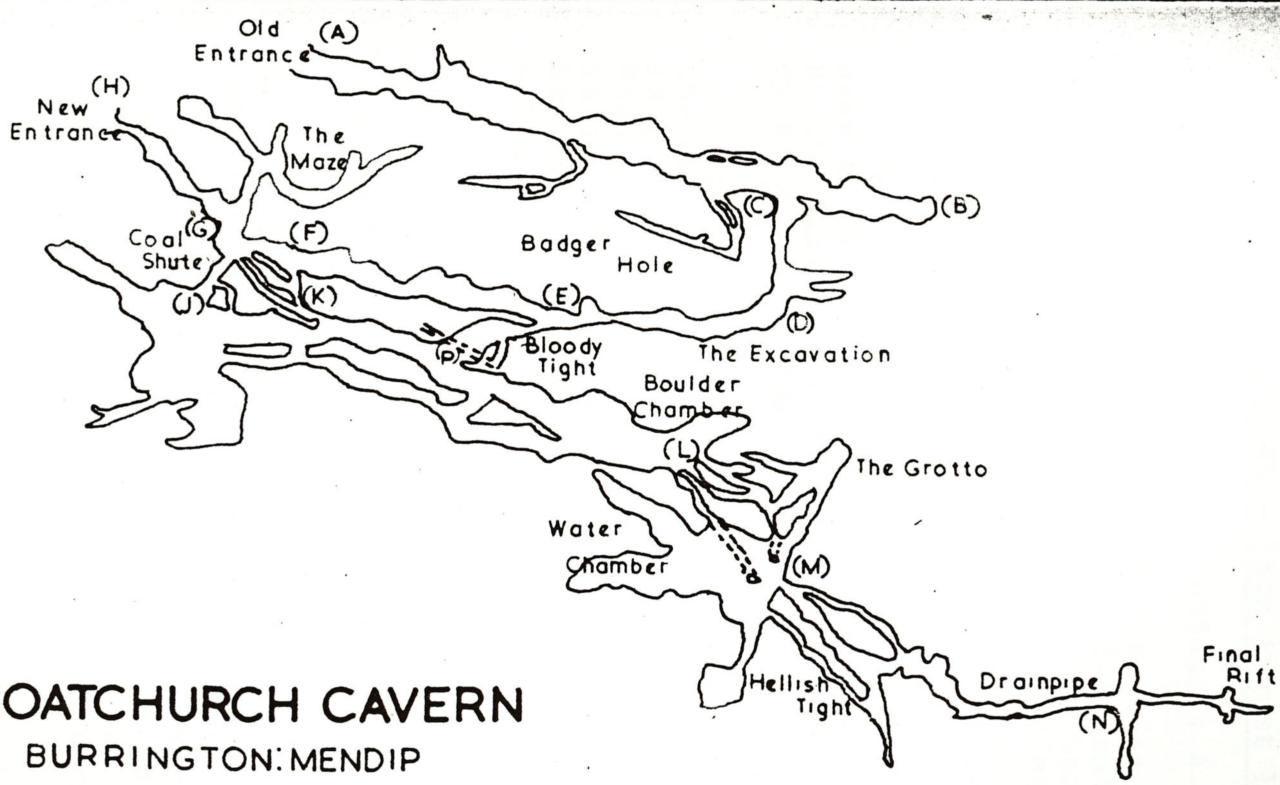


GOATCHURCH CAVERN

BURRINGTON : MENDIPS

TRUE LENGTH ELEVATIONS WITH CROSS SECTIONS

For letters refer to previous sheet



GOATCHURCH CAVERN

BURRINGTON: MENDIP

EAST-WEST ELEVATION

20 0 50

Scale: Feet

Copy of a Grade 6
by M.C.G. Copyright

Letters in brackets refer to next sheet

G. B. WEEKEND - 15th August 1959.

J. Green; P. Goddard; R. Goddard; A.Crawford.

We travelled down to Somerset on the 14th followed, we understand, by a desperate band of criminals who were armed with a box of Explosive Material, called tape recorder. This stuff was thrown at us all weekend but we all enjoyed it - it is wonderful what fine singers we have in our midst.

On Saturday, Richard rose early and went over to Mr. Tratman's house for the key of G.B. By the time he had returned, our party was ready to go down.

Once the four of us were in G.B. we took the ordinary route via the Devils Elbow. This is quite an easy route but not a beginner's. When you come to the chain section great care is needed to avoid losing skin on the way in. Coming out the section is a pure climb (a bridging chimney.)

Having reached the gorge we followed right down to the bottom first. We noted all the entrances on the way down also a maypole rope half hidden against a wall.

Our first move was a climb lead by John up a very steep rock face until we came to the base of some large slabs holding up a huge pile of lose rocks in a narrow rift. This opened out and rose until we were in the upper art galleries. Eventually we slipped into the lower series, which lead in turn to the beginning of the terrace. We turned off the terrace and followed the complete by-pass series which lead back to the natural bridge in the gorge; this we had originally gone under; this time we just walked over it and down to the floor of the gorge and out the same way as we had come in. This way over the bridge completely by-passes the ladder pitch in the floor of the gorge. This gives one a very good idea of the size of the by-pass series.

In this cavern we saw so many good formations that it would be hard to classify them, except to note the magnificent helictites.

Even though we have not agreed with the U.B.S.S. on many points of principle, we can only say in all truth that they have protected as far as we can see a magnificent cavern series.

TONY CRAWFORD.

THE POLICEMAN'S HOLE.

Around Juniper Hall field centre at Mickleham in Surrey, there are several places where the ground has collapsed. The most spectacular example took place in February 1947 before the eyes of the Village Policeman. A 30 foot tree, heavy with snow suddenly sank vertically into the ground and came to rest with its top twigs ten feet below ground surface.

The cylindrical shaft thus formed was not explored. During the first three days it was

steadily filling up with water from below, but even after this water drained away, fear of further collapse probably preserved the chasm from trespassers. In the course of the next eight or nine years the sides gradually crumbled and the debris infilled the central pit, so that the hole began to assume a cup-shaped form.

In 1956, after some researches into collapsed swallets in the Mendips, Miss Coleman of King's College turned her attentions to the Policeman's Hole. The hypothesis had been put forward by Mr. Fagg of Juniper Hall, that the collapse had been occasioned by the existance of an underground passage and finally triggered off by the extra weight of the snow on the tree. The roots of the collapsed tree would have plugged the passage and dammed back its stream, which consequently rose in the shaft. After three days it must have washed away an adequate outlet through the roots, through which it drained away. At this time it would have been easy to climb down the tree and verify the postulated cave. Nine years later it was impossible without serious digging.

The King's College party found the top of the tree projecting about two feet above the accu-mulated rubble, and began to sink a shaft beside it. At first they passed through an iron age layer, including a rowing machine, and several annual layers of leafmould and rubble. The rubble was derived from the Combe Rock of the walls of the hole, and continued down for about 9 feet.

At this point the tree trunk curved over to occupy the whole floor of the dig and a detour had to be made before vertical excavation could continue underneath it. Here the material proved to be a clean 8 foot sand allowing rapid progross, and a total depth of 15'3" was reached, still in sand.

The dig was abandoned as a result of Miss Coleman's departure to U.S.A. and not because any unpromising features had developed. On her return, eighteen months later, the students who were interested in the project had graduated and gone away. No labour force has subsequently been forthcoming, and it is hoped that some other speledogical Group will take up the challenge.

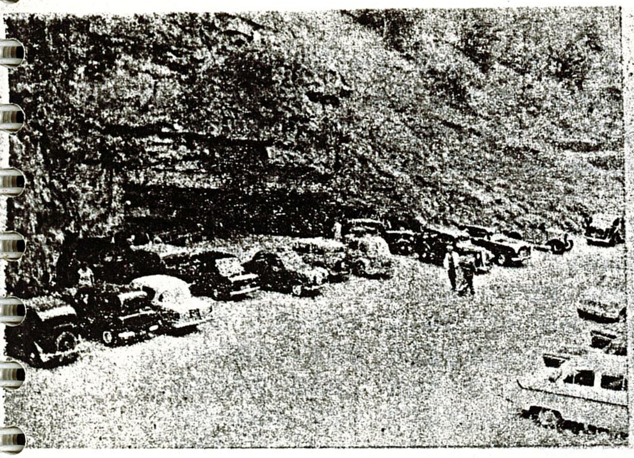
The Policeman's Hole has several attractive features from the point of view of a digging party. First, it is almost guaranteed to give results, since the tree is still in position to act as a direct guide into the cavity. Secondly the nature of the sandy fill, which was probably brought up from below when water rose in the shaft, makes digging easy. Thirdly, conditions are clean and dry. There is amply space for disposal of excavated waste, as the hole is immediately adjacent to a much older depression which is waste ground, and at a lower level.

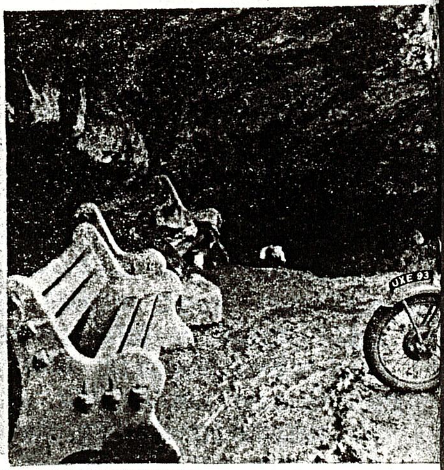
If a cave were discovered beneath the Policeman's Hole it should have extremely interesting features, as it would be in chalk, which underlies the Combe Rock. Caves in chalk are very rare, but they are most likely to exist where the relief is great and underground water can flow rapidly. The Mole Gap is just such an area. It is also a very beautiful environment in which to spend weekends with a digging party.

THE JUMBLE SALE

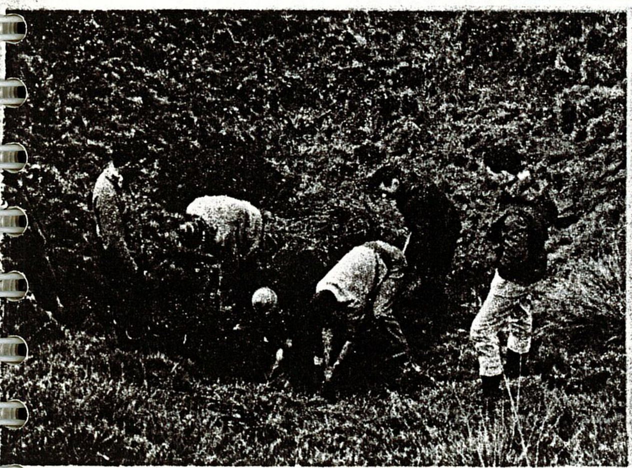
A SATISIFIED CUSTOMER

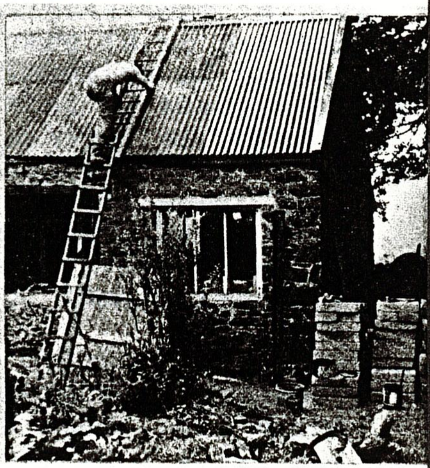
PICTURES BY:
M. COTTER
D. HARLE
A KNIBBS
D. SEARLE
R. WOOLLACOTT.





COOPERS HOLE





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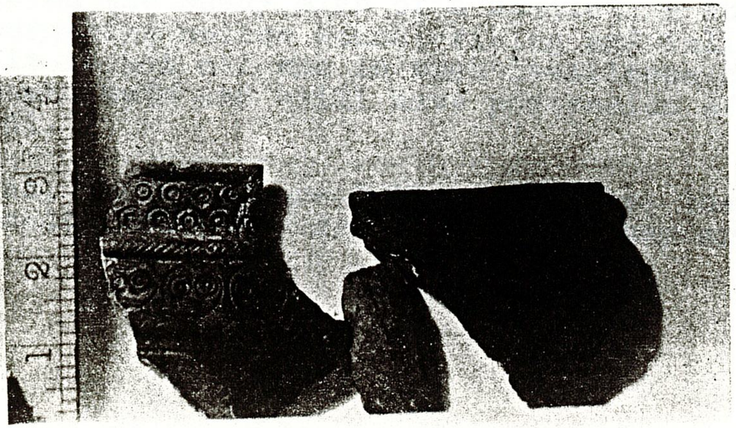

EDITORIAL NOTE:-

The Editor would like to extend his thanks to Miss Alice Coleman of King's College, University of London for the article on The Policeman's Hole.

MENDIP

Mendip, as one soon finds, as one trudges along its highways - for it has highways very definate, lonely, and walled with hedges of dry stone - or wanders along its indistinct tracts and byways, is a vast mountain tableland worn down by the countless centuries of time, meanly clothed with a shallow, poor soil; a lonely, windy place, a place of rolling and empty fields, of sudden and immense views, of a strange and grim enchantment.

For Mendip holds the secrets of man and civilisations older far than Rome. Measbury Camp, the lonely and forbidding Barrows on Blackdown, weigh upon one as nothing that Rome has abandoned here is able to do; they seem to speak to one of a life that is so old it is an agony to think of it, and they threaten us with their enormous wisdom: the vast labour which has ended in a few colossal heaps of barren earth. For upon the Mendips as upon no other mountains in the world, perhaps because few are as old as they, man and his efforts fade into nought; their futility is exposed by the emptiness of space and the passage of time. And if, as he will, the Wayfarer turns to the sky for assurance and for comfort that sky is so often an immensity of cloud, of large grey clouds hurrying no whither before the south-west wind, laden with the memory of the measureless ocean.

The loneliness of Mendip is a genuine loneliness. A man turns to the sky because he must; he is shut away there from the large and fruitful world he knows, the cities, the towns, the villages, and the ploughlands beneath him, not the height, but also the breadth and the flatness of that great plateau which the roads traverse so swiftly, anxious only to pass on their endless ways. One is caught as it were in an empty space, a featureless desolation, a solitude that is like no other solitude. And there is no one who has persevered in the exploration of these hills but has been astonished by their silence, the absence of trees, of cattle, of sheep, of all voices, and of the sound of bells, a sound one thinks, that might break the spell that lies over this desolate upland. Yet such a man will know that Mendip has voices and sounds of its own that are part of that silence.

For Mendip is hollow and full of secrets; secret springs, secret underground rivers whose courses may never be known, but whose voices one may hear suddenly on a still day as you lie on the shady side of a swallet, a curious murmuring hollow sound, rising and falling. It is not all who in such loneliness can bear such music and still have possession of his soul.

Yes, the hills are full of secrets; they are dreadful for they are very old; they are

full of caves where are mingled the bones of men and of beasts that are dateless; they are full of deserted camps and barrows which were built and used and defended by someone of whom we know nothing; every hill or headland is crowned with the work of man, work that was forgotten history by the time of the Romans. These remain. But the mines at Charterhouse, what is left of them? Where are to be found the religious houses of the Carthusians, Charterhouse a cell of Witham, and Green Ore a cell of Hinton? Nothing. It is though Mendip were outside History and Christendom.

And yet on a day of wind, a clear day after rain, this great plateau which a man fears almost as much as he loves is capable of giving him endless reward. On such a day Mendip awakes; the thin grass laughs like an old man in the sun, the rock shines with golden lichen, the lean woods are filled with the strength and the joy of the wind, and suddenly you find as you come up from the plateau on to a height such as Beacon Hill or Pen Hill or Westbury Beacon for example, all England is spread at your feet.

CAVING REGIONS

J.David Taylor, B.Sc

This is a brief resume of the various caving regions which have been explored in the Australian Commonwealth. It is not, naturally, a complete treatise, as exploration is far from complete. The Commonwealth includes, of course, not only the Australian for comfort that sky is so often an immensity of cloud, of large grey clouds hurrying no whither before the south-west wind, laden with the memory of the measureless ocean.

The loneliness of Mendip is a genuine loneliness. A man turns to the sky because he must; he is shut away there from the large and fruitful world he knows, the cities, the towns, the villages, and the ploughlands beneath him, not the height, but also the breadth and the flatness of that great plateau which the roads traverse so swiftly, anxious only to pass on their endless ways. One is caught as it were in an empty space, a featureless desolation, a solitude that is like no other solitude. And there is no one who has persevered in the exploration of these hills but has been astonished by their silence, the absence of trees, of cattle, of sheep, of all voices, and of the sound of bells, a sound one thinks, that might break the spell that lies over this desolate upland. Yet such a man will know that Mendip has voices and sounds of its own that are part of that silence.

For Mendip is hollow and full of secrets; secret springs, secret underground rivers whose courses may never be known, but whose voices one may hear suddenly on a still day as you lie on the shady side of a swallet, a curious murmuring hollow sound, rising and falling. It is not all who in such loneliness can bear such music and still have possession of his soul.

Yes, the hills are full of secrets; they are dreadful for they are very old; they are

full of caves where are mingled the bones of men and of beasts that are dateless; they are full of deserted camps and barrows which were built and used and defended by someone of whom we know nothing; every hill or headland is crowned with the work of man, work that was forgotten history by the time of the Romans. These remain. But the mines at Charterhouse, what is left of them? Where are to be found the religious houses of the Carthusians, Charterhouse a cell of Witham, and Green Ore a cell of Hinton? Nothing. It is though Mendip were outside History and Christendom.

And yet on a day of wind, a clear day after rain, this great plateau which a man fears almost as much as he loves is capable of giving him endless reward. On such a day Mendip awakes; the thin grass laughs like an old man in the sun, the rock shines with golden lichen, the lean woods are filled with the strength and the joy of the wind, and suddenly you find as you come up from the plateau on to a height such as Beacon Hill or Pen Hill or Westbury Beacon for example, all England is spread at your feet.

CAVING REGIONS

J.David Taylor, B.Sc

This is a brief resume of the various caving regions which have been explored in the Australian Commonwealth. It is not, naturally, a complete treatise, as exploration is far from complete. The Commonwealth includes, of course, not only the Australian

Continent, but Tasmania and the trusteeship territories of Papua and New Guinea.

Limestone occurrences are widespread, ranging in age from Protozoic to Pleistocene. This great variation in age implies a variety of limestone types and vast differences in the degree of effect from orogenic movements during this long period of time. These along with widely varying climatic conditions and topography have led to marked variation in the form of caves throughout the Commonwealth.

Caverniferous limestones of Protozoic age are confined to the Upper Protozoic of the Adelaidian Geosyncline. This is a 'hard rock' limestone (recrystallised) ranging in thickness from 50 ft. to 500 ft. At Melrose & Bundaleer Creek this limestone is inclined at more than 40 degrees but relatively thin, so that the caves have vertical entrance shafts leading to narrow elongated chambers. At Holowilena and Oraparinna the limestone is horizontal and the caves are developed along one bedding place, following a joint pattern which is perpendicular to the bedding. All these areas are in the Flinders Ranges (See map) which has a rainfall from 10 to 15 inches per year. These caves appear to have been formed by large quantities of running water, and may provide evidence to suggest that there were 'pluvial periods' during the Pleistocene.

Cambrian limestones are transgressive on the Protozoic rocks of the Adelaidian Geosyncline, ranging in type from pure limestones to dolomites, and containing thick

beds of intraformational brecciated limestones. At Curramulka, South Australia, these limestones are over 300 feet thick. Topographically, the town of Curramulka is in the centre of a drainage basin, while on a hill forming one side of this basin is a cave consisting of a complex maze of quadrille passages on many levels. These levels have developed along the bedding planes and the passages follow the rectangular joint pattern. This system is dry and dead, as it is almost completely isolated from any surface drainage water. Directly below the town is a 'wet' cave, with a vertical entrance shaft of 100' and high, narrow passages, following the joint pattern, but confined to one level. These passages are congested with an accumulation of bone-bearing cave fill. It would appear that the 'dry' cave is vadose in origin, its development ceasing upon its isolation from drainage, while the 'wet' cave is phreatic and is still developing.

Caves occur in the dolomites of possible Lower Cambrian age at Camooweal in N.W.Queensland. These beds are horizontal with the passages following the joint pattern. Rainfall is very low, but when rain does occur the area floods and large volumes of water flow through the caves down to the water table.

Much of the Eastern coast of Australia is composed of Paleozoic rocks deposited in the Tasman Geosyncline, which was active from Cambrian to Triassic times. Very little Cambrian limestone is present, and the Ordovician is mainly represented by dark, grapolitic shales, but limestones occur on the Western limits of the Geosyncline. Caves have developed in these at Cliefden, a dry area some 120 miles West of Sydney.

Some of the best known Australian caves ar in the Devonian and Silurian limestones of the Eastern coast, including Jenolan, Wellington, and Yarangobilly in N.S.W. Buchan in Victoria, and Hastings and Mole Creek in Tasmania. Generally speaking these limestones are structurally complex being greatly faulted and folded. They are of considerable thickness, made up of massive 'hard rock' often derived from reef-building organisms. The rainfall is generally from 30-40 inches per year and the country is generally mountainous - e.g. Jenolan 2,200 ft. and Yarangobilly 3,000 ft. The caves of these areas form extensive and complex syste with large chambers usually developed on severa levels, usually not controlled by bedding or other structural planes. The lower levels of these systems are usually in the form of stream passages, which often give access to chambers not otherwise open. Much current exploration consists of investigation of these passages by diving or other methods to endeavour to gain entry to new chambers. Spectacular arrays of spelian formation occur in most of the systems in these areas, and have led to their fame as tourist caves.

At Bungonia the Shoalhaven River has eroded out a gorge leaving a plateau 1200 feet above the floor of the valley. Here numerous vertical and near-vertical shafts have been explored, the deepest to date descending some 300 feet being filled to a varying depth with foul air. Considerable effort has been directed towards

establishing a connection between these caves and the effluxes in the valley floor, but so far without success. Similar caves have been reported in high limestone platea elsewhere in Eastern Australia but are in remote areas with very difficult access, so they have not been investigated yet.

Other extensive systems have been reported in the Devonian limestones of the Napier Range in the Kimberlys region of Western Australia, but again, these have not been visited by speleologists as yet.

Most of the marine Tertiary deposits are 'soft rock' limestones deposited in sedimentary basins in Southern Australia. The two major basins are the Eucla - the famed Nullarbor Plain - and the Murray Basin, extending through S.E. South Australia and Western Victoria.

The Nullarbor Plain is a very flat area, some 300 feet above sea level with a rainfall of some 2-3 inches per year. The surface limestone forms a relatively hard 'kunkar' cap above the softer material below. Once water penetrates this the softer limestones are easily dissolved and cave development is further assisted by the collapse of unsupported blocks in the roof. The result is the formation of very large chambers some extending down to the water table. Dimensions of some of these are:

Koonalda	1200'	x 100'	x 150'
Abrakurrie	1400'	x 100'	x 100'
Warbla	700'	x 80'	x 80'

The caves in the Murray Basin limestones are of a somewhat similar form, but much smaller, apparently due to a shallow water table at 100'. The best examples of these caves are at Naracoorte in South Australia. Caves have also developed in this area when rivers have cut across a joint plane. Punyelroo cave, on the banks of the Murray has a narrow entrance on the river bank with a tunnel extending for some 230 feet from the river. Other examples occur, not only along the Murray, but also on the Glenelg River.

Extensive exposures of Tertiary limestones also occur in Papua and New Guinea. Some of these are on elevated plateaux with numerous deep caves. The rainfall is extremely high - over 200 inches per year, with some of the fast flowing streams taking 'short cuts' through the limestone hillsides, forming huge tunnel-like caves. The difficulty of movement in this area has so far prevented exploration of any but the most accessible of these.

Along the southern coast of Australia are many consolidated Pleistocene sand dunes, composed of calcite sand with a little clay and silica. These dunes were formed when the withdrawal of the sea during the Pleistocene glacial epochs exposed calcite sand (the result of weathering of tertiary deposits) and the prevailing Southerly winds blew this inland. The present surfaces are hard while below the surface the limestone is soft, often almost to the point of being unconsolidated. Vast areas of caverns have formed in these dunes taking the form of a series of 'hills' and 'vallies.' Large dome-shaped chambers have formed on the 'hills' while the

'vallies' are low and often choked with boulders. The best examples of these occur at Kelly Hill on Kangaroo Island (South Australia) with others at Margaret River in Western Australia and in South-eastern South Australia.

Tunnel-like caves are also found in the Tertiary Basalts at Macedon and Skipton in Victoria.

Some Australian caves contain vast accumulations of red cave fill, in which there are an abundance of bones of Pleistocene marsupials. Many species of these were first described by Owen of the British Museum from material collected by Major Mitchell (1877) in the bone cave at Wellington in N.S.W. Aboriginal paintings, artifacts and other remains are occasionally found in caves, but not so often as supposed. Many of the so-called cave paintings are in semi-open rock shelters, usually in sandstones.

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EDITOR'S NOTE:-

The Editor wishes to thank the Australian Speleological Federation for this article, which has been taken from a Booklet which they prepared for distribution to delegates at the International Congress of Speleology held in Italy.

LIGHTING MISCELLANY

Every Caver, at some time or other, has experienced trouble with lighting equipment. Usually the outcome is a return to the surface fumbling with candles and matches or groping along passages with one's headlamp doing its own impression of a glow worm. Less frequently, serious accidents have occured due to lamp failure. Such events serve to convince us that whatever form of lighting we use it must be reliable and able to withstand the conditions to which it is subjected.

The choice of lighting equipment for use in caves is not as simple and straightforward as it may appear. One cannot yet walk into a shop and ask for a waterproof, anti-disaster shatterproof Cavern Lantern which means that we must purchase lamps not expressly designed for caving use but which will suit our purpose with or without modification. To facilitate this choice the following survey of lighting equipment comprising Acetylene Lamps, Electric Lamps and components suitable for the construction of home-made Electric Lamps has been compiled.

Comments and opinions, where included, are strictly those of the writer and should be accepted as such. It has proved impossible to include all the details of the equipment liste within the scope of this article. Further information such as pamphlets, handbooks and instruction manuals may be obtained on loan from the writer.

SECTION 1. Acetylene Lamps.

These sturdy and reliable lamps have long been established as an economical source of lighting amongst cavers. Of the two varieties of pattern, the cap lamp and the hand lamp, the cap lamp shall be dealt with first.

The addresses of the manufacturers whose products are listed will be found in alphabetical order in the appendix.

CAP LAMP TYPES

Daylight acetylene lamp.

Finish: Polished brass construction with plated brass reflector.
Specification: Brass wire helmet attachments. Push-in burner. Flint lighter mounted in reflector. Square section rubber sealing ring between Water Vessel and carbide container.
Price: 18s.9d.

Premier Acetylene Lamp No. 85

Finish: Matt brass construction with pressed aluminium reflector.
Specification: Brass wire helmet attachments. Push-in burner. Flint lighter mounted in reflector. Rectangular section rubber sealing ring between water vessel and carbide container. $4\frac{1}{2}$ hours burning time per $2\frac{1}{2}$ ozs. charge of carbide. Light output 12 c.p.
Height: $3\frac{3}{4}$ ins.
Weight: 6 ozs.
Price: 13s.6d.

Wolf No. 911 C Acetylene Lamp.

Finish: Matt brass construction with choice of 2½ ins, or 4 ins. dia. spun aluminium reflector.
Specification: Available with either brass wire or strip brass back hook helmet attachments. Push-in burner. Flint lighter mounted in reflector. Round section synthetic rubber sealing ring between water vessel and carbide container. 4-4½ hours burning time per 1½ ozs. charge of carbide. Light output 10 c.p.
Height: 3¾ ins.
Weight: 7¼ ozs.
Price: 11s. 3d.

Premier No. 64 Storm-Proof Inspection Lamp.

Finish: Brass water vessel-base with tinned steel carbide container and fittings.
Specification: Fully cowled burner with lens glass. Screw lifting bridle with carrying handle. 14 litre screw in burner; 10-12 hours burning time per 10 ozs. of carbide. Output 30 c.p.
Height: 11 ins.
Weight: 3 lbs 4 ozs.
Price:

Premier "Weardale" Lamp No. 65A

Finish: Brass water container with tinned steel fittings.
Specification: Eccentric lever lock bridle with carrying hook. 14 litre screw-in burner. 8 hours burning time per 6 oz. charge of carbide. Output 20 c.p.
Height: 8½ ins.
Weight: 1 lb 12 ozs.
Price:

Premier "Crescent" Lamp No. 87

Finish: Seamless brass stampings and stainless metal reflector.
Specification: Centre-screw lock and flint lighter. Forward burning 7 litre burner cap lamp style. Carrying hook and bracket at rear. 8 hours burning per 4 oz. charge of carbide. Output 12 c.p.
Height: 7 ins.
Weight: 1 lb. 3 ozs.
Price:

Acetylene lamps excel in dry cave conditions or caves not containing falling water. Additional water supply must be carried when a long stay in a really dry cave is planned. A simple addition to increase the scope of the lamp is the addition of a reflector cowl to guard against light spray to enable the lamp to be used in conditions of small quantities of falling water. Care should be exercised to ensure that the lamp flame does not come into contact with nylon life lines.

ACETYLENE HAND LAMPS

As handlamps find only limited support for their use in caves it will serve little purpose to deal with them at length. Due to the increase in the number of cave accidents and subsequent rescue call-outs it would appear advisable for clubs to have one or two of these lamps for emergency. A lamp having an output of 50 c.p. would be useful in the event of rendering medical assistance to an injured person underground.

HAND LAMPS

Wolf No. 60A

Finish: Tinned steel vessels with 5½ dia. brass reflector.
Specification: Lever lifting bridle, brass water regulating valve with ratchet control. 14 litre screw-in burner. 10-12 hours burning time per 9 ozs. charge of carbide. Output 25 c.p.

Height: $8\frac{3}{4}$"
Weight: 2 lbs. 14 ozs.
Price: £1.16.6d.

Wolf No. 60A M.P.H.

Finish: As for No. 60A but with completely cowled reflector with lens glass and milk pail carrying handle.
Specification: Basically similar to No. 60A. 10-12 hours burning time per 9 oz. charge of carbide with increased light output of 50 c.p.

Height: $9\frac{3}{4}$"
Weight: 3lbs. 4 ozs.
Price: £2. 15. 6d.

MAINTENANCE

The first requirement of any type of carbide lamp to obtain optimum performance is cleanliness. Always remove any spent carbide and pour away any water which may remain after use and wash out both containers with clean water. The filter pad should be dried to avoid rotting and occasionally washed or replaced as necessary. Reflectors must be kept in a clean and polished condition to avoid considerable decrease in light output. Burners will require occasional cleaning with the correct size burner

brush wire; strands of electric light flex are not recommended since they have a tendency to break off inside the burner. Threaded parts and the flint lighter spring benefit from a light application of Vaseline as also does the burner-brush, the individual wires of which may be cleaned of Vaseline with the fingers before insertion into the burner. This treatment will discourage rust and corrosion.

Remarks.

A burner brush should always be available preferably mounted on the lamp at some convenient point. It is advisable to carry a spare burner and also a small spanner or similar home-made device for removing and replacing defective burners.

If an expedition is of sufficient length of time to necessitate spare carbide being carried an excellent container may be obtained in the form of a carbide lamp base fitted with a screw lid. This enables the spent carbide to be brought out of the cave avoiding the need to bury the residue.

SECTION 11. Battery Lamps.

It will be noticed that cycle lamps and ordinary torches have been excluded from this section being deemed unsuitable for caving use. Burning times for the individual lamps may be approximately calculated from the graphs which appear in Section IV.

CAP LAMPS:

Ever Ready No. 4001

Specification: Battery box constructed of thin guage mild steel finished in silver/grey enamel. Headpiece chromium plated. Sliding switch on battery box. Headpiece lead is of plastic covered double wire.
Batteries: 3 Ever Ready U2 size in series.
Bulb: 3.6v 0.5A pre-focus.
Estimated duration:
Price £1.10s.6d.
N.B. This lamp is designed to serve several purposes i.e. a belt or button attachment for use when battery box and headpiece are worn as a headlamp set. Headpiece elastic band is removable to facilitate fitting headpiece to battery box and using as a carried handlamp. A bottom stand swivels out to enable the lamp to stand upright on the ground. Rather excessive gadgetry.

G.E.C. No. BA 618. Breast Battery Lighting Set.

Specification: Battery container of moulded neoprene; waterproof and containing a safety fuse. Headpiece, also of moulded neoprene, is fitted with armour plate glass and has a helmet clip for use with Miner's helmet. Switching is effected by rotating the lamp front. Cable is of "Cab Tyre" lay twin lead rubber covered heavy duty type. Body harness, belt and elastic headband are available.
Weight with Batteries: 3lbs.3 ozs.
Batteries: 3 Ever Ready U2 size.
Bulb: 3.5v 0.3A
Estimated Duration:
Price complete: £8. 10. 0d.
Price of Headpiece only: £2. 15. 0d.

N.B. Use of complete set is not entirely suitable due to short duration compared with accumulator sets and rather cumbersome nature of battery container. A Headpiece however, kindly donated by G.E.C. for experimental purposes, complete with cable, has proved most satisfactory under both wet and dry cave conditions. Strongly recommended for use with alternative or home-made electricity supply. The use of a fuse is advised as the replacement of the bulb (any M.E.S. Screw Type) requires the use of circlip pliers.

Wolf Headband Lamp.

Specification: Adjustable foam rubber lined headband with moulded bakelite headpiece. Battery clips on each side of headband. Switching effected by rotation of lamp front; with heavy lens type glass and plated reflector.
Batteries: 2 Ever Ready U2 type.
Bulb: Special half opal type.
Estimated duration: 6 - 8 hours.
Price complete: £1. 6s. 0d.

N.B. The exposed positions of the batteries made the complete set unsuitable for caving. The headpiece, however, may prove useful as a main or secondary helmet light when powered by an alternative light source. The two U2 cells could be attached at rear of helmet in a suitable housing.

R.A.F. Govt. Surplus Inspection Lamp.

Specification: Battery container and headpiece constructed of mild steel and finished in R.A.F. blue enamel. Headpiece attached

by an elastic strap; battery container is fitted with belt clip; lead comprises rubber covered twin cable. The reflector is usually painted white.
Battery: Ever Ready No. 15 As Bell Battery but with strip-brass contacts.
Bulb: 3.5v or 4.0v 0,3A M.E.S. cap.
Estimated duration: 6 - 7 hours.
Price: Varying 2s.6d. for headpiece only to 7s.6d. for complete set depending on supplier.

TORCHES

G.E.C. No. 6060 Safety Torch.

Specification: Constructed of cast aluminium finished in grey enamel. Front lens of armour plate glass. Heavy duty labyrinth type switch. Torch casting incorporates an interior battery case.
Weight: 1 lb.14 ozs. with batteries.
Size: 10¼ ins. x 3¼ ins.
Batteries: 3 Ever Ready U2 size or equivalent.
Bulb: 3.5v 0.3A M.E.S.
Price: £1. 17s. 6d.

G.E.C. No. 6061 Underwater Torch.

Specification: Constructed of cast aluminium and bakelite impregnated to withstand 50 lbs. per square inch pressure. Protected armour plate glass and labyrinth type switch. Suitable for use in fresh or salt water to a depth of 100 feet.
Weight: 1 lb.14 ozs. with batteries.
Size: 10⅞ ins. x 3¼ ins.
Batteries: 3 Ever Ready U 2 size or equivalent.
Bulb: 3.5v 0.3 A
Price: £2. 9s. 9d.

CEAG UNIVERSAL SAFETY TORCH.

Specification: Solid drawn brass body heavily chromium plated. Guarded armour plate glass with focusing bulb. Rotating switch at the base. Available in either 2 cell or 3 cell sizes.
Weight: 2 cell type 1 lb. 7 ozs.
3 cell type 1 lb.11 ozs.
Batteries: 2 or 3 Ever-Ready U2 size or equivalent.
Bulb:- 2 cell type 2.5 v. 0.3A
3 cell type 3.5 v. 0.3A
Price: 2 cell type £2. 4s. 0d.
3 cell type £2. 5s. 0d.

OLDHAM "TUBA" SAFETY TORCH

Specification: Constructed of heavy guage chromium plated brass. Armour glass protected lens and screw-type switch. Available in either 2 cell or 3 cell size.
Batteries 2 or 3 Ever-Ready U 2 size or equivalent.
Price 2 cell type. £1. 9s. 0d.
3 cell type. £1.10s. 6d.

HAND LAMPS.

Ceag Type BE 3 (Class 1)

Specification: Constructed of burnished copper with guarded armour plate glass. Supplied with either an accumulator or a 4.5 v dry battery giving approximately 3 hours continuous burning time.
Weight: 2 lbs 3 ozs. Battery included
Battery: 4.5 v.
Price: £4. 17s. 6d.

Ceag Type BE 3

Specification: As above but with unguarded armour plate glass and can be fitted with signalling device in the lamp top to show a red, green, or white light.

SECTION III Accumulator Lamps.

Although criticized for their weight, bulk and necessity for charging these lamps are tough and quite reliable, giving a very good light for up to 12 hours. The majority of these lamps are manufactured to Mining Industry specifications and give excellent results in all cave conditions.

The initial cost of these lamps is high compared with an acetylene or dry battery lamp but one must take into account that a Miner's Lamp will last a lifetime and will incur very little running cost. Maintenance and charging present only minor difficulty. A suitable charger can be made for about £2. or under.

Both cap lamps and hand lamps are mentioned in the following list. Of these the cap lamp is of most interest where general caving is concerned. The handlamps being of more potential use as rescue standby lamps or for other emergency purposes.

CAP LAMPS.
Ceag No. CgL.1.

Specification: A lead 3 cell acid battery in a moulded neoprene case with stainless

steel lid and headpiece. Leather carrying belts are available for all Ceag caplamps.
Weight: 5 lbs. 12 ozs.
Burning time 10 hours.
Charging rate: 1.5 A for 8 hours.
Price: £5. 12. 6d.

Ceag No. A5.

Specification: An alkaline 2 cell battery in a stainless steel case. A choice of 2 headpieces is available one in stainless steel, the other in bakelite. This is the lightest Miner's lamp available.
Weight: 4 lbs. 4 ozs.
Burning Time 11 hours
Charging rate: 1.5A for 8 hours.
Price. £7. 2s. 6d.

Ceag A7.

Specification: As above but with a 3 cell battery
Weight: 6 lbs 8 ozs.
Burning Time 12 hours.
Charging rate: 1.75A for 8 hours.
Bulb: Bakelite headpiece - 3.75v 1.0 amp. double filament krypton filled.
Stainless steel headpiece - 3.6 v. 1.0 amp single filament Kypton filled.
An emergency pilot bulb can be fitted.
Price £8. 19s. 6d.

Edison Model 'L'

Specification: A 3 cell Nickel Iron alkaline battery in pressed steel case. Moulded bakelite headpiece with armour plate glass and semi-matt aluminium reflector. 3 position

rotary switch in headpiece.
Weight: 5 lbs.
Burning Time: 10 hours.
Charging rate 2A for 10 hours.
Bulb: 3.6v 1.0/0.5 A or 3.75 v 1.0/1.0A
double filament bulb with B 15d/17 cap.
Price: £7. 6s. 5d.

Nife NC113C

Battery: Three-cell Nickel/Cadmium with alkaline electrolyte housed in a stainless steel case with belt attachment.
Headpiece: Lightweight moulded bakelite with either a matt or polished aluminium reflector. Fitted with a rotary switch.
Bulb: Main 3.6 volts 1.0 amp.
Pilot 4.0 volts 0.3 amp.
Burning time 10 hours.
Weight 5 lbs. 15 ozs.
Charging Rate 1.75 amp for 8 hours at 4.2 to 5.4 volts per battery.
Price: £7. 5s. 0d.

Oldham Type G.W.

Specification: 3 cell alkaline battery in moulded neoprene case. Headpiece of moulded plastic with separate main and pilot bulbs. Belt supplied with lamp. A choice of either matt or polished aluminium reflector is available.
Charging rate: 0.8 A for 20 per cent. longer than period of discharge.
Price: £5. 3s. 6d.

Wolf 830 CR.

Specification: 2 cell alkaline Nickel/Cadmium

battery in steel case. Headpiece in steel. Central vertical cable exit from battery case.
Charging Rate: 2.5A for time discharged.
Bulb: 2.5v 1.25A
Price: £8. 12s. 0d.

CONCORDIA No. SCL/5

Specification: 2 cell battery.
Weight: 5lbs. 6 ozs.
Charging Rate: 2.0A for 8 hrs.
Price: £4. 10s. 0d.

HANDLAMPS

As in the case of acetylene handlamps these mining type handlamps would perhaps be best employed as emergency lights and for rescue work. These lamps have all been approved either by the Ministry of Fuel and Power or by the Ministry of Transport and are of tough, reliable design.

Ceag Type: BE3 (Class 1)

Specification: Constructed in burnished copper with jellac 2v. lead acid accumulator. Guarded armour plate glass, non-magnetic.
Weight: 3lbs.
Burning Time: 5 hours.
Charging Rate: 0.75 A for 8 hours.
Price: £5. 12s. 6d.

Ceag Type 2v Inspection (Class 1)

Specification: Constructed in brass with 2v jellac lead acid accumulator. Guarded armour plate glass, non-magnetic.
Weight: 6 lbs.

Burning Time: 10 hours.
Charging Rate: 1.5A for 8 hours.
Price: £5. 6s. 0d.

Nife NH 07

Specification: Essentially a miner's cap lamp arranged with head piece attached to battery case. Cable is consequently shorter and leather handle is attached. 3-cell alkaline nickel/cadmium battery in stainless steel case. Toughened plastic headpiece with armour plate glass. Separate main and pilot bulbs.
Weight: 5 lbs. 4 Ozs.
Burning Time: 7 hours.
Charging Rate: 1.25A for 8 hours at 4.2-5.4 volts per cell.
Price: £6. 0s. 0d.
Bulb: Main 3.6v 1.0A Pilot 4.0v 0.3A

Nife NH 113

Specification: As for NH 07
Weight: 5 lbs 11 ozs.
Burning Time: 10 hours.
Charging Rate: 1.7A for 8 hours at 4.2 - 5.4 volts per battery.
Price: £7. 5s. 0d.
Bulb: Main 3.6v 1.0A Pilot 4.0v 0.3A

Nife NG 7

Specification: Steel case containing alkaline nickel/cadmium battery. Safety fuse contained in each terminal. Guarded glass with focus-ing device.
Weight: 6lbs. 8 ozs.

Burning Time: 5-6 hours with 1.0A bulb or 11 hours with 0.5A bulb.
Charging Rate: 1.5A for 8 hours at 2.8-3.6 volts per battery.
Price: £7. 15s. 0d.
Bulb: 2.5v 1.0A or 0.5A

Oldham Tanka II

Specification: Guarded glass and available with either a matt or polished aluminium reflector.
Burning time: 8 hours.
Charging Rate: 0.9A for 20 per cent longer than discharged.
Price: £5. 13s. 0d.

Wolf No. 641 Inspection.

Specification: A two-cell sealed nickel cadmium battery in cadmium - plated steel case. Fitted with spring controlled screw-type switch and folding handle. Available with matt aluminium or polished chrome-plated reflector. Unprotected glass.
Size: 3½ ins. x 3 ins. x 5 ins. high.
Weight: 4 lbs 8 ozs.
Burning Time: with 1.0A bulb 6-7 hours. with 0.75A bulb 9-10 hours.
Charging Rate: At double the current marked on bulb for same time as lamp has been discharged.
Bulb: 2.5v 0.75A or 1.0A Krypton filled.
Price: £7. 0s. 0d.

SECTION 4. COMPONENTS FOR HOME CONSTRUCTION OF LAMPS.

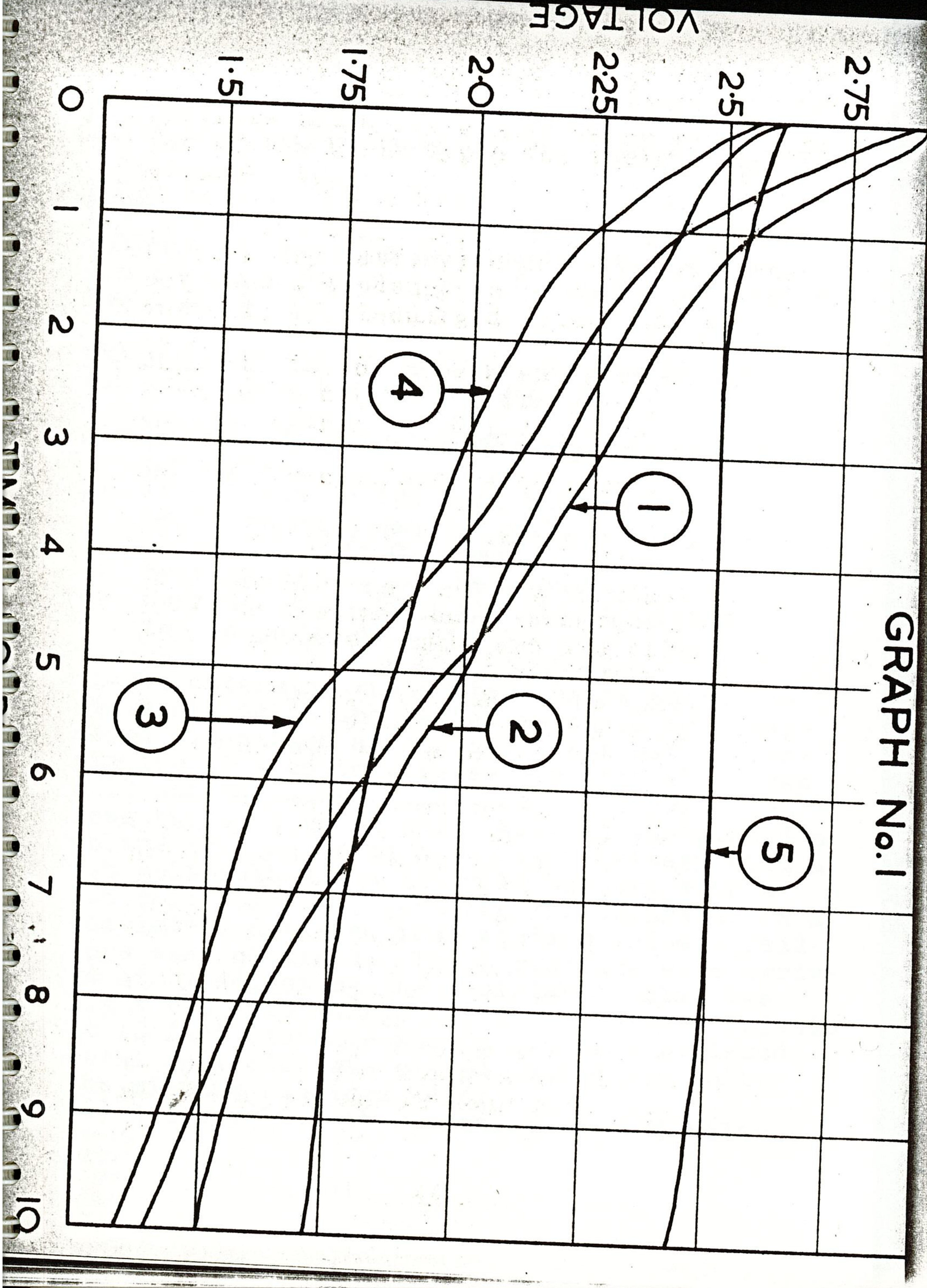
A. POWER SUPPLY

Portable lamps for use in caves rely on batteries of two basic types for their source of electricity.

(i) Batteries consisting of primary cells (i.e. a dry battery) which are not rechargeable but show a tendency to partially recover their capacity if discharged intermittently. In the case of the standard types of dry battery the capacity is not conveniently expressed in ampere/hours due to the irregularity of the discharge curve. The Kalium cells and Mallory cells show a more stable discharge curve and may be given an ampere/hour rating.

(ii) Batteries consisting of secondary cells (i.e. a Nife Accumulator) which are re-chargeable but show no tendency to substantially recover on intermittent discharge. Secondary batteries or accumulators are filled with either a liquid or jelly electrolyte which is either acid or alkaline. The capacity of an accumulator is always expressed in ampere/hours the discharge curve being very stable.

Before embarking on a list of the above types of batteries it would be as well to explain the term "ampere/hours". This expression is best clarified by an example. An accumulator rated at 10 ampere/hours (10A.H.) will deliver 1 amp for a period of ten hours by which time the potential (volts) will have fallen to a figure below which the accumulator is considered discharged. In certain cases an hourly rate may accompany a quotation of ampere/hours. For example an accumulator rated at 6 A.H. at the 12 hour rate gives most satisfactory usage when discharged over a period



of 12 hours at a current drain of 0.5 amps. which is the current drain for which the accumulator is intended. Unless an indication of optimum current drain in amps. can be obtained from a quotation of hourly rate it may generally be assumed, in the case of mining lamp accumulators and others of similar size, that a current drain of 1 amp. can be considered satisfactory. To discharge an accumulator at a current greater than that for which it is intended will result in a loss in capacity. This means that an accumulator designed to give 1 amp. for 10 hours (10A.H.) will not deliver 10 amps. for 1 hour but rather, for appreciably less than 1 hour.

DRY CELLS AND BATTERIES.

Standard dry cells and batteries as manufactured by G.E.C., Ever-Ready, etc., are a well-known, cheap and easily available range of products. The dimensions, initial voltages and prices are easily obtainable and hence merit no special reference.

Less familiar are the output figures for these products of which discharge curves for several popular batteries and cell combinations can be seen in Graph 1 (3.0 volt systems) and Graph 2. (4.5 volt systems) These results were obtained using Ever-Ready products with two exceptions - a twin-cell Ray-O-Vac battery and two ex-Admiralty inert cells (dated 1941).

GRAPH 1. In all cases discharge was through a 2.5 volt. 0.3 amp bulb.

1. Ray-O-Vac No. 9LP Twin cell battery.
2. Ever-Ready U2 Cells. Two pairs parallel in series.

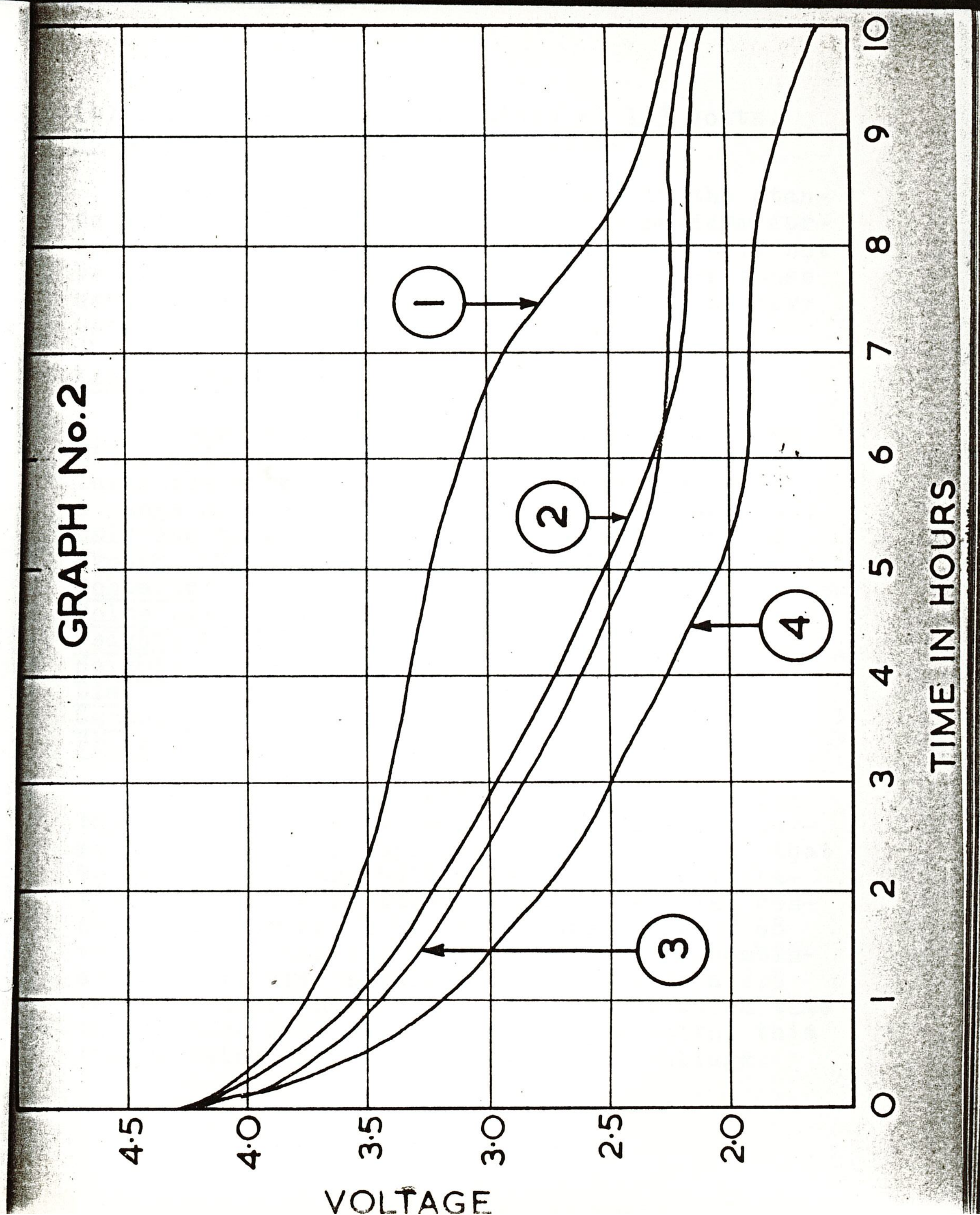
3. Ever-Ready No. 800 Twin cell battery.
4. Ex-Admiralty Inert Cells. Two in series.

NOTE: Modern equivalents for the inert cells are G.E.C. 4932 or Siemens 59. Dry cell equivalents of the same dimensions (4.375 ins. x 1.5 ins. x 1.5 ins) are G.E.C. 4949 and Ever-Ready B.27.

GRAPH 2. Except in one case as stated discharge was through a 4 volt 0.3 amp. bulb.

1. Ever-Ready U2 Cells. Three pairs parallel in series.
2. Ever-Ready No.126 Bell battery. Up to $5\frac{1}{2}$ hours bulb was 3.5 volt 0.3 amp. after which 2.5 volt 0.3 amp.
3. Ever-Ready No. 126 Bell battery.
4. Ever-Ready No.1289 flat torch battery. Two in parallel.

To determine the voltage below which the above dry cells and batteries could be considered discharged an apparatus was set up consisting of a battery in series with which was a 10 ohm variable resistance and a bulb. Across the bulb in parallel with it was placed a voltmeter. By using a 4.5 volt battery with a 3.5 volt bulb and a 3.0 volt battery with a 2.5 volt bulb and operating the apparatus in a completely darkened room minimum voltage readings were obtained. These readings were arrived at by adjusting the resistance until the light was just sufficient to illuminate objects at 10 feet distance when a 2.5 ins. polished metal reflector was placed behind the bulb. The minimum readings were:-
(a) A 3.5 volt bulb operating at 1.75 volts



(b) A 2.5 volt bulb operating at 1.3 volts.
NOTE: Both bulbs rated at 0.3 amps.

When choosing a bulb to use with the standard dry cells and batteries a safe maximum current rating is 0.5 amps. This figure should not be exceeded. Minimum voltage ratings are those used above: 3.5 volt bulb with 4.5 volt battery and 2.5 volt bulb with 3.0 volt battery.

KALIUM CELLS.

These are manufactured by Buondept-Vidor Ltd., and have greatly improved output characteristics as compared with standard dry cells. A range of these Kalium cells are available but only one type is suitable to power a lighting system. This is the Vidor V.0107.
Contacts: Cap positive, case negative.
Volts per cell: 1.34
Weight: 0.78 ozs.
Height: 1.985 ins.
Dia. 0.555 ins.
Capacity: 2.0 ampere/hours.
Price: 2s.6d. each cell.

Judging by the information available for this cell it would appear that the maximum current drain is 0.1 amps per cell which means that to power a 0.3 amp bulb we should use combinations of groups of three cells in parallel connected in series, i.e. two groups giving 2.68 volts comprising six cells total. This combination would give a very good light with a 2.5 volt 0.3 amp. bulb for 12-14 hours by which time the voltage will have fallen to 1.8 volts, this figure being the specified terminal voltage.

These cells are similar in conception to the ordinary standard dry cell i.e. Ever-Ready U 2 etc., thus requiring spring contacts to form cells into a battery. Soldering contacts to these cells is not advised.

MALLORY CELLS

Manufactured by Mallory Batteries Ltd., these cells are undoubtedly the most efficient of the primary or dry cell range. Although initially expensive they prove to be the most economical cells in the long run. Strongly recommended for circumstances where no facilities for charging accumulators exist but where accumulator-type characteristics for output are required. Several cells from the Mallory range would prove of service in lighting equipment but one in particular, the RM.42R, stands out as being eminently suitable for our purpose.

Contacts: Cap positive, case negative.
Volts per cell: 1.35
Weight: 5.85 ozs.
Height: 2.375 ins.
Dia: 1.25 ins.
Capacity: 14000 Milliamp/hours.
Price: 12s.3d. each cell.

Although the manufacturers recommend a maximum current drain of 1000 milliamps (1 amp) the cell will not give of its best at this output. According to the information supplied by Mallory Batteries Ltd., the hours of service after which the voltage of the cell drops below 0.9 volts are as follows:-

(a) Current drain of 1 amp for 7 hours.
(b) *Current drain of 0.5 amp for 24 hours.*
(c) *Current drain of 0.3 amp for 50 hours.*

In accordance with these figures it follows that two of these cells connected in series and giving 2.7 volts would light a 2.5 volt 0.3 amp bulb for 50 hours which works out at less than 6d. per hour. Another combination could be three cells giving 4.05 volts lighting a 4 volt 0.65 amp. Krypton filled bulb for about 18 hours; more expensive but giving a first rate light output.

These cells can be fitted with nickel-plated contacts at one penny per contact. Their similarity to the popular Ever-Ready U2 cell renders them suitable for directly replacing the U2 cell in torches etc.

Rechargeable Accumulator Cells
Venner Silver-Zinc Accumulators

Manufactured by Venner Accumulators Ltd., these accumulators are available in two ranges. Those prefixed by letter "L" are meant for considerably lower discharge currents than those prefixed by letter "H"; the latter type being most suited to our purpose. The cells are constructed of perspex and are able to with-stand a great deal of rough treatment. Contacts are by means of threaded terminal posts with two nuts at each.

Capacities stated in Fig.1. in ampere/hours are at the 10 hour rate. Discharge curve characteristics are slightly more erractic than most accumulators. For output data and prices see Fig. 2. Charging rates identical to the recommended discharge current drains to 2.1 volts per cell. Dis-tilled water must be added occasionally to bring electrolyte up to correct level.

FIG.1.

Type	Weight	Length	Breadth	Height
H 105	1.125 ozs	0.625"	1.125"	2.0"
H 4	3.75 ozs	0.797"	1.656"	3.313"
H 705	4.5 ozs	0.813"	2.063"	2.938"
H 15	8.0 ozs	0.75"	2.313"	4.813"

FIG.2. Output data and prices:-

Type.	Cap.A/H	Nom.Volt.	Recommended Max.Current Drain.	Price.
H 105	1.5	1.5	0.15 amps.	£1.5.0.
H 4	4.0	1.5	0.4 amps.	£1.17.6d.
H 705	7.5	1.5	0.75 amps.	£2.9.6d.
H 15	15.0	1.5	1.5 amps.	£3.5.0d.

DEAC Perma-Seal Accumulators.

These are a German product sold in Britain under licence by G.A.Stanley Palmer Ltd. As the title suggests these accumulator cells are completely sealed and are made on the nickel/cadmium principle and constructed in nickel-plated steel cases. The accumulators listed in Figs. 3 and 4 do not represent the complete range of these products but are the only types suitable for cave lighting systems.

Charging rates are at currents equal to t. recommended discharge currents for 14 hours.

These cells are considered discharged when the voltage on load falls below 1.1.

FIG. 3.

Type.	Height.	Length.	Width.	Wt.in lbs.
D2	2.4"	1.36"	1.36"	0.37
D3.5	3.38"	1.36"	1.36"	0.57
D4.5	3.15"	1.72"	2.0"	0.77
D6	3.7"	1.72"	2.0"	0.95
D7.5	4.25"	1.72"	2.0"	1.1
D11	4.88"	1.03"	3.54"	1.7
D15	4.88"	1.34"	3.54"	2.1

FIG.4 Output data and prices

Type.	Cap.A/H.	Recommended Max.current drain.	Nom.Volt.	Price.
D2	2	0.2 amp.	1.22	28s.0d.
D3.5	3.5	0.35 amp	1.22	32s.9d.
D4.5	4.5	0.45 amp.	1.22	43s.4d.
D6	6	0.6 amp	1.22	47s.2d.
D7.5	7.5	0.75 amp.	1.22	51s.9d.
D11	11	1.1 amp.	1.22	63s.9d.
D15	15	1.5 amp.	1.22	77s.3d.

One further type of DEAC cell which could be used is the BD 2.5 which is a cylindrical shaped cell rather similar to an Ever-Ready U2 dry cell in proportion and size. The only information available at present is that its capacity is 2 ampere/hours and its price 29s.3d.

The DEAC range of cells can be purchased as batteries containing the appropriate number of cells to deliver 6, 12, 18 volts. This costs 25% extra to price of cells used.

VOLTABLOC ACCUMULATORS

These French products are retailed in Britain by Cadmium/Nickel Batteries Ltd. The cells are built in steel on the nickel/cadmium principle and are becoming widely used in aircraft equipment. The accumulators mentioned in Fig.5. are those of the Voltabloc range which are of most use in cave lighting equipment.

Two cells of the Vo-9 type were kindly donated by Cadmium/Nickel Batteries Ltd. for test purposes. These were mounted in an alumimium alloy case and have proved very successful during tests carried out over the past eight months.

FIG.5.

Type.	Height.	Length.	Width.	Wt. in Ozs.
VO-4	3.0"	2.36"	0.6"	7.4
VO-7	3.85"	2.2"	1.08"	14.5
VO-9	4.05"	3.55"	0.6"	14.8
VO-15	4.55"	2.95"	1.12"	26.5

FIG.6 Output data and prices:-

Type.	Cap.A/H.	Rec.Max. Cur.drain.	Nom.Volt.	Price.
VO-4	4	4 amps.	1.2	-
VO-7	7	7 amps.	1.2	-
VO-9	9	9 amps.	1.2	£3.0.0.
VO-15	15	15 amps.	1.2	-

NOTE:- Prices not stated are obtainable from Cadmium/Nickel Batteries Ltd.

A general idea as to the output characteristics of the VO-9 when discharged through a 2.5 volt 1.0 amp bulb will be found on Graph 1. listed as curve No.5. This form of curve may be expected from most accumulators (including Miners Lamp Accumulators) when the discharge current is at its optimum value.

Although these cells are capable of delivering up to ten times the recommended maximum current drains quoted, to exceed these figures entails a loss in ampere/hour capacity. Normally the maximum current required for a Miner's Lamp bulb is 1.75 amps and this only applies to a few bulbs generally incorporated in handlamps.

Voltabloc cells should be recharged to 125% of the ampere/hours discharged. The following figures are charging rates and times for the four types of cells mentioned starting from the discharged condition. (FIG.7.)

FIG.7

Type.	Charging Current.	Time of Charge.
VO-4	0.5 amp.	10 hours.
VO-7	0.75 amp.	11½ hours.
VO-9	1.0 amp	11¼ hours.
VO-15	1.5 amp.	12½ hours.

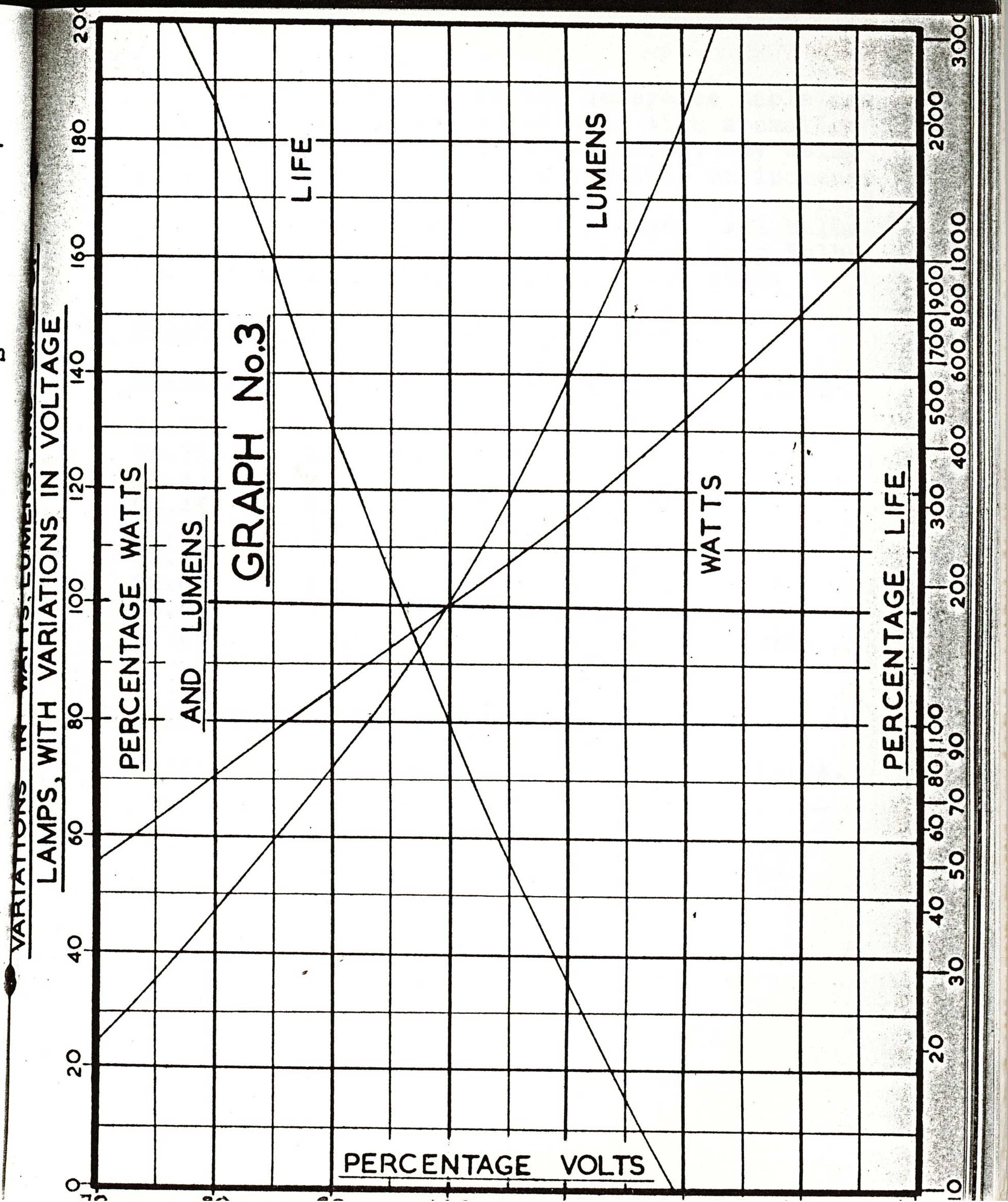
This charging data should be adhered to as closely as possible. No increase in charging current is permissible but a lower current can be utilized to charge over a proportionately longer period.

B. Bulbs.

When selecting a bulb for use with a particular source of electricity supply, two optimum values for the bulb rating in volts and in amps must be obtained. The chosen voltage rating is usually a lower figure than the maximum output voltage of the battery with which the bulb is to be used. Refer to Graph 3. for maximum overload figures compared with percentage life and output. In general a bulb chosen for use with standard dry batteries is considerably overloaded at the outset of the discharge time; a condition which must inevitably exist to obtain the best possible light output. Under these conditions it is essential that a spare bulb of the correct rating is carried for emergency use.

The situation when using accumulators is somewhat different due to the less pronounced drop in voltage during the discharge cycle. Although this will minimize the percentage overload on the bulb used a spare bulb of the correct rating must also be carried for emergency use. It might be mentioned at this point that, when constructing a lighting system using accumulators, a fuse must be incorporated to safeguard both the bulb and the accumulator.

Current ratings for selected bulbs may be obtained from the forgone information on dry batteries and accumulators. These figures for maximum current drain should not be exceeded unless otherwise stated by manufacturers.



The bulbs listed in the reference table are mainly of the vacuum-filled type with a smaller number of Krypton-filled types added. By using a Krypton-filled bulb where possible an increase of 20 per cent light output for no extra current drain or decrease in life is gained. All bulbs listed, with the exception of Mining Lamp Bulbs have Miniature Edison Screw (M.E.S.) caps.

OSRAM BULBS. Round bulb - clear glass.

Makers No.	Volts.	Amps.	Dia. (In m.m.)	Length (In m.m.)	Price.
OS.72	1.25	0.25	11	24	5d.
OS.71	1.5	0.2	"	"	"
OS.43	2.5	0.2	"	"	"
OS.45	2.5	0.3	"	"	"
OS.50	3.5	0.15	"	"	"
OS.55	3.5	0.3	"	"	"
OS.60	4.0	0.3	"	"	"
OS.65	4.5	0.3	15	29	"
OS.69	5.0	0.15	"	"	9½d.

OSRAM BULBS. Lens end type and Pre-focus types - clear glass.

Makers No.	Volts.	Amps.	Dia. (in m.m.)	Length. (in m.m.)	Price.
OS.99	2.2	0.25	10	24.7	8½d.
OS.67 P.F.	2.5	0.3	11	31	9d.
OS.68 P.F.	3.5	0.3	"	"	"

OSRAM BULBS. Round bulb - clear glass or granulated.

Makers No.	Volts.	Amps.	Dia. (in m.m.	Length.)	Price.
OS.1144	6.0	0.25	15	-	10d.
OS.200	"	0.3	"	-	"
OS.1145	"	0.45	"	-	"
OS.997 *	"	0.5	"	-	"
OS.208	"	1.0	"	-	1s.7½d

(* Gasfilled of granulated type is specified.)

OSRAM BULBS - Mining Lamp types. Krypton filled except for Letter H.

Usage of lamp.	Volts.	Amps.	Cap.	Dia. (In m.m.	Length.)	Price.	Index.
Hand	2.5	1.75	953	18	43.5	3s.0d.	A
Hand	2.5	1.75	SES	"	45.5.	3s.0d.	B
Cap	3.6	1.0	MES	"	30.5.	2s.6d.	C
Cap	3.75	1.0	SBC	"	40	3s.6d.	D
Cap	4.0	0.8	MES	"	30.5	2s.6d.	E
Hand	4.0	1.0	SES	"	45.5	3s.0d.	F
Cap	4.0	1.0	MES	"	30.5	3s.0d.	G
Cap	2.5	0.75	MES	15	27.5	2s.0d.	H.

The index letters are added by the writer and indicate the following characteristics:-

A.Special S.C.C.Cap. Pear shape pearl glass. Fuse in cap.
B.Pear shape pearl glass. Fuse in cap.
C.Round shape clear glass.
D.Pear shape clear glass.Double filament.
E.Round shape clear glass.
F.Pear shape pearl glass.Fuse in cap.
G.Round shape clear glass.
H.Round shape clear glass. Vacuum filled.

CEAG BULBS - Mining Lamp types. Roundshape Clear glass.
Pre-fix K denotes Krypton filled.
Pre-fix V denotes Vacuum filled.

Makers. No.	Volts.	Amps.	Dia. m.m.	Cap.	Price.
KC.84	3.6	1.0	18	MES	1s.6d.
VC.101	2.0	0.5	15	"	1s.7d.
VC.105	2.0	0.9	17	"	1s.7d.
VC.108	2.0	1.3	"	MES	1s.7d.
VC.125	2.5	0.75	"	"	1s.7d.
KC.128	2.5	1.0	"	"	2s.0d.
KC.136	4.0	0.65	"	"	1s.11d.
KC.137	4.0	0.8	"	"	1s.11d.
KC.140	4.0	1.0	"	"	1s.5d.
KC.408	4.0	0.8	"	"	1s.5d.

SECTION 5. General Notes on Lamp Construction.

When undertaking the task of designing and building lighting equipment for use in caves, it is of great importance that the product should be efficient. Whether the equipment is to be a caplamp or a handlamp every effort should be made to build it to a design which will survive, the treatment to which it will be subjected. The following observations and recommendations may be helpful to those who contemplate such a project.

Headpiece This is not an easy item to manufacture and would best be purchased from a Mining Lamp Manufacturer. If this is not possible the following points should be considered when designing one or adapting a lamp housing to suit.

Access to the bulb should be made as simple as possible without using special tools. The bulb should be protected preferably by an armoured glass lens or where this is not possible ordinary glass lens with steel cross-wire grille. Perspex is not as good as glass as it becomes scratched and scoured when cleaning off mud etc.

Wire connections to bulb holder contacts should be attached with solder-tags and screws or soldered directly to the contacts. The cable must be firmly anchored to the headpiece by binding or by a metal clip and, it passing through a metal housing, should run through a rubber grommet.

Wherever possible any metal used should be non-rusting such as copper, brass or aluminium. Efforts to make a headpiece watertight are well rewarded and enable the reflector to retain an uncorroded surface.

Cable. Short-lay or "cab tyre lay" rubber-covered cable is expensive but is the best. Most rubber-covered twin cored cable is suitable as long as it is really heavy duty type.

Plugs. If plugs are to be used it must be ensured that an accidental pull on the cable will not disconnect the plug. Several plugs are manufactured (Plessey Co., Cannon Plugs Inc. etc.,) which are retained by a screw-in sleeve and are rendered watertight by rubber seals. Screw threads could be damaged by the entry of grit and mud but such threads that are found on these types of plugs are normally

very course. Generally speaking plug connections will not need to be adjusted whilst underground if a switch is incorporated in the circuit.

Switches. A switch is normally situated in the headpiece of all mining lamps. This position is most convenient and should be adopted wherever possible even though it may entail making a special housing behind an adapted headpiece. If switch is situated on the battery box it would seem better to have a turning type rather than a lever-operated toggle switch. If the latter type is employed on a battery box it could have a double guard plate either side and in line with the lever movement to avoid accidental operation or breakage. Suitable switches are made by Bulgin, Rotax, or Cutler-Hammer (N.S.F.) The latter range of switches included an excellent waterproof toggle switch. Line switches incorporated in the cable are not recommended.

Battery Boxes. Both dry batteries and accumulators operate most efficiently when they are dry. Hence, when building a battery box for either helmet fitting or for carrying at the waist, this fact should be borne in mind. Battery boxes for dry batteries or accumulators should be made preferably of a non-rusting material such as brass or aluminium and should be as strong as possible with due consideration of weight. Some experiment with fibreglass battery boxes may produce some interesting results. In the case of a box made for accumulators it is strongly recommended that provision for a fuse be made and wired up in series with the circuit. When attempting to water-proof a battery box it will be found easier to achieve if the lid is not a hinged type but attached by strong snap fasteners or a screw-down device. For a really watertight seal a rubber gasket should be fitted between lid and box.

If the cable lead-in is not through a screw-locked plug then it will be found necessary to lead the cable in via a rubber grommet or gland seal; remembering to anchor the cable securely to the battery box. Contacts should have the wires attached by solder tags and screws or have good spring contacts for the battery depending upon type of battery.

When constructing a box for an accumulator, remember to make some arrangement for connecting a charger to the accumulator.

Consideration should be given to belt attachment for battery boxes worn at the waist. If the box is not more than $1\frac{1}{2}$ inches thick and fitting snugly to the body it will be found unnecessary to detach the battery box when negotiating tight passages.

Manufacturers Addresses.

Cadmium/Nickel Batteries Ltd., Spedant Works, Park Royal Road, London, N.W.10.
Ceag Ltd., Queens Road, Barnsley, Yorks.
Concordia Electric Safety Lamp Co. Ltd., Luma Works, Sanatorium Road, Cardiff.
Deac Accumulators, G.A.Stanley Palmer Ltd., Maxwell House, Arundel Street, W.C.2.
Ever-Ready Co. Ltd., Hercules Place, Holloway, N.7.

The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.
Mallory Batteries Ltd. Rainham Road South, Dagenham, Essex.
Mine Safety Appliances (Edison) Co., Ltd., Queenslie Industrial Estate, Glasgow, E.3.
Nife Batteries, Redditch, Worcestershire.
Oldham & Son Ltd. Denton, Manchester.
Premier Lamp & Engineering Co. Ltd. Moorfield Works, Armley, Leeds, 12.
Wolf Safety Lamp Co. (Win.Maurice) Ltd., Saxon Road Works, Sheffield, 8. Yorks.
Venner Accumulators Ltd. Kingston By-pass, New Malden, Surrey.
Vidor Ltd., Erith, Kent.

CONCLUSION

It is the hope of the writer that the "Lighting Miscellany" has served in some way to improve its readers knowledge of the lighting equipment available for cave exploration. Whilst every attempt has been made to include all the possible types of equipment which meet a caver's requirements no claim is made that everything suitable has been listed. Other alternatives may be discovered by further research and experiment.

One further article is to be prepared for the next issue of the "Journal". It deals with the construction of an accumulator charger capable of charging any type of accumulator mentioned in the forgone article.

Candles and waterproofed matches are not recommended as a main form of lighting but are essentially carried as basic emergency kit.

Don't forget them - they may save your life.

Having reached the end of the article the writer wishes to express his gratitude and acknowledge the help and advice which has been so readily given by the numerous firms whose products have been referred to. A special vote of thanks to the General Electric Co. Ltd., and Cadmium Nickel Batteries Ltd., both of these firms having donated actual equipment for test purposes.

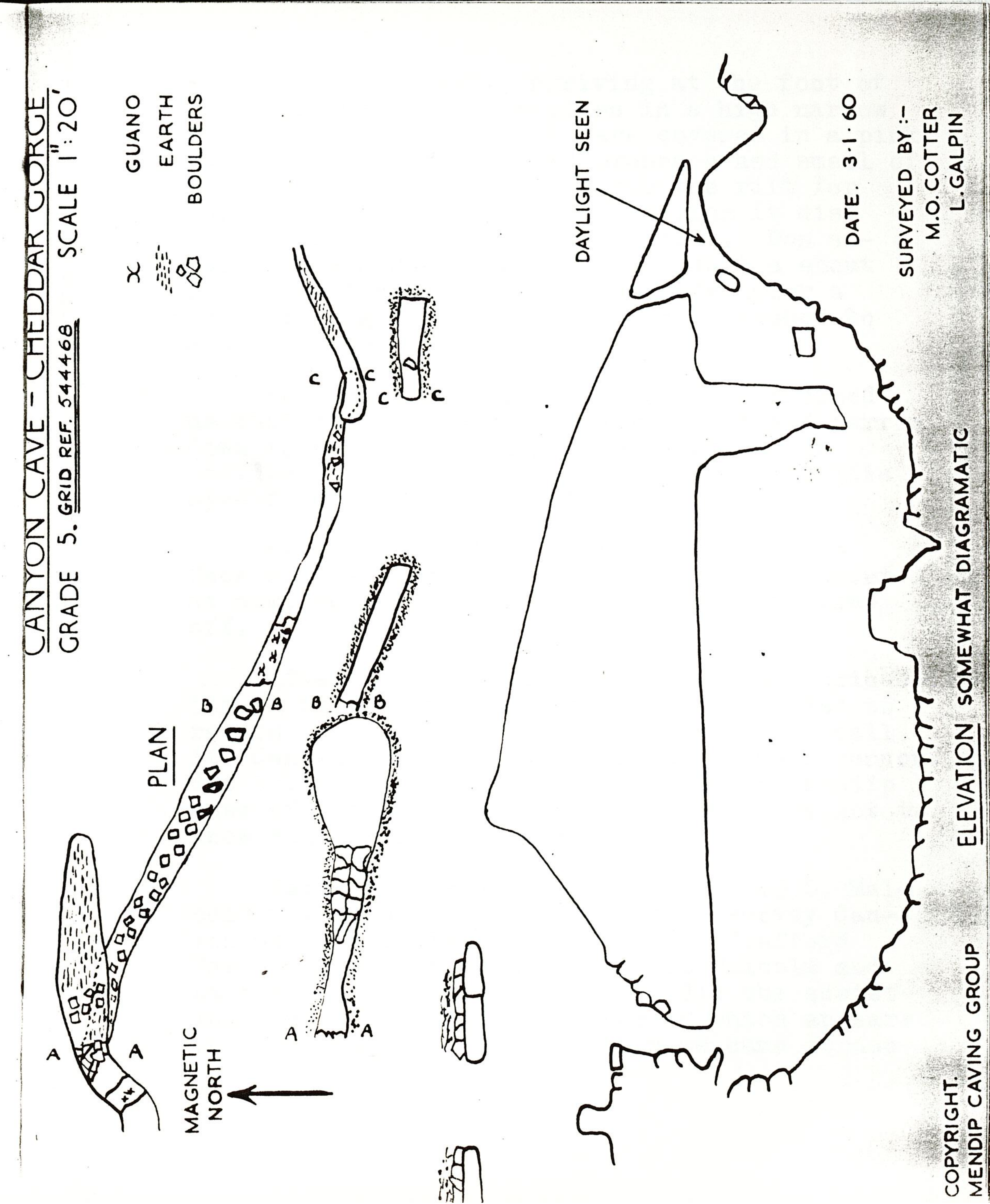
ANTONY J. KNIBBS.

THE DISCOVERY OF CANYON CAVE.

It was during the summer vacation, August 1st 1959, that Tony Crawford, Pete Goddard, Don Searle and myself decided that we would search for caves on the North side of Cheddar Gorge. Without much of a search we came across a buttress of rock which had parted from the main mass.

On entering this crack, we found a hole amidst some boulders which were precariously balanced on each other. These boulders proved to be the roof of a 15ft. pitch. Having no tackle with us, we returned to the cottage, and not wanting to be told to "go jump in the lake", by the other members, we informed Robbie Charnock of our intentions and then returned to our newly found pitch.

The ladder was belayed to a safe rock and Don Searle was the first to descend. After hearing his shout of "All Clear", the



rest of us followed. Arriving at the foot of the pitch we found ourselves in a high narrow rift, the walls of which were covered in a pink tuffa and we also noticed presence and smell of Bat guano. We proceeded along the rift for approximately one hundred feet when it displaced about two feet to the right. Don entered this awkward bend and we heard a shout of "lookout behind," - two seconds later a boulder weighing about two pounds crashed to a halt by us.

Returning to where we stood he informed us that the way ahead was very tight and narrow down to a small opening through which one could see daylight and that a fat fellow like myself would never make it!

He also said that he had come face to face with a Lesser Horseshoe Bat, which grinned at him, so he grinned back whereupon it flew off.

After all of us had satisfied our curiousity in this portion of the cave we decided to return to the surface where we agreed to call it 'Canyon Cave' as it resembled a small canyon. The following day almost every club on Mendip knew of its existance, although how they got to know still remains a mystery.

Early this year on January 3rd 1960, Malcolm Cotter and myself set out to survey Canyon Cave, assisted by Lauree from Stafford Caving Club. It turned out that Malcolm and Lauree did the survey whilst I did the assisting. We did a grade five survey which appears in this journal. On this trip we came across not just one Bat, but about six dozen of them.

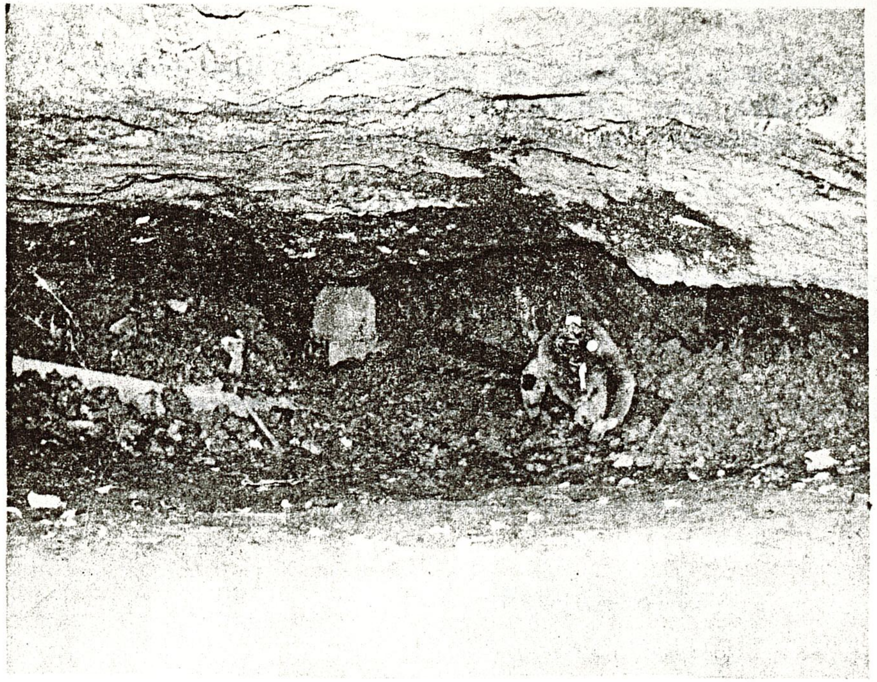
This, so far, is the history of Canyon Cave.

JOHN GREEN.

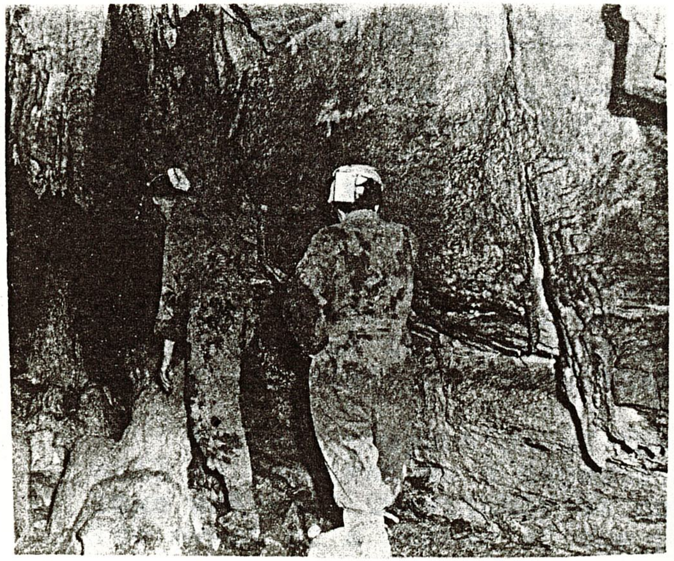
COOPERS HOLE - A theory of its origin.

Many prominent geogoligists consider that in an investigation of this type, Tautology is necessary. It is in order to combat this theory that this article is written.

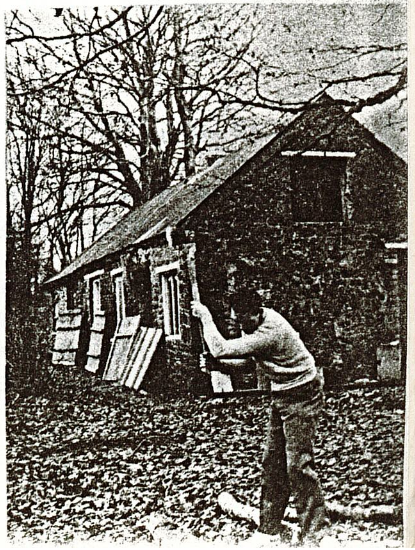
Due to its very position it cannot possibly be subapennine, rather must it be classed as subapostolic in nature. The complete absence of manchineel from the debris removed from the entrance suggests that its formation was due more to emphysema than to any other cause. After excavation the tunnel produced is somewhat reminiscent of a camouflet, the walls having deposits of spermaceti along all joints of the utricle. It is perhaps significant that members of excavation parties experience attacks of tantalus in the late evening, the writer in particular having had severe attacks, but large doses of tarragonda or its local equivalent will soon relieve all symptoms. Piophila Casei might be expected nearby, but so far as I am aware, no finds have been recorded. With these facts in view, I consider it impossible to regard the cave ·ehind as being other than a vacuole. The ·tting down action of small quantities of



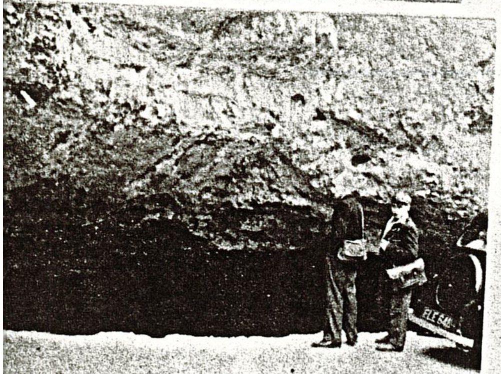
COOPERS HOLE

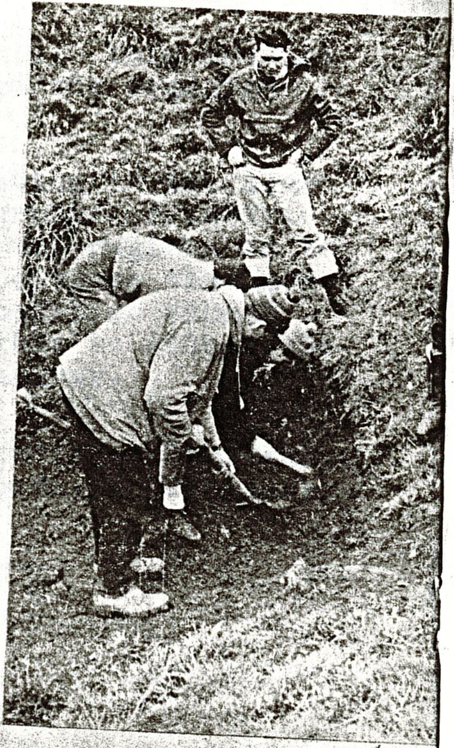


SWILDONS HOLE

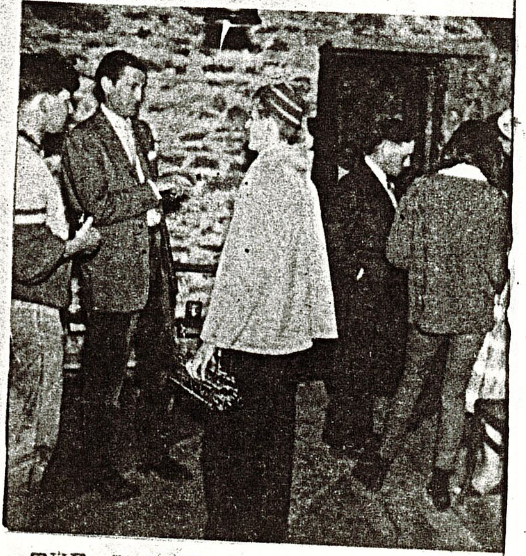


ING THE GENERATOR HOUSE





THE START OF PINE TREE H



THE PARTY

water has been shown by Daniel Kaye to cause at least temporary derangement, and this I offer as the main reason behind my theories.

Bibliography.

Beachcomber.	List of Huntingdonshire cabriol-etmen. (Beaverbrook Press)
Crut	Radioactive strata layers. (P.J.G. Ltd.,)
Fluorescein	Indication of water flows. (I.C.I. Ltd.)
Henry	The theory of an infinite Min. (Proc: G.O.O.N.S.)

R.L. Woollacott.

FRENCH EXPEDITION - 1960.

Plans for the Club expedition are progressing steadily. Possible dates have been discussed and it has been proposed that the expedition shall extend from the 19th August to the 4th September 1960.

The cost will be approximately £25. which includes travel expenses and food alone. This may be subject to fluctuation due to the somewhat fluid state of travelling arrangements.

A small proportion of the estimated cost will be required as a deposit on travel bookings and will inevitably be non-returnable in the event of a member of the party deciding to back out at the last minute. This measure is being adopted to safeguard the organisation of the expedition.

It is hoped to hold a meeting in the near future to decide upon a programme of activities for the expedition and the regions to be visited. It is of great importance that members wishing to join the expedition submit their names as soon as possible to either the expedition secretary or treasurer.

Antony J.Knibbs: Expedition Secretary.
John A. Green: Expedition Treasurer.

EDITORIAL NOTE.

I would like to take this opportunity to express my thanks to all Members of the Group who have given me their help and made possible this publication.

I hope they will be pleased with the result and continue to give their support in the future.

DAVID HARLE.
Hon. Editor.

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