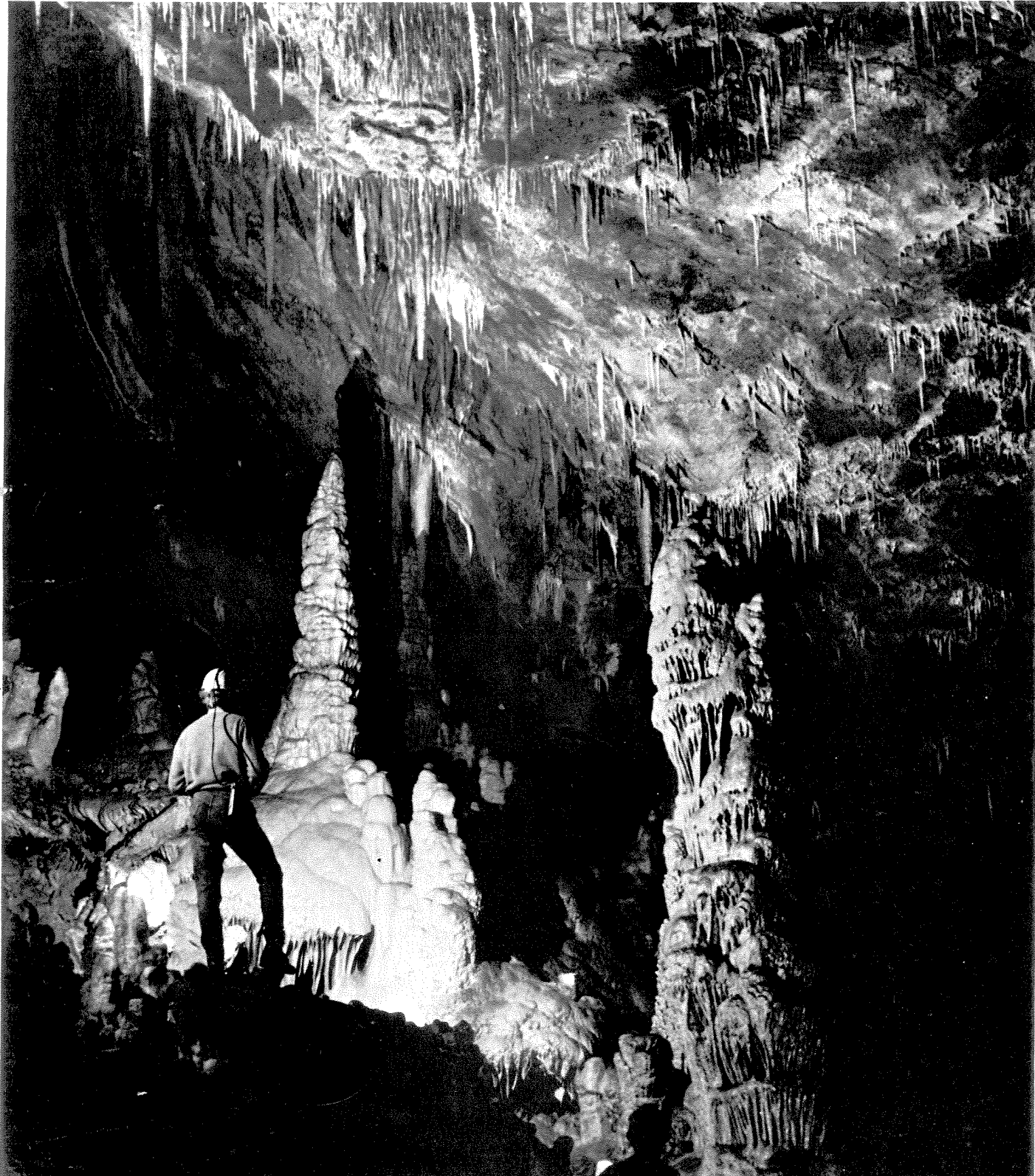


**SOUTH WALES
CAVING CLUB**

NEWSLETTER



SOUTH WALES CAVING CLUB

No 69

NEWSLETTER

July 1971

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Cover photograph - "A cave in Northern Spain" by Jem Rowland

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Chemical Investigation of Cave Waters

The present programme of cave chemistry research has been operating for about three years. During this period several advances in technique have been made. Thus, an improved method for the estimation of water hardness has been introduced (Ref. 1), a reasonably precise bridge has been made for the measurement of the electrical conductance of water and a remote-indicating pH meter has been built. However, apart from the observation that the water in the sump at the beginning of Mazeways was quite different from that in the terminal sump of Mazeways, little has been heard of the results since some preliminary notes in the Newsletter (Ref. 2, Ref. 3, Ref. 4). The reason for this has not been a lack of results (over a thousand estimations have been made, mostly in duplicate) but rather a suitable theme for the presentation of results.

An early observation was that the water entering the Dan-yr-Ogof system from Waun Figen Felen could be made, by adding calcium carbonate, to saturate up to a hardness of only about 35ppm., whereas the water leaving the resurgence had a hardness of 100-120 ppm. A similar result was obtained for water entering and leaving the Ogof Ffynnon Ddu system. It was decided to investigate how this extra hardness gets into the water.

One idea was that there might be continual re-establishment of the equilibrium between the calcium carbonate of the cave, the water and the carbon dioxide of the air in the cave, leading to a substantially increased hardness. This was tested by measurements on water in a surface stream. Here water without limestone-attacking power and having a hardness of 43ppm was found to take up an extra 17ppm of hardness in about a mile. Apparently this factor alone could not account for the hardness increases observed in caves.

A further idea was the mixed-water corrosion theory put forward by Professor Bögli (Ref. 5). This suggests that if two waters, having different hardnesses derived from different initial carbon dioxide concentrations but lacking limestone-attacking power, are mixed together the mixture is capable of limestone attack. Laboratory verification of this theory proved very difficult to obtain and success was gained only after rigorous attention to laboratory conditions. For the relatively soft waters of the established South Wales caves the additional hardness to be expected from this source seemed to be only a few ppm. Quite evidently some further factor must be at work.

Under low water conditions visual observations suggest that organic matter is carried into the caves in the water entering the swallets, but that very little organic matter leaves the caves in the water from the resurgences. Under flood conditions, however, the resurgence waters can be seen to carry organic matter. It seemed reasonable to look into the part dissolved organic matter plays in cave enlargement.

The usual suggestion is that organic matter might be oxidised to

carbon dioxide (or other acidic material) and thus bestow on the water a limestone attacking power not originally possessed. This idea seems to have suffered almost universal dismissal, possibly because of the difficulty of the experimental work involved in any investigation.

One difficulty is to explain the source of the oxygen for any oxidation process. Now, water can contain some 12mg per litre of dissolved oxygen at cave temperature. Any oxidation of organic matter in water in a completely flooded fissure would require the concentration of the dissolved oxygen to go down. In a sequence of experiments the resurgences at Dan-yr-Ogof and Ffynnon Ddu, both backed by turbulent aerated stream passages, were found to give water containing the usual saturation concentration of dissolved oxygen. Two resurgences, said to be of percolation water, were found regularly to give waters containing only about 70% to 80% of the saturation value expected at the temperatures concerned. This established that some of the conditions for an oxidation process were present. The real problem was to try to find out how much organic matter was present in the waters, and how this concentration changed.

The technique adopted was a modification of the "oxygen demand" test used by water supply engineers and estimates the amount of oxygen which is needed for oxidation of the organic matter in the water. Unfortunately this test requires fairly elaborate laboratory facilities and a method had to be worked out to preserve the samples collected in Wales for later examination at the school laboratory.

As luck would have it the requirement of steady water levels was not met during the summer of 1970 and the samples collected as part of the systematic work showed only that the organic matter concentration was lower in the water leaving the caves than in the water entering them. Even this was an advance but little really quantitative work was possible. The rapidly fluctuating water levels gave an opportunity to find out what happens to the chemistry of the Dan-yr-Ogof water during partial flood. Samples of water were collected at intervals from the Dan-yr-Ogof resurgence during the period of a partial flood and these samples were analysed as quickly as possible, the idea being to look for changes in the concentrations of the most important substances in the water during the passage of the flood.

The results which were obtained almost immediately showed very little. Conductance, pH and total hardness remained almost constant during the period of the observations and the alkaline hardness (said to be a measure of the calcium hydrogen carbonate content of the water) tended to increase. Results obtained from later work showed that the oxygen demand tended to decrease and that the sodium and potassium contents of the water remained almost constant. Comparison between the "flood" values and corresponding values obtained from a sampling only a day or so earlier shows that a flood in a cave system does not simply dilute the chemical material present in the water in the cave, but causes an upset in the chemical balance of that water. In this respect it was noted that the proportion of the total hardness ascribed to alkaline hardness decreased from 86% to 73% during the flood and that the potassium content increased, this latter observation being confirmed by other workers (Ref. 6).

	Sodium	Potassium	Total Hardness	Alkaline Hardness	Oxygen Demand
Normal	4ppm	0.2ppm	86ppm	74ppm	Used as reference
Flood	3ppm	0.3ppm	44ppm	32ppm	14mg O ₂ per litre

Although these results were interesting, and suggested new investigations, some work was done on calculating how much extra hardness could originate from the oxidation of the additional organic matter leaving the cave under flood conditions. For this one "flood" sample was selected the results from which are quoted above. A second sample has provided very similar results. The consumption of the 14mg oxygen per litre would, if converted completely into terms of extra hardness (as calcium hydrogen carbonate) give an increase in hardness of 42ppm.

At this stage speculation took over and suggested that, if this additional hardness to be expected from the extra organic matter carried by the water in flood were to be added to the hardness of the flood water, the result might be similar to the hardness carried by the water under more normal conditions.

	Total Hardness	Alkaline Hardness
Flood conditions	44ppm	32ppm
Hypothetical extra hardness	42ppm	42ppm
Speculative hardness for normal conditions	86ppm	74ppm
Actual "normal" values	86ppm	74ppm

It can be seen that agreement is good!

Whether this result can be obtained under different conditions and whether similar results can be obtained in different cave systems remain to be investigated, and a great deal of confirmatory work is still to be done. However, it does seem that for Dan-yr-Ogof at any rate the oxidation of organic matter could be a most important factor in cave enlargement.

Some of this work could have significance in the field of cave prospecting. It would seem unlikely that a resurgence giving water consistently low in dissolved oxygen content could be backed by a stream passage having big air spaces.

Acknowledgements.

A project of this sort, with work going on over a period of years, is bound to involve very many people. The members of the South Wales Caving Club have given help so generously in so many different ways that it would be quite impossible to make individual acknowledgement, and I hope that this general expression of thanks will offend no-one. I would like to thank the Committee of the Club for the use of the Club's facilities over extended periods.

This work has received financial support from The Royal Society under the Scientific Research in Schools scheme, and I should like to thank The Royal Society for that help and their adviser, Dr J.A.W. Dalziel of Chelsea College, for his encouragement, patience and assistance.

I should like to thank the Headmaster of Acton County School for his interest in the work and for the use of the school's laboratory facilities. Much of the work reported here has been performed by senior pupils of the school and two of them, Gordon Swindles and Derrick Watson, deserve special mention as they have taken the brunt of the work.

I should like to recognise the co-operation of Roger Stenner who made available details of his work on the measurement of aggressiveness in advance of the formal publication (Ref. 7).

Finally, I feel that I ought to thank those industrial concerns and other institutions whose employees would suffer acute embarrassment if individual mention were made:

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L.G. Bray
1 May 1971

DEGREES of DANGER

"In theory they were sound on Expectation
Had there been situations to be in.
Unluckily they were their situation ... "

by W.H. Auden.

The Name of the Game is Consequences.

Caving, like most high-risk element sports, has developed rapidly to a high degree over the past decade. Thanks perhaps to the ingenuity of the Technologist who has helped to promote greater confidence in our equipment, and Blessed is the Geologist for he shall inherit ... etc. etc. And a Litany of other professions associated with the game of "Caving". Thank you. But what of the psychological aspect? What of the human factors involved? Surely we are not too mechanized to stop and ask ourselves these questions.

You have to be pretty bold to advise others on avoiding accidents in caves, if only because subsequent injury to yourself would seem to discredit your recommendations. For that reason, it is tempting to hold in reserve the possibility of 'pure bad luck', as a posthumous pardon for yourself or for deceased experts or friends. To say that man can know the answers, but that to err is human, is an unsatisfactory defence, for it suggests that there is a limit to the value of theoretical and experimental knowledge of the matter.

Oaving or Potholing like its sister sport Climbing is basically a 'staying alive' game, a constant cheating to avoid death or physical injury. We set about doing this by acquiring various skills or qualities, a thorough knowledge of equipment and techniques, together with a steady development of a sense of judgement (a very undefinable quality), and an understanding of the basic aspects of safety. In the process of becoming so called "experienced", these qualities become more complex and important.

Cavers differ from climbers in many ways though their 'ethics' are basically the same. Climbers require agility and a high-degree of concentration, cavers require physical stamina and persistence. The caver has to be a very good all-rounder, as cave terrain varies enormously and this may involve the participant in climbing, wading, swimming, crawling and even diving. This probably explains why there are no "hard-men" in caving, or subterranean Joe Browns. Not that they do not exist but they are not recognised in the same way.

Once we leave the embryonic stage and gain confidence, we reach a level of performance, usually referred to as a "standard", whereupon attaining this, we cave fairly close to this "standard". We also have a built in tendency to look for our "limits", unless special factors

like Inhibition or Senility supervene. To some extent advances in techniques and equipment can be said to be supports to improvement in performance.

The Gratification - Safety Dilemma - Risk-free Roles.

It can be generally accepted that in the pursuance of Caving we obey certain rules (ethics). This is a devised handicap system evolved to equalize the inherent challenge, and maintain the caver's feeling of achievement at a high level in each of these differing situations. The rules are designed to conserve the caver's feeling of personal (moral) accomplishment against the meaninglessness of a success, which only represents merely technological victory. So the less the objective danger and the less the duration of effort required, the more rigorous are the rules. You can use a rope to safeguard yourself on the "TRAVERSE" OFD III, but not on the "POACHED EGG" climb, OFD II. The inescapable conclusion here is that whenever a significant step forward is made, the caver makes a compensation. He does not want to widen his safety-margin indefinitely, he wants to hold it to a satisfactorily narrow measure. He does this by moving into a higher or more serious situation. His safety-margin has to seem as marginal as ever.

A very large number of subterranean accidents could be accredited to several premature ultimates; error in judgement or inadequate safety-margins to name but a few. In the risk-free role, the safety-margin remains constant. It is probable that the fatality rate, in relation to the time at risk, increases steadily with more serious undertakings, e.g. Cave Diving.

I would like to say something about the degree of severity of Cave Systems, especially the more complex ones, these systems bear a relationship to climbs undertaken on Alpine Peaks, in as much as they cannot be classified. For example, for a party doing a "THROUGH TRIP" in Ogof Ffynnon Ddu II in drought conditions in July, the consequences may not be as serious as for another party attempting the same route with the streamway in full flood conditions. The objective dangers remain so great, and equally changeable that classification would prove useless, so classification is best ignored as far as cave systems go.

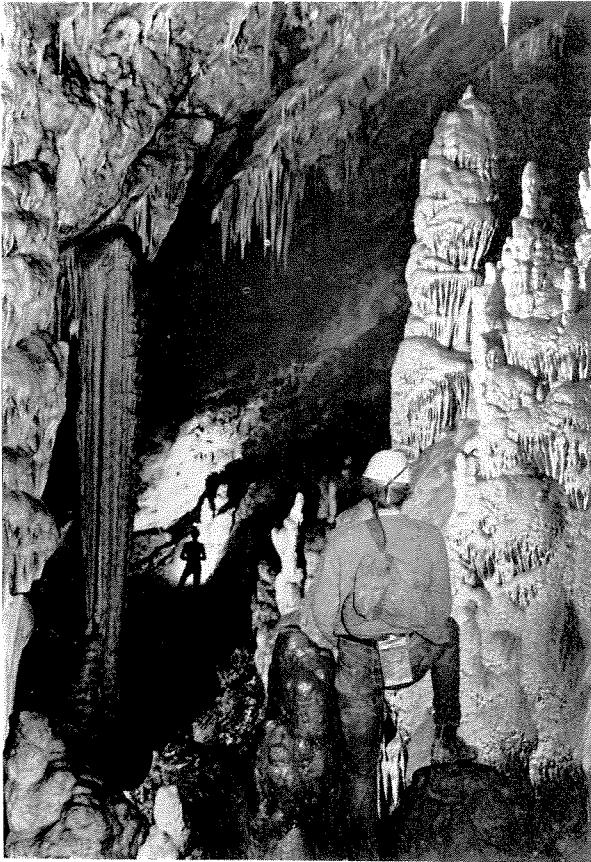
To get back onto my original theme. Any risks taken should be calculated risks and try to think of the safety-margin as a constant in the caver's head, rather than a variable in his boots. But this cannot always be adhered to, and some rather obvious groups of causes initiate this process. A caver who survives a mishap or a series of mishaps or misadventures, may begin to allow himself a broader safety-margin, this is a dangerous way of learning. Alternatively a caver may be influenced by having seen injuries or fatalities in caves, or by having had these happen to friends or acquaintances; this is highly effective, but there are moral objections to human sacrifice as an adjunct to teaching. Again it may happen that a man's caving is affected by personal matters, even when these do not restrict his time underground - by a sense of responsibility to wife and children, by loss of energy or drive due to the exigencies of earning a living, by the discoveries of values or interests which modify the importance of some of the rewards obtained from caving. These cavers belong to the risk-free role category.

There are cavers of course whose manner, style and drive are not affected by any of the above circumstances. The "WORRY POTENTIAL" in this type of caver is totally absent. He would probably be called the 'hard-man', but Speleology does recognise these characters in the same way as Rock-climbing does, perhaps this is a good thing.

It is also worth noting at this point that on average cavers are only active for a very short period of time, something like two years of their caving lives; the rest of the time they spend scientifically, socially, (consuming vast amounts of alcohol), or they may even join committees and councils, or other caving organisations - (only joking, Committee members!).

It is a wellknown fact that literature and the folklore of disaster exert a powerful influence on cavers and climbers alike. It is possible to see this in the survivor-stories with climbing. It is so well endowed, but can easily relate to caving in just the same way. The charge of feeling in such circumstances or tragedies is so strong that however painfully expressed, the listener or reader cannot avoid a response. The drama is always accompanied by all the atmospherics at Nature's disposal. So it seems the voices of survivors impress us more than the inscriptions on tombstones. Well, where do we go from here? Our style and attitudes towards caving, vary enormously from one individual to another, but the tendency seems to be towards more difficult undertakings. This is all too obvious if one observes cavers today, wet-suits are out, they restrict movement and tire one far more easily - shorts are in (for how long I do not know), the amount of ladder taken becomes less, and pitches preferred to be free climbed rather than rigged. The recent ascent of the "Minuteman Silo" by D. Judson and company, by pegging (artificial) may be introducing a new concept into caving, there must be many "Last unsolved problems" in Dan-yr-Ogof and Ogof Ffynnon Ddu. So while the Divers Dive, and the Climbers Peg, we'll sit back, wait, and hope that the history of "67" will repeat itself.

Compiled by Carl Ryan
20 May 1971



A Trip to NORTHERN SPAIN

"Got any photos for the newsletter cover?" says our enterprising editor one day.

"Yes", says I, "what sort of thing do you want?"

"Anything" says he, "but they must be glossy".

Now the only glossy cave photos I had were some I took in Spain three years ago. "That'll be

fine," says he, so the photos were produced and blocks or screens (or whatever it is that our new duplicator eats) were made. And that, I thought, was that, until I was approached once again by the editor wearing his glinting expression which usually indicates that he is about to 'con' something out of somebody. "We can't really print those photographs by themselves - how about an accompanying article?" said the crafty sod - so here it is:

The photographs were taken in 1968 on a trip to Spain with a group from Manchester University. We were interested in that part of the Picos de Europa which lies half way along the north coast and we camped firstly near Cangas de Onis - twentyfive miles inland. We were actually in a village called Amieva which is 3000ft up in the Picos. It was a real "peasant" village, its only contact with the 20th century (apart from us!) being a Land Rover which came up with the bread about once a week. We camped, conveniently, in the garden of the local bar!

During our two weeks in Amieva we found two potholes, one slightly reminiscent of Pant Mawr (including the stream passage) and the other a series of pitches going down 200ft. These two were surveyed and photographed. Dozens of shafts described by locals as being "Mucho profundo" were examined without reward.

Feeling, by this time, that, being in Spain, we had better see something of the sun (the Amieva and Penwyllt climates are indistinguishable) we shifted camp nearer the coast. Our sense of duty

remained, however, and our camp was again on limestone. If I remember correctly it was on the La Isla to Mirador el Fito road.

Just up the road from the camp was a fluorspar mine, next to which was an open cave entrance leading directly to a chamber containing some dead formations. This was Cueva Orecca. Spoil from the mine had been tipped into the cave, and at the foot of the scree slope so formed, a very tight downward hole was cleared of rubble and this gave access to a chamber somewhat larger than the "Big Chamber near the Entrance" in Ffynnon Ddu, but since the dip was about 60° it was tipped on end rather.

This chamber was undoubtedly the best decorated any of us had ever seen and was a photographer's paradise - being relatively easy of access and as photogenic as anyone could wish for. It is, of course, this chamber which appears in the photograph at the head of this article and in that on the cover. I spent many hours (and pounds!) in that chamber but was rewarded by some of the best photographs I have ever taken.

J.J. Rowland, 1971

Ref: Manchester University S.S. Journal No. 3, May 1969.

A Life in Steam

Visitors to Tooth and Llethrid Caves in Gower will almost inevitably have met Mr Will Harry, the grand old man of steam traction engines. Mr Harry, now 85, has worked all his life with these monsters of the past and still works one locally. Naturally he has led an interesting life and he has at last been persuaded to write his life story. He assures us that it will be available next week, but he does not know how much it will sell for.

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More Surveys

Demand for the Ogof Ffynnon Ddu Survey has been so great that the Club has decided to do a limited reprint. So if you missed your copy last time around be sure to buy now - the price is the same, £1.25p for members, £1.50p for others, (post free in U.K.). Copies available from: The Secretary, Hon. Records Officer, or Hon. Editor. (Cheques payable to 'SWCC' please.)

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The Opening of CATHEDRAL CAVE

The idea of opening Tunnel Cave to the public was first talked about by my father and I in the summer of 1969, following a trip into the Aven, and Davy Price's Hall.

The first thing to find out was if there would be enough in the 'Hall' to interest the visitors, as with our cap lights only a vague idea of the size and general structure could be obtained.

To get an answer to this we contacted British Oxygen who arranged to lend us as many gas lights as we wanted, and also to send down a photographer, so that they could do an article on the cave for the Company's magazine. On seeing the natural entrance the photographer appeared slightly apprehensive, and on seeing his £650 worth of equipment

disappear into the darkness, highly alarmed. However, as his equipment was now out of sight, he had little option but to follow it.

Once the gas lights had been set up along the full length of the 'Hall', for the first time the full colour and vastness of the cave came into view. The main point I remember was seeing so much colour in the rock and formations, and also the vast number of straws.

This visit by British Oxygen had proved beyond doubt that Tunnel Cave had much to offer our visitors, it being so very different from Dan-yr-Ogof.

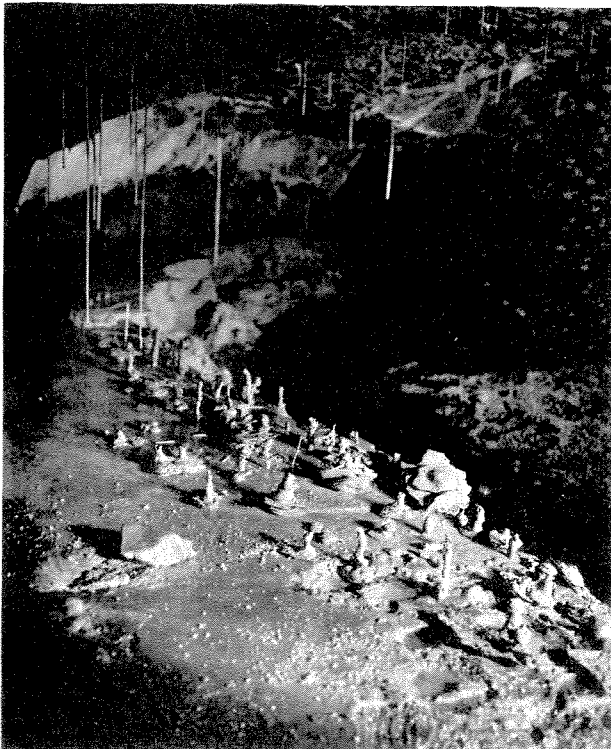
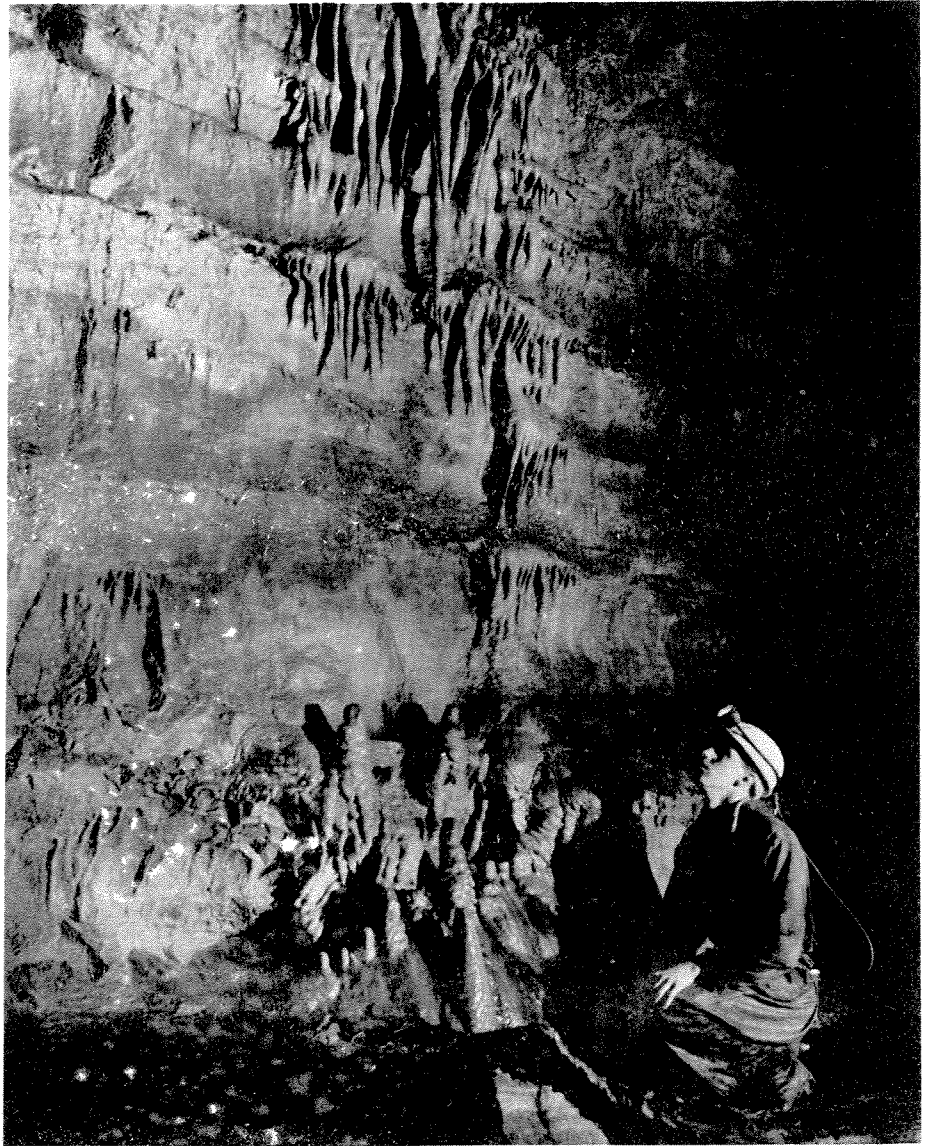
The next job was to carry out a survey, and this was done by Mr G. Morris from the N.C.B. After many cold weekends in the natural entrance we had completed the job, and a site was chosen to put in the shaft. Various firms tendered for the work of putting in the shaft, and eventually Foraky Ltd. of Nottingham were chosen.

The site, half-way up the disused quarry face, below the natural entrance caused one major headache - the roof fell in! - what we had taken to be a solid wall of limestone turned out after six weeks hard work to stop after 21 feet, and from then on nothing but earth appeared at the face, tons and tons of it. The "earth" appeared to be some form of glacial deposit; with sandstone boulders, pieces of rounded limestone sections, and peat, all mixed up in the earth.

We had to decide what to do, and quickly, as the equipment on site alone was costing the Contractors over £150 per week. Graham Morris, our Surveyor, came up with the answer, we would have one more attempt, and follow as closely as possible the beds over the natural entrance.

As Foraky intended to use a compressed air scoop to clear the debris, they were agreeable to the change over of the site. If they had used tracked Amco loaders the slope to the new entrance would have been impossible for the machines to climb.

Everybody in the Company said a prayer, and off we went again on site



In Cathedral Cave

Photographs BOC

two, leaving the other site for a future 'dig'. - Any offers! The roof on the new shaft turned out to be perfect; "the best I have ever seen", was how the much relieved Contractor described it.

In the meantime, I had been in touch with I.C.I. Nobel division, who spent a lot of time selecting the correct explosives to be used in order to lessen the risk of shock waves damaging the formations. The technical representative for the area was sent along to ensure that as the end of the shaft was reached no sudden blast would ruin the project and a special drilling pattern was worked out to guarantee this.

The actual break through into Tunnel Cave was on the very last day of 1970, the question was, would we open by Easter.

The next stage of the work was getting a pathway to run along the entire length of Davy Price's Hall. This was no easy task as anyone knowing the Cave would agree. We wanted to leave the general character of the Cave unaltered so the pathway kept to one side of the Hall, and the boulders on the other side left untouched. Anything in the way of the path was broken up with small explosive charges, and laid down as the base for the concrete that was to follow later. It was estimated that well over 1200 tons of rock was broken up and moved in this way.

One of the main problems turned out to be getting a path over the mud near the sump, and on one occasion the dumper almost disappeared into the mud, together with its protesting driver. It was taking ten tons of stone to move forward three yards, as the stone kept being eaten up by this sea of mud. However, after four weeks the pathways had been laid to the far end.

A waterfall was made at the far end by diverting the water back to its old course along Anemone Passage - this is now proving very popular with the tourists.

While the inside of the Cave was progressing, Frank, Bill, Laurie and others were erecting a grill just inside the Rifts to ensure that no unauthorised Cavers could enter the show-cave part. This had been insisted upon by our Insurance Company, who when seeing the final job seemed to talk more about this mechanical jigsaw masterpiece than our new Show-Cave!

Finally came the problem of how to light up the cave. It was obvious that it was no use stringing out 350 light bulbs as we had done in Dan-yr-Ogof; something on a much bigger scale would be needed. The end result was a somewhat complicated electrical system, needing $1\frac{1}{2}$ miles of cable to make it work, but making it possible for us to turn off any lights not actually in use; thus reducing the risk of moss and algae growing in the Cave and on the formations.

In all we hope we have improved the old Tunnel Cave by opening it up to the public, but if nothing else, it now means that Cavers can see the Cave without getting their feet wet!

Ashford Price

OGOF yr YCHEN .. part II

In our spare time we had a look at the surface where the fissure of human skull A should break out into daylight.

Brother James' intuition suggested a likely spot on the surface to commence digging in order to meet the SE continuation of the fissure. In anticipation of this operation the Tenby group had laboriously cleared the shrubbery which obscured the cliff face at that point. My earliest photograph even shows a small tree which had to be uprooted. We commenced digging on 29 July and soon two holes appeared - one leading directly to skull A fissure, and the other vertically downwards to the floor of chamber 3 some 11ft below.

Now chamber 3 was a rift some 2ft wide leading vertically downwards for about 8ft from the south side of chamber 1. It had received no attention so far, but immediately it was obvious that any material falling from chamber 1, or down the skull A fissure would find a safe haven on the floor of chamber 3. Hence this chamber came to be known as the "Abyss" and proved to be a prolific source of material. As digging continued from the outside large animal bones appeared in the entrance of the skull A fissure, on the same level as the human remains only 5ft away inside the cave. Daylight fell on these fragments of humanity for the first time just as a jaw bone and huge leg bones of *Bos Primigenius* became exposed in the dig. Some of the material might also have been bison. One of the leg bones was so enormous that it was thought it could be rhinoceros, a view apparently supported when I examined bones of Woolly Rhinoceros in Tenby Museum later that night. However, this theory was demolished by J.A. Bateman, Keeper of the Department of Zoology at the National Museum of Wales a month later.

After photographing all the bone finds I left the island again only to return within three days accompanied by Professor W.F. Grimes. He examined all the material thoroughly, and there was so much of it that it had to be housed in the spacious attic of the Caldey Village Hall.

Four weeks elapsed before Mr Bateman was able to come to the site in person, and he made a preliminary identification of the bones found up to 29 August, although his opinion will be subject to more detailed examination in the Museum when the bones have been transferred to his department. A brief summary of his initial examination is appended.

Brother James now had to continue digging on his own for a while, but within two weeks had made further exciting discoveries. From chambers 2 and 4 he recovered half a human tibia and skull fragment in addition to small animal bones. A flint artifact turned up at the new entrance to chamber 3. Later an almost complete skeleton of wild boar was found deep in chamber 3, with just above it another human skull, but with part of its lower jaw missing. A jaw bone found weeks earlier 11ft higher in chamber 1 fitted neatly into the gap. This proved that the human material had fallen from chamber 1 aeons ago for it was 21 to 24

inches deep in the cave earth and clay, and the whole was capped with stalagmite up to 3 inches thick.

In association with the bones was a flint implement - a type of blade steeply dressed along one side suggesting a Mesolithic age (Middle Stone Age). The skull became known as skull B.

My next visit to the island was on 3 October in order to help complete the removal of the human bones from the roof fissure (i.e. skull A fissure). This was accomplished while photos were taken at intervals. Then Brother James turned his attention to the tufaceous stalagmite in the floor of chamber 2. Almost immediately a third human skull (skull C) appeared. From its position it probably belongs to the human material found at lower altitude in the bone layer of chamber 4. Three weeks later I uncovered large rib bones, probably of Ox, from the same spot.

Which brings my story up to date. On 24 October it became possible for me to stay on the island for a whole week. The weather was mostly damp, but the rain was kept out by placing a sheet of corrugated iron over the upper shaft entrance of the cave which had been dug open a week previously by Brother James in order to lead to skull A fissure. I was joined by Peter Wilkins of Cwmbran Caving Club (who had experience of cave digs in Ogof Morfran), and he started off well by finding small human bones in chamber 3. A tooth of wolf and one of bear lay nearby. We then got down to measuring and marking out a section cut through the deposits in each of the four chambers of the cave. This operation occupied the best part of three days. New survey marks were painted on the cave wall to delineate future discoveries. At the end of my week probably the oldest find of all was made. At the bottom of a pit dug outside the entrance of chamber 4, Brother James found part of the antler of a deer. This was loose in a rubbly, clayey layer which is believed to be only just post-glacial, and is 2ft 9 inches deeper than the previous find of a tooth of hyaena and a patinated flint flake. Brother James has reported finding another twenty fragments of antler early in November, and some of the pieces could be assembled to give an antler 18 inches long.

Digging will be continued in the floor of chamber 3 (skull B site), and northwards in chamber 2 (beyond skull C site). There are deep fissures in at least two places where other early post-glacial deposits may be found. The final report will probably be written by Professor Grimes as yet another section of his "Prehistory of Caldey" published by the Cambrian Archaeological Association.

Melvyn Davies, Cwmbran
9 November 1970



THE HUMAN SKULL "B"
FROM CHAMBER 3

OGOF-YR-YCHEN

Report on excavations over Easter and in June 1971

Ogof-yr-Ychen continues to yield a variety of animal remains. On 10 April we continued to help Brother James in Chamber 3 - "Abyss", which is now widening from a 12" wide rift to a respectable passage of some 4 feet. On 12 April I blasted out a large obstructing boulder which had foiled three men and a lorry lifting jack. Later in the day we excavated a pit some 12 feet beyond the "Abyss" entrance where the ground seemed to be hollow. A calcite-lined, small chamber was revealed, roofed by fallen blocks. However, no animals had been trapped in the past by this hole as no bones could be seen in it.

Work was diverted for a time to a new cave called OGOF PEDR where Peter Wilkins found a human arm bone in a quick inspection as soon as the cave was opened. A separate, and extensive, digging operation will be required for this cave.

On 17 May Brother James telephoned me from Caldey to say that a complete skull of what seemed to be wolf was appearing 4' 6" down in the floor of the Abyss. He would not remove it until I was able to arrive to take photographs. This I did on 1 June. The jawbone had been found earlier and I photographed this with the rest of the skull. Later a tooth of deer appeared. The deposit at this depth is a scree and loose sandy-clay. Most of the scree is sharp-edged, and seems to be a post-glacial in-fill, laid down before the full return of warm conditions. A flint flake was discovered by Brother James near the wolf skull. Excavation continues.

Melvyn Davies
7 June 1971

SUBSCRIPTIONS 1971-72

All subscriptions should have been paid by now. All those members who have not so far paid should do so immediately.

The next meeting of the committee will be considering the state of membership and all unpaid members at that date will be considered to have lapsed.

Joint Subscription - £3; Single Subscription - £2;
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(Cheques, etc. to be made payable to "South Wales Caving Club.")

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The Exploration of

RHANDIRMWYN MINE

The Rhandirmwyn lead mine, the largest in South Wales, employing 400 men at one time, is situated north of the village of the same name at SN/787.446. Entrances to it lie on both sides of an east-west ridge of Ordovician rock but most of them are collapsed or filled in. The ore-bearing rock is bounded north of the ridge by the Nant-y-Bai stream, and south of the ridge by the Nant-y-Mwyn stream and the Tywi river.

According to Lewis in "Lead Mining in Wales" the traditional date for the starting of the mine was 1636, but the first reference to a "Cerrig-y-Mwyn" mine is 1749 when it was entered by means of boats via a canal level. From a plan examined in the County Archives Office it may be deduced that the mine was going strong in 1771. By 1833 it was called the "Nant-y-Mwyn" mine, but it seems to have passed its 1785 peak output of 1,500 tons of ore per annum. Work continued sporadically until the early 1930's when it was forced to close due to pollution of the River Tywi, although much expensive equipment had only just been installed.

I first visited the mine in 1949 during a walking tour, but it was not until Easter 1970 that I decided to explore underground. On 29 March I arranged to meet Dick Keen, then Assistant County Curator in Pembrokeshire (now in the Department of Industry at the National Museum of Wales), at the old Engine House southwards up the hill from the Nant-y-Bai stream. We searched for open adits or levels, as they are called locally, and found what we learnt later is called the Williams Level. From its entrance this level forms a straight gallery on a bearing of 105 degrees magnetic, with the Engine House about 200ft below it on a bearing of 300 degrees. The gallery is only some 100 yards long with the depth of water decreasing from 3ft to a few inches at the end. Dry workings extend for a few more yards, and there is a shaft running upwards from which the water issues. The shaft has been climbed for some distance by John Parker of Cwmbran Caving Club, but the galleries at the top are so far inaccessible. The level must connect with another entrance at a greater height judging from the draught pattern, but this has not yet been found. It is interesting to speculate whether this level has any connection with R.B. Williams who managed the mine in 1760. The material found in the level on 29 March was certainly not as old as this, but there is no reason why an older working should not have been re-used at the beginning of this century.

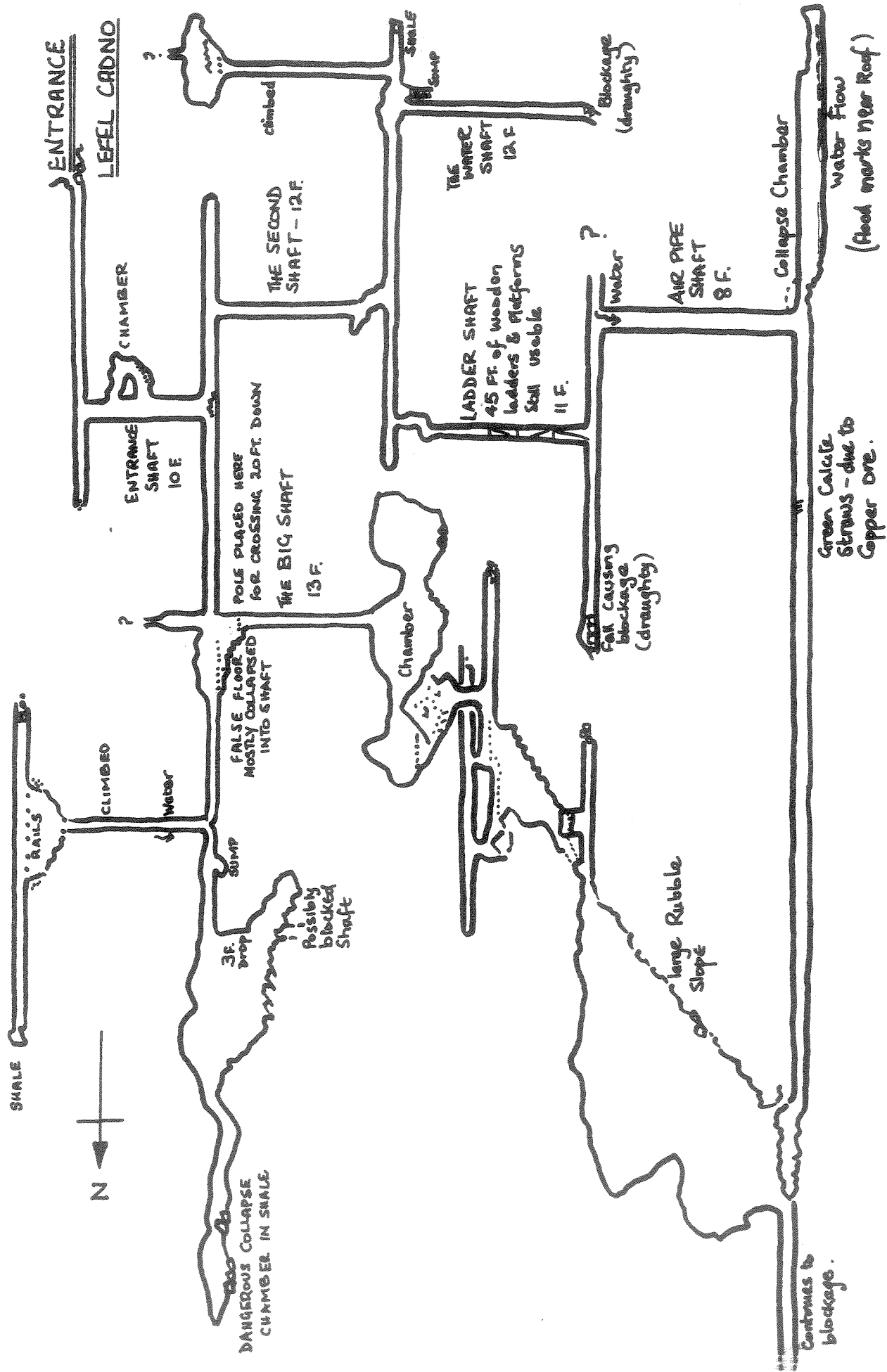
Dick now made inquiries at the Welsh Folk Museum at St. Fagans, and

found that a tape recording had been made in about 1965 of two retired miners from Rhandirmwyn. I got the address of one of them from Mr Vincent Phillips at the Museum, the other one having died. On 19 April I kept an appointment with the miner, Mr William Evans, at Rhandirmwyn. He was 79 years old but keen to see the old place again, so we drove over to the Engine House that afternoon. Mr Evans reminisced for over an hour and pointed out to me the main shaft in the latest workings, various levels every one of which had a name, the foundations of the workshops the main structures of which had now gone, and finally the "Roman" workings. This latter item placed a different complexion upon the whole exploration. The County Archives plan also mentioned Roman 'work on the surface', and the Ogofau Gold Mines, also worked by the Romans, were only 8 miles away. I knew that the Romans actually worked lead mines underground as well as on the surface from coin finds made by BNS Speleology Section members in the Draethen lead mine in Monmouthshire. Therefore from this time on, exploration fever was tempered with extreme care in view of the artifacts and early workings that might be found.

That afternoon when Mr Evans had been safely delivered to his own fireside, Dick Keen, John Parker and I searched along the Nant-y-Bai stream for the entrance to what Mr Evans had called the oldest level known to him - the Blaen-y-Cwm level. Years before he and a team of men had been given the order to re-open an old level known as Blaen-y-Cwm, and search for ore. They found little in the way of galena, but discovered instead a boat residing in a boat level. The boat was carried out and down to the Manager's house, Nant-y-Mwyn, over one mile away. This priceless relic of early Welsh mining then slowly rotted away over the years. No one knows what became of it.

After considerable searching along the stream I noticed a flow of water which came from a side stream but which was tinged with the brown staining due to iron. On following this up I discovered that the water issued from a tiny fissure. A brief dig with one spade between us quickly revealed that the fissure was the roof of an adit. The old Blaen-y-Cwm level had been re-opened for the second time! The dry stone walling in the entrance was removed and a trench cut for 10 yards down to the stream. A foot of air space was thus revealed and John Parker crawled in. The water was chest deep and very cold. The air space decreased in places, and sometimes John had to swim. He got to the end - a roof fall with timbers sticking out from shale and rock slabs. The water poured through unhindered.

This level deserved closer examination, so Dick and I returned on 16 May. We excavated the entrance trench further until the water was only waist deep. I took some measurements on the way out and found the length to be 101 yards ($\pm 5\%$) and the bearing from the entrance 137 degrees magnetic. The width was between 4 and 5ft, widening to 6ft occasionally. The height was $6\frac{1}{2}$ ft, and 92ft from the inner end was a roof cavity containing a $2\frac{1}{2}$ ft piece of timber supporting a small slab. A most perplexing feature was the presence of four stalactites up to 2ft in length. These must have been mostly under water before we drained the water away, but they could not have grown under water, and yet they must have formed after Mr Evans entered the level. The end



DIAGRAMMATIC SECTION of Nant-y-Mwyn Lead mine, RHANDIRMYN

Mining works known up to 18 JULY 1970 - J. Parker & M. Davies

of the level was a collapse where timbers had given way. It was possible to dig over the top to a certain extent, but the roof cavity above looked loose and cast down more slabs. The water came from the highest level so the debris may be damming it up to a dangerous height. Next day John Parker and Jeff Phillips dug in the collapse, but failed to make any progress.

The next episode came on 31 May 1970 when Dick Keen and I again met at the mine. We consulted with Mr Evans and got from him the locations and names of adits on the south side of the ridge. Here there is a wide gully, obviously mined over a century ago, running directly up the hill. Near the top lay Lefel Cadno (Fox's Level) which we found to be open, the stone wall erected to block the entrance having collapsed. The adit runs inwards very slightly uphill and a shaft was encountered only some 35 yards from daylight. Water would flow out of the adit in wet weather using a trench cut in the floor against the west wall, and it was carried over the mouth of the shaft with a wooden trough. We laddered the shaft and found it to be 60ft deep. This was the first time we had descended a shaft anywhere in the Rhandirmwyn area, so I thought it prudent to test the air with a candle, particularly near shaft bottom where there was an evil odour. Oxygen content was normal and the odour was found to be coming from two dead rabbits. At no time since have we ever found evidence of "foul" air, or carbon dioxide, in this mine.

The gallery ran north and south at the foot of the first shaft, but it was not perfectly straight. Northward (see plan) there was another shaft, called the "Big" shaft (found to be 77ft deep), where the passage also widened before narrowing again beyond the shaft. It was obvious that a timber platform once lay over the mouth of the Big shaft, but it had collapsed.

Southward lay another shaft which I descended by rope for 60ft to a point where there was an overhang which I could not pass without ladder. We called this the "Second" shaft as it seems the best route to deeper parts of the mine. On this visit Dick took photographs of the workings paying particular attention to methods of working, distribution of 'deads', timber cutting, tools and parts of a small winch. It was also evident that this part of the mine had been visited by other cavers not long before, although nothing was known to me in the caving literature. We found later that no one had visited the deepest parts of the mine since it closed down.

On 13 June I examined the Lower Boat Level, a route well used towards the end of the mine's life, according to Mr Evans, and found it badly collapsed around the entrance and flooded to well above roof height with water. The volume issuing was about 0.25 million gallons per day, and this after 29 days of dry weather according to my records.

Next day Dick Keen joined me again in Lefel Cadno, and this time we had more ladders, enough to enable us to reach the next level. The "Second" shaft proved to be about 100ft deep altogether but could be scaled with only 50ft of ladder, used on the middle section. The second level was found to be quite interesting again, the northern gallery this time ending in a shaft which was fairly wide and vertical for the first 30ft, and then narrowed off and turned slightly thus obscuring the view. Beyond this shaft, a shaft went upwards in the

roof, and a few more yards further there was a blockage resembling a run-in.

The southern gallery in this second level ran to another shaft which ended in a deep sump, with its water surface 25ft down. However a dry shaft could be seen 6ft to one side of it, the water from the sump obviously overflowing down this shaft in wet weather. The bottom of this shaft could not be made out on this occasion, and the gallery obviously continued at the same level on the far side of the sump. Again a connecting wooden platform had collapsed into the sump where large timbers could be seen under water. This water was also heavily charged with iron giving a bright, red-brown colour of ferric hydroxide. The shaft was called the "Water" shaft.

The time had now come to bring in a larger party for the descent of all the shafts, and this was done on 5 July when I joined Dick Keen, J. Parker and R. Edwards of Cwmbran C.C., and J. Phillips of ICI Speleology Section. We laddered the 60ft "Entrance" shaft, then the 100ft "Second" shaft, finally the initial 25ft of the "Water" shaft. We climbed down the rest on rope and found a blockage 70ft down. This was under an arch but had a small hole through which a strong draught emerged. A crowbar should suffice to dig it out. Jeff Phillips crossed the water shaft at the 25ft ledge using some very precarious timbers, then roped John Parker and me across. It was a dead end but had another shaft going upwards which Parker climbed. He reported an unstable chamber with a hole continuing upwards, and the ferric hydroxide deposit was coming from iron ore in or near this chamber.

Heading now northwards in the opposite direction from the "Water" shaft we descended what we called the "Ladder" shaft. This had 45ft of wooden ladders in usable condition resting on platforms, and we only required a short wire ladder for the top 21ft. The level thus reached had a fall at one end which Dick Keen and I excavated. Dick went through only to find another blockage immediately, but a draught filtered through the rubble. At the other end of the level was a shaft with a compressed air pipe going down into it from the far side. This proved to be the final level in the Lefel Cadno section of the mine, and the shaft was about 50ft deep. At its bottom the workings were quite large and did not appear to have been entered by anyone since the closure of the mine. Good tools were leaning against the walls, and timber structures in their symmetry and massiveness reminded me of the carved Stupa gateways at Sanchi, India. Water was running down this final shaft with a volume that could be troublesome in wet weather, and the air felt colder. The water flowed southwards into the left-hand adit of 3 galleries where it sank in the floor with a depth of 2ft. Heading northwards the adit assumed a quite remarkable aspect. The walls became covered with white calcite which reflected our lamp beams strongly. Calcite straws hung from the roof, and many of these were green in colour due to the presence of copper. The overall effect was striking and the equal of vistas in caves where the green tint is always lacking.

The adit ended in a fall but J. Parker dug his way through and reported another shaft soaring upwards. (This one proved to connect with the "Big" shaft which was explored on 18-7-70). The bottoming

and exploration on this occasion by the five of us took seven hours, but a good proportion of the time was spent in searching for suitable ladder belays. 5ft and 6ft crowbars or tubes should be taken in for belaying since the rock is often too shaley for pitons.

We returned to investigate the "Big" shaft on 18 July 1970. It was first descended to a ledge 20ft down. A steel pole was lowered to the ledge, one end being secured there. The other end was then lowered by rope from above to fall, slowly, on the far side of the shaft. J. Parker was first over and four of us followed him on a lifeline. A shaft issuing water from above was soon reached and Parker climbed it alone to a chamber containing rails and two ways on which became blocked. Our main route was over a sump to a 35ft drop which led to what may be the top of a blocked shaft. However it was possible to proceed over the top of this shaft into a chamber with a dangerously collapsed roof. The shale was sagging in places but Parker crossed the chamber to report a final blockage at the northern end. Coming back to the "Big" shaft, it was found that 77ft of ladder was just enough to reach a cone of rubble at the bottom. Workings led on, and Parker was able to make the connection with the area reached on 5 July.

The major exploration of Lefel Cadno completed, attention was diverted to other parts of Nant-y-Mwyn to effect an entrance to older sections of the mine. On December 20 1970, a Cwmbran party dug out the collapsed entrance of the Upper Boat Level. This was a main throughway situated down the valley from the engine house, and now in a gully below the forestry track. The party found an adit with 4½ft of water and another collapse within 10ft. Drainage work and a marathon dig is required to get in this way.

Another part of the mine system that has been investigated is a roadside shaft within 100yds of Rhandirmwyn school. This shaft has received local tipping over the years but is still 80ft deep, stone-lined at the top. J. Parker found the bottom to be blocked with rubbish and it is possible that this route is flooded because of water backing up from the Lower Boat Level which connects with it. In the later heyday of the mine the village miners would enter the workings by this shaft, and it was found cheaper to lower coal brought to Rhandirmwyn by horse and cart down the shaft, then haul it to the foot of the engine-house shaft where it was lifted for the engine, rather than take it by road on what is now the main road, and forestry track from Nant-y-Bai farm.

An underground survey of the Lefel Cadno has now been started by Cwmbran members, organised by Dick Keen under the aegis of the Department of Industry, National Museum of Wales. There are many mines in Wales where the ladder, platform and chute method of working lead (and gold) can be seen. The wooden structures are fast deteriorating and now is the time for a proper description with measurements and photographs. Already nothing is left in the Limestone lead mines of South Wales, which were worked out before the Ordovician mines. The importance of immediate surveys in certain selected mines in both south and Mid-Wales is thus obvious.

If anyone cannot see the attraction of exploring old lead mines,

let him travel to Rhandirmwyn, to the churchyard, and stand by the last resting place of Captain Arkell, the last, and much-respected manager of the Nant-y-Mwyn mine. The gravestone faces the hillside with its gaping, black openings and now grass-covered spoil-heaps. He will not hear the clank of machinery from the Lower Boat Level a few yards away, nor the fires of the blacksmith, or the hammering of the carpenter in the buildings alongside. The old workshops are all now cottages inhabited by Rhandirmwyn villagers who keep tidy lawns and shrubs among giant, quiet sycamore trees. Nearby is a huge, silent lake, no longer used to supply water to dress the ore, but covered with magnificent water-lilies which are a blaze of pink and white in the summer.

Melvyn Davies

12-6-71

Planning permission for quarry

Messrs. Hobbs Quarries Ltd., currently operating at Penwyllt, recently placed an application for planning permission to quarry on the hilltop known as Twyn-y-Ffald beside Ty Mawr. Many local people objected to the granting of the permission; amongst the objectors were the Club and several cavers who spend a great deal of time in the area. A special sub-committee of Brecon Planning Committee came to Penwyllt and examined the site. Mr Munday, the area manager for Hobbs Quarries, was available to give information as to the proposed development and the objectors had the opportunity to elaborate on their objections. Fears were expressed about noise and damage to property and to the loss of amenity that would result from the new quarrying. As far as can be ascertained there was no direct threat to the present known Ogof Ffynnon Ddu cave system.

REYNARD'S CAVE

The cave, called Reynard's Cave on the 6" O.S. map, is situated on the western side of Tresilian Bay at N.G.R. SS 946677. Although not so named, it is described in "Annals of South Glamorgan" by Marianne Robertson Spencer (first published 1913 and reprinted 1970) pp.130-1. Mrs Spencer says that the cave, according to Welsh mythology, is the Gave of Dwynwen (perhaps we should refer to it as Agof Santes Ddwynwen) and she describes the superstitions attaching to the "Bow of Destiny" a natural bridge, still to be seen in the roof, near the entrance of the cave.

My interest was aroused on reading, in the book, "On the western side of this cavern is the entrance to a subterranean passage, reputed to have led to St Donats Castle", and in a footnote "A very old man told the writer that he remembered the entrance to this passage being closed by an iron door which was washed away during a storm and never replaced."

As this part of the coast has been subjected to cliff falls, I thought a visit worth while. The cave is easily found, being the second (and much larger) entrance to the west of Tresilian House. There is nothing remarkable in the main passage which is a typical sea cave - commodious but uninteresting. The side passage, to which Mrs Spencer refers, is entered by an easy ascending traverse up the western wall of the cave by ledges which vaguely recall the upstream passage of Pant Mawr. The side passage, when reached, is a disappointment. It is very short, there is no sign of the "iron door" and the termination appears to be solid rock not a collapse. It is odd how many examples exist of reputed cave passages leading to old houses which, in fact, only penetrate the hillside for a few yards (for another example, see my article on Quaking House Cave in Vol. 7 of the Journal of the Wessex Cave Club No. 87 (November 1962), pp.131-3).

If anyone else wishes to visit the cave, I suggest that he leaves his car at the beach car park at Llantwit Major and walks half a mile in a westerly direction. The cliffpath is quicker but the sea shore is more interesting on account of the unusual cliffs. Care must be taken to watch the tide as these cliffs would not be safe for climbing and there is only one escape route between Col-hugh Point and Tresilian Bay. In the course of the walk a large number of cave entrances will be passed.

A small hand torch will facilitate an examination of the side passage and it might be worth taking a couple of flash bulbs to record the unusual red and green colouring to be found at the end of Reynard's Cave and also on the right-hand side of the small cave which lies a few yards to the east (nearer Tresilian House).

T. Charles Bryant

You DO want to be rescued

-DON'T YOU ?

In the past few months there have been several 'incidents' in Ogof Ffynnon Ddu involving Cave Rescue Personnel in Callout or Standby duties. As the cave is Britain's longest and deepest, there is a grave danger that the relatively easy access conditions will lead to a carefree attitude amongst visitors, and that the number of these incidents will not only increase, but perhaps get more serious in nature. It might be worthwhile to examine the recent events and to project ourselves into future:

Incident 1. Party of seven from UCCCCC overdue and possibly lost - met by another party in Salubrious Passage while a search system was being organised.

Incident 2. Caver fractured ankle in Big Shacks, but managed to get out without a callout being made.

Incident 3. Boulder "fell" over Cwmdwr entrance blocking it. Could have had very serious consequences.

Incident 4. Inexperienced party of two found almost exhausted at stretcher hauling pitch after failing to do a through trip.

Incident 5. Numerous small incidents of the 'short fall' or 'nasty cut' type - frequently not recorded but they could have serious consequences.

The vast majority of parties entering Ogof Ffynnon Ddu carefully detail their intentions on the SWCC "Where and when" board, but it has been known for such destinations as:

'Arete Chamber to top waterfall to OFD III', or 'DYO III via Cwmdwr' to be given by visitors who are new to the system.

The former trip is quite feasible, but unlikely on a first visit, while the latter is ridiculous - but think of the consequences - if the party does not return does one assume they have gone to OFD III or to the top waterfall? Do rescuers search Dan-yr-Ogof or Cwmdwr? The alternatives involve a great deal of labour and it helps enormously to know where the overdue party is likely to be.

Another feature is the accurate estimation of time. Because the through-trip from Cwmdwr to Top Entrance has been done in 1½ hours does not mean everyone can do it in that time - the average person who knows his way through will take about 4 hours on it - searching for the route could take up to 10 hours.

It has become fashionable to allow parties an hour's grace before expressing concern about their non-arrival, another hour before getting worried, and a further hour to begin standby and rescue - this means three hours pass before the operation begins - it is likely that it would take another hour for a search to be organised and set off and

goodness knows how long before the lost party is found. So the lost visitor in Ogof Ffynnon Ddu (particularly in the innermost parts of the system) can reckon on a delay approaching six or seven hours before he is found - this is provided he has accurately detailed his route beforehand. If a search has to be organised on a larger basis it could be many more hours before the searchers locate the lost souls.

Personally I deplore this 'hour or two grace' attitude - we may very well regret 'waiting till the pub closes before we rescue them' one day. If you say you are going to be out in a certain time then you ought to take the consequences of being rescued if you "just didn't realise it was so late".

Assuming that a rescue does begin in proper style then there are many other logistics problems to be sorted out, but basically they can be discussed from the point of view of where they occur, and the type of operation called for.

LOCATION OF ACCIDENT

a. Ogof Ffynnon Ddu

If a serious accident occurs in Ogof Ffynnon Ddu III, assuming stretcher carrying can begin, the major problem is initially, the mainstream. This can largely be overcome by use of the water-stretcher - in fact this is the one part of the whole system for which the water stretcher would be admirably suited. Two waterfalls cause serious obstructions, and the choice lies in lowering over them (low water) or climbing into the upper level (high water conditions). At the Maypole Bridge it would be an advantage to have a second maypole. The squeezes at the end of the Traverses would need to be enlarged but the major problem would be the Traverses themselves. Probably the easiest solution is to lower the body to the bottom, carry along the bottom and raise at the far end. Certainly this has the advantage of not needing gear such as stemples and not exposing so many people to the traverses, but it may be unwise to involve two pitches of 60ft in the problem. Further points of difficulty will be:

(i) All along the route to the Crevasse there are traverses and short steps to be climbed - all will require gear and rigging up.

(ii) The best route from Bhowani Junction is via the Chasm - this route has been practised and can quickly be prepared - an alternative is via Nyth Brân series - a faster route in any case, but with more awkward spots than the chasm. The shortcut is inadvisable and too awkward altogether.

b. Ogof Ffynnon Ddu II - the Smithy Area.

There are three practical alternative routes for rescue from here. Probably the most important one is the newly discovered link-up with Ogof Ffynnon Ddu I through Dip Sump series. The other alternative is via Cwmdwr - a very difficult and unlikely route, while the third, the long route up the Mainstream Passage in Ogof Ffynnon Ddu II and out at the Top Entrance would only be used as a last resort.

The former route has not been practised yet, but it is important to do so quickly - there are several awkward spots in the Dip Sump series that may require preparation beforehand. On the Mainstream

route a pitch has been prepared at 86381561 - it needs 100 feet of ladder and careful organisation of hauling personnel. From the head of the pitch the route is via Salubrious Passage and the Arete. This has also been practised.

c. - other parts of Ogof Ffynnon Ddu II

The problems of stretcher carrying from other parts of Ogof Ffynnon Ddu II are many. Should it be necessary to remove an injured person from Fault Aven series, Marble Showers series, or the Oxbow series, a great deal of extra effort is involved and rescuers must be prepared for arduous trips.

TYPES OF RESCUE

a. Parties overdue.

As already stated, when a party fails to arrive on time an allowance is usually made, depending on several factors - their experience, where they are caving, the number in the party, the weather, etc. etc. While this is basically a good idea - it prevents unnecessary standby - it is not sound practice. Organisation of a search is further delayed and even an hour may be critical.

A search involves a great number of personnel and must be thorough to be of any value - there is little point in searching with a party who do not know the cave, nor is there any point in sending in one large party hoping to cover everything. The best system by far is to give those lost some credit for intelligence and to search the major routes first, with small groups of two to four, hoping to find them there. Such an initial search does not involve every nook and cranny and the searchers from each party (and as many as ten parties may be involved in different parts of the cave) should be returning within two hours or so if possible.

If this initial search fails to locate a party then things become much more serious and additional personnel will inevitably be needed. Further searches must then be left to the discretion of those in control of the operation and it is pointless to lay out detailed schemes in advance - all known boulder chokes, dead end passages, pitches and avens may need to be examined before some trace of the lost party is found.

The scale of such an operation is so large that it hardly bears thinking about.

b. Trapped by Floods.

Since the discovery of Ogof Ffynnon Ddu II and III we have been able to study the flooding of the cave in detail and it is fortunate that severe floods occur only rarely. When they do occur they seldom last for very long. This is not to say the danger of being trapped is negligible, for there are still certain parts of the system where it would be possible to be isolated for several days and where there is little likelihood of being reached by rescuers. In Ogof Ffynnon Ddu III Smith's Armoury can easily become blocked off, so can the lower part of the Ogof Ffynnon Ddu III streamway below the Maypole Bridge. Between the Top Waterfall and Pendulum Passage there is a section of streamway that can become impassible and from which there is no escape route.

The stream passage below the First River Chamber is in the same

category. The Waterfall series in Ogof Ffynnon Ddu I is still isolated in heavy floods.

It is particularly important to realise that the Confluence floods to a depth of at least 8 feet and that fighting one's way down to it does not guarantee escape that way. I have seen foam in the roof of the Flood Bypass - 35ft above one's head!

c. Boulder falls.

Many parts of Ogof Ffynnon Ddu contain boulder collapses and it is tempting to push into them in an effort to extend the known cave - care must always be exercised, however, to ensure that there is someone who knows where the choke is, in the event of a party being trapped behind a fresh collapse.

d. Other rescues.

The remainder of the rescues are likely to be 'standard', i.e. someone falling, slipping, or just being exhausted and needing rescuing. These introduce no new problems to the rescue techniques, and hopefully our rescue service is well geared to tackling them.

Several food dumps have been placed in the cave strictly in case of Emergency - they are located at

- (a) the Entrance to the Marble Showers series,
- (b) just beyond the Crevasse,
- and (c) in Smith's Armoury.

It is important to note that any fixed aids that are left in the Cave have been left only where they are really necessary - some persons will find that they do not need them, but this is no reason for removing them - in every case there was a sound safety reason for placing them in the first place, and it is common sense to use them sensibly.

IN CONCLUSION

What is important to realise, is not that rescue in Ogof Ffynnon Ddu is likely to be any different from anywhere else, it is that the scale of the operation is likely to be greater than we have yet had to face. Any difficult rescue from the far end of Ogof Ffynnon Ddu III, for example, would stretch our resources, not only of equipment but of personnel, and it is important to be aware of the magnitude of the task before we ever have to embark on it. For this reason we must all be more critical of ourselves, our equipment, and our visitors. If we consider that they are inadequately equipped or not experienced enough to attempt certain projects then it should be pointed out in no uncertain terms what the consequences could be. We must also be critical of those who fail to return on time or who do not bother to leave a detailed account of their proposed trip. Practice rescues are a nuisance, but they may make a great deal of difference to our knowledge of a route - and after all you may need rescuing one day - personally I prefer to carry a gun.

P.M. O'Reilly

THE COMPLEAT CAVE

About eighteen months ago, I and others became increasingly concerned about the prospect of losing Cwmdwr entrance to Ogof Ffynnon Ddu, due to possible quarrying in this direction, or to the filling in of the Old Quarry. The thought of losing this entrance seemed a great shame to me, as I felt that this part of the cave showed good potential for future discoveries, so I decided to try to find another way in.

Everything on the surface was pretty hopeless and Ffynnon Ddu I had already been pushed to its limits over the past twentyfour years - or had it? So being rather conceited I started a dig in the Waterfall series just above the "coffin" (off the little stream which runs down the Waterfall, heading eastwards). The digging was very easy, but unfortunately had to be abandoned after only a few weeks, as it proved impossible to keep the water out.

The next obvious place was the Dip Sump series in II, but this was sealed off at the Diver's pitch. Sealed off, that is, until I persuaded Eric that it was quite a feasible free climb (my apologies and thanks to Eric who did not know I had already attempted it).

Once Eric had fastened the rope as a handline we now had a route right through to Shrimp series at the back of Dip Sump which was entered on a subsequent trip with the help of Pete Cardy and his fantastic "grip suit" (a wet suit with caterpillar treads). Things looked good here so we attempted a Radio test. Needless to say, with a wet aerial from the swim across Shower Aven, and a surface to cave depth of 315 feet, the radio test failed. However, at the agreed time we turned the aerial towards Ffynnon Ddu I, and were, miraculously, picked up. The pin point made showed that in theory we were already in Boulder Chamber.

Over the following months a great deal of effort was put into this dig, mainly by Pete Cardy, Bob Hall and myself. Sound connection was made to the timbered aven at the end of Ffynnon Ddu I. The digging was very hard going partly because of the nature of the material - Smith's Concrete, partly because of the pool of water we were digging in - be warned - if you want a nice wet grotty dig, take Bob Hall along with you (sorry Bob!), but mainly because of the difficulty of getting there.

Eventually, having dug about twenty feet in the worst imaginable conditions, we decided to wait for the radio to be repaired before any further work was done.

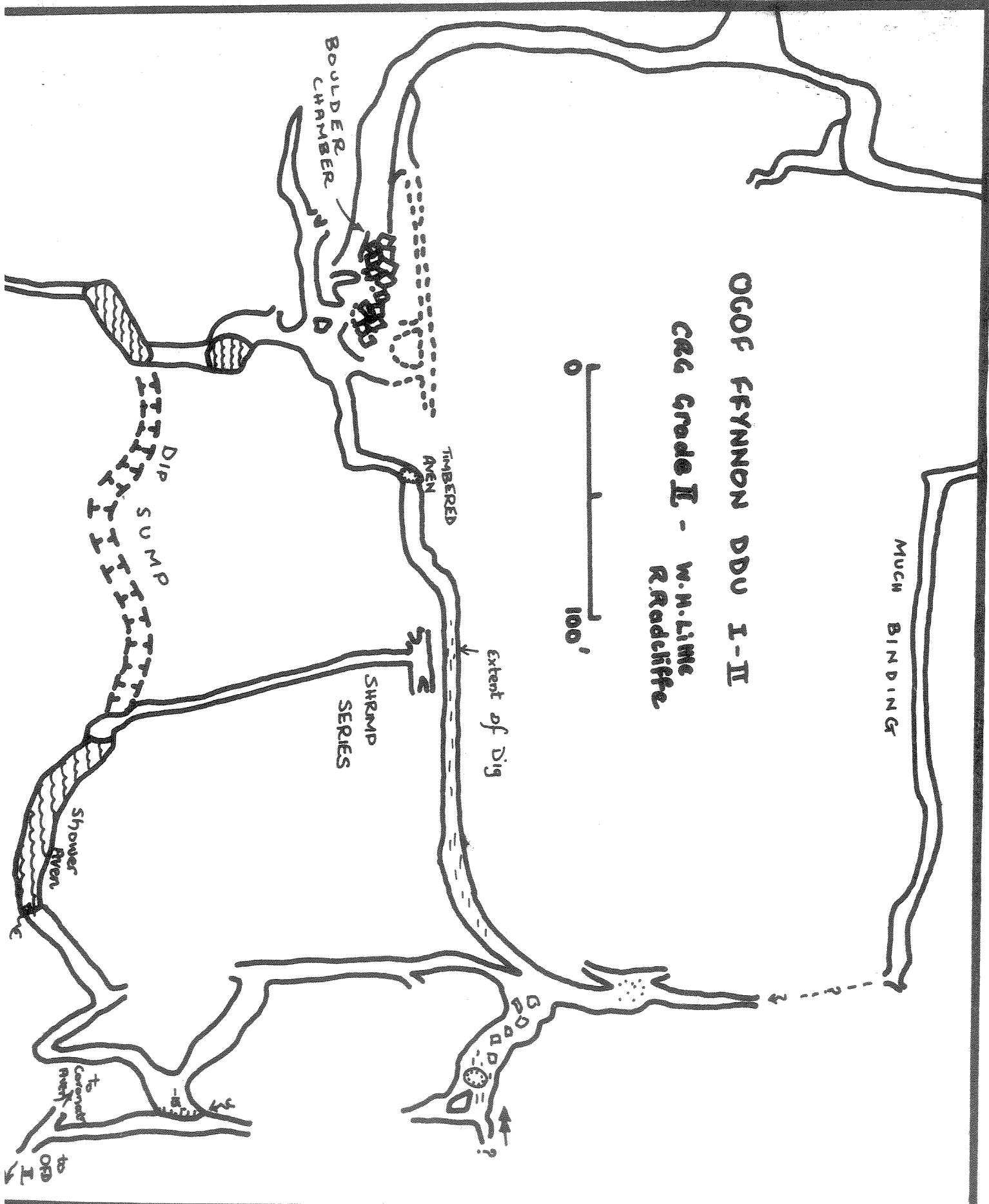
After more than six months, my patience ran out so I decided to turn my attention again to Ffynnon Ddu I (a year added to my life has made me no less conceited). This time I decided that as sound connection came from Shrimp series to the timbered aven, that the two could connect and as there was no trace of any passage in the aven, I decided to dig down in the floor amidst shouts of "What a horrid, grotty hole", and "You're flogging a dead horse", etc. etc.

After digging down nearly four feet, we came to some calcited boulders, presumably the original bottom of the aven before the diggers

MUCH BINDING

OGOF FFYNNON DDU I-II

CAC Grade II - W.M.L.I.M.C
R. Radcliffe



of the sixties. Another few feet and sure enough a passage heading East - straight towards Shrimp series dig.

The dig, already made wet by Bob Hall, was very easy. Within two weekends, we had dug seventy feet and broken through - not into Shrimp series, but into virgin cave. Bill Little and Pete Cardy had a narrow escape at one stage in the dig, because a few hours after they left the cave the end of the dig went with a sudden rush, for it had been holding back a suspended lake of some fair proportion, and we had been digging the plug out of the bottom of it. It took about an hour and a half of concentrated effort by Mick Day to clear the last thirty feet. We soon found ourselves crawling along a once water filled passage covered with beautiful crystals (most of them have unfortunately been spoiled already by the passage of cavers through the liquid mud).

Our series trended eastwards and so the following day Mick and Pete went into Dip Sump series to make and listen for noise. Within an hour and a half of our hearing the first whistle blast we congratulated ourselves, exchanged parties and made the first SAFE, dry through trip from the Grithig to Cwm Dwr.

Here endeth the saga of Shrimp series, which has been completely bypassed. Once again our armchair cavers have left it to their committee to show them the way.

How different would be the history of Ffynnon Ddu been if the diggers of the sixties had ignored the draught from their dig, and carried straight on instead of upwards? There must be a moral here somewhere.

Bob Radcliffe

N.B.

I have been asked to point out that

1. Only parties with Ogof Ffynnon Ddu I leaders are allowed to enter Ogof Ffynnon Ddu I from Ogof Ffynnon Ddu II.
2. Parties doing through trips from Ogof Ffynnon Ddu I should arrive at the Grithig on foot (no cars please).

FROM the LOGBOOK

Dan-yr-Ogof

Work has been intermittent in the cave, partially because of the poor weather. Towards the beginning of April attention was focussed on the boulder choke in Gerard Platten Hall and some banging was done in the hope of bypassing the Long Crawl. While digging, Dave Judson got trapped by a boulder fall. A full scale alert went out and fortunately there were plenty of people at Penwyllt to deal with the emergency. Within several hours, Dave, who was trapped on the Dan-yr-Ogof I side of the choke, was released none the worse for his experience. Also in Gerard Platten Hall the stream inlet at the upper end was pushed via a tight squeeze and flat-out crawl to about 100 feet of large passage. It ended in a boulder choke, but a hole in the roof was followed in a downstream direction.

The Far North was extensively pushed by a party led by Alan Coase, but they found several likely spots had already been examined without any record of them - this emphasises the need for people to write up new stuff in the logbook.

Hangar Passage extension was further extended in mid April; a dig lasting $1\frac{1}{2}$ hours led Martin Farr to a large, very unstable, high-level chamber. It was reached by digging straight up through loose boulders which are still a bit dodgy. Two steep scree slopes led on, one on the left ending in less than 100 feet, one on the right ascending very steeply for 60 feet before levelling off. Then the passage dipped down again, and a crawl began. At a fork one passage led for 100 feet or so over mud to a boulder choke as did the second. A quick dig yielded a small well decorated chamber with a small passage leading on.

Sink-y-Giedd has been regularly flooded this year but several attempts have been made to follow the draught. The likely spot is a boulder choke with a proverbial big black space every few feet.

Ogof Ffynnon Ddu

Martin Farr has been active in the Piccadilly area, and several hundred feet of interconnecting high level passages have been added. None give promise of going out into the blank space on the survey however.

At the beginning of May two cavers were well overdue on a through trip and were feared lost. A rescue party carrying ladders were lucky to locate the lost party at the base of the stretcher hauling pitch. Apart from being exhausted they were unhurt - WSG Members formed a second rescue party and met the others on their way out in Salubrious Passage.

Ken Maddocks and Carl Ryan led a maypoling party to an aven in Smith's Armoury in mid May and after some desperate climbing they gained access to a muddy 6ft diameter passage leading to a precariously balanced choke. There is a draught and the whole thing needs banging.

The beginning of June saw intense activity in Ogof Ffynnon Ddu I which has led to a connection through to Dip Sump series enabling dry

cavers to do the longest through trip - this is described elsewhere in this Newsletter.

Heavy rain flooded many of the caves in June - Gower was particularly badly hit. Llethrid Cave flooded badly, and Tooth Cave, which had only recently become 'dry' after many years, was reflooded. It should be pointed out that the Emergency food stores in both these caves are in bad condition and are in the process of being renewed.

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Scratched Negatives? - Don't Despair!

Most caving photographers find themselves, at some time or another, trying to make prints from badly scratched negatives. The problem is particularly bad with 35mm negatives. Dirt, grit and dust inevitably get into the camera, especially if film is changed underground and the result when the film is wound on is a great scratch along what might have been an otherwise acceptable negative. The scratches produce white lines which are difficult to retouch. A simple method of overcoming this is to sandwich the damaged negative between two optically flat surfaces, the inside surfaces of which are coated with microscope immersion oil to fill in the scratches and form an even coating on each surface of the negative, which is then enlarged as usual.

The immersion oil has a similar refractive index (1.51) to the gelatin (1.54) and the film base (1.56), and by filling in the scratches prevents internal reflection. If the scratches have penetrated to the film base they will print as black lines and the method is not effective.

A useful means of doing it is to hinge together two 3¹/₄ square lantern slide cover glasses, with waterproof tape. The surfaces should be cleaned and a 3/4 inch diameter blob of oil placed in the centre of each plate - they are quickly folded together, gentle pressure ensuring an even layer of oil is kept over each side of the negative.

Inevitably, the process is messy, and time consuming but it is far better than trying to retouch prints. After printing the negative is washed in methylated spirits to remove the oil, then washed and dried in the normal manner.

Glycerol (or glycerin) may also be used (refractive index 1.47) but it is considerably messier and is more prone to hold air bubbles, nor does it spread so easily - it may also damage the negative by buckling.

P.M. O'R

Suppliers of microscope oil:

C. Reichert, 266 Bath Road, Slough, Bucks.
(approx. cost 50p per 10 ml).

Ref: P.G. Pinnock, British Journ. Phot. June 11 1971, p.537.

CLUB NEWS

1. We welcome the following new members:
Sheila Eldridge, Greenfield, Garden Street, Stafford.
Frank J. Honey, 55 Whitehouse Road, East Ham, London E.6.
Michael Ware, 65 Ffynnonau, Crickhowell, Breconshire.
Clive D. Westlake, Flat 1, 60 Lichfield Street, Walsall, Staffs.
WS4 2BX.
David Williams, Nythfa, Cwmllynfell, Swansea.
2. Congratulations to:
Sheila and Gerry Eldridge on their recent marriage;
Jan and Robin Williams on the birth of their son in April;
Addie and Clive Perret on their engagement.
3. Correction: Caitlin Day was born in October.
4. Ogof Ffynnon Ddu survey - reprint:
It is expected that this will be available by the time you receive this Newsletter. Orders, with money, to Mary Galpin, 6 Trinity Rise, Stafford, or to Pete Cardy, 111 Roedean Avenue, Enfield, Middlesex. Cost £1-25 to members, £1-50 to non-members, postage included in U.K. Cheques, etc. should be made payable to the 'South Wales Caving Club'.
5. Annual General Meeting:
Members should receive a copy of the minutes with this newsletter.
6. Mrs Burton:
Members will be glad to know that Mrs Burton is better than she was at the time of the A.G.M. She is still in Craig-y-Nos Hospital.
7. Keys:
The keys are at present held at Ty Mawr, and should be returned there at the end of each weekend. In the event of no-one being in at Ty Mawr the keys may be with Miss Williams, next door.
8. Generator loss:
A generator has been removed from the back downstairs room of cottage No.3. Does anyone know of its whereabouts? Please let Peter Harvey know if you do.
9. Assistant Secretary:
Pete Cardy has agreed to continue as assistant secretary.
10. Ogof Ffynnon Ddu I leaders:
Geoff Cope, Jem Rowland and John Stevens have been elected onto the leaders list for Ogof Ffynnon Ddu I.

11. Address changes:

Sheila and Gerry Eldridge, Greenfield, Garden Street, Stafford.
Dave Judson, Bethel Green, Calderbrook Road, Littleborough, Lancs.

12. Members will be sorry to hear that one of the Club's former members Brian de Graaf has been seriously ill in hospital and is now recovering from an operation. Many will remember that Brian was Editor for something like eight years. We wish him a speedy recovery.

13. Connection between Ogof Ffynnon Ddu I and II

At the last Committee Meeting it was decided that:-

1. The leadership system for I is to be retained and any party going from II to I should be accompanied by a leader for I, even if they do not intend coming out of I.

2. If any caving party intends making a through trip in either direction, they should not park cars at Y Grithig.

3. Water Contamination: Mr and Mrs Barrows draw their domestic water supply from the rising at the surface. If anyone intends going through the connection between I and II in either direction, whether on a through trip or not, then they must inform Mr and Mrs Barrows before they enter the cave to ensure that they have sufficient water drawn off before the water is made muddy.

14. Photographs for Newsletters

As you have no doubt noticed, we are now publishing photographs inside the newsletter as well as on the cover. If you have any photographs which you feel are worthy of inclusion, please send them in. Required are Black and White, glossy prints - contrasty - at least the size they are to be published (exact size does not matter).

REVIEW

The LITTLE NEATH RIVER CAVE P.A. Standing, M.D. Newson and A.G. Wilkins. Proc. Univ. Bristol Spelaeol. Soc. 1971, 12(3), 303-325 (available as an off-print price 75p).

This Second Report on the Little Neath River Cave is a very welcome addition to the literature on South Wales caves. Four years have passed since its discovery and the publication records the exploration since then and presents a new survey of the cave. There is also a report on the geomorphology of the system. The booklet is produced in the usual ABSS way with a very high standard of reproduction and layout, and there can be no criticisms of the quality or quantity. An elevation shows the cave in relation to the surface, the section on the geomorphology outlines the fascinating studies under way in this fine cave (now over 5 miles long), and there are graphic warnings about flooding and safety precautions to be observed.
(The Bibliography contains one incorrect item - the 3rd item on Ogof o Flaen-y-Waun, SWCC N/L No.67, attributed to ANON, should be attributed to N. CRUDY.)

DISCOVERY OF OGOR RHOSILLI - O.S. 406878, sheet 152.

In a previous newsletter we were exhorted to examine sites which should yield new caves with a "modest expenditure of effort" - (N/L 64). Well, it has been proved that cave passages can still be found on the Gower using absolutely no effort other than throwing down 25ft of ladder.

The entrance to the cave is a body-sized hole about 70ft above sea level, at the foot of an outcrop on the steep slope of the cliffs, approximately half-way between the car park at Rhosilli and the coast-guard lookout station. Access is gained to the cave down a tight rift (ladder needed). At about 40ft there is a horizontal passage of mainly two to six feet in height, well decorated, containing a couple of small pools. It follows the line of a fault inland for approximately 40 feet and terminates in a 15ft deep pot, with a pool at the bottom. A continuation of the passage seawards consists of a chamber about 20ft long and 4ft to 5ft wide, with a scree floor which has run in from the surface down the rift.

There would not seem to be any obvious way on at any place. From the appearance of calcite formations on the cliffs above the entrance, it would seem that there was once a larger system which has subsequently collapsed.

The system was entered on 2 January 1971 by K. Maddocks and A. Stone (S.W.C.C.), A. Maddocks, A. Simpson, G. Leyshon.

K.J.G. Maddocks
June 1971

25th ANNIVERSARY CELEBRATION DINNER

To be held on Saturday, 13 November 1971, at Bishops Meadow Restaurant, Brecon (same venue at the 21st).

The whole of the weekend, Friday 12, to Sunday 14 of November will be a members only weekend. It is hoped that as many members as possible will stay at the HQ and take the opportunity of making it a real 'South Wales' occasion. A chance to see who's who and what's what after 25 years as a Club.

There will be a turkey dinner, bar, and transport arranged from Penwyllt to the dinner and back. It is not envisaged that there will be any organised entertainment.

Price: £1-50p (inclusive).

Bookings to be sent to: K. Maddocks, 9 Green Close, Mayals, Swansea, by 30 September 1971, (cheques, etc. payable to 'South Wales Caving Club').

SOUTH WALES CAVING CLUB

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 28.2.71

Expenditure	£	Income	£
<u>H.Q. Expenses</u>		Subscriptions and Enrolment Fees	350 50
Warden	52 05	H.Q. Fees	563 09
Electricity	32 34	Donations	46 60
Gas	21 13	Telephone	13 72
Coal	69 60	21st Publication	23 75
Rates	29 89	B.B.C. Broadcast	10 00
Insurances	66 37	Rent for Election	4 00
<u>General Expenses</u>		C.R.O. Publication	7 73
Cottages	87 04	Hut Deposits	17 50
Tackle and Tools	39 08	Miscellaneous	-- 77
Telephone	48 70	Interest on Deposit at Midland Bank	8 77
Ogof Ffynnon Ddu	14 61	Interest on Deposit at South Wales T.S. Bank	9 93
Conservation Expenses			
Cave Research Group			
- Subscription	6 00		
ditto Donation for Meeting	1 78		
Newsletters	90 67		
Treasurer	5 48		
Secretary	21 19		
Hut Deposits	9 70		
Cambrian Caving Council Subscription	2 00		
Miscellaneous	9 23		
Excess of Income over Expenditure	449 50		
	<u>1056 36</u>		<u>1056 36</u>

SOUTH WALES CAVE RESCUE ORGANISATION - APPROPRIATION ACCOUNT

Expenditure 1970/71	20	45		Balance at 28.2.70	160	54
Balance	c/f	197		b/f	57	81
		<u>218 35</u>		Income 1970/71	<u>57 81</u>	<u>218 35</u>

OGOF FFYNNON DDU CONSERVATION FUND (DONATIONS)

Balance	c/f	<u>92 72</u>		Income 1970/71	<u>92 72</u>
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NETT REVENUE APPROPRIATION ACCOUNT

H.Q. Repairs Fund	100	00		Balance at		
				28.2.70 b/f	81	45
Balance at 28.2.71	c/f	430		Excess of Income over Expenditure	449	50
		<u>530 95</u>			<u>449 50</u>	<u>530 95</u>

SOUTH WALES CAVING CLUB

BALANCE SHEET as at 28 FEBRUARY 1971

<p>CAPITAL BALANCE at 1.3.70 570 00</p> <p>Increase in valuation of Premises 5800 00</p> <p>ditto ditto of Equipment etc. <u>5340 25</u></p> <p style="padding-left: 100px;">11710 25</p> <p><u>Less</u> written off Duplicator <u>64</u> 11709 61</p> <p>Revenue Balance 430 95</p> <p>H.Q. Repairs Fund 800 00</p> <p>South Wales Cave Rescue Organisation 197 90</p> <p>Ogof Ffynnon Ddu Conservation Fund 92 72</p> <p>Creditors (paid 12.3.71) 69 66</p> <p>Subscriptions for 1971/72 prepaid <u>5 50</u> 1596 73</p> <p style="text-align: right;"><u>£13306 34</u></p>	<p>CLUB PREMISES:- 1-10 Powell Street (Committee Estimate) 6000 00</p> <p>Garage (Cost) 15 00</p> <p>Duplicator 4 25</p> <p><u>Less</u> 15% written off <u>64</u> 3 61</p> <p>Tools, Equipment, etc. <u>5691 00</u> 11709 61</p> <p><u>Debtors</u></p> <p>Subscriptions 8 46</p> <p>Donations 65</p> <p>Fees 1969/70 54 50</p> <p> " 1970/71 <u>3 90</u> 67 51</p> <p>Midland Bank Deposit Account 808 77</p> <p>South Wales Trustee Savings Bank 407 22</p> <p>Current Account, 186 44</p> <p><u>Less</u> Uncleared cheques at 28.2.71 <u>14 50</u> 171 94</p> <p>Cash in Hand (Paid in 27.2.71) <u>141 29</u> 1596 73</p> <p style="text-align: right;"><u>£13306 34</u></p>
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Hon. Treasurer: K.J.G. Maddocks