SOUTH WALES CAVING CLUB
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C O N T E N T S

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"PUBLISH AND BE DAMNED ...."

Well it's done. Seven boxes of bound, stapled, collated, typewritten, red-covered books are all to show for the many months of reading, writing, talking, scrapping, rewriting, typing, sore fingers, telephone calls to the printer, worries about costs, trips to Cardigan to collect the "finished" product, the collation - 300 yards walking per copy, the stapling, blistered hands and finally the posting ....

Is it worth it? Who'll buy? A quid for three hundred pages of mental indigestion. And we are waiting for orders. There aren't many left now - only two hundred or so - if you want your copy you will have to hurry.

As Editor I must say it REALLY is worth it. You can have fifty photographs - twenty sketches, 260 typewritten pages and three surveys for your twenty shillings.

In 21 years the Club has discovered many cave systems and Ogof Ffynnon Ddu and Dan yr Ogof are the two main ones. Their history is gathered together for the first time under one cover. On the archaeological side Derrick Webley's work in Tooth Cave, Gower, is included, and the truth (the REAL truth) about Balinka Pit comes out.

The Ogof Ffynnon Ddu story is a gathering together of all the published work on the cave. There are two sketches in the text, one of the Dip Sump Series, and the other showing the cave in relation to the surface. Two full size surveys are appended - one, Railton's Grade 6 of Ogof Ffynnon Ddu I and the other a preliminary one of Ogof Ffynnon Ddu II and III. The latter is produced in response to the many requests for an up-to-date map of the new cave, and it contains many of the major routes and some of the minor ones - no great claims are made for the accuracy but it varies from CRG 1 to 4 - it will be several years yet till a proper survey is produced.

Dan yr Ogof gets similar treatment to Ogof Ffynnon Ddu and includes a map of the cave in relation to the surface as well as Coase's survey in pull-out form. The great reduction needed in producing this survey means that some of the print cannot be read but this is compensated by the fact that the survey is again only preliminary and the size (30" x 22") kept the cost down by 1/3d.

Tooth Cave archaeology contains the details of the excavations there, and includes a survey of the cave, sketch of the site, a photo of some of the finds and some theories of cave formation.

The Balinka Saga is fairly controversial. Several people have complained that it takes up too much of the magazine - and perhaps it does. But it was a very important stage in the Club's development and the detailed planning involved is covered in its entirety, mainly because it is my view that far too many expeditions are written about without the "technical details". Thus the account here should become a reference for all similar expeditions.

And that's what you get for your pound. Good value? There is only one way to find out, and that is by buying a copy - don't let the Club down in this, its most adventurous publishing effort yet.

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THE END?

Twenty-one year's effort was rewarded in September last, when the new entrance to Ogof Ffynnon Ddu II was opened up on the moor behind Penwyllt. It was an unbelievable site. A small cwm with green grassy sides and a scree-covered slope on one side, with no indication whatsoever that there was a cave below it. How many cavers have crossed over it without even noticing it we shall never know, -- there were hardly ten feet of scree to dig through before the passage was reached.

As most people now know, the new entrance comes right into a big passage that leads to a multiplicity of interconnecting passages. The more obvious of these had been followed to the Snail Dig, and by a combination of luck and perseverence the spot had been located. Once the way was open the hordes came. The entrance passage is roomy and easy enough for the most inexperienced caver, and in the weeks following the opening just about every novice came, saw and conquered The mud flowers and crystals disappeared beneath a rush of Vibram soles, and Gnome Passage was rediscovered again and again by different parties in a variety of different locations. Pitches were rigged and vast extensions were found and claimed by different clubs only to be disappointed to find that they were interconnections of the many routes already explored. Sketches were produced but no two tallied. One interesting fact emerged from the initial rush; there seemed to be a great excess of gawkers over workers; working parties building up the new entrance were harassed by visitors to such an extent that the tidying up has never been finished; neither have any of the floor formations been taped. There were very few serious attempts at surveying or photographing. Many of the routes that were left by the initial parties were not pushed to their limits. It was left to the original explorers of the series to follow the draught - and a howling one at that - to Ogof Ffynnon Ddu III.

John Osborne led a party back to the Shambles, that tremendously shattered area that had been the limit of previous exploration, but instead of descending the obvious pitch he traversed along the rift for two hundred feet and arrived at the top of the boulder choke that barred progress below. Another bit of traversing led to a further choke. Unluckily, poorly-attended Nife cells were giving a lot of trouble and they had to retreat. There were two probable ways on - one was a small hole in the base of the choke and the other was to climb up over the blockage. Terry Moon did climb it a fortnight later. The survey that Paddy O'Reilly and Colin Fairbairn had been doing gave every indication that the way on to Ogof Ffynnon Ddu III lay this way, so the three, aided by Bob Pyke and loaded with ladder, climbed up over the choke through a very constricted aperture between jammed blocks and out over the top.

Paddy O'Reilly describes: We knew we were on to something because as soon as we got half way across the traverse we could hear the dull roar of the mainstream. We had not heard it here before, but on that day exceptionally heavy rain had swollen the rivers and we knew that there was probably a foot or two on the step on Ogof Ffynnon Ddu I. When we got over the top of the choke we were faced with what appeared to be a big pitch. The river was very loud but seemed to be a long way below us. I descended a ladder but found myself on a boulder floor after 30 feet or so. I went off down the slope, turned right and climbed down past some helictites to find myself on a platform of calcited boulders, looking into a big circular opening. Below, I could see big blocks of limestone and white foam, and for a few moments I thought we were still below

the top waterfall. We had only one ladder left now but by climbing part of the way up the previous pitch we managed to unclip the bottom one and let the two down a slit into the mainstream. I descended first, landed on a big block, looked around, and thought I saw a bootprint! Immediate disappointment disappeared when I realised it was only the mark of some mud that we had kicked over the edge above, so I jumped into the water and waded around a corner.

The low tunnel shape confirmed that we were in Ogof Ffynnon Ddu III at last! I ran back and made myself heard over the din of the water. The two little specks of light that were Colin and Terry seemed to be dancing for joy. Bob joined me and we rushed back upstream only to be stopped by a foaming cascade about ten feet high. The severe flood meant that there was no hope of climbing it so we rushed off downstream guessing that there would be a sump nearby. It was quite far away and we both fell into the waist deep pot just before the passage degenerated into wide bedding planes. The water rushed through sandy banks and glugged away into an evil looking bedding sump. Terry and Colin joined us and all Terry said was, "We should have dived the sump at the top waterfall ages ago!"

Caving in dry clothes was over again so, wet-suited, the next day we sweated three long maypoles into the cave. Like some Edgar Allen Poe-ish monsters we ding-donged our way across the traverses with the poles tied around our waists dangling down the rift. While John Osborne and Terry ferried the poles down to the stream I collapsed in a sweating heap and drilled half a Rawlbolt hole on one end of the traverse. John also manufactured an easy route through the boulder choke at the end, avoiding Terry's epic climb and the 30' pitch; another traverse on some false flooring above the big opening over the streamway avoided the 40 foot pitch there. The river was still in flood so the attempt on Niagara, as we termed it, was foiled.

The following week the weather was worse. There were three feet of water on the step in Ogof Ffynnon Ddu I. All the streams were a muddy brown, and the Tawe was badly swollen. In very heavy rain we entered the cave and were soon by the maypoles. There was absolutely no hope of climbing Niagara and it proved equally impossible to go downstream. A pole was hopefully hoisted into an opening in the roof and within minutes it was announced that it "went".

We were in a dry level caused by boulders jammed across the passage. The place was unusual and we none of us had seen any similar passages in other parts of Ogof Ffynnon Ddu - big boulders, small clusters of calcite formations, condensation on the underside of the roof and a big open route only twenty feet or so above the stream below. Where we could see the stream it was black and murky and slow flowing like the Styx and much wider than is normal in Ogof Ffynnon Ddu. Eventually our easy route petered out and we were forced to descend to the stream. Luckily the passage was wide enough to make the water only chest deep in most places, and there too the current was slow so we were able to move slowly upstream. In places where there were cascades we traversed on thin sandstone or rottenstone ledges, until we were halted by one particularly fierce set of cascades. Here, too, we lost one of our party, but eventually found him sitting comfortably watching the water level rise and fall. "Run off and leave me, would you?" he said. Our only way around the cascades was to traverse, so we did, jumping from side to side — we knew full well that if we had fallen ... well, the water there was four feet deep, on a later trip in normal conditions it was barely six inches ....

Farther on, the meandering passage became quite spectacular before

going through a series of ducks and finally a sump. Our search for a bypass to the sump was not successful, but during the search the level dropped and several of the team ducked through and disappeared into a low tube. Three of us waited outside in case of emergency.

Beyond the sump a crawl through a most unusual bedding plane with a sandstone (?) floor led to a chamber - the stream trickled from the base of a very final boulder choke and there seemed to be no way on. This was Smith's Armoury, his last hiding place.

On the way back through the sump the level rose again and trapped two of the party who had to dive out blind - a good sense of direction saved the day and everyone emerged safely. It appeared that we had reached the Byfre at last."

Many spectacular side-inlets seen on that day were mere trickles in normal conditions. Several parties returned and one found another waterfall beyond Niagara. Niagara itself has not yet been scaled, but it may one day make an excellent waterfall jump. It is not known how long the sump connection between II and III is - a survey of the new streamway shows that it is about 1100 yards long and is within a few hundred yards of the Byfre. The radio test failed to locate the end, possibly because of excessive depth. Another will be made as soon as possible.

FUTURE PROSPECTS: What of the future? Is this really the end of Ogof Ffynnon Ddu? It is impossible to say. The provisional survey (21st Anniversary Publication) might indicate that the new streamway has passed the Byfre and is continuing over in the direction of Pant Mawr. Is Peter Harvey's old theory about the two systems being joined likely to come true? There seems only one way to find out and that involves digging at the Crossroads in Pant Mawr. The big passage there could be the continuation of Ogof Ffynnon Ddu - especially of the Ogof Ffynnon Ddu "Misfits" - the Ogof Ffynnon Ddu III Streamway, Gnome Passage, Cwmdwr Jama, and Rawl Series. Any ideas?

Editor. (January 1968.)

On Location in Ogof Ffynnon Ddu.

This is the story of the important role of the Radio Locator in the discovery and exploration of Ogof Ffynnon Ddu II. The Birch Radio Device dates back to Tunnel Cave Top Entrance and the idea even goes back to an early location of the Pi chamber in Ogof Ffynnon Ddu I.

However, its first real success was in the location of Cascade Aven in Tunnel Cave and the shaft which was sunk illustrated the usefulness of the tool. The depth was reported to be within 9" at 40 ft.

Later on, the device was used to do a rapid survey of some caves under the Heads of the Valleys Road and after this its usefulness was never really doubted.

Experiments in Cwm Dwr, however, showedthat at 200 ft. its range was a limiting factor and so it was modified by Bill to increase the power and type of transmitter and to boost the receiver. This modified device then had a range of 400 ft. and was immediately used by the divers in 1966 to locate the Smithy in the new extension to Ogof Ffynnon Ddu I found in July. This was proved to be within 160 ft. of Cwm Dwr and the spur soon resulted in the discovery of the dry way into the cave via Cwm Dwr.

Once the dry way existed the radio was used on several occasions. Tests in the stream and the terminal waterfall all failed due to depth, or as was proved later, due to insufficient knowledge as to where to look on the surface. However, the Marble Showers was located as being close to the large shakehole behind the Club.

In September 1967 the device was carried into the newly-discovered Clay Series and was set up at what is now known as Snail Dig. On that occasion we were equipped with Walkie Talkie as well, and to our delight contact was made with the surface from a most unlikely spot in the Labyrinth. The surface party, led by Roger Smith, had located the very powerful signal from the transmitter much further South than we had expected and had already calculated the depth as 70 ft. (later corrected to 50 ft.). The transmitter was therefore moved to the point of original radio reception where the depth appeared to be in excess of 160 ft!

With these curious results plans were made to excavate Snail Dig which is an aven blocked with boulders between which snails had fallen. The surface at this point was just on the edge of a small limestone scarp with no depressions nearby. However, on reflection the aven was seen to be in the roof of a passage which was blocked further on, but due to the fall in the surface level in that direction it was likely that the depth was in fact less. Accordingly on September 18th a strong party carried the Radio in once more and a series of fixes were taken. The end of the passage was immediately and unmistakably taken to be the best site and even before the ranging was complete hammer blows were being exchanged. The depth worked out at 21 ft. by calculation and 15 ft. by empirical relationships.

Well, as we now know, the depth was in fact 15 ft. and the way through was open in 3½ hrs; surely the most impressive demonstration of science in caving?

Further tests in the chamber just back from Snail Dig, done whilst the entrance was dug, then explained the earlier odd readings. This chamber was found to be 50 ft. down and <u>above</u> the passage located at 160 ft. This conclusion was supported by the survey which Paddy O'Reilly had started. The Walkie Talkie appeared to have worked due to the flow of water down this route, with a loose connection between the two.

Thus the top entrance, which allows access to the nicest passages in the cave, and to the reaches beyond, was discovered solely by means of Radio and in fact no clue existed on the surface prior to the dig. This achievement should be appreciated by all those who now enjoy access, as without the device several years may have elapsed before the site was found by conventional survey, or for the challenge to be taken up by diggers. It would perhaps be nice to perpetuate this fact in a name for the entrance found by the use of radio in

caves. It is now the second entrance found by means of the Scientific Location of Caves by Radio and could be referred to as "SLOCR 2". The name would have something in common with Mendip terminology and could be enjoyed by those who benefit from its discovery.

The usefulness of the device has not ended, and in fact more ideas are being tried. A fix was attempted of the far end of the streamway in the new extension but without success as yet. Formulae exist for its use from surface to cave and from passage to passage, techniques which will add to the flexibility of the device.

Lastly, the device itself. This consists of a transmitter carried into the cave and a highly portable receiver used on the surface. In use the transmitter needs four NIFE cells for power and connects to a 10" dia coil. When it is switched on a current flows in the coil and sets up a magnetic field which can be detected at a distance. In use it is set up horizontally and left on.

The receiver is a small amplifier with earphones. The aerial is another coil of some 24" dia and this coil picks up the magnetic field when in the range of the transmitter. This results in a whistle heard in the headphones and the depth is then calculated by means of two tests.

(1) Holding the coil at one point it hangs vertically and is turned so that the signal decreases to a minimum. The bearing along the coil is noted and after walking some distance the test is repeated and a new bearing is sighted along to intersect with the first at a point directly above the transmitter. This point is called the axis and its location is checked with further tests.

(2) Moving to a distance D on a level with the axis the coil is held in both hands when facing the axis and, keeping the forearms still, the coil is turned. Once again the signal will fall to a null (not usually zero) and the angle of the coil to the vertical is measured by means of a plumb-bob. Several tests are made to average out the results but the depth below the axis is then 'H', where:-

$$H = \frac{0.69 \times D}{\tan \emptyset/2}$$

Where $\emptyset$ is the angle of the coil to the vertical for null signal.

The factor of 0.69 is still being investigated but when used, the depths can be calculated to within 3-4%.

Much talk is heard of improvements needed, planned or proposed but here at least is a device which works and is in use proving itself, thanks to Bill Birch.

J.V. Osborne.

Shrewsbury Dec. 1967.

Ref: "Technical Aids to Caving" - CRG publication.

CLAY MINERALS IN CAVES.

Following the tentative identification of the material found in Ogof Ffynnon Ddu 2 (1) Paddy O'Reilly and I sent a sample for positive identification by X-ray diffraction analysis. The result was disappointing - it turned out to be mostly calcite with quartz impurities. It just shows that without exotic test apparatus, analysis of rather impure deposits is difficult. However, there seems to have been an increase in the interest being shown in clay minerals from caves and if anyone finds an interesting deposit I will be glad to have a sample analysed. (On re-reading that last sentence I have a feeling that I have laid myself open to abuse). The following notes have been extracted from four papers dealing with the discovery and identification of clay minerals in caves.

1. MONTMORILLONITE & ATTAPULGITE from Carlsbad Caverns, New Mexico.
DAVIES, W.E., U.S. Geol. Surv. Profess. Paper 501/C, 82-3 (1964).
Also C.A. 62 2623 g.

   Two sorts of clay were found - a grey-green variety was mostly montmorillonite. The pink clay was a 1:1 mixture of montmorillonite and attapulgite.

2. ILLITE from the grotto of Saint-Cezaire in the Alpes-Maritimes.
POBEGUIN, T. Compt. Rend. 250, 2389-91 (1960), CA 55, 20799 d.

   The clay mineral illite was found associated with magnesite in the moonmilk deposits on stals.

3. DECOLORIZING NATURAL EARTHS from caves near Lazio, Italy.
TURRIZTANI, R. and CORRADINI, G. Russ. Chim. 15, No. 2., 61-3 (1962).
Also C.A. (1962) 16190 g.

   Naturally occurring earths found in these caves had decolorizing properties.

4. PALYGORSKITE from New Zealand Caves.
N.Z.S.B. British Caver, Vol. 43, 1966. pp. 10-11.

   Notes the discovery of spongy, slimy, wet leathery mineral in limestone joints. In N.Z. Speleo. Bull, 34, pp 86-7, G.C. HUNT identified the mineral as 'mountain leather', a variety of amphibole or asbestos. A further sample from another cave was identified as polygorskite, N.Z.S.B. 36, 135-49. The mineral has been found in other caves and in N.Z. Geol. Geophys. 7, pp 917, it is identified as belonging to the Palygorskite (Attapulgite) group of clay minerals.

   There is some confusion in nomenclature in this last report caused by the use of trivial names such as 'mountain leather' which can be used for two distinct and different minerals, i.e. the amphiboles and the palygorskites.

J. Hartwell.

Ref. 1. SOME NOTES ON MONTMORILLONITE DEPOSITS.
O'REILLY, P. S.W.C.C. Nl. 57, pp 11-12, 1967.

(Editor's Note: Now that it is known that the white deposit in Ogof Ffynnon Ddu II is not montmorillonite and only contains minute quantities of Halloysite, is there any budding geologist or chemist who can tell us how this most peculier mineral originated? Is it moonmilk after all? If it is we will have to revise our ideas about moonmilk. There is excellent scope for some research here.)

(The following article is reprinted from CRG Newsletter No. 109, Dec. 1967.)

DIFFERENTIAL SOLUBILITY OF LIMESTONE.

(- a brief report on some observations and tests carried out on what were apparently argillaceous beds found in the latest extensions of Ogof Ffynnon Ddu.)

During the weekend of 14/15 October a further 1100 yards of streamway were discovered in Ogof Ffynnon Ddu. A party revisited the discovery on October 21st to look for further possible extensions in the upper portion.

The last 200 yards of streamway are different in character from the rest of the known streamway. It is a low passage and ends in a short bedding-plane crawl. The stream, however, flows in a narrow but deep trench cut in the centre of the 'crawl'. Immediately after the crawl is a chamber blocked by large loose limestone boulders. The stream issues from the base of these boulders.

Whilst passing through the bedding-plane portion one of the party observed that we were crawling on sandstone. We carefully examined the beds, and two of them, about 1 to 2 feet thick, closely resembled sandstone, whilst several others resembled very impure limestones. Further downstream from the bedding cave a number of black flakes protrude from the walls of the otherwise smooth passage, and these were initially thought to be chert. Samples of one of the flakes and the two 'sandstone' beds were removed for examination.

Throughout the rest of this article the two sandstone samples will be referred to as '1' and '2' and the 'chert' sample as '3'. Bed 1 was above 2. Some simple tests were carried out on the samples and the results are given below.

Results.

(a) Sample Descriptions: Nature of freshly broken surfaces.

(1) Dark brown in colour, texture and appearance of sandstone.
(2) Light brownish grey; texture and appearance of sandstone.
(3) Dark grey fine-grained, appearance of calcareous mudstone.

(b) Appearance of fresh surfaces after reaction with 10% HCl for 20 min.

(1) Powdery, apparently siliceous grains left, white in colour, which were easily detached from the bulk of the sample.
(2) Whitish cellular structure left; not easily destroyed by abrasion.
(3) Surface unchanged, except for removal of superficial black deposit.

(c) Mechanical Strength of Samples (assessed from the ease with which the samples could be powdered).

(1) Very easy to powder.
(2) Easy to powder.
(3) Very difficult to powder.

(d) % Acid Insoluble Residue (% by weight of sample insoluble in excess dilute hydrochloric acid).

Sample No.	% Insoluble	Nature of Residue
1	4%	Dark brown infusible powder.
2	2%	Dark brown infusible powder.
3	3%	Black combustible powder.

(e) Reactivity of Samples (in all cases assessed qualitatively from the rate of effervescence when dissolving in acid)

(i) in the native lump form: 1. dissolves slowly; 2. dissolves briskly; 3. dissolves very rapidly.

(ii) in powdered form 1 and 2 dissolve at about the same rate.
3 dissolves much faster.

Discussion.

Before I discuss the significance of these figures, I should like to make it plain that these are only tentative observations based on not very rigorous quantitative data. The above results are to the author's knowledge unique evidence for differential solubility and are published with the intention of stimulating more precise studies.

The three samples are $>$ 95% acid-soluble, and the bulk of the soluble material is in all probability calcium carbonate, as the limestone outcropping at or near Pwll Byfre (there is considerable evidence to suggest that we are now at or near the Sink) is of K and S_2 zones, which here do not contain any dolomitic beds (Strahan 1932).

However, for some reason all of sample 1 and 2 is not as soluble as the remainder of the sample; the presence of a considerable proportion of this more corrosion-resistant form of calcium carbonate is the probable reason for the slow rate of reaction on No. 1. The absence of any of this corrosion-resistant material is the reason for the rapid reaction rate on No. 3; therefore we must look elsewhere for the marginally greater corrosion resistance of sample 3 than its immediate surrounding beds. The nature of this fraction of sample 1 and 2, which is resistant to acid attack but eventually soluble upon prolonged immersion in dilute acid cannot be determined from the above results, and I am not prepared to hazard a guess at its nature.

Referring to my description of the area where the resistant samples 1 and 2 were found, the nature of this area is consistent with their greater corrosion-resistance. The stream water is here only able initially to develop a narrow but wide bedding-cave. The most soluble fraction of the bed is dissolved away and the grains of more resistant material easily eroded away. In low-water conditions the corrosive/erosive action will be concentrated in the centre of the bedding plane where a combination of the low mechanical strength of the bed and the increased opportunity for corrosion would develop a substantial trench. When the least resistant bed was cut through, the water was sufficiently localised in its flow-path to be able to erode the more resistant bed below, resulting in the general section shown in fig. 1.

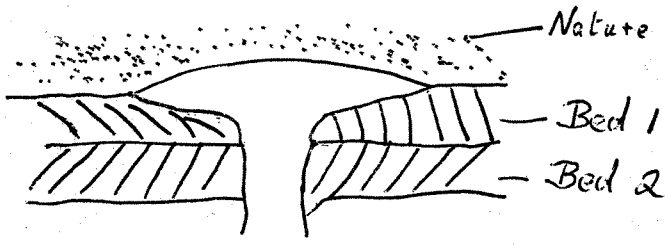

Fig 1.

The flake, sample 3, was originally found protruding about 6" from the wall of a passage circular in cross section and about 6 ft. in diameter. It is fairly obvious that the corrosion/erosion-resistance of 3 is not substantially greater than the surrounding limestone beds. The slightly greater resistance of 3 could be due to a slightly higher non-calcarous content, than the surrounding beds.

It has been shown (Glennie 1950) that the lower part of this cave was developed in a relatively narrow range of beds. The horizontal distance from the area Glennie studied to these latest extensions is nearly two miles N.E.; but with a 15 degree South dip (Railton 1953), it is conceivable that this portion of the cave is developed in the same or lower beds. If detailed geological studies are carried out throughout the cave, this interesting hypothesis may well be substantiated and the exact influence of the relative solubility of beds on the development of a cave network more fully understood, especially the influence of particularly resistant beds, such as those described above. Another interesting question is: are Dan-yr-Ogof and Tunnel Cave developed within the same range of beds? If so, the influence of differential solubility of limestone beds on cave developments may be substantially greater than currently thought.

N.S.J. Christopher.

Caerphilly,
5.11.67.

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NATIONAL SPELEOLOGICAL CONFERENCE - BIRMINGHAM 1967.

The B.S.A. Conference was held this year in the Students' Union, University of Birmingham, from September 8-10th. The venue was not as luxurious as the 1966 Bristol venue but the lecture theatre acoustics were a great improvement. Attendance was 130 compared with 200 the previous year, the drop being attributed mainly to holding the Conference in a non-caving area. Club exhibits were also fewer but some were of a very high quality, that of the Plymouth Caving Group being particularly good. A photo salon, with both black and white and colour slide entries was also arranged. The lecture programme covered a wide range of subjects, its theme being 'a year of discoveries'. It was pleasing to see the increasing liaison between the B.S.A. and the C.R.G. - both bodies helped in the organization of the lectures.

After the official opening by Jack Longland, the first lecture on 'Some old prints of Derbyshire Caves' was given by Trevor Shaw. This was a rather specialized subject but interest was held by showing a series of 18th and 19th century prints of Eldon Hole, Peak Cavern and several other sites. A short account is given in the conference Proceedings, the full details being available in Commander Shaw's monograph on 'Cave Illustrations before 1900'.

The Simpson memorial lecture (on cave formation and allied subjects) came next and was entitled "Geomorphology and Spelaeogenesis of vertical shafts in Carboniferous Limestone at Ystradfellte, Breconshire" by A.R. Burke. A new theory was advanced for the formation of vertical shafts, based on work in the Cwm Porth Woods Caverns, the Ogof Cosden Prop-Ogof Ffynnon line of caverns and Pulpit Hole. It was a highly technical paper and was probably beyond most of the audience but one of its fascinating features was a description of Drip Pocket formation in the laboratory. This was done by dripping 4% w/v hydrochloric acid solution onto limestone and the results obtained were similar to those observed in the caverns at Ystradfellte. The 30-page paper is published in full and is accompanied by several photographs and some excellent diagrams.

The afternoon session began with 'The value of Speleology in the study of Human Rhythms' by Professor J.N. Mills, Dept. of Physiology, University of Manchester. He dealt with the underground sojourns of Workman in Stump Cross Caverns and Lafferty in Goughs Cave, Cheddar. Apart from the publicity which these ventures attracted, they did serve some useful purpose, providing physiologists with data about man's circadian rhythms. The lecture stimulated more questioning than any other, the subject of the 'Inner Clock' being discussed most. Reference was also made to the three French underground pole squatters - Siffre, Senni and Mairetet, the last of whom holds the present record of 181 days.

An amusing lecture by Dave Brook (University of Leeds Speleological Association) followed on 'the Kingsdale Master Cave'. This system was first entered in June 1966 via a crawl from the Final Chamber of Swinsto, and was soon connected with Rowten Pot via a 50 ft. sump. Virtually all the pots on the western side of Kingsdale drain into the master cave and the Leeds speleos have drawn out a magnificent survey showing their relation to one another.

Alan Coase presented 'Some preliminary observations on the Geomorphology of the Dan yr Ogof System' in an excellent lecture. His paper is published in the Conference Proceedings and is accompanied by many photographs of the customary high standard. The S.W.C.C. Dan yr Ogof survey is also published at a useful 27 by 19 inch size, but some of the smaller lettering has necessarily suffered in the reduction. The diagrams, particularly the one depicting the geology of the Dan yr Ogof Catchment area are beautifully drawn. David Hobson of the Plymouth Caving Group rounded off a busy but very entertaining session with a well illustrated account of exploration in some of Devon and Cornwall's Mines. After dinner the Chairman's address was given by Ken Pearce on 'The 1967 Gouffre Berger Expedition'.

On Sunday there were only three formal lectures. Clive Westlake (Eldon Pothole Club) began with a talk on 'Giants Hole and Oxlow Cavern', the whole of which is published in the Proceedings. The lecturer dealt first with the history of exploration of the two caves, culminating in their connection in 1966. The two probably would have been joined a lot sooner had it not been

for a mistake in drawing out the two surveys together. One was to Grid North and the other to Magnetic North, the discrepancy going unnoticed for some time. A geomorphological account concluded. George Murphy (Birmingham University Speleological Society) then reported on a recent expedition, his title being 'Potential Caving areas on the Island of Crete'. The report was informative but suffered from inadequate preparation - the expedition returned only shortly before the Conference and there wasn't sufficient time to draw out surveys etc.

The afternoon session was opened by Peter Standing (University of Bristol Spelaeological Society) who lectured on the 'Little Neath River Cave, S. Wales'. This system is now over 3½ miles in length and considerable extensions have been made beyond sump 2, since the account which appeared in S.W.C.C. N1. No. 56. Sump 6 has been reached and the streamway now has over 750 ft. of underwater passage. The lecturer dealt in some detail with the development of the valley as a caving area and also put forward some controversial ideas about the hydrology of the region. All attempts to trace the resurgence have so far failed. The final session was devoted to a talk on Weather forecasting and Flood Dangers and a debate on Cave rescue organization, provoked by the recent Mossdale Tragedy.

Finally one must ask was it all worth it? The answer is a definite yes, for quite apart from an excellent lecture programme, the Conference offers a unique opportunity to meet cavers from all over the country. The S.W.C.C. representation was disappointing in view of the fact that three of the lectures concerned South Wales, and if this report stimulates a few more members to attend next year's conference it will have achieved its object. The 1968 conference will probably be held at Sheffield and the organisers would welcome both an exhibit from the club and a lecture from any of its members.

David Savage.

Note — The Proceedings of the 1967 (and all previous) conferences are offset litho productions and are still available from the B.S.A., Duke St., Settle, YORKS, price 12/6.

NEWS, VIEWS AND POLITICS.

Rumour and belated details filter through from one caving area to another with a speed not belonging to this century. Most clubs produce newsletters concerned almost exclusively with their own activities and the few that are circulated outside are usually hoarded from reading in some inconvenient library.

The Cave Research Group of Great Britain and the William Pengelly Cave Studies Association, as well as the B.S.A. produce quite a heap of matter having a national scope. However, it is obvious that those who make the news rarely write it and in any case CRG and Pengelly are more concerned with research

and studies. British Caver makes its bi-annual appearance as the result of Gerard Platten's lifelong enthusiasm, but much of the content is a repeat of club newsletters, and it is thus belated although of wide interest. The Speleologist is a periodical which attempts to present caving news and opinions to the commercial standards of a glossy magazine, but fails on account of profitability to be frequent enough to be a newspaper. I mention these publications, not to discourage them or any others, but to show that many cavers would not know what was going on elsewhere, but for the chat one gets among inter-region travellers and from those who attend a few national meetings.

Internationally, we are no better or worse than we are at crossing our own mini-boundaries. Our curiosity for countries abroad frequently exceeds the interest in neighbouring counties. For many France is more easily reached than Ireland. It is therefore easy to have one's head buried in one's own cave sand while the events and influences which affect the majority are nation-wide, and sometimes, nay, often, international, i.e. petrol rationing, new inventions in equipment or just the time and money to enjoy caving when and where you like. Nationwide are the problems created by access restrictions or by disease control (such as the disorganised ban on caving to prevent the spread of foot and mouth, or the closure of a major cave system (for all time?) due to the dictatorial powers of a coroner (it could happen again).)

Misguided enthusiasm can conversely become an embarrassment when new discoveries bring hoards of visitors to interfere with the discoverers' work, often to despoil places of great beauty or rare interest before adequate steps can be taken to preserve them. Local attempts to regulate this are laudible but as often are unpopular. This leads to clashes of principle, but more sadly, to bitter strife between those who would much rather be in the same team. This has been worsened by ignorance, causing failure to understand the other side's opinion, largely because the exchange of ideas at all levels in caving is insufficient. We should have more meetings at which these things should be discussed.

For several years in this country caving has needed leadership and often a national voice but this has been prevented by our history of speleology producing in its many associations a spirit of competitiveness, independence and parochial selfishness. This in turn has bred splinter groups and jealousies instead of unity and respect. It has gone on so long now that many cavers today accept this as normal, whilst others do anything they can get away with. Thus, the more a club puts into caving the more it has to lose by the uncooperative actions of others.

The Regional Organisations have come into being out of the differing regional needs, views and customs. They have changed from mere gatherings of informed club officers to be responsible democratic councils who can speak with the authority of their regions. They are stable as well as being progressive -- at least this is so in England with the Northern and Southern Councils and the Derbyshire Caving Association no longer standing away from each other as their joint meetings move nearer to becoming a National Council. Wales is out of this, as least as far as South Wales is concerned. North Wales has its own association of Clubs to represent them, but South Wales which brought about the Cambrian Conference of Caving Clubs will not get a word in edgeways, because up to now the S.W.C.C. has opposed and carried with it the view that the Cambrian Conference is not delegated and cannot speak for its members.

The time has come for a decision to change this and so be heard at the top level. One thing is certain - other regions cannot speak for South Wales and if no view is expressed it will be assumed that this region has none. In that case the majority (the others) will speak for the whole country as it suits them. Changes like these come about only if wanted and eventhen take a long time, so we must start acting now. If needed, authority must be given by all the South Wales clubs for the majority views to be represented as a whole on an inter-regional or national level. If passed, the Cambrian Conference must be changed to become a representative council or else should be dropped and be replaced by one. For those who cry 'Independence' let it be said again that there can be no interference with individual club managements, or to their private affairs.

Surely we want to be 'with it' and have 'with it' committee men running our affairs. The frank exchange of information and views does more to remove suspicions and fears than do the distortions and omissions of the 'grapevine'. A National Council could well provide such an information exchange and will probably succeed in having our existence as organised people recognised. Perhaps caving would even be accepted under the 'access to the countryside' rules like an 'open air' activity to give us some of the advantages of the other out-door pursuits. Now we have come of age we must not only take the key of the door, but we must get ourselves the vote.

W.H. Little.
(January 1968).

(Editor's Note. The views above are Bill's own, and do not reflect present Club policy. As they are pretty controversial any correspondence will be welcomed.)

CAVING IN THE USA.

"It's a 3 a.m. start, land owner problems, you know." Shades of the Carreg Cennen Caving Club. Such was my introduction to caving USA style.

"So they have Mendip and Yorkshire type problems here too ..."

"The land owner is the local JP so it's no lights till we're down the first pitch."

The four of us set off late on Friday night in one of those enormous gas gulping cars - the more gear you piled in the trunk (sorry, English translation, boot), the more the chromium plating sneered at you and demanded more. We arrived some two miles from the entrance at 2 a.m. and parked, real cops-and-robbers style, without lights, hidden from the road in a disused quarry. The temperature outside was 20 degrees F and a little too refreshing after the warm journey to change into my wetsuit outside the heated car.

By moonlight we made frozen tracks over the grass to the cave entrance. The Boston Grotto of the NSS had decided to show me Skull cave, "A real hard introduction for you" was the comment. The entrance was an oblong shakehole, and as I peered around in the gloom, two of my companions rapidly abseiled into the pit. I followed suit; the hot-seat type rapell in a wetsuit is not too bad, especially when you are going down a shaft that you don't know, dangling free in total darkness.

We arrived at the bottom of the first shaft, and, carbide lights seeming to be the exclusive lighting system of American cavers that I met, we lit up. Mine had been leaking water into the carbide chamber all the way across the fields and lit immediately, the others had terrible trouble because the water had frozen in their lamps. A few minutes under a warm sticky armpit in a wetsuit was enough to melt sufficient water to get the lamps going, and after that the heat of reaction did the rest.

The second pitch was a rift reminiscent of the Will's Hole pitch and at the bottom we stood in a long rift. Just then the realisation dawned that we had come down two pitches by abseiling and there was no ladder, so presumably we were going to have to climb or Prussik out. A hasty enquiry brought forth the reply: "You have NO prussik loops?", "Gee whiz. How the .... do you get out of potholes in Britain?" A chat about electron ladder brought forth a vast stream of comments: "300 foot ladder pitches must be **hell**." "You can always dangle from loops." "You don't really want to carry all that ladder around with you, do you?" Anyway I was not really disgraced, I knew how to tie a prussik knot and much to my own relief as well as that of my companions I had prussiked before - although it was only 10 or 12 feet, not the sixty or so that faced me on the way out.

Now that we were at the bottom of the shaft and our lights adjusted I looked round at the standard pile of rubbish that can be found at the bottom of a shaft anywhere. You know, motor car tyres, milk churns, bed steads etc. Despite the vast cascades of icicles on the entrance pitches there was a fair stream flowing along the floor of the passage.

I was invited to lead and to find the way for myself and so I set off along the rift type passage that in fifty yards narrowed down and then slowly and ominously the roof became lower and lower and forced us to first stoop and then to kneel and finally to lie flat out and to crawl in the icy water. In spite of the wetsuits we were soon really frozen and took every opportunity to creep out of the water and lie on the sandbanks to warm up. The passage was 'nose in the water' for short distances and then, relief, you could almost kneel up. It went on and on, and after an age I tried to ask as nonchalantly as possible: "how much farther?" About a third of the way ... My reaction I must admit was one of sheer horror but fortunately another hundred yards or so further on the roof rose and further enquiry revealed that it was total cave distance that my informant was talking about!

The rest of the cave was much like the Steeple Aven series of Tunnel Cave, except that the passage had a Ffynnon Ddu type stream bubbling along its bed.

On this trip we were going to investigate a high series in a dead part of the cave. The series had not been entered before, and we were going to have

to bolt our way up into it. There had been previous attempts to get up into this series and I was on the third attempt, all of them made by the party I was with. When we finally arrived at the place where the upper passage started its attraction was obvious. It was a big passage, it was going on in the right direction and from the way my cigar smoke drifted up into it, it took a good draught.

Now to the problem. It was sixty or so feet up and all of it mud-covered. The first twenty feet or so was a vast isolated block, then an overhanging chimney for the next twenty and finally a muddy stal slope - if you ever got there, for the chimney did not have square sides that would allow you to chimney up climbing style. The first twenty feet yielded to what can only be described as the Mark 0 uppit. It consisted of two fifteen foot tree branches, tied loosely together at about four foot intervals to make a ladder. Trouble was, immediately you trod on the bottom rung, the two branches moved towards one another rapidly and clipped you mightily about the ears, and for the rest of the way up it was like Samson struggling with the temple pillars to keep the poles far enough apart to be able to get your feet on the string.

The top of the block was almost a foot wide and four feet long and from here the second section curved outwards into the blackness. "We will put in one rawlbolt each till we are at the top," had been the arrangement, and I had drawn the matchstick for the second bolt. Rawlbolthole drilling is a tedious job and I settled down for a long wait, but I had just found a flat patch to sit on when I was told that it was my turn.

I climbed to the top of the block where Willy Growther was putting the final touches to the Rawlbolt that he had placed. Rawlbolt. About the only similarity with the ones we use in South Wales was in the name. What they were using were 3/16 in. self-tapping rawlbolts that they had put a nut on the threaded end and between the nut and the rock was a bent aluminium plate. This plate had a second hole in it that was big enough for a karabiner and a tape etrier was hung from it. This explained their speed - they were mini-rawlbolting and now I was to stand in the top rung of the etrier and to put in another bolt. There is some weird way of wrapping feet around an etrier so that it is perfectly comfortable and stable (I can't describe it but I'll demonstrate). I pounded away for ten minutes, and then it was the next bloke's fun. In a very short while it was my go again and by now we were at the inward slope of the bulge. A fall now would only mean a slide followed by a dangle in space - surely one of those mini-rawlbolts would hold? So rather than hammer away I set off up to the passage and by great good luck made it in one piece.

As I brought up the second and third men I was in the grips of explorers' fever, and surprised at myself for not going on for 'just a few feet' to take a preliminary view of the virgin cave. The agony of bringing up the fourth man was terrible. He was slow and fell off several times and all the time I could feel the patience of the other two wearing thin as they were itching to be off. Nonetheless we gathered together and set off into the unknown.

The passage, ten feet square, soon sloped downwards and offered us the choice of three ways at a joint. Two closed down, but the third became sandy floored and went on for some fifty or so paces before it too divided into two passages at a T-junction. Turning right we arrived in a labyrinth of sandy solution passages around large blocks that interconnected like a rabbit

warren. When we had exhausted ourselves and the possibilities of this maze we returned to the junction and set off up the right hand passage.

After a hundred yards or so the sandy floor sloped down and soon we were chimneying in a rift about four feet wide and a hundred feet high. Sixty feet of traversing diagonally downwards brought us to the new floor of the passage. It had changed from being sandy to very firm mud. The passage was now a large rectangle some twenty feet wide and about thirty high with the smoothest cave walls that I had ever seen. It soon became a chamber that was obviously a joint as we could see a passage coming in from the left side and another going on ahead on the other side of the chamber. However, it was the floor that commanded our attention. It looked deadly. A half moon funnel of mud about fifty feet in diameter, leading down to an inky black pool of water about thirty feet below us. The mud I set out to cross was hard, steep and very slippery, and only by repeated kicking could small dents, adequate for use as steps, be made.

Two-thirds of the way across the inevitable happened. I slipped - and shot slithering rapidly and gaining speed down the slope to the pool below. The belaying rope was getting slacker as I slid towards and below my belayer. An almighty splash and a great shower of water and I was in the pool, both legs buried up to my knees and firmly stuck! Fortunately the water only came half-way up my chest - it took ten minutes of struggling and heaving to get free of the water and to rejoin my companions. Willy completed the traverse and soon reported that both passages closed down within a couple of feet. Our discoveries for the day were over and it was time for lunch.

From my ammunition tin I produced my bar of chocolate and my Mars bar - but ye Gods, what was emerging from my mates' boxes. Tins of boneless chicken, accelerated freeze dried steaks and porkchops that all you had to do was add water and ten minutes later light the self-heater wick and the aroma was agonising.

The outward trip was a much more leisurely affair, and it did not seem so far. We were soon at the bottom of the shaft, and it was now evening and snowing. Prussiking in the snow is a horror that I would rather forget, but it took the experts about eight minutes to do a hundred feet pitch with an overhang half way up, and yours truly took about fifteen.

By the time we had ploughed our way through the eight inches of snow that had fallen, to reach the cars, our boiler suits had frozen and oh! how I longed for an S.W.C.C. hot, or even lukewarm, shower. The drive back to Boston was enlivened by an encounter with a fan snowplough that buried us, and by cleaning up in an exclusive girls' college on the way.

But that's another story .....

Noel Dilly.
Dec. 1967.

LOCHS AND QUAYS

We spent the last of this mercurial summer in the highlands of Scotland. We drove up north after spending some time climbing on Ben Nevis and Stac Polly. In pleasant weather we arrived in Inchnadamph and our enquiries revealed that permission to camp beside Loch Assynt could be obtained from the local gamekeeper, Mr. McLewish in the farm opposite the phone box. While camping we suffered rather from a surfeit of 'damph' and having no wish to repeat the Mossdale tragedy we kept away from the well flushed systems nearby.

While fetching supplies from Ullapool we dropped in on the Loomshed hut of the Grampian Speleological society, but found a BEC couple in residence - later we were glad of their assistance when they helped us when we were immobilised by two punctures at Durness. We found that the entrances to most of the Scottish caves lie in the Nature reserve between the Allt-nen Umph and Tralligill valleys.

Our stay in Inchnadamph was unfruitful so we moved further north in the hope of getting better weather near the sea. The deserted white beaches and the green crystal clear sea are in marked contrast to the Bristol Channel. The famous Smoo cave, although short makes an entertaining through trip, and we both left with the impression that this cave has more stream features than sea, and holds possible prospects of an extension. While walking along the beach at Balnakiel we rounded some headlands towards Durness and were surprised to find some small sea caves in what appeared to be schists and some of these caves contained thick tufa deposits, which surprised us. On examination, we found that the cliffs were overlain with sand dunes consisting largely of shelly deposits, and it appeared that these dunes were the calcite source.

The weather was a bogey, so we decided to journey south again in search of sun. On the way we came across several small risings which attracted our attention. When carefully examined the area south of Saragrum to Ach' a Chorrain proved to be very interesting. One rising spotted from the roadside issued from a small passage two feet high by one foot wide but was blocked by debris. Further around on the same small knoll of limestone there were some more small risingsall on the same level. To the North a stream, used as a water supply by the locals, was followed through a shallow valley with low limestone ridges for about 200 yards. Eventually it curved eastwards and emerged from three small impenetrable risings in a 60 ft. ridge of limestone. At the top of the ridge there was a row of deep dolines, the most northerly of which resembled a blocked pothole.

Our interest was held so we camped there. That evening we investigated a natural arch west of the old bridge over the stream. It was full of campers' rubbish and extended for some fifteen feet. The curvature suggested a passage about six feet in diameter. In view of its situation and size we decided that it may have archaeological prospects so we refrained from digging. By dusk we had covered a large area and discovered that between the two branches of Ach' a Chorrain is a row of shallow dolines one of which was deeper than the others and took a small trickle of water. On the following day it was found to contain metamorphic boulders so it was abandoned.

The blocked pothole near Saragrum was dug to an eighteen foot deep tight rift inclined at about 45 degrees. The dig was covered over and abandoned. While returning to the campsite we dug out a sizeable sinkhole to gain six feet of cave ending in two slightly enlarged joints in the floor, down which considerable volumes of water must go in flood.

As mentioned by Ford (1) the area between Ach' a Chorrain and Durness is scarred with dolines but no major caves exist except Smoo cave. Our finds seem to confirm this theory, and the drainage appears to be through a multitude of slightly widened bedding planes and joints, i.e. the area is speleologically too young. No evidence of significant solution enlargement was seen, only some vadose joint development.

Two days' hectic driving brought us to Wales again and back to sunshine. We journeyed westwards and stayed with the Birchenoughs at Cardigan. Bill Birch suggested that we should visit the limestone cliffs between Freshwater West and Stackpole Quay in Pembroke where there were supposed to be some fabulous sea caves. The weather was subtropical compared with Scotland and the area was so interesting that we only got as far as Stackpole Head. We noted two inviting shafts, one unfenced and the other fenced. One resembled Davies' (2) description of Stackpole pothole. The fenced site was a large circular hole some 40 feet in diameter, and had Army debris thrown down it. It was 110 feet deep and needs an 80' ladder. The rest can be free climbed, to a small chamber with sand stones and seaweed. A rift off led into a larger joint some thirty feet high into which the sea ebbs and flows. Daylight could be seen ahead and it was thrilling to ride out with the waves into the open sea. Near the bottom of the ladder a crawl led to a large and complex nearby cave. In one of its chambers just beyond the high tide line there were some fine formations. We walked from there to the nearby beautiful Barafundle Bay. Local people told us that all the sites we had seen were well known, even the tight connection between the pothole and the seacave.

On the local 6" map there were several sites marked 'cave', but not apparently ours. It is SR/99389535. Between Stackpole Head and Linney Head there are numerous sites marked 'cave' which we did not visit. One or two are marked in Caves in Wales and the Marshes.

Davies (3) suggests that the development of Stackpole Head pothole is not connected with the sea because of the presence of vertical fluting. Our pothole also contained some excellent fluting, but its connection to a complex sea cave, and the absence of any hills to act as catchment areas preclude the possibility of freshwater development. Examination of the cliffs shows that the beds are inclined between 0 degrees and 180 degreees. Where there is only a slight dip, flat wide caves develop but rapidly taper to nothing. In the vertical beds high rifts develop. All these caves seem to be developed like this and modified by extension due to the undercutting action of the sea.

N.S.J. Christopher, W.H. Little.
November 1967.

References:

(1) Ford, T.D. "The Caves of Sutherland" Trans. CRG, vol. 5 (2) p.154.

(2) Davies, M. S.W.C.C. N/L 54 p.21

(3) Davies, M. Speleologist, Vol. 11 (8) p.14.

CAVING AS AN ADVENTURE ACTIVITY.

Over the last few years there have been several changes in the number and type of person caving. Most of the Caving Clubs have increased in size and the techniques used have demanded a higher degree of skill and experience than was once sufficient.

In addition to the development of the specialist Caving Clubs there has also been an increase in the number of outside bodies who practice caving merely as an adventure activity amongst other outdoor activities. These groups often lack the necessary skill to appreciate the full implications of the sport and in the past we have attempted to guide these people towards a proper appreciation of the dangers and the need to cave with a responsible Club.

However, we have seen a continued increase in these adventure activities without the desire for full or continued training, and we have now decided on a policy when approached for assistance by such bodies.

It is our hope that an insistance on a correct training will reduce the number of incidents in caves and will serve to ensure a healthy development of the sport. The policy can be best illustrated by using a reply to such an enquiry from an Adventure Centre, and extracts are included below.

"Whilst we invite your comments we should mention that in twelve months the DCRO have had 12 accidents to novices under instruction and I will quote what John Needham the Sec. has to say:

> 'I think that it is time our Caving Club Members realise that they are playing with peoples' lives when they take novices, of any kind, underground. Let them take novices (but) they are playing with a very dangerous fire; the legal implications of being sued for every penny you will ever have is one reason why you must now stop and think'. "

We agree entirely with this statement and we would wish all clubs (for all Clubs will be or are approached) to consider the full implications carefully.

Extract from a reply to such a request:

"As you will know our own Club have been caving in Wales over twenty years, and in that time we have been able to discover, explore and study the caves in the area so that much has been learnt over the years. We have in fact trained several generations of interested people in the art of caving and we must have contributed to a significant extent in the present popularity of the sport, whilst maintaining a relatively high standard. In this time we have also assisted outside bodies who have not been specialists in caving, nor who wish to train their supporters to a full understanding of the art, and in the past we have run "training courses" in caving as an Adventure Activity much on the lines of your own Centre.

As you will know our interest in the wellbeing of visitors to the area is shown by the fact we have organised, and operate, the Cave and Mountain Rescue Post for the area and we have gathered much experience in its operation

over the years. We have found, as you may expect, that most of the accidents occur to inexperienced parties, often not belonging to recognised Caving Clubs.

"You are aware of the recent accidents to this type of party on Mendip, Yorkshire and Derbyshire (the latest on Oct. 2nd) and you will share our concern at the relative increase in these types of incident. (See Cave Accident Statistics, CRG Publication No 7 1962, and CRG Publication No 3, 1961 on Cave Rescue - A Reprint from the Medical Journal of the South West.)

"The latter article describes two fatal accidents on Mendip due to Exposure. In it emphasis is laid on the low reserves of young people to endure exposure particularly when coupled with shock. In both cases death was confirmed within 1½ hrs of the first signs of distress, following a soaking. In this respect your participants must have a serious dis-advantage when caving in view of the wet nature of most of our larger caves. It is an article well worth reading as it may well be that the children you introduce are unable to meet the demands asked of them in the event of a simple incident stopping progress. You will, we assume, have appreciated the dangers to your own organisation as well as to the young people you train and our CRO Officer, and ourselves would be most interested in having some assurance that you have given this matter your attention.

"In fact our Committee would stress upon you the need for full insurance cover indemnifying landowners (and the SWCC) against any possible claims due to accidents which may occur to yourselves or any person in your employ or charge; and for a policy covering the SWCRO against any financial loss which might occur due to a possible cave rescue. Our legal advisors would be able to check that such cover is adequate.

"We have, however, considered your letter most carefully, and we can reply with the backing of our own experience in this particular matter of training. In our experience it has been found to be a disservice to Caving and to the individual, to consider any Training Course designed essentially as an Adventure Activity, with no opportunity to follow up the interests so easily aroused. We have witnessed the birth of many independent Caving Groups in recent years whose experience is limited to such simple courses and who have not appreciated the need for further assistance. You will probably agree that you cannot hope to achieve all you set out to do, nor can you train a person to recognise all the dangers in a week. We appreciate that you can terminate the course with details of Caving Clubs but the place to gain this experience, in our opinion, is within and as part of, a Caving Club.

"As such our own Club will always welcome individuals who are interested in the sport enough to devote the time needed to become proficient. There seems little doubt that such people know of their potential interest long before they come caving for the first time, and are willing to approach a Club when the opportunity is offered.

"You have also mentioned another drawback of the Younger Person in that his ability to grasp that damage done now is damage 'in perpetuo' and whilst we agree many so called responsible caving groups leave much to be desired, it is the younger member who is most likely, often in ignorance, to despoil or negate the work of Aeons.

"We can therefore summarise much of the proceeding by recognising your appreciation of the problem and your balanced and very plausible outline of your caving method. However in our experience over many years, the age group whom you are introducing to the sport is one that is particularly susceptible to the normal risks in Caving. We have further concluded that courses aimed at the Adventure aspect of Caving are not able to cover all the points raised, whilst failing to develop the ties with an established Club who are able to further the interests of the individual. The result of the increase in inexperienced amateurs has been noticeable in recent years.

"We would like to conclude by requesting you to reconsider your plans to continue this type of Adventure Activity when we would hope to influence you towards a less ambitious programme which would be limited to an introduction to the idea of caving from within an Established Club.

"However, without adequate insurance cover my Committee regret that it cannot even consider any suggestions for access or assistance, nor can we recommend local landowners to accept the risks inherent in allowing your group access to caves in their control.

"We hope that you will appreciate our point of view, as we in turn appreciate the large amount of good Adventure Centres are doing for the Young. Many of our Members have been involved in similar activities such as Hill Walking, Camping and Canoeing and have helped a group to develop skills and talents otherwise latent. There is an increasing need for these Adventure activities but we do feel that Caving needs some reserves and experiences whichwe feel that the young person cannot yet have accumulated.

"We should be prepared to meet you should you feel a visit would be useful, but meanwhile please contact us if you would like to raise any specific or new points.

Yours etc."

J. V. Osborne
(Hon. Sec.)

NEWS FROM THE RECORDS.

The following is a list of articles or books which, from the literature received recently, appear to me to be the most interesting:-

1) An Inventory of the Ancient Monuments in Wales and Monmouthshire.
1. County of Montgomery.

A valuable book published in 1911 and acquired for the records by G. Platten.

2) Brecon Beacons National Park. Published by H.M.S.O. price 7/6.

A well illustrated book covering all aspects of the National Park - geology, fauna, flora, archaeology, history and recreation. Caving is represented by 2 pages of information by G. Warwick and four photographs including a helectite with a drip falling horizontally!

3) C.R.G. N/L No. 107 September.

Includes a report on the Balinka Pit Expedition - a speleo-engineering exercise by B. Woods.

4) No. 108 October.

Speleology in Gloucestershire by I.J. Standing has a review of the geology and a history of clubs in the area.

5) No. 109 December.

As a comparison with Balinka the article by J. Eyre on the "Abyss of Provatina" (Greece) is interesting. A vertical shaft of 2000' estimated depth was descended to 600' using a winch operated climbing harness. The use of additional lifeline and telephone cable resulted in some complex knitting problems.

Also includes Caving in Norway 1967 - D. St.Pierre; and Differential Solubility of Limestone - N. Christopher.

6) Cave Science, Vol. 5, No. 39 April 1966.

Includes The Design and Construction of an Electric Caving Winch by H. Lord.

7) Caves in Wales and the Marches. D.W. Jenkins & A. Mason Williams. (presented by the authors).

This is the 2nd edition, price 10/6, published in 1967 and unfortunately already out of date in some cases, notably Ogof Ffynnon Ddu.

8) Journal of the Craven Pothole Club. Vol. 4, No. 1.

Contains information on caving in Ireland, New Zealand, Africa, N. Italy and Turkey as well as in Yorkshire.

9) The Little Neath River Cave, South Wales. - M.G. Norton, D. Savage, P.A. Standing.

Contains history of exploration, description and geological notes together with a grade 5 survey. Reprinted from Proc. U.B.S.S. Vol.11, No. 2.

10) Some Preliminary Observations on the Geomorphology of the Dan-yr-Ogof System, A. Coase.

Includes several figures and photographs and a provisional plan. Reprinted from The Proc. B.S.A. No. 5.

11) Trans. C.R.G. Vol. 9 No. 3. Hypogean Fauna and Biological Records 1964-66.

Includes The Distribution of Hypogean Amphipods in Britain by E.A. Glennie, Microbiology by A. Mason-Williams and Mites and Myriapods by T.A. Turk.

12) Wessex Cave Club Journal No. 113.

The discovery of Nine Barrows Swallet. J. Church.

Light weight Double Lifelining Pulley Blocks. C. Pickstone.

(Has detailed drawings for construction with some mods published in the next issue).

13) No. 114.

Some Caving in the Canadian Cordillera. D. Ford.

Clare Harvey.

THE HYDROLOGY OF GOWER

by

R. T. BAYNTON

C O N T E N T S

1. INTRODUCTION

Richard Baynton died in 1967 whilst in his twenties after a long illness. His great love was the Gower peninsula. He lived in Swansea and knew Gower better than many people living there. Most of his spare time he spent climbing and caving and just walking there. His interest in the underground hydrology of the area was aroused when he saw an analysis of the Wellhead water supply and his curiosity brought forth this systematic survey of Gower. It is our intention to publish it in the Newsletter in several parts which can be pulled out and bound together in one volume.

2. WATER ANALYSES.

I have been fortunate enough to obtain copies of analyses carried out on water from Wellhead and Holywell.

These are of great interest and, for the benefit of Club members, I have included them so that it can be seen to what extent water can be analysed. They will also give an idea of the chemicals and bacteria to be found in water from limestone areas, although the chemicals present can vary greatly in type and quantity from one area to the next according to the geological structure of the land through which the water passes and, of course, by the presence of industries near at hand.

(i) CHEMICAL ANALYSIS.

Wellhead Chemical Analysis of Water

Appearance	-	Turbid
Ph. Reaction value	-	7.1
Turbidity	-	48 parts per million
Colour	-	Hazen 60
Temporary Hardness	-	6.6
Total Hardness	-	8.0
After filtration	-	Slightly turbid
Electrical conductivity	-	240
Smell	-	Nil
Suspended matter	-	Chiefly iron oxide
Permanent Hardness	-	1.4
Degrees English grain	-	$Ca\ Co_3$ per gall.

Parts per 100,000

Lime as CaO	-	4.9
Magnesia as MgO	-	1.1
Iron total as Fe	-	0.45
After filtration	-	0.005
Silica as SiO_2	-	0.6
Chlorides as Cl	-	2.5
Sulphates as So_4	-	1.0
Free Carbon Dioxide	-	1.5
Total Solids at 80 deg.C	-	160
Bicarbonate Alkalinity as $Ca\ Co_3$	-	5.3
Silica	-	0.6
Calcium Carbonate	-	8.8
Magnesium Carbonate	-	0.6
" Sulphate	-	1.5
" Chloride	-	0.7
Sodium Chloride	-	3.3

Grains per gallon = parts per 100,000 x 0.7

	Wellhead 30.1.62	Wellhead 29.4.47	Holy Well Cefn Bryn	Bob Cottage Rhossilli
Appearance in 2 ft. glass tubes	Pale yellowish green	Pale green	Pale green	Pale green - clear
Colour Burgess Scale	36	14	14	14
Reaction P.H.	7.2	7.0	7.4	7.6
Hardness	137	137	91	188
Chlorides except as Cl	2.3	18	19	41
Nitrates	1.2	0	0	Trace
Nitrides	0	0	0	0
Amoniacal Hydrogen	0.006	0.006	0.006	0.006
Albuminoid Hydrogen	0.013	0.010	0.012	0.010
Poisonous Metals	0	0	0	0
Residual Chlorine	0	0	0	0
Volume of Sediment	0.5	1.0	0.5	1.0
Microscopic Examination of sediment	Practically nil Amorphous Debris	As previous	As previous	As previous
Oxygen absorbed (4 hours at 80 deg.F. from N80 permanganate)	0	0	0	0

N.B. The Burgess scale of colour is not generally used today.

Not being a chemist, I referred to the Water Engineer to get a clearer understanding of the effects of these chemicals upon the quality of public water supplies.

1. P.H. Reaction Value.

This is a measure of the alkalinity or acidity of a water. 7.0 is the figure given to a neutral water; a water that has a ph. value of under 7.0 is said to be acid, whilst over 7.0 is alkaline. Water from limestone areas with a high percentage of calcium carbonate and little free Co_2 usually has a ph. value of 8.8 or over, whilst those waters from moorland areas have ph. values of 6.0 to 7.0. If, however, the moorland is of peat, the ph. value may be considerably lower. Water authorities regard 6.8 to 7.2 ph. as neutral. The water must have a ph. value of 7.0 when used for human consumption.

2. Turbidity.

This is the amount of suspended solids in the water and is measured

in units Hazen. A figure of 5 units Hazen is desirable in public water supplies since anything above this figure is able to be detected by the human eye and could be a sign of sewerage pollution. The appearance of the water in a 1 or 2 foot glass tube is another means of expressing the turbidity of the water.

3. Hardness.

There are two types of hardness - temporary and permanent. Temporary hardness is removed by boiling, whilst permanent hardness is not. The two combined give the total hardness of the water which is measured in p.p.m.

i.e.	0 - 50 p.p.m.	-	soft
	50 - 100 "	-	moderately soft
	150 - 250 "	-	moderately hard
	Over 250 "	-	hard

Either moderately hard or moderately soft are most desirable in household supplies.

4. Silica.

Silica as SiO_2 is found in most waters in quantities of up to 40 p.p.m. A figure of 1 p.p.m. is common in moorland waters. No permitted limits are quoted for silica contents in water.

5. Chlorides.

This term is usually used to express the amount of sewerage in water. The amount present should not exceed 250 p.p.m. - even this amount is enough to suggest sewerage pollution of a resurgence, or well.

6. Carbon Dioxide.

One of the main causes of acid water is Carbon Dioxide. Large amounts are found in iron bearing water, moderate amounts in moorland waters and wells, and small amounts in water from limestone areas (limestone having a neutralising effect). A safe quantity of Carbon Dioxide is up to 10 p.p.m.; a figure above this may be corrosive.

7. Calcium Carbonate.

This causes temporary hardness in a water. The amount permissible is governed by the required hardness of a particular water.

8. Calcium Bicarbonate.

This is found in all limestone water in large quantities. It is caused by rain water having a free CO_2 content which changes it to carbonic acid which dissolves limestone. It causes hardness in the water and is permissible up to 200 p.p.m.

9. Magnesium Sulphate.

This forms part of the permanent hardness of the water. The total amount of sulphates permissible is 250 p.p.m.

10. Magnesium Chloride.

This is of little significance and is not often found in water.

11. Sodium Chloride.

Sodium Chloride is the amount of salt present in the water. This term should not be confused with "Chlorides" which means the estimation of sea-water on sewerage pollution. If the salt does not originate from sewerage pollution, amounts of up to 1,400 p.p.m. are acceptable. The normal amount found in water is 10 to 20 p.p.m. although most people will not taste 700 p.p.m.

12. Nitrates.

These are caused by organic matter decaying in the ground. Amounts of up to 20 p.p.m. are acceptable. The amount in a water should not vary greatly as this may mean harmful pollution.

13. Nitrides.

Nitrides are not commonly found in water because they are an intermediate stage in the formation of nitrates. All effluents from sewerage purification plants contain nitrides and if found in a water in even the smallest quantities a full investigation is needed as to the cause of their presence.

14. Residual Chlorine.

Chlorine is a sterilizing gas which is added to water. Amounts of up to 0.2 p.p.m. are regarded as safe to remain in the water.

15. Oxygen Absorbed.

This is a test to measure the amount of organic matter in the water, since organic matter requires oxygen to decompose. 4 hours at 80 degrees F. should not show an oxygen demand of more than 1 p.p.m. More than 2 p.p.m. or 4 p.p.m. for peaty waters, is a sign that the water may be polluted.

16. Smell.

The only measurement for odour is that of threshold odour. This is the amount of pure water that has to be added to a sample to make it odourless.

17. Magnesium Carbonate.

Causes temporary hardness. It is not harmful to health but should not exceed 125 p.p.m.

(ii) WATER BACTERIOLOGY.

Before any water can be considered safe enough for household purposes, it also has to pass various tests for pollution from bacteria.

The following diseases can be caused by drinking foul water:- Typhoid, Poliomyelitis, Gastro-enteritis, Worms, etc. etc.

Because of the possibility of contracting one of these diseases, all water has to pass rigid water board tests before being considered fit to drink.

Results of typical tests of this nature are given below.

Name of Source	Test No. 1 Plate count yeastrel agar 2 days at 37 d.C.	Test No. 2 Probable Number of Coliform Bacilli 2 days at 37 d.C.	Test No. 3 Probable Number of Faecal Coti
Wellhead 4.4.62	8 per mc	0 per mc	0 per mc
Holywell	0 " "	0 " "	0 " "
Pumping Station Pitton	3 " "	0 " "	0 " "
Wellhead	0 " "	0 " "	0 " "
	Unsatisfactory Faecal	Pollution	
Cartersford	1,000 " "	180 " "	160 " "

A brief explanation of these tests is given below.

Test No. 1.

This is the probable amount of bacteria which thrive at body temperature and are, therefore, likely to be of faecal origin.

Test No. 2.

This is an assessment of the bacteria which originate from the soil.

Test No. 3.

This is the probable amount of the bacteria Escherichia Coli 1 which are present in the water, thereby giving a positive idea of the extent of faecal pollution.

Before water can be considered fit for drinking, samples taken throughout the year should fall into the following classes given below. Throughout the year 50% of the water sampled should fall into Class 1, 80% should not fall below Class 2, and the remainder not below Class 3.

	Test No. 2 per 100 cc	Test No. 3 per 100 cc	Comment
Class 1	None	None	First class water
Class 2	1-3	None	Satisfactory.
Class 3	4-10	None	Suspicious
Class 4	More than 10	0 or more	Very unsatisfactory

To Summarise

As can be seen from these analyses, there is far more than H_2O in the water that rises from springs etc., they also point out how essential it is that a crystal clear mountain stream can in fact be heavily polluted, possibly by a decaying animal lying a little further upstream. In Gower these analyses have helped to form some very interesting theories regarding the source of not only the Wellhead and Holywell Resurgences, but several others as well.