SOUTH WALES CAVING CLUB
NEWSLETTER

NUMBER 61 NOVEMBER 1968

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SUMMER VISITORS, 1968.

S.W.C.C. members visiting the Club H.Q. during the summer may have noticed that the laboratory had been the subject of a near take-over bid and that the invaders were using strange, none caving, equipment. These notes represent an attempt to outline what was being done and to thank those members whose help and encouragement we were privileged to enjoy.

An outline of the chemical work of the Easter Dan-yr-Ogof study was given in the July, 1968, Newsletter. Very close examination of the chemical results had suggested that the results, although apparently satisfactory, lacked sufficient internal compatability to allow really detailed comparisons to be made. Experimental work in our school laboratories had led us to believe that the hardness estimation methods were at fault and it was resolved to test on cave waters a method which involves direct determination of calcium and of magnesium. This method has the disadvantage of requiring the use of unconventional (and highly expensive) reagents, but had given excellent results during laboratory tests - especially with solutions containing little magnesium.

Certain sites within the Dan-yr-Ogof system had aroused interest at Easter and our first tests were on samples from these sites. All analyses were made in duplicate and both the conventional and the direct methods for hardness estimation were used. The results of our first tests are given below.

SITE	CALCIUM (p.p.m Ca CO3)	MAGNESIUM (p.p.m C_a CO3)	TOTAL HARDNESS (p.p.m Ca CO3)
100' CASCADE			
CONVENTIONAL	58 ; 61	(10) ; (6)	68 ; 67
DIRECT	64 ; 64	5 ; 5	(69) ; (69)
DALI'S DELIGHT			
CONVENTIONAL	59 ; 57	(12) ; (13)	67 ; 70
DIRECT	64 ; 64	14 ; 12	(78) ; (76)
WASHING MACHINE			
CONVENTIONAL	98 ; 102	(17) ; (15)	115 ; 117
DIRECT	106 ; 104	12 ; 13	(118) ; (117)

Evidently better agreement was obtained using the direct method, especially where magnesium content was low. Our experience with the direct method leads us to believe that very close comparisons between water samples can now be made and it is intended to use this method for future work. Work is in hand on the preparation of a detailed description of the new method and it is hoped to publish this soon.

Some 30 samples of water from the Dan-yr-Ogof system were examined. The weather was good and the conditions within the cave were very stable, at least during the period of sampling. This enabled the re-sampling of waters which aroused interest, subject to the collection of a sample from a "control" site (the Washing Machine). This procedure was not ideal but the results encourage us to feel that little significant change took place during the period concerned.

The interpretation of chemical results into caving terms will take some time. From the chemical viewpoint it was encouraging to find confirmation of correlations obtained at Easter. The correlation between electrical conductance and total hardness was first class, and that between alkalinity and total hardness was good.

The controversial result obtained at Easter was confirmed. From our observations (now covering about 60 samples) it appears that, within the Dan-yr-Ogof system, the pH of the waters becomes almost constant when the hardness exceeds about 50 p.p.m. In this system the measurment of pH would seem to be of little value in the comparison of cave waters.

The hopes of being able to study a flood pulse were foiled. We were staying in Pontneathvaughan and, after a night of only moderate rainfall in Pontneathvaughan, we were surprised to find the Tawe very swollen and to hear that the water level in Lake 1 of Dan-yr-Ogof had risen by almost eight feet. The problems of being ready for flood pulse measurment are very great. If observations are started too soon both operators and stocks of reagents can quickly become exhausted; quite possibly before the really important readings can be taken. It is hoped that the use of a continuous recording instrument will help to solve this problem.

A dye test was run on Friday 16th August, when 500 g. of fluorescein was placed in a minor sink on Waun Fignen Felen. Little positive can be said of this test. The dye was seen in Dali's Delight on Sunday 18th August and in the Tawe at Pen-y-Cae and at Abercrave on Monday 19th August. All detectors from the cave and the resurgence were negative. If this test can be confirmed it can but be concluded that the Dan-yr-Ogof system is even more complex than hitherto imagined.

Other experiments were conducted, two of which are reported in detail. In several cases experimental results have provided answers which simply pose new problems. Electrical conductance measurments allow a quick check to be made on the degree of saturation of a cave water with respect to calcium carbonate. We were somewhat surprised to find that water from the Dan-yr-Ogof resurgence was fully saturated even though the total hardness was only 122 p.p.m. Another interesting result was obtained at Pwll Byfre. When fully saturated with Analar calcium carbonate, Pwll Byfre water has a hardness content only one-third that of the stream in OFD 1. Although interpretation of the results will be difficult we have started experiments to assess the oxygen take-up of sink waters. Preliminary tests made with water from Pwll Byfre suggest that the method used is promising. In all of our experiments the idea is to establish chemical estimation which will allow detailed comparison to be made between different samples of water.

Some time was spent under the expert supervision of Alan Coase in an examination of the adhesion to horizontal and vertical surfaces of thin films of polymer materials of varying spectral properties. We were pleased to be able to make some contribution, however small, to the transformation of the new Married Quarters.

Our appreciation of the problems of transporting 500 ml. sample bottles was made more acute when we were taken into some of the cave systems. Visits to Porth-yr-Ogof became somewhat dull after our introduction to the more spectacular caves.

We were in the area for nearly a month and our list of acknowledgments is doomed to be incomplete. We wish to thank Noel Christopher, Alan Coase, Mick Day and Bill Little for the collection of samples from Dan-yr-Ogof; we would like to thank Noel Christopher, Alan Coase, Gareth Davies and Bill Little for our introduction to caving. For the use of the laboratory we thank the Committee of the S.W.C.C.

I must thank Mrs. James, my laboratory technician, for arranging the transport to Wales of distilled water and other essential supplies: it is surprising to find that nearly a hundredweight of distilled water was required. Last, but by no means least, I would like to give a special word of thanks to my pupils Gordon Swindles, Henry Samuel, Adam Pierzchala and Stephen Nutt for giving up conventional holidays in favour of chemical work in Wales.

(L.G. Bray.
Middlesex Sept. 1968)

A NOTE ON
THE EXAMINATION OF CHARCOAL DETECTORS FOR FLUORESCEIN.

The conventional method for the checking of a charcoal detector for fluorescein adsorption involves the elution of the fluorescein from the charcoal with aqueous ethanolic potassium hydroxide solution. Under these conditions a "positive" results is indicated by a green fluorescence in the solution obtained. One problem in making a visual inspection of the solution is that the eluting mixture is itself yellow and this can mask slight fluorescence.

Tests were made to find a solvent which, while retaining the simplicity of the method outlined above, did not give a yellowish solution in mixture with water and potassium hydroxide. One solvent fulfilling these requirements is acetone. Although this is rather more expensive than industrial methylated spirit, it is easily obtained and is not subject to strict Customs and Excise control.

Trials were made by immersing detectors overnight in buckets containing very dilute fluorescein solutions. The detectors were processed by draining off the excess liquid and transferring 2 to 3 g. of the charcoal to a boiling tube. 5o ml. of 5o% aqueous acetone was added and two pellets of potassium hydroxide were dissolved in the solution. A control tube was made up by using fresh charcoal. After standing overnight clear "positive" tests were obtained from detectors which had been suspended in fluorescein solutions containing one part of fluorescein in 100,000,000 parts of water.

River tests were needed and these were run (in the absence of the author) by Noel Christopher and Bill Little. Detectors were placed upstream and downstream of a point at which a small amount of fluorescein was poured into the river. Strips of grossly over-burnt toast were placed in the river to find out whether this form of charcoal would adsorb the dye.

The detectors and the strips of burnt toast were checked as described above. The conventional activated charcoal detectors gave results which were confirmed by Noel and Bill as being correct. One strip of burnt toast gave a rather doubtful positive result.

The "burnt toast" aspect of this experiment began in a light hearted manner. If the charcoal produced could be activated to adsorb fluorescein, the blocks obtained would need no external support and the preparation of detectors would be very simple. Any printable ideas will be welcomed.

L.G. Bray

THE CHEMICAL INVESTIGATION OF CAVE WATERS.

Part 1. Interim Notes on Sample Deteriation.

Most analytical work on water samples from a cave system is performed in a laboratory on the surface and this analytical work might well be conducted several days after the collection of the samples. For work on the Dan-yr-Ogof system we have attempted to complete the analytical work within a maximum of two days from the collection of the samples.

Comments (often unprintable) have suggested that, during the two day period, changes could take place within the chemical system within the samples resulting in appreciable errors in the results. It was considered important to test this suggestion.

With the help and encouregement of Bill Little a temporary laboratory was set up in a part of Toast Rack Passage in OFD 1 where as little inconvenience as possible would be caused to visitors to the cave. Unfortunately the SWCC pH meter was not working and, in spite of replacement of battery and of electrode, it remained inoperative. Estimation made included

a) electrical conductance,

b) total hardness,

c) calcium hardness,

d) alkalinity.

These estimations followed conventional practice. In the absence of a portable pH meter alkalinity was estimated by titration with 0.01N hydrochloride acid using screened methyl orange as indicator (the colour change taking place at about pH 4).

The experiment was designed to give as much information as possible. Five sites within OFD 1 were sampled, three samples being taken at each site. One set of samples was analysed straight away in the cave. A second set was stored in the temporary laboratory within the cave. The remaining set was removed from the cave and was stored in the back of a Mini-Traveller car where the samples were subjected to high temperatures and to considerable vibration. After three days these samples were returned to the cave and allowed to attain cave temperature. Analysis of the two remaining sets of samples was then performed. Although by no means perfect it was thought that this experiment would cover the extremes of conditions to which water samples might be subjected.

Results.

Alkalinity, total hardness and calcium hardness are quoted in p.p.m. calcium carbonate. Specific conductance is referred to 9° C.

Site		Specific Conductance	Total Hardness	Calcium Hardness	Alkalinity
Toast Rack	A	207	166	158	157
	B	200	160	155	157
	C	212	164	157	162
Column Pool	A	232	158	148	131
	B	235	156	149	131
	C	235	152	144	127
Stream	A	149	1o6	1o1	100
	B	148	1o7	98	103
	C	148	1o6	98	101
Alpha Ledge	A	168	132	122	125
	B	173	132	127	128
	C	173	130	127	127
Loopway Pool	A	200	134	131	114
	B	203	134	128	116
	C	207	134	128	118

In each set, Sample A was analysed immediately,

Sample B was stored within the cave and

Sample C was stored in the car.

These results show no consistent trend applicable to samples from all sites and it would appear that little significant change took place. It is acknowledged that experimental error is high. This is attributed to the difficulty of working for long periods at relatively low temperatures and to the difficulty found in observing the colour changes of solochrome black, murexide and screened methyl orange near their respective end-points under "cap lamp" illumination. The values quoted for alkalinity are rather high due to the pH 4 end-point of screened methyl orange. It is worth indicating, perhaps, that a difference of 2 p.p.m. on paper is represented in a burette by a difference of only 0.1 ml.

During the period of this experiment (but independently of it) a new method for hardness estimation was tested. This new method involves the use of a fluorescent indicator which, surprisingly, gives an end-point more easily seen under cap lamp illumination than in daylight.

We regard this investigation as having great importance in that the whole basis of our analytical technique relies on water samples undergoing no significant change during the period of transport and/or storage. With this in mind we hope soon to repeat the experiment using more the sophisticated analytical

techniques now available.

On a personal we wish to thank Mr. Barrows for permission to set up the underground laboratory. We would like to thank Judy Day and Bill Little for collecting the samples for us, and Noel Christopher and Bill Little for help in transporting equipment to the temporary laboratory.

(Acton County School, Gunnersbury Lane, London W.3.)

L.B. Bray

G.A. Swindles

(Sept. 1968)

The following Article is reprinted from Nature, Vol. 210, No. 5038, pp. 831-832, May 21, 1966 with the Compliments of P.F.Bird).

A NEW MECHANISM FOR THE FORMATION OF VERTICAL SHAFTS IN CARBONIFEROUS LIMESTONE.

In the course of study of a newly discovered series of caverns in Carboniferous Limestone at Ystradfellte, Breconshire (National Grid Refs. SN 91 : 926.115 to 929.112), we have observed a process of spelaeogenesis apparently unrecorded hitherto.

In this area the limestone series is about 1.000 ft. thick and is covered unconformably (the post-Avonian Unconformity) by a comparatively thin layer of the Basal Quartz Conglomerate of the Millstone Grit, both rocks dipping 10° south in the vicinity of the caverns.

The outstanding feature of these caverns is the presence of incised vertical grooving, that is, fluting, which is due to the process of formation by drip. Water leaving a series of peat-bogs at the top of the hillside (see Fig.1) runs both over and within the grit, eventually reaching the limestone. The pH is on the acid side, gradually becoming neutral as it traverses the limestone. Figures recorded are: (i) before reaching the limestone, 3:8-4:2; (ii) within the caverns, 4:2-5:6; (iii) water of the presumed resurgence 5:6-7:4. Subsequent to the formation of a small initial solution cavity on the plane of unconformity, water drips on the limestone from the overlying Grit caprock, dissolving a series of drip-pockets. These are vertically orientated cavities of circular cross section and with a concave base. Examples were found from 2.5 to 1o cm diameter and from 2.5 to 17 cm depth respe ctively. Penetration by dripping water beyond the base of a drip-pocket extends it mainly vertically rather than laterally. Recent work by one of us (A.R.B.) indicates that vertical growth proceeds four times as fast as lateral growth during juvenile stages. Lateral growth is responsible for the eventual coalescence of neighbouring juvenile tubes. As a result of this coalescence, slender columns of limestone remain. These eventually collapse, forming debris at the base of the shaft.

The mature shaft of greater diameter thus formed eventually causes collapse of the roof due to lack of support. At this stage, the shaft can be termed senile. When the ratio of shaft diameter to caprock thickness is adequate, collapse extends to the surface and a doline of collapse results. This can be shallow- or steep-sided, or vertical, depending on the angle of grading of the limestone walls by collision of frost-action. Collapse of the roof causes a simultaneous advance of the surface-juntion between limestone and grit and hence also of the area of maximum drip. The process of formation then continues to enlarge, and less mature, cavities further up the valley side, leaving lower abandoned caverns to grading, forming an inclined boulder-field.

Fig. 2 shows diagr mmatically the stages assumed by any one cavern over time, superimposed on calculated curves of vertical and lateral growth over time.

We have concluded that:

(1) In the aforementioned caverns, the roofs are flat because they coincide with the plane of unconformity. Somewhat similar shafts have been studied in the United States[1], but they have dome-shaped roofs and they originate in the limestone at a lower level, developing upwards till caprock is reached, at which stage the roofs become flat.

(2) The United States workers propose abrasion by dripping and the effects of trickling water as being responsible for shaft formation. They make no mention of solutional effects. In contrast to this, the caverns described here are considered to be formed mainly by the solutional effect of water of an acid pH. It has been found that carbonic acids are present in the incoming water. Titrations using EDTA reveal an increasing amount of calcium carbonate in solution, with a range of 0-105 p.p.m. (Corresponding pH readings have been given previously: (i). (iii). No abrasive materials from either the grit of the limestone have been found in the pocket bases, but the abrasion due to friction of dripping water on limestone is yet to be estimated. It is considered that solutional effects, rather than physical ones, predominate.

(3) The transition from the juvenile to the mature stage has been observed to be due to lateral coalescence. This does not appear to have been mentioned in the American literature.

(4) Similar features have been located in other caverns of the same nature within the area (for example, Coeden Prop and Pulpit Hole).

(5) The formation of collapse dolines at senility illuminates the views of Thomas[2] and is correlated to the distribution which he illustrates, that is, that they are concentrated on the Millstone Grit.

Full results will be published elsewhere.

A.R. Burke

The Warren Spring Laboratory,
Stevenage, Herts.

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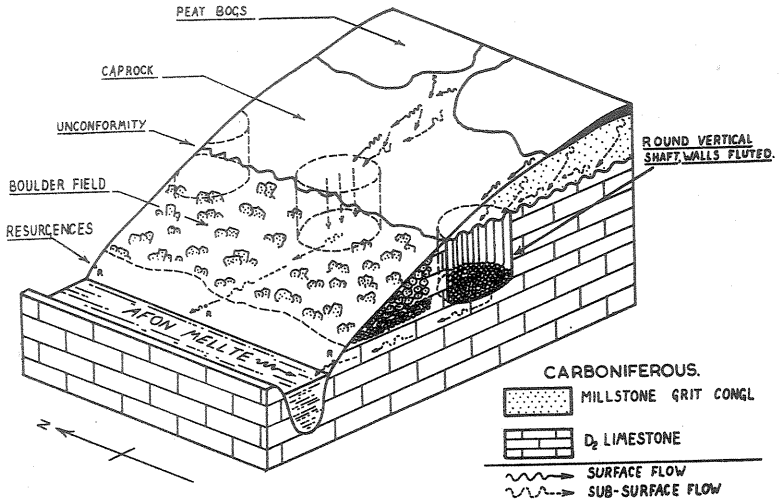

Fig. 1. Block diagram of the E. bank of the Afon (River) Mellte showing relationships between vertical shafts and geological structure. The shaft illustrated in section lies midway in the mature stage of development, and hydrological connexions from peat bogs via shafts to the river are shown

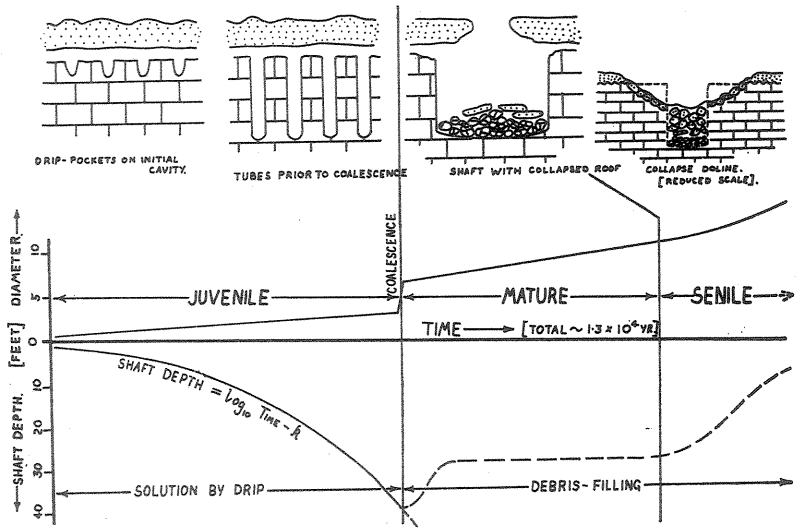

Fig. 2. Showing the relationships between shafts in various stages of development, superimposed on calculated depth and diameter versus time curves

THE GREAT HOLWAY MYSTERY.

Lead mining in Wales was, for many centuries, more closely associated with Central Wales and many mines, such as the Van 1866 - 1888, made the region popular with investors. After reaching peak outputs in 1850 and 1875 many mines were becoming deep and pumping costs increased. With falling Ore prices (particularly during the Franco - German War) the industry declined and fortunes were lost by mine adventurers.

Flintshire, however, had not followed this pattern and since 1875 became the only effecive producer in Wales. The mines here are usually in limestone, which, being saturated, presented special problems. The area chiefly worked stretches from Dyserth to Mold, and thence to Minera; along the limestone ridge and in the late 18th century the many independant mines were in trouble with water. When times were bad a mine would stop pumping forcing his richer neighbours to pump harder or be flooded and many actions resulted from this type of incident. Although a rich deposit the superabundance of water was always likely to cripple the projects.

The advantage of efficient drainage was perhaps first demonstrated by the Great Holway Mine in Flintshire when in 1774 a drainage level was started in Holywell village (108/185 764) and by combining drainage with a boot level the mine survived until the late 19th century. Even here pumping costs finally crippled the mine.

However, its success in delaying closure stimulated thoughts of more ambitious projects and in 1818 a deep drainage level was driven into Holkyn Mountain to unwater a series of mines. The project failed and by 1860 the industry was in a ruinous state, this when other areas were in their hayday. An Act of Parliament in 1876 however vested the Holkyn District Drainage Co. with the rights to charge a compulsory royalty from mines serviced provided the extended Holkyn level proved effective, and work was restarted. By draining 4 million gallons per day 28 mines were drained and the scheme was hugely successful. Its result is shown by the Peak in lead production for Flintshire in 1897. Finally the level stopped at some $4\frac{1}{2}$ miles by 1916 the mines had reached the level.

Four miles to the N.W. another level had been started in 1896 which was from sea level near Bagillt, some 2oo ft. lower than the Holkyn level but in spite of the obvious advantages to the mines to be serviced no support could be volunteered.

After lying idle for 17 years an Act was passed giving support to the drainage scheme. In 1913 therefore, the Milwr Level was restarted. Then $2\frac{1}{2}$ miles long, it turned SE under the ridge and began to unwater the mines. This, the greatest drainage level, was delayed by disputes and poor prices and in 1931 was holted. However, even with low lead prices in 1934, 5oo men were employed and in 1938 the level was $8\frac{1}{2}$ miles long with one selling at £3-17-1od ton. Since that date the level has reached some 11 miles in length, and carries up to 25 million gallons per day.

The mines today are, with one exception, decayed and neglected. Some work was done on the Great Holway during the last war but the shafts left are not very attractive. One shaft near Holway Council Houses was laddered after the local lads had maintained it reached sea-level since at high tide water could be seen. At 2oo ft. a level was entered which showed signs of regular flooding flowing from the shaft to a roof fall. Around the roof were salt crystals and

water level was some 15 ft lower down the shaft. Thus the theory had been proved but for one fact. The shaft is at 4oo ft OD according to the survey map. No conclusion has yet been reached.

Although there are many open shafts around the mine most were thought to be of old workings but the maind rainage level can be entered and followed some ¾ mile. This is still the boot level as planned in 1774 and a crude boot in the water was raised and used at one point. The generous water flow has, until recently, been used by the water undertaking and it wells up out of a hole (winze) in the floor at the far end. The level continued but, with no water flow, it was nearly silted up.

The Holkyn Deep level can also be entered but after a mile or so a roof fall blocks the level. Since it is waist deep throughout the trip is quite exhausting but its construction is of interest.

Although these levels are interesting the portol of the Milwr level at Bagillt (108/21376o) shows this to be the major level. Discharging, as it does, straight onto the tidal flats it has a hinged door 4 ft x 2½ ft which, when last seen, was held open at 4o° by the flow of water. Even standing on the door does not close it against the flow by an appreciable amount. It is now that the cavers interest could be aroused since all this water discharges from limestone country rock. The present owners, Courtaulds Ltd., have bought the mine purely for the water and a talk with their engineer makes a fascinating story. The level, at least for 2½ miles, is some seven feet wide and four feet deep and for repair work boots 2oft x 5 ft are powered up the level from the works. In high water, however, the flow is too strong and instead they are carried by lorry to Pen-y-Bryn shaft on the mountain and by standing them on end they are lowered 8oo ft to the level where the engineers can ride out again.

Some eight miles along this level is the next interesting feature as the mine is still being worked for lead, the last in Wales. The Holkyn and District Mine Drainage Co. employ about five men who work the far end of the level almost under Llanarmon. Access, for convenience, is via an intermediate shaft, Olwen Goch some 42o ft deep. Until the beginning of this year twenty men also worked another part of the mine for limestone.

Underground the Milwr level is some ten feet wide by seven feet high with a railway occupying half the floor and a 3 ft deep duct carrying the "River Alun" in the other half. Along this track the diesol locos push the tubs the five miles to the working face were the miners dig the near vertical lode. All track maintenance is done in summer for in winter the rails lie below the water and the train ploughs up the level casting a bow wave which can be seen 4oo yds. ahead. It is said to be quite an experience to travel the road with no rail in sight and waves crashing off the walls. The tubs even have holes cut in them to ensure they do not float. On occasions the track runs over the water duct, invisible but detected by the roll caused by the springy supports.

During mining the level has cut through several natural cavities, one of which carries four millon gallons a day. These streamways are large enough to enter, being phreatic but blocked by slabs of rock. A cover may be able to persue these some distance. At the level's end is such a tube with water jetting out. Natural cavities abound, generally small, but the greatest lies under Rhosesmore were a chamber some 12o ft long x 4o ft wide with a lake over half the floor was discovered during mining. Its depth was unknown but was plumbed to 200 ft (this from a level at sea-level) and was crystal lined.

By a curious operation the water was pumped to - 9o ft and lead crystals stripped from the walls. If the pumps failed, the miners had to climb immediately.

After this work the lake was used as a dump and a railway and truck-tip installed but after many years use its depth was still unknown. The roof of this chamber is in fact a fissure and some 45 ft up are routes off which have never apparently been explored. The overflow for the lake is also a natural fissure too small to allow passage however but is seen again in the level near the chamber.

This then is a brief account of the imprtant levels in Flintshire and, because of their location, they can be of interest to speleologists. The area has the advantages of being mined recently and many fact can be gained in conversation with the mining community. The existence of large natural cavities in these beds of limestone must provide encouragement to those searching for caves in North Wales and in fact Ogof Dydd Byraf is accessible only from a mine which cut into it during excavations.

Ref: Lead Mining in Wales T. Smith.

"The Holkyn Mine: 1930" reprinted from the Mining Journal.

(The Miners).

SOME CAVING IN RHODESIA.

When we first enquired about caving prospect in Rhodesia, the picture we gained was gloomy in the extreme. The geological survey did little for our morale, as it did, endless areas of granite and only a few small patches of dolomitic limestone. Then it became apparent that some of these patches were 10 miles long by 25 miles wide. Gradually news of caves began to trickle in from members of the Mountain Club of Rhodesia and from one of the British Sub-Aqua Clubs who have explored some of the caves in the Sinoia area and there, of course, the story really begins.

Our first look at the Rhodesian underworld was on February 24th when a few intrepid members of MCR accompanied us to SWISSWA. The "cave" turned out to be a fault along the centre of a granite kopje, access being gained from three points on the surface. Following the fault along, it was found that the end of one of the 3 openings led into a 70 ft. deep pitch about 6 ft. wide. A ladder was quickly belayed to a handy tree and our beloved leader shot down into the depths. At the bottom of the fault narrowed down to about 3'-o" wide and ran back towards the other two surface openings. It was possible to follow the passage for 150 ft. before the way was blocked by a fall of boulders. It may have been feasable to back and heel up the rift (at this point about 50 ft. high) and get over the blockage at a higher level but due to the unstable nature of the boulder choke this wasn't attempted. On returning to the surface a hoard of people descended on the middle hole of the 3. (These included people who had just come back from the 3rd and final opening who had given up when a vast hole had opened up beneath their feet). This second cave consisted of the same fault filled with boulders. Progress could be made through the boulders rather like an ant in a bowl of lump sugar.

From the entrance access was gained to a small low roofed chamber, the only way on being a chimney down a gap between boulders at the back. This brought us into a chamber 15' x 10' x 10' high, the floor of which was covered in bat droppings (BATCH). In one corner of this chamber a 15 ft. ladder pitch led down to a fairly large chamber full of bats. The bats took badly to our waking them up and suddenly took to the air. Instantly the chamber was full of a brown fur fog as thousands of bats all flew around. Trying to take no notice of the bats (and the smell) we crossed the floor of the chamber and climbed up a boulder slope on the other side. There we could look up a steep rift to daylight. This was the 3rd entrance that the other party had looked at. We climbed up the rift driving vast clouds of bats out before us, much to the surprise of the people on the surface. At the end of the rift we had a little traverse round a shaft of unknown depth and then up to the surface. This shaft still remains for future exploration as it was at this point we called an end to the day and dashed off for a few quick beers.

Our next excursion was a month later when seven of us went to TENGWE approximately 9o miles E.N.E. of Salisbury as the crow flies and 150 by road. Here we stayed with a farmer and his wife, who were happy to point out caves so long as they weren't expected to take part in the activities. We were shown the potholes by the farmer's 11 year old son: A short walk through trackless bush brought us put on to the edge of a 6o ft. cliff running along the edge of a valley. The shafts were all along the top edge of the cliff and had obviously been formed by streams flowing into the valley below.

Two shafts were looked at, one requiring 6o ft. of ladder and the other 15 ft. Both had dry system of caves at the bottom full of thick dust and BATCH.

The former consisted of a 60' pitch from which a low passage led into a bedding plane chamber, which in turn narrowed to a very tight crawl out on to the cliff bottom. In the second, the short pitch was followed by a short crawl which led into a small chamber which sloped down to the foot of the cliff in the valley. From this chamber a small passage gave access to a long low chamber full of bats. In a second the air became so thick with them that it was impossible to see across the chamber. From the end of the chamber two possible ways lead on, one involved a climb into the roof; the other a flat out crawl in BATSH; not liking either, the party left the cave. More of the surrounding bush was searched but we were forced to give up by grass seeds. These seeds seemed worse than any others we have encountered in Rhodesia. They would work through shorts, socks and flesh so that every 2o minutes the party came to a halt to try to remove the worst. Several members of the party completed the day sans socks as they had so many seeds in them as to make walking almost impossible. (Over 10 days later we were still squeezing seeds out of/festers in arms, hands and legs, and it took several weeks to remove them from socks).

The next day we left for Salisbury but not before the Farmer's son had passed on MUMPS to a certain member of the party.

Since then three more trips have been undertaken; two into the HUNYANI range north of Sinoia and one to CHIMANIMANI mountain range (on the borders of Portugese East Africa).

On both trips to the Sinoia area we camped the night at the campsite at the Sinoia National Park, Rhodesia's only tourist cave and "FREE" as well. This cave consists of a vast open shaft approximately 200 ft. in diameter by 150 ft. deep down to a large pool. A sloping entrance passage enables the tourist to go down to the edge of the pool which has been sounded to a depth of 315 ft. This pool is at a standard Rhodesian cave temperature of 75°F all the year round and is used by the B.S.A.C. branches for deep diving practice. These divers have reached a depth of about 280 ft. (thanks to the pool being at a high altitude) of the vast continuation of the cave which must exist.

On the first occasion we camped there, Fred got up early in the morning, (before the guide arrived) and had a quick swim across the pool and a look at the passages on the other side. On the other side he passed a large pool which connects to the main pool (at a depth of 175 ft.) After this he reached a point where the passage climbs steeply before turning back. The passage continues from here to the bottom of another shaft about 8o ft. high going up to the surface.

Leaving the campsite we took a dirt road going north towards MANGULA MINE. After looking at a couple of rubble filled hollows marked on the map as sink-holes we were told by a farmer to seek out a Mr. Mc.Cloud for details of local caves. On finding this chap (he was as black as soot) we were told of caves on a farm called DICHWE, 17 miles north of Sinoia and another which was supposed to be a vast open shaft on a farm called DINGLEY DELL 8 miles north of Sinoia.

Arriving at DICHWE we quickly employed an indigenous guide to point out the entrance of the cave to us. The cave had two entrances and consisted of a small complex little maze of passages on 3 different levels. A quick look round the top two levels produced only small choked passages with one small chamber that connected the two entrances. Exploration was just on the point of being abandoned when a small, flat out crawl was found down a steep incline; out of this came the strong smell of bat. Working on the theory that if there were bats down the crawl there must be a space to hold them, the crawl was cleared out and was found to enter a small low chamber. From here a passage opened into a much larger chamber whose walls vanished into gloom on all sides. On walking round the chamber a number of low outlets were found, none offering any further line for exploration although in one corner a boulder pile did produce a collection of low passages which could have been better explored. The lower chamber contained some large bones which showed the teeth marks of a big cat. These together with the 10 ft. long skeleton of a python near the entrance showed that the cave had some interesting visitors.

"DINGLEY DELL" was the object of our second trip up to Sinoia and it was located on an unoccupied farm, access to which was gained from the adjacent farm. The sheer size of the place made searching for potholes difficult and the exceptionally dense bush didn't help either. Only one shakehole was located - 200 yards in diameter and about 200 ft. deep. At the bottom was an extremely unstable 20' shaft blocked with fallen boulders and rubbish at the bottom. This find does not really correspond either in position or appearance to the description given us by various local inhabitants, and it may be that there is more to find.

On the Easter trip to the CHIMANIMANI Mountains the caving potential of the area was discovered by accident. Staying at the National Parks Mountain Hut with the intention of walking in the area, a cave was pointed out to us only $\frac{1}{2}$ mile from the hut. As the rock in the area is a form of chlorite schist we didn't expect to find the cave to be much more than a rock shelter. However, as it turned out the entrance dropped one into a low, water worn stream passage, proving that the stuff is affected by water action. Grabbing a couple of torches we pushed down a low passage with an unstable roof until the walls opened out on either side into bedding chamber. At the end of this a small stream came in and flowed through a series of low passages and chambers all descending at a fairly rapid rate until the water vanished down a small crack leaving the way on as a low crawl. Going along this one's head came out over a 5 ft. drop into a small grotto where we were joined again by a little stream. From here the way on involved crawling almost flat out in an inch or so of water until the passage was blocked by a large boulder almost filling the passage. Beyond this the passage could be seen to continue. The boulder seemed to be made of softish material and the chances are that if anybody took a crowbar to it the way on could be forced.

Returning to the surface we continued $\frac{1}{4}$ mile further from the hut to a point where the BUNDI river vanished into the ground. Here a fair time was spent looking into a number of holes which produced a rumbling noise. The following day we returned to one of these holes only to find that the river, instead of flowing through a jumble of boulders as most people believed, actually followed a large rift passage 40 ft. below and to one side of a dry river bed.

Further explorations was halted through lack of rope and ladder and the fact that Frank was in the middle of an attack of mumps. On the same day another member of the M.C.R. (Phil Murrey) had been up to the top of Turnet Towers (7,000 ft+) and had found a large shaft on the P.E.A. side. Phil reported a shaft, over 100 ft. deep, taking a stream and with water at the bottom. Since, the entrance is over 7,000 ft. above sea level it may well be that here is a pothole well worth exploring, although the ascent from the hut to the entrance is difficult even without kit. Just the thought of it was enough to send us running, mumps and all, back to the flesh pots of Salisbury.

Naturally, these are only small b eginnings, but we have been encouraged by fact that on every occasion we have looked for caves we have found something, however small. We have also gained an intimate acquaintance with some bats and the more incious flora of the Rhodesian bush. Caving is certainly different here.

Penny and Frank Salt

(Salisbury) MAY 1968.

A SLOVENIAN SOJOURN.

July 19th marked the start of the annual exodus from the Club of would-be cavers. In the Van was the battered Land-Rover commissioned to transport the four members who were to join the J.K.L.M. Club of Ljubljana in a joint exploration of Slovenian caves.

Progress through Belgium, Germany and Austria was proved by a pencil moving over the map and by evening of the second day we were camped at the Austrian border having decided on regular rest stops. Time was found to call in at Hallein Saltmines beyond Saltzburg where for 9/- parties, enter the working mine, cross into Germany underground, and then proceed to drop through the mine via a series of slides.

Terry wore the heel off his shoe trying surreptitiously to brake on the slopes, but when it came to the train out, he could do nothing except hang on whilst the "pole on wheels" hurtled out the last half mile. It makes quite a trip which can be enjoyed without the extra expense of the chair lift also provided.

That evening we crossed Austria using the Taurentunnel at Badgastein. (This train ferry cost 36/- which compares with the toll on the Grossglockner at 43/- plus petrol. Either way it comes expensive).

We arrived at our camp at Pivka late at night and spent the next day unwinding. A trip into Postojna Cavern at 10/- was deemed good value for money and at the end of the day we were ready to start.

Our first impression of Franc and Yuri were made at the Karst Institute and together we travelled via beautiful scenery to the secluded Cwm where they had made their headquarters in an old cottage at Kalisa. We were just settling in when a group from the Cave and Crag 'dropped in' hoping to join in and were accepted with typical Yugoslav hospitality.

The area to be studied lies above the sinks of the Unica at the end of the Planinska polje and was considered the most explored area after Postojna. However, the JKLM Club had been allocated it and by systematic exploration have found a further 1oo caves in the area some 8 Km x 3 Km.

The limestone used to be overlaid with an impermiable marl (flysch) which still forms one boundary whilst dolomite defines the eastern boundary. Within this area are some 24o potholes usually choked at the bottom with little lateral development. The extensive wood cover makes location and exploration difficult. Although the limestone is thick the water table is some 350ft. below ground, at the level of the polje.

One major exception to the general rule was found by the Yugoslavs two years ago with the discovery of Najdena Jama, a cave 3573 metres long dropping through 123 metres to a series of sumps that we had travelled 1200 miles to dive. However, the rains came and the water rose. The sumps begun to run dirty brown and frothy and rose during the day. Only one sump remained aloof from this petulant outburst, this being the main river which depended on catchment from Planina, Postojna and originally the Cerknica valley. However, this sump was not very suitable in location or type and instead radio tests were carried out to confirm their surveys with some success.

The enthusiasm for the device was later to take up much time in similar tests.

The cave was found, they have similarities with our own caves with more modest formations and plenty of mud. The approach to the sumps was horried however.

We soon found ourselves at home with the caves and the Yugoslav cavers who were much the same as our members in age and ability but dare I say it with rather more enthusiasm. They had taken some trouble to see we were comfortable in the cottage and it was with some little regret that continuing rain forced us to change our plans and abandon the diving programme.

We, therefore, moved to Sezana on the Italien border where the potholes were deeper with little lateral development generally but with large amounts of sinter formations. Since the systems were fossil the rain would not affect the new plan so, predictably, the weather changed and became fine.

Here the radio was again put to use in Scampalova Jama which was thought to come within 15 metres of a second pot. Both entrances exceeded 140 ft. and since two tests were wanted for various reasons the first was done with the transmitter on the surface. By devious measurments the signal was received at maximum range. The second test was a complete failure suggesting the surveys are inaccurate.

Some work in the area was frustrated by the difficulty in locating the positions of pots reported by the Italians and two days were spent looking for specific pots without success. We begun to suspect the accuracy of the previous reports particularly as some known pots had been proved to have been exaggerated. However our combined explorations culminated in an attempt on a pot reported to be 200 metres deep. A crude winch had been borrowed for the occasion and this was lashed to boughs and by late morning all was ready. We had managed to persuade Franc that it was vital that a Slav speaking member was first and Primos was kitted up and pushed in. The winch was thought to be 1o metres short so a tether this long extended the winch rope and he set off using the radio. The depth increased and the radio became quieter until all trace was lost. At 208 metres we decided to haul back only to find we had lowered him to within a metre of the bottom and then hauled him back.

Having proved there was enough rope, and with the radio OK, Rod and Oz were dispatched to enjoy themselves. There being no passages to explore the exercise was soon over and by the time Primos and Rod were out time was pressing. The fact that Oz's lamp had failed did not damp enthusiasm as a barbeque had been arranged for that evening and it was late after all. The trip up, left quite an impression one way or another, then to save time all 13 cavers and the kit was piled on the Rover and we set off for the Barbeque.

It was with genuine regret that we bade farewell next day and then only after promising to call in as we passed through Ljubljana.

After two days at the sea we called back at Postojna as promised and a last project was accepted and the extremity of Mala Karlovica Jama was successfully located on the surface using the radio, and although it was not where expected the results were pleasing.

Terry also completed our only cave dieve here although a brave attempt has been made earlier when kit had been carried into Krizna Jama. His enthusiasm in kitting up and diving the 'Silent Lake' off Blata series was commendable considering a mistake had been made in translation and it was'nt a sump.

Our final evening was spent in noisy celebration at the Club HQ in Ljubljana meeting other members of their society and in cementing friendships. There can be no doubt the Jugoslav hospitality does not change and that English and even Welsh clubs are welcomed. There are many pots to be found but more rewarding may be a study of the better known large caves. Caving around Postojna provides more active caves, and diving sites abound.

The pleasant surroundings and low cost of living must make this an attractive locality for preliminary overseas expeditions.

The JKIM Club are keen to see further visits from our Club and it is hoped that next year a new team will set out to enjoy a combined exploration of this type.

J.V. Osborne, C.Fairbairn.
R. Stewart, T. Moon.

(NOTE: There was another trip to Yugoslavia as well as the one above. A party of nine went to Vjetrenica Jama to the "fabulous" dig mentioned in Newsletter 57. Apart from spending some time in the unimpressive hole and finding a few hundred feet of equally uninteresting cave they did little else than alternatively chase sun and rain across the continent.)

A NEW CAVE AND CAVING PROSPECTS NEAR PENDINE.

This article describes a preliminary examination of the Pendine Carboniferous Limestone outcrop by John Parker (Cwmbran Caving Club and Cave Diving Group) and myself in June 1968, and the finding of a short, new c ave.

A narrow belt of limestone starts on the Carmarthenshire coast near Pendine roughly between the peninsulas Ragwen Point and Delwen Point, and runs inland at first northwards, then northwest wards, reaching Ludchurch in Pembrokeshire.

The main speleological feature known to date is the large resurgence on the beach just east of Ragwen Point at 22/223075. The water flow approaches that of Dan-yr-Ogof in volumn, but it is not possible to enter a cave here as the site is covered with millstone grit slabs and sea-washed pebbles derived from the outcrop 300 ft. above. The water temperature on 15th June was 11.1 deg. C (52 deg. F.), and it was fresh water. Some 60 ft. above the resurgence, on the steep, grit boulder slope, contractors have excavated a shaft which goes down 58 ft. to r each about 4 ft. of water. This is stagnant and there seems no way on for divers; the shaft is circular, 6 ft. wide, and concrete-lined.

The resurgence obviously drains the whole of the outcrop, and the pattern is very similar to that at Dan-yr-Ogof in that surface water from old red sandstone drains southwards to sink in the limestone, and then runs southwards passing under the everlying grit cap. Behind the resurgence is a magnificent dry valley, up to 450 ft. in d epth, extending north to the first sink - the Green Bridge Cave (ref.) - at an altitude of 230 ft. and 1 mile distant. The stream sinking here is only a trickle and originates a mile away near Westpool farm. The 1" O.S. map is inaccurate in this respect because it shows the stream sinking $\frac{1}{2}$ mile further up the valley. Examination of the cave shows that the sump known in 1958 has now broken and John Parker was able to squeeze on to a low, gravel-bedded section which emitted a slight draught.

The next sink is a larger one at 213.096, 1.45 miles from the resurgence. This site is a large swallet, floored with clay over which the stream meanders, and ending in a 30 ft. limestone face containing several openings. All of these become clay choked within 20 ft. and there are no draughts. It might be possible to dig where the stream sinks at the bottom of the face.

From this sink onwards the valley becomes very shallow and the convenient bridle path running on its west side peters out. Hidden in copses on both sides of the path are small, long-disused quarries, and the new cave found is in one of these (see below).

The outcrop was followed by me on 23rd June along a line of similar quarries which are very-much evergreen with gorse and small trees, until the stream marking the Carmarthenshire-Pembrokeshire border was reached. Every quarry was minutely examined, and 2 small, active swallets were found, but no caves. It was suspected that the border stream (unfortunately not named on the 1" map) might be sinking to form the major supply for the beach resurgence, and it was followed across the limestone and south to where it broke through a fine basal grit scarp near Garness farm at 187.092. The stream failed to sink and it reaches the sea 2 miles further on at Amroth Castle.

The question now remains, where does the water come from to supply the beach resurgence near Pendine? Is it supplied by a multitude of small sinks extending as far as Ludchurch, 5½ miles away? If so the water travelling underground would have to run under the border stream, and at right angles to it. The total known volume of water sinking in the outcrop traversed amounts to less than a tenth of that rising on the beach, and no major streams are known on Marres mountain that could sink through its grit to supply the cave system.

Reference: Ogof Pont Las Cymru: Cave of the Green Bridge of Wales by Melvyn Davies. The British Caver, Vol. 3o, p.105, 1958.

OGOF GARREG WEN (WHITE ROCK CAVE)

The cave is at 22/2125.0955 in Carmarthenshire and is situated in a deciduous wood which is dotted with small quarry faces. An occasional limekiln can be detected in the undergrowth and a faint path leads to the cave from the main valley cart-track. The entrance is 3 ft. wide and 2½ ft. high, and has stalagmite flow on the rock face for several feet above it. The cave length is about 100 ft. and from the entrance leads steeply downwards into the first chamber. This chamber also slopes downwards, is liberally covered with stalagmite flows and is taken to end in a boulder pile, also stalagmited. A climb of about 4 ft. over these leads to the second chamber some 10 ft. below, also completely stalagmited. The only way on is up a stalagmited slope ahead leading to a squeeze. This had been blasted but is not wide open yet. It cannot lead far because there is no draught. The cave was known locally, and a few stalactites had been vandalised when we entered.

(Melvyn Davies)

18.7.1968

THE DISCOVERY AND EXPLORATION OF OGOF GOFAN.

Ogof Gofan lies on the west side of Saddle Head in Pembrokeshire. The entrance was first spotted by me on 26th August 1966, and an attempt to reach it by BNS members using ladders on 1st October failed due to the overhang just above. The entrance was about 40 ft. down a sheer cliff and 40 ft. above high tide mark. The ground above the cave is a wave-cut platform at an altitude of some 130 ft. and it contains very little evidence of cave activity except for the entire absence of streams.

This Summer I decided to re-examine the problem of entry, and returned to study the 10 ft. by 6 ft. hole with binoculars and take photographs. There seemed to be a patch of light on the entrance chamber floor which might indicate a climable pothole. On 1st September I went to investigate this with 3 members of Cwmbran Caving Club and one of them, Bill Wilkes, descended by rope to the area of the pothole.

There was no pothole. The patch of light is caused by reflection from stalagmite, as we found when we descended with Bill to an entirely separate entrance that he located. This entrance is well hidden from above by another overhang, but it is possible to descend the face to the north of it and traverse across. A crawl of 80 ft. or so leads to the awe-inspiring 1966 "window".

A higher chamber lies behind the entrance which immediately yielded bones and teeth. We were on the lookout for archaeological remains being well aware of previous work in the district, and we uncovered these from the surface of the clay. Some vertebrae etc. have been brought out for expert examination, and cavers are asked not to visit the site until it is announced in a Newsletter that the clay may be trodden by "unqualified boots". Members, dare I say long-suffering members, are, by now well accustomed to these restrictions, and anyone interested in the cave's interior can view my photographs.

Beyond the bone chamber there was an archway which had to be heightened with a hammer. A strong draught blew out of this hole, but the draught was found to be reversed on a second visit (there have been only 2 visits - the second one to take photos and collect a few bones for evidence). This draught is extremely interesting in that it does not follow the usual thermal reversal pattern, and yet it does not exhibit that short-term variation in velocity which is characteristic of draughts between entrances which are either close together, or at the same altitude, or both. In this case there seems to be another (a third ?) entrance a few hundred feet away, and the draught velocity and direction depends on the wind direction around Saddle Head.

The archway gave way to a well-decorated passage and then a magnificent chamber. Measuring some 50 ft. by 30 ft. with a great hollow in the middle, the chamber is an amphitheatre of stalagmites. Growing out of a pool at the bottom are 4 monsters - the highest just meeting the roof at 14 ft. The others are about 12 ft, 8 ft and 6 ft. Another 5 ft of the largest is submerged as was proved by a diver, and this part of it is covered with calcite "flowers" as might be expected. Another dig was required to leave the chamber, but only another 150 ft. or so remained to be explored, making perhaps 400 ft in all. This again was well decorated, with stalagmites to the fore.

Apart from its archaeological significance, this cave gives rise to some new problems. First of all why should stalagmites predominate? In some north-crop caves stalactites only are plentiful, and we have to come to Gower, in Llethrhyd cave, to see 'mites. It is true that the Limestone beds are thicker in Gower and south Pembrokeshire than in the north, but Ogof Gofan, like Llethrhyd is only overlain by, at most, 90 ft of rock. Then again large stalagmites are usually presumed to be of considerable age, in this case 19 ft would surely not be completely post-glacial, i.e. younger than about 12,000 years? If one takes the notorious cave guide's rate of 'an inch in a thousand years', then there would be evidence of a marine transgression during the Eemian Interglacial. Nothing of this sort could be found. Something in between seems to be called for - growth starting in the Weichselian Glacial Period perhaps, and continuing only during climatic periods wetter than the present one, for most of the stalagmites are now dead.

The main passage ends in a stalagmited, small boulder choke which slowly admits body steam. Nothing would induce me to dig here because of the damage that would be caused among the surrounding stalactites. The draught migrates through a pot well before the upper end, and this has been excavated to a depth of 20 ft. Only slab-filled gaps can be seen and the prospect is not hopeful.

The best thing about the cave is to emerge on the 1966 "Window" with the sea lashing at the rocks below. It is difficult to imagine the scene during the Wechselian with a scree slope running from the entrance to the plain beneath, which stretched right across to the Devon coast.

References.

1. Bowen, Dr. D.Q. "Dating Pleistocene Events in South West Wales", Nature, 211, July 30th, 1966.

2. Brown, M.J.F., Ellis-Grufydd, I.D., Foster, H.D., and Unwin, D.J., "A new Radio-carbon Date for Wales", Nature, 213, March 25th, 1967.

3. Day, Dr. Michael, "Guide to Fossil Man", Cassell, 1965.

(Melvyn Davies

Cwmbran 8th, Sept. 1968).

SOME NOTES ON RUNG FAILURES.

Occasional failure of ladder rungs made from aluminium alloy tubing have occured at Penwyllt over a period of several years and the cause of these does not appear to have been established.

A sudden spate of failures following the leaving of ladders underground in Dan yr Ogof for several weeks led to the examination of the broken and unbroken ladders concerned and also of all the other ladders that could be located.

Four ladders that had been left in Dan-yr-Ogof were examined and of these, three had the rungs secured by swaged ferrules and the other remaining one had tapered alloy plugs inserted in the rung ends secured by stainless steel pins. This ladder also had thimbles secured by binding the ladder wire and soldering, and as far as could be ascertained was upwards of ten years old. All the ladders were 3/8" dia. X 20 SWG,

Two of the swaged ladders had a broken rung and several rungs of the pinned ladder were slightly bent.

The first point to be noted on is the marked difference between the appearance of the surface on the rungs of the t wo types of ladder, that of the swaged ladders were covered in numerous black patches, amounting on average to about a quarter of the total surface area; those of the pinned ladder were of a uniform matt silvery appearance (see Fig. 1). Cleaning off the spots of mud on the rung of the swaged ladders revealed that in most cases further black areas were present beneath the mud.

The two broken rungs were found to have fractured in a brittle manner, i.e. with negligible bending before fracture and the fractured faces exhibited some dark areas near the outer edge which corresponded with black patches on the surface of the rungs.

The ladders were hung up and the each rung was tested by jolting it three times with a booted foot. They were then inverted and the test repeated. In doing this eleven rungs on the three swaged ladders were broken, all in the centre and in a similar way to the failure that had occured in service's dark areas on the fractured surfaces corresponding to black patches on the surface of the rungs. The old pinned ladder suffered no damage during the tests.

At this stage in the examination it was evident that the rungs of the swaged ladder had suffered damage due to corrosion and sections from a number of rungs were examined microscopically. It was found that severe intergranular corrosion was present in the black areas of the rung extending in many cases to as much as halfway through the thickness from the outside, and a lesser degree of attack was present on the inside of the rung. Brittle failure had resulted from the notch effects of the intergranular corrosion (Fig 4). There was no sign of such corrosion on the pinned ladder.

Analysis of the rung material revealed that in the case of the swaged ladder this was of the 'Duralumin' type containing about 4.5% copper and corresponding to BS1476 HE 15 WP. Attractive though this alloy is from the strength point of view it has poor resistance to corrosion and together with other high strength alloys is not suitable for service conditions expected of caving equipment. The rungs of the pinned ladder proved to have been made of a copper free alloy corresponding to BS 1476 HE 30 WP, of very good corrosion resistance.

As a result of these findings other ladders which had been in normal club use and had not as far as could be ascertained been left underground for any length of time, were examined and similar corrosive damage was found. The age of any of these swaged ladders is not exactly known but they were thought to be about five years old.

The ladder wire was examined on all the ladders, and except where copper wire had been used for binding on the pinned ladder's thimbles, it was in very good condition throughout, as were the ferrules which were also in HE 30.

In no circumstances should either tinned or plain copper wire be used for binding steel wire rope, as galvanic corrosion will result under damp conditions. Galvanised iron wire which is obtainable for the purpose should be used.

As a result of the investigation the following recommendations are made:

1). Use the alloys BS 1476 HE 30 WP or HE 10 WP for ladder rungs and other vital components of caving gear as these are the strongest alloys having the necessary corrosion resistance.

2). Avoid the use of oddments of aluminium of unknown composition for the manufacture of any article, the failure of which could endanger human life. Failure through intergranular corrosion is always in a brittle manner and without warning.

3). Identify ladders and other gear with a serial number or date of manufacture so that their service life can be assessed.

Glyn Thomas.

(Cardiff, September 1968).

(Editor's note: Following this article, in the next Newsletter will be an article by Glyn on the recent wire failures on Club ladders).

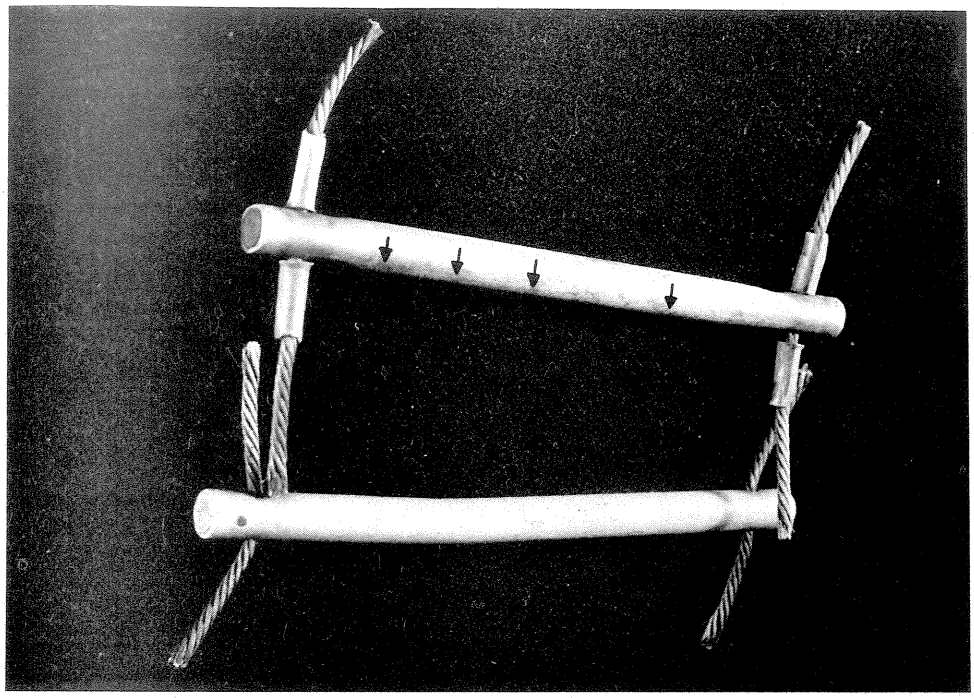

Fig. 1. Comparison of appearance of swaged ladder rungs (top) with pinned (bottom).

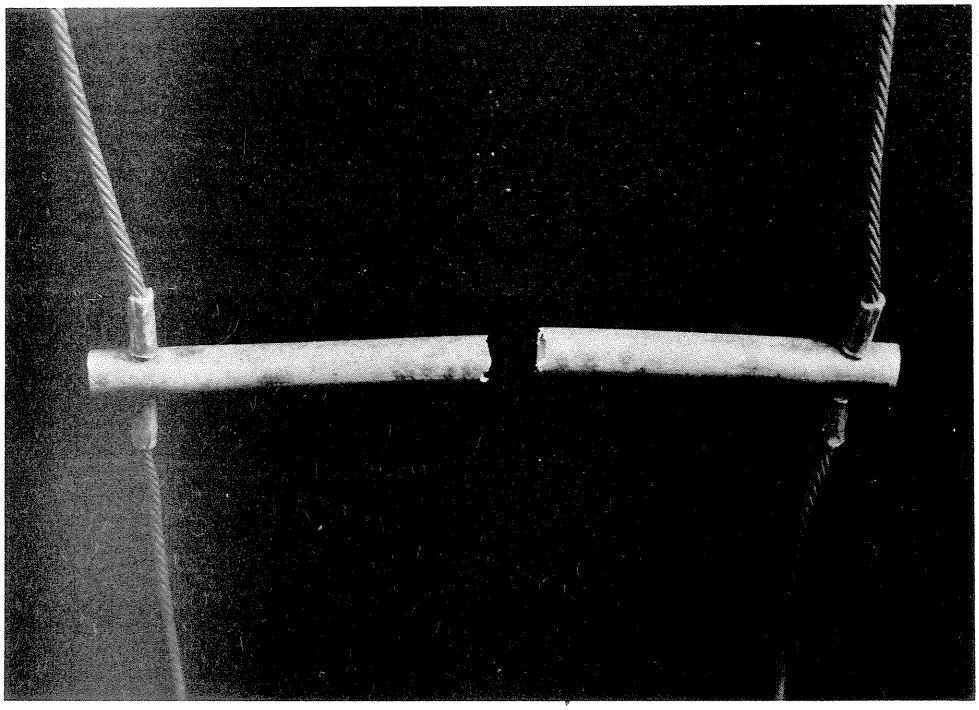

Fig. 2. Typical Fractured Rung.

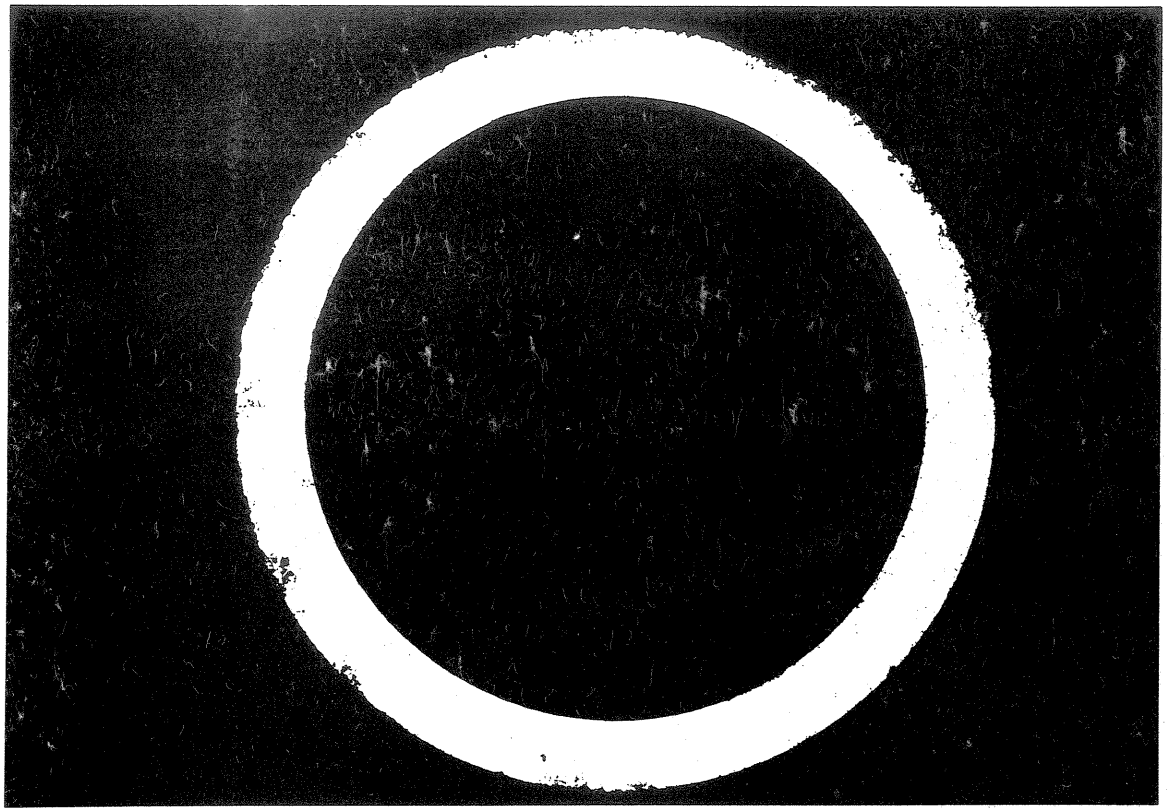

Fig. 3. Section through rung showing black patches extending into the tube wall.

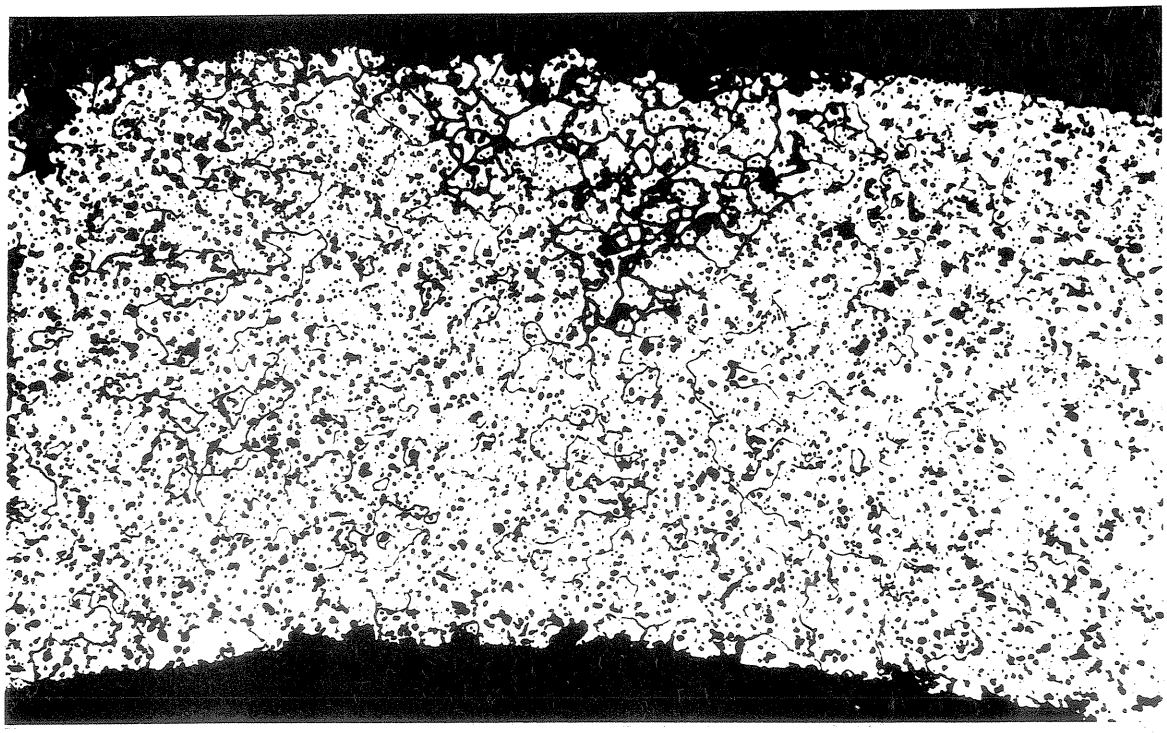

Fig. 4. Section through black area on rung showing intergranular corrosion extending almost half way through thickness (X 90).

JORDAN 1967.

After the debacle at Balinka and the disruption it caused of our thoughts and activities, I vowed on the emblem of the Red Banner never to stray from the archaeological path again. Thinking something like this led me back to the straight and narrow time-scale of a few thousand years - to the Bronze Age. To cut a long story short, I went East, old man, and found myself, on a Sunday evening in March 1967, outside the Dong Gate at Jerusalem wondering where the hell I was. The question was never answered. Leaving sinning London on Saturday, here were my two feet surrounded by beards, biblical clothes, new smells, old smells even stronger; limestone, miles of new, colourful limestone. Nothing could be as bad as Balinka - I had joined the British School of Archaeology in Jerusalem with some trepidation that people who dig in the East are top draw and have plums for tea on Sunday. The fears were groundless; indeed, Balinka was Bunny-land compared with the Australian (a relic of the Japanese campaign in the war who had a hat to prove it) who directed the dig.

Jerusalem was different, was evil, three prophets had been slain within its walls; the whole place was beautiful and evil, the golden limestone walls, the blue sky and somewhere in its alleys one shivered. Men chanting from Mosques, Gregorians chanting from churches, taxi horns, transistor top of the pops, Mohammed Ali staring from the walls of the slums. It was noise, all noise and weeping; where the hell, or where in hell, one wondered. The place was allright, the Dead Sea scrolls looked safe enough in the museum along with a hundred other things. The limestone Mount of Olives gleamed across the Kidron valley. Olive groves, dull and shimmering, passed between donkeys loaded by men, bundles, overbearing, overburdened they stumbled from clint to clint to the church of Ascention.

The dig wasn't there, of course, but thirty miles away on the Dead Sea desert, two miles East of the Allenby bridge and the river Jordan. The lowest point on Earth. The plan was to dig from Monday to Friday and back to swinging Jerusalem for the weekend, then back down to the site on Sunday night. That Sunday we went down after my first sight of the evil and the history. Down a deep valley pocked with caves where hermits lived, past Jericho, getting hotter, to the place itself. A wasteland.

The dig was a Tell i.e. an artificial mound of debris containing the complete remains of many centuries, many thousands of years of occupation. No ribbon development, the site grows layer on layer out of the desert. It was called Ghassal and the top of the mound (the last occupation) was 4.000 B.C.- the early Bronze Age. We were to see the dates beneath. The dig went on for three Months and my task in the last three weeks was to find the natural soil in a small shaft, 2o x 6 ft. We lived (camped) on the site, and water came each day from Jericho by mule train. There was nothing, no vegetation, only cacti and scorpions, black goats, rubble, sand, stones, pebbles, decayed mud bricks, sand, stones and, in the distance, the Dead Sea, at dusk magnificent. and thirty miles further away, the towns of Bethany and Jerusalem pointed into the reddening purple gloom. Around us was the Biblical wilderness, a strange, new limestone land.

The site had been surveyed and it was dug in ten-metre squares, each square had a supervisor, a foreman and pickman and fifteen to twenty 'boys' to take away the rubbish. The pickman picked the debris loose (it was like soft concrete) the foreman picked up the finds and gave them to the supervisor and the 'boys' twenty to sixty years of age, took the rubbish away. We started at five in the morning and worked until noon. A whistle blew and off they went, running like schoolboys to their homes some miles away. The only human occupants of the desert were the Bedouins who lived in their big, black tents like slugs clinging to the ground, on the brown bare land. Tall people, proud people, friendly in a sort of indescribable way.

We ate and afterwards did what we wanted; walked four miles to the oasis to swim, walked over the hot wilderness, washed pottery, photographed and visited the Bedouin or looked for flints. It was new and exciting. Another bloke (Australian - there were only two British in the British School) flint-mad like myself went collecting around the site on the surface - the quantities were so great that statistical analyses were done on the surface finds. Our pockets bulged each time. We returned from walking, axes, scrapers, saws etc. - my lot is in the national museum. We went visiting Bedouin, sat in their tents and accepted their hospitality, sharing the drink from the one cup they possessed which went from hand to mouth among the cross-legged tentees. My first delicacy was warm goat yoghurt from a Shell oil tin; What we have is yours, they said, accept us in this tent and you are one of us, microbes and all. Went walking, saw the Bronze Age dolmens in the wilderness, the huge cromlechs of death.

Each day was like another, we scraped down into the mound, removing the decay of buildings, one floor upon another. We hit sand in two and a half weeks, two feet of it to be followed by more finds on the last day of the dig for that season; we have to go back. There was a party on the last day; The workmen formed two lines on their haunches and we took the food and laid it on the ground on large platters - boiled sheep and rice, mounds of it. Sat down with them, took up a handful, squeezed it into a round ball, rolled it, the juice falling back onto the plate, then threw the ball into the mouth. The chap next to me was pinching my meat (he was welcome) but oh so subtley fingering my meat in the semi-darkness. There was singing, chanting like Balinka again, the director (Basil) was whirling around in the circle, barn-dancing, sword brandishing, shorts in the air, music on home-made instruments.....

Things happened, of course, each day and night. An Israeli plane came over and all the anti-aircraft defences went blazing away into the night. My white pants were to hand expecting to see soldiers in the morning. However the morning was as before, stones, heat, dust and gravel and the drive up to Jerusalem, grinding up that great rift valley to Bethany, Jerusalem and the freezing cold- Easter day there was snow falling there.

The weekends were for sight-seeing and the cheapest way was by taxi crammed with as many people as possible. 250 miles to the south was Petra and on Easter Sunday the journey was attempted. It was icy cold at the Dong Gate at four o'clock in the morning, waiting for the four wheels to arrive, the stars like Christmas cards. It came, and off we went, back down to the Dead Sea, from freezing into boiling and up again to freezing desert roads.

We ploughed into a snowdrift near a castle somewhere. The black tents were still dotted around and white. Turned back to Amman - built in a swallowhole and flooded out by snow melt. There was a lady in the car who said she had two pairs of bloomers on; the journey was the longest of the lot.

Another weekend Oliver (an Englishman) and I went to Samaria, Wablus and Jericho and back to Jerusalem. This journey was memorable for the scenery and a volley of bullets which flew across the windscreen - we had stopped for tea.

How about caving etc? Three things are worthy of note:- Jerusalem is built on a series of caves, mines and sewers that have not been explored or mapped. Bethlehem is littered with rock shelters of Paleolithic date, but not excavated, but there are few long caves, plenty of risings and dry valleys. When the war is over, I am going to a Tell 110 feet high near the edge of a dry valley and with a rising at its foot and with small caves with SCROLLS in.

Derrick Webley.

FROM THE LOGBOOK.

Dan-yr-Ogof.

1. Hangar Passage.

The end of July saw Alan Coase and several other members continuing the dig at the end of Hangar Passage Extension. By mid August their perseverance was rewarded when access was gained to a bout 100 feet of large passage: 20' wide x 10' high, but with much mud fill. At the end boulder chokes met the roof - but the two chokes (one on either side) are fairly loose and progress was easy on the right hand side. It appears to be on top of a roof collapse in a very large passage - and there seem excellent long term prospects of pushing the chokes.

2. Rottenstone Avens.

It proved possible to climb a small aven in the passage immediately beyond Rottenstone Aven and after some awkward pushing, to reach the window 25' up the Aven wall. An awkward and slippery traverse led to a high and narrow rift passage heading off at right angles to the Main route and it was followed to a small chamber. A similar rift was followed at a later date for a considerable distance (250 feet or so) till a floor appeared. The rift eventually terminated in an unstable boulder choke.

At the beginning of September a very large aven was also discovered in the vicinity and its floor was littered with Sandstone blocks and oolitic fragments. The roof of the aven is almost certainly in sandstone.

3. Mazeways.

On August 24th. last, what was to be the final great attempt to break into the hitherto unknown reaches of Dan-yr-Ogof was made by a party of three divers in the terminal sump of Mazeways.

Four days previously the cave had flooded but a quick look at the lakes showed that the water level was not much above normal for the time of the year. It was decided to carry in sufficient kit for a long dive - anything up to 1000 feet was envisaged. Actually taken in were:

one twin 40 cubic feet set,
two 50 cubic feet sets, and
two spare tadpoles.

The carrying in and out especially through the Crawl would not have been possible without the help of the many eager helpers.

In Mazeways the water was much higher than normal, with only 12 inches of airspace in the entrance duck; the terminal sump itself was three feet higher than on previous dives, and probably at the same hydrostatic level as the main river at the entrance to Mazeways. This point towards the fact that there must be some connection between the water in the sump and the main river in the entrance passage.

Three divers entered the water in quick succession, the first carrying an 850 - 900 foot line reel. As on the previous occasion the water was murky and visibility was down to a bout a foot.

After following the right - hand wall for 150 feet the passage dropped sharply and the divers entered an area of crystal clear water. After a further 30 feet an obvious way was followed to the left going North West and updip, and it became gradually shallower and smaller. After a dive of 300 feet a small airspace was encountered beyond which the passage continued underwater but was too small for the overkitted divers.

Back at the point where they had entered the clear water, it was obvious that they had missed the main way on and they then followed a large passage that went off in a northerly direction for a further 350 feet at a depth of about 30 feet. Past a bridge of rock there was a chamber with its floor at 45 feet. Two ways out of the chamber were examined but both were small and appeared to close down soon. The water soon became murky with the three divers swimming around, and further progress seemed unlikely so a slow retreat was called for, and the line was tied around the large rock bridge on the way back. The return journey was in almost zero visibility because of the mud that had been stirred up. The dive took about twenty minutes and the divers covered a distance of almost 1900 feet.

On the whole it was a disappointing result but perhaps another dive in clearer visibility will reveal the way on. The next obvious diving site is in the entrance to Mazeways, but it will be in almost zero visibility because of the running water.

T. MOON. C. Fairbairn, R.Arculus.

4. Radio Tests.

Several radio tests were made in Mid September with a view to locating Dalis Delight, the Rottenstone Avens and the Rising, but all were failures; a later attempt located Dali's Delight at a depth of about 200 feet, in the expected location.

OGOF FFYNNON DDU.

1. The Maze OFD II

R. Hall and J. Aldrige are continuing their work in this area and have left numberd markers at each junction in order to survey the place more easily. You are asked not to obliterate them.

2. Waterfall Series Sump OFD I.

A small sump off on the right hand side of Crystal Pool Chamber (towards the Canyen Pot, but straight on) attracted the attention of J.Osborne when he was considering possible connections to OFD II.

On close examination the apparently attractive pool gets small and would probably be too small to admit a diver.

3. OFD II - III.

The survey is still in hand and the Main Stream is now completed. Preliminary calculations show that there is almost 2½ miles of active stream passage in the OFD System. The coordination of Smiths Armoury were marked out on the surface after another recent Radio test failed to locate the chamber.

It was concluded that the surface listeners were not s earching the right area as the final point seems to be about ¼ mile from the Byfre and under the collapse area to the S.E. of the Pwll Byfre near the peat bog. Several independent water diviners have detected "passages" running in this direction, but more about this in a future Newsletter.....

CLUB NEWS.

1. ADDRESSES: there will be an address list in the next Newsletter, so if there are any amendments to the old one please let us know about them as soon as possible. Meanwhile the following changes are to be noted:

CONS. Mr. and Mrs. 2, Hawthorn Way, Sonning on Thames, Berkshire.
JENKINS, Mr. and Mrs. D.W. Doneraile, Brookfields, Cefnllys Lane, Llandrindod Wells.
COASE, Mr. and Mrs. A.C. not known as yet. Rads.

2. We welcome the following new member;

Saunders, R.B., 34, Marine Drive, Sandfields, Port Talbot.

3. OBITUARIES.

W.B. Mills.

Older members of the Club will be sorry to hear of the tragic death of Bill Mills whilst taking part in a motor cycle trial.

Bill was an active member of the Club in the 1950's but his real sporting interest lay in trials riding and to that end he devoted his efforts. Last year on the Six Day International Event which was held in Poland he won a coveted gold medal.

I am sure that all members will join in extending our sympathy to his wife, Ruth and his son, Christopher.

D.W.J.

Dr. F. J. North.

Not all members might not know that this summer our ex-President passed away at the age of 79. Ever since the formation of the Club he was an ever present background to our activities and helped in many ways to further the cause of caving.

It is customary on these sad occasions to set out the career of the deceased. This I started to do, but I then realised that it was pointless who had not heard of his reknown in limestone geology, who had not read his' River Scenery at the Head of the Vale of Neath' and his 'Evolution of the Bristol Channel'. The books are the foundation stones of our craft and are a permanent part of our literature. He had other facets and interests besides our own and was an acknowledged expert on the geology and the geomorphology of Finland on historical geology and its human figures. His broad wealth of knowledge of maps and the geological aspects of archaeology are also well known.

After his retirement from the National Museum he continued his interests and augmented our records with plans and papers that had been carefully preserved. The Balinka project was always in his mind and he supported the project of our cause behind the scenes and was pleased with the success in 1966.

We have lost a good friend. We send our sympathies to his widow and family. His books and works will be always with us.

D.W.

4. There are still a number of people who have not paid their membership fees for the current year. Can anyone in arrears please contact Eric Inson, 42, Torrens Drive, Lakeside, Cardiff.

CONGRATULATIONS.

5. To Mr. and Mrs. Idris Williams on their recent marriage,

CONDOLENCES.

6. To Terry Moon for being caught at last.....

SUMP RESCUES.

7. The divers have now finalised their sump rescue technique and demonstrated it recently to the Save Rescue meeting in Cheltenham. Details are available from J. Osborne on request.

NEWSLETTER.

8. The Gower Hydrology article was not ready for this Newsletter, so it is being held over for the next edition in December. More articles will be very welcome.

COTTAGES.

9. The last Committee Meeting decided to amend one of the long standing cottage rules. Married couples without children are to be allowed use of the Married Quarters, but only if they are not required by married couples with children, who will have priority at all times.