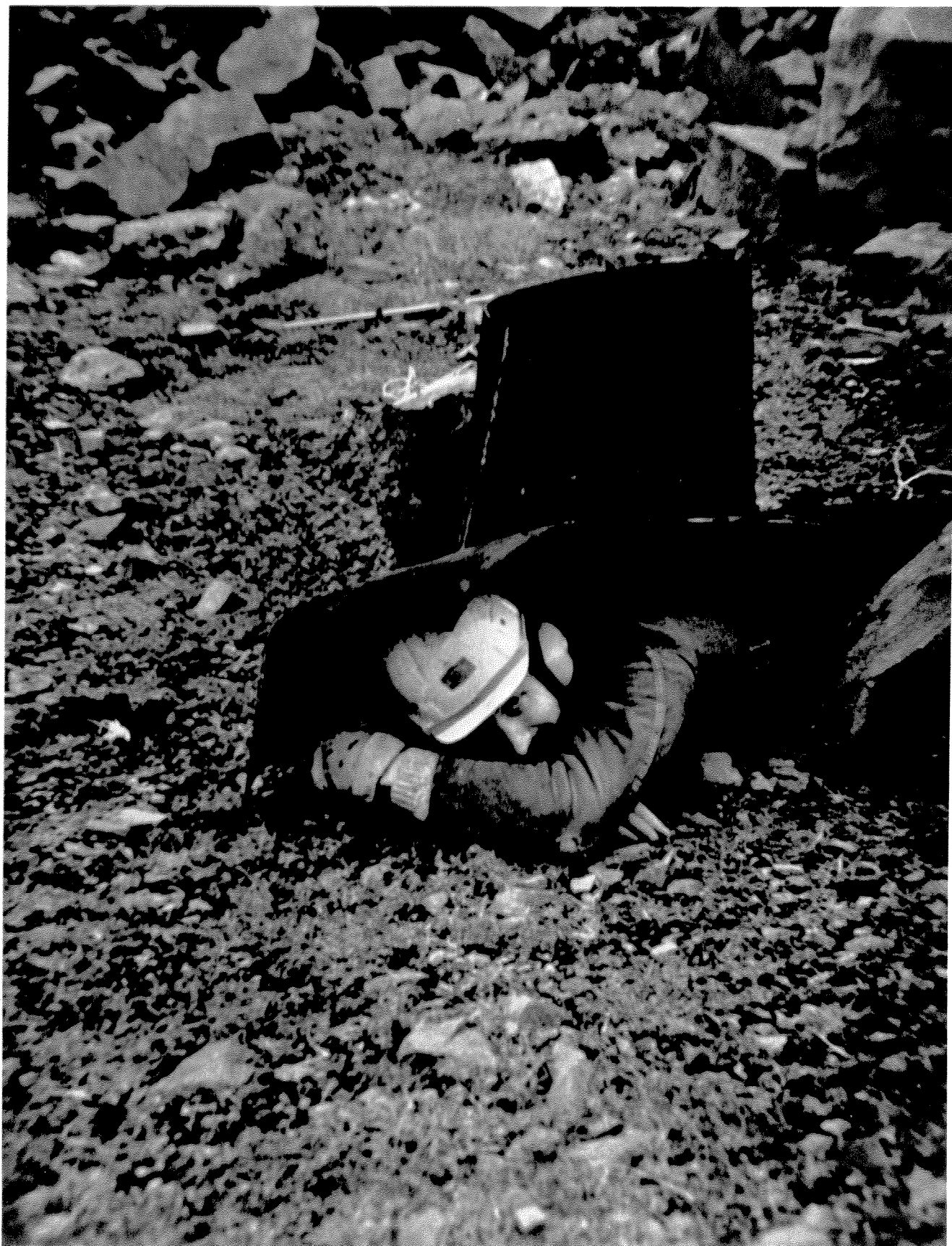


SOUTH WALES CAVING CLUB



JOHN ALDRIDGE

John Aldridge died suddenly in May 1983. He leaves his wife, Dorothy, and two daughters, Teresa and Clare.

John had been a Member of SWCC since 1965. During his membership he made his mark on the Club in a number of directions. He served as Assistant Secretary in 1968/9, he was involved in the re-opening of Waun Ffynnon Felin in the early sixties, was a pioneer of electronically-triggered, multiple-flash photography and put this to good use in producing a notable 'photographic survey' of Ogof Ffynnon Ddu I.

John will be remembered as a man of great humour, both in person and in his unique prose. His writings were published in the 21st Anniversary publication and in several Newsletters.

John was an early friend and companion on many of my first caving trips and proved a solid counterbalance to my youthful zest. Together we made a good team.

John will be missed by all those who knew him.

Bob Hall

ALAN C. COASE

Alan Coase was a Member of the Club for many years. He was the half brother of the late Don Coase, both of whom succumbed prematurely to heart trouble.

Alan began his caving on Mendip and was a lifelong member of the BEC. He went to University at Leicester where he obtained an honours degree in Geography and Economics.

In 1963-64 he became an enthusiastic Member and began to explore the recently reopened Dan yr Ogof. After two years effort and several small finds, he, in conjunction with several other Club Members, notably Bruce Foster and Eileen Davies, made the big breakthrough in Easter 1966.

The resultant publicity, encouraged by the owners, allowed Alan to develop his photographic talent to the full and this culminated in an Observer Colour Supplement devoted to the discoveries.

He had been a Club Committee Member since 1965 and helped to develop the new Married Quarters. He was also instrumental in the previous discoveries of Tiger Aven, Ogof Ffynnon Ddu, and went on the 1966 Balinka Pit Expedition.

His speleological interests resulted in him being elected to the Committee of CRG and subsequently BCRA.

He continued exploration in Dan yr Ogof making further discoveries, notably the Great North Road, and his passionate interest in the system resulted in a detailed study of the cave that was written up for a PhD at Leicester University, supervised by Trevor Ford and submitted in 1975. A precis of this, combined with Dave Judson's survey and other short articles by Club Members, was subsequently published in 'Transactions of BCRA' as the Dan yr Ogof double issue.

At about this time he became warden of Thornbridge Hall Study Centre and built it up considerably. His commitments to this project led to his retirement from active caving and the Club. However, he took up fly fishing as a substitute.

He died on Saturday, 19th November after a short illness and our sympathy goes to his widow, Joan, and his two daughters.

N.Christopher

W.Little

SOUTH WALES CAVING CLUB

No.98

NEWSLETTER

FEBRUARY 1984

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PHOTOGRAPHS

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Please note change of address.

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The opinions expressed in articles printed in this Newsletter are those expressed by individual contributors and are not necessarily upheld or supported by the Editor or any other Officer of the South Wales Caving Club.

EDITORIAL

Whilst sitting contemplating the slow-drying properties of stencil correction fluid during a particularly error-prone typing session, I got to thinking about the kind of life I could be living if I wasn't the Editor. Normal people don't devote three hours a night, seven nights a week, for six weeks at a stretch, to something as intangible as a Newsletter - do they? (I will ignore such intrusions as the odd Newsheet, Book List, AGM Minutes and Officers' Reports - a mere extra three or four nights each).

So what was it, I wondered, that caused this desire for self-exclusion from normal society? Could it be that television has become about as stimulating as a coma? Could it be that a night out in the pub requires a second mortgage? Could it be that I am just a frustrated author - with dreams of sales in excess of 300? Or am I just a freak? I suppose that the answer is four times 'Yes'! So, having established that I really like the job, I wondered what could be done to improve the flow of articles so that I could do this all the time.

I have formulated a four point plan which I hope will be implemented before hibernation ends:

1. Close Ogof Ffynnon Ddu to Members for a period of three years (Leading visitors, and specific digging expeditions excepted).
2. All trips into Dan yr Ogof must start at Waun Fignen Felin or further afield. (Exceptions as in 1.)
3. All trips to Sinc-y-Giedd area shall last for a minimum period of one week, 75% of time to be spent underground.
4. A written report of every trip will be handed to the Duty Officer in exchange for a key to the Changing Room. Reports will be despatched to the Editor, via Securicor, weekly.

That should ensure a constant supply of the sort of thing that people want to read about - but seldom manage to submit.

The correction fluid's dried. The coffee's gone cold. The heating's gone off. Reality returns. Ho hum.....

Is there anybody out there?

Dave Edwards

THE RAPE OF SGWD GWLADYS

It is the 23rd September 1983. A fine morning, low mist, it's early. We set off to Gwladys. We take the footpath from Pont Nedd Fechan. We try to forget the large concrete wall; the gate with its bright-red 'Sgwd Gwladys'. We forget the wooden board advertising the local beauty-spot. We forget the concrete walls and the seats every fifty yards. We forget the culverts, the drainage, the waste, the piles of sand and the many small bridges. We forget the picnic tables; the green, tin-can hut. We forget the chopped-down trees used to build the little wooden ranch. We forget the litter, the assortment of tin-cans and the bottles. The last straw that we can't forget is the 'viewpoint balcony' with its seat and its iron railings.

So you've never been there? Why not try it? If, when you get there, you feel like bursting into tears and screaming 'Bastards' at the top of your voice, you will know exactly how I feel this morning!

This poem was taken from the Information Board at Pont Nedd Fechan. The workmen are sponsored by the Neath Development Agency on behalf of the Manpower Services Commission.

The Workmans Poem

1. This path we started in wind and rain
by local men who're employed again.
River banks we did restore,
trees and bushes cleared galore.
2. Drains were dug for paths to dry,
new paths were cut for you to try.
Stone walls were built as you can see,
this adds more to the scenery.
3. Picnic tables on which to eat,
even a barbecue to grill your meat.
Seats to rest along the way,
all this and no money to pay.
4. These we made for you to enjoy,
please we ask use n don't destroy.
Give us all a nice surprise
and don't our work vandalise.

If you know Sgwd Gwladys well, pay it a visit now. Tell me your opinion on the improvements which have appeared over the last month.

Who are the vandals? Is Porth-yr-Ogof next? Will all the valleys suffer this fate?

Bob Peat

MICROCHARGE BLASTING IN CAVE RESCUE

The following article is the text of a paper given by the author at the National Cave Rescue Conference held at Settle in May 1983.

Scope of Article:

1. To describe the essentials of the microcharge technique.
2. To suggest possible cave rescue applications for the technique.
3. To describe some recent experimental work.
4. To outline problems met and to indicate areas needing further work.

General Background

Many of us who have explosives certificates have 'Cave Rescue' use mentioned on them. Indeed, we may use this to justify the certificate. But can we really contemplate conventional caver-type blasting operations during more than the very exceptional rescue?

1. The microcharge technique.

- (a) Definition and description of a microcharge.

Definition: A microcharge is an explosive charge of less than 20g mass, placed in a shot-hole less than 13mm in dia.

Description: A small hole (typically 9mm dia x 60mm deep) is drilled and charged with a high-velocity, high-strength explosive (e.g. Plaster Gelignite). The charge is fired by a detonator at the mouth of the hole, or further in, surrounded with mud. (See Figures 1 and 2)

- (b) Brief description of conventional blasting methods for comparison.

- (i) Plaster blasting.

A charge of high-velocity, high-strength explosive is placed on the surface of the target rock and fired. The explosive may be covered with a mud cap. In cave digs, the size of this charge is in the range 50g to 500g.

The shortcomings of this method include:

- considerable fume production
- considerable air blast shock
- a minimal effect when applied to solid walls.

The reasons for the poor performance of plaster charges are:

- poor confinement results in lateral energy loss
- poor contact with the rock results in poor energy transfer
- the direction of the shock wave in solid rock is away from the free face.

In simple terms, the vast bulk of the available energy goes to waste in producing undesirable air-shock and incomplete chemical reactions contribute to excessive fume production.

- (ii) Conventional shothole blasting.

A hole, 25mm or more in diameter, is drilled to the middle of a boulder or to the required depth in solid rock. The hole is partly filled with explosive and partly filled with sand stemming. This is an excellent technique making very efficient use of the explosive. If much solid rock is to be removed, it is the method of choice.

The main problems are:-

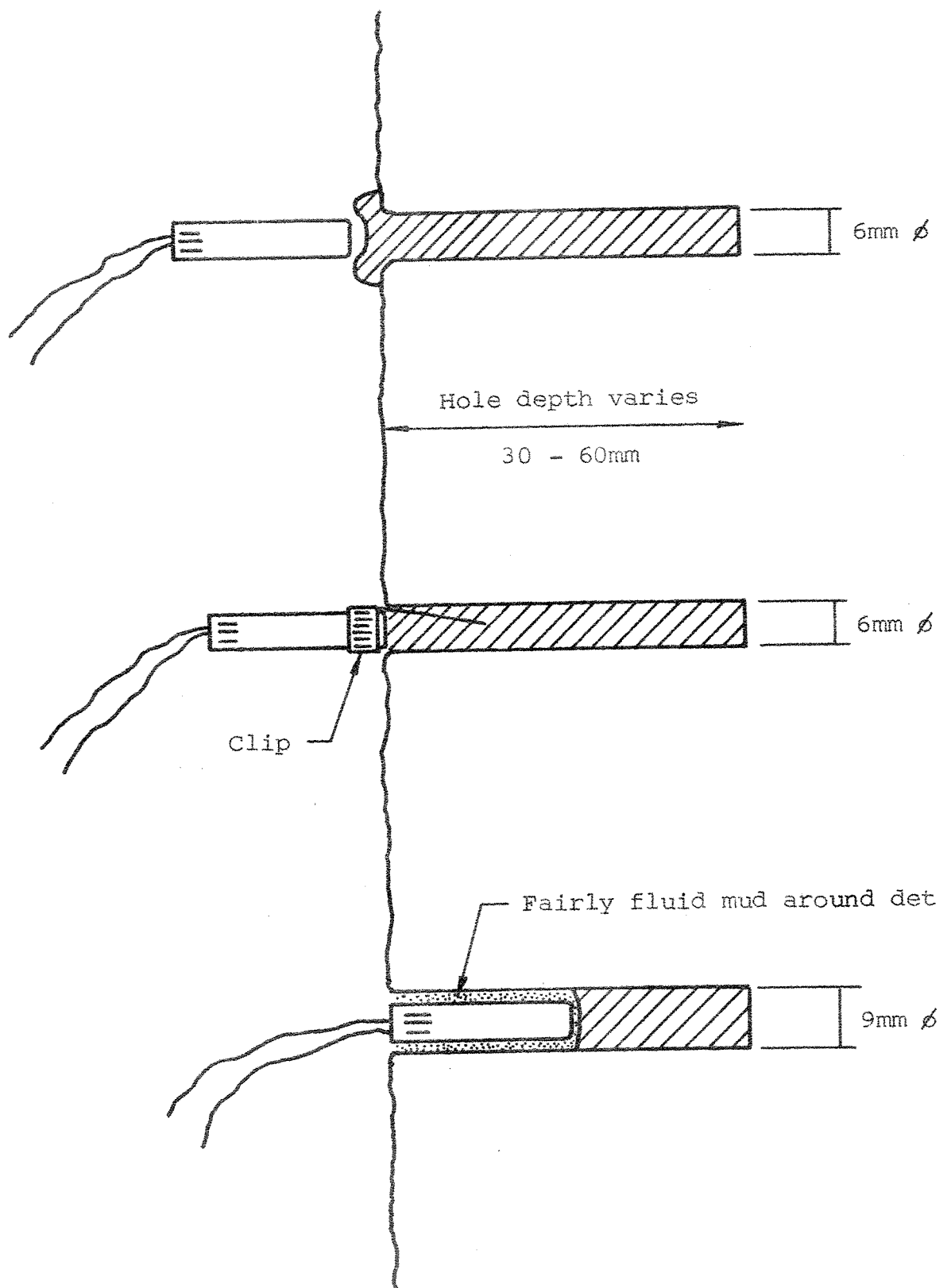


Figure 1.
Microcharge Arrangements
(Cross Sections)

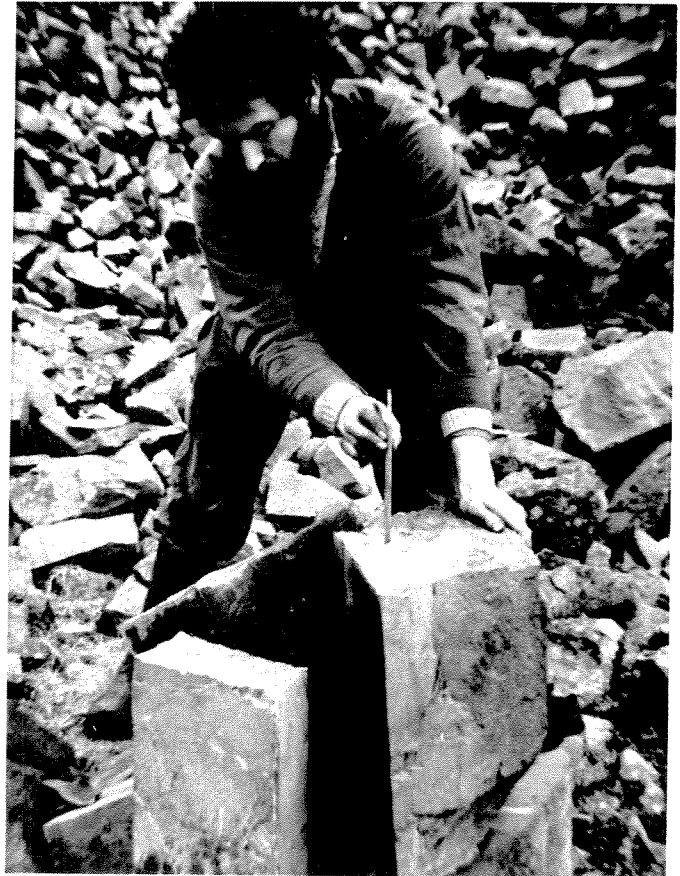


Figure 2.
Loading and firing of a microcharge in a boulder.

- The drilling requires an external power source or a rather slow hand method.
- The drilling method may not be safe when applied to unstable rocks.
- Large diameter holes lead to the use of charges larger than are necessary to achieve the required fragmentation.

(iii) Shaped charges.

The principal purpose of shaped charges is to 'drill' holes which can then be charged and fired.

The problems are considerable. Their use for cave rescue must be limited by the considerable fume problem coupled with extreme blast and shrapnel risks.

(c) An explanation of the workings of a microcharge.

- (i) Because the explosive is pressed into the hole, which has clean, smooth sides, excellent contact with the rock is obtained. This gives improved energy transfer.
- (ii) The hole provides confinement giving lower lateral-energy losses. The theory of this is complex but the result is increased impulse against the rock.
- (iii) Confinement helps to maintain a high velocity of detonation. (It must be admitted however, that the small diameter does reduce velocity of detonation. I have no data on the relative importance of the two conflicting factors for plaster gelatine.)
- (iv) The hole does not provide significant advantage from the secondary, expansive stage of the explosion in the way a deep, conventional hole would.

2. Possible applications for microcharge blasting in cave rescue.

This idea was tried because we were well aware that in rescue work the likely urgency of the situation, coupled with the fact that a victim could be trapped close at hand, would limit the scope for blasting by conventional methods. The twin problems of blast and fume are just too serious.

We see microcharges as possible aids:

- (i) To enlarge an area to permit evacuation of a patient. Repeated charges could be fired over a period of a few hours without producing excessive amounts of fume.
- (ii) To free the victim of a collapse of boulders, even to the point of blasting a boulder adjacent to the victim.

The latter potential required us to conduct experiments into the following potential hazards:

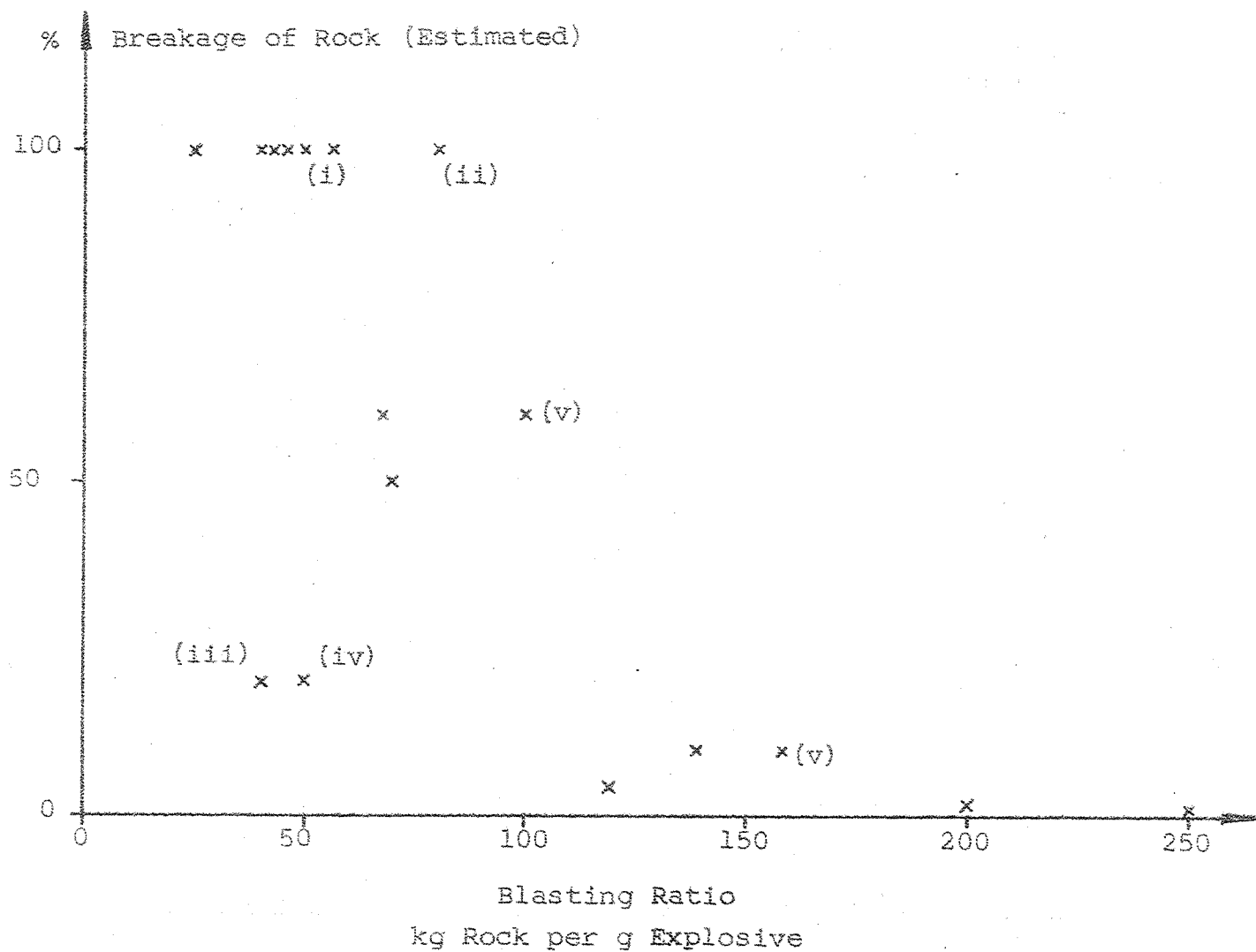
- (i) The shrapnel from the detonator.
- (ii) Flying rock fragments.
- (iii) Air-blast shock
- (iv) Fumes.

3. Experimental Work

A total of about 60 test shots have been fired to test microcharges applied to boulders and solid rock, and to provide safety and comparison information.

(a) Boulder blasting tests.

Some typical results:



Notes:-

- (i) - Large Lumps
- Hole half charged and stemmed
- (ii) - Large Lumps
- (iii) - Could be 'unscrewed' more
- (iv) - Strong joint plane limited effect
- (v) - Hole half charged and stemmed

Figure 3. Summary of Boulder Blasting Results

Early trial	2g : Hole $\varnothing 7$ x 30mm : BR 140
" "	3g : Hole $\varnothing 7$ x 50mm : BR 80
" "	4g : Hole $\varnothing 11$ x 28mm : BR 70

Also two further tests of larger blocks.

Our results are best summarised by a graphical plot (See Fig. 3). Blasting ratio (BR) is the ratio of rock (target mass) to charge mass. Typical results are shown by the lower two pictures in Fig. 2.

Conclusions:

- (i) Useful results can be expected at blasting ratios of no more than about 50kg/g.
- (ii) Strong joint planes can 'protect' parts of a rock.
- (iii) Provisional results suggest that a somewhat deeper hole, allowing the det to sit in mud in the outer part, can be used to raise the effective BR to 60 or 70. Time is lost drilling the extra 30mm but may reduce air shock somewhat.
- (iv) In some circumstances it may be better to take two 'bites' at a target. Repeated 2g shots may produce more effect than a single 4g shot.
- (v) Results obtained in recent tests on Yorkshire limestone are not shown in Figure 3. These results are somewhat less encouraging and point to the need for further test shots in a variety of rock types.

(b) Solid rock blasting tests.

The pictures in Figure 4 show typical results. These results are not so encouraging, but the ability to remove the odd 100mm here and there, particularly on corners, could still be important.

Conclusions:

- (i) When no free face is near, a crater no deeper than the hole and about five times as wide may be expected.
- (ii) A deeper, half-charged hole produces the same blasting effect with reduced air shock.
- (iii) As might be expected, better results are obtained when a free face exists near the hole.

(c) Safety and comparison tests.

To establish the risks involved if blasting were to be undertaken close to a victim, a number of test firings were made. These included investigations into the effects of detonators on various materials.

(i) Detonator debris tests.

These tests were carried out to determine what protection was needed against the metal fragments produced by a naked detonator. Figure 5 shows some results.

The conclusions are:-

- A detonator produces a very penetrating axial jet.
- Conveyor belting can provide protection from detonator debris when the det lies parallel to the belting.
- Wetsuits and woolies provide no protection from detonator debris.

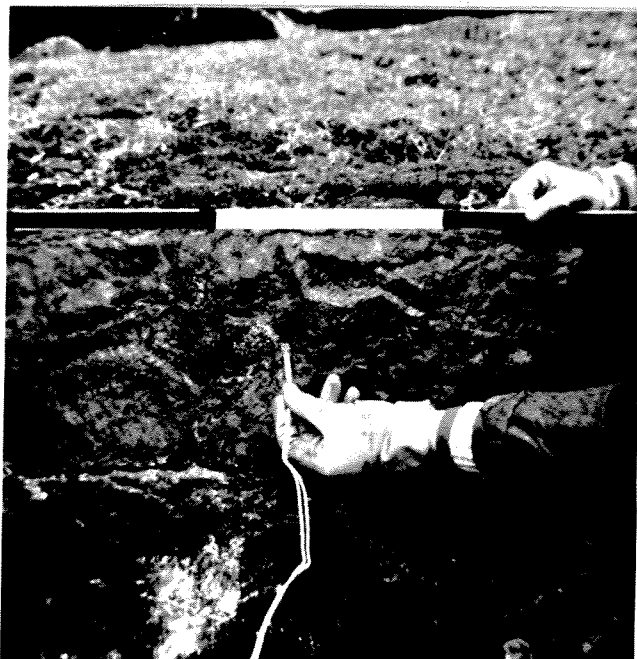
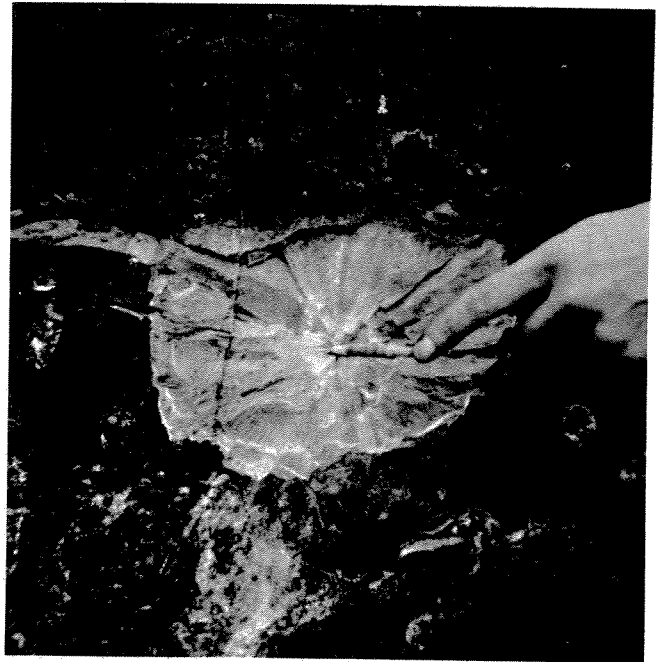
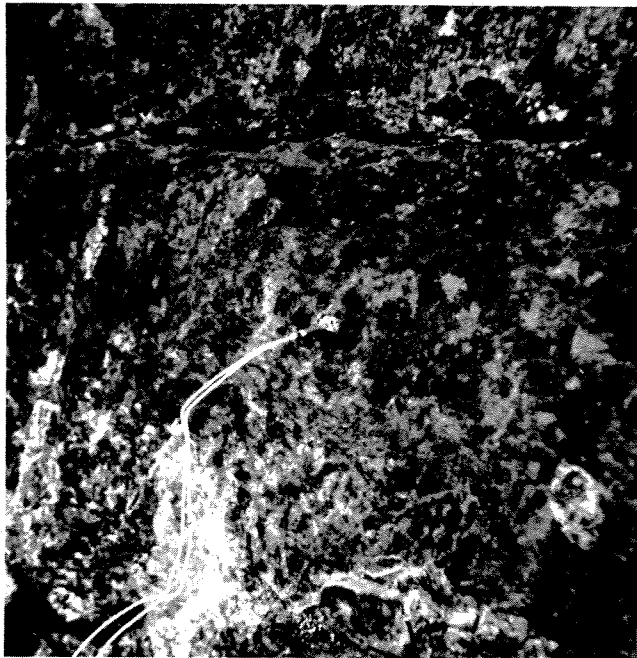


Figure 4. Microcharge in solid rock - Upper:- On a flat face
- Lower:- Near a corner

(ii) Boulder blasting near a 'victim' - surface tests.

Several test shots were fired as illustrated in the picture on Page 12. Ear defenders are essential. No discomfort was experienced during the tests.

(iii) Boulder blasting near a 'victim' - underground test.

One test was fired using 3g of plaster gelignite in a ϕ 9mm shot hole, 300mm from the subject's feet. The subject lay alongside the boulder, squeezed against the wall and under a low roof; i.e. the area was locally confined. The boulder was well broken (BR = 50kg/g) and no problem was experienced with debris, blast or fume.

(iv) Solid rock blasting near a 'victim' - underground test.

One test was fired using 7g of plaster gelignite in a \varnothing 9mm hole, 1500mm from the subject's head. Conveyor belting was used as armour. The subject lay on the floor of a passage some 2400mm high and about 700mm wide. A crater was produced in the solid wall. Some ricochet debris caused trivial facial injury. The blast was uncomfortable but not (apparently) injurious. The fumes were acceptable and soon cleared although there was no discernable draught in the passage.

Conclusions from 'near victim' tests:

- A microcharge can be detonated within 500mm of a person wearing ear defenders who is suitably armoured.
- The author would not, on the basis of these preliminary tests, use a charge of more than 4g in a confined passage or choke within 1m of a person's head.
- The above conclusions are not statements of what is necessarily safe, nor should it be assumed that smaller charges or greater distances would be safe in all situations.

(v) Miscellaneous Tests.

Tests have been conducted to compare small (5g, 10g) plaster shots to microcharges. Effects are fair at BR of less than 20kg/g, but air shock is greater than required.

Tests have been fired using a phlegmatised P.E.T.N. paste (similar to military PE4 in texture). This is a more powerful explosive than plaster gelignite but no significant improvement has been noted.

A test firing of 10g of plaster gelignite as a plaster shot, in a confined spot underground, produced fumes too thick and acid to be tolerated 30 seconds after the shot.

4. Unresolved problems and further work.

(a) Hole drilling is the 'bottleneck'.

We have tried:

- Hand - Rawl drill
- Rawl machine
- Redheads
- Power - Cordless drill (Makita 6mm)
- 12V cheapo with hammer action
- Home brew motorised set

None have been totally satisfactory. A quick, compact, portable device requiring a fairly low drilling pressure is required.

(b) General Safety.

I have some reservations about the safety of ramming 'naked' gelignite into holes. Very considerable shear forces can result and gelignite can 'toothpaste' out of the hole past the stemming rod!

(c) Blasting near people.

A search of medical literature has been started and an attempt will be made to scale existing knowledge to the cave situation. I hope to be able to conduct further experiments without having to be a guinea pig!



Picture of the author blowing himself up!!

(d) Plaster blasting.

This is open to improvement if charge/rock contact can be improved and if good confinement can be obtained. Careful design and construction of prefabricated plaster charges could pay dividends. There is also scope for experiment with improved charge formulations giving superior contact with the rock.

Acknowledgements

The many SWCC Members who carried, drilled, machined and assisted.
Clive Jones - Ideas.
Roger Bryan - Chemist.
Pete Cardy and Steve West - Photography.
Barbara Hall and her staff at Dewsbury Tech for library services.
C.U. Insurance for not loading my life insurance!

Bob Hall

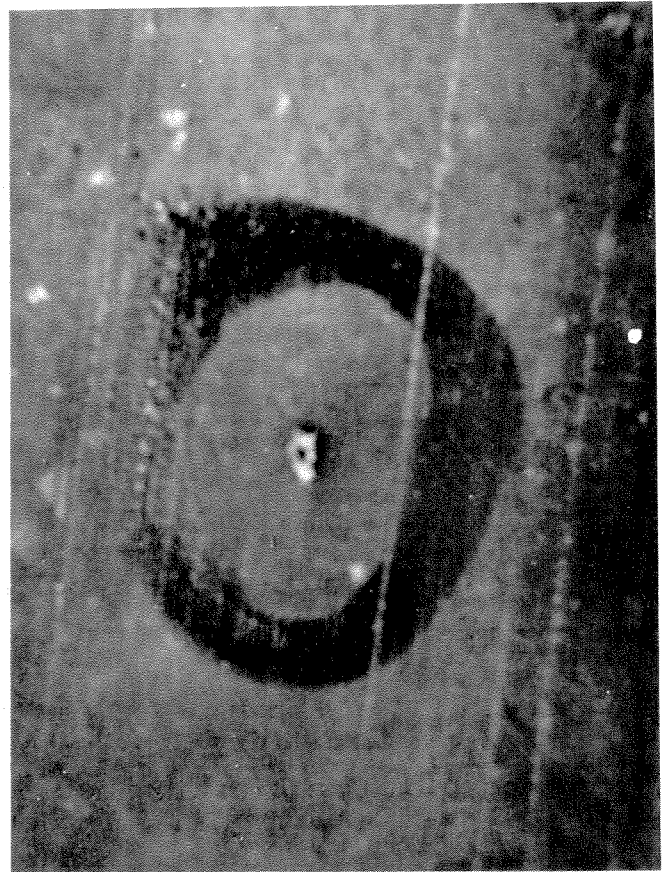
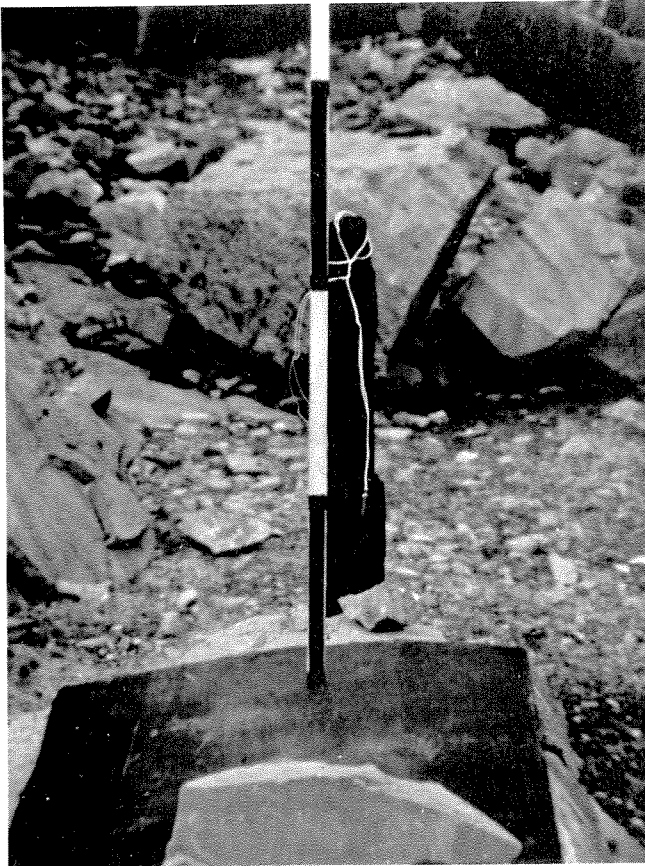
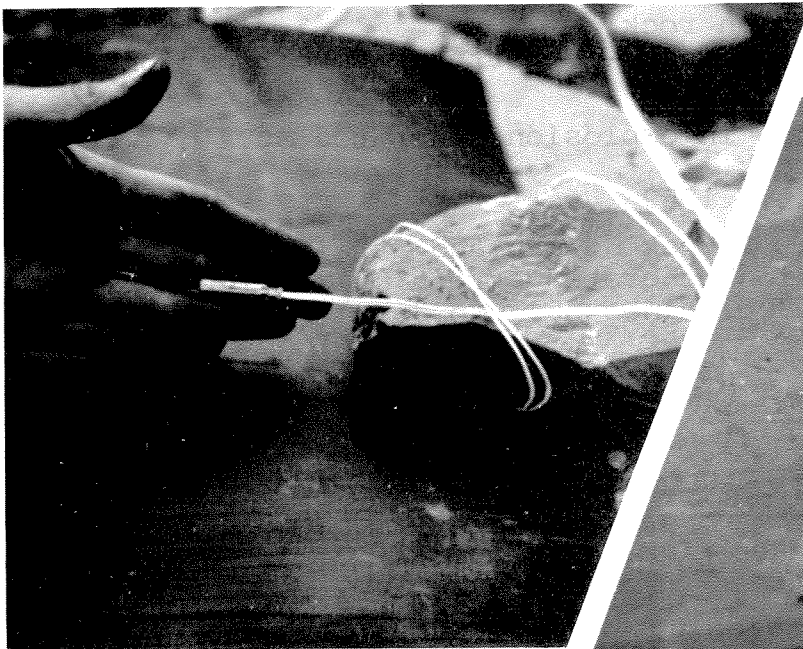


Figure 5. Testing the effect of dets on conveyor belting.



Upper:- Axially
Lower:- Parallel



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OGOF DIWEDD YR ENFYS

Situated on the eastern side of the Upper Twrch valley (796.191), the entrance to this cave was re-opened by Nelson Goodwin and myself in May 1981 after two hours digging. Approximately 500ft of streamway led to a low, wide bedding-plane where the stream could be seen flowing tantalisingly onwards. Further digging was obviously required but the prospects looked good. We left the cave feeling satisfied but also a little intrigued because it was clear that our visit was not the first. Evidence for this came in the form of the remains of shoring in the entrance and footprints at several points within the cave. No mention of the cave could be found in any of the old SWCC logbooks or Newsletters, and none of the older Members had heard of it. An appeal for any information was published in 'Caves and Caving' but this elicited no response and the identity of the original discoverers remains a mystery.

Bad weather prevented a return being made for nearly three weeks - a most frustrating wait. Martyn Farr was recruited in order to push the tight bedding and 'Little' Richard Jones came along as well. Martyn became totally jammed for fifteen minutes but was eventually able to force his way on for another 10ft. He could see a duck ahead but decided against proceeding further without a wetsuit hood.

A month later, feeling refreshed after a holiday in Cornwall, I returned with Little Richard and Chas Jay. Richard was sent across the bedding-plane to the point reached by Martyn, where he was able to turn around. We then spent one and a half miserable hours lying flat-out in water, digging from either side. Upon returning to Chas, who had waited patiently in a dry chamber, Richard was shivering so badly that he was unable to open a chocolate biscuit. He therefore left the cave whilst I went back to retrieve the digging gear and to see if the passage really was large enough for normal-sized people. It was, but the duck looked grim and was left for another time.

This came the following week when I was back with Nelson, who boldly passed the duck without further digging. After a good deal of the floor was cleared out from the far side, I was able to get through and join him. The way on was open and we set off into the unknown. Nelson was on an adrenalin-fired high and there was no keeping up with him. "Far out, man - better than drugs", was all that could be heard from somewhere ahead! The stream soon disappeared down narrow rifts, the passage continuing as a dry, sandy crawl. A small inlet entered from the right, and two muddy blockages had to be dug through using our hands as trowels. The passage had just opened up again when we came to an abrupt halt - Nelson had tried to force a ridiculously tight squeeze and had got himself completely stuck. Ten minutes was spent removing the floor from beneath his legs and hips until he was able to reverse out. One quick look convinced me that this was as far as we were going to get without extensive digging. Disappointed, we turned around and set off out. Some of the squeezes were very awkward as they were uphill and the duck seemed even tighter than on the way in. An estimated 400-500ft of new passage had been explored and our only regrets were that it had not been larger and more pleasant. Prospects at the end were far from hopeless however, and we were encouraged by the strong, inward draught that we had felt whilst coming out of the cave.

The next couple of trips came as something of an anti-climax following this relatively easy breakthrough. At the end of July, Liam Kealey and I spent a few hours digging at the end while Haydn Rees single-handedly built a superb drystone wall in order to stabilise the entrance. The final trip of 1981 took place at the end of August when I managed to persuade the two smallest midgets I know to have a go at the terminal squeeze. Neither Little Richard nor Steve West were able to get through, but we did do some worthwhile digging.

Lack of enthusiasm meant that the end of the cave remained unvisited for almost a full year. The duck had silted up over the winter and it took Nelson nearly forty minutes to get through; half this time being spent jammed by his chest, with his head on the other side and the rest of his body submerged. A further fifteen minutes digging was required before Mike Hopkins and I could follow. This delay, combined with the presence of froth on the roof of most of the normally dry passage beyond the duck and a dubious weather forecast, meant that we did not have long to spend at the end of the cave. Nelson was once again voted 'thin man' and was sent into the final squeeze. Despite being impressed with the increase in passage size since his last visit, he was unable to get into the small chamber which can be seen beyond. This was probably due to his sobering experience in the duck and the ever-present thought of being stuck with the water rising around him. We therefore left it until a suicidal dwarf could be found and made our way out to find it raining back on the surface.

A mere fifty-three weeks passed before I was back, this time with Clive 'Oxfam' Gardener. The weather forecast was for possible thundery showers later in the day but Clive was so enthusiastic that the trip was bound to go ahead. The Giedd river was bone-dry and no water was flowing down the fenced collapse. Water levels in the cave were the lowest that I had seen them but it was still an unpleasant task digging out the duck again. Clive had a couple of good attempts at the squeeze and managed to get his head and shoulders into the 'chamber'. It was solidly choked at one side and he was 90% certain that it did not go in the other direction either. To proceed any further would have made reversing out practically impossible - he experienced the utmost difficulty as it was. Some time was then spent digging out the floor of another chamber where the draught disappears into a very low bedding. This bedding now seems likely to provide the main way on and it is hoped that it will be possible to undertake a concentrated series of 'banging' trips this summer. We left the cave three and a half hours after entering to be greeted by a massive electrical storm. We had to follow an extremely circuitous route back in order to avoid the lightning and we spent over an hour holed-up in the bothy at Sinc-y-Giedd. During this time we were fortunate to witness a memorable event - a huge flood pulse flowed down the Giedd in the form of a miniature tidal wave. We actually ran along beside it until the water began sinking at the cliff-face and within minutes the river was transformed into a raging torrent, 2-3ft deep. This was after less than three hours heavy rain - had we still been down Enfys at this time we would most certainly have drowned. As it was we were merely faced with the prospect of a long, miserable walk back, having to head towards Cribarth because lightning was still striking the ground along the normal route.

So there it stands - roughly 1,000 feet of cave with good prospects at the end for anyone dedicated enough to persevere. The desination of the water is still unknown and it is hoped to perform a successful dye-test during the winter. My personal view is that the water will drain to Frwd-Las, a large resurgence two miles lower down the valley. If this is the case, it should meet up with the water from Carreg-yr-Ogof and a major cave-system is likely.

The fact that I have been on every trip up to now derives from necessity and not personal choice. Any Members of the Club are welcome to have a trip down at any time. The cave is open to anyone willing to undertake the four mile walk to the entrance. A gate has not been fitted and will not be in the future, no matter what is found.

The entrance slope is still rather loose and should be treated with respect. A wetsuit is essential, and a hood is very useful for passing the duck. The weather is the over-riding factor when planning a visit to the cave and a sudden flood would have lethal consequences for anyone beyond the duck.

Lastly, please write up any trips in the Logbook at Penwyllt so that future explorers will know who has been where before them.

Nig Rogers

A HOLIDAY IN SPAIN - S.W.C.C. ON TRESVISO '83

"We get the 'bus from Santander to Bilbao, then on to Tresviso", said Simon Edwards as he, Rob Parker and I sat in the Plymouth Coach Station. Simon knew where to go. He had instructions.

"Bilbao is EAST from Santander though, isn't it Si?", one of us said. "Oh yeah", he replied confidently, "Santander, Bilbao, Pyrenees."

"But I thought Tresviso was in the Picos de Europa!", came the choked response, as our confidence in ever reaching the tiny mountain-village, let alone the White House, slipped a little more.

The following day, having reached the ferry terminal - by some strange twist of fate, before the ferry actually departed - our luck was in. In the crowded building a caving helmet strapped to a rucksack was spied - and so we met Martin. Martin was a member of L.U.S.S., our hosts at the White House. He knew where to go. He had instructions.

Thus, after a 24 hour ferry ride, a day in sunny Santander and a three hour 'bus ride, we found ourselves on the path past the hydro-electric power-station heading finally for Tresviso. Tresviso is a small village about 3,000ft up in the Eastern Massif of the Picos de Europa. The White House, our home for the next three weeks, was 3000ft higher again. So, with our rucksacks on our backs, we started up the 5,000ft ascent. The 'sacks were a story in themselves: suffice to say that they couldn't be put on without sitting down - and once on, standing became impossible. Rob's weighed in at over 100lbs. Finding ourselves waylaid at a bar in Tresviso, by wine at five pence per glass, we spent a wet night there before resuming our journey. In the race for the White House, Rob and Simon broke all the records and passed the tape neck and neck, whilst I followed a slow third with Martin not seen until later that afternoon.

At the disused, white-washed miners' hut we met the men of L.U.S.S. and M.U.S.S. Our leader, Howard Jones (or 'H' as he is affectionately known), Ross Schlick (American), Mike Averson, Rich Barker and Pete Hartley. Four others who were underground, and had been for three days, were expected out at any time.

The cave in question was '56': awkward, strenuous, cold, muddy, and deep. This was L.U.S.S.'s third season in the hole, out of eight years of visiting this area of the Picos. In that time they had explored many caves - Sara, Tera, (both nearly 800m), Flowerpot, and others including the 10km resurgence, Cueva del Agua, to which '56' drained 1600m below its entrance. This year, hopes of reaching the magical 1,000m mark were high - last year's limit being -817m. The cave was now so deep that a camp was required at a depth of 650m in the warm, dry, Dripping Blood passage. It could support four cavers and consisted of hammocks, sleeping bags, Goretex outer bags, dry wooly bears, balaclavas, socks and gloves; plus cooking equipment and a handy water supply. Absolute luxury to a wet, cold, caver.

That evening, Steve Foster returned from the fray with news of ducks, rifts and impassable slots. There was however, a high-level continuation at -720m, over the top of a previous pitch. This was now being pushed by Dave Checkley and two Spaniards, Huanjo and Chicha. The pushing trip set for the following day was on, with one spare place for the newly arrived. Rob, Simon and I drew straws for the privilege - Parker won. Simon and I were to help carry their food to Humbug Hall, through the Slasher (not a nice bit of cave).

So, wearing our bright, shiny, new SRT gear, we set off into the depths. A 45 minute walk led to the shakehole. At the bottom of this a 10ft passage led to the first pitch - 400 fearful, tense, strenuous feet; with two bolt passes. And this was the easy bit, going down. A crawl, followed by a 160ft pitch, and the fun was over. The Slasher was

all that it was made out to be - on a scale of one to ten. A thin, meandering, effing awful passage; only wide enough to pass at 20ft above the stream; no foot holds and 'don't drop that bag 'cos you won't get it back!' After that came Bonies Cafe, the Maze and Humbug Hall some hours later. Here, a brew kit was on hand so I volunteered to make a cup for the crew. "Where's the matches? We've forgotten the matches." I cursed and noticed that, in the light of my expedition carbide lamp, everyone started to snigger. Simon and I left the others to continue on in and started our return journey. Having just remembered how to abseil, we now had to work out this prussicking lark. Are you sure this is a chest tape? Which way up do the jammers go? And we weren't too hot with the carbides either! Twelve hours after leaving daylight we were back at the bottom of the entrance pitch, light failing fast. I got out on a quarter light and Simon completed the whole pitch in total darkness. To cap it all, without light we couldn't navigate back down the mountain on the moonless night and so spent a cold few hours sleeping on a sharp stone or two.

Meanwhile, Rob's pushing trip was going well. After a night at camp, the four had gone on a 24 hour pushing bonanza - adding a further 200m to the depth of the cave. They reappeared three days later, babbling of depth approaching 1,150m.

My turn at camp, with Steve Foster as expedition primadonna to lead the way. The other two campers were Ross baby - on his 17th caving trip ever - and the recently arrived Mark Sefton. Foster set a reasonable pace and we both reached Dripping Blood by early evening. Settling down for a cozy night's sleep, we knew that the other two would be slower - when they still hadn't arrived by the following morning, we got just a little worried. They eventually arrived after a 20 hour trip! The Crumbles had proved crumbly and the Wrectum an asshole. That to one side, Steve and I now set off on the Big One. The cave at 1,150m, still going, and us armed with 300m of rope plus all the bolts, hangers and belays we could muster. Watch out Jean Bernard!

The cave beyond the camp could actually be described as pleasant. Nice formations and big, free-hanging pitches; until, that was, -1,000m was reached. A muddy crawl led to the Ramp - a 60 degree, 180m, very wet, cold, horrible pit. Previous exploration had been stopped, by a lack of gear only, at the bottom of this ramp. We started rigging; pitch, chamber, rift, pitch, chamber: Steve bolting whilst I sorted tackle. The third pitch stopped us. A twenty-foot diameter shaft sank straight into water in an impersonation of Epos Chasm. No question of a duck or nearby bypass, this was a dark, deep, sump - and after only an extra 30m too. The cave surveyed, and another pitch checked with no joy, we derigged the first few pitches and headed for camp.

The following day was spent taking photographs, while Mark and Ross had another epic - derigging the ramp. Ross ended up derigging it alone and returned to camp after 24 hours.

Steve and I headed for surface on the fourth day, thinking of the mine full of beer and wine awaiting us. That evening, as we slowly got wrecked at the White House, the final depth was calculated to be 1,169m: the deepest cave ever explored by a British group, and tenth deepest in the world.

However, there was still 1,800m of rope in the cave. Rob and Simon, helped by Martin and a MUSS lass - Andrea - set off. Howard, Steve, Mike and I followed two days later to meet them above the Wrectum with all the gear. Another four days of camps and day trips had all the gear to the entrance pitch, during which time Rob had brought six bags through the Slasher on one trip and on another, Simon hauled the eighteen bags of tackle up a 160ft pitch alone.

We finished detackling on a damp Sunday morning and left the White House that same afternoon. Another year must now pass before the team can return to reveal a few more of the secrets that '56' holds. Who knows where these will lead - maybe to Cueva del Agua!

Julian Walker

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DAYLIGHT CAVING

The delights of daylight caving, otherwise known as 'canyoning', are known only to those members of the caving fraternity lucky enough to live in Sydney, Australia. The caves within a reasonable weekend drive from Sydney are not large or numerous and in recent years, attention has turned to the river canyons of the Blue Mountains, only two to three hours drive west of the city. A river is followed from the canyon head until a suitable exit point is reached, possibly some miles downstream. Waterfalls are negotiated by abseiling on doubled rope. Often it is necessary to swim across deep pools, and many short climbs or boulder obstacles present themselves - in short, it's caving in daylight, and hopefully under a clear-blue Australian sky!

One sunny weekend, four of us headed for the Blue Mountains and Davies Canyon. The car was left at the end of an old logging road, many miles from any habitation. T-shirts, shorts and training shoes are the standard gear; with rucksacks full of rope, abseiling gear, jumpers, sleeping bags and food - the latter items carefully wrapped in poly-bags. We set off to reach the head of the canyon through very thick bush with absolutely no tracks except wombat trails (saw no wombats unfortunately although I did disturb a 4½ft poisonous Black Snake). Thanks to Tony White's expert mapwork we reached the river just above the first pitch which required both ropes, knotted together and rigged to hang dry down to one side of the waterfall.

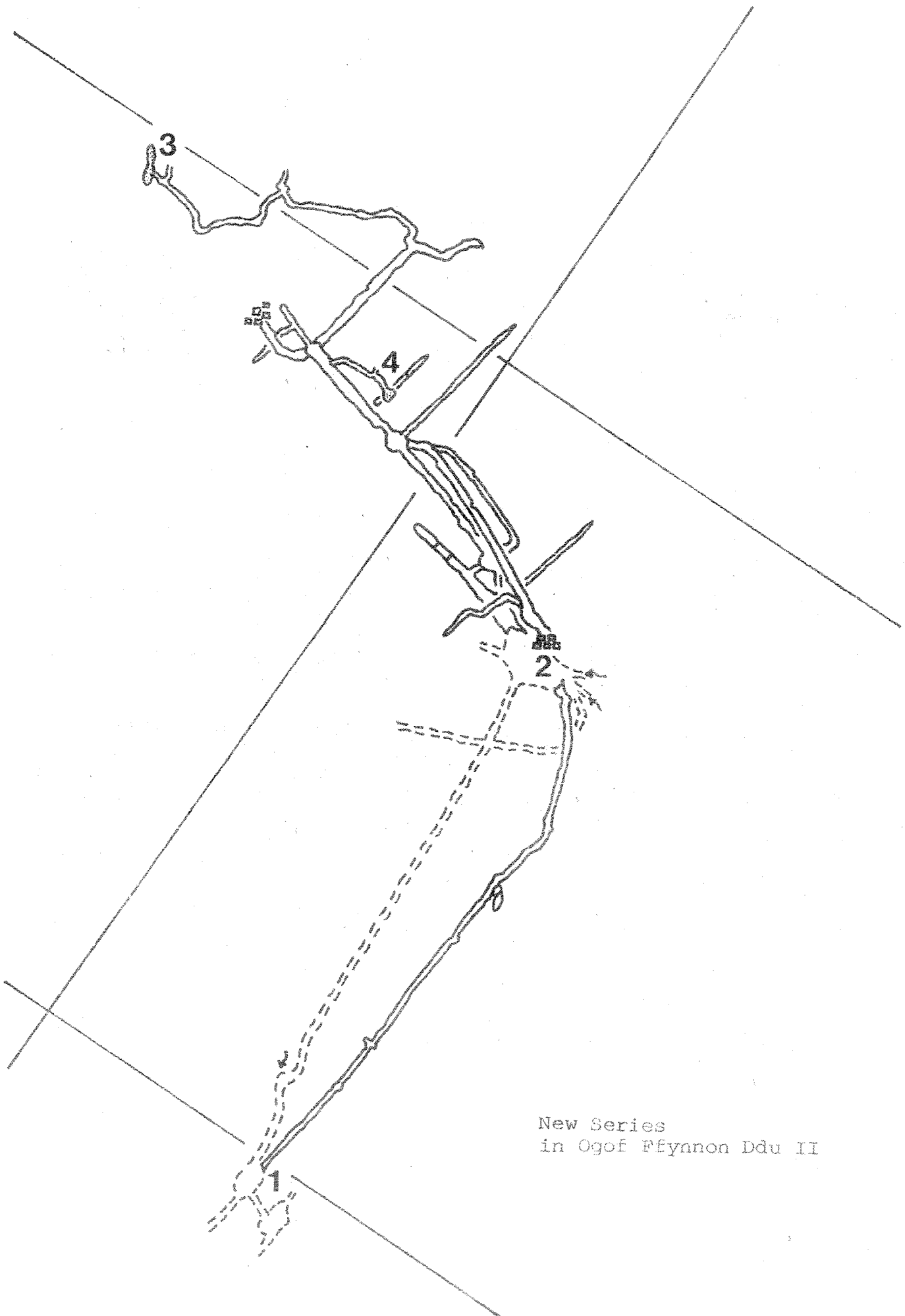
Bas and then Hester (both Chelsea CC exiles) descended while I looked down the 150ft drop and reflected that my previous longest abseil was 30ft. Eventually I persuaded myself to go over the edge and of course it's fun when you get going, especially the plunge into the pool and the swim at the bottom. Two more long pitches followed, with swims at the foot of each, then a couple of hours hard 'caving' in the river bed until a grassy island was reached, just as it got dark. A big fire was built, tea brewed, steaks barbecued.....

Next day saw us negotiate I think nine or ten more pitches, some wet and some not, though none more than 60ft high. A party led by Julia James had visited Davies Canyon a few weeks previously (only the third or fourth party to do so) and on a couple of pitches had placed bolts where no trees were handy for belays.

Eventually we turned off the main river and began to climb out of the canyon, up the steep valley side through thick bush - it was necessary to wear nylon overtrousers and cag to protect legs and arms, pretty sweaty! It took a couple more hours of bush-whacking to reach the car and the warm beer awaiting us - at which point I discovered the leeches in my socks and bled profusely most of the way back to Sydney.

Canyoning is such a new sport that there are many canyons still completely unvisited. The mountains are covered in extremely dense bush, there are few access roads and not a great number of enthusiasts, hence the challenge presented includes original exploration as well as excellent sport.

Kitty Hall



New Series
in Ogof Ffynnon Ddu II

A NEW SERIES IN OGOF FFYNNON DDU II

During August Bank Holiday week, 1983, a new section of cave measuring an estimated 1300ft was entered, bringing a successful conclusion to a rather protracted bolting project.

New ground was actually reached six weeks previously (see 1 on survey) with the discovery of 200ft of vadose passage which abruptly terminated 70ft above a large chamber. Natural thoughts of 'Caverns measureless to man' were tempered with the realisation that the chamber was in fact one already on the survey at the top of Splash Inlet: however, a continuation could be seen 30ft away and 20ft higher on the other side. (See 2).

My nerve gave way at that point, but luckily Paul wasn't to be daunted and after a good traverse/bolt/abseil, he free-climbed a slippery calcite slope to reach the inviting black space. While I stood fidgeting and twitching on the traverse, Paul went off to investigate. First reports were not hopeful with "It goes to a small chamber with no way on", but after a short while he returned saying that it looked like there may be a continuation. Time was running short however and we had to head out.

That was how it was left until August Bank Holiday week, with a rope hanging down into the chamber at the top of Splash Inlet and 'fair game' for anyone who found it. A discrete silence was maintained.

Rob Parker and I went back in during the week and, after a quick prussick, climbed straight into large passage varying between 5 to 10ft wide and 10 to 30ft high. It is always a magical experience to look on cave that no one has ever seen before, even if there are no fabulous formations - just an untouched gravel floor with water-washed, white pebbles in a pool is sufficient to take your breath away. We carefully and slowly traversed our way from boulder to boulder, getting as close to flying as humanly possible.

Unfortunately the main passage soon ended in the mud-choked remains of a sump, much to Rob's relief. If it had been full of water he would have felt compelled to drag in his diving gear and have a go at it.

Back tracking, we estimated length and had a good look at all the crawls and smaller passages off to the sides. One long crawl, not far from the sump, led to two tight and water-washed inlets (see 3) which cannot be far from the surface - there were quite a few dead beetles found nearby. All obvious openings were looked at with two, higher-level, large passages ending in substantial collapses.

Two leads were, however, left until the following Saturday. One, a very tight rift that dropped an estimated 60ft, and the other a crawl that ended in a pitch from which could be heard the sound of a stream.

The rift proved too tight for me to descend, with thoughts of Neil Moss preventing me from ramming myself too firmly into the depths: but the crawl and the pitch? (See 4) The stream was even louder (due to the typically wet weather on the surface), and drawn on by this it proved an easy 30ft climb down.

This led down to yet again another large rift. While I decided to put a bolt in for the ladder, Rob traversed across and slithered down into the depths. Cursing my faint-heartedness I frantically started to bolt as he disappeared, leaving me with the consoling thought that he 'might need the ladder to get out'. I was torn between not wanting him to go too far, and knowing that if he was

gone a long time there could be a lot of passage. Just as I finished and clipped in the ladder, Rob returned. "Well, it goes; but I think someone's been here before." Ah well. I knew that the only place it could be was the Upper Oxbow extension, previously discovered by others. A quick investigation confirmed this, and we marvelled that such an obvious lead-up could be missed. We started to retreat, surveying as we went.

The survey has yet to be completed, so the accompanying plan is from memory only. With this surveyed section, and the Upper Oxbow extension which is now being surveyed by Nick Geh, we should have an estimated 3000 - 4000ft of passage to officially add to the cave - pity we've just bought 1000 new surveys!

My special thanks to Paul Quill, Rob Parker and Mags McLaughlan for help received.

Roddy McLaughlan

ARCHAEOLOGICAL CAVES IN GOWER - OLD AND NEW!

This article deals with the discovery of three new cave archaeological sites in Gower, and evidence that a fourth site is a long way from being cleared out.

Although the Gower cliffs are constantly being searched for caves (explorable or diggable) in the course of other work, mainly concerned with bat conservation, only two of these sites are the result of careful, planned searches armed with a geological textbook in one hand and a first edition 'British Caving' in the other. The other two came about by accident - such is the way of the world.

The first accident happened while I visited the Glamorgan/Gwent Archaeological Trust 'Open Day' at their HQ in Swansea. A chat with one of their duty experts revealed that someone had brought in bones from a Gower cave not long previously, but the bones had been adjudged 'non-archaeological' and thrown away! Only an expert would be fool enough to take such precipitate action and I decided to investigate. Having tracked down the cave I then tracked down the digger to Brynmill, Swansea. Jim Walker and friends had excavated a sand-filled passage in a cave variously known as Cwtch Cave, Ogof Gwyntog and Cunnington's Cave as long ago as 1974. Finding bones at the upper end of their opened tube they religiously took them to the G.G.A.T., only to be told that the bones were of no great interest. They were accorded the fate described above and, who knows, may one day be laboriously excavated from some municipal rubbish dump. What a surprise awaits someone when he finds bones of Bison and the extinct Giant Ox mixed with empty cans of Felinfoel Ale and empty bottles of Fairy Liquid.

Despite this setback, Jim Walker continued digging in the cave for a while (there was a draught but I think that this leads away from the geological part) and retrieved a few more bones. These I was able to examine and I found a nice mixture of mammal bones, bird bones and limpet shells. One impressive bone was a complete, 23cm long, left metacarpus of Bos/Bison. This bone from the front leg is not very diagnostic and both the Bison and the Giant Ox (Bos primigenius) were around in Gower just before and just after the coldest peak of the last glaciation. Its size puts it in the size range for the Ox, but some of the Bison were pretty large as well. One fragment in the collection beat me so I sent it off to the British Museum (Natural History), and the Palaeontology people there said that it was part of the radius of one of these two species. If all that wasn't archaeological, I don't know what is.

The problem now was, how did the bones get into the cave? Jim and friends had dug out quite a lengthy tube to get to the small bone-chamber - about 50ft of crawling using a tin tray on a rope. I calculated that the bones had got in via another entrance, but could this be located on the cliff face? After some searching, by August 1982 I had it. A steep rubble slope comprising angular limestone fragments, strictly speaking a 'head' deposit, higher than the cave was found to contain bone fragments. Among these I was able to identify a left metatarsus fragment, again of Bos/Bison. This is from the back leg. Could there be more bones? I had to wait almost a year, and until bat work took me that way again, to find the answer. Diligent searching in the rubble slope revealed a collection of broken bones coming from some buried source, possibly a cave platform. Among these a calcaneus of the Bos/Bison species and other fragments. Some large pieces were solidly cemented in stalagmite. Was this a collapsed cave entrance? Only a proper excavation and from the surface will prove this; the British Museum has been kept informed.

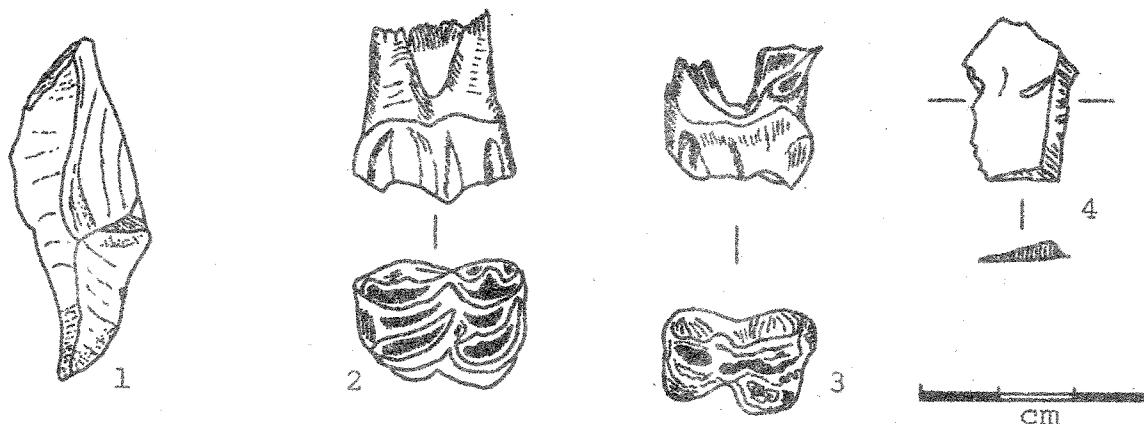
The second accident, resulting as it were in an important find, occurred at Whiteford in north-west Gower. While sheltering in Prissen's Tor cave (also called Spritsail Tor) during a sudden heavy shower, I noticed that the trampling of holidaymakers' feet on the steep, sandy slope below the cave had revealed an underlying layer of stony, red clay. This cave was revealed by quarrying in the last century and excavation had thrown up a range of mammal bones, pottery and some human bones. It was thought that the cave was completely cleared out: but was it? I picked the odd bone fragment, and also some very patinated flint flakes, from the debris. Strange how this flint, once used to slice up meat and hides, might now be cutting into holidaymakers' feet; its condition suggested great age, probably several thousand years BC. Again nothing much happened until Gower suffered a terrible thunderstorm on 7th June 1983. Three weeks later, during a routine patrol on the Whiteford National Nature Reserve, I noticed that the flood of water resulting from the storm had poured down over the old quarry face above the cave, falling as a torrent onto the cave 'platform'. Such a platform must have been present because the July holidaymakers' feet had been at work and a range of mammal species lay revealed. So far, I have identified a premolar of Woolly Rhinoceros, teeth and antler fragments of reindeer, pig, fox, badger and a smallish wolf. There was no hyena, an animal that might have used the cave as its lair and carried in all the other remains. None of this material is stratified but it leads me to believe that the platform and the cave interior could be worth a proper excavation. In the meantime it seems impossible to keep off the trampling feet. Also there is a small problem - if the cave was revealed by quarrying, how did the animals get into it in the first place? Is there a second, undiscovered entrance?

The third cave was discovered during another bat roost check in August 1982. It has been called 'Ogof Arllechwedd', a name descriptive of the very steep slope in front of the cave. A check with J.G.Rutter, author of 'Gower Caves' and 'Prehistoric Gower', has shown that this is a new cave. Entry into the first tiny chamber to collect guano was not possible without some clearance of stones and earth from the passage floor. There is also a strong, indeed violent, draught at times, showing a connection between the lower entrance and another one about 50ft away up the cliff, above the Knave, not far from Paviland. The debris removed was carefully checked and, amazingly, it proved to contain three fragments of pottery. There is a trace of pattern on these and Mr.Rutter agrees that they are probably from the Bronze Age period. Only modern fragmentary bone was found with them and this is quite understandable because badgers use the cave. These clean animals carry bedding material into and out of caves and the process results in some disturbance of surface layers. A good example of this may be seen in 'Badger Cave'

(or Ogof Tudno) on the Great Orme in North Wales. No doubt the pottery was at one time buried more deeply, but badger erosion has brought it nearer the surface. No real excavation has taken place in the cave and it has been left to its tenants, the badger and (possibly) the bats.

Finally, the fourth site was also found as a result of a thorough search on Gower coast for cave-using bats. It lies near Overton, and J.G.Rutter has been to see it in order to confirm that it is a new cave site. The name is 'Rockrose Cave', after the beautiful yellow flower which graces the high cliff early in the summer. Rockrose Cave is situated at about the same altitude, and only a short distance west of, the famous Longhole. My attention was attracted to the site by phreatic solution marks high on the cliff face. There was no way on however, but a low space suggested that bats might be able to fly through. Some of the large stones on the floor were scraped out and a jutting protrusion of limestone in the roof hammered out. Because of the fearsome reputation of Gower caves as archaeological sites, the material on the floor was carefully examined. Human and animal bones were found just in the surface. They are so interesting that a full account follows in which there is a detailed analysis of the human jaw fragment.

A full consideration of the human and animal remains forces one to the conclusion that the animal remains do not necessarily represent an archaeological deposit, since all could have been carried into the cave either by fox or nesting sea and cliff birds. However, the sheep remains are comparatively sparse considering the number of sheep which are found grazing in the vicinity of the cave at certain times of the year. Also, the human remains suggest that part of the cave is archaeological as in all probability they represent an inhumation in the cave. For the human bones to have been found in the surface layer, the inhumation must be at no great depth. It is therefore suggested that the cave deposits are potentially of great archaeological interest, the animal remains may be of considerable antiquity since the matrix containing them filled the cave practically to its ceiling, and the two human bones are the forerunner of one or more inhumations which can only be revealed by full excavation.



Prissen's Tor Cave

1. Patinated flint flake showing signs of use.
2. Right mandibular molar of Reindeer (*Rangifer tarandus*).
3. Maxillary premolar with broken cusp; Reindeer or *Bos* sp.
4. Patinated flint waste flake.

Rockrose Cave, Gower - Identification of Human and Animal Bones.

Human: Two human bones were identified in the collection, a mandible fragment and a phalange. The mandible is from the left side of the jaw and is 63mm long; none of the teeth have survived in it. In the case of the lateral incisor, a portion of the upper half of the alveolus survives and the bone is fractured at an angle through the medial incisor position. For the canine the alveolus is almost complete except for the outer part of the bone. In the anterior or first premolar position the alveolus is present and has a fragment of the root embedded in it, the fracture seemingly ancient. The posterior or second premolar was lost in life and the alveolus survives only as a shallow (3mm) depression. In the first molar position the alveolus has completely disappeared and the bone surface is flat, so the tooth must have been lost well before death. The bone is then fractured between the first and second molars, and the remainder is missing. The interior of the bone is hollow with a cross-sectional space of 8mm width. Because of the fragmentary condition it is almost impossible to estimate the age at death. It may have been quite considerable as mandibles from caves, while showing extreme tooth wear by the age of forty, usually have the tooth remnants intact. There may have been some periodontal disease, as suggested by the hollow bone, leading to tooth loss in life but the mandible as a whole is so eroded that the hollow could have been caused by natural processes after inhumation. Such extreme erosion is normally seen in bones which have spent much of their time only lightly buried in the surface layers of cave deposits.

The second human bone is an almost complete phalange, 47mm long and also very eroded.

Animal: Several species are represented as follows:-

Fox - left maxilla with only the carnassial present and alveoli for five other teeth. Wear facets on the palatal side of the tooth. The tooth row including the remaining tooth is shorter than in modern fox (but this may be due to sexual dimorphism). Right mandible with only M2 surviving and this is very much worn, the two main cusps having been completely eroded away. Lost in life were M3, P1 and P2. This bone must be from a long-lived individual but it is possible that both upper and lower jaws are from the same individual. Three loose canines, only two of which are certainly fox; the third may be from badger. *Epistropheus*; six vertebrae about fox sized. Two metatarsals, possibly from the Mt II Right position. In general it is considered that two animals are represented here.

Badger - canine and a right humerus with its proximal end missing.

Pig - maxillary incisor only.

Bos sp. - a phalange 1 of a young animal with its proximal epiphysis missing.

Sheep/Goat - one cloven bone (hoof) only.

Hare - pelvis fragment and an ancient-looking, grey metatarsus III Rt, which is 59mm long. From its colour, this bone could be from a somewhat deeper level in the cave.

Mole - humerus.

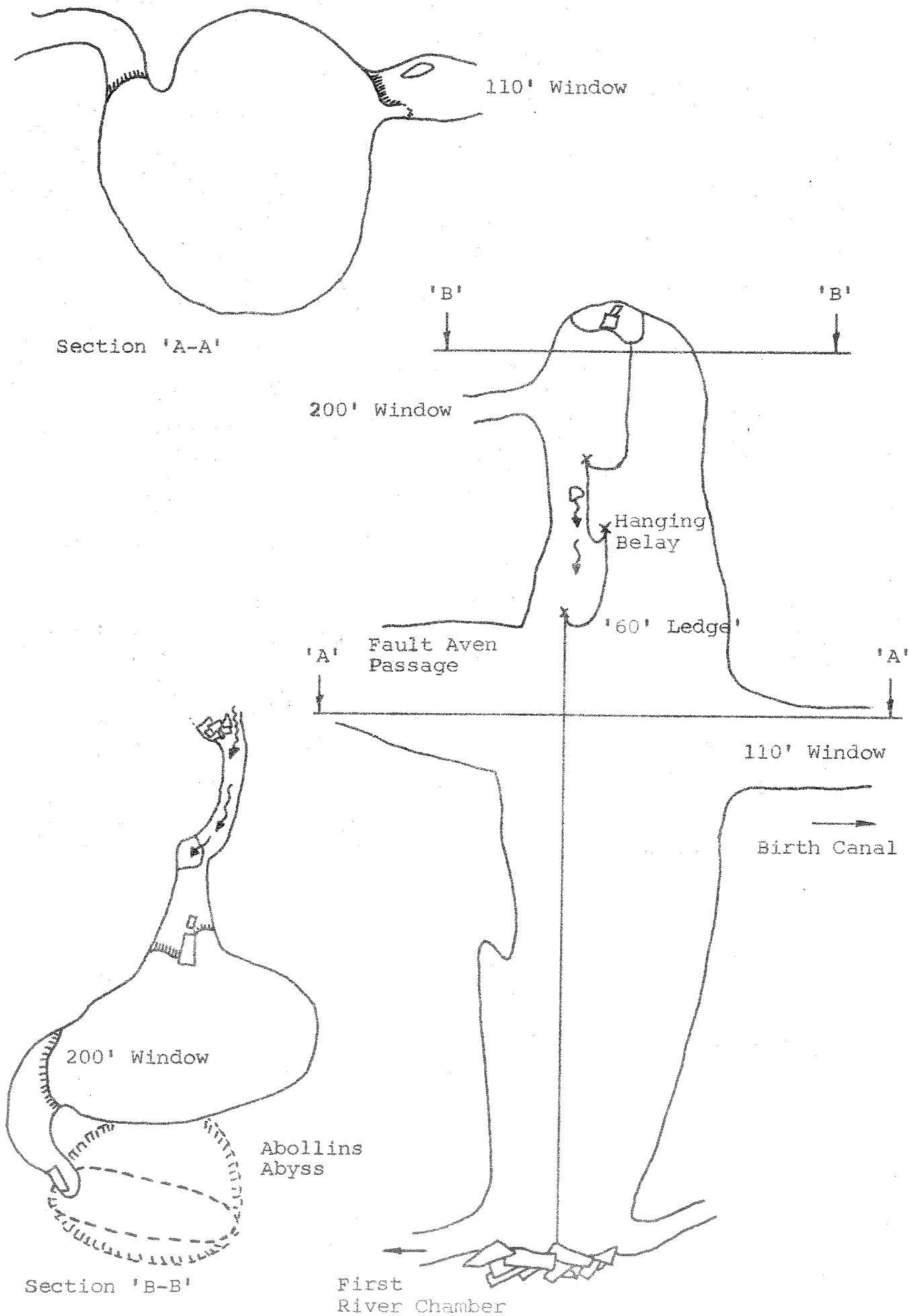
Bird - a humerus and other bones.

Fish - one symmetrical fish bone 23mm long, not placed anatomically.

Several limpet shells and unidentified bone fragments including small skulls, ribs, one large rib 86 x 18mm, a small ulna, scapula and others.

Mel Davies

Fault Aven Passage



THE GRANARY

During 1983 a concerted effort was made by Rob Parker and Simon Edwards to reach the top of the 230ft high aven known as The Granary in Ogof Ffynnon Ddu. The Granary rises above the First River Chamber but can also be viewed from a passage looking out into the aven, 110ft above the floor. This was reached through the Birth Canal by Mike Ware some years earlier, and on the opposite wall, some 40ft away, is another window. Near the roof of the aven a stream flows out from a hole in the wall and above this a passage can be seen. To reach and explore this passage and whatever lay beyond has been a project of considerable difficulty, danger and discomfort. The climbers were continually menaced by falling rocks and it was necessary to carefully check the SRT rope for damage on each trip. Wetsuits were worn as they climbed always in the spray of the stream from the roof. Considerable quantities of gear were needed, and a total of fourteen trips with heavy tackle-bags were made through the Cwm Dwr Crawl!

The first trip took place in June 1982 when Rob, with a couple of visitors to the Club, set out to pendulum across the Granary from the 110ft window, to reach the window in the wall opposite. A secure belay was made using a rock column in the passage but this was in a poor position for the pendulum: a flake of rock some 4ft away from the edge provided a much better position and the rope was re-belayed. Rob gave a few tugs on the flake to check it and prepared to abseil. One last tug - and the whole thing came away and fell to the floor. Finding no other well-placed belay point he had to abseil using the rock column and found, after half an hour suspended on the end of the rope and continuously soaked by the stream from above, that not enough swing could be gained to reach the rock projection that could be seen on the opposite wall.

Eventually, a nubble of rock to re-belay from was found which gave enough advantage for a sling to be hooked over a flake to one side of the opposite window. Rob was then able to traverse around and into the passage, and, belaying securely, he set up a Tyrolean Traverse - which the others chose not to try out! So, on his own, Rob followed the passage about 150ft, climbed up a narrow rift 40ft in height, and passed a squeeze into a big oxbow. Here, to his disappointment, he found many footprints and further exploration revealed the fixed rope at the top of Fault Aven. A return was made across the Tyrolean Traverse and back through the Birth Canal.

Six months later Rob returned to the Granary with Simon Edwards and, crossing over to Fault Aven Passage, he climbed about 60ft above the passage on its outer wall to a small ledge where a bolt was placed. Simon swung over to that side of the Granary and prussiked up to join him. With a short traverse, Rob was able to place bolts to create a free-hanging pitch of 180ft to the floor and from then on the Birth Canal route was not used.

The third trip took place after rain and so much water was coming down from the roof that "face masks would have been useful!". Rob aid-climbed 25ft above the '60ft ledge' and placed bolts; Simon free-climbed into a groove above this with the full stream washing down it - but the flow was too heavy to enable him to find a belay or place a bolt and he was forced to back-climb and the trip was abandoned.

Returning under less wet conditions, Simon again climbed the groove while Rob belayed him from a hanging belay at the last bolt. "The worst lifelining I have ever done", is how he describes it; with water running straight down the rope onto hands and legs and no chance to get out of the spray of the stream falling only two feet away. At the top of the groove, Simon reached the hole from which the stream was coming and, by removing excess climbing gear, managed to wriggle in - only to discover that it was much too small to pursue. He then aid-climbed over



an overhang making a final free move onto "a foothold the size of a housebrick", where he placed a bolt and abseiled back to Rob at the hanging belay. It took twenty minutes to swop belays, achieved only 'semi-safely', and Rob prussiked back up to Simon's bolt. Above this, with only a flake for protection - so dubious that he didn't like to use it as a handhold - Rob climbed 16ft up a wide 'scoop' by bridging, and, with his back on one wall and one foot on a "sort of a bit of a foothold" on the other wall, he placed a bolt over one shoulder. At which point he rested for a bit!

It was then only another 15ft to a small ledge just below the roof of the Granary where two bolts were placed, and Simon joined him. Crawling up the abandoned stream passage for about 100ft they reached a choke which was dug for a while but needed a crowbar. Abseiling down from the topmost bolts required the whole 230ft of rope and the negotiating of three rebelayes.

On the way down a hole was noted at about 200ft and a return trip was made by both a couple of weeks later to explore this. Prussiking to the top and abseiling down a short way, Rob then traversed out using six bolts to get round into the 200ft window. Up a short passage and he reached Abollins Abyss, a hole too deep to descend with the available rope. Returning again a week later with more rope and a crowbar, Rob and Simon once more prussiked to the top of the Granary. Rob abseiled and traversed back to Abollins Abyss and after placing bolts abseiled down into an aven, about 20-25ft round towards the bottom and some 90ft deep with a boulder-strewn floor. A window was reached through which the Granary could be seen - at the same level as Fault Aven Passage and the 110ft Window. With no further leads to explore, Rob prussiked back up to Simon and they dug with the crowbar in the choke in the highest passage. When just about to push through the cleared boulders, a whole lot more collapsed and the dig was given up.

With exploration potential in the Granary exhausted a final trip was made in March last year ('83), a team going through the Birth Canal so that Annie Peskett could photograph Rob and Simon as they de-rigged the 230ft pitch.

Kitty Hall

TROGLOPHILES IN THE CARBONIFEROUS ROCKS OF NORTH WALES

In 1896, the Holywell-Halkyn Mining and Tunnel Co began to drive a drainage tunnel at sea-level from Bagillt (NGR 222754) on the Dee estuary; at first for 8970ft south-west and then more nearly South. This adit is known as the Milwr or Sea-level tunnel. In 1913 the Halkyn District Mines Drainage Co., joined with the younger company to extend the tunnel beyond the previous boundary. In 1919 this boundary was reached beneath the village of Windmill (NGR 198715), a total of 17,985ft from the portal. The tunnel was already affecting mines as much as two miles south of the breast.

Mining ceased for a time around 1920 but in 1928 the present Company, the Halkyn District United Mines Ltd., amalgamated previous interests and re-commenced the tunnel, which had reached Cathole lode (NGR 205627), rather more than ten miles from the portal. Following the inception of the new works the tunnel was driven with 10ft x 8ft section with a 'grib', or drainage channel, to one side some 4ft x 2ft deep.

Shortly after restarting the tunnel, a natural cavity was struck which was water filled. When the flood decreased, the passage was seen to be some 60ft long and 10ft wide and rising for some 20ft. Eleven hours after this, the well at Holywell decreased and dried up completely, at a distance of some three miles north-west. The water supplies to Holywell were also affected until deeper drilling was done. Gas was encountered in the top workings of the Milwr Mine itself and a miner is reported to have been overcome by gas in Halkyn at one time.

An account has been given of previous explorations of this mine when the far end of the workings was reached. Here, at least, there is a track to follow.

The old books were scanned, records pawed, and locals chatted up: a picture developed. Ore was mined upstream of Olwen Goch on Cathole for instance, but it was trammed down to Peny Bryn to be hauled up to the surface. From then on, the water coursed a further 4 - 5 miles to the sea via the older mines. Some doubt existed as to how far the railway went but it was thought that it would go at least as far as the Milwr Mine. Also, Courtaulds maintain the tunnel by driving boats up it - or so we were told. Accordingly a passage must exist, but was it open and accessible?

At last all was ready and an attempt was to be made. February 8th 1969 was agreed to, but on the Friday a blizzard blew and by Saturday up to two inches of snow carpeted the ground. The car needed to be thawed out before the start but, surprisingly, we arrived O.K. at Rhydymwyn. Our target? The through trip!

We made our plans carefully; checking lighting, food, clothing and equipment, and agreed that all was O.K. A suitable shed was found near Olwen Goch and a store made. All the mining gear was left here together with sleeping bags and groundsheet. We then went to Bagillt, some nine miles away, and inspected the water level. The door was hinged open some 35 degrees: rather low we agreed, and left the car. Then, by bus and foot, we wended our way back to Rhydymwyn via Holywell and Halkyn.

It was fast approaching dusk as we enjoyed a quiet pint in the Antelope before setting off down the road into a snow storm. Changing in the growing gloom amidst swirling snow seemed dramatic enough and we checked each item religiously. By 1930 hours we were ready and plodded off into the snow. We both wore wetsuits and carried spare lights, but I had nylon overgarments for camouflage should it be necessary at the far end.

Rustling like an irate lolly-pop man I approached the shaft. Olwen Goch is some 465ft deep, but access via a level reduces this to some 400ft. The level is within the mine buildings which are lit-up at night. By then darkness was upon us and the snow showed every move. By assuming a bold front we reached the tunnel and laid a false set of footprints past it - hoping to puzzle anyone who noticed the extra prints. Then, it was past the boiling tea urn and on to the shaft. Ice hung from the steelwork and tinkled down the shaft: booms and roars echoed up from the depths, but much was as before. At 1940 hours we started dropping, passing the old Drainage Level after 12 ladders and reaching the bottom after ten minutes and 22 ladders. The water was again over the rails but not too deep. Trains abounded and the track was above water for some feet: not wasting too much time, we set out.

Crash-splash, crash-splash; the steps echoed from the walls as we made heavy going along the railway line. Being covered by three to ten inches of water it defied speed, but, after 20 minutes, the branch to Powells Lode was reached. Here, a one mile long cross-cut reaches into a once rich vein; then yielding some 60,000 tons of lead concentrates and including a fine, natural cavity for the explorer. This was not the objective however and, with one mile behind us, we looked forward to the new ground.

We pushed on in deeper water and the pace flagged. Wetsuits rubbed, legs ached, packs knocked. We passed several TNT stores, some 60 yards apart, leading from the level and eventually came to a major side passage which served the Penybryn shaft. This is offset from the level by some 50ft and is in poor condition: it does not appear to have been used for some time.

The rails formed sidings and a passenger train stood quietly and patiently on its tracks over the grib. Passages off at this point had worked a small vein but with little to show for it -

except some old banger. Still, after 45 minutes we had covered two miles - three or four to go. At that rate we speculated that we would be out within two hours and we started out blithely for the Milwr Mine.

A few steps wiped the grins off our faces! The track ended and the grib widened to cover the passage. The 10ft wide tunnel extended water-filled as far as the eye could see. Could it be that all four miles were to be water filled? Could we possibly tackle that flow if we had to return? What would happen if there was no through route? All these questions were considered - but no answers forthcoming. We thought that we could make it back if necessary - just! And there must be a through route because they brought boats in - didn't they?

After a short debate we agreed - to go on. After a bite to eat we unpacked two car tyres from the kit, to assist us in the deep stretches, and quietly blew them up and tied them to our waists. A dinghy had been originally planned for the trip but was unobtainable. This idea was flexible and light - or so we thought - as we jumped into the water and let the tyre pull us into the dark ahead.

Although initially waist deep, the water shelved to thigh deep ($2\frac{1}{2}$ ft) and stayed that way, rushing and pulling at our legs. As a test we turned to move back and immediately the water objected! Swirls and eddies sucked and pulled, opposing each step; the implications of four miles of that were obvious. Nothing needed to be said however as we again turned downstream and walked wither the water wished. Soon we realised that a water channel existed to the left where it deepened to waist level. Almost together we found that walking in that, although cold, required no effort since the current pulled faster than we could walk. Within 15 minutes we had threaded ourselves onto the tyres and, lying in the water, found ourselves enjoying an erratic, silent, effortless rush along the passage.

The roof passed noiselessly overhead and the walls quietly moved to join the roof in a receding darkness behind: soon all sense of risk was lost. Not for long! Suddenly, approaching at some relative three miles per hour, an old wall bracket reached for the vulnerable tyre and plucked at my clothes. Frantic strokes pushed the tyre out of reach of the bracket but did not check the headlong flight. Now a new noise was heard - a roaring and rushing which gained in strength. Turning and braking, the water was found to deepen and cascade over rapids. Standing still to view the situation we were again conscious of the force of the water, but at least we could see that a natural cavity had been reached. A meander had been broached which curled and twisted some 25ft above our heads. Stemples 'held' the roof up and fallen, jammed rocks shallowed the water to some 6 inches deep. A few, unsure steps and the pull became insistant and tore at legs and boots. It was difficult to stop - so why bother? We again laid in the water and the pace slackened. Soon all was quiet again, except for occasional rustles and gurgles.

The smell of gas was first noticed around the natural cavity and an uneasy conversation held. We were already some three-quarters of a mile from Penybryn and tests showed almost no draught, yet the tunnel was open at sea level - wasn't it? The smell seemed like that of a gas works mixed with old oil and sewage, and quite strong. Again we decided to carry on, watching for changes in breathing rates, but none came and soon the smell disappeared.

After a further quiet mile, and an hour in the water, another rapid was heard and again waters rushed over boulders. But here was the natural cavity mentioned in North's book, the one which had flooded the level when reached. It was some 45ft high, 30ft wide and up to 10ft deep, but where it crossed the passage its depth was

uncertain. In fact, a bridge had been fitted for walkers in drier times. (It can be noted that the river in flood passes 20 to 30 million gallons per day, carrying any sand and rocks in its way, but still a channel needs a bridge in the floor!) Again at this point the smell of gas was very strong and definite fears as to the state of the air were felt; however, once more we pressed on with unjustified confidence created by the ease with which the current carried us along.

Rapid followed rapid, but now the appearance of the tunnel had changed. After the first natural chamber the tunnel had reduced in size to some 8ft square and had begun to twist and turn erratically. The slope increased and the water speed built up. After the second chamber a fast walking pace was reached and each twist and turn deflected tyre and burden into the walls. After a further half hour a few tunnels began to appear off the passage, (these had been missing since Penybryn), and some were quite large. Eddies at the larger junctions demanded attention, but suddenly, one dryish one with a fitted door frame was passed and immediately a strong draught was felt rushing up the level.

Shortly after this a large, silent passage branched to the left; it remained water filled and unexplored as we rushed on without check. We agreed to prove the connection before the cold obtained the better of us because the cold was by now the one big snag. Sitting idle, up to the chest in water, was having its effect so, when we noticeably turned and raced NE, we just laid back and noted the change in strata.

Quite shortly, a brick lining was reached where the tunnel passed into the coal measures and a telephone wire looped from a brick bothy at the start. Marks on the wall suggested 2,300 yards and the countdown started.

Brick arch was followed by steel square section, then brick. Very occasionally a few feet of rock was allowed to show through. Soon, a roaring demanded attention and, turning, an obstacle could be seen. The brick arch, becoming suspect, had been braced with steel sections within the arch and the bracing struts reduced the width at water level to some three feet. Boats could never pass in high water and would have trouble in the rapids in low; however, this work was recent and later sections showed that all suspect sections had been so treated before collapse occurred.

The countdown continued - 18, 17, 16: cold, cold: 15, 14, 13: cold, damn cold, the draught getting colder. At 800 yards (for it was now clear that this was so) a car was heard faintly ahead so now we were close. Switching to emergency lights we drifted into the final section, lined with cast iron, and then into the basin. Standing with some difficulty in waist deep water we checked that everything was O.K. The time - 23.15; just three and a half hours for the six and a half mile trip. All was well and the tyres were deflated before hands became too cold. There only remained the short walk to the car, and the great Halkyn through-trip was over!

One who was there.