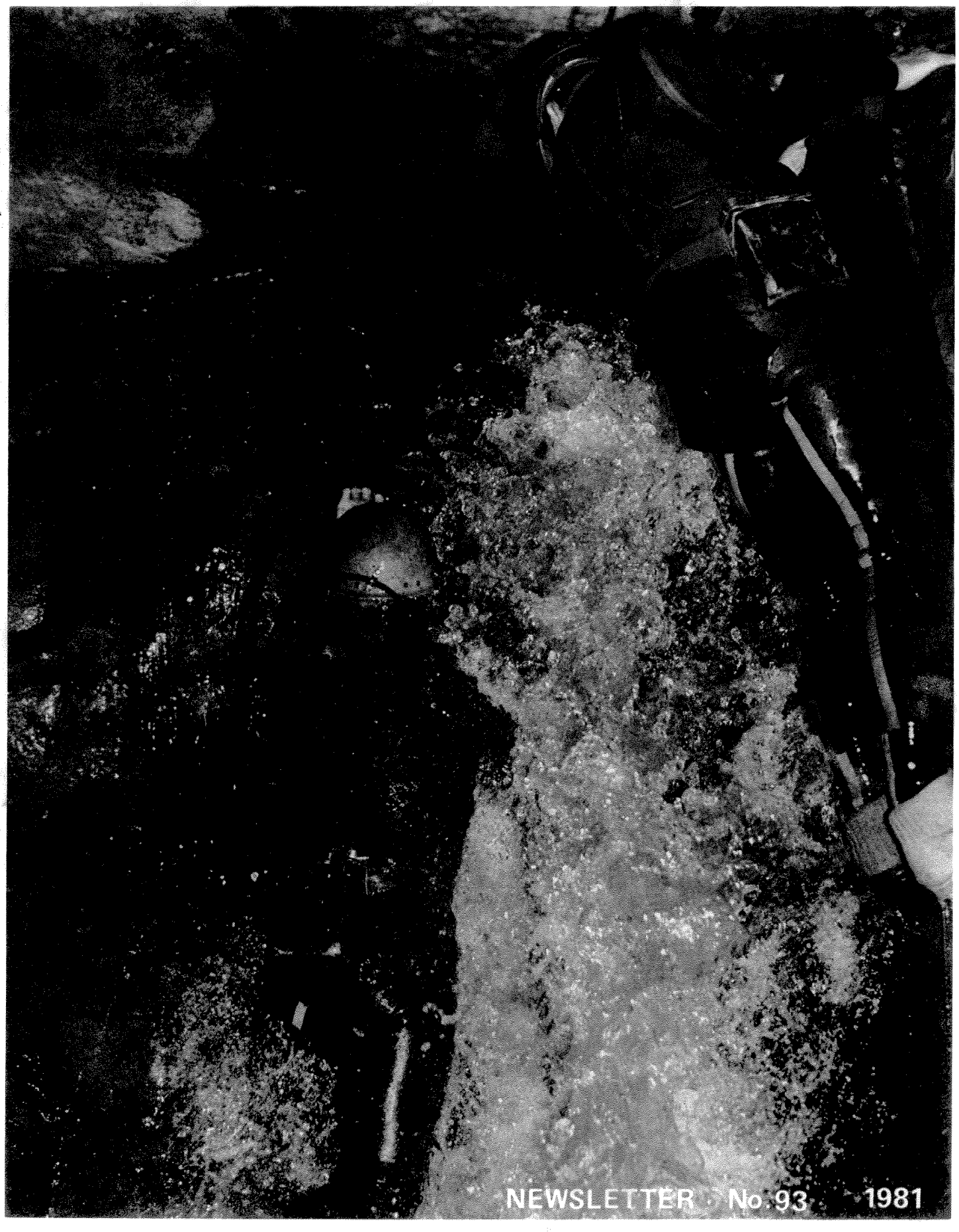
SOUTH WALES CAVING CLUB



NEWSLETTER No. 93 1981

SOUTH WALES CAVING CLUB

No.93 NEWSLETTER NOVEMBER 1980

CONTENTS

- o - 0 - 0 - o -

PHOTOGRAPHS

Cover - Long Churn - Dave Edwards

p15 - Alum Pot - Dave Edwards

- o - 0 - 0 - o -

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COLIN HILL

Many long standing members will be sad to hear of the death of Colin on 10th October 1980.

Colin was one of our first members and served as Treasurer during the early 1950's. Although his membership lapsed after a move from Cardiff to Bakewell, many members have maintained contact with him.

He leaves a widow, Ivy, to whom we extend our sympathy.

Bill Little.

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DONATION

Following the deaths of David Gough and John Fitton in Ogof Ffynnon Ddu on 2nd December 1979, Brian Jopling has recently received a letter from Mrs.Fitton, John's mother.

In the letter, Mrs.Fitton apologised for not writing sooner, this being due to the death of her husband during the year. Enclosed with the letter was a cheque for £240 being a donation of £200 from Mr. and Mrs.Fitton, and £40 from John's colleagues at Lucas Girling.

The Club wishes to thank all those involved for the donations and also to extend to Mrs.Fitton its sympathy and regret at this sad and untimely second loss.

Dave Edwards.

TWLL GWYNT OER - THE STORY SO FAR

From Cwm Dwr to the Engine House the boundary wall of the reserve lies between two dry valleys. In 1976, 3,000 gallons of water and dye were pumped into two dry shakeholes in the valley between the wall and Hobb's quarry. The dye tests proved that water did find its way into OFD from this area. Apart from 'Gents Dig' there is no known passage between Hobb's quarry and the tram-road. If open passage could be found in this area then it may be possible to extend the nature reserve beyond its present boundary.

Early in 1979, Bob Marsh and I decided to dig one of these shakeholes. We failed to recognise the two tested shakeholes so we dug at the first one that looked likely. True to form I set Bob to work. It was a cold day so I wandered off leaving Bob searching for glory. A couple of yards down the valley I spotted what I thought was a limestone block. A quick inspection showed that the block was the edge of a fluted shaft. Recovering Bob we soon exposed the edge of the shaft and discovered a strong draft. The draft was not only strong, it was also cold and this gave us a name for the dig, Twll Gwynt Oer - Cold Wind Hole.

Soon, bare hands were not enough so we returned to Penwyllt for digging tools. How soon the rumour of a 'possible' spreads. We returned with treble our number and the dig began to take shape. The shaft was eye-shaped and filled with sandstone blocks and mud and the NE side was loose. Digging was easy and only one bang was needed. Bruce was there. The fuse took so long to light that Haydn threatened to throw the boulder at Foster but he had to be satisfied with the two halves. At -7ft the dig had to be timbered as the loose end kept running in; 'Cave Rescue Officer swallowed by his own hole' as the Sun would have had it! A few feet deeper and a rift was exposed from which issued the sound of a stream. How close it sounded! 30ft deeper the hole had turned into an aven and measured some 12ft by 5ft at the bottom.

The decision had been made to take out all of the fill and not to 'rathole'. At -35ft a breakthrough was made at the NE end, the day after I had to leave! A rift controlled stream passage was entered which ran for about 80ft to a choke. The stream is about the size of Salubrious in normal conditions and it vanished into a bedding plane at the base of the fill which was too tight to follow. It now remained to dig out the SW end.

Many members and non-members helped throughout the dig. Peter Harvey visited us and Clive Jones gave us all a fright by saying that it would 'go', but we persevered nonetheless. Laurie took a rest from building and helped with the digging; after all, we had pinched his scaffolding, buckets and best spades. Mind you, he did spend some time hauling before he trusted our timbering! I returned a couple of days later, in time for the breakthrough at the SW end.

We dropped into a chamber with a rift taking the stream which reappeared via a short waterfall from the bedding plane. The rift became a little lower and an inlet was met as the stream turned 90 degrees left. I was sure that we would be leaving via Cwm Dwr. The passage led straight to a sump! There was no way on. Mick and I 'blessed' the sump and squeezed out past the hordes of diggers that had followed us down.

By the time we reached the surface I had convinced myself that the sump would be short and soon passed. Dye was introduced and gave a positive result at Cwm Dwr upstream choke, at least we had proved the source of 90%, if not all, of the Cwm Dwr Stream.

Martyn dived the sump after digging his way in with his feet. Sam and I sat and watched his bubbles break the surface. After a few minutes the bubbles stopped. "He's drowned", I said. "No", said Sam, "The bastard's through!" We were both wrong. The sump had turned left, running back on the cave about 35ft to an air-space with no way on and then to a vertical rift with no air depth. We portered Martyn's bottle out (it was about the size of a 'Sparklets' bulb) feeling more than a little pissed off.

To be continued.....

Brian Jopling.

STRUCTURAL GEOLOGY AND CAVE FORMING PROCESSES

The question of the distribution of cave passages in relation to the major structural elements is one which has puzzled a number of people over the past years and another, which has come to the fore even more recently, is the relationship between the average direction of cave passages and the average trend of fractures, be they faults or joints.

First of all it is worthwhile defining the terms with which the rest of this article will deal.

JOINTS - are vertical, inclined or horizontal planes of division which are found in almost all rocks. In stratified rocks such as are found in our area, the joints are more or less perpendicular to the planes of bedding but not exclusively so.

Joint Sets - are those that occur systematically in one series and are parallel in dip and strike.

Joint Systems - if two or more joints can be recognised which commonly intersect at a more or less constant angle, these can be referred to as joint systems.

FAULTS - in distinction, are fractures along which the rocks on one side have been displaced relatively to those on the other. The vertical displacement is called the 'throw' of the fault, the side of the fault on which the relative movement of the rocks is downward is called the 'downthrow' side while the other is the 'upthrow' side.

As with any planar features both joints and faults can be described in space in terms of dip and strike and the faults can be characterised by the terms 'normal', where the dip of the fault plane is towards the downthrow, and 'reversed' or 'thrust' faults where the dip is towards the upthrow. Vertical faults are obvious. Where faults show a dominant horizontal movement, they are called 'wrench' or 'tear' faults.

Both Joints and faults are believed to have a common origin in response to a deformative stress pattern during a folding phase and, assuming that only one phase of deformation has affected the rocks, it should be possible to determine the imposed stress pattern by studies of the fracture pattern when due allowance is made for the fact that a very important joint

plane (the bedding plane) already exists in sedimentary rocks and may therefore relocate the stress components.

Although joints are defined, quite rigidly, as having no relative movement on either side of the fracture, there is quite often some relative movement albeit on a very small scale. Roberts (1966) will even have it that all joints show movement. Similarly, very small scale faults are observed with throws of millimetre dimensions. Quite often the distinction between faults and joints is a question of degree and the safest course would be to classify them simply as fractures. Movement along joints may be unrecognisable to the unaided eye, being revealed only by microscopic examination where movement may be observed at the sub-millimetre level affecting ooids or even crystals.

The subdivision of folds into anticline or syncline is, I would imagine, clear to most members of the Club. Where the axis of such a fold is not horizontal it is described as 'plunging' in whatever direction.

Having then, I hope, cleared the undergrowth let us have a look at what people have written about the relationship between these structures and caves.

HISTORICAL One of the first people to do any modern, scientific work on the caves in the area was Glennie (1948 and 1950). Although the work was concerned mainly with showing how the Entrance Series in Ogof Ffynnon Ddu was confined to a limited number of beds, he nevertheless made several observations on the relationship between the fracture pattern and the direction of cave passages. His general conclusion was that cave passages were controlled very much by the joint direction which he concluded to be an orthogonal set (mutually at right angles), and that not only did faults not play much of a part, but were instrumental in actually reducing the frequency of cave passages in the vicinity of 'The Fault'. Now this occurred before the finding of the higher level Fault Series (Little 1962) and it is also true that there are many more faults in the Entrance Series than were recognised by Glennie, but more of this later.

The next to paddle in these muddy waters was Ball who, in 1962, observed that there was a surprising degree of uniformity in joint patterns over the whole of the North Crop, from the Tawe Valley to Agen Allwedd, and that cave passages tended to show a preference for development along fractures which were sub-parallel to the dip, and those which approximated most closely to the strike.

One of the most comprehensive studies of the joint pattern on the North Crop has been due to the efforts of Roberts (1966). Although his study was further east, covering the outcrop from the Nedd Fechan to Blaenavon, his conclusions are nevertheless relevant to our particular area, especially the section dealing with the relationship between jointing and faults. Roberts was able to recognise joint sets trending 340°, 320°, 290°, 270°, 240° and 210° in limestones but, specifically in the S-2 zone, reported that the dominant joint sets had strikes of 330°, 270°, 240° and 210°. He concluded that there was a close relationship between the direction of faulting and jointing in the area and, furthermore, that faults were the 'macro-expressions of related joint trends, and that the direction of faulting is determined, at least in part, by the pre-existing joint set'.

Neither of the joint sets trending 270° or 210° were blessed with parallel faults. Low angled thrusts striking either E/W or NW/SE were shown to post-date the jointing. Joint sets trending 360°, 330°, 270° and 240° had sometimes suffered dilation and had been infilled with a variety of minerals, the introduced material being mostly calcite but commonly accompanied by barytes and, more rarely, by galena and chalcopyrite. Usually, the cross cutting relationships show that 330° joints are cut by the 240° and 270°.

O'Reilly, O'Reilly and Fairbairn (1969) published passage orientation rose diagrams for Ogof Ffynnon Ddu and concluded that passages were related to the dominant joint directions which were determined by analysis of aerial photographs. Those passages were orientated approximately N-S and approximately E-W although other passage trends do occur. They also showed rose diagrams of passages in Dan yr Ogof and, while this was produced by analysis of the 'pre - Authorised Version' survey, the dominant passage directions were shown to coincide with an approximately N-S trend, reflecting passages in DYO III, and also a NE-SW trend passages in DYO I and II.

Weaver (1974), in a study of the jointing along the whole of the Swansea Valley Disturbance, paid particular attention to the Craig y Nos area. He was able to demonstrate that four main joint sets were developed but that the distribution of these sets was governed by proximity to the disturbance. Close to the fault zone only NE-SW and NW-SE sets were found, while away from this zone only approximately N-S and E-W sets were developed. In another paper (1973) he showed how the passage directions in both OFD and DYO accomodated themselves to the orientation of these major joint sets, with the passages in DYO III aligned preferentially along the NNE and EW trends and those in DYO I and II along more nearly NE and N trends. The swing in passage trends, from OFD III through II to I, was also correlated with adjustment of the joint set direction to the presence of the fault. Furthermore, he showed (1974) that the orientation of fractures with vertical slickensides were very close to N-S, a direction also taken by carbonate veins in limestone and quartz veins in other, less interesting rocks. Both Roberts and Weaver concluded that the joint set fault patterns were responsive to a dominantly N-S compression; the NW-SE and NE-SW jointing being shears to the compression, and the N-S and E-W trending joints to the extension.

Coase, (in Coase and Judson, 1977) in a very comprehensive study of the Dan yr Ogof system, recognised more then 100 fault/passage intersections. The outstanding fault feature is that extending for much of the length of the Great North Road. One significant feature of the fault is the very great vertical passage development along it, a feature not associated with other faults in the cave. The orientation of the faults is statistically N-S and Coase includes rose diagrams illustrating the parallelism between the fault directions and one of the major joint sets, the other major set trending E-W. He was able to recognise a further joint set trending 300 - 310°N. Coase was able to divide the cave into domains in which the influence of N-S fractures, be they faults or joints, were dominant, and domains apparently controlled by the main Dan yr Ogof syncline. Even in the synclinally located passages, the N-S direction is more abundant than any other sector. The passage directions in the synclinal areas, however, do exhibit a considerable spread of maxima within the NE quadrant.

Christopher and Charity (1978) have confirmed that the majority of fractures in the OFD I area, Top Entrance series and OFD III streamway are aligned along N-S fractures ranging from tension fractures, most commonly, to rarer minor faults with throws of a few centimetres although these may be larger.

STRUCTURES IN THE CAVES Because of the conflict of opinion as to the relative merits of joints and faults in the development of caves, it is worthwhile examining some of the faults in some detail in order to determine what, if any, differences there are between faults in parts of Dan yr Ogof, where the work of Coase (1977) suggests that in certain areas fault control is dominant, and Ogof Ffynnon Ddu where joint control has been regarded as most important.

The fault in Pluto's Passage, OFD, was not recognised as such by Glennie, however, it nonetheless exists. It is characterised by a westerly downthrow at the stream passage end of about 18 inches, where the fault plane is occupied by about 3 inches of carbonate. At the other (N) end of the passage the fault has a similar westerly downthrow, but here this has been reduced to only about 4 inches. A small element of lateral shift may be observed where one of the calcite filled, E-W joints is displaced. The passage ends abruptly at both ends, the present stream passage ignoring the presence of the fault. (see Fig. 3B). A small fault with a westerly downthrow of 1 to 2 inches is found aligned along the lower part of Toast Rack Series but it is fair to state that a very large number of joints are present in this zone which parallel the fault plane and it is difficult to determine the relative importance.

The fault exposed in Traverse Passage is particularly interesting as it demonstrates one of the ways by which faults may die out vertically. Traverse Passage is one of the straightest passages in this part of the cave and is aligned along the fault. Where exposed in the southern wall of the stream passage at a high level, the fault exhibits a westerly downthrow of about 9 inches: further down the wall the fault feathers out into a series of minor faults, each with a displacement of an inch or two, finally dying out altogether. This is demonstrated diagramatically in Fig.1.

Finally to 'The Fault'. Glennie (1950) concluded that this stucture had a substantial downthrow to the east of some 13 feet and was instrumental in diminishing, by some unspecified means, the frequency of cave passages in the vicinity. Unfortunately, this was before the discovery of the Fault Series (Little 1962) and also the fault has, in fact, a variable westerly downthrow. In the passage to the north, the throw is reduced some 5 inches across the width of the passage. At the bottom of the climb up into the Fault Series, the fault zone exhibits a large, brecciated mass of limestone with a very small throw apparent. (Fig.3A). Although it is difficult, some would say invidious, to extrapolate these findings throughout the cave, it can be demonstrated that:

i) Wherever N-S faults are suitably exposed, the vertical faults have an almost universal westerly downthrow and the amount of downthrow varies along their strike: see, for example, those in the Great Chamber Near the Entrance.

ii) They are almost invariably steeply dipping and tensional fractures, often with carbonate infilling.

iii) They parallel one of the major joint directions.

Now this is very far from saying that there are no nearly, N-S trending faults with an easterly downthrow in the area because, in fact, there are. However, these are concluded not to be the other halves of hinge faults because of their age relationships and because of their slightly different trend. In OFD I stream passage these are well exposed and show quite a different character to the westerly downthrow faults. Typically, they are characterised by a broad zone of veining and sometimes, brecciation; they are high angled, they trend between N10°E and N15°E (compared with about due N for the other faults), and, where the relationships can be ascertained, they predate the prominant, calcite-filled, E-W joint set. A typical example is exposed in Boulder Chamber (see Fig.5), and another in Twll Gwynt Oer.

Typically, the westerly downthrown faults trend almost due N-S, postdate the E-W joint set and do not exhibit broad fault zones, except where they die out.

Joints are developed parallel to both fault directions but the joints most favoured by the cave passages are the ones paralleling the early fault trend. In spite of this, the early faults are virtually ignored by cave passages. This, incidentally, illustrates one of the dangers in the choice of class intervals for statistically evaluating fault and joint trends for, by choosing too great a class interval, both types of faults could be grouped in the same class direction.

One other minor feature which is generally ignored in the consideration of structure in the area is the presence of very low-angle thrust faults. They sometimes dip at a lower angle than the bedding, post date the vertical jointing and are particularly abundant, along with their parallel joint set, in parts of the Waterfall Series, especially in Crystal Pool Chamber. They appear to have little effect on cave development, although further studies may elucidate more subtle controls.

As has been pointed out by other workers, the E-W joint set, especially the slightly-open, calcite-filled variety, has a very important functional relationship to the stream course and about 26% of the OFD I stream passage is controlled by such a joint while if one measures all the E-W joints, the proportion increases to 40%.

The attitude of the faults and their apparent disappearance along the strike presents an interpretational problem. Normally, one would expect such a behaviour to be typical of a species of fault called a 'hinge' fault, whereby the downthrow varies in amount and, above all, in direction along the strike. (see Fig.2A). Now admittedly I have not seen every last cranny in this very large system, but I do form the impression that, with the exception of the thrust faults, all of the N-S vertical faults have a westerly downthrow. This impression is reinforced by the published Geological Survey Map and by the faults exposed by quarry sections. This is admittedly, in many ways, negative evidence and the finding of N-S vertical faults with an easterly downthrow in large numbers would certainly cause a revision of the ideas to be discussed next.

It is possible that the cave is only located along those sections of the faults that exhibit westerly downthrows, and that volumes of limestone containing faults with easterly downthrows are, for some unknown reason, not suitable for cave development. If the hinges of these faults were arranged on a linear or en-echelon fashion it could possibly explain why the cave is situated where it is, because the hinge line is slightly north of the observed limit of the overall trend of the cave. This is considered to be unlikely (or absurd) if only because the decrease in throw is also observed to take place in a southerly direction along the strike of the fault plane, e.g. in the Great Chamber Near the Entrance, and because of the evidence of faults on the surface (discussed above).

The alternative explanation must therefore be strongly fancied and that is that the N-S faults are representative of a style of structure which is drawn in Fig.2B. This diagrammatic representation, with the vertical scale exaggerated adequately, represents the observed situation. (It is, however, remotely possible that the upthrow side is anticlinal, or even that one side is synclinal whereas the other is anticlinal). If these faults can be arranged en-echelon, as seems likely, then the total overall movement of a block of country rock may be large. For convenience, but so as not to coin a phrase, let us call these 'sag' faults. DeSitter (1956 p.150) describes effects against normal faults represented, in part, by half domes truncated by normal faults. He regards both doming, and fault development, as a response to one and the same tensional stress field. The effects of doming, with its concommitant, normal faulting, may well be observed in Ogof Ffynnon Ddu where Christopher and Charity have observed that cave passages are more frequent in zones of shallow anticlinal uplift.

The recognition of this style of faulting on one side of the valley raises questions as to its prevalence on the NW side of the Cribarth Disturbance. If one were to expand the scale and exaggerate the vertical component a little then this might be an explanation of the interrelationship of the faulting and fold axis in the Dan yr Ogof Syncline. Here, although the overall trend of the trough, and hence the cave, is ENE, the structure is made up of elements of an EW trending syncline offset, apparently, by wrench faulting. If, instead of this explanation, one can envisage a set of en-echelon sag faults developing, with strong synclinal downwarps on the downthrow side (Fig.2D), this would explain the apparent absence of features associated normally with wrench faults. These considerations bring us neatly into the NW block of limestone, leapfrogging such considerations as the effect of the minor faults such as the Garth-Gwared Fault and its larger splay (if they exist) because they apparently do not support caves.

Keeping a steady progression across the area brings one to Dan yr Ogof, the geology of which has been comprehensively described by Arculus (1970) and Coase (1977b). The major fault in Dan yr Ogof is that along the Great North Road, and has been described in detail by Arculus (1970) and Coase (1977). The throw was unable to be determined underground but Arculus recorded both horizontal and vertical slickensides. The fault plane dips very steeply to the west however, suggesting a westerly downthrow. The fault, according to the geological map of Coase (1977), is one of a family of faults trending slightly E of N, which intersects the lower parts of the limestone succession on the southern bank of Cwm Haffes where a

consistant westerly downthrow may be recognised. Surface mapping of the fault near Pwll y Wydden also indicates a westerly downthrow.

One of the most significant findings of the work of Christopher and Charity (1978) is the recognition of the close spatial correspondence between southerly-plunging, anticlinal axes and major cave series in the Ogof Ffynnon Ddu area; especially the Entrance Series, Railton-Wilde/Waterfall Series, Cwm Dwr area, Top Entrance Series and high level passage off the streamway. One of the best examples of this correspondence however, is, in fact, Tunnel Cave on the opposite side of the valley; the passages of which are located very near the crest of a fairly important, plunging anticline. Moreover, the examination of the detailed geological map published by Coase (1977) shows that a shallow, but nevertheless recognisable, anticlinal axis exists in the DYO III area.

The control of cave passages by the presence of plunging anticlines in the areas is thus well established, although the reason for this development is obscure. It is possible that the cause is a result of tensional forces acting over the crest of the anticline which have 'opened up' the pre-existing joints with an increase in the possibility for ground water percolation. In this case the frequency of joints and normal faults should increase in the vicinity of these anticlinal areas, e.g. Fig.2C. This proposal is (conveniently?) difficult to disprove by observations in caves since, in synclinal areas, passages are fewer or absent and consequently fewer measurements of passage/joint frequency density can be made. Recourse would therefore have to be made to surface exposures but here, difficulties would arise owing to the lack of the three-dimensional picture which can be obtained in caves. Some idea of the presence of large tensional zones may be obtained by plotting the presence of the larger normal faults which are recorded in geological maps of the area. These are sufficiently large structures that they offset, by a substantial amount, the gross lithological units of the succession. The work of Gatrell (1903), Weaver, and personal communication from K.Taylor of I.G.S. show that those major, normal faults are indeed related to the anticlinal axes recognised by Christopher and Charity for Ogof Ffynnon Ddu.

Surface mapping by the Geological Survey and Weaver (1975) of the faults which affect the limestone in the vicinity of the caves show these to be steep structures. For the Ogof Ffynnon Ddu area, these are mapped as being laterally impersistant, steep structures with a westerly downthrow. Over the length of limestone from Pwll Byfre to Ffynnon Ddu the swing in trend from slightly E of N near Wern Quarry, through N at Penwyllt, to slightly W of N near Rhongyr Uchaf occurs, mirroring the trend of one of the major joint sets (Weaver, 1975). These major faults correspond spatially to the Top Entrance and to Cwm Dwr and are co-linear with the Rawl/Waterfall Series and with the Lower Entrance Series.

On the Dan yr Ogof side, faults are mapped by the Geological Survey which correspond much better with the trend of faults observed in the cave (Coase 1977) than do those claimed by Weaver (1975). Faults on this side of the valley are mapped as persisting for greater distance (and depths of limestone) than in the east and one, at least, corresponds very closely to the NNE passages in Dan yr Ogof II (see also Coase, 1977b). Here again the downthrow is to the west.

CONCLUSIONS

This article started out as an attempt to elucidate the major structural features of the area which have had profound effects on cave development. It appears to have got lost somewhere in the realms of straight structural geology but I will attempt to drag things back to a consideration of the effects of these structural elements on cave formation.

i) There are many more faults in the area than are recognisable from surface geological mapping and it is only by studying fresh underground exposures in caves and mines that one realises quite often what a fools paradise surface geological mapping is.

ii) With the exception of sub-horizontal thrusting (which appears not to have too much effect on caves), most of the faults in the area are steep or vertical structures, are tensional (normal) and are impersistant, both laterally and vertically. The major exception is the fault which extends for much of the length of the Great North Road in Dan yr Ogof. This fault appears to affect the whole of the limestone succession and to have wrench components. Wherever the relationships can be ascertained, the faulting post-dates the joint development and may be coeval with the development of major and minor folds. In Ogof Ffynnon Ddu, cave passages appear to be aligned far more often along joints than faults, however, there are, of course, many more joints than faults. The nature of the cave passages appear to be no different whether they are fault or joint aligned although the control does appear to be rather more definite and planar in the case of the faults. The Great North Road is totally different in character and where it corresponds most closely to the fault, the passage takes on the appearance of a very deep, steep-sided slot. Even in this series however a large number of passages are joint aligned. To use an anthropomorphic (and why not?) argument, the cave is incapable of distinguishing between faults and joints and treats them both as simple fractures. Most joints and faults, being impersistant, only control passage directions for short distances except in the Great North Road where a major fracture is developed and the cave passage follows it with avidity. It helps that this fault is almost in line between the sink at Waen Fignen Felen and a convenient stream junction, where the Sink y Giedd stream joins, and is aligned along the dip.

iii) Normal faults appear to be spatially associated with anticlinal axes and the axes correspond with with major cave series in Ogof Ffynnon Ddu (Christopher and Charity, 1978) and also with the DYO III and Tunnel Caves. Tensional features over the anticlinal axes may have opened up previously formed joints, thereby easing the flow of ground waters and inducing cave development. The obvious relationship of much of Dan yr Ogof with the Dan yr Ogof Syncline is not explained by this observation however, since synclinal folds should be the sites of compression. The explanation given by Coase (1977), that the exit of the cave is where it is because that is the lowest exposure of limestone on this side of the valley, is concurred with and this certainly explains the course of the present, active cave system. However, a higher series is observed and an alternative explanation is proposed for these. With tongue firmly in cheek:-

iv) The Dan yr Ogof Syncline has a complementary anticline to the south. Whether this is a straightforward anticline as thought by Gatrell (1903), or has a southern, faulted limb as thought by

Weaver (1975) is immaterial. The core of the anticline is filled with Old Red Sandstone rocks which are impermeable. If one can imagine a time when the Tawe Valley did not exist, or at least when the floor of the valley was much higher than now, then it is possible that the ground water level was controlled as much by this impervious anticlinal core as by a high level rising. Water entering the cave system would descend the long dip slopes from the north and, meeting the water table, form passages at this level. (See Fig.4). This is in accord with the water table stream theory of Swinnerton. If this is so, high level passages could also exist extending south and south-east of the presently known limits of the cave.

v) We have at least two approximately N-S trending fault sets in the area. The early set is not very abundant but it, and the parallel jointing, appear to be of great importance as a control to cave passage direction. The later fault set, which is far more abundant, does control some cave passages but its parallel joint is less important as a cave control.

Very tentatively, it is concluded that in the structural history of the area the N-S trending faults, at least in the Ogof Ffynnon Ddu area, are related in time to the broad N-S plunging anticlines. The anticlinal folding has resulted in the opening up of the early formed joint and fault sets, with a consequent improvement in the permeability of the limestone and initiation of cave passages where the beds are favourable.

Keith Ball.

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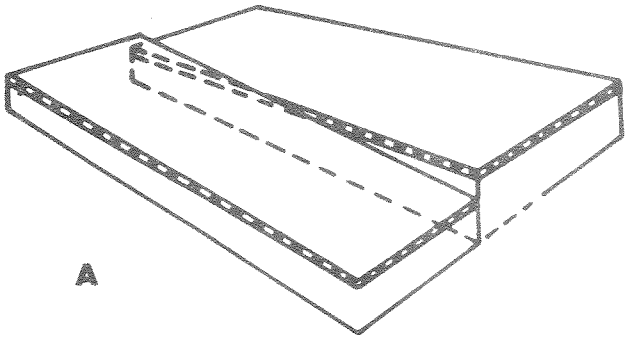
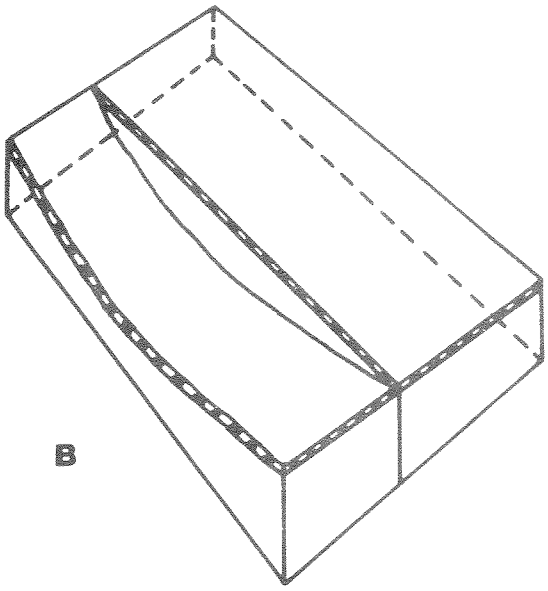


A



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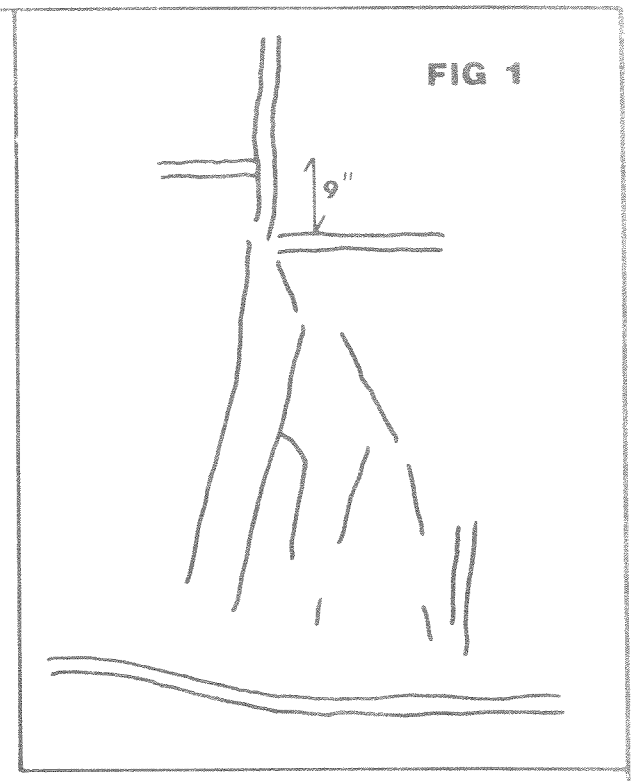
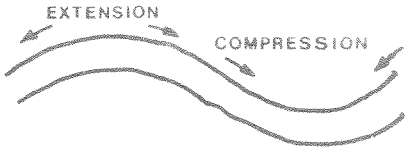


FIG 1



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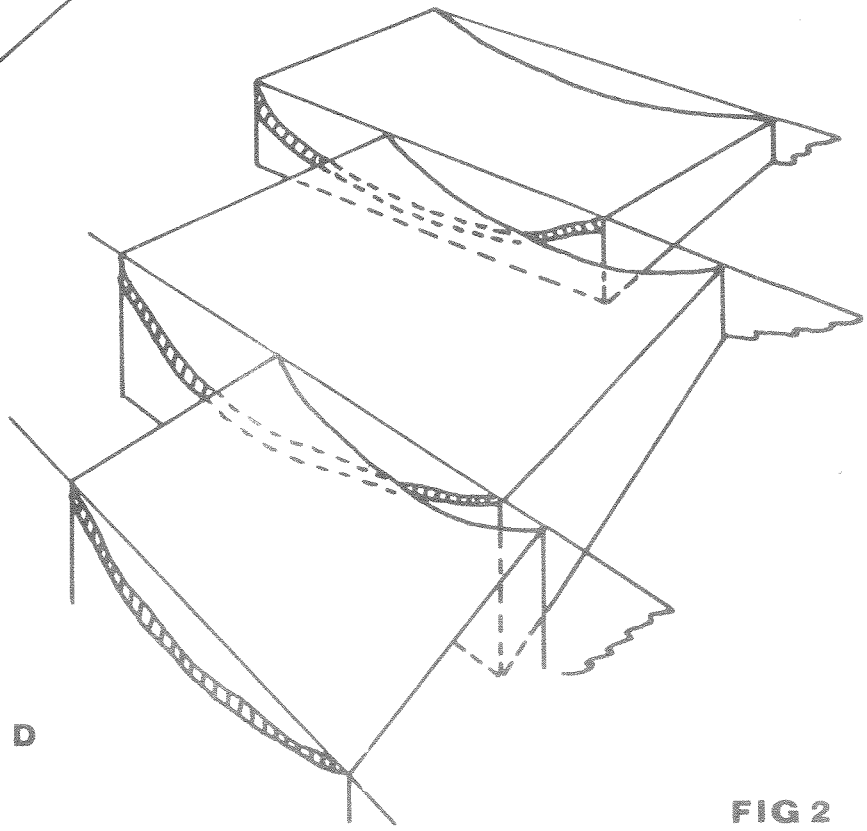

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FIG 2

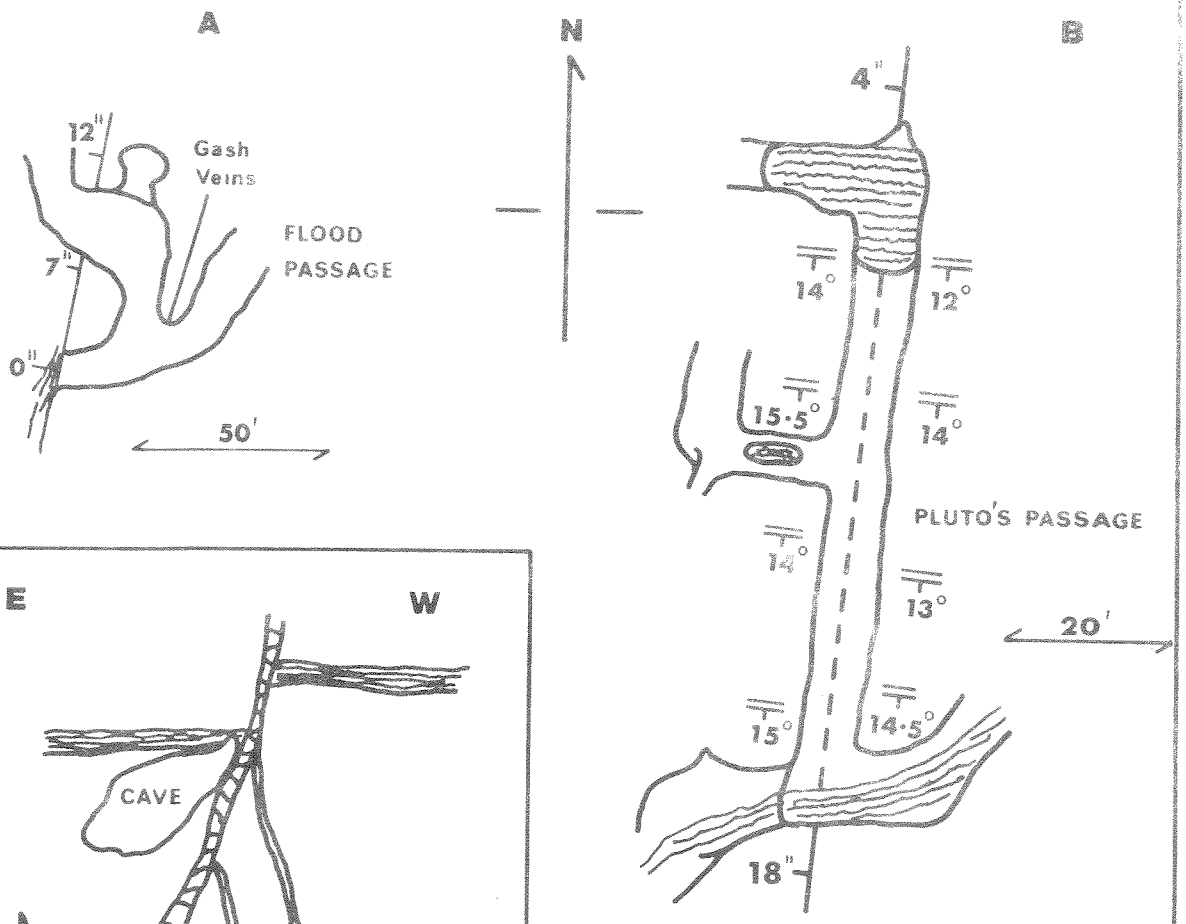


FIG 3

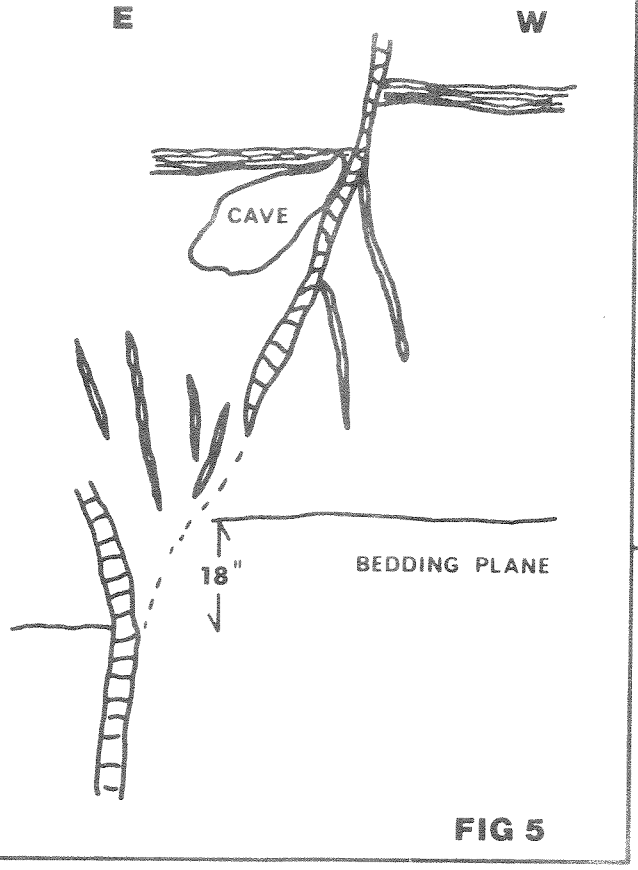


FIG 5

Diagrammatic Section
showing possible
Proto Dan yr Ogof System

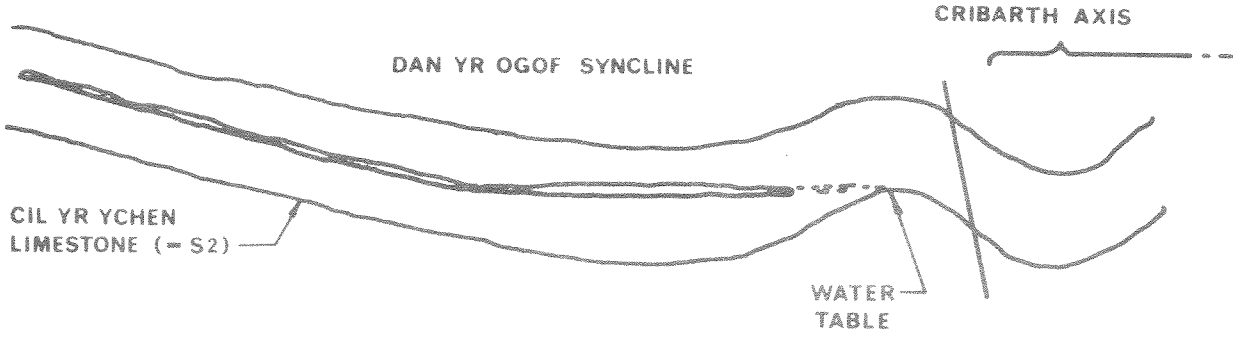
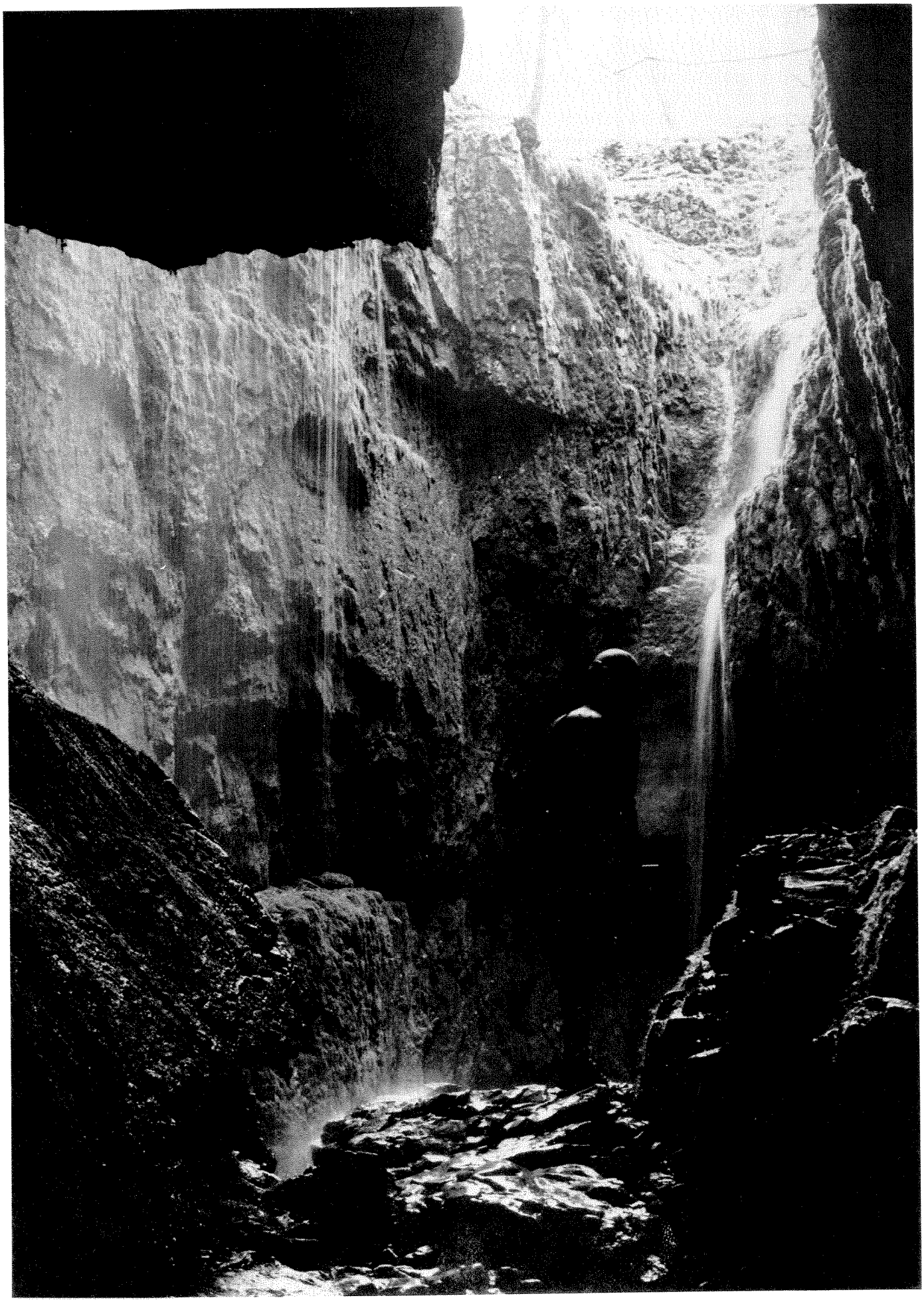


FIG 4

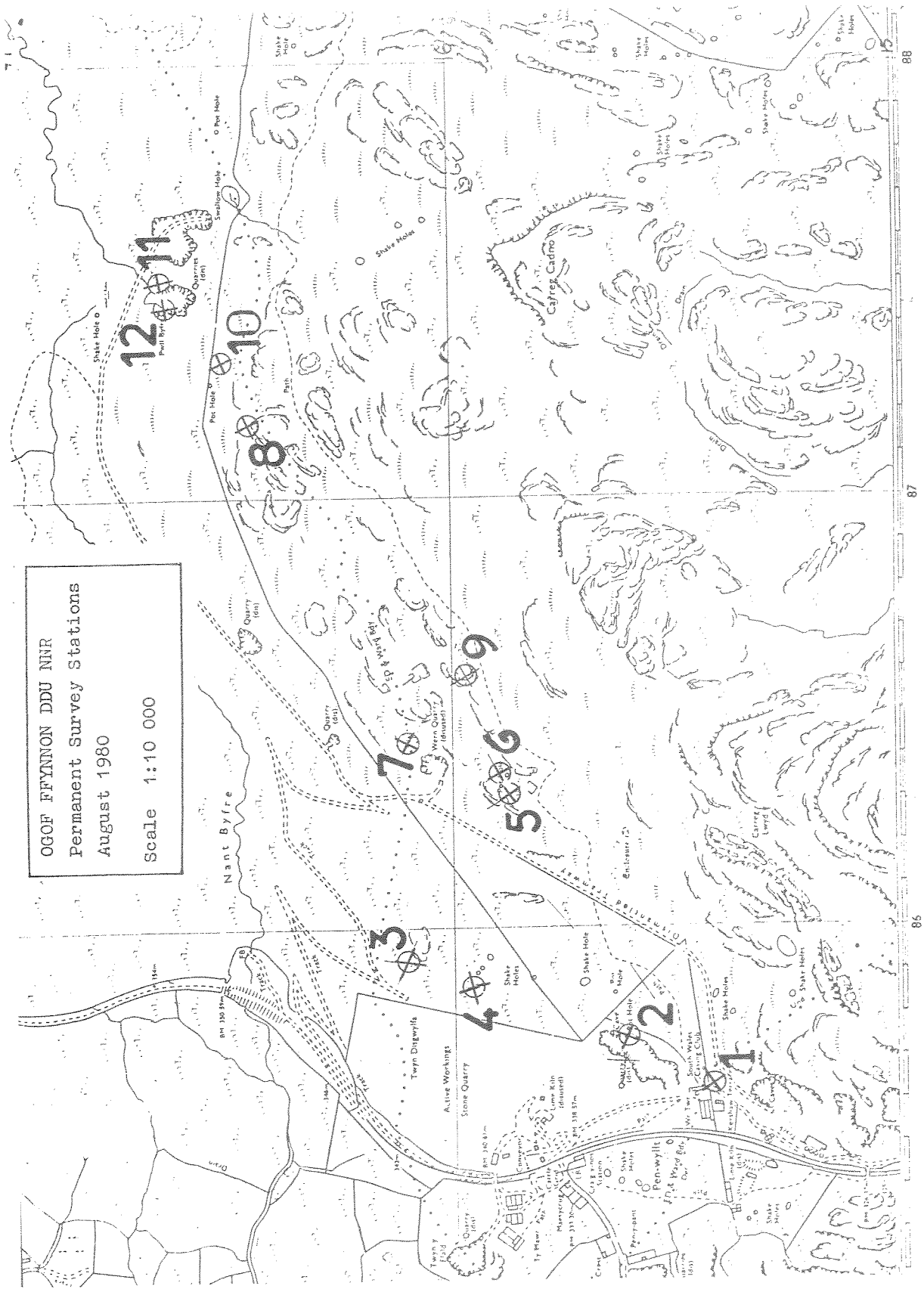


OGOF FFYNNON DDU - A TOPOGRAPHICAL SURVEY

This is a summary of the altitudes and positions of 12 permanent stations set up and surveyed over Ogof Ffynnon Ddu, from South Wales Caving Club HQ to the Pwll Byfre Sink, using a Geodimeter and Wild theodolite on 15th - 17th August 1980.

Stn.No.	Stn.N.G.R.	Stn.Altitude		Station Description
		m.	ft.	
1	8564 1541	339.518	1113.89	Steel tube in concrete, 5cm O/D 11.26m from SE corner of club building. Height checked from 2 O.S. bench-marks.
2	8575 1560	339.042	1112.33	Cwm Dwr Quarry Cave, chiselled arrow on concrete entrance sill.
3	8592 1610	407.145	1335.76	Chiselled cross inside white-painted ring on prominent boulder below limekiln.
4	8587 1595	382.12	1253.7	Twll Gwynt Oer: chiselled cross inside white-painted ring on O.R.Sandstone boulder at edge of doline.
5	8630 1586	433.404	1421.91	Top Entrance Hillock: 56.26m from Top Entrance of OFD. Steel tube in concrete.
6	8635 1589	432.793	1419.91	OFD Top Entrance: Rusty bolt cemented in bedrock, vertically over centre of door.
7	8643 1610	466.296	1529.82	Engine House Quarry Hillock: steel tube in concrete set back from quarry edge.
8	8717 1646	520.213	1706.71	Flat Hill: steel tube in concrete.
9	8658 1596	466.956	1531.99	Permanent Quadrat wooden post No.8, measured to post top; N.G.R. approx.
10	8731 1652	514.73	1688.73	Byfre View: steel tube in concrete.
11	8750 1666	475.54	1560.15	Byfre Brink: stone painted white on east side of the Sink near edge of steep slope.
12	8744 1664	470.27	1542.87	Byfre Sink (West): large boulder painted white, about ⅓m above water level at the sinking point. When measured, the sink was in moderate flood with a slightly swirling pool over 1m deep. In heavy flood the boulder will be temporarily submerged.

The data can be used as reference points by the surveyors currently working underground in OFD. From station 1 to station 8 the altitudes should not be more than 4cm in error. From stations 10 to 12 the error will be slightly greater. The horizontal positions shown on the map may be a few metres in error due to the difficulty of plotting at the scale of 1:10 000. Sites within the cave located by Inductorphone can be adjusted by reference to the permanent surface stations.



This work was carried out with the help of Bob Haycock, NCC Warden, and the following members of SWCC: Roger Smith, Laurie Galpin and Bill Little. In addition, Bob Radcliffe organised timings and labour. Without the invaluable transport provided by Laurie Galpin, the work could not have been completed.

Mel Davies.

OTTER HOLE RESCUE PRACTICE - AN UNOFFICIAL VIEW

The weekend started well. On Thursday night I lay aching and shivering in bed with a temperature of 101. Knowing that nobody would believe this I prayed that the symptoms would go away. Unfortunately, He listened; and they did. No excuses left. Oh well, lets go and see if anything believable turns up.

I arrived at the forest early; the caravan was there but no occupants. Ho hum! I drove around for an hour and then returned to the caravan. Paul Taylor told me where I could camp so I drove off and pitched the tent. When I returned, Sally Harvey was at the caravan. "Where's the pub," I said. Sally didn't know. Somebody thought that it was called the Carpenters - nobody knew where it was. Resourceful as ever I drove to the nearest pub and asked. A helpful barman gave me long, complicated instructions on how to get there. As I got back into the car a kind, helpful local came out and informed me that there was another pub of the same name in the opposite direction; it wasn't too far. I tossed a coin - it fell between the seats. I plumped for the local's directions, it wasn't far, about five miles. Actually, it was ten there and back; there was nobody there. Hmph! Five or six miles later I found the barman's version. My luck was in, the round didn't cost too much. Closing time came and a most interesting drive back to the campsite. Good stuff 6X! Filled with doom-laden warnings about being late in the morning and still no outbreak of 'flu, I fell asleep.

Morning seemed very early (it always does to me!) and breakfast seemed very dry and chewy, strange for boiled eggs. Still no sign of 'flu and all the joints seemed to be working as well. Worse still, I hadn't forgotten any of my caving gear. Give in? O.K! Let's go.

At the car park, organisation ruled. Scouts erected soup-kitchens, faces I knew popped up everywhere and collected dog-tags. Car keys were collected and blood groups collated. H.M. Coastguard arrived and nearly everything went according to plan. When all the bodies were sorted out we found that SWCRO and Midlands had fielded 27 people (what, only one Welshman?!) but the non-appearance of the Mendip team meant that this group had to be split into two. I wound up in the second group, another hour to wait. The adrenalin subsided, another pee perhaps, maybe a branch will fall on me!

The first party including the victim - sorry - patient left base camp for the cave: the first rescue team followed shortly after. Two more cigarettes, now we can go. Steeply down hill through the trees almost to river level and then parallel with the river: it's about half a mile in all. I didn't break my leg and my lamp works. It should do - it's brand new! All excuses gone now, so have most of the team. I followed Emyr into the entrance, a gate followed by a narrow vertical rift. "Which way?" a muffled voice asked. "Straight down," I replied and promptly did so, straight past Emyr's boots projecting from a small crack. At the bottom of the rift is a small horizontal tube the end of which changes level by two feet up through a tight hole. Above this hole and at right angles to it is another tight vertical rift shaped like a letter 'T' on its side and about six feet long. After this is a low chamber with room to breathe. I laid down and breathed. I can hear the sound of

laboured thrutching, punctuated with Brummie curses. I found that section tight, will Brian Major cork me in? "I'm stuck!" said Brian, "And my cell's jammed!" "Hang on," I said. What else could I say? I was in no position to help. The earth boiled and the air turned blue - for hours! Eventually a helmetless face, redder than his Ghar Parau suit and flowing faster than OFD stream, appeared at the other end of the 'T' slot. "That was the easy bit," I said. Emyr caught up and passed up Brian's helmet and lamp and his own ammo box; it weighed a ton. At last we got going, more rifts and crawls which became progressively more lubricated - with mud. Clinging, slimy mud, the consistancy and temperature of cold custard. In no time at all we became several pounds heavier.

Eventually we came to Sand Chamber, I recognised it from previous trips. Which way on? More time wasted. This was turning into a disaster! A body flashed past. It seemed to know what it was doing so we followed it through a short, complicated section. The body disappeared. So did our morale. By now the going was easier: big stal bosses and flowstone slopes, all uniform silt-grey and slippery as hell. At last we reached the sump, it was wide open. Just past the sump is a short, fixed iron-ladder climb into a high level boulder choke - Choke 1. Here we met Paul Taylor with the telephone. He explained the way on to Choke 2. We said we would follow shortly. His party left.

From here was pleasant; a short traverse above the stream and then real stream passage and a chance to get rid of some of the mud. Not a lot, but some. Soon the way on was blocked by collapse so we climbed up into a strange area with lots of solution holes in the floor and then - Choke 2. Rescue team 1 and the victim - sorry, patient - were beyond this in the extensions. We decided to wait here and take over the carry-out from this point. At least we had the company of Paul and his telephone.

We got colder. I was prepared. I had a wooly vest sealed in a polythene bag inside my wetsuit jacket. Lethargy ruled. The jacket zip was caked with mud and I daren't undo it. I decided that I would do it if I got really cold. I got really cold. Lethargy ruled, I shivered.

Paul was in contact with the surface. Was the soup party coming? Would it beat the sump? The answer to this question started to get really important. Where the hell were they? Message: 'One of the soup party has fallen in the entrance series and hurt his ankle. He's being taken out.' Is the soup coming? 'We don't know.' The injured party is out and is being taken up the river by the Coastguard. Good fun, what? Yes, but is the soup coming, the sump must be closed by now. Don't know! Queeg's balls! 'Hello, this is the soup party. We're through the sump and will be with you soon.' The sun shone! Isn't this fun? The soup arrived. If I had been served that in a restaurant I would have called in the food inspectors. Under the circumstances, it was nectar.

Muffled voices filtered through from the other side of the choke. A ladder pitch was being negotiated. Rescue party 1 had almost arrived.

"Pull together."
"Together!"
"Oh,Christ!"
"Let go you silly sod!"
Better than the Archers.

Looking up the tight, loose rift which was the return into Choke 2, I could see rescue team 1. Equipment bags were passed down and then it was the victim's - sorry, patient's turn. He didn't fit, or rather, he did - perfectly! But he wouldn't come through. He was pulled out and re-inserted at a different angle. No good. Out again and off with the thermal bag. Still no good. Very close, but not quite.
"Pass up a lump hammer," said Jop from above. Everyone below took one lock at the state of the choke - and ran!
"Urinate somewhere else," I said, or words to that effect.
"It'll be alright," said Jop.
Strangely, we couldn't find a lump hammer anywhere! Eventually, the patient climbed through under his own steam, the lesson was noted.

The chamber in Choke 2 became very crowded. With the two rescue teams and the soup party and doctors and photographers we must have numbered 40 people. Chaos reigned! Rescue team 2 took over the carry. We were glad to, we had been sitting in Choke 2 for four hours.

The carry back to the food dump, just by the traverses, went well. Too well. When we got back to the food dump we still had an hour and a half to wait before the sump opened. Due to the original splitting of the team into two parts, rescue party 2 had tea, milk, sugar, primus and fuel, but no water. As the water in Otter is not drinkable, the rescue dump water was used to make tea. One primus, one mess tin and one hours wait if you were sixteenth in line. Still, the anticipation passed the time.

At last the river dropped below the traverse and the draught started again - the sump was open. Rescue team 1 thundered past and headed for the early bath. Now the fun began. Twenty bodies sat across the traverse and passed the patient - sorry, victim, over. Then the bastard bit - up a narrow 30 degree slope with 'V' shaped floor, flowing with liquid mud. Laying outwards, trampling on each others feet, mud in the patient's eye, struggling up one foot at a time. At last, into Choke 1 and a breather. Now a long lower back down to the fixed ladder and down to the stream. At this point, two photographers who were busy taking shots of the struggle were sent packing with a beautifully voluble flea in the ear. One nasty moment getting up onto a jambed boulder and then down to the stream and through the three-quarter open sump. This was followed by a most unpleasant carry for about 200ft through thick mud and over slippery boulders and then it was all over. The entrance series had been tried before and was known to be feasible.

Paul Taylor took off like a rocket. I followed suit. My cigarettes had gone out with rescue party 1 and I wanted one. Near the entrance I saw Brian Major, he looked tired. I didn't offer to wait! At last, the entrance, 2am, plenty of tired looking scouts dishing out soup but no cigarettes. Now I'm not an addict, much, but this was serious. No, I'm saved, I can hear Emyr's ammo box coming through the entrance series. Perhaps he wont be far behind. He arrived; he looked tired too. I scrounged a cigarette

and set off up the long slog back to base camp. I had been dreading this bit but it just sailed past. The pump station for washing off was a bit crowded so I didn't bother. I was past caring.

Back at base camp there was tea and coffee and cigarettes. Lethargy set in again. No water, nowhere to wash and plastered with mud. Have another cigarette and think about it! It took another hour just to remove the wetsuit and pull long johns over the mess. I drove back to the campsite, wrapped my head in a towel and climbed into bed - 4.30am.

Sam, in the next tent, got up early. He'd got to bed earlier. Oh well, a cold wash in the farmyard soon cleared most of the cobwebs, if not all the mud. We all met up in the car park again and swapped lost gear, what we could find. Some of it is probably still down there! Then, off to the Carpenters'. I managed to turn Sunday lunchtime into Saturday night. Then, back to the camp site. It was pouring with rain. I'll just have a ten minute kip before I take the tent down.

I woke up at 8.30pm! It was still pouring with rain. Soggy tent, muddy gear, and a bleary-eyed drag up the motorway. Ho hum! I started to sneeze. So that's His idea of a joke!!

Dave Edwards.

Just in case anybody gets the wrong impression from this article, I should add that in actual fact the planning and organisation of the rescue practice was really excellent and that the rescue was probably one of the best executed that we have ever achieved.

D.E.

NEW YEAR IN POLAND - 1980

The first thing that hit Pete Francis and myself as we stepped off the bus in Zakopane was the intense cold. The smog around the small, tourist town almost hid the stars from view on this chilly, boxing-day night. Everyone at the bus station was armed with a pair of skis, eagerly waiting for their transport to the larger hotels south of Zakopane in the granite, 'high' Tatras mountains. A small group of us huddled together in one corner awaiting a different bus to take us to the limestone region of the 'West' Tatras.

Arriving in Kostchalieska Ddina, we made ourselves at home in a lofty and very cold barn. Six members of the Krakow Club were with us and not one of them could speak a word of English, yet we could feel an understanding between us having the one thing in common.

It was two days later before we started our first caving trip with Krzystof and Nicholi. There was not much snow about but it was very cold indeed. Dolina Kostchalieska was frozen solid and it took the brisk four mile walk up the valley to acclimatise to the extreme cold. We headed up a small path on the steep, eastern side of the valley towards the base of an impressive, 400m, limestone cliff-face. From here we had a splendid view of the rest of the valley, carving its eight mile path towards the final ridge to the south, and the Czech border.

The gated entrance to Black Cave opened out into an almost vertical fissure running straight into the mountain. We were constantly climbing up and down and traversing along break-down on the floor. The cave had already been rigged by an earlier party from the Krakow Club who were exploring in the further reaches of the cave. Our progress was fast and we reached the last 80m pitch, before the terminal mud choke, in three hours. Stopping for a quick bar of chocolate and an orange, we made our way back to the frozen darkness of the outside world. This cave is commonly used for novice trips and the difficulties were very slight however, we did find the frozen climb at the entrance very slippery without crampons.

After a very drunken New Year celebration I set off with Krzystof and Nicholi to descend the second deepest cave in Poland, the 527m deep Banjo Cave. We had many reports from the cavers coming off the mountains that strong winds were blowing on the tops; a sure sign of the coming storm which delayed our departure until gone mid-day. Six hours later and 1000m above the valley floor we found the top entrance of Banjo Cave. This was first explored less than two years ago, from the lower entrance, making this one of the most complicated and arduous caves in Poland today. There are seven bottoms and it was our aim to traverse from the top entrance to the lowest bottom, some 527m in depth, and back again. This had only been done three times before and this particular bottom had only been visited five times before; quite a unique trip. The first half of the cave followed a steep 70 degree angle with complicated small crawls and boulder chokes, and a long section similar to Salubrious Passage with slimy moon-milk all over the place. A 90m climb down a rift, which should have had a rope on it, brought us into the Grand Canyon. This was a fairly wide rift meandering down to the first campsite used for the exploration of many of the passages that we had just traversed. It was here that we realised that we had overtaken the party of Warsaw cavers who were rigging the cave for us, explaining the absence of the rope on the last pitch. The next three pitches descended a total of nearly 150m, the last one being a superb cylindrical shaft with a free hanging drop past beautiful fluted walls. We now entered the Crazy Meander through a tight squeeze into a nasty tight rift with a small stream flowing for half its distance. This dropped 180m in about 1½km and ended in the inevitable, undived sump. From here to known resurgences in the valley is a nearly 200m vertical drop and not a lot horizontally. Four hours of caving brought us to this point and we had a long haul out again which took almost twice as long. It was snowing quite hard when we got out into the dark of the morning and we had to climb up to the summit ridge and down the southern flanks of the mountain to avoid the avalanche prone area just above the lower entrance. I think I slept for almost two days after that. In the meantime, Pete had had a epic trip down 'Cold Cave' whilst trying to take photographs.

The next few days we were held up due to a tremendous downpour of snow. It was so cold and the three feet of very light powdered snow made conditions on the mountains very treacherous. Things brightened up and a trip to Bird Cave was planned. The weather had to be as near perfect as possible for this excursion because of the 200m fixed rope climb to get to the entrance. With news of bad weather on the way again we had to risk the bad conditions.

Reaching the head wall of the hidden valley it was clear why there was a fixed rope to aid our progress to the entrance. The vertical and overhanging wall loomed over 400m above us. Small avalanches hampered our slow progress and it was well gone dark before we reached the entrance, situated underneath a huge, impressive overhang. Changing in a temperature of almost minus 40 degrees, we gingerly stepped past a protruding buff to reach the entrance shaft which plummeted 80m straight from the opening gash, guarded by a beautiful ice column. At the bottom, squeezing through some boulders, we descended a narrow canyon in the floor which immediately opened out into a large chamber with the floor 40m below. Two small pitches followed, one with a tyrolean traverse, leading into a large hall with the roof soaring off into the darkness above. Two more pitches lead to the head of the final 'big' one, Father's Pitch, 100m of beautiful, free-hanging SRT: the second biggest pitch in Poland. Landing on a wet, gravel floor one finds that all leads from here are choked but this was still a fine 320m pothole. Abseiling off the mountain in the dark proved to be quite precarious but we finally made it back to the barn as the sun rose over 'Big Brother' to the east.

Altogether a splendid three weeks was had by all with some superb, sporting caving behind us. Because of the horrendous locations of the cave entrances in the Tatras Mountains, Polish cavers are usually good mountaineers as well. Sometimes it can take up to two days to get to some cave entrances which means an appreciation of many specialised winter mountaineering techniques. This is probably why there are only 2000 odd cavers in the whole of Poland with only a small percentage of that number who ever reach the top. Most cavers in Poland now use SRT as the standard method of descending caves; ladders are unheard of in some quarters. I must say that they have mastered their own specialised techniques to overcome the unique problems of caving in their own country and that this has been a very hard task, against tremendous odds, considering the difficult way of life that they have to live.

Phil Rust.

CLUB MEETS?

The greater the size of a body the harder it becomes and the longer it takes to communicate information to its individual members: dinosaurs are a good example. Is the growth of membership of SWCC causing the same thing to happen? If so, then the club is not functioning as efficiently or effectively as it should.

How many times have you come to the club with no specific caving plans and no idea who is likely to be there? Fairly often I would think; and has the result often been a standard, non-productive tourist-trip at best or, at worst, a negative fester at the pub? O.K., we all like the occasional fester and it's more enjoyable spending time with convivial fellow festerers than weeding the garden at home but, with ever escalating fuel costs, it makes it a rather expensive pint nowadays.

It is interesting to note that concurrent with the rise in fuel costs over the past few years has been a significant drop in

active (i.e. non-tourist) caving. So significant in fact, that Tony Oldham, in his latest literary gem, has written us off as a now minor, local club. How far are we prepared to sink?!

I am sure that the majority of members would like to think of themselves as respectable, active cavers; so what can we do to stop this rot? Perhaps one answer might be to have a calender of club projects/meets. Although frowned upon in the past, this system would give a sound framework on which to base and direct activities.

With the size of the cave systems already on our doorstep, new members can quite easily spend the first few years of their club life pottering happily around OFD until they know it off by heart, and then retire having contributed nothing constructive to the caving world.

People need to be pointed in the right direction and, with thoughts of fame and glory as an end result, often want to be. Where should they be pointed? South Wales probably offers the best area for discovery potential in Britain with large systems just waiting to be found by those dedicated enough to look.

Dan yr Ogof still has huge potential. A link between Dali's Delight and Mazeways II is imperative for any long push there and that must be the key area in the cave. The Sink y Giedd area must yield the back door to Dan yr Ogof and what a through trip we'll have when that is found!

West of there, with the exception of Pwll Swnd, virtually no cave is known but one look at the Ffrydiau Twrch risings should convince even the biggest unbeliever that there must be extensive cave systems there.

Going East, Pant Mawr offers great potential and easy digging and Clive Jones has always got some hole in Ystradfellte area which he's prepared to take you down.

Knowing that these areas exist is of no use unless they are pushed systematically, hence the suggestion of a 'meets' calender. A typical format for this could be; week 1 - Pant Mawr dig: week 2 - surface walk/dig west of Sink y Giedd: week 3 - Ystradfellte area dig: week 4 - Sink y Giedd dig: week 5 - OFD survey: which is then repeated all over again. This way, no one gets bored visiting the same area all the time and different experienced leaders can take turn in assuming control.

Too structured? Well, maybe so; but it's about time that this club started finding things again if only to stop the intimidating Yorkshire success story, and this might help us to do just that!

Pete Francis.

CAVING IN WEST WALES

In May this year, Lizzie, Rowan and I, together with John Stevens, Viv and kids, and other friends and kids (Kids everywhere! Familiarity breeds!!) rented a cottage from the National Trust estate at Stackpole, 5 miles south of Pembroke. The following is a brief account of the caving we did and didn't do.

Stackpole Quay is a tiny harbour and beach marking the start of the limestone which forms the Castlemartin Peninsular. Most of this limestone is out of bounds as it is controlled by the Army and is used as a live firing range. When there is no firing scheduled, the Army will let you on to certain bits but by far the largest part is permanently out of bounds and therefore unexplored as far as caves are concerned. A dawn mission to view this Army territory proved abortive due to Rowan complaining that he needed his breakfast and didn't like shellfire. The odd bits of twisted metal scattered about underlined the 'live' nature of the firing. The bit that we did look at therefore was from the 'Green Bridge of Wales', a large, well-photographed limestone arch near Stack Rocks, eastwards to Stackpole.

The scenery is, to say the least, awe-inspiring. Of particular interest, beginning at the western end, is the huge cliff breakdown between Elegug Stack and Flinistor Bay. Here the sea has produced cave collapse of massive proportions. There is a pit of about 25m across, dropping from cliff-top 30+m into the sea below; the bottom being illuminated by a large series of arches opening out to sea. This hole is made doubly scary by the hundreds of gulls, fullmars and razorbills nesting there. It would seem that the hole (or holes as there are other, smaller shafts) is caused by sea action rather than freshwater cave development. There are signs of old cave collapse exposed in the cliffs nearby but, despite a bit of airy scrambling, I was unable to find any sign of cave related to inland hydrology. Tony Oldham however, in his book 'Caves of West Wales', does mention finding eroded stal in this area. I didn't find any.

Further east are a number of sea-caves which, though I assume they don't 'go' inland, are nevertheless very entertaining in the antics necessary to get down the cliffs to take a closer look. For some of the caves a boat is essential and therefore we didn't visit them. Occasionally the caves are connected to the surface by a blow-hole; a most spectacular one being near Saddle Head where a black, pothole-type opening drops about 40m to the sea-cave below.

Due to firing on the range, we were unable to visit Ogof Govan which is east of Saddle Head so we turned our attention to the area Stackpole Quay west to Broadhaven. There are several interesting and difficult holes here but it is also a tourist ridden area and muddy cavers with rucsacks full of rope and nice bright tapes and pegs are liable to get an audience. John and I visited the place in the evening and had a quick look at most of the obvious holes. There is an interesting 'window' in Stackpole Point but the cliff overhangs sheer into the sea, 50m down. There is also a spectacular cylindrical hole dropping down from the top of Gun Cliff Bay which has no belay point and would need to have stakes driven in to facilitate exploration. One pit, just on the point east of Broadhaven, was a very tempting, vertical, cylindrical hole, 15m wide, with the sea filling the bottom. We resolved to try and swim into this hole and next day saw us battling around the point looking for the sea level entrance. Either the tide was too high or there was no man-sized hole connecting the pot to the sea, for we found no way in. We noted several other sea caves during our swim but eventually had to climb out of the water and scale the cliff due to the cold and the tide preventing us from swimming back.

For sheer fun and family caving you can't beat the little cove just south of Star Rock on Broadhaven. The kids and mums really enjoyed themselves exploring the caves that dot the cliffs here and connect one cave to another. None go out of sight of daylight but they were great fun and gave numerous through trips. One cave, higher in the cliff face, was of interest in that it was in a heavy conglomerate and part filled with old, redish silt. Someone had obviously been digging here but the dig was not systematic and very hastily undertaken.

Well, we didn't find lots of new caves. Pity, but the plateau is only 'recently' abandonded by the sea and there are few signs of surface features which would suggest a developed cave drainage so the potential is slight. It's a great place for a holiday though!

Perhaps, as an afterthought, I ought to comment on the only guide book available specifically devoted to West Wales. (Tony Oldham's 'Caves of West Wales'. See also book review. Ed.) I didn't think it was worth the money (£2) but it was the only book with even a hint of cave description. Coverage of the area is sketchy and gives no indication of areas of possible potential or of 'known', but unexplored, sites. It strikes me that the book uses mainly library sources rather than personal knowledge of the whole area. Presentation is poor; numbers and figures are difficult to distinguish due to poor reproduction. There is also a dig about SWCC being a club which 'now seems to specialise in the Swansea Valley'! A pity; look closely and you'll see that quite a bit of the information in the book comes from old SWCC Newsletters. Nevertheless, it is the only guide available to date.

Gary Jones.

BOOK REVIEWS

THE CAVES OF WEST WALES by TONY OLDHAM

Yet another duplicated volume from the financially orientated quill of Mr.Oldham. If you are interested in sea caves, buy now, as it is bound to quadruple in price in six months time from its already £2 cost. However, you do get a liberal dose of advertisements as extra value.

If Mr.Oldham wishes to produce a volume on sea caves, many of which are outside the limestone area, he really should take up sea canoeing; it's far easier to explore them that way, and more enjoyable. He would also find that there are dozens more than those which he has listed, often more interesting ones at that.

It is good to see that he has at last included some of the more important caves which he missed out in 'Caves of Carmarthenshire' such as Ogof Coygan and Green Bridge Cave; an event due probably to the help of the much publicised material of Mel Davies. But speaking of Mel, do get your facts right Mr.Oldham. John Parker found Ogof Gofan; Mel was merely responsible for stopping access to it.

Good quality soft paper, excellent for those with heamorrhoids; but don't worry Tony, you will be a millionaire before the rest of us.

Pete Francis.

THE DARKNESS BECKONS by MARTYN FARR

Anyone who thinks that this book will read like a watery version of 'Life and Death Underground' will be very much mistaken. In fact, Martyn seems to have really got everything together and the result is impossible to fault, right from the word 'go'.

The glossy jacket, with excellent colour photographs, encompasses exactly what the sub-title says, the history and development of cave diving. This is covered, in well written style, from the earliest attempts up to the modern day and includes a survey of the current international scene. The text is extensively illustrated with a good selection of colour and monochrome photographs, both ancient and modern, and clear explanatory diagrams. There is also a useful appendix which includes a glossary, bibliography, accident analysis, long dive records and a comprehensive index.

I found Martyn's narrative both readable and informative with just the right degree of involvement, neither self-effacing nor opinionated, and genuinely very difficult to put down.

This book is a must for any caver's bookshelf and will, I am sure, become one of the caving classics.

Dave Edwards.

EIGHTH INTERNATIONAL CONGRESS OF SPELEOLOGY - JULY 1981

Since 1977 when the club was host to the main speleo-camp of the Seventh International Congress, many of us have looked forward to the possibility of going to the next Congress. The Eighth Congress will be held in Bowling Green, Kentucky, USA, from the 18th to 24th July 1981, with field trips, camps and excursions in the weeks preceeding and following. As organiser of the camp held at Penwyllt, I have been involved in producing a preliminary costing for a trip to the USA based on a three week package. Below are outlined a variety of itineraries with their respective cost. Hopefully, this will enable club members to get some idea of the overall costing.

Firstly, let us deal with the Congress fees themselves. Based on current exchange rates - with a strong pound - we have $2.36 to the £. Full membership is $106 = £45; accompanying = $71 = £30. It would seem that unless one is a member of the Congress one cannot benefit from the excursions etc. Also, if you don't join the Congress and participate in the Congress and camps, you may as well go off-season when things are a lot less expensive. As it is, July is peak season for travel, accomodation etc. Accomodation at the Congress is $6 per day (£17.80 per week); food is about $7 per day (£20.76 per week).

Camps:- There are a lot to choose from. Art Palmer (of Mammoth Cave) suggested to me the following as being the best (based on inside information).

Pre-congress	Post-congress
Greenbrier, W.Virginia (£46.60) (Horizontal)	Carlsbad Camp (£105.95) (New Mexico)
or	or
Northern Alabama (£50.85) (Vertical)	Flint Ridge (£29.60)

He has offered the club a private Flint Ridge-Mammoth camp in the second week after the Congress - this depends on time available.

So, the overall cost to a caver attending the Congress, going on a trip to, say, Greenbrier camp and post-congress to, say, Flint Ridge will be £159.76, plus pocket money, plus travel to and from the camps to the Congress. However, the biggest cost is yet to come. Actually getting to the USA is by far the largest expense and one is plagued by the fact that the Cogress is held during the height of the tourist season at peak rates.

As usual, Freddie Laker is cheapest at £249 return to New York. This is the cheapest bookable flight (at the time of writing). Laker do a cheaper 'bus' ticket but in July you can wait up to three days either way to get a ticket. Most people will want to go for about three weeks so that kind of wait could be unacceptable. Arriving in New York, you are still several hundred miles off-target and if time is at all important to you a more direct flight would be better. These are available, but are very expensive indeed. Travel within the USA is therefore a very important consideration as distances are vast.

Pan-Am have a fly-drive package which is expensive but very comprehensive. Avis 'Rent a Car' also work via Pan-Am and British Airways do a similar deal. Minimum cost about £347 for two weeks, plus petrol, plus taxes.

Trek-America do a three week trans-America trip for £204 (plus food) which includes camping at set sites with a guide. One would hardly expect them to be flexible enough to detour to the Congress at the height of the season, and air flights to and from the US are extra to the above cost.

Jetsave America (I thought it was God save America!) do a very nice motor-camper package which, however, works out at about £450 per head, per two weeks during the tourist season.

After much searching, Custom Tours produced the best deal which was £380 for a return flight to Nashville (nearest airport to Bowling Green), hire of car and two nights hotel in New York. This deal is specially for cavers attending the Congress, at our request. They can also get a group direct to Bowling Green for £280 per head return, without the car and N.Y. stop etc. This is the best deal yet, however, there are snags. One has to fill a large portion of the 'plane (about 250 seats) and this can only be done on a national basis. Dave Judson will be putting this costing to the BCRA soon and, depending on their response, this could be the accepted arrangement; viz. three weeks in the USA for £280 minimum. Add to this the cost of the Congress itself (£160 + £280) = £440. So, the minimum cost of attending the Congress and the nearest two camps will be £440 plus about £50

internal travel, plus fun money.

If you want to have a sight-seeing holiday it'll cost a lot more. The Carlsbad camp could add another £200 to the total as could any trip west to the Rockies or the West Coast. Hitching rides and bussing are time consuming and on a three week trip it couldn't be done. Pity.

So, keep a look out for the BCRA arrangements, which should be the most competitive. In order to reduce costs as much as possible, people should agree to travel together, to apply for grant-aid together and maybe start fund raising together. It sounds like it is going to be a very expensive trip.

Gary Jones.

A LETTER FROM TURKEY

To my dear friend Mustafa Pint,

At long last, my dear friend, I have returned to my village, Manavgat. The mountains, they are now so far to the north and yet I can see them from my father's home; the Tarus Mountains that stretch like a strong breast shield across the Southern Region of our country, Turkey.

This last summer I spent up in those mountains, watching over my father's flocks of sheep and goats. It was not my first time amidst the peaks of towering white rock although it was through them that I came to appreciate the land of my father and of my father's father and his father before him, etc.....!

One day, as I was thinking just such things as these, and about how so few people ever come to these wild places, (as different from your city Istanbul as a forest is to a desert of sand), when the sound of voices talking in a strange tongue disturbed my ponderings. I chased over rocks and through bushes and took up a discrete position behind the bushes. It was the strangest sight that I have ever seen Mustafa! There were three men carrying great packs upon their backs and lashed to the packs were several small cages although I could not see if there were any captured animals inside them. They struggled through thick bushes and clambered over great mounds of sharp rock and I wondered at this because there was a wide, easy path close by. My puzzlement increased further when, at the great pit of no bottom (where we throw down all the dead sheep and goats), they stopped at its very edge and unloaded their heavy packs. Next, they all undressed!! I was filled with amazement. Perhaps they were some suicide sect and were going to leap en-masse into the depths. It became more strange when they dressed again in different clothes, like symbolic sackcloth, and placed on their heads hats fitted with charm lanterns. Each blew into their own lantern and muttered in their foreign language, probably a blessing, "It needs bloody pricking!!"

Soon the cages were brought to the hole's edge. Well, that was it, I thought that they were Priests and that the cages symbolised captive creatures being released to the spirits of the earth! Then my friend, to my further amazement, they opened the cages, turned them into ladders and in no time were descending the hole of no bottom.

They returned to the surface after one hour, pulled up the ladders and once again turned them into cages. Then, with all their packs and cages, they moved to other holes and repeated the same ritual. At this, my friend, I had to return to my wandering flock which by now was stamping through the camping site of those strange people.

When night came and the sky became heavy with stars, the same stars that my father and my father's father and his uncles of grandfathers had gazed at before, etc, etc,....., I could see their campfire glowing in the dark and the three strange men gathered close to its warmth and comforting light. One was reading a book: he was slim, had a neat beard and wore a scruffy cloth cap. Next to him was a short, fat man also with a beard. He spoke a strange incantation in a low, sad tone, "Could do with a pint of bitter!" The remaining one was very tall with pointed chin and thin, slitty eyes. He ate bread and jam, one slice after the other, and never spoke.

I approached the fire and sat a little way back but in full view of the strange trio. The one who was reading the book broke the silence with a greeting in my own language and the short, fat one followed suit. They began to ask me questions. Did I like it up in the mountains? Were there any wild beasts in the area? I replied that there weren't any as I had not seen many wild creatures, but even as I spoke I remembered all the animals that we had lost lately. Next came questions about holes in the ground. I looked about for a quick escape - I thought they would use me as a sacrifice! But no my friend, they were extraordinary indeed and asked me questions about my mountains that I had never before considered: about rivers flowing out of rocks and more bottomless holes.

Eventually I left their camp and returned to the quiet of the mountains. As I climbed the hill to rejoin my flock, I paused for a moment to observe them slumbering around their fire. It was the only visible sight around except for the watching stars in the sky.

Well, Mustafa, my brothers and sisters are in good health as are my father and mother. I enjoyed the journey back to my village, it took two weeks travelling through the mountains. I must sign off now and hope to see you soon.

Your devoted friend,

Ali Inkpot.

P.S. For several days I watched those strange men going all over the mountains. On their last day they were searching all their equipment and it seemed that some of the sacred cages were missing. They became extremely agitated, shouting at each other, until I could no longer see them through the dust and chaos! I later found these cages quite close to the camp so, to appease the spirits of the earth, I sacrificed them to the bottomless hole!

Harvey Lomas.