

SOUTH WALES CAVING CLUB

1946—1956

SOUTH WALES CAVING CLUB.
TENTH ANNIVERSARY PUBLICATION.

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FOREWORD.

by

F.J.North O.B.E., D.Sc., F.G.S., F.S.A.

It is a privilege to contribute a foreword to this account of the activities of the South Wales Caving Club during its first ten years, and to pay tribute to the optimism in planning, courage, endurance and ingenuity in practice, and diplomacy in negotiation that modern cavers display.

Though comparatively limited in extent the outcrop of Carboniferous Limestone along the northern rim of the South Wales Coalfield is unusually rich in caves and their related features. It not only offers every inducement to indulge in caving as a sport but it affords unique opportunities for studying many of the problems connected with the origin and development of caves, the underground movement of water in limestone, and the adaptation of animals to cave life.

The Tenth Anniversary Publication shows that the South Wales Caving Club have the satisfaction of knowing that whilst they have enjoyed to the full the excitement of a sport that has been described as mountaineering in reverse, they have added greatly to our store of accurate knowledge of the underworld. They have opened up new and extensive vistas in research, not only for themselves but also for the many whose interest in the subject is not matched by a capacity for personal investigation.

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THE FIRST TEN YEARS

by A.H.Hill

Ten years have passed since the South Wales Caving Club was formed. This was more than the case of a few keen individuals deciding to form a club irrespective of others already in existence. The proposal was part of a plan to establish caving in South Wales on a basis likely to be acceptable to all clubs which had been active in the region before the War, and also to those which had arisen elsewhere during the War and could reasonably be expected to expand their scope in the direction of Wales in the future.

Pre-War Activities

It is necessary to sum up the position in 1939 to appreciate the reasons for the proposals and decisions made in 1946.

The Wessex Cave Club had started caving in South Wales in September 1936. This was begun by a few members resident in and around Cardiff supported by others from Mendip. The White Horse Inn at Pontneathvaughan was used as headquarters and the Vale of Neath was the main field of operations. Several of the larger caves were extended and surveyed; their most important find was Wills Hole at Dinas Rock.

In the Tawe Valley, Dan-yr-ogof attracted large parties to complete its exploration in 1937. With full co-operation of the owners they were drawn together first by E.E. Roberts (Yorkshire Ramblers Club and well-known mountaineer) and later by G. Platten, also of Y.R.C. and a man of considerable caving interests. Again Mendip cavers of various clubs were in the majority. It is not surprising that first impressions led to quite frequent visits to explore other caves and to make surface examinations of this comparatively virgin area. An early move was the formation by Gerard Platten of 'The Dragon Group' composed of cavers, regardless of club, to further exploration in South Wales. The Gwyn Arms was frequently used as headquarters.

In the latter part of 1938 a Welsh Group of the Mendip Exploration Society was formed. This was composed of members living in the Swansea and Tawe Valley districts but was subject to the rules and organisation of the parent club based at Bristol. Among an enthusiastic group perhaps Ken Radcliffe should be singled out by name for his excellent work in tracing caves and the high standard which he quickly attained. During this period a number of interesting finds were made which included a new cave at Cwmdwr Quarry (Penwyllt) - subsequently to be lost by quarrying - Ogof Pwll Swnd on Foel Fraith, and the entry of an active swallet at Ogof Fawr, Pant Sychbant (near Penderyn). Several caves, the existence of which was rumoured by local gossip, were

located and explored. Others, of which the caves at Llandebie were probably the most notable, were found to have been lost by quarrying. In this connection it must be said that Gerard Platten did a monumental work in sifting Welsh guidebooks, geological surveys and library records to produce knowledge of caves and possible caves which he imparted liberally to individuals and generally through the Mendip Exploration Society's Journal - later to reach a wider field as "The British Caver".

The caves of Gower were explored by Brig. E.A. Glennie and party. Ogof yr Esgyrn (The Bone Cave) at Dan-yr-ogof swiftly yielded some thousands of human bones when a new excavation was started by E.J. Mason in 1938. This work was to continue for several years and brought to light a site of some considerable importance.

In a very short space of time a caving area of a wild, mountainous nature - as exciting as it was interesting - emerged from the unknown. Despite such a publication as that of our President - Dr. F.J. North, The River Scenery at the Head of the Vale of Neath, (National Museum of Wales) which incidentally appeared in 1930, the area had remained unknown to the majority and visited only by the few. Undoubtedly there were individuals living in South Wales who had explored many of the caves, but without the permanence of club records their efforts remained largely unknown. The advent of the Wessex Cave Club and those who followed produced the scribe as well as the experienced caver.

British Speleological Conference at Swansea

The culmination of this period of intense activity was the Annual Conference of the British Speleological Association held at the University College, Singleton Park, Swansea in August 1939. The selection of Swansea for this distinguished assembly was not only a tribute to those who had opened up the area in such a short time, but was also an acknowledgment of its magnitude and newly found importance.

The B.S.A. was established in 1935 to provide a national body to advance all departments of speleology. Immediate support was received from the majority of clubs. It rapidly gained prestige and had headquarters at Settle, Yorkshire, with library, museum and recording centre. It survived rather a stormy passage, mainly due to financial troubles, to the outbreak of War. The annual conference, which included lectures, field trips and cave exploration, were well supported and well organised. The Swansea Conference (locally organised by T.A.J. Braithwaite) was no exception. Jimmy Braithwaite played a big part in Welsh activities of the Wessex Cave Club at the time.

It must be a matter for regret that the B.S.A. has subsequently lost much of its character as well as the wholehearted support which it received before the War. From the club angle one of its most useful functions was the recording of new finds and excavations thus avoiding confusion and misunderstanding in areas where a number of clubs were covering the same ground. Once a club had recorded with the B.S.A. it held prior right to continue work or exploration to completion, subject, of course, to land-owner's permission. As far as Wessex and M.E.S. Welsh Groups were concerned there appeared to be an unwritten agreement that Wessex worked east of the Swansea Valley and M.E.S. in the Valley and to the west.

1939 - 1945.

Precisely one month separated the B.S.A. Conference from the outbreak of war. The first effect on caving was the break-up of the local caving groups. Numerous members of both were called up immediately while others became rather unsettled in outlook through the prospect of call up in a matter of months.

Those who remained in so-called "reserved occupations" generally worked long hours and took on other spare-time duties connected with the war effort. Rationing and restrictions increased almost daily. Pleasure motoring was restricted to a nominal mileage per month with finally a complete ban as the course of events moved against us. At the time censorship denied full details of the grim struggle which was to continue for nearly six years. As civilians and members of the armed forces alike, numerous cavers, not only from Wales but all parts of the Country, paid with their lives in this terrible upheaval.

Among the remnants of M.E.S. Welsh Group members there was agreement that an attempt should be made to meet occasionally and, in particular, to continue the archaeological work which had been started at Ogof-yr-Esgyrn, and which could be reached by public transport. Accommodation was available at the Gwyn Arms and all necessary equipment was on the spot. Furthermore, it was in the nature of serious scientific work the results of which would have some value to the community at large. Visits were necessarily infrequent but a lot of hard work was done during this period. Occasional trips were made into Dan-yr-ogof which was closed as a show-cave in 1941 and put to more serious use.

During the first week of June 1942 several old members stayed at Glyntawe and did some excavation work both at Sink-y-Giedd and Pwll Byfre. At the latter a small quantity of fluorescein was introduced into the stream in the hope that it would confirm an old local rumour that connection with Ffynnon Ddu had been established previously with chaff. Despite a keen watch (well supported by local residents) results were negative, possibly through insufficient quantity.

Also at this time the Ffynnon Ddu resurgence received probably its first serious examination with the aim of entering the suspected cave system. Several openings in the immediate vicinity of the rising were dug out as they were reputed to discharge large quantities of water in time of flood. All appeared to be too near to saturation level. Powell's Cave by the Penwyllt road was examined and finally a small cave then described as Ffynnon Jenkins lying in the hollow below.

Quite a lot of work was done at Ffynnon Jenkins which was really little more than a rock shelter. A floor excavation led into a short but sizeable passage partly filled with debris - indeed, the passage was much too big not to go somewhere. Sounding of the walls led to the uncovering of a narrow winding passage, a very, very tight squeeze, and a lake. The cave became known as Pant Canol. There were several interesting features and it held out great promise. The most attractive was a high level passage ending precipitously over the far side of the lake (at one of its deepest parts as one or two members will remember for a very long time). About 10 feet beyond but unapproachable there was the appearance of continuation. A triple extension ladder was laboriously transported through the cave and a trapeze act enabled examination of the continuation which proved to be a disappointing grotto. At the landing place a very strong draught blew through a very small hole. Due probably to the rather depressing effect of the place and the difficulties of making up a party this particular spot did not receive further attention until the inaugural meet of the South Wales Caving Club, when a further 50 feet of passages were added. The link up with Ogof Ffynnon Ddu was still a few years away! Pant Canol was surveyed and recorded with the B.S.A. as a M.E.S. Welsh Group find and part of the Ffynnon Ddu system. This interest was naturally passed on to the new club in 1946.

Also during the War Palebnyna - a cave about which Gerard Platten had asked for details - was located near Llygad Llŵchwr and the two caves Pale 1 and Pale 11 were explored. Later a small party, including Ken Leadbeater and Will Thomas, put in a lot of work on the western side of Cribarth in the great depression known as Pwllcoedog, without forcing an entry. This area has since been neglected, although more than half-a-dozen springs break out on the eastern side of Cribarth to join Tawe, and also to supply Abercrave reservoir behind the Abercrave Inn. The west side is almost entirely lacking water except in flood when it runs to ground at several places in Pwllcoedog. The geological map shows a considerable anticline hereabouts.

Towards the end of 1945 contact was made at Brynamman with that enthusiastic individualist Eddie Morgan. Exploration was made with him of a cave in Herbert's Quarry on the mountain. Later an interesting extension of this cave was explored by S.W.C.C. members. This was Easter Cave (Ogof Pasg) now quarried away.

Despite the extreme difficulties which had accompanied the attempt to keep things going during the War, the infrequency of meetings, the change of individuals and the limited scope, at the conclusion there was, in fact, a small band of people prepared to play their part in expanding the M.E.S. Welsh Group to a peacetime footing or any other club which might arise.

Thoughts of the future.

With the War ended, and the B.S.A. no longer performing its original functions, the maintenance of equitable relations also became a matter for serious consideration. Several new clubs had started on Mendip and it was reasonable to suppose that the return to peacetime living would lead to a revival of activity in South Wales on a mounting scale. It was agreed there was a wonderful opportunity to put caving in Wales on a basis which would be acceptable to all clubs likely to be interested. One idea was that clubs or members of clubs should sink their identities when working in Wales, and work together as a unit. On the other hand those who had these thoughts were also members of the Mendip Exploration Society's Welsh Group. There was considerable doubt whether the parent club would survive the War but there remained a moral obligation to establish the wishes of old members, and to ascertain whether they wanted the Welsh side of the club reformed, or whether they would be prepared to accept arrangements believed more suitable, if finally agreed between clubs. Another important aspect of the matter was that increased local support was likely for an organisation which was controlled within the area, and certainly continued growth at the pre-war rate would soon make this essential.

As a result of a postal ballet among as many old M.E.S. members as could be traced, there was strong evidence that a new Welsh club would be favoured. Neighbouring clubs (particularly those of Mendip) were notified of the Open Meet organised by the M.E.S. Welsh Group to take place at the Gwyn Arms at Easter 1946. A very representative gathering considered the joint proposals:-

- i. The amalgamation of all clubs interested in the South Wales area, or
- ii. The formation of a new club to operate in South Wales in place of the M.E.S. Welsh Branch.

The new club emerged, not as an alternative, but as a necessity. The idea of amalgamation was not popular and a form of association was preferred. The outcome was the Cave Association of Wales, of which all clubs active in South Wales would

be eligible for membership, with equal representation. The C.A.W. was to be arbitrator and keeper of records, library and special equipment. "..... The launching of the Association represents the first attempt made to co-ordinate club activities within specified regions, and it is generally considered as a step likely to result in closer working and contact to the advantage of all interested clubs". (From report of Formative Meeting).

The inaugural meet of the South Wales Caving Club lingers in memory as an inspiring occasion. Old friends met again after several years of conflict and strain, and many new friendships were made. Among those attending the discussions and the formative meeting of the Association were Brig. E.A. Glennie (Chairman) F. Frost (Wessex Cave Club), G. Platten (Yorkshire Ramblers Club), A. Atkinson (Bristol Exploration Club), F.G. Balcombe (Cave Diving Group), J. Sheppard (Northern Cavern & Fell Club), E.J. Mason (M.E.S. and S.W.C.C.), Miss A.M.A. Hazelton (Sunbury Caving Club), R.D. Stride (University of Bristol Spelaeological Society), H. Davies (M.E.S.), P.B. Dolphin (Dragon Group and C.P. Weaver (Mendip Nature Research Committee).

Protracted negotiations with the owners and the presence of Gerard Platten made possible trips into Dan-yr-ogof. Graham Balcombe and Jack Sheppard, key members of the new Cave Diving Group, donned their suits to attack the resurgence at Ffynnon Ddu. Easter Cave (Black Mountain), Llygad Llchwyr and Pale caves were visited. Much interest centered around the diving. The resurgence was explored for about 40 feet where a large rock obstacle prevented further progress. Efforts to blast this away were not successful.

Ffynnon Ddu entered!

Interest was now thoroughly aroused in the Ffynnon Ddu system. Ian Nixon and Peter Harvey were destined to open Ogof Ffynnon Ddu in time for the August Meet. Truly a splendid find! Even Ted Mason and the archaeological party at Ogof yr Esgyrn were caught up in the wave of excitement which followed the finding of the skeleton. After a day's caving there was endless discussion of cave pearls, the stream passage and the pots which were very cautiously tackled on the first trips. Little did the first exploring parties realise how important and extensive the Cave was to become. Hopes were that Pwll Byfre would be connected underground. This was not to be. Indeed the result of the first survey led to some disappointment that Stream Passage itself was followed a comparatively short distance towards that objective. Outside digs were prospected around Penwyllt but not seriously continued.

Events moved swiftly however. Within two months John Parkes

and party entered the Waterfall Series, a maze of passages which proved almost as complex as the then known part of the cave. Shortly afterwards Bill Weaver and party followed up the same route to add considerably to the passage length. The sump at the head of Stream Passage had remained a source of irritation since the cave was entered and in November the Cave Diving Group, led by Bill Weaver and with Graham Balcombe and Don Coase in support, failed in a determined attempt to pass through the sump which was much too restricted. Just as in the case of Dan-yr-ogof the underground stream held its secret and remained a tantalizing challenge.

Club-building

The entry of Ogof Ffynnon Ddu could not have been more timely. It provided a wonderful playground for the new Club with plenty of scope for the pioneering types. Its character was such that it was later to receive the serious attention of that worthy student of cave-formation, Aubrey Glennie.

During this time the more serious business of club building proceeded. At the commencement a few assets had been passed on from the Group, a few pounds in cash, a fair stock of tools, also ladders and ropes from individuals.

There was an urgent need for headquarters as the Easter Meet had shown a serious deficiency of accommodation in the Valley and it was obvious that substantial support was coming from members living outside Wales. At Easter the restaurant building at Dan-yr-ogof was used for sleeping but the main burden was carried by the Gwyn Arms where resources were strained to the limit.

There was an excellent response to an appeal launched for subscriptions for a Headquarters Fund. At the time the aim was to buy a suitable hut. Most unexpectedly two generous offers of accommodation came together. Mr. Cyril Powell offered a vacant cottage near Ffynnon Ddu and Mr. T. Ashwell Morgan one at Penybont. The latter was gratefully accepted as it was more convenient to public transport and bigger. Funds received from the appeal were quickly put to use to furnish the cottage and to effect a number of repairs to make the place habitable. Much attention was given to the resetting of walls, floors, roof, replacement of broken windows and repairs to the chimney - tasks with which John Barrows helped admirably. Lady members also performed superhuman feats in white-washing walls and washing floors to make the place fairly comfortable. It is difficult to convey the transformation which was accomplished by enthusiasm and hard work of a few members. Headquarters was eventually used at Easter 1947 and has remained a most valuable dug-out for members off duty.

The Club now began to take definite shape. Single sheet circulars were issued periodically to members with brief news of activities and future events. A number of University of Bristol Spelaeological Society members who had helped with the survey of Ogof Ffynnon Ddu became regular visitors and subsequently joined, thereby lending their weight of experience to a membership which was already a happy mixture of country and local cavers. The snowball grew - new members and visitors came along from all parts, and the result was keen carefree caving.

For several years the glamour of new discovery was to lie with the country member, with the local core performing the less spectacular tasks, such as guiding new members or prospects, surveying caves and supporting club trips. All were essential tasks in its continued growth. Meanwhile archaeological work proceeded at Ogof yr Esgyrn and expanded with the re-excavation of the famous Minchin Hole in Gower, the latter being in co-operation with the Royal Institution at Swansea.

Club trips were an early institution. During the first year there was a highly successful meet on Mendip to explore G.B. Cavern and the following year (1947) Swildon's Hole and Eastwater were visited. In the next few years trips were made to nearly all the local caves, some of them again and again. During this period Jack Rigg was a staunch supporter possessed of sound judgement and experience. He succeeded Ted Mason as Chairman and was associated with a number of surveys which later appeared in "Our Caves" series.

The 1947 Easter Meet

The 1947 Meet was again "open" but several changes were made in the arrangements. Headquarters was used by members but also permission was obtained to use Glyntawe School for sleeping and feeding the multitudes which numbered some 60 persons. There was a large contingent from the Craven Pothole Club and a smaller one from the Bristol Exploration Club. The weather was bad throughout and contributed nothing to the success of the meet. Diving at Llygad Llchwyr by C.D.G. was spoilt by muddy water and other trips were curtailed owing to flooding.

Pwll Dwfn

The bottom of Pwll Dwfn was not reached until 5th July, 1947, but the suspicions of the finders were aroused at Easter. For years Paul Dolphin and Norman Paddock, latterly assisted by Colin Low and others, had made an increasingly deep hole in the swallet at Waen Fignen Felen without success. How fitting it was that Paul, a man of great stature, should have been a member of this party. Pwll Dwfn was a pot 310 feet deep and required 225 feet of ladder to reach the bottom. Asked by Paul Dolphin what the new

find could be called, someone (obviously not Welsh-speaking) suggested there was something in Welsh which sounded very like "Paul Dolphin" and it might be appropriate. By co-incidence it was. Pronounced the English way it was very similar - Pwll Dwn (Deep Pot). On account of the weight of Wessex Club support it was declared a joint W.C.C. and S.W.C.C. find.

Swallet Digging

In September 1946 Ian Nixon and Peter Harvey had turned their attention to the great swallet at Sink-y-Giedd. Later in the Winter local members supported Dr. Aubrey Hudson in an equally ambitious venture at Ffrydiau Twrch, tucked away in the hills north of Cwmtwrch. Several visits were made including a Whitsuntide camp in 1947. They did not succeed any more than the Nixon/Harvey party of 1949, Little's party in 1951 or Hunt's party in 1954. Ffrydiau Twrch still resists. On the other hand the Sink-y-Giedd dig went favourably and the system was entered at Easter 1947 although weather conditions were bad. The system proved a disappointment in passage size as well as extent and state of development. The hope was, of course, that it would lead into the unknown parts of Dan-yr-ogof. Perhaps it was as the result of this excavation that doubts arose regarding the possibilities of the great swallets. The last few years have produced strong evidence in support of base-level digging.

Restrictions and improvements

During the Summer an attempt was made to excavate an entrance at Pwll Byfre and at another swallet nearby. In August Bridge Cave above Cwm-pwll-y-rhyd, was extended and an exciting although short section of river cave explored.

Towards the end of 1947 the withdrawal of the private motorists' basic petrol ration created serious difficulties in making trips to the more inaccessible parts of the area. The state continued for more than six months. Consequently, Dan-yr-ogof and particularly Ogof Ffynnon Ddu were visited more than ever. The Easter Meet of 1948 was restricted to members only and no special arrangements were made.

Several improvements were made to the cottage. Electric light was installed and wired without charge through the generosity of member Phil Duncan. Calor gas followed later for cooking purposes. Improved tier bunks were fitted and reduced (at least to some extent) annoying bunk collapses in the middle of the night. A wireless set was donated - this proved a mixed blessing if for no other reason than its variable behaviour. Registration of the Club as a Friendly

Society was permissible under the Scientific Societies Act. Several changes were necessary to the rules to conform, including one to the effect that the Club was a non-profit making institution, but the important outcome was exemption from payment of rates on the cottage.

Aubrey Hudson produced an excellent scheme for a cave rescue organisation which was circulated to all members with useful information regarding the treatment of the injured. The Police were also notified of the existence of a rescue organisation and theoretically an efficient organisation should have been created at this time. That it was not so was certainly not due to a lack of keenness on the part of the organiser.

Early in 1948 there was contact with the Central Council of Physical Recreation which was endeavouring to encourage rock-climbing in South Wales. The Club suggested that would-be rock-climbers should turn to caving as a substitute for which there was scope. There was still an urgent need for more local members who could give support regularly and take a full share of the various duties in its expansion. Numerous prospective members were taken on trial trips and not always did they decide to join. Caving is not everyone's meat. The belief that South Wales would be frequently visited by cavers from other areas (anticipated in 1946 with the formation of the Cave Association) proved a fallacy. The hard economics of living and continued restrictions severely limited visitors from over the Border. C.A.W. was generally felt to have no useful purpose and, by mutual consent of participating clubs, was suspended but not wound up. On the other hand, Penybont cottage had been used by visiting clubs from quite an early date, thereby creating beneficial contact and amicable relations with other clubs. The matter of cave records, which was one of the primary functions of C.A.W. was already being handled very efficiently by David Jenkins who has since continued to do a monumental work in this connection.

Outstanding among the events of 1948 was the first use of scaling gear, made up by Peter Harvey, which led to the entry of the Maypole Series in Ogof Ffynnon Ddu. It was later used to re-visit the Red Chamber in Dan-yr-ogof, which had always previously been reached with a long ladder. The historical dig at "Wiggy-Wiggy" was finally abandoned in July just when hopes were really high. A large boulder fall occurred which, at a depth of 50 feet, was impossible to shift. In November there was an extension of Downey's Cave to connect the Pearl Chamber in Ogof Ffynnon Ddu. Downey's had been examined by the original discoverers of O.F.D. before digging at the old entrance. The connection with Pant Canol was not to be made until 1953. There appears to be a moral here.

Good news from new fields

The extent to which operations in Ogof Ffynnon Due crowded out all other activity became rather tiresome to a secretary whose duty it was to plan for the varying interests of members, and to set a programme which catered for operations throughout the area and not just in the Swansea Valley. A headquarters at Penybont was emerging as a mixed blessing, it provided a rest-house for those who just wanted to rest and not cave, but unfortunately this produced a detrimental influence on others who would otherwise have been keen. For those who were luke-warm Ffynnon Ddu was near for a gentle amble. It is essential that a club must have objectives agreed in committee and, in the present case, the club was formed to cover South Wales. At this period club trips notified by circular were abandoned or cancelled in a general spirit of apathy and the club showed every sign of going downhill fast. Certainly keen individuals kept up their efforts, principally in Ffynnon Ddu, and in this cave the RAWL Series was extended from Low's Passage and much work was done in Starlight Chamber and in Boulder Chamber in the hope of pushing through to the Byfre again.

With Railton's high-grade survey going ahead Glennie was studying the cave very seriously from the geological angle and, in extremely low water conditions, alone pushed downstream towards the resurgence to enter a normally waterlogged series of passages, dare it be said, to study phreatic conditions!

It was most refreshing to receive good reports from members away from the main sphere. The Rev. Cullingford and boys of Monmouth School had entered Ogof Furgad at the head of Cwm Crawnon. They also started a dig at Ogof ap Robert in the same region and descended a 25 foot pot which looked most hopeful.

Brian Price, resident at Brynmawr, was frequently finding small caves and digging where there was promise. Ogof Clogwyn was a most interesting find although not a big cave. Ager Allwedd, near Eglwys Faen (Llangattock) was, however, to prove by far his most notable discovery. Months and months of excavation in a rabbit-hole under trying conditions led to the break-through to the master system at Christmas 1949. Again a most interesting cave in a region where nothing of outstanding size had been known before. Similarly, Doan Coase had the foresight to turn his attention to the swallets of Gower during his short stay in Swansea. He dug out the blocked up swallet at Llethrid and found a system of size hitherto unknown in Gower. Bristol Exploration Club colleagues assisted the first exploration.

It was Don Coase also who probed Pots in Ogof Ffynnon Ddu

by diving, to establish the First as 13 feet deep and the Fourth as 11 feet deep, the latter devoid of the numerous torches, helmets, boots, divers' weights and other impedimenta which had been dropped into it from time to time. At this time he and John Davies attacked the Boulder Choke without success. Several other digs were started, and in one or two cases, small caves were entered. The original date of commencement of work at the "Ladies Dig is somewhat obscure but it was certainly receiving spasmodic attention at this time. This was the deep swallet behind Penwyllt Quarry to which attention was originally drawn by Aubrey Glennie who considered that it was the most promising of the many in the area. The assault here was originally inspired by the lady members of the Club, in the hope that they would succeed where the male members continued to fail so miserably.

1950 was rather a disappointing year. The weather took a hand and week-end after week-end was marred by rain and flooded caves, and activity was sometimes limited to the spectacle of flood conditions in Dan-yr-ogof at the Bridge Chamber and at Stream Passage and Pluto's Bath in Ogof Ffynnon Ddu. Craig-y-nos Quarry Cave was re-visited and surveyed. It proved, on re-examination, to contain interesting features. At the year's end the Secretary was moved to suggest ways in which members might break the stalemate in 1951.

Part Two

An unforgettable year

With the Annual General Meeting at Easter 1951 the Club celebrated its fifth birthday. It was established and unlikely to fail through lack of support. It was becoming financially sound - in no small measure due to the keen housekeeping of the Treasurer, Colin Hill. In other ways this was, none the less, a rather critical time. Visits of country members continued and, through their efforts, they made a valuable contribution to the work of the club. Far more than local members they desired a full share of satisfying caving as the reward for what might be a very occasional visit, and their objectives were usually individual efforts. On the other hand, recruitment of new members inside Wales continued to be rather slow, while, for various reasons, the original key members found it impossible to continue to support the Club with their previous regularity. There was, therefore, rather a lack of local members able to take over the responsibilities of running the Club. Possible selections for such posts were inevitably limited by members' activities in other directions or lack of spare time. The urgent need was a bigger local membership which could be expected to include more really keen members who would, in time, become fitted for the more important offices.

The first Annual Dinner of the Club was held in May 1951 at Cardiff and its success was in no small measure due to the efforts of Miss Peggy Hardwidge. The date co-incided with the second Cardiff General Meeting of the Cave Research Group and there were caving trips from Cardiff on the following day.

Everything that happened this year was eclipsed by the enforced imprisonment of Lewis Railton and Bill Little in Ogof Ffynnon Ddu for some 50 hours. When they entered the cave about 10.45 a.m. on Saturday, 25th August to continue survey work at the extremities of the cave they did so in accordance with previous practice, intending to leave the cave the same evening. Unknown to them, rain during the day had swelled the Stream Passage and produced a full flood from the Boulder Choke, making it impossible for them to get out. No concern was felt by those outside until midday Sunday as it was known that special rations were stored in the cave for such an emergency. By this time the flood showed no sign of receding despite a temporary improvement of the weather during the morning, and the first emergency calls went out to various members of the club. The full story of this incident has been adequately covered elsewhere. It may be said that this was the Club's first emergency and that the forces which fought the flood throughout the Sunday night and Monday included all available members of the Club, Mendip Cave Rescue Squad, the Army, National Fire Service, Police, Miners' Rescue Squad, R.A.F. Mountain Rescue Squad, and the Yorkshire Cave Rescue Organisation party which responded but arrived after Railton and Little were released. The Yorkshire men missed the glory but rank among the heroes. Their vain journey and immediate turnabout was duty done in the highest traditions of their breed. The rescue was accomplished by a major diversion of Pwll Byfre water into the Nant Byfre surface stream (an engineering feat performed largely under foul mountain conditions) with a strong fresh team largely of Mendip C.R.C. Members to reach the trapped men and inspire them to leave the cave to reach safety about 8.30 p.m. on Monday the 27th. Their hope had been that they would find improved conditions on the Tuesday morning, and they were naturally ignorant of the course of events outside the cave. It was estimated that their first chance to leave the cave would have been on the following Friday evening had not the rescue measures been taken.

In common with events of a similar nature tremendous publicity was given to the matter in the national Press, while locally the rights and wrongs of the case were thrashed out interminably.

Even as the ill wind is reputed to blow some good, so also did the publicity. Many a Mother's son saw himself as a national hero if only he could manage to be trapped in a cave, and applications for membership showed an encouraging increase.

Far from being deterred by past events Railton and Little pressed on with the survey work and the following November were able to declare that an overland route was established to the RAWL Series.

More Trouble

Precisely one year later on 24th August, 1952 a further emergency arose at Bridge Cave in the Vale of Neath. A party of eleven Scouts was leaving the 1947 extension to evacuate the cave when a large boulder movement occurred trapping three members on the wrong side of the fall and causing one a broken leg. An exceedingly tricky situation developed as it became known that the broken leg was actually trapped by one of the boulders further movement of which was liable to have disastrous consequences. Again Police, National Fire Service and Miners' Rescue Squad as well as the Club members were called in as rescue work continued throughout the Sunday night. The men were finally removed from the cave at 8 a.m. on the Monday after a masterful piece of timbering work by the Miners' Rescue Squad to whom all credit is due. Dr. Aubrey Hudson and Club members dealt with the movement of the stretcher case through the still tricky fall.

Earlier in 1952 members took part in the making of recordings in Dan-yr-ogof and Ogof Ffynnon Ddu for a B.B.C. Outside Broadcast put out in the Welsh Programme and later in the Light Programme. As this was an indirect form of publicity for the Club, members revealed a divergence of opinion regarding the composition of the programme although its final shape, through the noble work of Producer Alun Williams, must have satisfied all tastes. Caving is not an easy subject to handle on sound radio.

Further Outstanding Discoveries

It is perhaps rather incongruous to urge the expansion of operations over a wider field when such magnificent discoveries have been made as those at Pant Mawr and Tunnel Cave in 1953. These will certainly provide the Club with pioneering work for a further period of years, but in no way should they be allowed to discourage members from getting away from "The Valley" and to continue explorations elsewhere as a matter of principle. However, the temptation not to do so is now greater than ever.

Problems which appeared in gaining the Maypole Series by means of the Harvey Maypole and of establishing the Overland Route as a safe escape-hatch by bringing into operation the best devices that Birmingham could produce, these now seem quite insignificant when set against the problems of Tunnel Cave. The force of gravity is a bane to cavers not only because it causes rocks and boulders to fall, but also because an individual is liable to fall if he loses

a foothold. In Tunnel Cave this is dangerous. It is interesting to observe the various ways in which the present-day caver is now attempting to propel himself upwards by means of elaborate contraptions which require ingenuity and skill in their erection, when it would seem that the old-fashioned balloon would do the job more quickly and positively. Encased in a ultra-lightweight metal skin this must surely emerge as the caver's future form of transport. Consider for one moment the ease with which a full trip could be made into Pwll Dwn.

Dr. Edward Aslett and Bill Clarke were responsible for forcing the boulder choke in Pant Mawr Pot. Both Jimmy Braithwaite and Lionel Dingle actually passed through the ruckle here in 1938, in itself a tricky proceeding. Another grand piece of cave has been added although it appears to possess many of the dangers which now appear so frequently in new finds. Edward, the retiring, efficient and ever popular Chairman of the Club commenced his caving with the old M.E.S. Welsh Group. His original interest was in bone excavating at Ogof yr Esgyrn. He ranks as one of the original members of S.W.C.C. and certainly holds the record for active service with the Club.

Of The Future

Much more detail might have been added to this brief history had time and space permitted. From the onset it was apparent that any attempt at detail would create a general expansion beyond the present intentions of the publishers. Really a book could be written about Welsh caving to date! Many members who have served the Club nobly have not received mention by name. This is regretted but has been unavoidable. Neither has mention been made of numerous friends who, often behind the scenes, have helped in many ways and perhaps have not always received the thanks due to them. Some have passed on, even in the short space of ten years.

Undoubtedly great progress has been made. The outstanding feature of the past decade is the rise of S.W.C.C. as the only club in a great caving region. Clubs outside the region have honoured the aims and aspirations expressed at the inaugural meet for a united effort in Wales. At the same time, this was to have been accomplished through the Cave Association with the expectation that other clubs would want to work in Wales. More frequently however, members of these clubs have found membership of S.W.C.C. to their advantage in making trips here. Whether the area will continue to have only one club remains to be seen.

S.W.C.C. is, therefore, in a unique position, and one which is capable of producing a spirit of complacency through lack of competition. There is a moral responsibility to maintain a live

club, to maintain good relations with other clubs and to assist in every possible way their visits to South Wales. In this respect the record is good. A club is mainly judged on its achievements and again some highly creditable discoveries have been made the results of which have gone beyond Newsletters to the national media. This is good for the club and far better than keeping discoveries secret.

Publicity has received brief mention in these pages. At this stage of the Club's history it must surely be considered among general aspects of policy and development. There would, no doubt, be conflict of views on the question of maximum membership. Some, even now, would say the Club is too big. It must be expected that the great caves of Glyntawe will continue to receive frequent visits. If this is going to absorb most of the available active manpower, it is then impossible to organise regular exploring and excavation parties to other parts of the region. The ideal would surely be to have available sufficient active members to allow three or four regular working parties to go elsewhere in addition to teams working around Glyntawe. There is an urgent need to attain this state, if only to publicise the Club among farmers in caving territory and to keep check on cave demolitions.

Several caves have been lost in the last 20 years. The cave list is by no means static. In this period two caves have been blasted away at Cwmdwr Quarry, Easter Cave has gone, Llygad Llwhwr has been sealed. The cave found at Penderyn in 1939 is still apparently sealed and intact, but for how long? It has not been visited by the Club although thoroughly examined by the National Museum of Wales and the Wessex Cave Club at the time. A number of caves at Llandebie have disappeared in a vast quarry. While the bulk of work is at Glyntawe other caves are neglected. It is impossible to save all caves from destruction, but it is possible that important features are being missed during the "life" of the caves. This point is deliberately stressed without any desire to detract from the wonderful work done at Glyntawe. It merely exposes a deficiency which must surely be made good in the next ten years.

Of more general publicity it may be said that the Club has some wonderful friends in the Swansea Valley who are proud to know of its achievements, and not only because the caves are beneath the hills in "their Valley". The Club does itself no justice by withholding discreet information about finds. More general knowledge of its activities would raise its prestige within the Principality and would certainly result in an increase in applications. The ultimate form of the Club is tied up with finance, which is dependent on a flourishing membership. A higher standard of accommodation at headquarters and the prospect

of auxiliary huts or depots at convenient points elsewhere must be given serious consideration.

In every way the member of today has a wonderful caving future to work for. New discoveries which have followed the Club's formation lead to the feeling that there is more reason than ever for full confidence in the hopes for even more and greater caves. Disappointments there must be. Again and again results have been produced only by a capacity for pursuing the obvious to its logical end. "Nothing venture - nothing win". May the Club continue to flourish, to search and to find!

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THE PAST FIVE YEARS AND FUTURE PROSPECTS.

by D.G. Hunt

Since its formation in 1946 the club has become recognised as one of the foremost in Great Britain, and the many visitors to the area are always impressed by the size and number of caves quite near to our headquarters. There would be very few cavers in the country who have never heard of Ogof Ffynnon Ddu, and it is the first cave any visitor wants to see on his first trip to South Wales. There have been more words written about O.F.D. than any other cave, and every caving club must be familiar with Lewis Railton's high grade survey, which has had wide circulation as a C.R.G. publication. It has become, at least to S.W.C.C. members, the standard by which other caves are judged, and it is jealously guarded by the club and the owner.

No one person can claim to have seen all of O.F.D., though this is not surprising considering the size of the cave. Over the past five years new discoveries have added to its length which at present stands at nearly three and three quarter miles, all in the rather small area of approximately a quarter of a square mile. One of the most interesting additions was the break through by John Truman into Pant Canol via the Upper Toast Rack Series in 1953. Pant Canol had been known since 1942, when several small caves were discovered during efforts to find O.F.D. If more had been known then about air circulation in caves, O.F.D. would have been found four years earlier. It is still undecided whether a few hundred feet had been added to O.F.D. or three and three quarter miles added to Pant Canol! Some months later it was surveyed by Jack Myers, Noel Dilly and others, and the result appears to have solved the mystery of the skeleton found in O.F.D. A fissure near Pant Canol entrance connects with the fall of boulders at the back of the skeleton chamber, at the foot of which the bones were found. He must have fallen down this fissure from the surface and died a miserable death from the effects of a broken leg and exposure. Over the years the fissure has become choked with debris. So ended the mystery of the man who was last seen entering Ffynnon Ddu blowing a trumpet, as legend describes him; or is the mystery best left unsolved for the benefit of future visitors?

The survey of Downey's Cave was also carried out, and if only to prove it is part of the O.F.D. system, at least one person made the very tight crawl into Pearl Chamber.

Many attempts have been made to find a way on from Boulder Chamber, but although the sound of the stream beyond can be easily heard in the passage in the north wall, all have so far

failed. How disappointing it was, after a week's hard work in the floor of Boulder Chamber, to discover that the noise there was not caused by the main stream but by a much smaller flow in a passage that proved too small to follow any distance. Much work has also been done in Starlight Chamber. The main draught was found to enter a small boulder choked passage at the back, and during the week-end of the Coronation in 1953 an aven was broken into, since named Coronation Aven. Due to the dangerous state of the walls and roof the dig was abandoned for some time, but during the next year the aven was partly by-passed, and another small chamber entered just beyond, where the draught filters through large boulders. It is quite a safe place to work in, but one still has to run the risk of crawling under Coronation Aven. In spite of the obvious danger of the place, it is the only way on to the major part of O.F.D.

Much use was made of the Peter Harvey Maypole, especially in Lowe's passage and Upper Flood Passage, to investigate what appeared to be high level openings. The passages were ideal for maypoling, as there are many ledges on either side, and a height seventy feet was reached near the Waterfall Series. No passages were discovered, but it was good practice for later work in Dan-yr-ogof and Pant Mawr.

So up to the summer of 1953, Ogof Ffynnon Ddu was the only major cave system that was readily accessible, and besides an occasional visit to Dan-yr-ogof and Pant Mawr it was the only cave of interest to the majority of members. Lewis Railton finished his survey after about four years patient labour, and produced the most accurate plan of a cave yet published.

Peter Harvey and Peggy Hardwidge explored the Upper Vale of Neath, both the Mellte and Lesser Neath, for many weekends, and discovered Ogof Coeden Crau, near Pwll-y-Ryd. This cave is of interest as it is in a fault, one wall being limestone and the other Millstone Grit.

One Saturday in September 1953, Bill Little and I surveyed Pant Mawr as far as the first boulder choke, all that was known at that time. The next day Bill Clarke and Edward Aslett found a route through the boulders, through a second boulder choke and proceeded to discover a further half a mile of cave, being finally stopped by a muddy sump at three hundred and sixty feet lower than the entrance. Although the cave has been visited many times in low water conditions, the sump has never broken. There is evidence that during heavy rain on August Monday, 1954, when 3.04 inches of rain fell at Glyntawe, the water level in Pant Mawr rose one hundred and fifty feet. This seems to indicate that beyond the sump the stream is filtering through a fall of boulders, and even a visit by the Cave Diving Group will not add much to the

cave. A fluorescein test by Peter Harvey showed that the water rises near Pwll Du on the Lesser Neath, about three and a half miles away, making it the longest system, sink to rising, in South Wales.

Several members of the club have the opinion that the waters of the Upper Neath once flowed westwards to the Tawe Valley, via the Rawl Series of Ogof Ffynnon Ddu, the passages of which once contained a much larger stream than the one now using the cave. Perhaps this theory has received further support by discoveries in Pant Mawr. At the crossroads a passage about forty feet high crosses over the main one, and points to the west, but digging there is out of the question, as Sabre Rift, as the passage is called, is blocked by fallen boulders and stalagmite flows. The whole of Pant Mawr has now been surveyed by John Alexander, Clive Jones and others, and the plan is eagerly awaited.

Although draughts had played a big part in cave exploration for several years, it was not until the autumn of 1953 that any notice was taken of the draught at the end of Tunnel Cave which was then a mere hundred and fifty feet long. In extremes of temperature the draught at the entrance can be fierce enough to blow out carbide lamps. John Truman and I started a dig in the boulders, but it being a warm day outside, the fumes from the explosives blew back on us and we made a hasty exit. Some time later when the draught had reversed, Bill Little and others carried on. Much to Bill's annoyance, he was not in the party that finally broke through, on Boxing Day, 1953. Because of the smoke it was not until the following weekend that we could appreciate the size of the passage later named Davy Price's Hall. About a mile of passages were explored and it soon became apparent that we would not end up in Wiggy-wiggy as we had at first hoped. The first problem to confront us was in Cascade Aven, where we had reached the top of the First Cascade, and a second Cascade seemed unattainable. But within a month Bill Little had crossed the traverse and climbed to the top of the Aven, almost four hundred feet above the entrance.

The following Christmas, Upit, that ingenious device contrived jointly by Little, Harvey and Railton, was used to scale the sheer walls of Steeple Aven. It took almost a week to reach the top, not without incident, to find a much shattered chamber, reminiscent of a Pant Mawr boulder choke, and no way on.

The use of Upit has shown that nothing is now out of our reach; even Gaping Gill could be ascended if necessary.

John Alexander, Clive Jones, John Hartwell and others pursued the draught in Cascade Aven, and found a warren of passages, about a thousand feet altogether. Work is still being carried out there,

in small passages ending in the usual boulder chokes.

The most puzzling thing about Tunnel Cave is the flood rising in Davy Price's Hall. In flood conditions much more water issues there than from the rest of the cave, and it is apparently connected with a boulder strewn bedding plain near Christmas Grotto, some four hundred feet away, where water has been seen flowing after heavy rain. The first person to explore the rising was Bill Clarke, when there was a few inches of air space during a drought. He found the passage rose above water level in a very short distance, but came across another sump about fifty feet further on. At Whitsun, 1956, Glyn Thomas having finally finished his pump, the first sump was drained, but the head of water in the second sump became too much, and operations were suspended for improvements to the pump.

Lewis Railton's survey shows Tunnel Cave to run northwards towards the River Haffes, and the higher parts are quite close to the surface, so there does not appear to be much more to be added except within the present boundaries of the system. Some work in the passage above the Cross Joint might be profitable, as the stream there flows from under a fall of boulders in a passage similar to the Cross Joint and in the same line.

Before the war the only cave of any size in South Wales was Dan-yr-ogof, first explored by the Morgan brothers in 1912. Although it has been known so long, comparatively little work has been done there, due mainly to restrictions on entry. It is the most promising of our caves, with many miles of passage waiting to be discovered. On one of our few permitted visits, a party led by Peter Harvey took in sections of the maypole and erected it in Boulder Chamber, under an aven where a strong down-draught had been noticed. At about forty feet overhead a passage was discovered and the draught traced to a boulder choke some two hundred feet away. It should not need much work to break through there, but until permission can be obtained for further visits to the cave nothing can be done.

The Cave Diving Group has visited Dan-yr-ogof on two occasions, to dive in the resurgence and the lakes, to try to discover how and where the river disappears. Despite the usual low visibility underwater, about four or five feet at most, it was found that the water sinks in the third lake down sand-choked fissures, but such is the amount of sand washed in, the place of sinking is continually changing. Not much progress was made inwards in the resurgence, because the passage became narrow, and sharp fins of rock made any further advance too hazardous. In the fourth lake where the river rises, a depth of about thirty feet was attained, and no bottom found, but the nature of the breathing apparatus used prevented them going any deeper.

It is hoped that the C.D.G. will return there in the near future with the new equipment they now use.

During recent years there has been increasing activity on the surface, on both sides of the Tawe Valley, searching for an easy way into the cave systems we know are somewhere below. Some success was had when the Ladies Dig, just east of Penwyllt, was reopened, but it was abandoned in favour of a debris filled cave in the floor of Cwmdwr Quarry. There is no doubt that it is part of the Ogof Ffynnon Ddu system and work is continuing on the removal of the many tons of rock that have filled it. Les Hawes has acquired some interesting details about the cave from members of the Yorkshire Ramblers Club who explored it before the war, when it was much more extensive and almost unharmed by quarrying.

An attempt was made to revive interest in the dig at Wiggy-wiggy where Paul Dolphin did many years of work during and after the war, but although several week-ends were spent there, the place has once again been abandoned. At Easter, 1956, some fluorescein was put in the sink there and after some eighteen hours it re-appeared at Dan-yr-ogof, to the annoyance of officials of the Water Board.

Although the rising at Ffryddiau Twrch had received attention on several occasions before, I decided to have a dig there myself in early August, 1954. A strong party, with some members of the Cave and Crag Club, camped by the river about a mile below. Though we dug for a week and removed many tons of rock the strata proved so shattered by glacial action that the face of the cliff became dangerous to work under. The presence of two beds of shale, each over a foot thick, discouraged us from further efforts, and nothing has been done there since. I have walked over there a few times since then and it seems much more stable than it was before, and perhaps it would be worth returning there some day.

A short article of this nature cannot hope to catalogue all the work done and discoveries made by members of the Club during these recent years. It will probably be noticed that a great deal has been written about the caves in or near the Swansea Valley. This does not mean that the rest of the caving area has been ignored. In the West, at Pal-y-Cwrt and other promising spots near Carreg Cennan Castle a party lead by Les Hawes did considerable useful work. All the mountains and river valleys between Llygad Llchwyr in the West, Abergavenny in the East and the Gower coast to the South, have been investigated. Bill Clarke and others tried unsuccessfully to extend our knowledge of Pwll Synd. Ogof-y-Ci, near Merthyr Tydfil, has been often visited and twice large extensions have been made. Agen Allwedd was discovered by Brian Price and in recent years Bill Clarke has tried to push on in this cave by digging. Different members of the Club have explored

the Taff and the Clydach valleys, and the mountains nearby. Naturally, the Club appears to concentrate its activities in the Swansea Valley, because it is here that the possibilities are greatest, and it is here that the Club has had its greatest success.

We should consider ourselves lucky, in South Wales, to be able to enjoy a caving area unrivalled anywhere in Great Britain.

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CAVE FAUNA

by E.A. Glennie, C.I.E., D.S.O.

I. General considerations.

Some parts of a large cave system may be subjected at times to floods which interrupt the normal conditions there. At all other times the cave environment in all parts within the cave, which are well separated from any entrance, is remarkable for its uniformity. The chief elements of this environment are:

- (1) Total darkness, and, as a corollary, no green vegetation, since this requires light for its development and therefore is restricted to the surface.
- (2) A nearly constant temperature.
- (3) In most parts sufficient ventilation to keep the air fresh.
- (4) In a 'living' cave, or part of a cave, where conditions are suitable for the maintenance or development of calcite formations, the humidity approaches 100%.

This is the climate of the cave, and if animals thrive and multiply there, it is evidently one which suits them.

Another factor, which may well be important, is that, when away from the sound of running water, the stillness and silence in a cave is intense. It is beyond man's experience and he is liable to introduce imaginary sounds. Against this background of silence insects and other arthropods, with their highly specialised sensory organs, may be able easily to detect and recognise the movements of other animals in the neighbourhood.

There is no difficulty about finding many places close to the surface and wholly separated from caves which have the same 'climate' (darkness, high humidity, small temperature range) and these will be found to be very well populated with a great variety of creatures. For instance in a mixed wood with some undergrowth, there will usually be a more or less thick layer of leaves, replenished from above and rotting downwards into soil. Very many creatures (worms, snails, millipedes, woodlice, spiders and insects) will be found here below the surface among the dead leaves or deep in the soil below. Some of these will come to the surface in wet weather or at night when it is cool. They have found a temporary refuge from drought or extremes of temperature.

Some will go below in winter to hibernate and escape from the cold. Yet others stay permanently below. The climate and food is suitable for all their needs. The roots of trees and plants will be there and some animals will be present because of these. These will not find the cave environment suitable. It is dark underground, but this is no deterrent to those found there. Some are blind, and though they have no eyes, some (worms, etc.) will deliberately avoid light. Long sighted hunting-spiders and others which use their eyes to hunt for food by day will avoid darkness except as a temporary refuge. They will not be found in a cave community. Other predatory animals, although fully equipped with eyes, can use other senses to catch their prey and may be found underground and in the dark. I have found staphyline beetles and their larvae eating springtails in caves. The blind shrimp (Niphargus fontanus) in caves will kill and eat Asellus cavaticus, the cave waterlouse. Perpetual darkness in fact acts like a sieve to keep out those which depend on their eyesight for food but is no obstacle to others.

Temperature is a very important factor. In deep caves we are dealing with cold blooded animals. Many species can exist only within a very narrow range of temperature, others may survive within a wide range of temperature but require a special narrow range for breeding purposes. None of these can live permanently in a nearly uniform temperature unless it happens to be a temperature which is suitable for breeding purposes. Thus the prevailing temperature of a locality is an effective sieve, admitting some but excluding others.

If a small boring is made into solid ground, and temperatures taken at different times during the year, the temperature near the surface will vary during the year according to the prevailing temperature above, but as the depth increases the variation during the year will get less, until, at a hundred feet or so below the surface, the temperature is approximately that of the mean annual temperature above. Below this there is no annual variation, but as the depth increases the temperature gets greater due to the influence of the internal heat of the Earth.

In a cave system above the water saturated zone, ventilation will offset any influence of the Earth's heat, and the general temperature within the cave will be near that of the mean annual temperature of the region.

There are of course special conditions affecting some caves which produce Ice Caves. These are exceptional and are not found in Britain at present, but similar conditions may lead to a cave without ice but with temperatures in the lower parts less than those in other caves of the region. Read's Cavern on Mendip opening into a depression below the north slope of Blackdown

appears to be an example. Cave temperatures in England and South Wales are normally:

	Degrees Fahrenheit	Centigrade
Lancs., Yorks., Durham	48 - 44	9 - 7
Derbyshire, S. Wales, Somerset.	52 - 47	11 - 8
Devon, Cornwall	55 - 52	13 - 11

Below the zone of saturation under phreatic conditions, the Earth's temperature may begin to make its influence felt, and at great depths the water may become hot. Not long ago a boring nearly thirteen thousand feet deep drilled in Pakistan tapped a strong flow of water with a temperature well over boiling point at atmospheric pressure. This flow seems to have come from limestone very close to the bottom of the boring which was in shales. In England exceptional temperatures in borings have been calculated to be due to hot water in carboniferous limestone which had descended to a great depth East of the Pennines. Unfortunately the water was not actually tapped in this case. H.E. Balch has suggested that the hot springs at Bath may come from Mendip swallets.

Ice too is a good insulator from extreme atmospheric cold, and if an ice cap is thick and several miles in diameter, it will be a protecting blanket and the internal heat of the Earth will act below it so that unfrozen water will be found below the central region of the Ice cap even though the mean annual temperature above is well below freezing point. This is the case in Greenland where flowing freshwater springs occur in spite of the severe climatic conditions. Thus in Ogof Ffynnon Ddu fracture and collapse, which may have been due to deep freezing (Waterfall Series, etc.), occur precisely in those parts where no ice protected the ground during the Ice Age. In parts of the cave below the glacier-filled valley similar indications are absent. Probably the unreached parts of Ogof Ffynnon Ddu beyond Penwyllt to Pwll Byfre will be found to have escaped damage by deep freezing, because protective mantle of ice was present.

These remarks are relevant to the existence of cave fauna, since in spite of glacial conditions, water in deep caves remained unfrozen. Possibly, too, in yet deeper warm phreatic waters there may be animal life as yet undiscovered.

The next factor (fresh air) need not be stressed. Many non-cavers think that there must be a great lack of ventilation

in caves, but as a well known French speleologist has said a limestone massif 'breathes', not merely through visible cave-entrances if any, but through all the tiny joints and cracks in the exposed limestone. All experienced cavers know that good ventilation is normal in a cave, though of course one must be on the look out for the exceptional places where there may be dangerous quantities of carbon dioxide gas. On the other hand very special care is essential when exploring artificial excavations, wells, shafts and mines etc. Many small animals (spiders, insects, etc.) can exist in concentrations of CO₂ which would be harmful to man.

There is often a strong draught not only at the entrance, but occasionally at places deep in the cave. This may have a drying action, reducing the humidity locally. A high humidity is most important. Collectors will find that a dry or a draughty passage is a bad place for collecting in a cave, although in other parts of the same cave fauna may be plentiful. A high humidity in caves is important for aquatic animals also. They may then leave a pool and move about over the wet mud or calcite slopes, and so will be found in unexpected places. The presence of Asellus cavaticus in the temporary puddles made by cavers' boots in cave earth shows how freely aquatic animals will wander about. They do not get trapped in isolated pools, where they would starve when the food supply is exhausted. The fact is that under conditions of high humidity the boundaries between land and water become ill-defined. I have seen a land beetle enter a pool of water without hesitation, and walk steadily across the bottom of the pool and out at the other side. Millipedes are reported to act in the same way.

As stated above a jointed limestone breathes, so that a cave un-entered by man has its own natural system of ventilation. Any large new opening, whether made by quarrying or by cavers forcing a new entrance, may make drastic changes in the natural ventilation. A drying draught may invade parts previously enjoying only a scarcely perceptible movement of humid air; fauna will have to migrate elsewhere or die, beautiful growing calcite formations will become dull and decay. If this is to be prevented, cavers who force an entrance, where previously there was no obvious passage for air, should install some barrier to maintain as far as possible the original conditions, and, in particular, if quarrying threatens to break into a large system similar action should be taken beforehand to isolate the rest of the system from the threatened area.

Whilst it is certain that good air will be available in caves, it seems rather surprising that it is good enough deep down in dead vegetation and soil. There is however no doubt about it since many kinds of animals can and do thrive there,

not merely anaerobic bacteria. Exceptionally, conditions become adverse both on land and in surface sheets of water, but this is rare enough to excite comment when it happens.

The situation under the floor of a wood has been taken as an example. Many other places will provide a 'climate' (darkness, humidity, etc.) similar to that in a cave, such as, under large logs or boulders, under deep stone screes, or in cracks and crevices of rocky outcrops. These too will be found well populated.

There is one characteristic common to all these places. They are narrow and tight without roomy spaces. Only animals with the instinct to go into corners and narrow places will be there. In caves entered by man, there appears to be no need for this instinct, and yet it may well be an essential qualification, both for the original population of caves and for the continued existence of the population after its establishment.

The food available in the special near surface habitats mentioned above consists of vegetable debris, remains of dead animals and other animal matter, and fungi. Bacteria are of course present in large numbers, and, if not actually used as food, they help to break down the organic material and make it more available as animal food or for the growth of moulds. Predatory animals are of course present to prey on the others. Many of these will also find organic remains acceptable.

The food available in caves is the same, though generally in less quantity. The amount available varies considerably from cave to cave, and in different parts of the same cave system. In the narrow fissures the food may be more uniformly distributed and perhaps more plentiful. Exhaust pumps have been used to draw material out of such places and a surprising amount of organic matter has been found. The fact is that in all jointed limestone, including the Chalk, there is a continual filtering down of small particles of surface debris. In the clear seepage flows over calcite floors in caves a water fungus may be found, perhaps in sufficient quantity to maintain a community of the cave water-louse, Asellus cavaticus, without the need for any other source of food. The Asellus is a tasty morsel for the Cave shrimp, Niphargus fontanus.

The nature of this water fungus is not known, nor the source of the energy which enables it to grow in complete darkness in water apparently devoid of organic matter. Bacteria may provide the necessary link between the fungi and inorganic matter, but very little is known about bacteria in caves. Besides the water fungus other fungi are present in caves. Probably most of these are from spores carried in by draughts, or by cavers, but some may be indigenous. On one occasion I looked sideways along a

flat ledge of rock and saw in silhouette a veritable forest - tiny swellings at the top of diaphanous stems - the whole growth being not more than two millimetres high. Except in silhouette they were quite invisible, and there was no mat of mycelium to be seen on the rock. Such large numbers close together was an exceptional case, but even in the remotest parts of caves careful scrutiny will often reveal similar fungi scattered about. So it may be that organic debris from the surface may be only a supplementary source of food and that, even without it, some cave fauna could exist.

When swallet streams run through caves, floods will bring down organic debris in bulk, and also surface animals many of which will speedily die. All is good food. On the Continent highly specialised cave beetles, not often seen at normal times unless bait is set out for them, will appear in numbers after a flood to forage in the debris left behind. Bat droppings are a good food, but in most caves in the British Isles the amount is insignificant. Abroad the floor of caves may be hidden under several feet of bat guano, and here a special guanophile fauna may abound and normal cave fauna is excluded.

Many aquatic animals carried in by swallet streams will be found apparently living normally in the cave stream. Caddis fly larvae for instance may be found with their large funnel-like silk nets fixed across a small channel. They will catch a good supply of food and are probably quite comfortable. However they do not appear often to develop to the adult stage, and when they do they do not breed. The temperature or the lack of warm sunlight may be unsuitable. The common freshwater shrimp, Gammarus pulex, etc., though often found apparently permanently established in cave streams is, I believe, never found in pools which are not touched by floods frequently. The community is only permanent because it is frequently replenished from the surface. Pluto's Bath, in Ogof Ffynnon Ddu, appears to provide a proof. This is only invaded by flood waters at very rare intervals and it has no permanent population of Gammarus pulex. It is in large numbers in the Pwll Byfre marshes and every flood must bring them down into the cave; hence it is not surprising to find them always present in the Raised Canal and the Submerged Lake, since these, unlike Pluto's Bath, receive flood water several times a year. Green vegetation may be a necessary food stuff for Gammarus pulex. It is a pest in watercress beds at Berkhamsted where it feeds on the small stem-roots of the cress. Continental workers hold the same view about the status in caves of Gammarus pulex and its near relation G. fossarum.

I have tried to show that, wide spread over the land area, close below the surface, there will be found great numbers of animals living permanently in cave like conditions, and very well

equipped to do so. Most are uniform in colour, white, black or brown, with the patterns or other colours useful for camouflage, etc. in the daylight. Some have eyes, others have no eyes and are no worse off, since all are in the dark. All must have other senses than sight well developed for life in darkness, and this will often mean long appendages (feelers, tails, etc.) and also organs for tasting and smelling or for detecting vibrations (hearing) developed to an extent beyond man's imagination. If they go into caves, there is scarcely any necessity for further development in these respects and very often there is no change. All like moist situations and avoid dry places. They are prepared to go into narrow places, and this is an instinct developed by selection to lead them into a suitable habitat, if an adverse change in their environment operates like a trigger to bring the instinct into action.

There must be a constant gradual infiltration deeper and deeper down in fissures and into caves; this will be particularly the case at the marginal areas of the distribution of a species, where the near-surface climate is on the border line of suitability. Beyond this line the species may become a permanent cave animal (a regional troglobite). Changes of climate associated with the Ice Age must have produced a situation of this sort. Animals unable to escape from it on the surface had perforce to go deep underground or die. This applies to aquatic as well as to land fauna.

At first sight the route for migration into caves seems obvious. The threshold of many caves provides just the situation required for land animals. It is usually damp and more equable in temperature than outside, and the floor may be covered with dead leaves and other vegetable debris. It is only a step on into the dark cave beyond. However this cannot be their main entrance. Cave openings on the surface are rare. Wide areas of the land surface have caverns below without obvious openings. Many actual openings will be exits full of fast flowing water and are unsuitable both for land and water animals which are not strong swimmers. When water is not there to oppose entry, there will usually be a draughty, relatively dry zone beyond the threshold, which will be quite an effective barrier to immigration. (Incidentally it will also be a barrier preventing the emergence of cave animals to the surface).

Aquatic animals in caves, usually crustacea, are poor swimmers, and will seldom have entered through the main water exits, often strong artesian flows. Accidental flooding in would have been frequent, as indeed it is at the present time. However most existing swallet entrances have developed quite recently. The usual passage down for water in typically dry limestone regions is through joints and fissures. Peat marshes etc. may hold up

water providing a surface habitat for aquatic fauna, but there is a steady percolation below and over wide areas there are no active swallets. This is especially the case in the Chalk where swallets are rare, and the cavities below very small. The blind, white cave shrimp found in most South Wales caves and in the Mendip caves in Somerset is Niphargus fontanus. This is found in deep wells in the chalk along the whole length of the Chiltern Hills and the North Downs and through to Dorset. Another N. Kochianus kochianus has been found only once in a cave in Britain, but is found more commonly than N. fontanus in deep wells in the same chalk lands and also extends northward to Norfolk. In Kent, in a dry region near Sittingbourne, eight borings were made to reach water at a depth between 150 and 200 feet below the surface. In five of these N. fontanus and N.k.kochianus came into the boring when the water was reached.

In the case of these cave shrimps it seems that narrow joints and fissures and the small channels of deep phreatic waters is their real habitat. Their arrival in the large caves entered by man is a matter of chance and in no way necessary for their continued existence. The relatively few individuals seen in caves are not isolated there but form part of a larger unseen population. Small communities isolated for a long time tend to develop a local race or subspecies. N. fontanus has shown no tendency to do this. Other cases can be cited of a preference for narrow fissures. The two water beetles Hydroporus ferrugineus and H. obsoletus are uncommon and usually only obtained in single specimens usually from a small spring or pool associated with a crevice, but sometimes they have appeared in pump water. Dr. F. Balfour-Browne (British water beetles Vol.I Ray Society 1940 p. 359) considered that possibly both species were largely subterranean, and said that nothing was known of their life history. Since then he has obtained the larva of H.ferrugineus in the laboratory, but the first and perhaps the only discovery of the larva in the 'wild' state was by Derrick Turner in Giants Hole, Derbyshire. This beetle has turned up in several caves in Britain, the first occasion being from Porth-y-Ogof since the War. On the Continent the immature stages of highly specialised cave beetles are unknown. These stages are presumably passed in the narrow fissures. The instinct to retreat into narrow crevices persists, even in the darkness of caves, in the case of land and water cave animals, and probably most of them remain permanently remote from the large caverns. This instinct alone will save them from being swept out into the open during catastrophic floods.

In conclusion cave fauna has been derived from those living under closely similar conditions above, where selective evolution has already endowed them with sensory organs suitable for life in

permanent darkness, and many, perhaps most, will not have changed in form as a result of their invasion of the deep subterranean (or hypogean) domain. However, though food will probably always be present deep down, it will not be in the same abundance as above, so migration will have led to a changed environment, that is, one with a more thinly scattered food supply than before. Such a change is likely to accelerate evolutionary adaptations by selection of chance mutations which are favourable. The chance of this happening will be increased if there is some isolation.

Migration has been mainly through small fissures and channels impassible to man and it is in these narrow places that the true habitat for cave animals is to be found. Those seen in large caverns have arrived there by chance, and may be only a small sample of a large hypogean community.

This short account is very incomplete and includes many broad generalizations to which exceptions can be found. If this stimulates criticism and discussion, this chapter will have served its purpose.

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THE DISCOVERY AND EXPLORATION OF TUNNEL CAVE

by C.L. Railton

Introduction:

In telling this story of the exploration of Tunnel Cave, I have referred to what has already been written on the subject. Unfortunately, there are many gaps and to fill these, I have had to depend on memory; my own and that of other members. If there are any mistakes or omissions I can only beg the forgiveness of the reader. Except for the first two big days of exploration, I have omitted the names of all the members and friends who formed each party. This is partly because I do not know who went on every trip, and partly because I feel that lists of names would make reading rather tedious; but, as far as possible, I have attempted to mention the instigators of each major trip, and I can only hope that the many members and friends who helped in the exploration will forgive me if they are not mentioned by name.

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Tunnel Cave is situated above and behind the restaurant building of Dan-yr-Ogof. On the far side of a fence is a track, leading up to a disused quarry, and just before entering this, a stream bed is seen on the right which in wet weather carries the water flowing from the cave. The entrance, at the head of a small gully, has a brick dam across it.

The first 150 ft. of the cave has been known for years. Since the building of the dam it could only be entered after a period of dry weather when the water inside the entrance seeped away. Just inside, the roof is below the top of the dam and in rainy times a 'trap' was formed; a second low dam is 65 ft. along the cave passage. Even under good conditions the cave was generally knee-deep in water throughout its length. The passage is smooth and water-worn with a curved roof, seldom more than 4 ft. high, which drops to form a low crawl for a few feet at the end, after which it is possible to stand upright in a most unpromising looking space with a jamb of boulders on either side, in front and overhead - the only solid rock was behind one - and a small stream ran from under the boulders. It is little wonder that if anyone enquired about the cave the comment was generally "Oh, that miserable little drain; its not worth getting wet to see!" and so it remained until 1953, when while Bill Little and I were chatting to Ashford Price he mentioned Tunnel Cave and how a strong draught sometimes blew through it. We pricked up our ears; a draught had led us to the recent opening up and discovery of the Rawl Series in Ogof Ffynnon Ddu. I then went into Tunnel Cave for the first time and was not impressed by anything except

the cold water and the strong draught. We scouted around on the surface above and near the cave to see if there were any holes that could account for the draught, but none were to be found in the good overburden covered with luxuriant bracken. One or two more checks showed that the direction and strength of the draught depended upon external temperature; in fact, all the evidence pointed to the presence of a cave that continued well up and into the hillside. Whether we could get past the boulder jamb and whether the passage on the other side was big enough for human beings was all that had to be found out.

Many members of the club were soon interested in the problem, particularly Edward Aslett, Bill Clarke, Bill Little, David Hunt, Clive Jones and John Truman - all of whom put in plenty of hard work. Which direction to try in the boulder choke was anyone's guess, but generally it was towards what looked like the biggest space visible between blocks consistent with leaving some of the largest and safest looking blocks in situ; not that any of them looked really safe. The direction of progress generally turned out to be forwards and upwards.

The use of hammers and crowbars was out of the question without running the risk of being crushed to pulp by the sudden collapse of the whole lot. The job was done with small explosive charges placed in crannies between the smaller blocks. The charges were fired from a safe but wet place back along the tunnel. Most of the debris fell to the floor of the small chamber and loose poised blocks were fished down with a piece of angle iron from a bedstead, from the comparative safety of the low crawl with its solid roof. The debris was then carefully removed and stacked in available places on either side. Work proceeded over many weekends, always cold ones, so that there was an inwards draught to carry the smoke clear of the workers. Soon it was necessary to bring in an 8 or 9 foot wooden ladder to get up to the 'working face' as it was not safe to use the blocks in the walls as footholds. This made operations slower because the ladder had to be removed and stowed safely before every bang. At last a narrow space, about 3 inches wide, was revealed between two big blocks and shining a light up it showed nothing but a black space beyond; whether it was big enough for a human being we could not see. This was encouraging but we dare not attempt to disturb two such big blocks so work continued forwards and upwards, as and how we could dislodge small blocks without, we hoped, disturbing the big ones. Eventually at the top of our ladder we had a sizeable shelf-cum-alcove. It was between 3 and 4 p.m. on Sunday, Dec. 27th, 1953, the last day of the Xmas Holiday, that John Truman went up the ladder to do some careful gardening of the loose debris. After a short while he announced that he had a huge flat capstone above his head and a big flat-topped block at his side with a space about 8 inches high and 18 inches wide between them. He called

to us that he was going to try to get through; a tricky operation to get from a vertical to a horizontal position in his situation without double-jointed knees. The rest of us got well out of the way, held our breath and hoped that nothing would shift - except John. After a little muffled grunting John shouted that he was through and standing up. (1) (2). I went next, followed by David Hunt and Edward Aslett. All I could see was a wall about 5 feet away and a flat roof about 8 feet above a floor of large jumbled blocks; in every other direction was a wall of whiteish smoke, the product of our bangs. I set off at right angles to the wall and in about 15 feet found another wall. The others had swung off slightly to my left, while I swung right keeping close to the wall on my left. While I was groping along in the smoke a shout from the others indicated that the floor was sloping up to meet the roof their way and I called them to follow me. After about 100 feet I had reached a floor of mainly fine, white gravel and in the thinning smoke the passage seemed huge, as indeed it was. The others soon joined me to paddle along a shallow stream meandering between flat topped mud banks about 2 feet high. We soon came to the end of the stream; it seeped out from the left hand wall. We went on up over a heap of boulders and down the other side to a stream flowing from right to left. We had reached a T junction with an even larger passage. Here again was a mud bank liberally adorned with fine examples of 'mud flowers' formed by drips from the high roof. All the banks have since been marked off with tape and all visitors are earnestly requested not to walk on or disturb these banks.

The left hand passage soon petered out with the roof coming down close to the mud floor with just enough space for the water. Going the other way we were soon scrambling up over a mass of boulders, and at the top of these the scene changed abruptly and the way on was a relatively narrow passage, varying between 3 and 8 feet wide and in places 15 to 20 feet high. The floor was covered with small and large blocks which had fallen from the walls and progress along this section was slow, because in many places we had to climb up and crawl between blocks, jammed in the passage, and then get down to the floor again. A considerable amount of 'gardening' was done to remove many of the more insecure-looking blocks. At last we found ourselves going along up near the roof with irregular fissures in the 'floor' and then we were confronted by an awkward looking 10 feet drop. Here, we called it a day; the folks outside would be worrying about us. We ought already to have been on the homeward road and some of us had headaches from the effects of the smoke. Thrilled with our discovery, it was agreed that we would continue the exploration on the following Saturday.

Where would it lead us? Was this the original course of the stream now flowing out of Dan-yr-Ogof and would we eventually come

to some window and look down on the Dan-yr-Ogof stream, somewhere beyond the trap at the Fourth Lake. Perhaps instead it would take us to "Wiggie Wiggie" (Waen Figen Felen). What thrilling hopes - much more likely we should be stopped within the next few yards by one of those damnable boulder chokes!

The following Saturday, there was quite a crowd; John Truman, David Jenkins, Edward Aslett, David Hunt, Bill Little, Bill Clarke, Ashford Price, John Barrows and myself. Our start at 5 p.m. was late, but we had been paying our last respects to the club's good old friend and member, Davy Price. It is to his memory that the huge passage we had broken into is named Davy Price's Hall.

In case of minor obstructions, we had a 30 foot all-metal rope ladder, a 100 foot rope and a small crowbar. Just through the entrance boulders, Davy Price's Hall, now clear and free from smoke, looked really impressive, but we pushed on quickly and soon reached our previous turning point and found that the short vertical descent was easier than it had looked the previous week and in a few feet we arrived at The Junction. We carried straight on into what is now known as the Steeple Aven Route, and it was some time before we realised that the two Bills were not with us and that they must have found some other way. From The Junction the passage was different; no boulder floors, no jammed blocks, but a nice water-worn passage at first about 2 feet wide and 10 feet high which soon changed to a figure 8 passage with the gap between the two tubes too narrow to get through. Here one could crawl along the top or the bottom. The top route was quite well adorned with reddish straws but I regret to say that many of these have since been reduced to mere stub-ends. We soon had to climb out of the bottom tube because of a blockage and then progress was up a steeply, sloping tube about 4 feet diameter with a slot at the bottom. At a crystal encrusted basin the passage still went up steeply but here it was half moon shaped with a stalagmite floor. Very soon it levelled off and where a stalagmite boss nearly blocks the way we had to crawl, but were soon on hands and knees past a fine array of formations on the right. Then once again in a figure 8 passage the way on was first upwards and then level where a decorated, narrow passage went off to the left-Cross Passage. We followed the larger one straight on and to our surprise, it went down quite steeply. Near the bottom, the passage was wide at roof-level, but too narrow for progress at the bottom and we had to traverse on small foot holds. Beyond this point the floor was sandy and walking was easy along a very meandering passage, until at a small fissure in the floor where a crawl passage went off to the right (to Xmas Grotto) the sandy floor ended. We followed the main passage which was rougher once again, and after a short scramble over blocks it was only about 15 inches wide with a floor of calcite; here the walls were well coated with stalagmite. Soon a climb was necessary and we were up near the roof on debris

again; another walk and another climb brought us to another junction. Here I think some of us went left and some straight on; the left hand route was soon found to be blocked and we reassembled a few yards along the other passage where there was another complication. A low passage in front petered out, a slope down to the right led into a low chamber with numerous dark corners all looking promising and going nowhere. The way on appeared to be via a 6 foot diameter tube that sloped up very steeply and started about 7 feet up from the floor. This passage after a few yards lost its steepness, its tubular shape and its smooth floor and just in front blocks came up to the roof. Fortunately after a little careful removal we were able to crawl past. (Some subsequent energetic 'gardening' has eliminated the crawl). The way on was now down a steep sandy, mud slope to a sizeable chamber of considerable height; there and then christened Aven Chamber. With my electric headlamp adjusted to give its best beam and directed up the left hand wall we could see, some 50 feet up, what appeared to be another big passage. At the end of this left hand wall we found a way on. An awkward 8 foot climb led into a small tube with a down-cut floor with the groove too narrow to get along and wide enough to be a nuisance. After quite a few yards a climb down brought us to the floor of a small, but well decorated chamber. Another climb of about 15 feet between flow-stone covered walls led into a very meandering crawl and here we were stopped by some short stalagmite columns near the left hand wall. Beyond we could see that the passage widened and that the floor fissured again. Something had to be done and after a stubborn struggle with my short crowbar there was just room to pass. After some traverse tactics at roof level the way on seemed blocked, but, at a spot where it was wide enough, we chimneyed down some 12 feet and found a crawl that was also blocked, but David Hunt, who was then in the lead, got busy on a few of the stones and managed to clear enough to get through into a sizeable chamber with a sandy floor. From here a rift-like passage led, after more climbing and crawling, to another sizeable opened-out joint chamber where at the far end, after climbing up over stalagmite cemented debris, we were confronted by a blockage too great to tackle with the weapons that we had with us. This route from Aven Chamber is now called Switchback Passage. On our way back between Aven Chamber and the passage leading to Xmas Grotto we met the two Bills who were feeling rather annoyed because they had found a 15 foot drop along the route they had found and followed, and we had the ladder and rope with us! After exchanging descriptions of our finds, we all made our way towards the exit, but at the small passage going off to the left David Hunt decided to investigate and Bill Little and I went with him while the others settled down to wait. The passage started with a crawl, but soon at a 5 foot drop it was of comfortable height. After another short drop there was a choice of ways and we took the easiest, straight on under a low roof which led into a narrow high part that opened

out into a chamber with blocks on the floor. From here the way on was decidedly smaller; relatively clean at first, but soon in a very meandering passage there was soft clayey-mud on the walls and floor. All the signs indicated that we should soon end up at a dirty muddy sump, but to our intense surprise and pleasure it suddenly opened up into a couple of small chambers well adorned with straws and stalactites, which above a certain height (an old flood mark) were almost as white as snow, so the chamber was called Xmas Grotto; there was no way on so we returned. Just as we reached the chamber with the blocks we met the rest of the party who, becoming tired of waiting had come along after us. We told them of our find but they decided to leave their visit for another day. Well satisfied with the day's exploration we all set off for the exit and reached the headquarters at 1.30 a.m.

Next day, we were again in Tunnel Cave to see what the route, found by the two Bills, had in store for us. We were soon once again at The Junction where we took an unobvious left-hand fork. After a few yards progress became difficult - the traverse commenced! This passage is an opened-out joint generally about 30 feet high; not that it is often possible to see all the way from top to bottom because the meanders at different levels do not coincide. At the beginning we were about 15 feet below the roof and there were occasional jammed blocks for use as foot holds, but at a bend the passage widened and there were no blocks. Bill Little went on relying on faith and friction, but David Hunt and I didn't have so much faith, so I made good use of the four pound hammer - an addition to the previous day's tackle! I managed to chip out a small foot hold in a useful place and our faith improved, and so we and the rest of the party continued after Bill. Soon we had a welcome respite in a small chamber with a boulder floor, but then the traversing started again, this time close up to the roof. Footholds were very few and far between and the method of progress was with ones bottom against one wall and feet against the other with frequent changes of sides as the passage meandered. The general width of this passage was between 2 and 4 feet.

Soon we heard falling water and had to chimney down to a sandy floor; here was The Cross Joint. It opened out with a climb on the left into a great, clean-cut gash that surged up into the darkness, and it was here, a short way in, that the water was falling. The route on was straight up a 12 foot climb, around a couple of corners and then another climb at the top of which we had to crawl more or less horizontally sideways under a huge block and once again we found ourselves up near the roof. After a few yards of scrambling over blocks, the roof height increased and there was a narrow passage off to the right (later explored and named Cross Passage). Continuing straight on the traversing

recommenced and the way meandered considerably for about 25 yards. Then we reached a low chamber about 10 feet square (Maiden Chamber) which due to fallen flat blocks has a floor. From here traversing at roof level continued round numerous bends until we chimneyed down to the block-strewn floor of a small chamber (Marble Arch). Two ways led on; we chose the left hand one because it was the most spacious, took most of the draught and led to the 15 foot pot which had stopped Clarke and Little on the previous day. From now on roof heights varied from 4 to 15 feet and we could generally proceed at floor level, although in places it was necessary to squeeze sideways and some members of the party preferred to traverse along about 6 feet up where it was very much wider. Soon we reached the place where the passage which had been uniformly narrow and high, widened out to about 6 feet at the top of a 15 foot vertical drop. A block on the floor served as a belay and we soon rigged a 15 foot ladder. At the bottom of the pitch was a sloping floor of sand and blocks and at the bottom of the slope there was a lowish chamber under the passage that we had come along above; there was no obvious way on. A scramble up the slope led to a climb of about 20 feet at the top of which we had to swing up on to a ledge and once again we were in a passage carrying the draught. After a short distance this narrowish passage widened out into a chamber with huge blocks that afforded an easy descent. This was followed by a scramble up over rubble and another 20 foot climb, in an opened out crack, where at the top was a passage 3 or 4 feet wide and barely high enough to stand up in. After a few more turns and twists we were on hands and knees and to our disgust we came to a 'T' junction where the already small passage branched into two much smaller ones and it began to appear that we should soon find the way too small for further progress. Following the draught - very strong here - we crawled into the left hand passage, and after some loose blocks had been moved to make progress possible we were through, and to our great surprise, found ourselves in a sizeable, lofty chamber with a slope of calcite covered boulders in front of us. At the top of this slope, the roof shot up to a height of about 60 feet. At right angles to the slope there was a very steep stalagmite cascade, just climbable thanks to occasional stumpy stalagmites and convenient hand holds in the right hand wall. David Hunt, who makes no claims to being a rock climber, went up this first and was soon looking down from a platform some 45 to 50 feet above us. I followed and decided that the general steepness warranted a hand line and after fixing this everyone followed up. From the platform was a lowish chamber with a narrow, steeply sloping aven going up from one corner, and one or two crawl holes in the roof and high up in the wall in another. The floor was partly covered by a rather pretty, calcite lined pool (The Oasis). The draught was no longer with us so little time was spent here and we returned to the platform. From here facing out over the stalagmite cascade which we had climbed, there appeared to be a possible traverse along the left hand wall going

to the base of what appeared to be another high and wide stalagmite cascade. This part of the cave was there and then named Cascade Aven. The traverse to the second cascade was not attempted on this trip because time was getting on and some of the party were eager to explore a balcony which they had noticed on the left, part of the way up the first cascade. A large, water worn passage led from this balcony but it was soon blocked with collapse debris; again we had lost the draught. Below, at the level we had entered Cascade Chamber, another small passage was found, but after some squeezing and crawling this was blocked and again there was no draught.

Well satisfied with the day's work we set off for the entrance and all went well until we reached the 'Homeward' side of the 15 foot pot. I was leading and before long I began to notice things I could not remember seeing on the way in and when, after rounding a corner and finding myself looking down a pothole that appeared to be about 50 feet deep, I knew that something had gone wrong! We reversed our steps and found that I had taken a downward passage at a point where we should have climbed up to a higher level route. After this mistake, we remembered to keep up near the roof and got out without further incident.

The following weeks and months were a period of exploration of branch passages and 'holes'. One small party led by Clarke and Little and armed with 50 feet of ladder investigated my 50 foot pot hole and proved it to be 35 feet deep! But at the bottom they found an interesting series of passages and a large chamber where a stream flowed out of a fissure high up in one wall. (This was later investigated but became too tight for progress.) The party returned by the same route by which they had entered this system, but on a later occasion, when Bill Clarke was investigating the great joint passage, he found a branch that entered just below Saddle Corner. After traversing at roof level along this branch for a few yards, Bill climbed down to the floor and at once recognised that he was in the system that had been entered previously via the 35 foot pot.

It was not long before Bill Little and David Hunt were back in Cascade Aven, standing at the top of the first stalagmite cascade and looking across at the second one which was only accessible by the delicate traverse across the left hand wall. To a good rock climber such as Bill, the rather 'airy-fairy' traverse was a challenge, so properly roped-up, he was soon on his way passing the rope behind the few short stalagmites and so belaying himself as he progressed. Safely across, he had a look around and then came back. This stalagmite cascade, longer than the first, terminated in a small, rough passage that was blocked with boulders but through which whistled the lost draught. A couple of promising looking openings in the walls of the second

cascade were later found to be blocked up completely by calcite. At a later date the traverse between the two cascades was fixed with a steel wire hand line.

Bill Clarke spent much time investigating the meandering joint passage and those beyond and I believe it was he who first explored Marble Arch Passage - the alternative route from Marble Arch to the 15 foot pot - and he also went down a small hole in the floor of the main route just before the pot, which proved to be an easy way down (for thin people) into the 35 foot pot series.

Near to Steeple Aven a left hand branch passage was blocked with boulders and David Hunt and his party got to work on this. A very tight squeeze way was opened up which led through to a spacious passage - disappointingly, the known route to Steeple Aven! But in spite of this they continued working and were rewarded by the discovery of Whitsun Grotto.

In the early days the route from Davy Price's Hall to The Junction and from there to Cross Passage via the Cascade Aven route was quite hazardous because of the many loose blocks that were either in the walls or loosely jambed across the joint passage. Most of these, we hope have now been 'gardened', but care is still needed in case any such blocks have been missed. There is still a large loose one just below the saddle at Saddle Corner and when coming up from the 35 foot pot series this block is a tempting left-hand hold, but its use is inadvisable. This block has not been removed because if it were it may cause a collapse of others.

None of the Club was very happy about the 'dug' entrance into Davy Price's Hall and a very careful check was made by the 'regulars' on every visit as to whether anything was beginning to slip or settle. One of the occasional floods (4) caused some serious undermining and made things look unsafe. Should we try to shore it up - an unpleasant job and not permanent if done with timber - or dig a new way in or rather, out? Obviously, it would be better to go into Davy Price's Hall and dig downwards. By this method there would be plenty of room to dispose of the large quantity of spoil and if anything fell, it would not cause anything more serious than to block the way out. Furthermore, it was summer which if nothing else gave a better chance of there being an outside temperature above 48° F. and therefore an outwards draught to carry away any unpleasant smoke from the diggers. A weekend was chosen when there was a large gathering at the Cottage, so that some seven or eight members could go into Davy Price's Hall to work, and there would still be a goodly party on the surface in case the way out became blocked and 'diggers' were required to work from the outside. Needless to say, the inside party took a good supply of food and fuel for cooking just in case its stay was

longer than anticipated. The idea was to make a new route down against the solid wall and actually, it was much easier than we had thought. When the new way was completed the old one was blocked. This operation has an amusing repercussion. A few weeks later a member told a few of us that he had gone into Tunnel Cave but had turned back because he did not like the look of things in the boulder choke. We were really worried, the new route had seemed so very secure, so I went off at once to see what had happened, accompanied by the member and his party. When we got to the choke, the rubble at the entrance to the old route was pointed out to me and then I realised what had happened; our friend had not heard of the new route!

The days of easy odd corners to explore in Tunnel Cave were over and we were left with three main problems; was there a large passage some 45 to 50 feet up Steeple Aven; where would the draught lead us to beyond the choke at the top of Cascade Aven, and what was the passage like that could be seen through the clear water of Flood Rising in Davy Price's Hall?

Bill Little and I spent many hours, by the side of a good fire, dreaming and discussing how to get up the wall of Steeple Aven. One evening Bill brought round a sketch of a device, complete with little figures standing or tied in various positions, the whole entitled "Operation Upit". From this beginning many ideas were sketched and the most likely ones were passed over to Peter Harvey, an expert on stresses and strengths of materials. His final design, to be carried out in high tensile steel tube, would give an 18 foot ladder in three sections that could be socketed together. It was strong enough to be used as a bridge across a 16 foot chasm, should we ever have such a need, but surprisingly light and handleable. The steel chosen was not easy to weld and distortion had to be very carefully controlled if the sections were to socket together easily. Fortunately, welding is 'up my street' and so the problems were solved; "Upit" was born and the great day arrived.

A merry party of nine wended its way towards Steeple Aven to a musical accompaniment of ringing tones as the tubular sections brushed or hit against walls or floor. Someone remarked that we seemed to have everything except the kitchen sink. The full story of the scaling operation of the great wall is ably described by David Hunt in an article in the S.W.C.C. News Letter (6). David - a wizard with a Rawl drill and a four pound hammer - was the real hero of the operation. It was he who drilled the five Rawl-bolt holes at nine-foot intervals up the wall; a very tricky job when perched on the top rung of a vertical ladder that swung quite considerably because it was only fixed at the middle and bottom by links to two bolts. One thing we had not thought of was something like a bicycle saddle, fitted on to the top rung of the

ladder, for David to sit on during hammering operations. This would have been a great comfort to him and would have saved him from being nearly cut in half. From below, what had appeared to be a large passage turned out, at 54 feet up to be only a ledge about 3 feet wide. From this a fissure carried on upwards, quite invisible from below, and another Rawl-bolt had to be put in so that a rope ladder could be hung down from the ledge and so free 'Upit' to be used as an ordinary ladder to reach the climbable part of the fissure. All this work only yielded a much shattered chamber where all the outlets were blocked - very disappointing, but at least we had proved that 'Upit' worked!

John Alexander and Clive Jones were responsible for the dig in Final Chamber (5) (the then end of the Steeple Aven route) with the result that this should perhaps be renamed The Penultimate Chamber. Unfortunately, the continuation of the chamber they dug into was blocked by a substantial calcite flow.

Later in the year Clive Jones, John Alexander, Gordon Clissold and John Hartwell, with occasional help from others, were making regular trips to a dig at the top of Cascade Aven. (7) It was a damp, muddy and draughty place, but they stuck at it for many weekends and got through. Much to everyones surprise the way on was not forwards or upwards, but downwards, by means of sloping passages and a 30 foot pitch with an awkward squeeze at the top. The extension was a veritable rabbit warren of passages and chambers of a total length of just over 1000 feet. It has been much cursed by the surveyors. The original discoverers have done much further digging in this system. In the lower reaches a passage was dug out that gave access to a 15 foot pot, from the bottom of which another passage looped round and through a boulder ruckle back into one of the already known chambers. This discovery was made a week after the surveyors thought they had covered all the Cascade Aven Extension - so it is still unsurveyed. It was in the upper branches that the draught was most noticable; one passage was too tight to dig out, the other was little better, but this insatiable digging party pressed on and opened it out somewhat. They worked into what appeared to be the bottom of a choked shakehole with a very unsafe-looking mass overhead and now, perhaps wisely, they have deserted it.

The Flood Rising in Davy Price's Hall compelled attention. The pool of greenish water was always beautifully clear, and with a good light it was obvious that a sizable passage continued on a few feet below the surface of the water, and it was generally agreed that some day something would have to be done about it. In wet weather, a stream flows from the pool but after a dry spell, its level may drop by a foot or eighteen inches. In June, 1954, after a particularly long dry spell, it was noticed that the pool had dropped sufficiently to leave an air-space of about 2 inches above

the water and it appeared that in about 20 feet this space was even greater, but because none of the party who noticed this fancied getting any wetter and colder, it was not investigated. In the evening of the same day, Bill Clarke swam through and discovered a further 120 feet of passage that terminated in another pool.

It was not until September 4th, 1955 that there was again an air-space. John Alexander and Clive Jones thought that some bailing out with buckets might be interesting, so on the following day, with assistants and buckets, they set forth. (8) Unfortunately it had rained during the night and so the pool was once again full to overflowing. However, they bailed for 2 hours at an estimated rate of 2200 gallons per hour and lowered the level of the water 18 inches; this at least proved that pumping would be feasible and provided some data. Glyn Thomas got busy and from ex W.D. disposal dealers he collected a little petrol engine and a pump. This was given a try-out in the cave and several modifications and improvements were found to be needed. He collected some more gear and with much hard work turned out a really neat, portable and practical pumping equipment. The petrol motor, generator and one pump could be mounted on a common bed-plate so that the motor could drive the generator or the pump. An electric motor and another pump were fixed to another base plate. A dirt-tight electrical control box complete with ammeter and voltmeter provided remote control for the electrically driven pump which could be run at the end of about 150 feet of cable. All this equipment was brought along to the club cottage and given a final test, using the water of the Llynfell. It was then dismantled into components of convenient size and weight ready to be carried up and into Davy Price's Hall; it was, I think, Easter 1956. On the following morning an enthusiastic party set off and it was not long before Davy Price's Hall was reverberating with the chugging of the engine. The system, was first to pump the Flood Rising pool using the pump that was belt driven direct from the engine. When this pool was nearly empty, the cable was run-out and the electric motor and its pump were carried through to the second pool. Here the pump was fixed up with enough hose to pump from the second pool, over a rock barrier into the first pool. When all was set-up a signal was given to start the electric pump. Someone stayed with this pump long enough to see that it was working properly and then withdrew to the pumping base in Davy Price's Hall as this pumping operation would partly refill Flood Rising pool and again seal off the passage beyond. When it was considered that enough had been pumped into the first pool, the electric pump was stopped and the other pump was brought into operation to pump out the first pool again. The petrol motor was not powerful enough to run the generator on full power and drive the attached pump at the same time. With the first pool empty again, we returned to the electric pump to move it down

nearer to the pool. We then discovered that we had pumped too much into the first pool and that the water had flowed back over the rock barrier and down over gravel which had so been washed into the 'works'. The motor was totally enclosed and therefore none the worse for its wetting, and the 'works' were soon dismantled, cleared out, and ready for running again. The next time we took care not to pump so much into the first pool.

By this means the level of the second pool was lowered considerably, about 8 feet. Unfortunately, working against this lift the electric pump was not powerful enough and the flow dropped to a mere trickle. By probing around under water with a 7 foot pipe at arms length I could not detect any significant change in the shape or slope of the passage and so this interesting pumping operation had to be abandoned. We all hope that one day we will have a more powerful pump and so be able to finish the job.

Thus ends the story as far as it goes. What may be found by pumping or diving in Flood Rising Passage or by digging at the end of Balcony Passage or in the many other masses of boulders will have to be told in the future. Even if no more passages are found it can be said that the 1½ miles already known affords some of the most interesting and sporting caving in the country.

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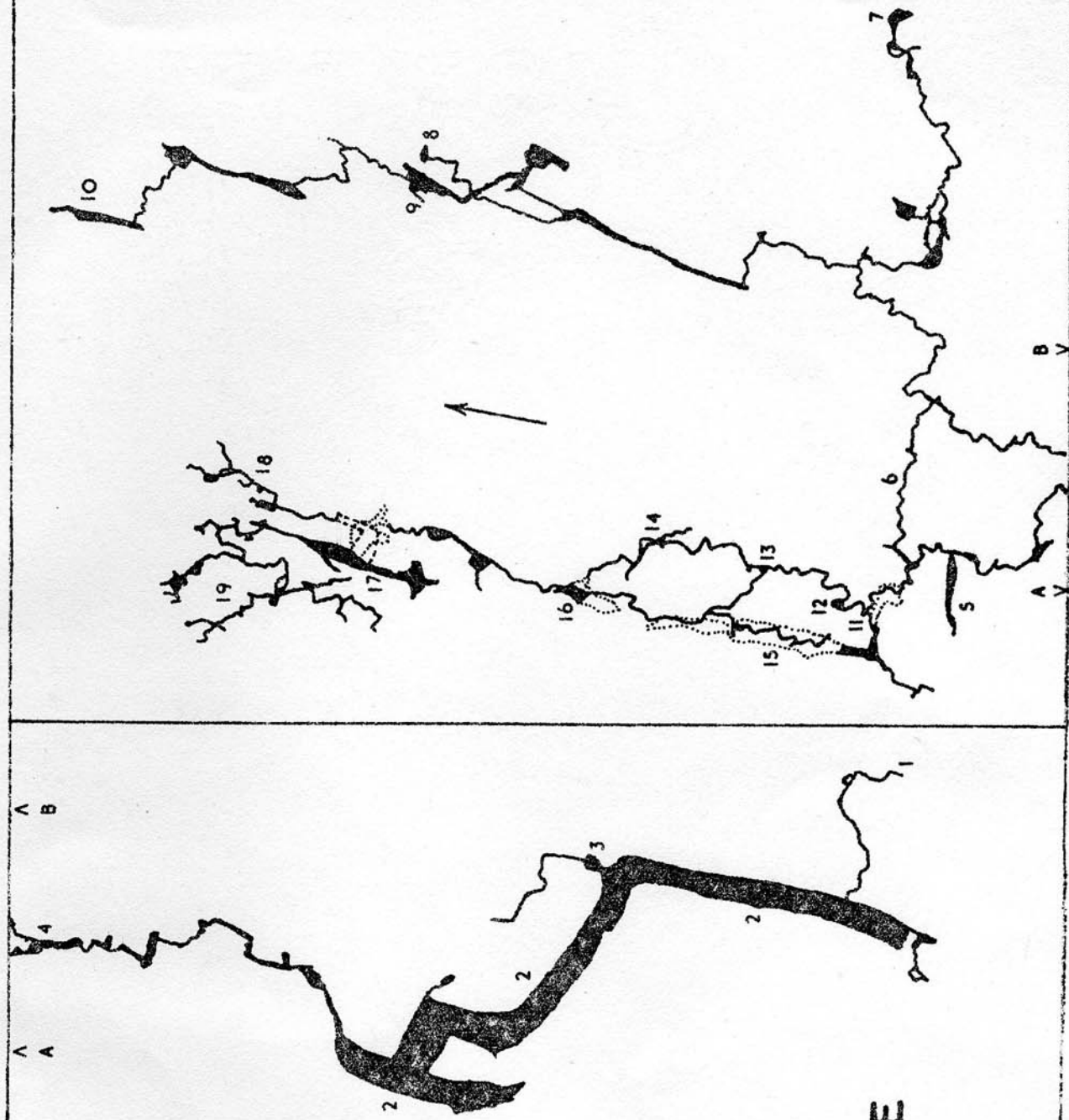
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8. J.M. Alexander. 1955. "Flood Rising in Tunnel Cave", S.W.C.C. News Letter No.13, Sept, 1955, and British Caver Vol. 27, 1956.

- 1 Entrance
- 2 Davy Price's Hall
- 3 Flood Rising
- 4 The Junction
- 5 Cross Joint
- 6 Cross Passage
- 7 Xmas Grotto
- 8 Whitsun Grotto
- 9 Steeple Aven
- 10 Final Chamber
- 11 Saddle Corner
- 12 Maiden Chamber
- 13 Marble Arch
- 14 Marble Arch Passage
- 15 35' Pot Series
- 16 15' Pot
- 17 Cascade Aven
- 18 Balcony Passage
- 19 Cascade Aven Extension

TUNNEL CAVE

sketch plan from survey by
W.H. Little & C.L. Railton.
scale 1"=140' approx.



SOME MECHANICAL AIDS TO CAVE EXPLORATION.

by P.I.W. Harvey.

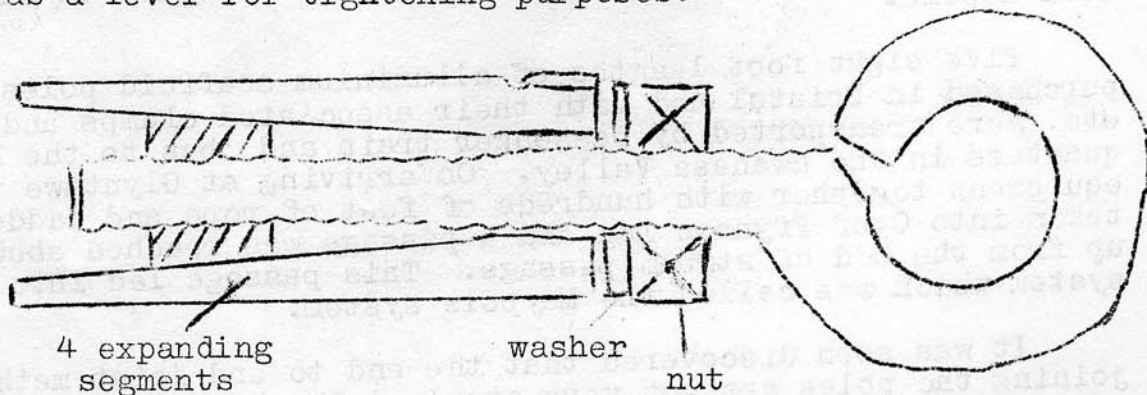
During the past ten years a number of mechanical contrivances have been developed in South Wales for the purpose of climbing upwards in caves. That these developments are more advanced than in other caving areas is due to the type of cave system found in Wales. The saying "necessity is the mother of invention" can well be applied to this type of cave exploration as most of the equipment described is a direct answer to some requirement made during exploration. Once in use large numbers of further possibilities are within our reach. In the main the problem consists of using tackle to climb up to an observed or suspected passage leading into a new part of the cave. On quite a number of occasions several weekends have been used to climb anything up to 80 feet, only to find that the suspected passage was a shadow and did not exist.

Rawl Eyebolt.

The basis of all scaling equipment must be a reliable belay. It must be one that is fairly simple to use and not too difficult to put in position.

In the early days of exploration in Ogof Ffynnon Ddu I saw one climb in the Upper Flood Passage accomplished with 6" wall nails. It was soon found that these were not satisfactory! It was also found that pitons were not much better. It is usually impossible to find a suitable crack to give 100% belay.

Nowadays all scaling operations are carried out using galvanised $\frac{1}{2}$ " Rawl Eyebolts for belays. It is necessary to drill a 1" diameter hole about $3\frac{1}{2}$ " deep using a star drill and a lump hammer. The Rawlbolt is then inserted in the hole and tightened up. The star drill inserted in the eye of the Eyebolt may be used as a lever for tightening purposes.



This belay will be strong enough for any normal use. One of these was tested to destruction and withstood 11 cwt. at right angles to the axis of the bolt before fracture. The bolt should withstand a larger load in an axial direction. The makers guarantee them to withstand 1000 lbs in any direction without breaking.

The Rawl eyebolt is a convenient size for use with snap-links or karabiners, and frequently people belay themselves to the rawlbolt while handling other equipment.

Rawlbolts are also found to be useful at the heads of pitches where there is a poor belay for the ladder, or where an inordinately long belay is necessary. Pant Mawr Pot has a rawlbolt hole at the head of the pitch and the ladder is attached directly to it. In the old days the ladder was double tethered to two crowbars and a boulder 100 feet across the moor.

It will be found that all the equipment described in this short article depend on the use of rawlbolts for their efficient use.

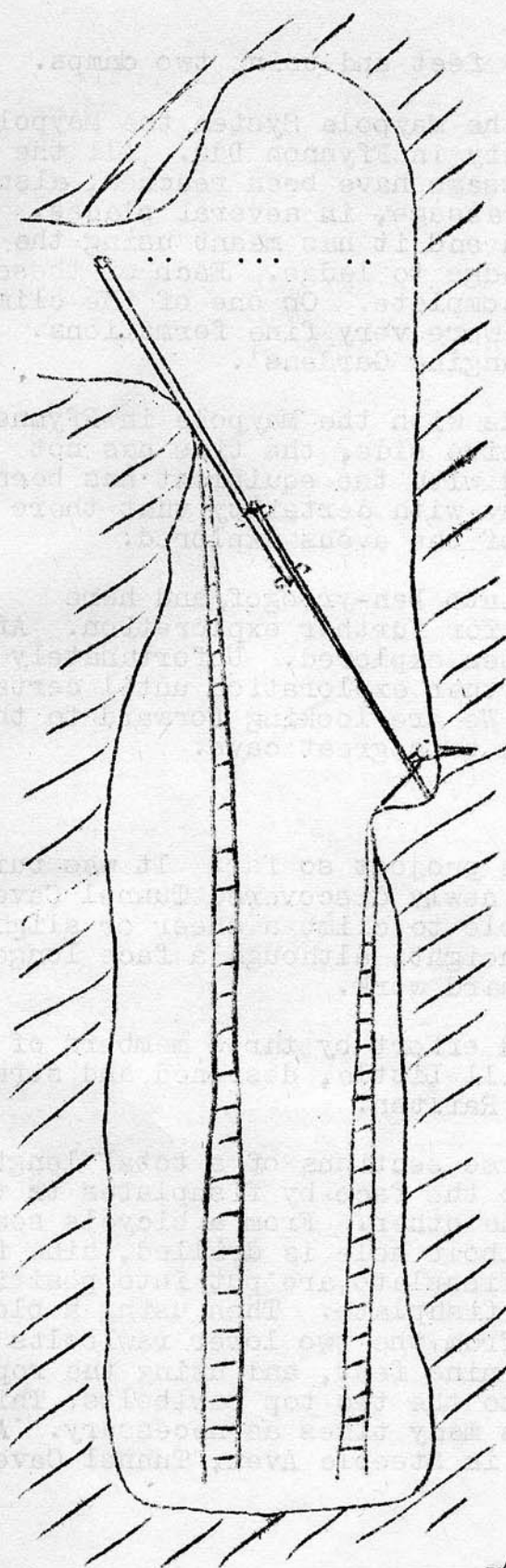
The Maypole.

After all the accessible passages in Ogof Ffynnon Ddu had been explored it was obvious that the tops of the high avens would have to be investigated to see if there were any high level passages.

It was decided that a sectional pole with a rope ladder belayed to the top would be a moderately safe proposition. The danger with all poles is that they will collapse in the same way as a strut. If a person climbs up a pole this will not be apparent until the climber reached the top, but if a ladder is belayed to the top it will be obvious when the climber puts his weight on the ladder whether the pole will behave in a stable manner or not. In any case a rope ladder is easier to climb than a pole.

Five eight foot lengths of alluminium scaffold poles were purchased in Bristol and with their associated clamps and joints, etc. were transported by passenger train and 'bus to the Headquarters in the Swansea Valley. On arriving at Glyntawe the new equipment together with hundreds of feet of rope and ladder was taken into Ogof Ffynnon Ddu and a passage was reached about 20' up from the bed of stream passage. This passage led into a new system which was called the Maypole system.

It was soon discovered that the end to end joint method of joining the poles was not very stable. The best method was over-



Rope ladder attached
to top end of Maypole.

Rope ladder and Maypole
belayed to Rawl Eyebolt.

Sketch showing Maypole
in action.

lapping two sections by about two feet and using two clamps.

Since the first success in the Maypole System the Maypole equipment has been used extensively in Ffynnon Ddu. All the jammed boulders in the stream passage have been reached, also the top of the high upper flood passage, in several places. This passage is over 80 feet high and it has meant using the Maypole in several stages from ledge to ledge. Each of these climbs took several weekends to complete. On one of the climbs above some wedged boulders there were very fine formations. This place was christened 'The Hanging Gardens'.

Although the discoveries made with the Maypole in Ffynnon Ddu have mainly been on the negative side, the time has not been wasted. The practice gained with the equipment has been useful and also we are able to say with certainty that there is no high level passage in any of the avens explored.

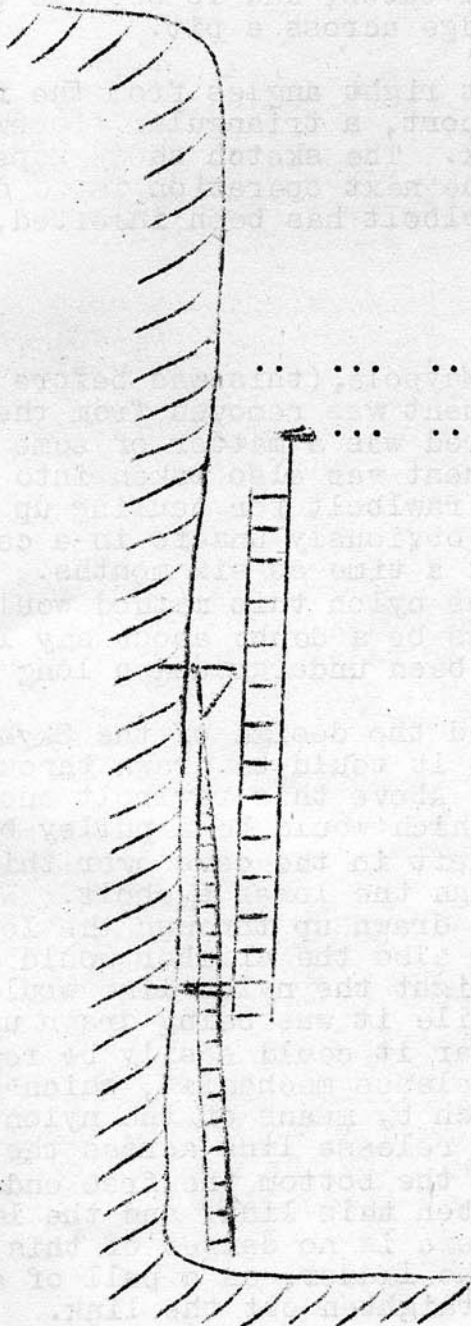
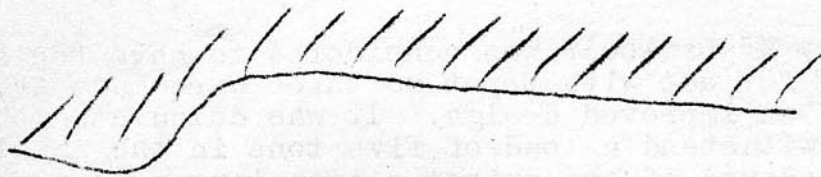
The Maypole has been taken into Dan-yr-ogof, and here there are enormous possibilities for further exploration. After two climbs two new series have been explored. Unfortunately the owners are unable to sanction further exploration until certain legal difficulties are settled. We are looking forward to the day when the work can go ahead in this great cave.

UPPET.

Uppet was the most ambitious project so far. It was built to meet a situation found in the newly discovered Tunnel Cave. In action with Uppet it is possible to climb a sheer or slightly overhanging face of rock of any height, although a face longer than 100 feet would become very hard work.

The apparatus was a combined effort by three members of the Club. It was conceived by Bill Little, designed and stressed by the author and built by Lewis Railton.

Uppet is steel ladder in three sections of a total length of 16 feet. It is first fixed to the face by fishplates to two rawlbolts, one nine feet above the other. From a bicycle seat on top of the ladder another rawlbolt hole is drilled, nine feet above the last. A rawlbolt and fishplate are put into position and a rope ladder hung from this fishplate. Then using a block and line the ladder is detached from the two lower rawlbolts and the whole thing is drawn upwards nine feet, and using the rope ladder for support, it is bolted to the two top rawlbolts. This operation can then be repeated as many times as necessary. A climb of 55 feet up a sheer face in Steeple Aven, Tunnel Cave, was successfully completed.



- Position of next rawlbolt hole which
- will be drilled by person sitting on
- bicycle seat at top of Uppet.

Sketch showing 'Uppet'
in action.

The ordinary $\frac{1}{2}$ " Rawlbolt was considered to have too small a margin of safety for use with Uppet so three were made from High Tensile Steel of an improved design. It was calculated that the new bolts would withstand a load of five tons in the axial direction, but because of the spigot a much larger load could be held in any other direction. These bolts fitted into the same diameter hole and used the same expanding device.

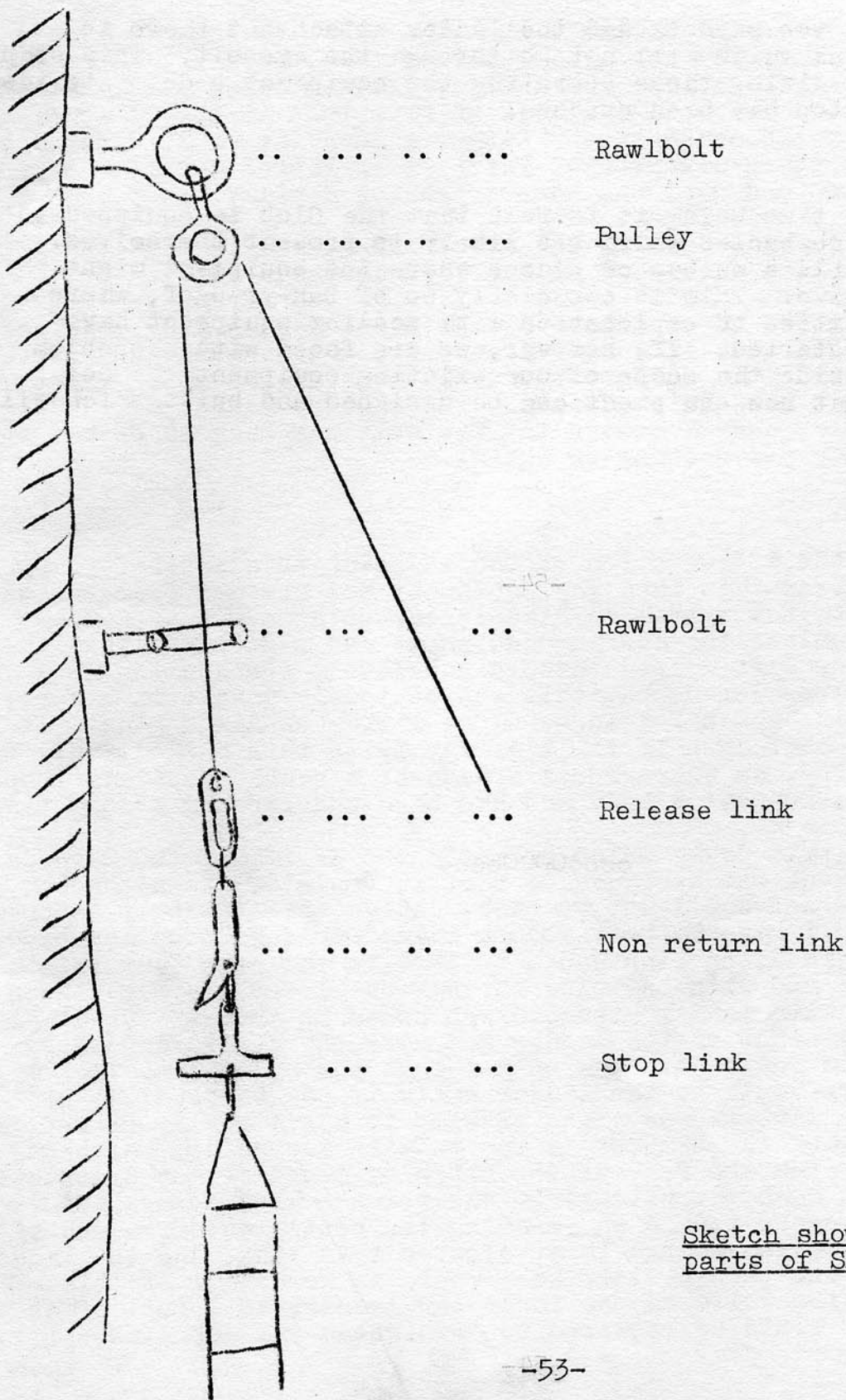
Uppet is made from 80 ton steel tubes, and is capable of supporting a man when used as a bridge across a pit.

When in use Uppet sticks out at right angles from the face, so in order to give it a bit of support, a triangular framework is used to brace it against the rock. The sketch shows uppert half way up a face in a chamber. The next operation is to drill the next hole, and then when the rawlbolt has been inserted, it will be ready for drawing up again.

The Skyhook.

After the introduction of the Maypole, (this was before Uppet) it was apparent that when the equipment was removed from the cave, re-entry into any system so discovered was a matter of some difficulty unless the scaling equipment was also taken into the cave. A line left looped through a rawlbolt for hauling up a ladder was considered, but this was obviously unsafe in a cave, where the line could rot in as short a time as six months. It was thought that even if the line was nylon this method would be unsatisfactory, as there would always be a doubt about any loop which had to support a body and had been underground a long time.

It was this doubt which prompted the design of the Skyhook. This instrument was designed so that it could be drawn through a rawlbolt eye and would not go back. Above this rawlbolt another rawlbolt would have to be fixed on which would be a pulley block. A loop of thin nylon line could be left in the cave over this pulley block and with one side through the lower eyebolt. When the Skyhook with ladder attached was drawn up through the lower eyebolt, the weight of the ladder and also the climber would be taken on this rawlbolt. The only weight the nylon line would have to carry would be the ladder while it was being drawn up. If the nylon line showed signs of wear it could easily be replaced. The top link of the Skyhook is the release mechanism, which can be actuated from the foot of the pitch by means of the nylon cord. The last man down the pitch sets the release link across the bottom rawl eyebolt, and on reaching the bottom the free end of the line is pulled enough to straighten this link, and the ladder and skyhook can then be lowered. There is no danger of this release working while anyone is on the ladder, as a pull of at least 50 lbs. would be required to straighten out the link.



Sketch showing different parts of Skyhook.

Between the skyhook and the ladder attachment there is usually a link which will not go through the eyebolt. This stop is useful in giving those operating the equipment a definite idea of when the top has been reached.

The Future.

For the time being it is felt that the Club is equipped to tackle most obstacles which are likely to present themselves. There are still a number of places where the equipment might prove effective. This is especially so of Dan-yr-ogof, where the possibilities of exploration with scaling equipment have hardly been started. If, however, we are faced with a problem which is outside the scope of our existing equipment, I feel confident that new equipment can be designed and built, which will do the job.

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