Upper Flood

Exploration to 1996

Mendip Caving Group 1996

Published by:

Mendip Caving Group
Nordrach Cottage
Charterhouse on Mendip
Blagdon
Bristol BS18 6XW

First printed September 1996

Upper Flood

Exploration to 1996

MCG Occasional Publication No. 4

To all MCG members; past, present & future

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Cover Design: Charlie Allison
Acknowledgements: James Allen, Andy Beare, Sonia Cotter, Joan Goddard, Neil Hutchinson, Peter Mathews, Martin Rowe, & the MCG membership.

Mendip Caving Group 1996

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Preface

An introduction to the history of Upper Flood Swallet. This publication stems from an account of the chain of events sparked when a camper enquired of a group of cavers - out of curiosity - what a void further up the valley was called.

Editorial

Charlie Allison

The phone rang one evening towards the end of April asking if we could produce something on Upper Flood in ready for the BCRA Conference as the MCG were proposing to have a club stand. Well the reply was yes, and here it is!

Of all the recent phenomena on Mendip the Great Flood of 1968 is probably the most important in living history - *a sinistra* a device of mass destruction, *a dextra* paving the way for the discovery and subsequent extensions of several major caves.

The Flood has greatly enhanced the understanding of the history and geography of Mendip, yet it has raised many a debate on the likely course of caves and their extent. Although the MCG {with assistance from the Wessex} has devoted many, *many,* man years of effort to this area of Mendip, without the Flood the discovery of Upper Flood, Middle Flood and Grebe Swallet in this small, but significant, area may have been delayed for several years - if at all. Passage discovered in this area so far exceeds 1300 metres, with Upper Flood accounting for over half of this.

With each new discovery many questions are answered and many others compounded.

Mendip caves are noted for the war of attrition that ultimately leads to a breakthrough. Upper Flood is no exception to this rule, and indeed we are almost certain that, in time, the best is yet to come.

This cave does not give up its secrets lightly. Virtually continuous digging for over twenty seven years has yielded one of the prettiest caves in Britain. It is perhaps difficult to appreciate the amount of blood, sweat and tears poured into the cave over time. Jonathan Roberts *(q.v.)* has quantified many years of this toil, although even this cannot provide a complete picture of the total work as some MCG trips were not recorded at all and others were not recorded in the logs whilst used for analysis.

This work is a tribute to the effort and dedication of the ***digger***. We hope that this Journal gives inspiration and ideas to those digs which have yet to go, and to those who are new to the sport.

However, there is a great Mendip tradition that, shortly after a publication concerning caves is produced, it becomes rapidly out of date. We sincerely hope that this is the case here.

Foreword

Malcolm Cotter

Part of this report was submitted in about 1986 as a Journal article to follow in sequence with other progress reports on Upper Flood.

The Journal was never produced and the manuscript was returned in 1992. This report updates the 1986 version. With the later introduction of MCG Occasional Publications, the publication editor suggested reprinting & embellishing the earlier reports in order to make the overall account more comprehensive. In addition the earlier works have had illustrations and photographs added. An extract from the narrator's chronicle giving an account of the first MCG exploration is also included.

The field help of many members is acknowledged.

The excellent input, practical additions, and support of the publication editor, Charlie Allison, is greatly appreciated, together with the help and encouragement of my wife, Norma.

Thanks to Tim Francis for acting as honest political broker, to Charlie Allison for providing the annotations for the plan & diagrams, Wayne Hiscox for the early reference material, and Peter Mathews for assistance with the cross sections. We must also acknowledge the assistance and kind help of the staff of the Charterhouse Outdoor Centre and Mendip Wardens provided over the years.

1:

Mendip

A short extract from Highways and Byways in Somerset by E Hutton - as featured in the 1960 Mendip Caving Group Journal.

Mendip, as one soon finds, as one trudges along its highways - for it has highways very definite, lonely and walled with hedge or dry stone - or wanders along its indistinct tract and byways, is a vast mountain tableland worn down by countless centuries of time. Meanly clothed with a shallow poor soil; a lonely, windy place, a place of rolling and empty fields, of sudden and immense views, of a strange and grim enchantment.

For Mendip holds the secrets of man and civilisations older far than Rome. Maesbury Camp, the lonely and forbidding barrows on Blackdown, weigh upon one as nothing that Rome has abandoned here is able to do; they seem to speak to one of a life that is so old it is an agony to think of it, and they threaten us with their enormous wisdom: the vast labour which has ended in a few colossal heaps of barren earth. For upon the Mendips as upon no other mountains in the world, perhaps because few are as old as they, man and his efforts fade into nought; their futility is exposed by the emptiness of space and the passage of time. And if, as he will, the wayfarer turns to the sky for assurance and for comfort, that sky is so often an immensity of cloud, of large grey clouds hurrying no wither before the south west wind, laden with memory of the measureless ocean.

The loneliness of Mendip is a genuine loneliness. A man turns to the sky because he must; he is shut away there from the large and fruitful world he knows, the cities, the towns, the villages and the plough lands beneath him, not the height but also the breadth and flatness of that great plateau which the roads traverse so swiftly, anxious only to pass on their endless ways. One is caught as it were in an empty space, a featureless desolation, a solitude that is like no other solitude. And there is no one else who has persevered in the exploration of these hills but has been astonished by their silence, the absence of trees, of cattle, of sheep, of all voices, and of the sound of bells, a sound one thinks, that might break the spell that lies over this desolate upland. Yet such a man will know that Mendip has voices and sounds of its own that are part of that silence.

For Mendip is hollow and full of secrets: secret springs, secret underground rivers whose courses may never be known, but whose voices one may hear suddenly on a still day as you lie on the shady side of a swallet, a curious murmuring hollow sound, rising and falling. It is not all who in such loneliness can bear such music and still have possession of his soul.

Yes, the hills are full of secrets; they are dreadful for they are very old; they are full of caves where are mingled the bones of men and beasts that are dateless; they are full of deserted camps and barrows which were built and used and defended by someone of whom we know nothing; every hill or headland is crowned with the work of man, work that was forgotten history by the time of the Romans. These remain. But the mines of Charterhouse, what is left of them? Where are to be found the remains of the Carthusians, Charterhouse - a cell of Witham, and Green Ore - a cell of Hinton? Nothing. It is though Mendip were outside history and Christendom.

And yet on a day of wind, a clear day after rain, this great plateau which a man fears almost as much as he loves is capable of giving him almost endless reward. On such a day Mendip awakes: the thin grass laughs like an old man in the sun, the rock shines with golden lichen, the lean woods are filled with the strength and joy of the wind, and suddenly you find as you come up from the plateau onto a height such as Beacon Hill or Pen Hill or Westbury Beacon, for example, all England is spread at your feet.

The Etymology of some Mendip place names:

An abridged extract from an article by the late Arthur Cox in the 1967 MCG Journal.

It describes the history and evolution of some of the place names associated with this part of Mendip.

"In particular the West Saxons were responsible for the place names of this area as they exist today. In this short summary the term Old English must be taken to include the Nordic and Saxon Contributions. These are just a few of the possible or probable derivatives of some of the local names. Further research can easily be made by reference to the excellent county volumes of the English Place-Name Society, and many other useful works."

Blackmoor *Blac Mor:* Old English - Bleak Moor

Bleak House *Blac Hus:* Old English - Bleak House

Charterhouse *Chartreuse:* French - the abbey of which a cell was built here

Cheddar *Coed:* Old English - a cove *draeg:* Old English - a slipway

Mendip *Mynydd Eppynt:* Welsh & Cornish (*Celtic*) - lookout mountains

Nordrach *Noro:* Old English, *drag:* Old Norse - a hill *[* also *poss. German]*

Swallet *Swealewe:* West Saxon - rushing water, whirlpool

Velvet Bottom *Fiellet:* Old English - disafforested *bothm:* Old English - valley floor. . .

2:

Flood & Discovery

by Malcolm Cotter

A brief history of the discovery and early exploration of the cave. It is largely drawn from the MCG Journals of 1976 and 1982, and provides an insight into the events stemming from over a quarter of a century ago. This section covers events and progress up to the end of 1982.

Velvet Bottom is one of Mendip's more delightful dry valleys, and has become increasingly popular with visitors to the area. The valley begins under the south-east slopes of the Old Red Sandstone anticline of Blackdown, and descends in a south-westerly direction to Black-Rock where it merges into Cheddar Gorge. Among the tributary valleys entering Velvet Bottom those of Longwood and Manor Farm are noteworthy - both enter from the North.

The upper part of Velvet Bottom, known as Blackmoor has been variously explored by the Group since the late 1950s. Perhaps more has been learnt of the locality since the Great Flood of 1968. And, it is since then that the greatest length of cave passage has been discovered.

The Great Flood of Wednesday 11th July 1968

During the afternoon of the 10th July torrential rain fell over Devon and Somerset. At Charterhouse the storm continued well into the night. By evening the water in Blackmoor formed a lake above the track which leads down from the church. A second lake formed lower down between this track and the Priddy Road which crosses the valley. The road was still intact in the evening, but the rain continued into the early hours of the next morning when the road probably collapsed. Many people believe that the track and road gave way suddenly since a wall of water was reported at Cheddar. Rapid rising waters are, however, a

feature of flooding and similar surges were reported in other Mendip valleys where there were no such dams.

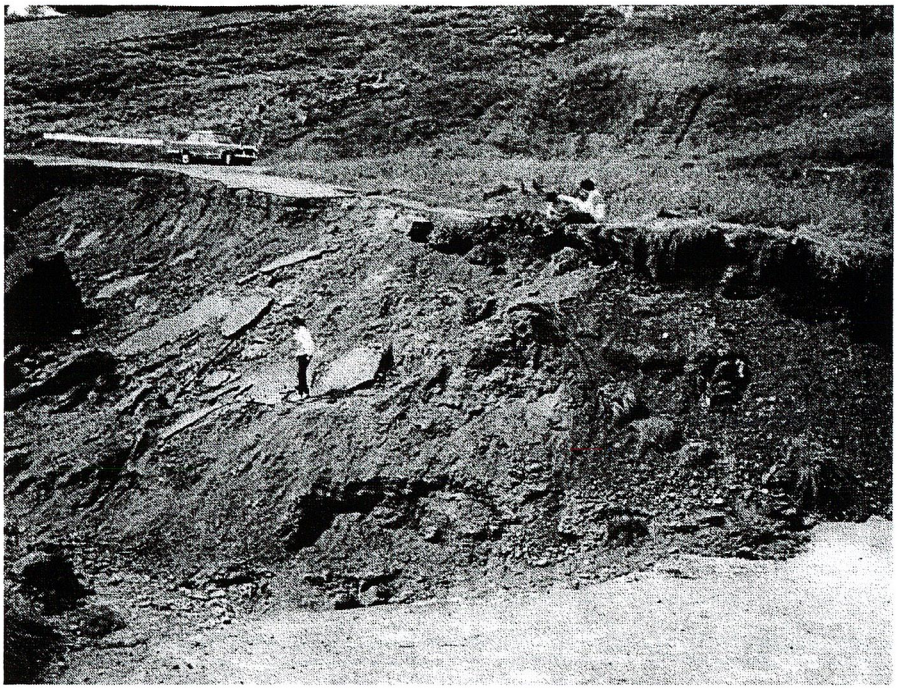


Plate 2.1

The collapsed Horseshoe bend on the Priddy to Charterhouse road, 1968

Photo: Malcolm Cotter

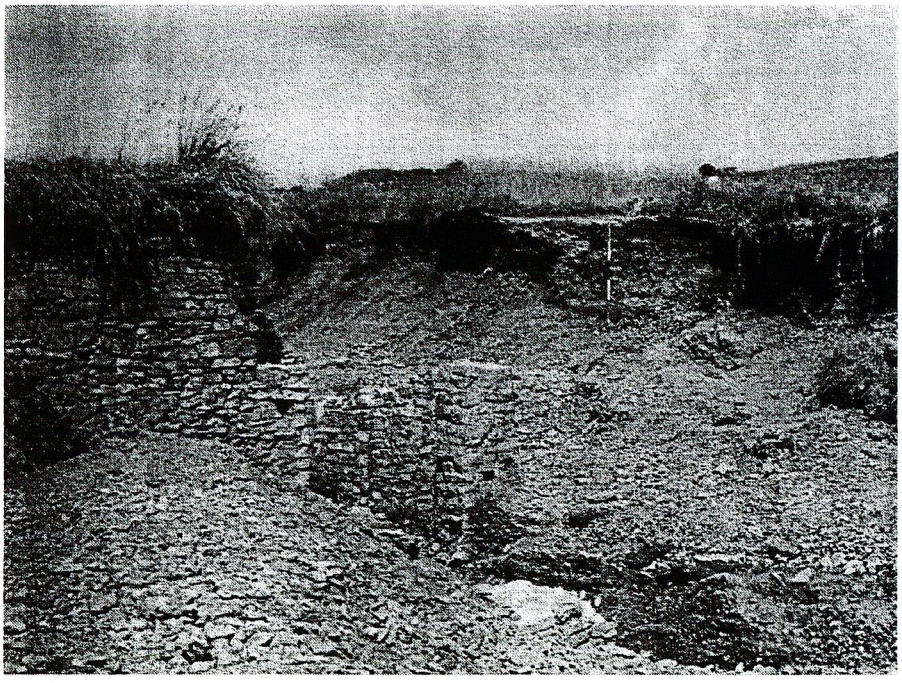


Plate 2.2

Part of the washed out track at Blackmoor, revealing stone built structures.

Photo: Malcolm Cotter

Farmer Harold Brown of Hazel Warren Farm reported that the Thursday was a fine day which attracted many people to Blackmoor where the torrents of water provided a pretty sight and an opportunity for paddling. In the morning water formed a flood running across Town Field from Blagdon Hill reaching the lower corner of the pond where the outlet normally occurs. Water also crossed the road at the dip by Paywell Farm, where chaff

caught on the fencing indicated a depth of 1 metre. The pond itself was also a metre above its normal high water level.

The exposure of washing bed structures and heaps of flood debris attracted numerous treasure hunters. At this time the stream flowed on down the valley, overflowing the hollows below the Somerset Youth Centre Hut.

Upper Flood Entrance Swallet

From the 1976 MCG journal:

The entrance to this cave became known to us on 3rd August 1968, three weeks after the flood.

A digging party composed of Richard Peat, Greg Smith, Roger Wallington, and the writer were exploring a leat near Middle Flood Swallet (Waterwheel), when a camper named Peter Anderson enquired about a 'mine-shaft' higher up the valley. The party were unaware of any such mine and asked to be taken to it. I remember walking up the valley with curiosity dosed with a degree of scepticism. On seeing the hole, however, all such doubts were lost. The shaft did bear a superficial resemblance to a mine, being almost a perfect rectangle. Near the bottom, on the North side, a number of timbers were visible. At the bottom itself, a square flat roofed tunnel led away. . .

It was with rising excitement that I entered the cave, realising that in it lay the key to the Blackmoor drainage. After all the hard years of digging it seemed that at last we would be able to explore the great cave which collects the waters of the valley.

This is the original extract from Malcolm Cotter's log dated 3/8/68 of the immediate events leading to the discovery of this cave:

Greg Smith, Roger Wallington, Richard Peat and I went to the new Middle Flood Entrance (which later became part of Waterwheel Swallet) to dig. After about an hour, Roger had got down about four feet and reported a general boulder choke. The side of the hole then started to collapse and they all decided to come out. The entrance tunnel had a roof of calcite cemented blocks. The chamber was in bedrock dipping towards the valley floor. The floods had filled the cave to the roof.

The others then waited outside a leat whilst I crawled along it. It seemed to go on for a very long way and the going was slow. In places it was a flat out crawl and in others almost a hands and knees crawl. After some 200-300' there was too little room to move and I had to return. This point was well out of earshot of the others. While in the leat I heard sounds from overhead and assumed it was people walking about.

When I got out only Richard was there. He told me the others had gone to look at a mine shaft which they had been told about. I said there was one marked on the map above the track to the old MCG cottage but he said it was in the valley.

Apparently a near by camper (Peter Anderson) had come over and asked if they were Pot Holers. They said that they were. He then asked where the large hole up the valley led to,

adding that his friend had nearly fallen down it the night before. The others asked him to show them the hole. When they saw it Richard came back for me. I was just about in hearing range in the tunnel.

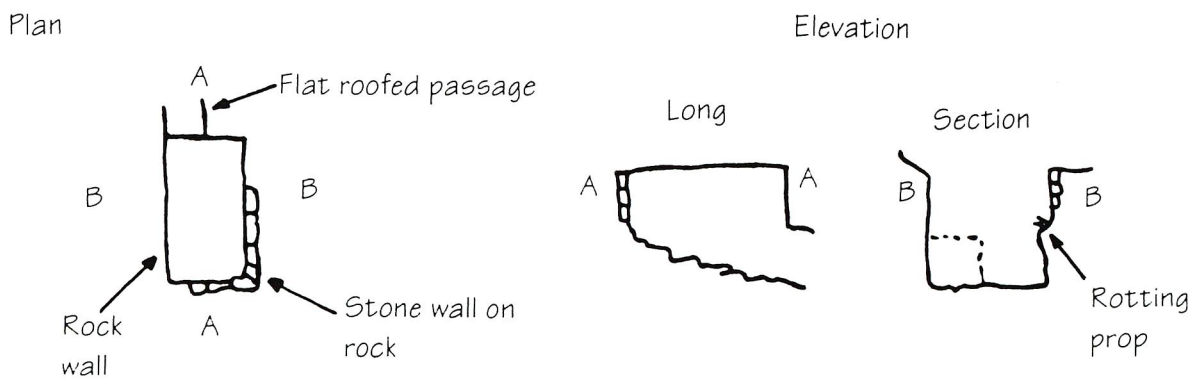
Richard went to my van to get a lamp while I walked up the valley. I completely missed the hole and was directed to it. It was not visible until one got very close.

On seeing it I knew it had been opened up by the floods. It was not possible to tell whether the down turned grass near the edge had been caused by water or people walking by the edge. At a quick glance it looked like a mine opening, since it had been partly built up on one side by a dry stone wall. There also appeared to be shot holes. A moments inspection showed that there were no shot holes but grooves along the joints. The (bedrock) wall had been corroded so that it had a rough laminated appearance. However it can at times be very nearly impossible to discern the difference between natural cave passages and mined mineral veins, as veins have often been invaded by water which causes similar corrosion to that in caves.

Below the miners wall were one or two pieces of rotting wood which must have been used to cover the hole, which was then covered by spoil. The upper foot or so of the hole contained typical miners waste.

Leading from the shaft was a square shaped passage which widened inside where one came to a drop of some eight feet. Grass clinging to the walls showed that the water had been very deep. The hole now looked more like a cave than a mine especially when one looked down the drop and saw the eroded passage beneath. Before going down we had to dislodge some precariously placed boulders - a sure sign that we were the first party in. The crash was heard by Roger and Greg below. Greg shouted back that this was definitely it!! At the bottom of the drop one had to pass down a vertical squeeze (which Roger and Greg had cleared to get through) into a drain pipe with a typical cave section. As Greg had said there was no doubt that this was all cave. At the end of the crawl one came out into a pot with beautiful stall formations. This pot was in the top of a wide stream passage (almost dry) and on seeing the whole visage I thought at once that we had a days caving ahead. At this juncture we met the other two who had just come from downstream to say there was no way on beyond a muddy fifty foot crawl. Richard went on down to have a look complaining strongly about the mud. We then went upstream and joined the others. After the stal pot we went up a narrowing passage over a calcite squeeze to a more roomy intersection of two passages, one to the right and the other straight ahead.

Fig 2.1 Sketch of Original entrance



I took the way straight ahead which went into a steeply rising boulder chamber. Corrosion had revealed numerous fossils everywhere. The chamber continued amongst boulders but became low and since it had the appearance of an inlet passage I did not pursue it as far as I could have done. On returning I tailed onto the others who were in the other branch.

The branch led to a series of narrow passages with rounded sections at top and very prominent chert protrusions. The intersections were nearly at right angles. One of the passages which one had to climb into had a chert partition right across and since the total height was only about 18" it looked to Roger as if there was no possibility of progress. However the band proved to be very brittle and broke easily. This passage led to a further one at right angles, to the right which had a chert bridge with mud on top and a few broken straws above that, in all about 1' thick. Immediately beyond one entered a chamber with good stall. There were some good pendants some 3' in length. At the lower part was a muddy sump fed by a trickle of water from another passage entering the chamber. The inlet passage took a turn and extended to a point where muddy rimstone pools were encountered. This was obviously another inlet passage.

I now went downstream into the muddy section. The passage started at about eight feet wide by twelve high at the Stal Pot. Leaving the pot one first had to crouch, then get onto all fours, then lie down in the most unpleasant cave ooze I have ever encountered. The walls narrowed at one point where there was an inlet passage. This inlet turned out to be too mud choked to enter. One then entered a small grotto which would have looked quite pleasing if it hadn't been for the mud. At this point one could get off ones belly, crouch and turn round. The mud appeared to be stratified. The top layers were yellowish while the bottom layers were in places black. The fill rested on a stall floor being some 3" thick in the centre of the grotto but thickening to about 18" near the stall grotto. This clay or mud may have filled the lower sections of the cave and only been partly removed by the floods. At roof level a bedding plane space 2" high had taken water as it had chaff clinging to stalactites.

I tried to lower the water level in the mud sump by swishing it towards a gap in the stal with the blade of a spade but with no avail. The way on almost certainly lies beyond this sump...

Fig 2.2 Stal Pot

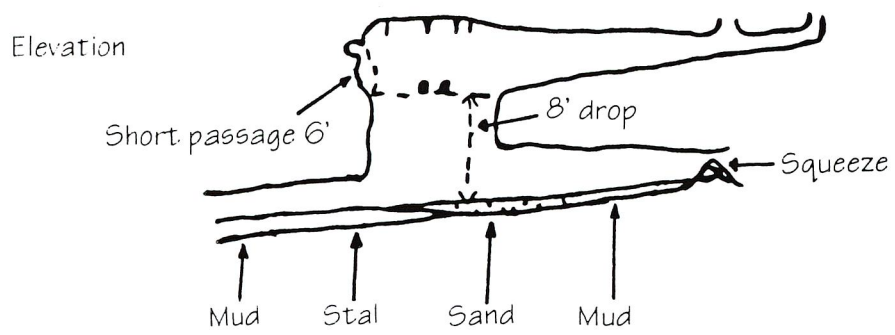


Plate 2.3

The entrance to Upper Flood on 3rd August 1968.

Greg Smith looks in to the entrance.

Photo: Malcolm Cotter

A short way in a drop of 3 metres (now the first flight of steps) offered a small but sporting climb. From ahead came the voices of Roger and Greg, "*this is it!*" At the bottom of the drop a hole which, had just been cleared, gave access to a flat out crawl along a drainpipe. Progress along this could, unfortunately, only be made by breaking small straw stalactites. We then came to another short drop where we emerged at the side of a small stream passage. This section was well decorated and was named 'Stal Pot' (now the second flight of steps). On this visit there was a heap of sand and turfs on the floor.

Downstream the passage rapidly turned from a crawl into a mud wallow; upstream the way looked fairly large. The downstream passage revealed 17 metres of passage; the way on being blocked by a flowstone barrier behind a shallow pool. At roof level a slit only inches high continued; it contained a few straws bearing traces of flood debris.

Exploration upstream revealed a roomy boulder chamber, the walls of which contained numerous protruding fossils. A side passage gave hope of continuation. Progress at one point was stopped by a band of chert completely dividing the passage. This was easily broken and progress continued to a small chamber containing a chert bridge and good calcite formations. It ended at an impenetrable sump. Blackmoor had closed its secrets yet again.

Our exploration for the day had ended leaving us somewhat disappointed. The following day a survey was undertaken and this showed the cave was 83 metres long and 13 metres deep.

There was no evidence that water had flowed over the *top* of the shaft: the altitude was too high and no flattening of the grass was observed. The shaft, presumably, must have been undermined by water from below.

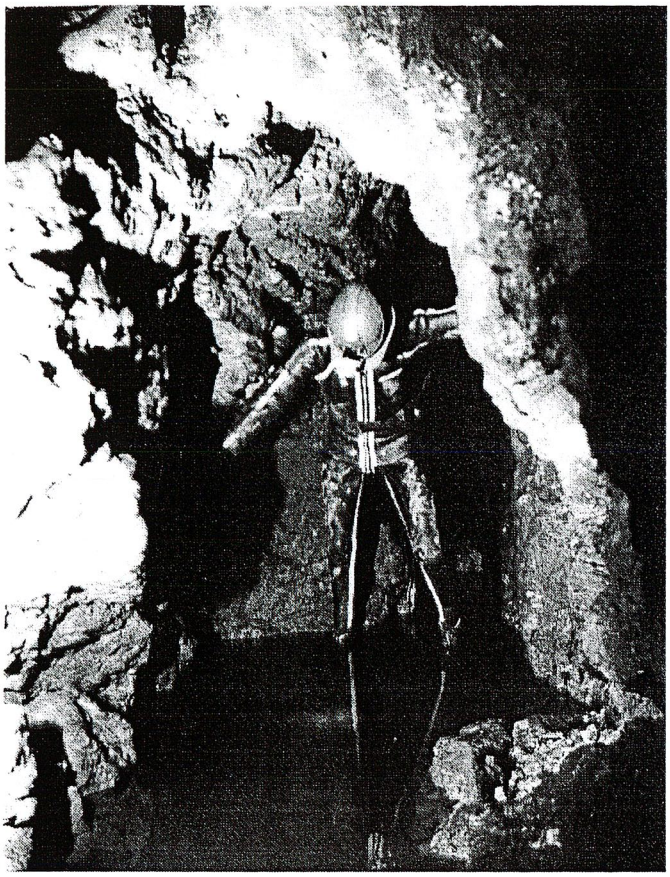


Plate 2.4

Position of the first obstruction. The flat vertical wall in the centre of the picture was the limit of the first exploration. The dam can just be seen behind left leg.

Photo: Malcolm Cotter

End access was improved by digging mud from the wallow. This was stored in plastic bags and used to construct a dam at the Stal Pot. Attempts to lower the water level and the end of the cave by bailing water behind the dam were unsuccessful, even when a hand operated sludge pump was used.

The Reservoir Hole Team

Additional text by Peter Mathews.

In late 1971 work was started in the entrance passage by the Reservoir Hole Team - consisting of Willie Stanton, Tom Evans, Frank Reynolds, Willie Edwards, and Alan Trickey. The aim behind their work was to establish a walk-through to the final obstruction, where more powerful methods could then be brought to bear.

Events at this stage can only be described as bizarre for the Reservoir Hole Team were unaware of the Group's efforts and permission to dig. And the Group for their part were unaware of the Reservoir Hole Team and their permission to dig. By a strange twist of fate this part of the Valley had been sold since work originally started. The Charterhouse Caving Committee, who originally controlled access on behalf of the Bristol Waterworks were informed of this. The obvious solution to the situation was a joint dig - and in this way work continued in December 1971.

The excavation of the entry passage resulted in both the removal of roof and floor of the drainpipe. Slabs of rock from the roof were used to construct the steps down the first drop,

and at stal pot. During this work a passage behind the first steps was sealed with spoil (P R Mathews, MCG Newsletter 80, 1969).

Before the commencement of this clearing operation there was much evidence of the presence of lead miners. Most of the roof above the first drop consisted of large boulders, once held in place by now long rotten timberwork , and succeeded by calcite cement. In the floor above the drop a board was found buried in the mud, while rope marks were discernible in the left hand wall above it. It is thought that miners diverted water down the Swallet, using it as a drain. As much of this water would have been derived from the buddle pits used for washing lead ore it would have been heavily silted. Presumably the Swallet required some attention to keep it clear - the board appeared to be part of a sluice, the rope marks are thought to have been caused by dragging out the silt. Subsequent analysis of cave mud deposits indicate a very high content of lead. (See Stanton 1976).

Work on enlarging the passage continued and spoil was deposited outside the cave beyond a wall of heavy boulders. Sections of the concrete pipe were rested on the wall so as to preserve access through the increasing depth of spoil which was being dumped outside.

The First Breakthrough

Systematic work on enlarging the small entrance crawls was carried out by the Reservoir Hole Team working midweek evenings, and the Group at weekends. By the Easter of 1972 the passage had virtually been enlarged as far as the terminal calcite blockage. Here the water trickled away in an impenetrable fissure. It was clear that extensive blasting was the only means of making effective progress. After some further weeks work a stage was reached when water could be heard running away in the constricted passage ahead.

On the 11th June 1972 John MacMillan, Peter Mathews, Pat Walsh, and Don Vosper forced their way through a flat out squeeze with little air space over liquid mud. They found themselves in a well decorated passage which enlarged into a roomy chamber festooned with formations. the chamber descended more steeply at the far end and closed down, but a way on was achieved with little effort. Beyond, a narrow passage was encountered which contained about 0.6 metres of thixotropic black mud. On the first crossing the explorers were able to walk across it with ease; subsequently it became difficult to extract oneself. The passage lowered to a wallow and ended once again at a stalagmite known as the Stal Boss. The Boss did not form a total obstruction so that an extension could be seen on the far side.

Only one side passage was found, an inlet entering the left hand side just before the wallow. It originally contained some superb formations, but was later used for storing spoil. A flood mark was noted about 0.7 metres above the top of the floor at the top of the inlet.

Subsequent Work and Discovery

The next breakthrough came on 18th August 1972 when Tom Evans, Frank Reynolds, Willie Stanton, Alan Trickey, and the writer passed the Boss into 5 metres of passage ending in another almost total blockage. Water flowed away through a small slot at the base of the obstruction, and trouble with blockages was frequent - there was some danger of the approach passage flooding and rendering the approach passage inaccessible.

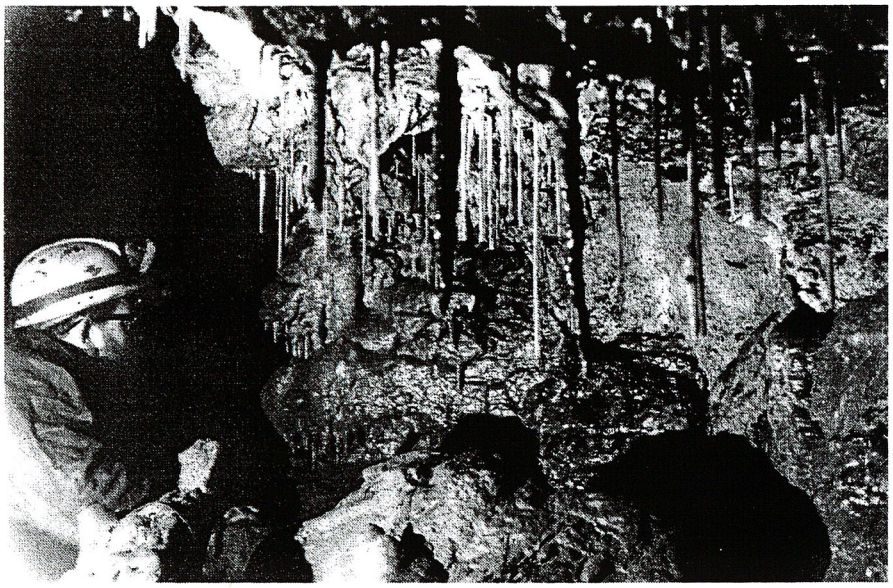


Plate 2.5

Simon Knight in the first new chamber. Unfortunately a number of these formations were damaged following the increase in traffic in 1985.

Photo: Malcolm Cotter

After some 6 metres tunnelling through solid rock another breakthrough was made by members of the Reservoir Hole Team. The passage widened and the floor dropped, revealing a long descending chamber. From here the passage continued for 10 metres ending in a horizontal slit above the dam of glutinous mud - beyond the stream could be heard cascading over a drop. It was apparent that open cave did not go as far as the tell-tale flood debris that was deposited on the roof.

Once the lip of the dam had been breached the obstacle was easily passed, and on the 3rd December a short drop of 2 metres was descended. Almost immediately the stream vanished in a loosely filled floor; progress was halted *again*.

Ahead, the old pre-existing passage was entirely filled with an ancient deposit composed mainly of calcite with pockets of red clay and occasional voids. The infilled passage was sometimes so narrow that bedrock had to be removed. Below the clay a stalagmite floor was reached on occasions. Drainage of water was again restricted and the passage often became a canal.

In dry conditions water was seen to drain down two excavated holes on the right of the passage, presumably finding a route through sediments under the floor. This feature of water flow below the stal floor appears to occur throughout the cave. At different stages dams were constructed - at the first breakthrough point, just after Stal Boss and in this lower section. Dams were made both to keep the working face dry, or at least free from flooding, and to wash away the mountains of mud.

To date about 235 metres of new cave has been discovered, at a cost of excavating 15 metres of totally blocked, and 25 metres of partly blocked passage. . .

Plate 2.6

A wall of deads holding back spoil. A portion of tailings is just visible on the left

Photo: Malcolm Cotter

From 1976....

Progress in the Blackmoor Area of Velvet Bottom.

During 1976 blasting and clearing operations continued. Half way through the year we encountered a mass of black mud (tailings from lead working) blocking the upper half of the passage. Expectations rose when a probe hit a free space on the far side. As usual our feverish digging gave way to disappointment when the cavity came to an end after about 1 metre. Digging downwards revealed that the stream was in a water filled cavity on the left side which shelved sideways about 1 metre.

Very little was done in the cave between 1976 and 1981 since all our efforts were directed to cottage building. In 1981 work resumed in earnest, aided by fresh helpers.

The initial task was to tidy up the approach face which took several sessions. Blasting and clearing of the calcite obstruction then continued. About half way through 1982 we found for the first time that the calcite blockage projected below water level and this gave us hope that we had reached the final spoil dam. On breaching the calcite we encountered mud and water which could be probed for 1.5 metres without finding the bottom. Another calcite barrier lay ahead and work continued.

During the following two winters water levels were frequently been high in the cave. Flow away at the end was never impeded.

The latest system of spoil removal, dragging fully loaded skips from the face right out of the cave was proving far superior to the old method of using poly bags.

Bank subsidence: several digging sessions were made up the valley at the bank subsidence, but work ceased before any firm conclusions could be reached.

Upper Flood Future Projects

A steady advance at the face of Upper Flood will continue. In the same cave an investigation will be made of the recently infilled passages behind the first flight of steps. It is likely that the continuation of this passage discovered in 1968 could lead out to the valley at stream level or below. Since miner's props were observed, it is probable that the cave extended in that direction in the past. In Swildon's Hole water drops vertically down the Wet Way a short way in, leaving dry ways above - a similar situation may have existed at Upper Flood. Another good reason for reaching the stream would be to flush out the present system.

The search for the Post Glacial Swallet will continue in the valley. An investigation is to be made at the point where water vanishes on the left (East) side of the valley. Here, an arm of the stream used to enter a covered leat. Over the last 20 years or so the stones covering the leat have collapsed and the bank subsided. This process has speeded up over the last few years and a clay face has been revealed. Before the great flood of 1968 water was only observed entering the left bank in exceptionally wet conditions, or following blockage of the mainstream (which also enters a covered leat). Impedance of the flow since 1968 has meant that the left branch of the stream has been increasingly active, and probably accounts for the subsidence.

An interesting feature now revealed is that the left distributary is joined at the bank by a large volume of water flowing from the right bank (South). The enlarged volume then appears to sink vertically. The site is to be investigated as soon as conditions allow.

Another change to water flow since 1968 has also been observed: water has not been seen at the lower swallets at all. Before 1968 the lower swallets were active after Blackmoor Swallet. Blackmoor Swallet is occasionally active after very wet weather, but reduced in volume. Before 1968 it generally took water continuously between October and March.

3:

Upper Flood Swallet

by Malcolm Cotter

The work up to the end of 1989, the events leading to the discovery of Midnight Chamber, and one of the most beautifully decorated streamways on Mendip, are narrated.

Surface Work- The East Bank Dig

The Blackmoor stream splits into two distributaries just before the track across the valley. In the 1982 Journal, a proposal was made to investigate the easterly branch where water disappears into a covered leat.

Work was carried out in January 1983 in very wet conditions, so an approach path was cut along the north bank of the distributary (the Upper Flood side) and the sods extracted were used to form a dam across the channel. This action only caused a partial fall in the level of the small pool below the bank which continued to be fed by an inflow from the south referred to in the earlier journal. Even so it was possible for Geoff Barton, clad in a wet suit, to clear mud and rock from below and in so doing relocate the covered leat. By pushing a probe into this it was possible to determine its starting direction, which to our surprise, was to the N.N.E. that is towards the entrance to Upper Flood. In February when conditions were not quite as wet and with the dam of sods still in place a good flow of water was observed vanishing into the southerly covered leat (leading straight on from the stream in the valley). The site of our recent digging had a very low flow coming from the south and the stones covering the leat were exposed.

Exceptionally wet weather brought about repeated flooding of this part of the valley causing further subsidence, and developments within the cave diverted our attention.

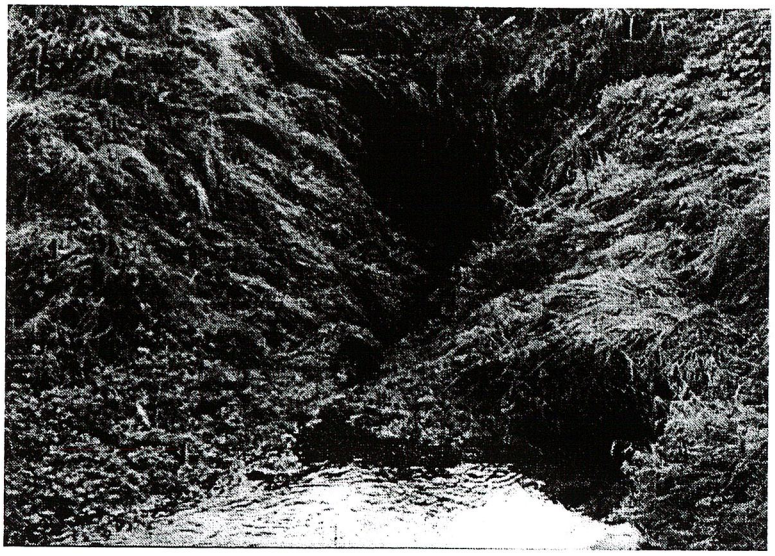


Plate 3.1

The South-East Bank dig.

Was this to be a way into the cave?

Photo: Adrian Ducket

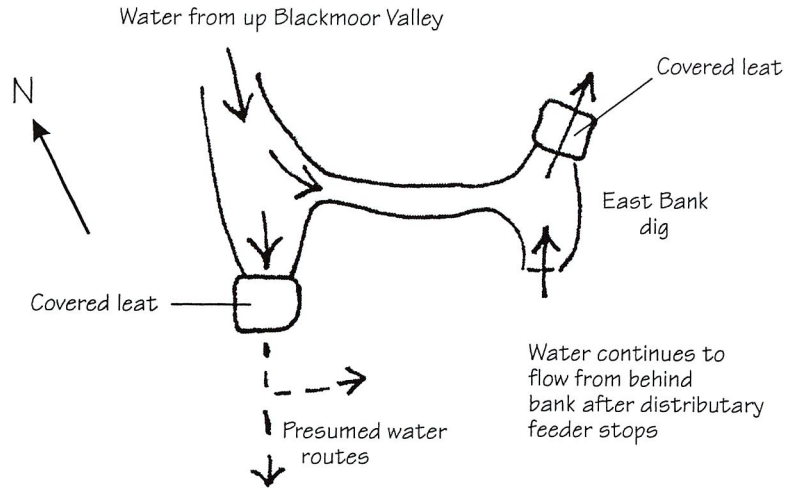


Fig 3.1

A sketch plan of the South east bank dig.

Upper Flood Swallet

The willpower to reopen and pursue the passage behind the first steps was not forthcoming since no certain gain was apparent. In addition there was insufficient manpower to work the end face at the same time. However, the prospect of another route near the entrance remains. In a recent valley flooding in 1987 Phil Ingold observed water vanishing into the bank about half way between the East Bank dig and Upper Flood. A lot thus remains to be found out about waterways beneath the tip heaps.

Had the valley stream been diverted into the cave, as proposed in the previous article, it is likely that rather than flush out the muddy end, sediment would have been carried down and become trapped before a very substantial barrier so adding to our difficulties. In the long term, a stream of large volume would have re-excavated the passage, as happened in other parts of the cave but blockages in the main streamway, such as the outfall to Midnight Chamber, point to this process being very slow indeed.

Early in 1983, hopes were again raised. The end of the cave at the time contained a pool beyond which was a stalagmite blockage. Geoff Barton while working with hammer and

chisel found a soft fill on the left which broke up readily to reveal a muddy cavity. Probing this with a 1.5 metre beam of wood dislodged sediment which could be heard splashing into water ahead. A totally unexpected sight was water flowing from the developing crack. We wondered if we were heading into an inlet passage.

Since the reactivation of the dig in 1981 the newly cleared passage had followed a more northerly trend. At first it was assumed that this was caused by deepening the passage along an East West fault dipping to the North but when there was no change of direction on the level there was strengthened speculation on a link with Nether Wood Swallet, the entrance to the latter occurring some 50 metres above and 300 metres to the NW of the dig. Perhaps we were going to make a connection? Unfortunately the void closed down to solid fill by March.

Digging at this time consisted of putting an explosive charge at the face, generally on the right and just below water level, where it was possible to chisel out a cavity without the extreme effort normally required to drill shot holes by hand.

It sometimes required more than one hauling trip to remove the debris produced. With the dig in this state it required a lot of persuasiveness to get people on a hauling team. Fortunately there were a number of newly joined members who were "conned" it was said laughingly into lending a hand! Without their effort progress would have been exceedingly slow. Among this group of people special mention must be made of Chris Martin and Pete Dyment who helped on a number of occasions following their introduction to digging. (For a membership as large as ours even one digging trip per member per year could produce significant results). Not all the spoil produced by blasting was removed from the cave because there was a muddy water filled volume to the left (North) below a shelving roof. Additionally the stirring of the fine sediment probably meant that it was partly washed onwards. Thus the pool at the face was gradually back filled to water level as we advanced.

The next "exciting" discovery was made by Martin Rowe in May. While working at the face he broke into a small cavity at roof level which took a chisel at arms length without impedance. It was later possible to shine a light along the hole which did not reveal any immediate enlargement.

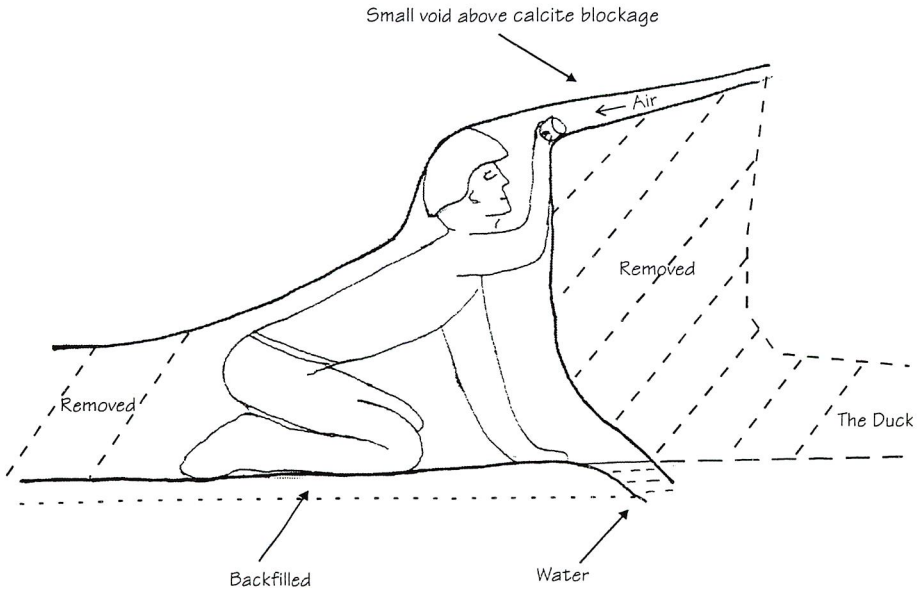


Fig 3.2

The next discovery, May 1981. A sketch from the narrators log.

On several occasions we were able to work Nether Wood and Upper Flood in a labour intensive mode. Only two people were required at that time to dig Nether Wood and likewise

only two were needed to fill skips in Upper flood. Resting supporters at the surface site thus made an occasional haul of filled tubs in Upper Flood!

It was events which occurred in June which gave hope for the future. At the beginning of the month the "siege" was joined by Mike Haseldon who devoted his immense energy and explosive handling ability to the task. Then at the end of the month during a well supported digging session the first obvious air current was detected. It may be recalled that summer '83 was late starting, with cold winds and sleet driving surface workers below for respite. In June the weather became exceedingly hot and it was on the scorching 16th, while loading at the face that a distinctive outward airflow was felt coming from the roof hole mentioned earlier. Although the draft was not particularly powerful it was the first time in this cave that we had an identifiable air current. Later the same night an air flow was detected from the entrance.

Throughout the remainder of the year and during 1984, slow but inexorable progress was made at about 30 cm (1 foot) per month.

At times there were relatively large flows of water in the cave but most of it fortunately found its way into a small hole on the left at the start of our floor tip and only a small volume reappeared at the end. The dump thus served a useful purpose although this had not been its intention.

The next interesting news from the cave came in November 1984 when Mike Haselden reported hearing a distant rumble from beyond the choke. Unfortunately no one else could confirm leaving uncertainty as to the source of the sound which perhaps came from the stream in Upper Flood Passage.

By March 1985 we had reached the end of the eye hole in the roof and lost the draft, but fortunately the air remained fresh. The pool at the end could be probed a full arms length. What lay a only a short way ahead could only be dreamed of.

Mike Haselden reports of his digging in April:

> *I approached the work face on all fours and before I could see the end I was surprised to observe a bank of mud and gravel which had been thrown up by the underwater blast, as if by a tidal wave. Next, I saw a clear water pool right across the passage bottom. And then, as I came closer to the end, my eyes were drawn to a deep cavity under the calcite choke. This made my adrenaline level rise, and placing my head in the water, I peered into a black hole which went beyond the choke.*
>
> *What I saw was a heart-stopper and I knew that we were about to make a breakthrough. I thought about crawling through there and then but I soon realised that the gap was too narrow; the space above the water was no more than a six-inch triangle of air. I then gave the rock face a good bashing with the lump hammer but diagnosed the need for a little more chemical force. During my short stay at the face I was aware of increased air movement and moreover the sound of running water in the distance. All these manifestations produced quite a state of excitement in me.*

The easy part came on the 13/14 April 1985 when, following the clearance of his previous weekends bang debris Mike Haselden was later joined by Tony Knibbs, John Mirriam, Jonathan Roberts and Denise Samuel (Knibbs). Some 150 metres of fabulous stream passage the like of which every digger dreams about was explored. Mike Haselden writes of the breakthrough:

Surveying the ceiling and way on I cautiously crawled in. What I saw at first was discouraging, but the sound of running water beyond was music to my ears. I proceeded slowly along a muddy slimy crawl which steepened and impeded my view. I had to move a couple of loose boulders to ease my passage. The way on then levelled and opened up a little and a few muddy formations restricted my movement, but the "music" was louder and I could see a tight opening into total blackness.

Carefully I passed through the opening and the reality of the chamber I walked into was more like a dream. No words can match the joy and emotion of such an experience, so you will have to imagine the magic of the moment when I stood in the spacious chamber, the first person to do so since its creation, the first witness to a magnificent calcified chamber with a sizeable flowing stream as a bonus.

The cave was at last beginning to fulfil expectations, but even so, as on previous occasions it only revealed a relatively short portion of the vast system. The waterway had been followed downstream to a low tight bedding plane ending in a sump which could only be entered by arm!

Subsequent Work - Bypass Passage

Just before the wet bedding plane a climb led into a chamber which continued as a low flat out crawl over stalagmite with a blind end. This upper passage was roughly parallel to the wet bedding plane so it was decided to excavate it onwards in the hope of bypassing the sump and dropping back into the stream. The task of breaking through the stalagmite floor was extremely difficult and tiring since there was little room to wield hammer and chisel while lying flat out.

Plate 3.2

Malcolm Cotter in the wet bedding plane, heading towards the then terminus of the cave.

Photo: Norma Cotter.

Once a little space was achieved work proceeded apace. Several skips were brought down the cave and a continuous loop used to pull the containers back and forth along the crawl. The work was enjoined by new helpers among them being John Beauchamp, Alan

Dougherty, Andy Scully (the sculptor) and Yvonne Ward (Rowe). The work was done mid week and at weekends.

By November 1985 the dig had progressed 4 metres and a change was apparent in the fill. It thus seemed sensible to determine whether we were beyond the bedrock roof. It was during a lone spell at the face (the ideal time for a little hammer work) that the writer made an attack on the roof of the passage, which it will be recalled was the continuation of the stalagmite floor previously dug through. Initially there was no indication of a void above and the surface had the appearance of a bedrock roof. Progress with hammer and chisel was slow and the lack of hollow sound indicated that the stall floor and bedrock formed a continuum. Then, quite suddenly, a boom developed and a few blows later a hole appeared. This was gradually enlarged to reveal a very low passage starting at a height of some 6 centimetres but appearing to get a little higher further on. An obstruction could be made out at the limit of vision some 6 metres ahead.

Since this passage was exceedingly low contained numerous formations and represented an interesting section workers agreed to continue tunnelling through the softer fill beneath.

This part of the work progressed with restraint as it was clear that at some stage we would come close beneath a slight rise of the roof which would gain or ease access to what lay beyond. The time of this investigation could easily be advanced by sacrificing some of the features mentioned above. There was thus presented the possibility of a planned breakthrough. We had by August 1986 advanced a further 3.5 metres beyond the window and effective work required three people to get spoil back into the chamber where it was disposed of behind a wall of "deads". It was by this time clear that the end was beneath the higher roof and a new window would answer a lot of questions. This section has been called Bypass Passage on the survey.

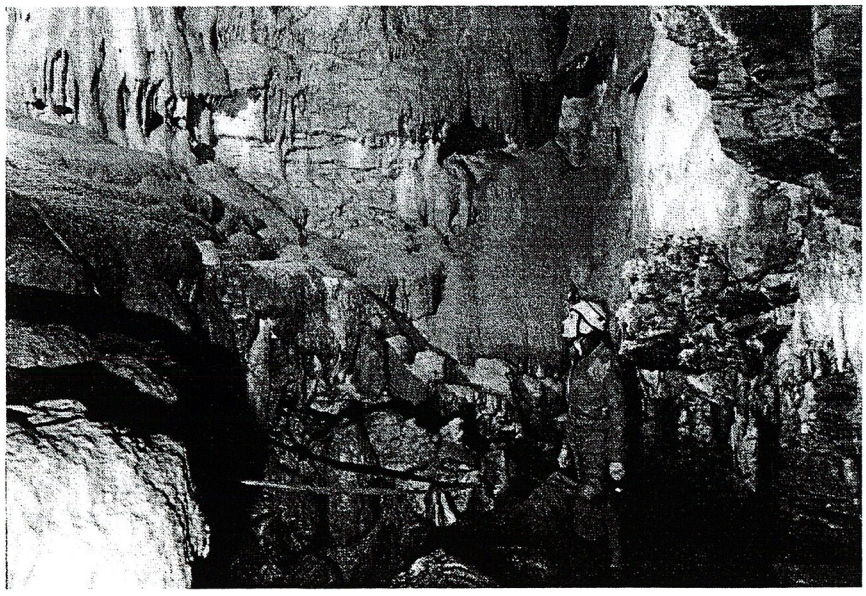


Plate 3.3

Malcolm Cotter in Midnight Chamber

Photo: Charlie Allison

Upstream Midnight Chamber

As a diversion to working at the end of the cave Andy Beare assisted by the writer had a go at pushing upstream from Midnight Chamber. The nearest point of water sinking outside is

some 150 metres in direct line so there should be a significant length of stream passage with the added possibility of higher ways leading off. Although the exploration was undertaken in late June, when the water flow in the cave was low, a stalagmite dam at the outfall into Midnight chamber rendered our efforts at lowering the water by digging only partially successful. The low inlet passage beyond remained half filled with water. Progress was halted some 10.5 metres upstream where water issued from a small mud passage. Andy dug the walls and floor and after about an hour he was able to push ahead another 4.5 metres, when the passage became too tight. If the water level could be lowered more it would be possible to go further as adequate space exists below the water.

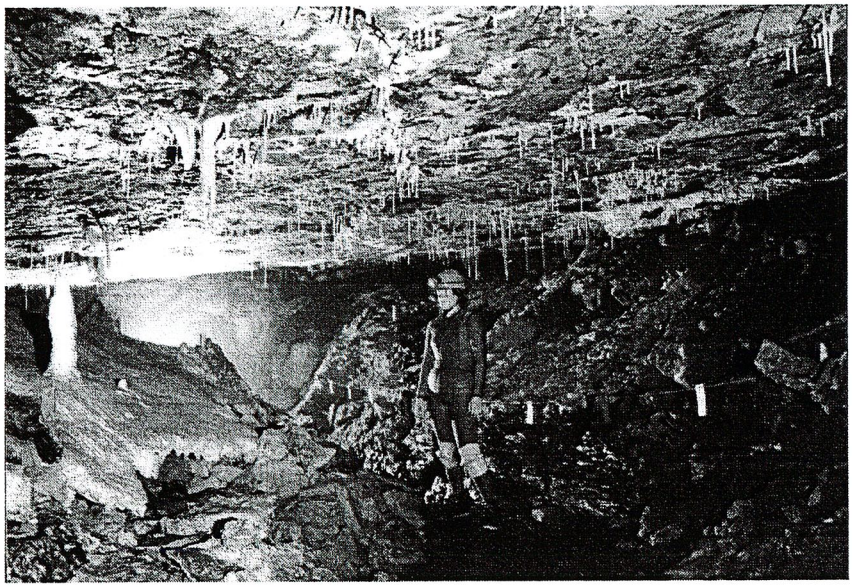


Plate 3.4

Lisa Williams in the chamber at the end of Midnight Passage

Photo: Charlie Allison

The Lavatory Trap and Sludge Duck

The next significant event occurred in August 1986. Alan Dougherty writes:

> *Whilst digging at the present end of Upper Flood, on Wednesday 13th August, Garry Pairaudeau and I noticed several sections of the roof appeared very loose. Indeed minimal work with the bar brought down some large slabs of calcite, leaving a small hole in the false-floor which forms the dig roof.*
>
> *We enlarged the hole with ease and were able to see the boulder, which has been visible from the first hole in the roof for some months, only some 10 feet away.*
>
> *Looking forward we thought we could see a void behind the boulder, and felt a fairly strong draught blowing outwards. The space above the false-floor had increased, but not enough to allow progress.*
>
> *Another day was spent removing a layer of stalagmite floor for two metres beyond the second window. The rock obstruction seen earlier was pushed away and a negotiable space lay ahead. Four metres of crawl lead to a slope giving a view into a void the likes of which every explorer hopes to find. A T - shaped passage some 5 metres high disappeared into blackness. Although from the initial vantage point it looked as if the passage would continue a long way it ended at a vertical "cliff" after only 20. The reconnaissance had turned out to be the full exploration; Upper flood was back to*

revealing its secrets in small packages! We had taken 1 $^{1}/_{2}$ years to dig 9 metres and gain 25.

The "cliff" was climbed on the day of exploration and no continuation found. At the end of the passage and below the cliff was a hole formed by collapse. Extensive areas of mud cracked floor were taped off since, owing to the lack of water, we thought them an ancient feature. This conclusion we later found to be wrong. The best examples of mud cracks occurred above the hole referred to above and they remain intact.

The day following the discovery of the new passage the hole became the site of digging. At first while it involved the removal of clean loosely packed rock work was easy and the presence of a weak inward air current indicated that this was the way to go. By the end of our first session at the new dig we could see into a small cavity with mud cracked floor. Winter brought renewed difficulty when a muddy pool appeared at the dig effectively halting useful work.

Conditions were bad enough for us to plan an assault on the wet bedding plane. We did not get started on this until May the following year (1987), by which time the mire in the dig had started to dry out. Even so we thought it a good idea to pursue the bedding plane alternative.

Being in solid rock blasting was the only way to progress. We could either make the passage higher all the way to the sump, which would produce a lot of spoil and delay the time when work would be done at the face, or start work at the face. The second option meant working in very difficult conditions lying flat out in cold water with the added difficulty of removing spoil in restricted conditions. We decided, on balance, to work at the end. Since few people were needed in the bedding plane the other site in the cave was occasionally worked at the same time. It took three sessions to clear the approach to the sump. An investigation was then made using drain rods as a probe. The rods were first tried with brush attached in the hope of assisting clearance but came up against immediate resistance. With plain rods however it was possible to thrust forward 8.1 metres without suggestion of a bend. When working in the wet bedding plane muffled voices could be heard from the party travelling between the other dig and us. An entry in the writers personal log dated 7 June 87 says of the bedding plane dig:

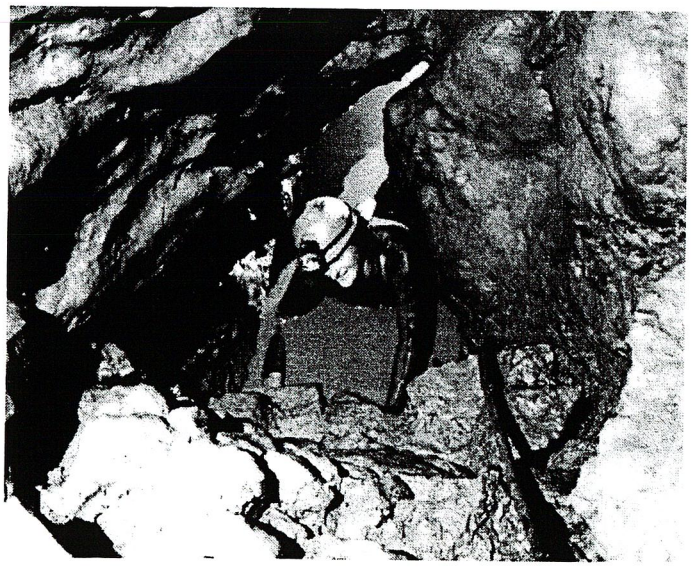


Plate 3.5

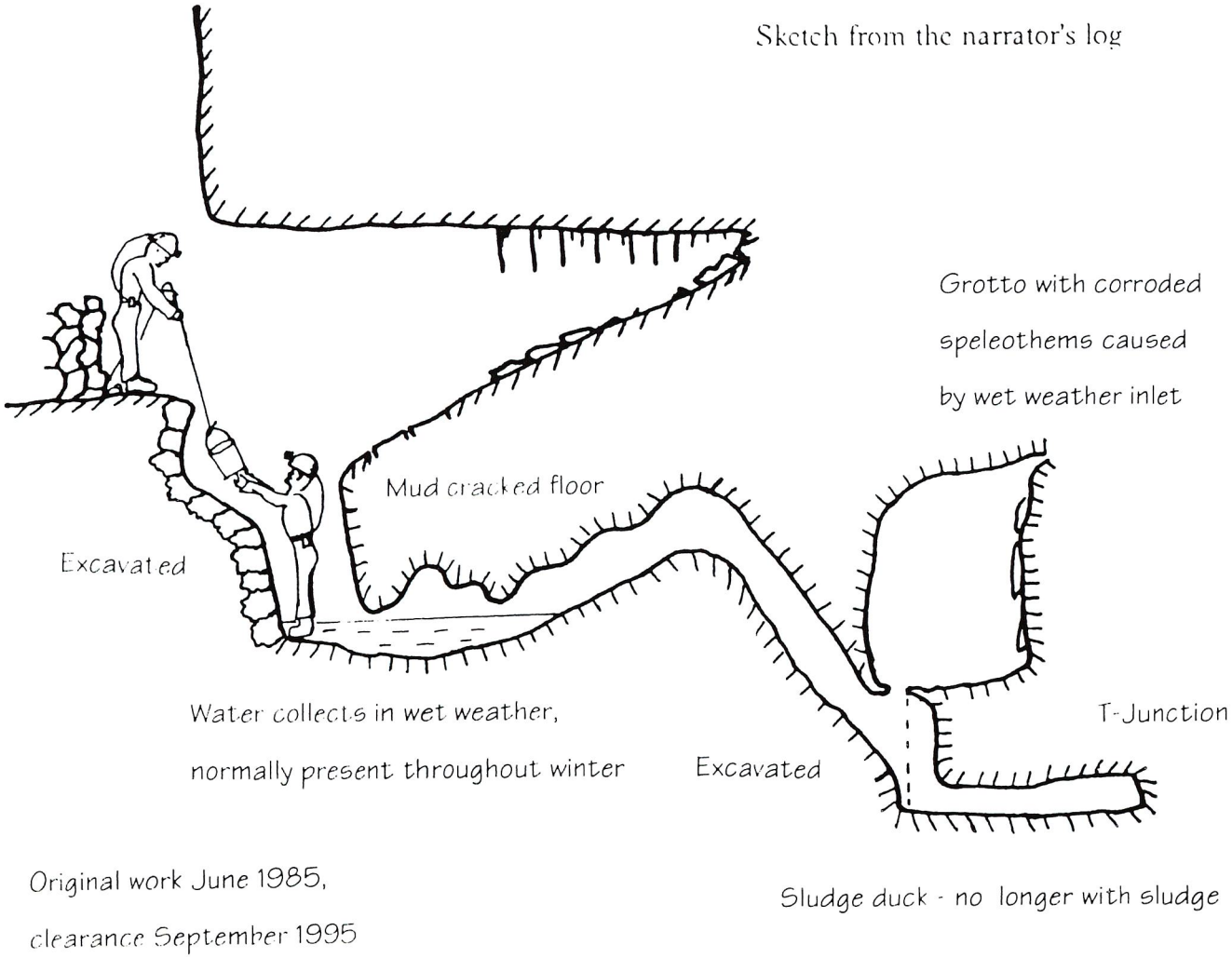
The Lavatory Trap following clearance

Photo: Charlie Allison

"Once in the final section the smell of fumes remained quite strong. Several heaps of clay were visible. Unfortunately very little damage was apparent. One rock had been brought down and the roof showed signs of shattering. Some large charges or shot holes blasting is required. I think the other dig will go first for the least effort."

The dig at the end of the high passage was looking promising by the end of May when a small void was broken into by digging upwards through a stal floor. At the beginning of June 7 metres of low passage was entered in the same way. The success and promise of the new find meant that there was no further activity at the end of the wet bedding plane. The work force over this period was strengthened by Gordon Lister, Andy Beare, Sonya and Andrew Cotter, Andrew and Phillip Goddard. This dug section was later called the Lavatory Trap.

Fig 3.3
The Lavatory Trap and Sludge Duck



Following the June breakthrough digging was continued with great vigour, some old faces returned and a number of new ones appeared. Slightly drier conditions allowed sludge and water to be removed from the approach to the end so improving conditions.

Initially the floor along the entire length of new passage was slightly lowered to allow manipulation of skips and rocks. Fortunately the heavy inlet trickle near the end dried up but even so there remained a quantity of liquid mud to remove. The small hole leading downwards was blocked by our working. The mud supported some large chunks of calcite and rock which were broken up by hammer and chisel. After breaking they were roped out but were still large enough to almost fill the small passage and temporarily trap the person pushing from behind, this activity being likened to ants clearing eggs from a nest. Over a few weekends the dig was well enough supported to allow working in shifts. As the hole developed we passed a thick stalagmite floor with a small void above. This was the first indication that the way was to become horizontal again. About 30 cm lower we reached the underside of the stall where a mud fill was encountered. On further clearing under the lip a void was reached which immediately emitted a strong outward air current. This was the strongest yet found in the cave and had the effect of chilling those at the face. This caused much speculation on the possibility that the main Blackmoor drain lay ahead in easy passageway. The day following we had great difficulty in making up a second shift - every manner of excuse being presented to ensure their presence on the first shift!

Work was pursued in an atmosphere of excitement. Lowering the floor resulted in increasing difficulty since water entering from ahead mixed with the mud which became increasingly sloppy. Eventually we were moving more water than mud. At this stage Bob Marles who was making some progress by lying in the mess and drawing the slop back with his feet had lighting trouble brought on by the wear and tear of his exertions and was forced to retire. There was a gap above the mud and the sound of trickling water could be heard. These observations combined with the strong air current gave rise to an overall optimistic appraisal. At this stage several members tried pushing through. Entry to the area was from the bottom of a steep somewhat restricted hole so that the feet first mode was easiest. Unfortunately the roof, formed of an old stalagmite floor, gradually lowered so restricting progress. To find out what lay beyond a head first entry was needed. This was an extremely nerve testing operation since it required pushing into a sloppy mud duck with only one eye, an ear, and the nose exposed. Vigorous movement would have produced a wave of engulfment. Progress was stopped by a mass of gritty clay which could not be dug satisfactorily by hand. It was possible to see that we were at a T - junction. The sound of trickling water was very distinct but its direction could not be discerned. Extrication from the duck was assisted by those behind.

These investigations made the workers extremely cold and they could not think of carrying on. It was decided that a return should be made with a hoe to draw back the mud.

During the week following a large party of 9 people assembled and decided to try bailing. A water storage pond was made in the high passage before the dig by using the excavated mud. The sludge was then passed back hand to hand. The operation proved highly successful resulting in the lowering of the level by several centimetres. Vince Simmonds then went in feet first and was able to kick a channel through the sediments into the higher region where it was possible to turn round. Vince went some 7 or 8 metres towards the sound of water but because there was no back up did not go press on. At this stage of exploration the conditions were very unpleasant, the whole new passage being a flat out crawl in ooze.

By this stage there was much excitement and speculation, possibly the best part of the scene for the dig enthusiast, the hoped for new land usually being better than that actually attained. We knew that we were heading for a stream passage but was it to be the old one or a new one?

On the weekend of the 11 July an expectant and harmonious party assembled, comprising Andy Beare, John Beauchamp, Alan Dougherty, Mike Hasleden, Neil Hutchinson, John Mirriam, Vince Simmonds, Andrew and Malcolm Cotter. We took an assortment of containers with us in the hope of repeating the successful bailing operation of a few days before. Unfortunately the exercise failed since the groove made on the previous entry acted as a channel for water to flood our workings. There was no option but to brave the sludge duck which was only just passable by taking advantage of a small groove in the roof. Passage through at that time was entirely different to that at present requiring almost complete submersion in black ooze largely comprised of tailings slime derived from the lead washing operations. Several members who passed through at that time paid a visit to their doctor complaining of ear inflammation. The remedy suggested by the writers doctor, which is here recorded for future reference, was to wrap some strong thread in Blue Tak and use it to fashion an ear plug. The latter should be shaped rather like a mushroom with flange to prevent insertion too far into the ear. The cotton is used to pull out the plug! This part of the cave was called Sludge Duck Junction.

There was some respite after about 4 metres where it was possible to crouch at a 'T' junction. The stream was audible from the left passage while to the right the way looked very restricted and unpromising. The left passage gradually lowered to a flat out crawl over mud which sagged under the weight of a person so that water temporarily flowed from the almost horizontal passage ahead. At one point a stalactite shaped like a downward pointing toadstool very nearly barred progress and created a very tight duck. Only 3 metres beyond it was necessary to dig out tailings mud to progress before finally being stopped at an impassable squeeze. This obstruction extended for about 2 metres but a shale bed at roof level offered a line of weakness for chiselling or blasting.

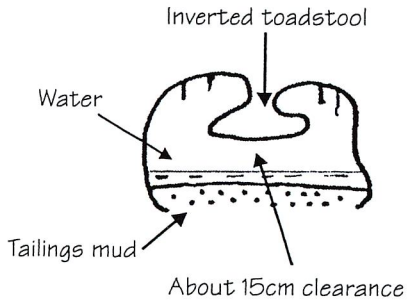


Fig 3.4

The inverted Toadstool stalagmite, virtually barring progress.

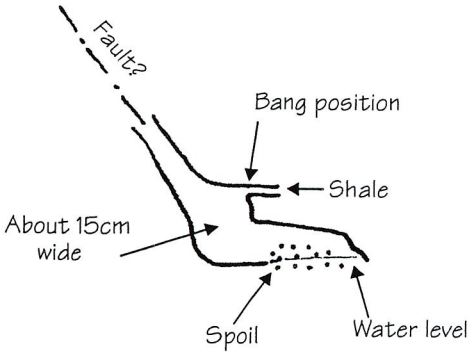


Fig 3.5

Blasting position in the shale bed.

The way beyond the obstacle continued low with a suggestion of wet reflections but best of all was the sound of running water and the strong outward air current.
The return may be described by quoting from the narrator's log:

"As the approach to the obstruction (inverted toadstool) had been very restricted, and at one place some roof had come loose on my belly I thought that I would need assistance to get out. John Mirriam followed through bringing digging tools. On a second attempt I managed to pass back beneath the roof obstruction after which the way back was not too bad."

The roof obstruction was removed that evening by Mike Haselden but for some time a duck remained.

The upstream extension - Shale Rift

While the downstream push was proceeding Neil Hutchinson had made his way upstream and called back that we had better "come and have a look". The way from the junction commenced with a very tight squeeze followed by a duck in ooze which improved to a wallow. Gradually the passage got higher improving to standing height. The way ahead looked clear for at least 30 metres so it was decided to give the other members a chance to explore new cave in turn. (If one chances upon a new passage the find is the finders but if a protracted dig leads to a new discovery all participants should have a chance to share in the first exploration.). Andy Beare, Neil Hutchinson and Vince Simmonds then made an exploration halting where the passage entered a chamber. They noted one side passage entering from above and containing black stal which they called the Black Aven. In the evening Paul Dixon, Alan Dougherty and Mike Haselden continued the exploration discovering a low, upward sloping, mud floored chamber ending at an aven. The next day Mike Haselden, Neil Hutchinson, Andrew and Malcolm Cotter climbed into the Black Aven. Some 4 metres up more passage was found parallel to the lower one. The part above the upstream passage ended after a short distance at a small hole, which on a later visit was found to connect with the chamber found on the previous day. The part above the downstream passage contained some good formations. The aven continued upwards but was too tight to follow although it did appear to widen beyond the constriction.

Since the upstream passage was developed along a fault in the Lower Limestone Shale it was called Shale Rift.

Downstream from Sludge Duck - Puddle Lake and the Red Room

A serious and in retrospect hilarious attempt to pass the downstream obstruction was made by Martin Rowe. Martin had been told that a way on had been found after passing a tight squeeze. Confusion arose since he was under the impression that the way lay to the left whereas Shale rift was to the right of the sludge junction. Being convinced that others had gone before and knowing the way to be tight he struggled as hard as he could to pass the downstream squeeze but to no avail! It is conceivable that a very small person could have passed through but safety demanded enlargement.

On the 2nd of August bang was put into a shale parting above the downstream constriction. Because the party saw a risk posed by the strong air current carrying fumes rapidly outwards the party took a shot line almost back to the main stream.

An inspection of the result was made on 4.8.87 when a party of mainly younger workers passed beyond Sludge Duck. The writers personal log for the occasion reads:

> *"We decided to make two parties up in order to prevent one party getting cold by hanging around. The second group were to follow after about half an hour.*
>
> *First party:* *Sonya Cotter, Philip Goddard, Alan Dougherty, Malcolm Cotter.*
>
> *Second party:* *Joan and Andrew Goddard, Andrew Cotter.*
>
> *The second duck (which no longer exists because of lowered water level) was passed and I remembered to bring the draw hoe. On looking at the blasted bed I was extremely pleased to see that it had been totally removed and would provide a way forwards. I used the hoe to pull back debris and then moved forward to attack the mud which lay ahead. The hoe was the ideal tool for the purpose. Alan told me that his light was giving trouble and that he would have to return for a spare. He would ask someone else to take his place. We kept conversing about progress and found that we could keep in contact while he remained on my side of sludge duck. After pulling back a lot of mud it looked as if it would be passable ahead. It was not and the final work was done by hand. I came through and found myself at the edge of a pool the surface of which was level with the mud in my passage. I hesitated before pushing away the last of the mud because it looked as if the water would flow into the passage I was lying in. A moments thought and I realised that there was a slight gradient draining the inlet passage. The water ahead looked deep and extensive. The hoe sank to its full length. A cautious approach was required. I decided to wait for backup. Eventually Sonya came through as backup and said that Alan was returning. I sent the message back that we had found the "largest underground lake on Mendip!" I could see that a little ahead the roof rose . The water was entered with care. There was a fortunate handhold afforded by a rock on the left and the hoe was used to steady me. The pool was floored by very soft sediment which I sank into waist deep. There was not an inlet on the right. Sonya followed and commented that there must be a connection with the outside as she saw a flying insect. (Flying insects had been seen on a number of previous occasions. Following the 1985 breakthrough lots of flying insects were seen but have not since been noted. Our presence seems to have disturbed their hatching.) The stalactite flows had red blemishes where insects had died.*
>
> *Sonya then said that I had passed an inlet passage on the left carrying the stream. This was a narrow rift just passable which we did not enter. By this time we were rejoined by Alan who dived into the pool."*

The water was held back by a gravel and pebble bank containing rounded pebbles and followed a course on the left side of the passage where the walls were well covered with stal.

The first view ahead was made while lying 3/4 submerged in mud so that eye level was close to water. This so altered the perspective that the open water seen ahead appeared to be of considerable extent. The message was excitedly passed back that we had found the largest spread underground water on Mendip! A garden draw hoe had been taken into the cave and this proved its worth in clearing the mud obstructing the way ahead firstly by drawing the fill up the passage and then once through pulling the mud through the crawl into the pool. Even so on first passing through it was necessary to take stock of the pool. At that time there was not the clearance which there now is and the water was much deeper with soft mud on the

floor. The hoe was very useful to probe the bottom and then act as a handhold during the first exit into the pool. Without the benefit of the hoe some members of the party following plunged headfirst into the slurry.

The pool proved much less in extent than was at first reported so that on return the name Puddle Lake was suggested by Pete Goddard. The "lake" is no longer as deep or sludgy as it used to be.

The stream entered the pool from a narrow passage on the left. The main way on lay ahead along a low stream passage which presented the explorers with a hands and knees crawl on pebbles. The left wall of this passage was coated with calcite and here again were numerous red blemishes some caused by dead flies and others by surface mud agradations. The crawl subsequently had the floor lowered to make it easier to negotiate. Ahead an enlargement could be seen. The explorers entered a wide chamber formed by collapse in a fault. Some of the blocks had slickensides. It was also apparent that the cave was still in the lower limestone shale. This is by far the best developed cave in this rock unit on Mendip. On entering the chamber the stream dropped rapidly to the right. The centre of the chamber seemed a good place to stop since we had gained about 100 feet and there remained unexplored passage. Alan went to have a look at the lower end of the chamber and when calling back his voice could be heard coming from ahead. By this time the two Andrews had joined us and went to have a look at the lower end of the chamber as well. It was on this occasion that a squeeze was passed by Andrew Cotter which gave access to a small well decorated grotto at one end of which was a hole between boulders which emitted a good air current. The party returned to the chamber via a loop leaving a thorough investigation of the choke for a later exploration.

The following day Lesley Robbins (Beare) and Andy Beare continued the exploration finding that the way in the boulder choke led back into the chamber. There were no other open possibilities.

The chamber before the boulder choke contains a very fine red stained stalagmite flow and several names were tried, The Red Room being the one which seems to have survived.

The latter part of the 1987 was given to digging with Mike Haselden providing most of the muscle.

New years day 1988 provided a novel experience for Sonya and Malcolm Cotter. The weather was very wet and a stream was running in Upper Flood Passage. The main stream was also running high adding to interest. The passage leading to the Lavatory Trap was dry and silent. A bucket had been taken in just in case it was required to bail the trap and was used to remove some water in the bottom. On reaching Sludge Duck Junction we were pleased to find that the mud had gone and that the head room was much improved. A very good stream was encountered coming from Shale Rift. Our object was the survey of Shale Rift and this was accomplished in very noisy conditions since water was pouring in everywhere. On our return to Sludge Duck an impressive roar could be heard from downstream. At the Lavatory Trap the pool only had a few centimetres of air space. The bucket had been left ready for bailing and was used vigorously but without effect. Thus the only way left was to treat the pool as a sump (the Lavatory Trap was an easy hands and knees crawl at the time). Once through it was immediately apparent why the pool had filled so quickly and why bailing had not had any effect. A stream was cascading into the pool! This stream was seen to rise in Hannah's Grotto.

The next exploration of any significance occurred on the 27.3.88. by a party made up of Andy Beare, Sonya and myself. It was a day of forcing squeezes. A tight squeeze between boulders at the top of the boulder choke (later blasted by a different party) was passed by Sonya but defeated Andy and I. Unfortunately it did not go a long way on the far side and digging would have been required.

We next determined to try and enter the stream inlet to Puddle Lake which had so far resisted passage. Andy had made an earlier unsuccessful attempt but considered that it should be passable without the need of enlargement. He again pushed in but ran into difficulties caused by wearing helmet and lamp. This forced him to retreat and suggest that Sonya have a go. She also went in wearing helmet and lamp and it was apparent that she would be stopped unless they could be removed. Fortunately this was possible to do in the squeeze and they were lowered forwards. After more effort she passed into an easier bit ahead. She reported that the passage enlarged with easy going. Andy had another go wearing only a Petzl lamp and this time after much effort was able to pass the squeeze. I was just behind but finding the way exceedingly tight decided not to push into the tightest part of the squeeze, since, had I got stuck no help was available from behind and the other two would have been trapped. After making an exploration of an estimated 100 feet of passage the others returned. I then made a successful attempt at the squeeze. Entry is by a narrow not quite vertical squeeze. It is necessary to get into an almost horizontal position, follow the widest part and breath out while pushing forward. At the tightest position it is necessary to go slightly upwards then plunge down head first to a pool where there is a little more room. A short crawl through the pool is followed by a nice standing height stream passage some two metres wide which ends at a cascade forming a nick point in the stream way. The top of the cascade forms a lip beyond which the water deepens in an elliptical passage, ending with a sump. This sump must be the downstream end of the one in the wet bedding plane.

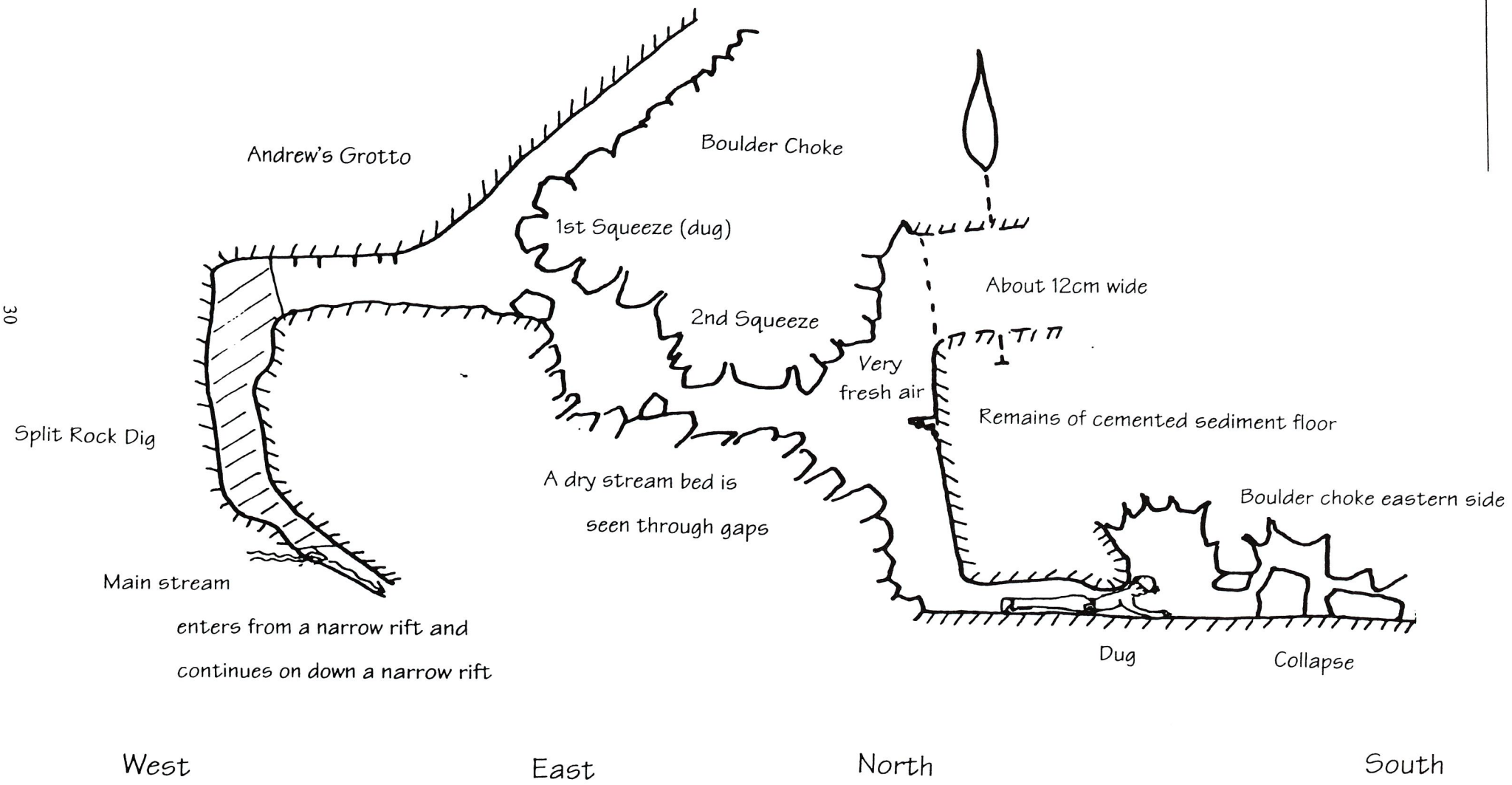
Plate 3.6

Sonya Cotter in the Wet Canal

Photo: Andy Beare

Fig 3.6
The final Boulder Choke:

a sketch from the narrator's log.



Digging activity in the latter part of 1987 and the beginning of 1988 concentrated in the place where water vanished into a crack at the lowest part of the Red Room. During the second half of 1988 and the beginning of 1989 digging had moved to another site at the lower end of the Red room some 5 metres upstream of the first site. Alan Dougherty had noticed that some water sank in its bed. After digging the new hole took all the water. This period saw vigorous activity at the new site mainly by John Beauchamp, Alan Dougherty, Vince Simmonds, Steve Redwood, and Brian Murlis.

During the second quarter of 1989 digging moved back to a position just beyond the original dig. This site, known as the Flake Dig, made great progress during the second and third quarter of the year. In the course of work Andrews grotto was opened from below to make a second entry and the original squeeze through was blocked with spoil. During excavation Gordon Lister found a bone which had cross marks indicating butchery. By mid October it was possible to see the stream again running in a steep poorly developed passage some 150cms wide. The way could be seen about two metres ahead and with the knowledge that it would be hard going all the way the diggers were greatly discouraged.

In November 1989 Vince Simmonds and Bryan Murlis assisted by another dug upwards in the Black aven to reveal an interesting but disappointingly short continuation. This is entered by a tight upward climb and squeeze of 1.5 metres leading to the base of a 6 metre high chamber. The top metre of the chamber is in massive limestone, covered with flowstone, with very restricted upstream and downstream ways blocked by stal. Most of the 5 metre long chamber is treacherous black shale. The part of the cave in limestone was probably formed above the impermeable shale and later the rift in the shale was formed by downcutting to a lower level possibly as headward erosion.

Following the disappointment with the lower dig Vince Simmonds, Steve Redwood and Bryan Murlis had another look at the boulder choke. It may be recalled that a strong air current had been noted emanating from a hole in the boulder choke in Andrews Grotto when it had first been entered. The writer had made an attempt at digging there but had been put off by the way rocks had tumbled from above. The aforementioned party dug into the choke to reveal a promising lead. This choke was not as expected. It is a double choke. An old one, dominated by large cemented boulders, and a newer one in the boulders can be followed for 8 metres. At the end the sound of water can be heard. The new fill consists mainly of loosely packed cobble sized rocks, and included a twig. The passage in the choke bends sharply to the right, in a fault, heading in a south westerly direction. In the upper part of the choke above Andrew's Grotto a wall (probably the same fault) may also be followed to the right beyond the squeeze passed by Sonya but that way also requires digging.

Meanwhile the decade turned...

4:

An analysis of MCG digging efforts in Upper Flood Swallet 1968 - 1985

by Jonathan Roberts

Digging in Upper Flood Swallet (also known as Blackmoor Flood Swallet) fell into three phases between the cave's discovery in August 1968 by the Mendip Caving Group, and the Group's April 1985 find of the Blackmoor stream passage.

The first 5½ years, August 1968 - March 1974, included exploration of the initial passages, their interpretation and survey, and the extension of the cave to just beyond the second chamber. For 20 months during 1971 - 73 there were two caving groups working intensively in the cave: the MCG, and Dr Willy Stanton's group from the Wessex Cave Club. Much of Dr Stanton's efforts were devoted to easing access in the upper cave, with the enlargement of tight and glutinous sections (not without some criticism from the MCG!).

He has written up his group's activities in the Wessex Journal for October 1976 (Vol.14 No.167, pp101-106). He concludes in his section on exploration that the Wessex team made 191 trips to the cave during the 20 month period, with the number of diggers varying from one to seven. Trips by individuals are listed.

Wondering what the MCG efforts were during the early years, I have looked at our log books. I have also gleaned some information for the subsequent periods: for a further 5½ years from March 1974 to September 1979, when activities were slowed due to our cottage-building efforts; and a similar timescale from then to April 1985, during which time growing MCG membership and the attraction from 1981 of a new cottage on Mendip meant that a dig at Upper Flood was at least a plausible trip to make - sometimes even the object of enthusiasm! The figures include visits by guests on MCG working parties. Readers are also referred to MCG Journals 6 (in 1976) and 7 (in 1982) which contain descriptions of the Upper Flood dig.

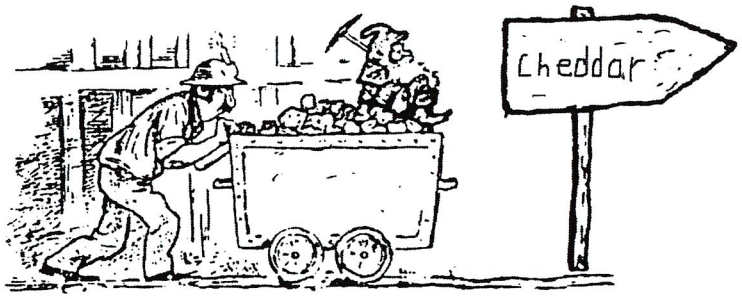
The statistics which follow must be regarded as incomplete since not all working trips were recorded in the MCG log books. There have of course been leading participants, varying over the years, and here the tables (even though incomplete) tell their own story. They also show that no fewer than one-third of the MCG membership has been active in Upper Flood at any one period, with nearly half the members during 1968-85 having participated in digging in the cave - making it truly a club dig rather than the exclusive province for a few.

Combining the recorded MCG trips with those of Willy Stanton's group - and assuming that Willy Stanton attended each one of his group's 191 trips - gives the nearest approximation to a complete analysis of trips and personal efforts that is likely to be obtained. The cave has seen at least 463 group trips (perhaps nearer 500 allowing for unrecorded events), and 1412 (perhaps nearer 1500) person trips, with an average of three people on each digging venture.

The initial cave, as discovered, was about 77 metres long. A further 123 metres was discovered by early 1974, of which up to 35 metres was "constructed from nothing", to use Dr Stanton's statement. Allowing for some early tourist trips, his statement that "in spite of the exceptional level of energy and enthusiasm the mean advance per trip was about 40cm" in the early years is about right, with 345 trips recorded to March 1974, an average of 35-36cm on each occasion. As noted above, this includes many 'enlargement' trips. So progress at the working face was more a painfully-slow series of trips, attending to the result of the previous bang, inching forward, and followed very occasionally by a notable breakthrough.

Subsequent events from 1974 to 1985 had proved no different, with the discouraging absence (until the end) of any breakthrough at all in the cave. Excavation amounted to 16½ metres of passage, the excavation required being almost total, from massively calcited fill, before the Group achieved the breakthrough into the approach passage to Midnight Chamber and the Blackmoor streamway. The work involved a minimum of 118 recorded trips, perhaps nearer 150 included those unrecorded, giving an average progress of 11-14cm each working trip at a digging face of about 0.7m x 1m.

Continued...



Working Visits to Upper Flood:

From 3rd August 1968 (discovery) to 12th August 1985 (breakthrough into Blackmoor stream passage).

Visits made, by persons:	**3.8.68 to 2.3.74**	**3.3.74 to 2.9.79**	**3.9.79 to 12.4.85**	**Total Number of Visits:**
Working trips by MCG members	415	105	252	**772**
Working trips by MCG guests	60	19	48	**127**
Sub-Total:	***475***	***124***	***300***	***899***
Estimated visits by Wessex Cavers	513	-	-	**513**
Total visits by all:	**988**	**124**	**300**	**1412**

Visits made, by groups:	**3.8.68 to 2.3.74**	**3.3.74 to 2.9.79**	**3.9.79 to 12.4.85**	**Total number of visits:**
Working trips counted as groups	345	42	76	**463**
of which:				
MCG	154	42	76	**272**
MCG/ Wessex joint	6	-	-	**6**
Wessex	185	-	-	**185**

Estimated MCG membership during periods	120	85	145	**220***
MCG members working in Upper Flood	48	28	64	**106****

The final two figures represent:

* The number of persons at any stage from 1968 to 1985 who were MCG members.

** The number of persons at any stage from 1968 to 1985 who were active in Upper Flood.

MCG MEMBER ACTIVITY IN UPPER FLOOD (members making the same number of trips are listed together)	No. of WORKING VISITS DURING: 3.8.68 to 2.3.74	3.3.74 to 2.9.79	3.9.79 to 12.4.85	TOTAL NUMBER OF VISITS
Malcolm Cotter	39	13	41	**93**
Greg Smith	47	9	-	**56**
John Miriam	40	10	3	**53**
Pete Mathews	47	3	-	**50**
Bill Jones	32	12	-	**44**
John MacMillan	32	6	-	**38**
Bernard Reeves	25	4	7	**36**
Tony Knibbs	18	8	5	**31**
Martin Rowe			18	**18**
Don Vosper	13	5	-	**18**
Wayne Hiscox	16	1	-	**17**
Jonathan Roberts		7	8	**15**
Simon Knight	14	-	-	**14**
Mike Haselden			14	**14**
Don Searle	11	1	-	**12**
Roger Wallington	11	-	1	**12**
Adrian Duckett			10	**10**
Roy Kempston			9	**9**
Judy MacMillan	4	3	-	**7**
Neil Brooker	-	7	-	**7**
Geoff Barton, Jean-Paul Burch, Ian McKechnie			7	**7**
Arthur Spain	2	1	3	**6**
Richard Dominey			6	**6**
Pat Walsh	5	-	-	**5**
Roger Bowdon, Steve Melliar-Smith	4	1		**5**
Brian Terry	3	1	1	**5**
Mike Lovell	1	2	2	**5**
Mike Mintram, Steve Taylor, Bob Varley			5	**5**
David Graves	4	-		**4**
Vic Ingraham	4			**4**
Bryan Pittman, Allan Wicks	3	1	-	**4**
Pete Bulling, Peter Dyment, Gordon Lister, Chris Martin, Paul Merron			4	**4**
John Pudduck, Pete Virgo	3	-	-	**3**
Len Eley	1	2		**3**
Peter Spain	-	1	2	**3**
James Davies, Alan Dougherty, Bill Ducklin, Dik Houseago, Neil Hutchinson, Mick Lowe, Denise Samuel, Clive Towner, Yvonne Rowe			3	**3**
Steve Conquest, John Evans, Pat Terry	2	-	-	**2**
Ian Bramble, Dave Mitchell	2			**2**
Brian Finch, David Humphrey, Dave Welton	1	1		**2**
Eric Dowley	1	-	1	**2**
Joan Goddard	-	-	2	**2**
Anthony Alston, Mike Dean, Pat Newman, Ian Parry, Fiona Picton, Jerry Roberts, Graham Sutliffe, Pete Turcan, Chris Whittle			2	**2**
Doug Anderson, Arthur Cox, Geoff Davies, Bruce Dean, Helen Ingold, Phil Ingold	1	-	-	**1**
Andy Moll, Dave Stanford, Clive Wheatley	1	-		**1**
Dave Hankin, Richard Norris, Richard Peat	1			**1**
Carl Ruxton	-	1		**1**
Fred Burton		1	-	**1**
Ron Saunders	-	-	1	**1**
Gill Attwood, Victoria Arbizu, Andy Beare, Mike Bygrave, Robbie Charnock, Phil Eliot, Linda Gates, Peter Harvey, Dave Higginson, Dave Howe, Alan Rarity, Lesley Robbins, Grant Shephard, Steve Thompson, Derek Walsh, Gill Warren, Peter Whittle			1	**1**

5:

The 1990s and the Terminal Choke

A collection of recent digging and prospecting work in the cave, which takes us to 1996. These have largely been compiled from the MCG cottage log books, together with Malcolm Cotter's notes.

We commence with the wane of the 1980s, these are selected extracts from the log books to provide a flavour of the activities. Unfortunately space does not permit a full transcript:

2/12/89

Steve Albino, Bill Headington, Andy Goddard, Malcolm Cotter

Weather very cold. At the entrance a cold inflow of air was noted which dried out the rock... Streams in cave are all remarkably low. The main stream similar in flow to late summer... Lavatory trap not too bad - especially after Steve bailed out some of the water.

At the boulder choke found a lot of spoil dumped on stal in Andrews Grotto, and a lot left just behind end of dig. Bang wire also missing. Stove and solid fuel also missing from BDH container.

Last bang broke up rock to right as intended, but large block now sits in middle of passage.

While in cave Billy did a smoke test - smoke rapidly went into boulder choke - emphasising the inward flow noted at the entrance.

Most rock moved from end and Andrew's Grotto, 35 skips.

Please do not dump on calcite along right bedrock wall. A low drystone wall constructed to protect formations.

Billy found that a hole on the left which comprised the old way into the grotto could be used a chute for spoil, but probably easier to use the skip.

Very cold walk back through heavy drip from trees from melting frost.

Malcolm

31/12/89

Joan Goddard, Simon Goddard, Malcolm Cotter

We went through the entrance passage until we arrived at the duck. After a wet passage through we climbed up into Midnight Chamber. This was as far as I had been before. We went along the stream passage mostly crawling and stooping. I thought it was very pretty, then we did a muddy crawl to the lavatory pan. I had a look through and then turned back.

S Goddard.

The new decade:

11.2.90 UPPER flood.

BEWARE THE DIG IN THE BOULDER CHOKE IS EXTREMELY UNSTABLE. A COLLAPSE HAS ALREADY BURIED ONE DIGGER, NEARLY RESULTING IN A CALL-OUT. THIS AREA HAS THE POTENTIAL FOR A FATAL ACCIDENT — BE WARNED Pete

7/4/90 UPPER FLOOD BRIAN NICK GEH. Nick had his first trip into this "Mendip Classic" and enjoyed it so much that he blew up the end with rather a lot of plaster. Brian

15/4/90

JR, D Tooke, L Hawkswell, M Ward

A trip down to clear spoil from bang.

Shifted 20 skips. Too tight to progress - can make hand connection with stream. Needs more bangs. Good trip.

M Ward

7/7/90

Surveying with Roger Wallington, Mike Lovell, Joan Goddard, Derek Walsh, and Malcolm Cotter.

20/10/91

Dave, Lee, Tim, Ralph, Andy B

Trip to look at the horrible dig. Its collapsed since Malcolm removed that little boulder. A few pokes with a spike allowed lumps to fall off the roof. No thank you.

Tim

8/2/92

Charlie, Ralph, James, Tom Hadley

Bash down to the terminal boulder choke - which has collapsed again! We will now direct our attention to where the stream sinks.

Charlie

6/9/92

Party 1 *Julian, Dave T, Sonya*
Party 2 *Malcolm, Graham*

Quick tourist trip to lavatory trap - not a lot of water despite rain, but the lavatory trap pretty flooded as usual (so Dave & I said the pretties were really at an end by this point!) Took props down for dig - after all that you'd better use them Charlie! Lots of fun as always.

Sonya

4/10/92

Charlie, Cheryl Wicks, Pete Hollings

Tourist trip to the pretties. Charlie & Cheryl took a load of rope to the dig & that's about it.

Charlie

13/2/93

Tim, Julie, James. Paul Benn

Quick trip to formations plus rooted around in roof dig.

Tim

By and large these examples represent the tone of the early 1990s - active digging in conjunction with 'tourist trips'. As indicated earlier space does not permit a fuller expansion of these activities or further mention of the many persons involved. Therefore emphasis has been placed on those trips where the purpose was other than a 'simple' tourist trip. Details of these other trips are recorded in the original MCG log books.

Later, during the mid 1990s, the emphasis seemed to shift with changes in membership, aims, and aspirations.

{Still needs more bangs! - ed.}

29/7/95

Malcolm

Continued cleaning the slope leading to the Lavatory Trap. Loose mud & stal at top needs to be put on spoil pile. Floor still needs to be lowered to give access to trap. The fill consists of clay, broken stal & limestone. Water level in stream very low. Two small fish seen in streamway, one where the stream first enters midnight chamber and the other in the level passage leading from the chamber. Both fish were pale. Muddy hand prints were noted on the right-hand stal on first entering midnight chamber.

26/8/95

Malcolm, Sonya

Very little water in cave. Midnight chamber dry. Water sinks in floor upstream of midnight chamber. Small fish seen last month dead in dry pool. Fish in canal below midnight chamber still alive. Another small fish seen in pool where passage takes a right turn by large stalagmites. Digging to clear the climb down into the lavatory trap continued.

28/8/95

Malcolm, Nikki

Saw the fish: 1 dead & 1 alive, rescued a frog. Removed 57 buckets of spoil from the lavatory trap & shifted the boulder. No cream tea. Very pretty cave, loads of straws.

28/8/95

Upper Flood lid loose, has it been vandalised?

3/9/95

Nikki, Huw, Malcolm

Conservation at lavatory trap 33 buckets removed.

16/9/95

Nikki, Huw, Malcolm

Lavatory trap again. Back to lavatory trap which was a bit flooded. Baled a pit and dug out some of the fall-in. Reinforced clay sides by building steps up to protect formations (definite conservation). Finished with clay dam at top to stop rubbish ending up back in hole.

4/11/95

Tim, Joe

A quick bimble to assess the current conservation workings, and I'm not too impressed that the lavatory trap is an ex-feature. Large as I am I used to like crawling into this grovelly little duck.

Joe

11/11/95

Tim, Reggie, Julie

Started a prospective dig just downstream of the formations, nicknamed 'Chocolate Muffin Inlet'. This passage actually takes water in dry conditions. Today it was emitting a fairly sizeable flow of water. Dug in for a body length and re-shaped the mud banks. A return is planned in drier conditions when hopefully there will be no flow.
Several other fissures suggest there may be something to the south-east of Upper Flood.

Tim

6/1/96

Dave, Julie, Ben

Bashed down to Rip-Off Aven to do a sound test. Not much luck on the hammer front - a bit disappointing...until we heard the drill reverberating around the top of the aven as clear as day - almost as loud as the surface. It was so loud we didn't hang around at the top of the aven for fear of being hydraulic'd! As we found out with the first dig sound travels very well through the Upper Flood rock but despite this we can't be far from a breakthrough.

Julie

7/4/96

Norma, Malcolm

Small stream in Upper Flood Passage. Moderate stream in main streamway. Lavatory trap low. Smell of hydraulic oil throughout.

13/4/96

Tim

Loads of rain on Friday meant that there was more water in Upper Flood 2 dig than the single bucket we had poured in. Went into Upper Flood to investigate the hydraulic oil smell. Loads of water in Rip-Off Aven area. I assume that any trace of pollution from the dig has washed away, I couldn't really tell if any drips of water were new - possibly coming in the rift rather than the aven itself.

Dug a body length in the bedding plane below Rip-Off Aven. It closes down to the right but continues low on the left for another 10-15ft or so. Serious digging required to make it wide enough to pass.
Good draught. Note that there was more last week.

Tim

4/5/96

Reg, Kerry, Tim

Used molephone to do another radio location. Top of Rip-Off Aven appears to be about 3-4 feet diagonally from the left corner as you face the track. Hilti drill was useless. Work to recommence at Whitsun with a breaker.

Dave Tooke

27/5/96

Letti, Yvonne, Martin

Went to Rip-Off Aven for a sound test. Letti got to the top to do the banging. We could hear the drill fairly clearly above us, but not them banging back. This may have been due to the amount of water coming in all over the place - very noisy, especially on your helmet. The top team could no hear us banging! Very disappointing.

Yvonne.

During 1993 Sonya Cotter and Lee Hawkswell undertook a dig under the stalagmite floor at the top of The Red Room in the hope of underpassing the choke, but after a promising start they encountered the boulder choke about two metres in.

John Beauchamp and others were also active in the exploration of roof cavities in Upper Flood Passage.

In May 1995 Charlie Allison and Malcolm Cotter taped off the first downstream chamber, the chamber before Bypass Passage, both sides of the rock bridge & the mud crack formations above the Lavatory Trap as a conservation measure. Future work is intended in the Shale Rift area. Work was also begun on improving the approach to the Lavatory Trap. The slumped in calcite restriction (a rather stubborn boulder!) was partially removed, improving access, and preparatory work for the steps started so making access easier. Some further actions are noted in the log book quotes above.

Rip - off Aven

by Malcolm Cotter

The aven terminating the Shale Rift Series, slippery with black tailings slime, was only climbed a few metres - and that rather warily - since there seemed to be a delicately resting mass of rock at the bottom which, if moved, could block one's return. The writer thought of shoring the block with rocks, but as the aven appeared to close off at the top - and must have approached the surface, the matter rested.

In 1993 Tim Francis and Joel Corrigan made a determined effort to climb the aven and found that it did not close off but led via an exceedingly tight and awkward squeeze, which required digging, to a slight enlargement and second upward climb. At the top, passages too tight to follow because of infill, led up dip and down dip. In the process of exploration Joel ripped his clothing to such an extent that the aven was named Rip-Off Aven. The continuation has been called Rip-Off II. In the spring of 1995 the upstream horizontal passage was excavated by Tim Francis, Lee Hawkswell, Julie Hesketh, Sonya and Malcolm Cotter. It led to a relatively open boulder choked aven too tight to follow (Rip-Off III). On one digging trip a strange sound was heard coming from Rip-Off III. It lasted for episodes of about a minute. The diggers approached the end warily thinking of the possibility of an Adder. Nothing was seen although the sound continued intermittently throughout the work session. A later encounter in a cave with an Adder (in Bone Hole) by the writer reinforced the sense that the sound could have been produced by such a snake.

The air in Rip-Off Aven passages remains remarkably fresh even when working in the confined space for prolonged periods. The excavated horizontal passage contained tailings and a red sandstone cobble - proving its connection with the surface.

A Short Exercise in Engineering.

by Charlie Allison

The twilight of 1994 was spent in Castle of Comfort. As usual there was much speculation on Upper Flood. The mantra of 600 feet and three miles was duly uttered. The cabaret was provided by the resident band, and the encore by Mike Pittman, who was ceremoniously carried out to the dawning 1995...

The next day...

"Hang on it's 1995, I suppose we should go caving..."

"Urrgh"

Mike declined the invitation, seeing he was unconscious at the time. Pity his parents weren't.

Tim Francis, James Allen and I decided that carrying a large plank of wood plus assorted scaffolding down a cold wet cave in the middle of winter was perfectly normal, and a good idea. (MCG hint: no it's not). James had the best deal: he was able to surf along the streamway on the wood, whereas the scaffolding was more inclined to sink.

The nature of the passage had seemed to indicate a possible continuation in the roof, above where the stream disappeared into the wet bedding plane, just before the passage leading to

the Lavatory Trap. We climbed to the ledge on the right, the scaffold was clamped together and the bridge constructed. Across the bridge a short traverse gained the dig. After some probing and the removal of many buckets of spoil we discovered Upper Flood was up to it's usual tricks - there was no obvious continuation. Unfortunately, despite Tim and James' best limpet impressions, the dig was at best inconclusive.

We appeared to have a scoop in the roof, rather than definite passage. *Aaargh!*

After this even the prospect of the typical MCG pastime of real-life *'Ker-Plunk'* in the boulder choke held no joy. The pub was, however, now open.

The bridge was later removed.

Upstream Inspection

by Malcolm Cotter

During the drought of 1995 small fish were seen in the pools in Midnight Passage. At the height of the dry spell water ceased to flow down Midnight Chamber and one marooned fish was found dead. The dry spell offered an opportunity to try forcing upstream. Water was still present in the upstream passage escaping under the floor and appearing again below Midnight Chamber. The way upstream starts as a flat out bedding plane crawl for some 10 metres when it becomes necessary to plunge into a narrow watery rift. Just below water level is a very soft ooze into which the body sinks - very disconcerting for the explorer. The rift was found to narrow after about 10 metres preventing progress. By removing material from the walls it was possible to advance a few metres.

The rift can be seen to continue.

A New Entrance - Upper Flood II ?

by Malcolm Cotter

It may be recalled that the East Bank distributary entered a covered leat apparently going up the valley. This prompted speculation that it may have been used to divert water into a nearby swallet. Between the leat and the track is a hole with tip all round. It thus seemed possible that the hole represented the position of a swallet supposedly occurring at the natural edge of the valley.

A new entrance at the top of shale rift would be help conservation, since tourist parties, whilst enjoying an interesting round trip, would only need to pass the pretties once . Digging parties would not need to pass the pretties at all and additionally would have a much shorter journey to the dig site.

The cave survey reinforced by radio location showed that the Shale Rift series went under the track and lay not far from the above mentioned hole. The survey also indicated that the top of Rip-Off Aven was likely to be only a few metres below the surface. In 1994 two parties, one underground and the other on the surface assembled at the same time to test for a connection. Two methods were tried. One involved tipping water into the hole and observing if any flow could be seen in the cave. Water was taken from the stream and tipped into the hole until a pool formed. The other test was by sound. A scaffold pole was placed in the bottom of the hole and hit with a hammer. Next the pole was used as a listening device. A sound was heard by putting an ear to the pole but significantly louder when the pole was placed on the nearby tip towards the road which had rabbit holes. The underground party reported hearing banging and seeing an

increased water flow. It was much later learned that the water flow observation was suspect. The failure of water to drain from the pool we had created should also have been taken into account. In October 1994 during a valley flooding the hole contained about half a metre of water appearing to be level with the water in the valley. This did not indicate that a swallet lay a short distance below.

Notwithstanding the above an excavation was undertaken in the bottom of the hole in the hope of intersecting a tight rift leading from the bottom of Rip-Off Aven. A short digging period was given by Somerset County Council while English Heritage laid down strict terms governing the way it could be done. Thus the better part of a week was spent sifting nineteenth century slag under the direction of Yvonne Rowe.

The excavation failed to locate any serious leads to the cave but did give some information about the site. The top of a drystone wall was found at a depth of 1.8 Metres. The wall was 0.65 metres high. The excavation was continued to the north as a trench where bedrock occurred at a depth of 2 metres. The hole was dug to 4 metres or about 2 metres below the stream bed before being abandoned.

At this juncture Brian Prewer did new radio locations to fix the position of both Rip-Off Aven and Rip-Off II. A good underground digging effort revealed Rip-Off III. The roof of Rip-Off II is a flat featureless bed of exceedingly hard limestone, perhaps up to one Metre wide. Rip-Off III is a much wider feature. Logic pointed to investigating this aven by enlarging and fixing its position. However some believed that permission would not be granted for another seasons excavation and with time apparently running out a decision was made to dig at the spot, indicated by the radio location to be, directly above Rip-Off II. To date the excavation has reached a depth of 5 $^{1}/_{2}$ metres to where it reaches a thick band of chert.

The dig, again through slag, revealed indications of a dry stone wall. A dark sandy layer was seen between 1.3 and 1.4 metres down. Loose bedrock occurs at 2.3 metres This showed black tree root staining. A prominent shale band occurs at 3.5 metres.

The Future

The reality of the cave is there to be seen and may be yours.

The end of the cave is nearly 3 miles and 600 feet above the rising at Cheddar.

So, what we have is merely the entrance series to a vast cave system.

Appendices

Upper Flood Survey Notes

This is a resumé of the surveys carried out in the cave since the initial discovery in 1968. Indeed the survey, section and map has been compiled from survey data obtained over a number of years. These words are taken from Malcolm Cotter's notes.

The first survey was undertaken by the author and Peter Munt on 4th August 1968, the day after our first exploration. The observations were done using a hand held liquid filled prismatic compass, Abney level and steel tape. The downstream end of the survey was roughly where the dam now is. Everything went well and I consider the result strong.

The second survey, with assistance from Don Searle, Tony Knibbs, Wayne Hiscox and Pete Mathews, from the second steps (repeating the downstream section) to the bottom of the first downstream chamber was undertaken using the same instruments as the first survey, while beyond the chamber, a Silva compass graduated in horizontal and vertical angles was used. Silva instruments have compass and vertical angle scales graduated in 2 degree increments with a slightly loose circle for compass alignment. Readings were estimated to the nearest degree. I consider the result to the bottom of the chamber strong.

The third survey, repeating the legs from the bottom of the chamber, was done with Dave Humphrey on 3rd November 1972 using a Silva compass for bearings and vertical angles and steel tape for length. Observations were taken to the then chamber (now much filled with deads) just before what is now a tiny waterfall. This survey was satisfactory.

Observations of the passage leading from the chamber (with deads) to the dig face were made several times, during the progress of the dig, between 1974 and 1985 with good agreement.

Following the 1985 discovery a number of observations were undertaken:

- From Midnight Chamber to The Duck mainly with Adrian Thomas. Midnight Chamber itself, the upstream passage and downstream 30 metres, mainly with Andy Beare. The rest of the 1985 discovery to the wet bedding plane and the end of what was to become Bypass Passage with Norma Cotter.

- All the main passages of the 1985 discovery were observed using tripod mounted oil filled prismatic compass and Suunto level the only exception being the wet bedding plane line observed with a Silva compass in 1987. Readings were estimated to a tenth of a degree between the one degree graduations. Instruments were removed and returned to the stand at most stations and the mean of the readings used for computation. Lengths were measured using a plastic coated fibre tape. Several lines were re-measured giving excellent repeatability or clearing up problems revealed when plotting. All the stations were noted and many are recoverable. Unfortunately the Midnight Chamber station was later removed.

- A query remains regarding the vertical difference between The Duck and the main stream entering Midnight Chamber. The first computations indicated that the Duck was half a metre lower than the stream. The observations were repeated with the same result.

The dug bypass to the roped stalagmite above Hannah's Grotto was surveyed with Sonya and Andrew Cotter in 1987, while the high part of Bypass Passage was measured with Yvonne Ward (Rowe) and Mike

Haselden in 1986. The Lavatory trap connection was surveyed with Sonya and Andrew Cotter, and Philip and Andrew Goddard. All observations from the start of the bypass dig to Sludge Duck were done using a Silva compass and plastic covered fibre tape. Vertical angles, height changes and offsets were not measured in this section which is thus weak vertically. Height may not be far astray however since the passages are mainly horizontal with sharp drops which can be estimated.

Shale Rift series to Sludge Duck was surveyed with Sonya Cotter in 1988 using Silva compass reading horizontal and vertical angles and metric lengths using plastic covered fibre tape. Rip-off Aven was measured vertically by Tim Francis in 1993 and as a short traverse in 1995 by Sonya and Malcolm Cotter. The Black Aven, above the horizontal passage, was measured vertically and the chamber above horizontally in 1996 with Nicki Robinson, Julie Hesketh and Marcus Ward. The Shale Rift Series seems to be satisfactory.

Downstream from Sludge duck has been surveyed several times and observations made by several people with generally poor and unsatisfactory repeatability. The measure used from Sludge Duck to The Red Room was done by Oliver Haselden. It is shown as a direct line although the passage itself is not straight. Conditions in the Canal are so adverse that good repeatability would be difficult. The Red Room itself is comfortable and the poor results unexplained. There may be a mass of iron in the area (heavy red staining?!). The short upstream passage from Puddle lake has been sketched in from memory. The Map downstream of Sludge duck is thus weak and unsatisfactory.

Before 1985 Compass North to Grid North was taken from the figures given for the area model on the Ordnance Survey maps. Compass checks were made after 1985 using local alignments and no instrument deviation from the computed area model found.

A computer program was used to calculate simple rectangular co-ordinates from an origin at a point near the North East corner of the old entrance pit and plotted on a "cave grid" with the same origin. The "cave grid" origin was determined relative to the National Grid by observations to nearby features and was taken as 350569.0 East and 155763.5 North.

The height of the cave lid was determined by spirit level traverse, using a Hilger and Watts level and levelling staff, between the bench marks (1912-1921 OS levelling) at Charterhouse Warren Farm and The Stirrup Cup and taken as 236.6 metres. Lee Hawkswell did several spirit level traverses in the area notably for the digs for Upper Flood II.

Radio location has been undertaken a number of times. The first by Frank and Val Murphey and daughter and Mike Haselden in 1985 to fix Midnight Chamber and the then final chamber at the start of the Bypass Passage. The Bypass Passage underground station lay 0.44 metres to the West and 4.63 Metres to the North of the surface station. In 1987 Frank Murphey and Mike Haselden did a line of points in Shale rift series and located a point at the top of the chamber near the final Aven subsequently called Rip-off Aven. Brian Prewer supervised a determination at the same site in 1994 and again in 1995 when the bottom and top of Rip-off Aven was fixed. It is satisfying to note that the chamber station gave good repeatability. The exercise was repeated in 1996.

Geology of the Locale

This is a summary of the geology of the area and suggests explanations for the reasons behind the formation of various sections of the cave.

The Blackmoor caves lie in Lower Carboniferous Rocks, represented by the Lower Limestone Shale and Black Rock Limestone.

Structure

The Blackmoor Valley lies close to the axis of the Blackdown Pericline which in this part of Mendip is flattened, with minor anticlines and synclines, so that the bedding has a very shallow dip. The shallow dip has influenced the horizontal nature of the cave passages. In the early stages of formation, parts of the cave developed in the limestone above the impervious shale, and in thick limestone beds within the shale. Elements of these passages can be seen at the top of the Black Aven & Rip-Off Aven.

The plan of the Blackmoor Caves shows a fan like pattern because most of the passages follow faults splayed around the anticlinal axis as a result of tension.

The North side of the entrance pit, although no longer visible, is one face of a fault. This could be traced below as a very narrow rift, visible before the first steps were emplaced, where water emerges in very wet weather.

The passage between the first and second steps is clearly fault aligned. Calcite veining can be seen in the roof and, where the passage has been excavated to the floor, calcite can be seen infilling the fault.

In one of the tighter passages upstream of the second steps a clear displacement can be seen between chert bands on opposing walls.

In Upper Flood Passage a fault may be inferred from the narrow rift which can be seen in the roof of the second downstream chamber.

Below the second downstream chamber in Upper Flood Passage, and the fine formations in the first third of Midnight Passage, stal has covered the bedrock and thus any evidence of faulting. The narrow rift emitting the main stream to midnight Chamber is probably fault aligned. The main pretties end where the roof sharply lowers to a low crawl. This sudden change marks a vertical fault crossing the passage. Beyond the vertical fault the flat roof forms one surface of a bedding plane fault (*cf.* the Water Chamber in Swindon's Hole). At the start of the wide flat roofed chamber the fault brecchia is at least a metre thick. This fault can be traced downstream, where it forms the roof of the high Yorkshire style stream passage, to the cascade falling into the wet bedding plane where it is intersected by several faults which have brought about the change in feature.

The vertical fault responsible for the alignment of Bypass Passage has produced drag folds which can be seen at the start of the crawl leaving the chamber. At this position it intersects a superb exposure of the bedding plane fault. Slickensides can also be seen on the underside of the bedrock on the left (South) side of Bypass Passage when squeezing up to the rope traverse above Hannah's Grotto. In the high part of the passage before the Lavatory Trap the fault can clearly be observed in the roof where a band of fault calcite up to 30cm wide may be seen.

One of the most impressive fault exposures is displayed in Shale Rift. This fault is clearly visible on the surface in the small quarry above the main parking area at NGR 50575568. Between sludge Duck and

the Red Room the passage is masked by stal, although a fault may be inferred from the narrow rifts which occur on the left (East) side. Faulting can be seen in the Red Room where slickensides occur on the fallen blocks. The boulder choke represents the position of another fault intersecting the Shale Rift fault roughly at right angles. On entering the choke the cave takes a sharp change of direction.

The Sediments

One of the joys and difficulties of Upper Flood are its deposits. Throughout exploration a great deal of excavation was required to make progress - perhaps more than in any other Mendip Cave.

Upper Flood Passage, our way into the cave since 1968, is an old fossil inlet which has not taken the main stream for a very long period, possibly not since the beginning of the last glacial cold period. After very wet weather this passage carries a medium size stream for short periods, measured in hours. Upper Flood Passage flooded to the roof during the Great Flood of 1968 because of restrictions caused by stalagmite deposits. An amazing number of drips now enter the cave and not surprisingly we noted a build up of stal where they occur. Some sections of the deposits were noted during excavation.

An interpretation of the sediments:

1. Formation of passage. The rough surface and protruding fossils indicate a corrosive phase.

2. Stalagmite grows to fill middle of passage leaving a void above and below. Pools form in traps on stalagmite flows resulting in the formation of horizontal layers of calcite. Occasional wet periods either carries mud from above or from a stream.

3. Red clay is carried into the cave and deposited in voids. The red clay possibly originated during a period of bare ground on the surface. Red earth is found over much of the local area and is probably a residue from a Triassic cover.

4. Seepage of the lime rich water continues at the interface between the surface of the stal flow and red clay. This resulted in calcite crystal growth in the contact area and in the soaked sediments at the base of the stalagmite formations, giving a sandy texture.

5. Re-excavation of the lower part of the passage followed by sedimentation. The new sediments continue to be saturated with lime rich water resulting in calcite growth and weak cementing.

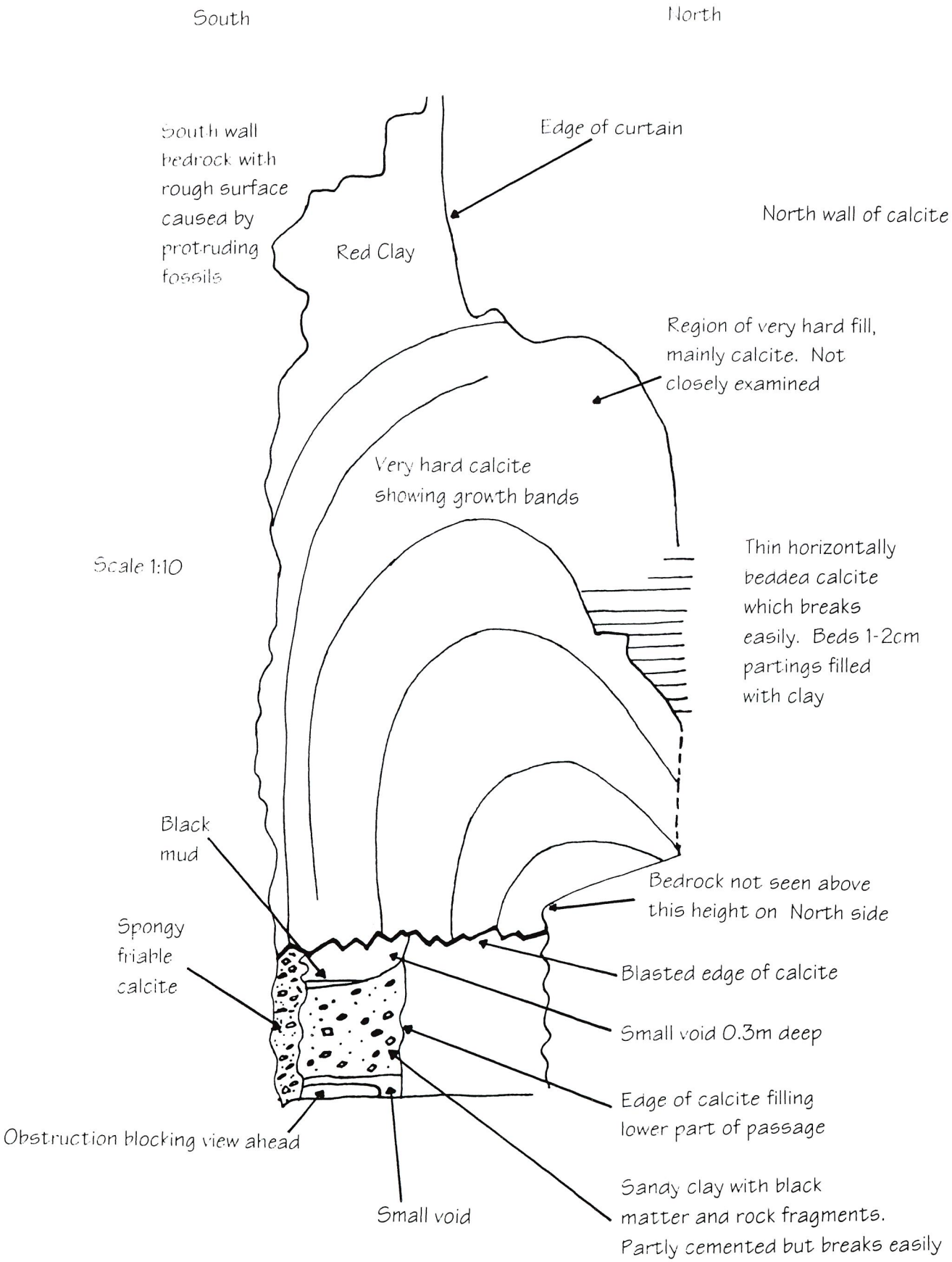
6. Slight re-excavation and deposition of recent deposits. A peaty deposit was noted in one section. Deposition of black tailings from the recent mining period.

It seemed likely, from seeing the abundance of formations on our first exploration, that any extensions should also have good stal features and the first breakthrough in 1972 did not disappoint the workers. The development of speleothems in the last few hundred years may have been enhanced by the activities at the Mendip Mines Smelting works where lime would have been used in buildings and possibly in the smelting process (*cf* Pools Cavern Derbyshire and Waterwheel Swallet beneath concrete reinforcing).

One remarkable feature, especially notable in Upper Flood Passage, are the broken stalactites, sheared close to the roof as if on purpose. The original stalactites are generally much thicker than the re-growth which may be multiple. In the course of excavation we encountered fat old stalactites buried in the fill. The mechanism of their breakage is not apparent. Stanton has invoked earthquakes as a mechanism. An earthquake would surely have affected other nearby caves such as Manor Farm Swallet and GB. It would be interesting to observe formations in earthquake zones.

Fig APP 1

Cross section of sample sediments



Other possibilities are floodwater breakage and periglacial mechanisms such as solifluction and frost-shattering. Stalactites in the wet rift before the 40 foot pot in Swildon's Hole (opened up during the Great Flood of 1968) show much breakage although not completely comparable. Solifluction deposits moving through the cave should have left evidence of their presence in roof pockets, since to break stalactites they would have to have scoured the roof. In the Red Room there is a clean roof area and evidence that a space existed with stalagmite floor and sediments beneath. The roof there does not have comparable broken stalagmites.

When the cave was extended in 1985 a block of rock in Bypass Passage was banged and some of the straws in the ante chamber shortened. In recent years there seems to have been a recovery, with some of the straws appearing to have re-grown by as much as a centimetre below a thickened ring, clearer white than above. A long whisker has grown at the base of some of the straws. Careful measurement and / or marking could decide the matter.

Alongside the stream there are large amounts of chaotic sediments variously consisting of a little sandstone, angular and rounded limestone, together with copious amounts of broken stal, all in a mud matrix. Sometimes the sediments are separated by old stalagmite floors with stalactites growing beneath. In the stream bed rounded sandstone, limestone, and chert pebbles occur. One chert pebble had chattermarks. The shape and marking of some pebbles indicate that they were derived from a beach deposit which the stream intersected on its journey to the cave. These rocks from outside (where the sandstone at least must have come) point to a different past landscape. At present no rock is exposed in the surface stream. When the area was wild, before the interference of man, we may picture a rocky stream bed and water regime which responded rapidly to heavy rain, so increasing stream energy and capacity to carry sediments into and through the cave.

Upper Flood has a history of deposition and re-excavation as in other Mendip caves. When the cave was re-invaded by stream water after a deposition phase the sediments from beneath the stalagmite floors were removed first, followed by collapse of the floors. A stalagmite floor overhangs the stream in Midnight Chamber and completely forms the roof of the supposed small inlet from Upper Flood Passage. Comparable situations exist in the Old Grotto of Swildon's Hole, the numerous suspended floors of Manor Farm Swallet, and the Bridge in GB.

Stanton has described a peaty deposit. This can clearly be seen in the sides of the passage between the first and second steps where it is some 40cm below the 1968 floor. The peat is also well exposed in the first downstream chamber in Upper Flood Passage where it lies at a shallower depth. In Nettle Pot, peaty deposits occur on the floor. the black ooze and slimes seen in much of Upper Flood, in particular Shale Rift, is of recent origin dating to the ore dressing period when the smelting works was active. Fragments of charcoal dating from this period also occur and can best be seen below the overhanging floor leading to Bypass Passage.

Unresolved questions

The source of the stream entering Midnight Chamber is not known and any upstream passage leading to the valley has a minimum length requirement of 200 metres.

Water sinking at the East bank dig is not encountered in the cave. The Shale Rift stream may take some of the water from the nearby stream but has too small a volume to account for it all.

Since the 1968 Flood, water rarely flows to Blackmoor Swallet and never to Grebe Swallet whereas it used to flow for half the year, Blackmoor drying first. The presence of a significant swallet may thus be inferred from the water loss.

In 1964 Gerald Platten brought my attention to a passage in Knight, Heart of Mendip published c. 1860. This refers to operations of the Mendip Mining company:

"...While lighter and less valuable portions were swept away with the overflow, which disappeared down a small hole, coming out again at the lower end of Cheddar Gorge. This 'Mindry Water' as it was called, although not holding enough lead to be thought worth recovering, contained quite sufficient to poison the fish in the streams below, which it did all the times that the works were in operation."

At the time we were unaware of the existence of Upper Flood and the description seemed to fit Blackmoor Swallet. After the discovery of Upper Flood I considered that there were two candidates to fit this description and still do. Stanton has stated that he has "little doubt" that the description refers to Upper Flood. Blackmoor Swallet also has round buddles adjacent and there is also the ramp leading down to it which had a railway. There is also a possibility that the drainage to Rip-Off Aven could be Knight's "small hole" since the whole of the Shale Rift series is heavily laden with tailings.

Chemical Analysis

Chemical analysis for lead, zinc, and silver in the sediments in certain Mendip caves performed by Malcolm Cotter in 1974.

The samples were dried at approximately 110°C, digested in Aqua Regia and then assayed by atomic absorption spectrophotometer.

Location	Lead %	Zinc %	Silver %
Upper Flood			
Sandy Clay	0.0243	0.0287	Not Detected
Black Mud	8.0980	1.4746	Not Detected
Clay from roof pocket	0.0541	0.0448	Not Detected
Grebe Swallet			
Galena	85.50	0.0475	Not Detected
St Cuthbert's Lead Works			
Sandy soil from burrow	4.7969	0.4960	Not Detected
Sandy soil	6.9887	0.6827	Not Detected
Manor Farm Swallet			
Sand from NHASA Gallery	0.20	0.05	Not Detected

Specimens of Galena found in the Charterhouse area occur poorly sorted in a matrix of clay and other rock fragments such as limestone, so have been derived from elsewhere. The Galena has been subject to oxidisation by percolating water and has a white coating, probably of Cerussite (lead carbonate), although it may be Anglesite (lead sulphate), an intermediate stage to Cerussite. The lead bearing mineral in the sandy deposits is likely to be Cerussite produced as above. These Cerussite rich sands have been left in the settling ponds and dumps in the Mendip mineries. When the mineries closed an efficient lead extraction process was not in use for these relatively low ore bearing sands. At the end of the 1939-45 war a study was made to assess the feasibility of extracting the lead from the sands using a modern chemical process. Although positive as a commercial proposition nothing came of the scheme.

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Although not all these works are related* directly *to Upper Flood they nevertheless provide interesting historical and contemporary information on the area. This list is by no means exhaustive.

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* First published account of post Flood caves with surveys, although slightly editorially inaccurate.

UPPER FLOOD SWALLET

CHARTERHOUSE ON MENDIP

PLAN

Scale 1:500

20 metre grid approximate to Ordnance Survey

This plan lies in the area of Ordnance Survey plan ST 5055-5155

Chert Bridge
Crawl
Boulder chamber
Water seeps from sump
Water rises in very wet weather, but sinks in less wet.
Inlet trickle from cave wall below dam.
Upper
Dam
Steps
Entrance
Back filled passage behind steps which had roof shoring timber at end.
Well decorated chamber
Buried curtains
Spoil behind wall
Flood
PASSAGE
Main stream enters along rift containing fluidised tailings.
THE DUCK
Streamlet drains from duck
MIDNIGHT CHAMBER
Streamlet from beneath overhanging stalagmite floor.
Trickle from ponded water behind dam.
Beautiful formations on tiered floors
MIDNIGHT
PASSAGE
Crawl
Chocolate muffin dig seepage from stream and possibly to stream.
Crawl
High passage
Jammed rock bridge
BY - PASS PASSAGE
Crawl
Window
Low wet bedding plane
High passage
Crawl
Water deepens upstream to sump
Knick Point
Small chamber
Explored 27.3.88
THE LAVATORY TRAP
SLUDGE DUCK
Flat out crawl in small stream
THE CANAL
Crawl
PUDDLE LAKE
THE RED ROOM
FLAKE DIG
Boulder choke
RIP - OFF AVEN
Rip - Off III
Light and sound connection
THE BLACK AVEN
SHALE RIFT

Beehive stalagmite
Breaks in feature tick on downside
Boulders
Mud & silt
Stalagmite flow
Survey station
Wall of 'deads'
Water flows
Unsurveyed

55780N 55760N 55740N 55720N 55700N 55680N 55660N 55640N 55620N 55600N 55580N
505E 506E 507E

Malcolm Cotter-1996

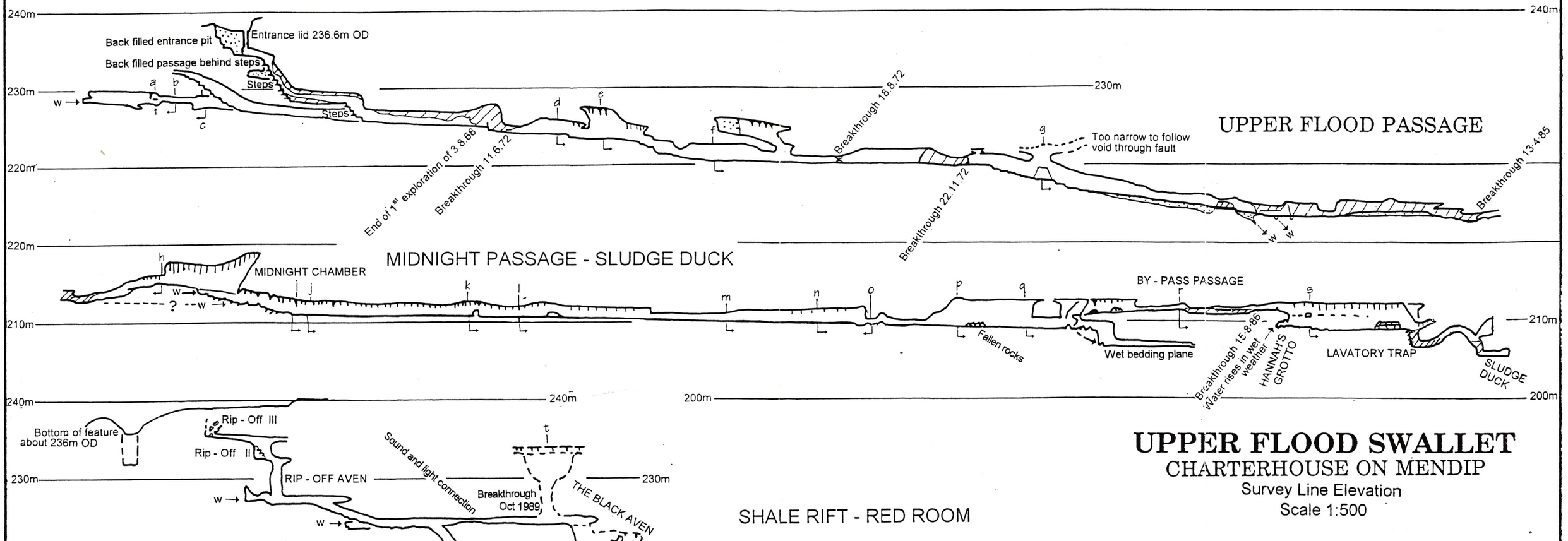
Published by Mendip Caving Group September 1996

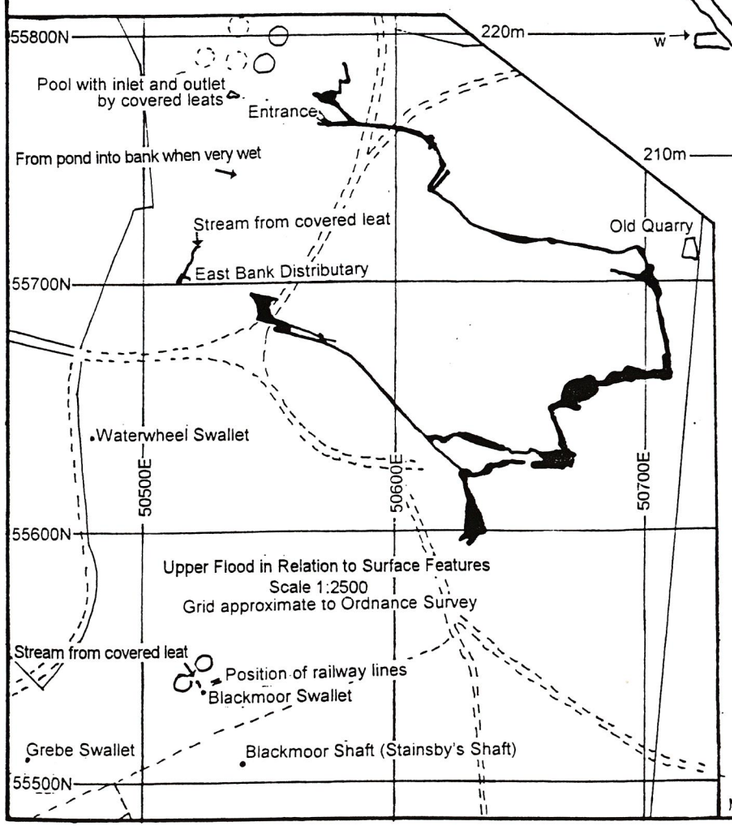
UPPER FLOOD SWALLET

CHARTERHOUSE ON MENDIP

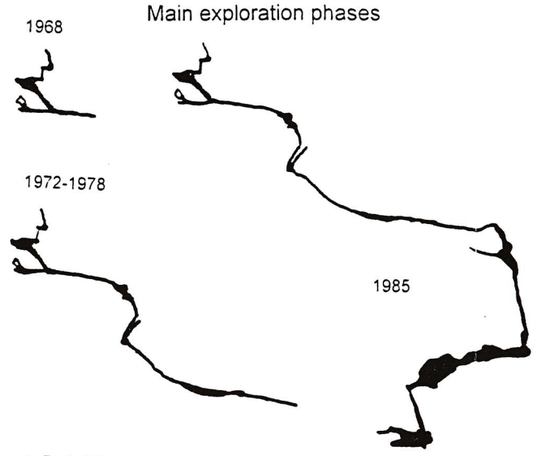
Survey Line Elevation

Scale 1:500

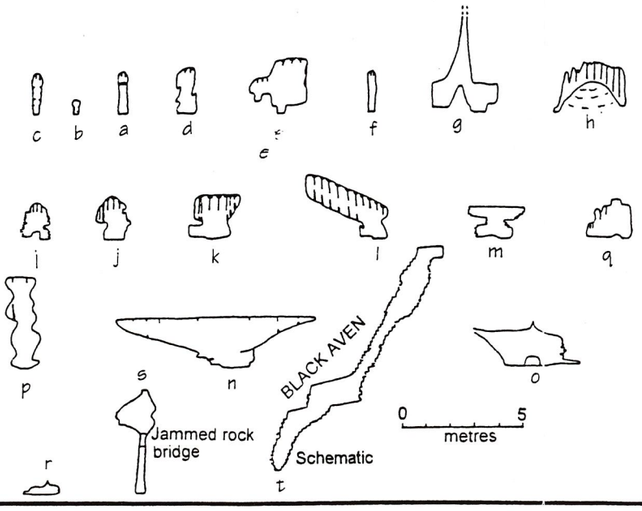


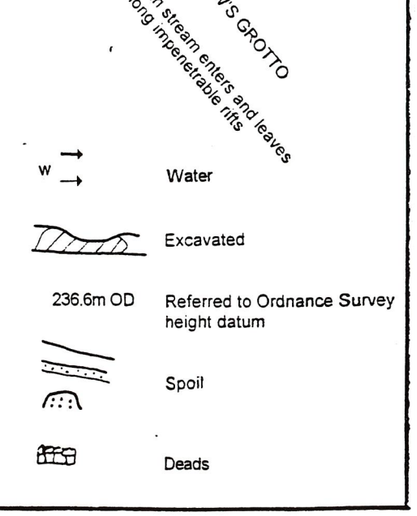


Main exploration phases



Cross sections at 1:250 or twice scale of plan and elevation





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