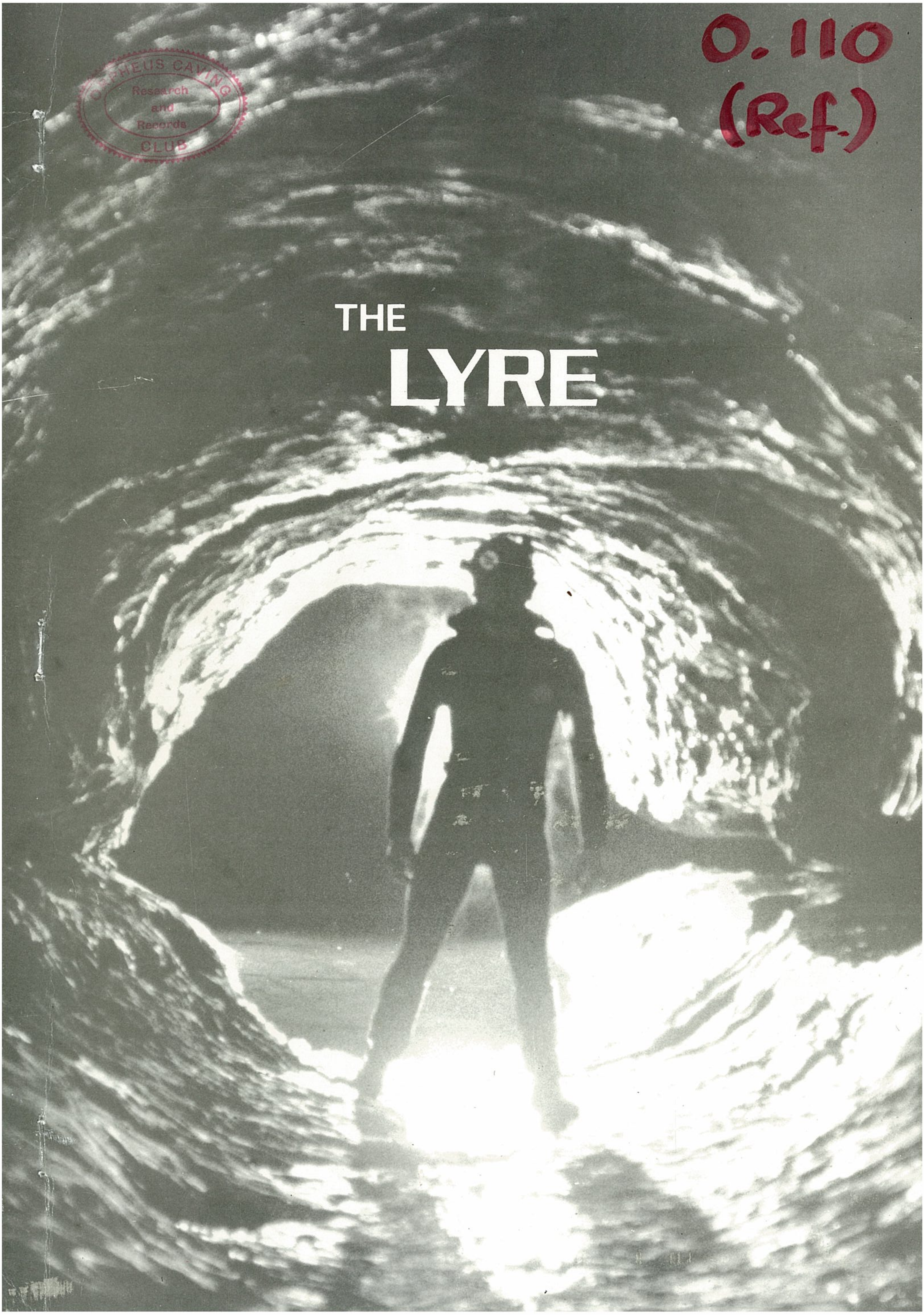
THE LYRE



THE LYRE

No. 5

SEPTEMBER 1981

THE JOURNAL OF THE ORPHEUS CAVING CLUB

Obtainable from:

K.Drakeley,
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Littleover,
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£ 1.30

(£ 1.60 post paid)

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EDITORIAL

Well, it's been a very long time, longer than I can remember, since the Journal of the Orpheus Caving Club has been published. At one time it was a fairly regular publication, looked forward to by Derbyshire cavers and others elsewhere, but then after 1965 it just faded away and never reappeared. Why this happened is complicated, although it was certainly not because of a lack of material, but one result of this is that the image of the Orpheus as an ongoing Derbyshire Club has suffered. To some people this may not seem important but it certainly is, especially for example when you want to attract good new members which all clubs need, or want favourable treatment when it comes round to grants, whether it be for expeditions or whatever.

A journal certainly portrays an image of the club to the reader, this is one reason why a journal and its contents are so important, particularly since all sorts of people read it. A journal is also important and essential to a club because it is a means of presenting its members' work and opinions to others and by doing so it avoids duplication of effort and is a reference point for future work. All too often success or failure, whether it be to do with digs, new discoveries, new ideas or whatever, has not been written up properly or has been hidden away in club log books or newsletters, most of which are not readily accessible to other cavers or may not even be known about. For this reason I make no apologies for some of the contents of this Journal being slightly dated. Where this is so they have been included because they are important and have never appeared properly in print before.

Before you read on, please bear in mind that the production of a journal such as this is inevitably a joint effort and I would like to thank Denyse Marchington for doing most of the typing, Dave Malley for his help with the typing and collating of material, Mick Phipps and John Hall for constructive criticism and Jenny and Boyd Potts and Brian Cowie for printing the surveys. Finally, to all those people who dared to put pen to paper, thank you.

KEV DRAKELEY

P.S. All contributions for the next journal which is in preparation will be very gratefully received.

FROM THEN TILL NOW - A BRIEF RESUME OF CLUB ACTIVITIES 1965-1981.

Sixteen years is a long time between journals so what have we been up to in that period? Quite a lot is the answer, so much in fact that it would take several journals to recount the lot. I offer the following brief history of club caving based on Log Books, Newsletters and my own recollections, so on the pretext that is is hopefully of interest to club members and others alike and partly to put the record straight. I have not mentioned the multitude of the 'run of the Mill' away trips and Derbyshire meets of which there have been well over a thousand.

After 1965, the first main caving event was an expedition to Norway in 1967. Here 2½ weeks were spent in the Mo-i-Rana, Krokstrand area of N. Norway. Over 50 sq. miles of ground being covered by clubmembers, all the sink and resurgences being plotted. Aksla Grotten, discovered by the club in the 1965 trip to Norway was extended and Jordbeck Grotten and Brakebeck Grotten, both earlier club discoveries were surveyed. In 1967 we also saw one of our members bottoming the Berger on the Pegasus C.C. trip. The late 1960's also saw some important original work and discoveries in the faulted blocks of Carboniferous Limestone around the southern part of the Lake District around Witherslack. A number of caves were discovered, the most important being Lythe Valley Cave (see O.C.C. N/L Supplement New Series Vol. II no. 45, April 1966) a 100m long, high level resurgence cave ending in a sump. This proved to be 65m long (a long sump in those days) eventually passed to a short length of passage in 1969 by M. Jeanmaire and Orpheus divers Kev Chambers, Malc Wood and Dave Wall.

In May 1967 the beautifully decorated Dianes Chamber in Blackwell Dale Cave, Derbyshire was discovered after much digging by M. Robinson and F. Fielding. Then in October 1968 it happened - the only serious O.C.C. accident underground. Scratch (Maurice Hitchin) fell down the first pitch of Ireby Fell Cavern, badly breaking his femur and kneecap. Also in 1968 there was a brief visit to the Berger and by this time the club had purchased and were busy improving the present Club cottages at Parsley Hay, after many years at Crowdecote. In 1969 another expedition went to Norway, where a water testing programme was undertaken in the Plura Valley, with a number of caves being extended, one, a nice stream cave to over 65m deep. Also the main streamway and main stream sump of Jordbeck Grotten was discovered.

Again in 1970 another Orpheus team disappeared off down the Berger. At this time, in Derbyshire, Club members were showing renewed interest in gaining access to the Hubberdale system around Taddington, and the Taddington Dale dig on an area known affectionately at Death Shaft Hill commenced. A 30m mine shaft followed by a 14m pitch gave access to a very old mine passage with wooden rails on the floor which disappeared into a roof fall. After several near misses the dig had to be abandoned, it was far too unsafe. It was a case of everyone huddling in a small passage at the bottom of the entrance shaft to wait for the boulders to stop raining down after somebody had climbed up before it was your turn. At this time Dimmins Dale Resurgence SK169705 and Old Moor Dig (SK145811) on Bradwell Moor were being dug.

1971 saw two small discoveries being made, Masai Hole, a cave in the clints in Chapel le Dale and Tyre Pit Quarry near Biggin in Derbyshire. 1972 saw the Orpheus helping out in the pumping out of the lower levels of Knotlow and also saw some original exploration and surveying work done in the Bincliffe and Highfield Mines in the Manifold Valley in 1972 and early 1973. 1972 also saw a very successful weekend camp in the Sand Cavern of Ireby Fell Cavern where much digging was done in the ULSA dig in upstream Duke Street.

In 1973 Speleo Holland visited England and at their invitation some of us visited Belgium where much drinking and caving was done, including a trip to the bottom of the Trou Bernard, the deepest cave in Belgium. This was one of the first club trips on SRT by the way. The Orpheus also set the caving poster ball rolling with the production of the Columns OFD poster and Coke set the still unbeaten record on an away meet by taking 12 hours to drive from Derby to the Forest of Dean (via Peterborough!) Pindale Quarry was dug and extended until part of the roof fell in reducing Geoff Thornbers finger to a flat bloody mess - Ah I remember it well.

August 1973 was a landmark in club digging activities as although several digs were being dug THE club dig began, later to become a labour of love, and still continuing, off and on to this day. Of course I mean the mammoth dig in the N.W. passage of Water Icicle Close Cavern, Monyash, Derbyshire, inherited by the club from S.U.S..S. To date 900 man hours over 58 recorded digging trips have been spent down here.

The beginning of 1974 saw a very boozy away trip to Majorca of all places, Bell in a drunken stupor amazing everybody by climbing up the outside of the hotel. 1974 also saw the extension of Lathkill Head Cave by Orpheus members resulting in the discovery of Gloop Canal and Surprise Aven leading off from Gassons Passage. A small extension in Knotlow was made at this time, consisting of a 8m rise to a short length of passage. 'Turfur Trev' and his amazing rocket racks and Mitchell boxes appeared on the scene and SRT began to feature much more prominantly in club trips and newsletter articles. Meta Rift near the cottages was also discovered at this time.

A lot of digging began in the Manifold after Simon Amatt had got permission off the National Trust to dig. In May 1975 Ladyside Pot was discovered as was Riverside Swallet and St. Bertrams Cave was extended with the discovery of Skull Rift. In July 1975 Didos Cave was first dived by M. Phipps, J. Hall and K. Drakeley as was Puke Sump in the entrance of Redhurst. In October 1975 Peter Roe and friends connected Elizabeth and Beza Shafts in Nettle Pot and further dives were undertaken in Giants and also in Wookey Hole in the Mendips. 12 hour digging trips down Nettle became the norm with Ben, resulting in the extension of Beza Shaft down into Payne Street and Xmas 1975 saw another successful trip to County Clare, Ireland. Seven members also went back to Norway in 1975 connecting two already known caves around Virvaselen and some more streamway in Jordbeck Grotten. A practise rescue was also held with the Norwegians.

1976 saw yet more activity. An extension was made to Cold Water Cave in Sutherland, whilst in Derbyshire, Weags Bridge Resurgence Cave in the Manifold was discovered, Riverside Swallet extended and the Deterred Series downstream in Ladyside Pot found. In Giants Hole, Death I and Death II series at the top of Maggins Rift was found by Ben, Dave Malley& Jim Reynolds. By far though, the best discovery made by Orpheus members in Derbyshire was Winnats Head Cave. Dave Malley Jim Reynolds and Ben were the first to notice the entrance and proceeded to dig out the entrance crawl. On 4th July 1976 Mick Phipps, Steve Tucker, Roy Sendor and Stuart Smith broke through into the main cave after a short dig in the small chamber after the entrance crawl. The cave was surveyed. Fox Chamber was later discovered by Eldon under the auspices of Ben.

1977 onwards saw several Orpheus members helping out with work in Peak Cavern, with several small extensions being made. In February, Nervous Breakdown Cave was discovered in Eldon Quarry, the 20m long Pritchards Cave found at Beeston Tor and Ladyside extended downstream to sump 4 after an epic trip. Abroad a small group went to the Grotte de la Cigalere and the Gouffre Martel in the Pyrenees and Ireland was again frequented at Xmas.

1978 saw a successful trip to Skye at Easter and diving trips to the East Canal in Giants. Bagshawe Resurgence was also explored at this time and Placenta Pot near the cottages was extended to 15m deep. Digs at Sandholes Swallet, Dowel and Grindon were begun. Norway was again visited, Greftkjelen (The Cave of the Lost Waters) being visited, and Greftsprekka was surveyed and further explored and further extensions and a new entrance found to Jordbeck Grotten.

Chrome Hill Swallet on Greensides, Derbyshire was dug to 12m and 50m long in June 1979 and in July and August the Aude Gorge in the Pyrenees was visited, nearly all of the party being Orpheus members. The terminal sump of La Grotte de Fontriabiouse, some 2kms in, was dived by Tim Nixon for 20m and the large resurgence of La Font Maure dived for 100m by Tim Nixon, Steve Tucker and Jerry Murland to emerge at the foot of a large cascade at the top of which was the second sump, as yet undived. A few hundred metres of new passage was also gained by climbing in Le Trou-du-Tunnel as well as the discovery of several smaller caves. In late 1979 Churn Holes in Derbyshire was extended by digging to 65m long. Furthermore in 1979 Simon Anatt was assisting Trent Valley Caving Group at Wetton Mill Sink and together with P. Mellors extended Critchlow Cave by 30m.

1980 began sadly in January with the death of J. Plowes, the club President, without whom there would have been no club.

Once again digging was much in evidence, Eureka Pot at Grindon being found and Ricklow Cave being extended slightly. Swallowdale Swallet, known as Plan Z, at Dowel was extended to 50m long. Yet again Norway was visited and the sumps were investigated in Trollkirka Cave around Molde. A new cave, Herrigrotten, was also found, though not fully explored and the resurgence of Jordbeck Grotten dived for 70 metres.

Further diving was done in Derbyshire at Russet Well and Streaks Pot and in Giants Hole a 9m bolt route up an aven at the top of Maggins Rift gave access to T.V. aven extension, consisting of 34m of tight inlet passage over a vertical range of 21m.

The last three or four years has seen a lot of work done by O.C.C. members and ex-members in digging (for example 30' of new passage in Picnic Dig) diving and sherparing in Peak Cavern, two of the most significant events being the passing of Ink and Far sumps in 1981 due to the co-operation and work of a number of individuals and clubs. A lot of work is now planned for next season in Speedwell.

In early June, Giants was dived to 46m by Jerry Murland (and still going down) although no further work is envisaged at this site now. In early 1981 Waterways Swallet was visited again and 30m of passage found by Rob Harrison and Brian Cowie. Digging at the moment is concentrating on Grindon which is now 10m deep and draughting very well and on Calton Lane Swallet in Staffordshire. The next club expedition is in August to the White Mountains of Crete - a joint expedition with Sheffield University Speleological Society, so we should have plenty of material for the next journal.

Well, there it is, a tremendous amount of work has been done by club members in the years since the last journal, lets hope it doesn't take as long for it next time to appear in print again.

If anybody wants any details of any of the activities of the club then a more detailed account can be found in the Orpheus Log Books or relevant Newsletters for that year as listed below. Contact the librarian.

KEV DRAKELEY.

ORPHEUS CAVING CLUB LOG BOOKS.

Vol. 9 part I 22/3/70 - 9/7/72
Vol. 9 part II July 1971 - June 1974
Vol.10 June 1974 - Sept. 1976
Vol.11 October 1976 - July 1979
Vol. 12 July 1979 onwards.

ORPHEUS CAVING CLUB N/L's NEW SERIES.
Vol. 1 (1965) to Vol. 17 (1981).

"SMALL DISCOVERIES IN THE DOWEL AREA, DERBYSHIRE."

Over the last thirty odd years the club has spent many periods digging the numberous holes in the Dowel/Greensides area, the only real reward being the discovery of Etches cave. (Harrison 1965)

During late 1977 a 'new' look was taken at the area and the various sites were reappraised. Of these, four were considered to be worthy of further attention.

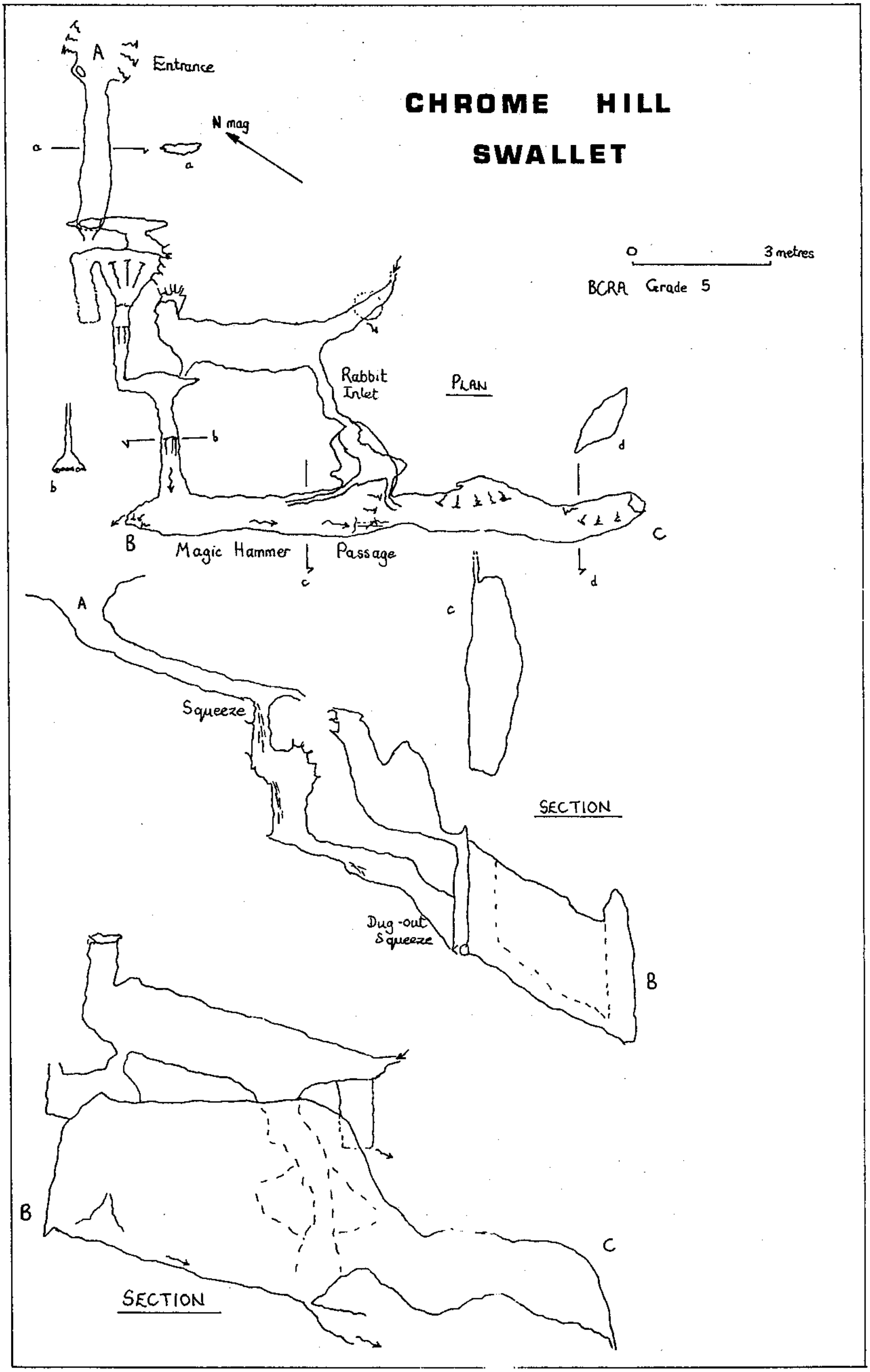
The first to be considered, Dowel Resurgence itself is an obvious choice. Drilling and blasting here in the 60's by Geoff Thornber, Dave Martin and others opened the narrow joint for about 20 metres where it can be seen to continue. Further digging has required considerable blasting and little more has been undertaken as the farmer, Mr. Etch, has been worried about the caves proximity to his farm. Various parties have, from time to time, claimed to have pushed this passage for several hundred feet.

The second site, which had been extensively dug in the early 50's, was Sandholes Swallet (Smith 1959). Rapid progress was made here in the early months of 1978 and on the 10th May Geoff Attwood and Mick Phipps reached a depth of over 10 metres in a partly collapsed oval pot. With high hopes the dig was visited the next weekend but was found to have completely run in. Further work has not been attempted.

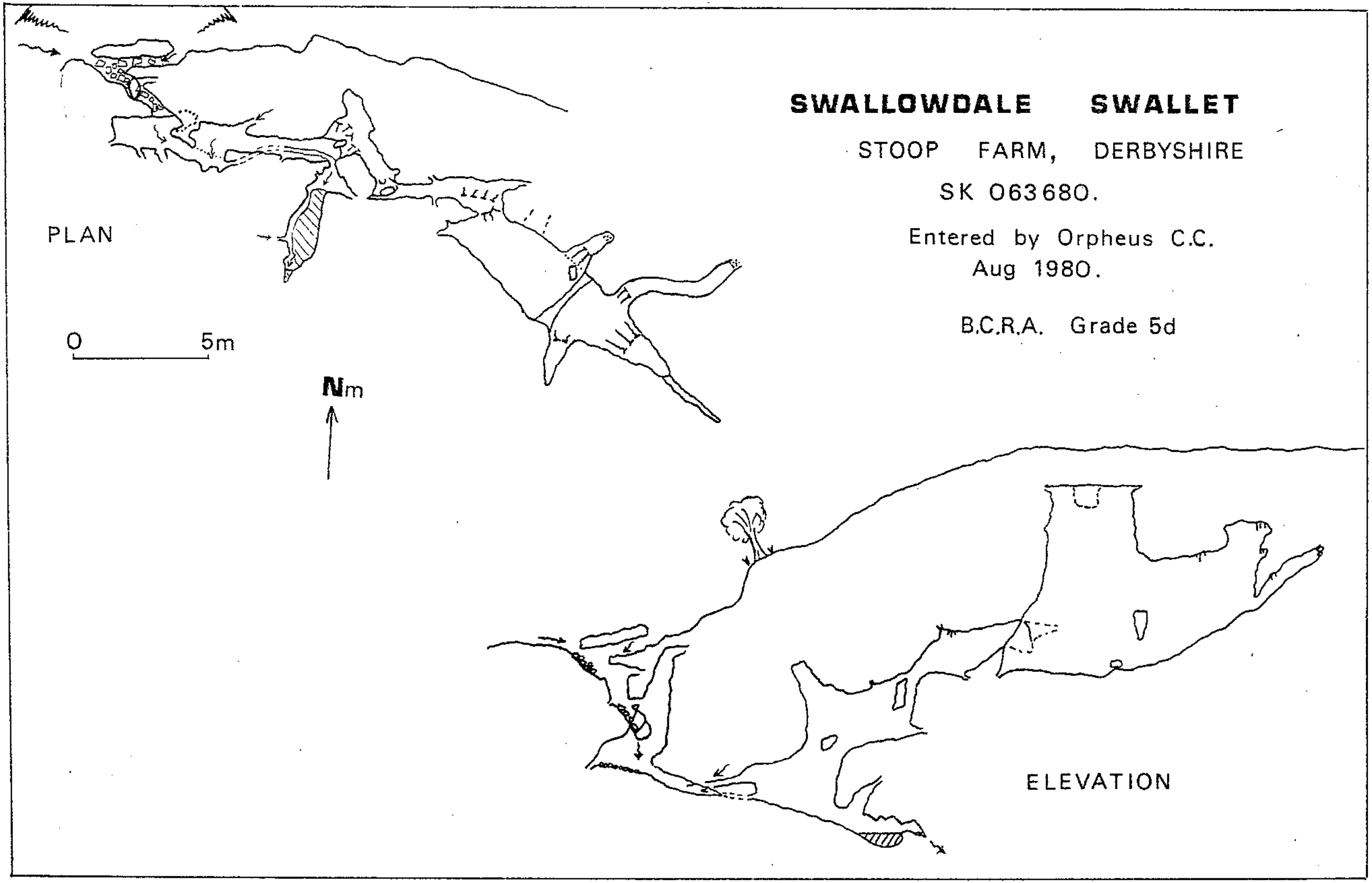
Stoney Low Hole was the next place to be attacked. This was also opened in the 1950's (Smith 1959). A low crawl leads immediately onto an eight metre pitch in a narrow joint. More digging at the foot of this in 1978 revealed a possible way on and a series of blasting trips were made. Further digging was eventually abandoned as the muddy and awkward situation eventually got the better of us.

Chrome Hill Swallet (Smith 1959) was a dig which never had been seriously looked at, due to its tricky entrance squeeze. A low crawl, which takes a fair amount of water for most of the year, drops vertically after a couple of metres in a narrow slot which is difficult to reverse. Three metres lower the stream sank into cobbles at the foot of a small aven. Five minutes digging in June 1978 immediately revealed a way on to a further drop. One wall was a continuously moving scree and John Hall and Mick Phipps spent several trips stabalizing this and experiencing near entombment.

It was over a year before the above returned to the dig and only one hours work allowed the drop to be safely descended and it was with great surprise that the diggers slid down and emerged in a large stream passage, up to 5M high and 2 - 3M wide. Sadly the way on was completely choked by a large wall of mud after only 20 metres. A loose inlet on the left was climbed and a small chamber gained. A voice connection to the entrance squeeze was made from here and small stream descended from the next shakehole along on the surface. Digging at the final choke proved to be fruitless.



CHROME HILL
SWALLET
Entrance
A
N mag
a
0
3 metres
BCRA Grade 5
Rabbit Inlet
PLAN
b
d
B
Magic Hammer Passage
c
C
A
c
Squeeze
SECTION
Dug-out Squeeze
B
B
C
SECTION


SWALLOWDALE SWALLET
STOOP FARM, DERBYSHIRE
SK 063680.
Entered by Orpheus C.C.
Aug 1980.
B.C.R.A. Grade 5d
PLAN
0
5m
Nm
ELEVATION

It is worth noting that 1 kg. of flourescien introduced into the stream failed to be picked up on detectors at Dowel resurgence or in the River Dove.

A fifth site looked at in May 1980, Swallow Dale Swallows (Smith 1959) provided a little of the success which does not come easily to diggers in this area. A few minutes excavation at this 'hopeless' dig opened a narrow passage where a small hole soon appeared in the floor. Descending this, Kev Drakeley and Mick Phipps entered a small chamber some 2m diameter and up to 4m high. Two streams united to flow down an impassible crack.

, More digging by 'Coke' Calcott, Roy Sendor and Mick Phipps entered a continuation via a squeeze which was little short of desperate and which has since been removed. A short stream passage ended in a silted up sump, whilst a climb of 3 metres led, via an awkward vertical tube into an unexpected chamber, some 10m x 3m x 8m high. The only way on was a possible high level passage up in the roof.

On a subsequent trip Stuart Smith climbed up to this passage and was just about to enter it when a boulder he was hanging onto moved and both took to the air. The only runner, a doubtful peg, stopped him only half a metre from the floor. It would have been difficult to remove an injured person from here. No further attempt has yet been made and probably would not be worthwhile as the survey and some experimental radiolocation showed the passage to be only a metre from the surface.

Although these discoveries are of a minor nature, the amount of fruitless digging that has been seen in the area hopefully justifies this record. Little else is likely to be found at the sites described.

As always, mention must be made of the great friendliness and hospitality of the landowners, Mr. Etch of Dowel Hall Farm and of Mr. Beresford of Stoop Farm who's land covers some of the sites.

MICK PHIPPS.

REFERENCES: 1965 Harrison. H.R. ETCHES CAVE. The Lyre. No. 4.

1959 Smith. P. THE UPPER DOVE. The Lyre. No. 3. Volume 1.

'THE DISCOVERY OF WINNATS HEAD CAVE'

Mention Winnats Head Cave and most Debyshire cavers at least, know what you're talking about - an impressive, large fossil cave at the top of the Winnats Pass near Castleton, Derbyshire. Much publicity appeared with the discovery of Fox Chamber, but nothing much was ever written about the caves discovery. Few people actually know how it was discovered, so for the record then I'll let the reports from the Orpheus Log Book Vol. 10 tell the tale.

The cave was discovered in 1976 by Orpheus members working in conjunction with Ben (Keith Bentham). The entrance was first noticed on the 31st January, 1976 by Ben, Dave Malley and Jim Reynolds, the log book entry reading as follows:

31st January, 1976. Winnats Head Cave.

"After a quick dash to the entrance to avoid the farmer, we saw a cave which seemed to have been intersected by quarrying for Blue John, remains of which could be seen. 'Upstream' has a small chamber (useful for dumping spoil) and a tight crawl off it. Downstream is a steeply descending bloody huge phreatic passage with no obvious floor or sides. Dig is at the bottom where it flattens out and a sloping bedding plane comes in on the left. About a 6" air space, then boulders, then a fairly loose fill with hundreds of bones. Found a rabbit skull. In all a very promising site. BEN, DAVE & JIM. Time underground 3 hours."

Digging began, and some very inspired, difficult, digging in a filthy flat-out crawl over the next few months by Ben, Dave and Jim eventually gained their access to the first small chamber with a small, muddy tube leading off again requiring digging. This first chamber was surveyed on the 3rd July, 1976 by John Hall, Mick Phipps and Roy Sendor. The next day the breakthrough was made. The log book account reads:

4th July, 1976. Winnats Head Cave.

Kev, John and Sue surveyed Windy Knoll Cave whilst Stew, Roy, Tinger and Cy (Stuart Smith, Roy Sendor, Steve Tucker and Mick Phipps) descended Winnats Head with the intention of coming out in a boat. After a short period of digging, a way through could be seen, but conditions were appalling - head first down a tube, no room to wield a pick mattock, one nostril out of the liquid mud. After a really hard effort Stuart came out knackered, Cy went in feet first - nearly through. Stuart was through at the next attempt. "You'll have to come through Mick, my light isn't good enough to see the walls." Down a steeply descending rubble slope into a large chamber - we fumbled about in our steam cloud, the ways on seemed infinite - astonishment - joy - 'The Orgasm.'

We climbed ecstatically up a towering boulder slope into a boulder floored gallery but met disappointment when it choked with mud after an eight foot climb. Walking back we passed several holes in the floor but left these for later as they were amongst unstable boulders and anyway we were too high! "There's an inlet here" said Stuart "Sod that I'm not getting on my hands and knees" sez I. Back in the cavern Tinger had at last struggled through the Muddy Mouth as the tight tube came to be called. We switched our lights out and chuckled at their gasps as he and Roy descended the boulder slope for the first time. We must have looked a right collection of twats - chocolate coloured lunatics, dancing, whooping and shaking parts of each others anatomies. Incredible.

After another look around we realised it wasn't all that good, but good enough. Back at the entrance it took us an hour to convince John and Kev (and ourselves) that we weren't lying. The dig took 1½ hours, the trip 2½ hours.

MICK.

Tuesday 6th July.

This time we even took paddles! John, Roy, Kev, Heri (Geoff Attwood), Tinger (Steve Tucker), Spew (Stuart Smith) and Cy (Mick Phipps) descended. This was the choker really: everything choked. The holes in Boulder Gallery produced a few small inlets. The choke at the end of the gallery was dug and could be seen to continue with 2 inches of airspace above the mud. The big chamber was thoroughly searched and various routes down through the boulders were found but nothing went. The deepest we got was 20 - 30' down a mineral vein on the north side of the chamber this is where the draught comes from but is a suicidal dig. Took a few bearings and 'photos and went to the Wanted. Time underground 4 hours. Total length of passage about 450 - 500'.

This was the end of the major discoveries although on subsequent trips small bits and bobs were found down amongst the boulders. The whole cave was surveyed on the 25th July by Mick Phipps and Kev Drakeley and some digging was done amongst the boulders by Ben, Dave Malley and Pete Roe. Then on the 14th August because of the very dry weather, Ladyside 'went' and attentions were distracted from Winnats Head Cave. Ben continued digging though and together with John Beck dug into a little bit more passage at the end of Boulder Gallery.

A little later Fox Chamber was discovered but thats another story..........

"NERVOUS BREAKDOWN CAVERN AND THE LEFT-BOOT SAGA."

OR

"A NERVE RACKING TIME IN BRITISH SUMMER."

Arriving at Dirtlow Rake at 11.00 p.m. (Winter-time) we, i.e. Andy Amatt, Stuart Smith, John Hall and Mick Phipps set off across the moor accompanied by hushed whispers, 100' of tackle, photographic and surveying gear and two left boots! A staggered couple of miles later we arrived at THE QUARRY, the tension electric.

The whole place was a mass of illuminated windows and doorways, but we pressed on, tip-toeing like elephants into the quarry proper.

Andy crept off up a boulder slope as we froze, mentally dampening the crashing of falling rocks. No go. Farther along John spotted what we had come to investigate - THE 'OLE. A fumbling and noisy scramble led us into the entrance.

The passage looked exciting, phreatic and four feet high and wide. Soon however it degenerated into a collapsed bedding plane, eventually petering out and became too tight. On the left, a lowish grovel led to the head of a spectacular and inviting pitch. This (British Summertime Rift) was easily free climbed and proved to be 50 - 60' deep, well decorated (2' long straws) and inevitably blind. The bottom was choked with rocks and silt and two small inlets, choked with flowstone entered here.

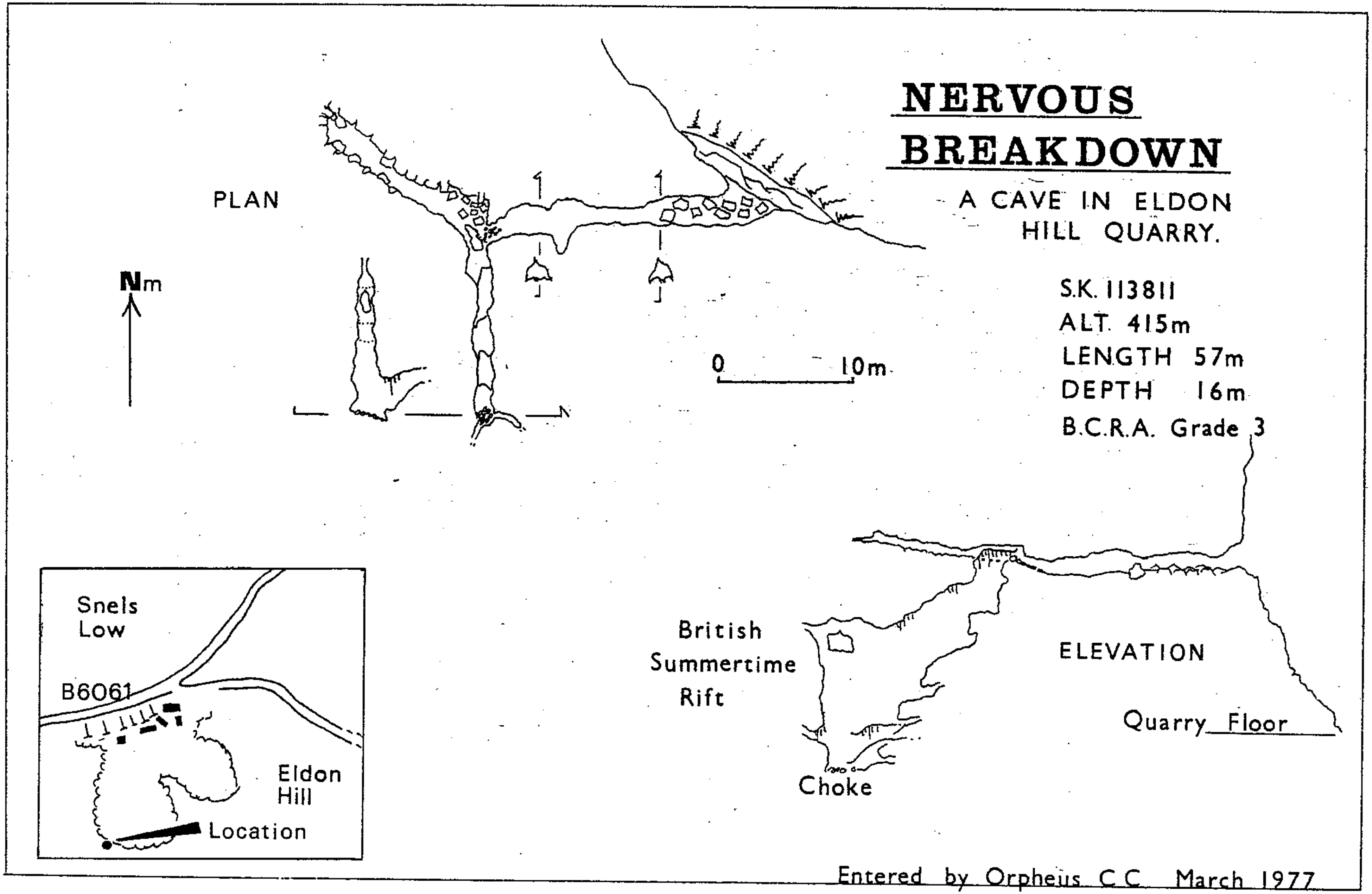
We surveyed out, took photos and paused for hysterical laughter at the boots, what a farce.

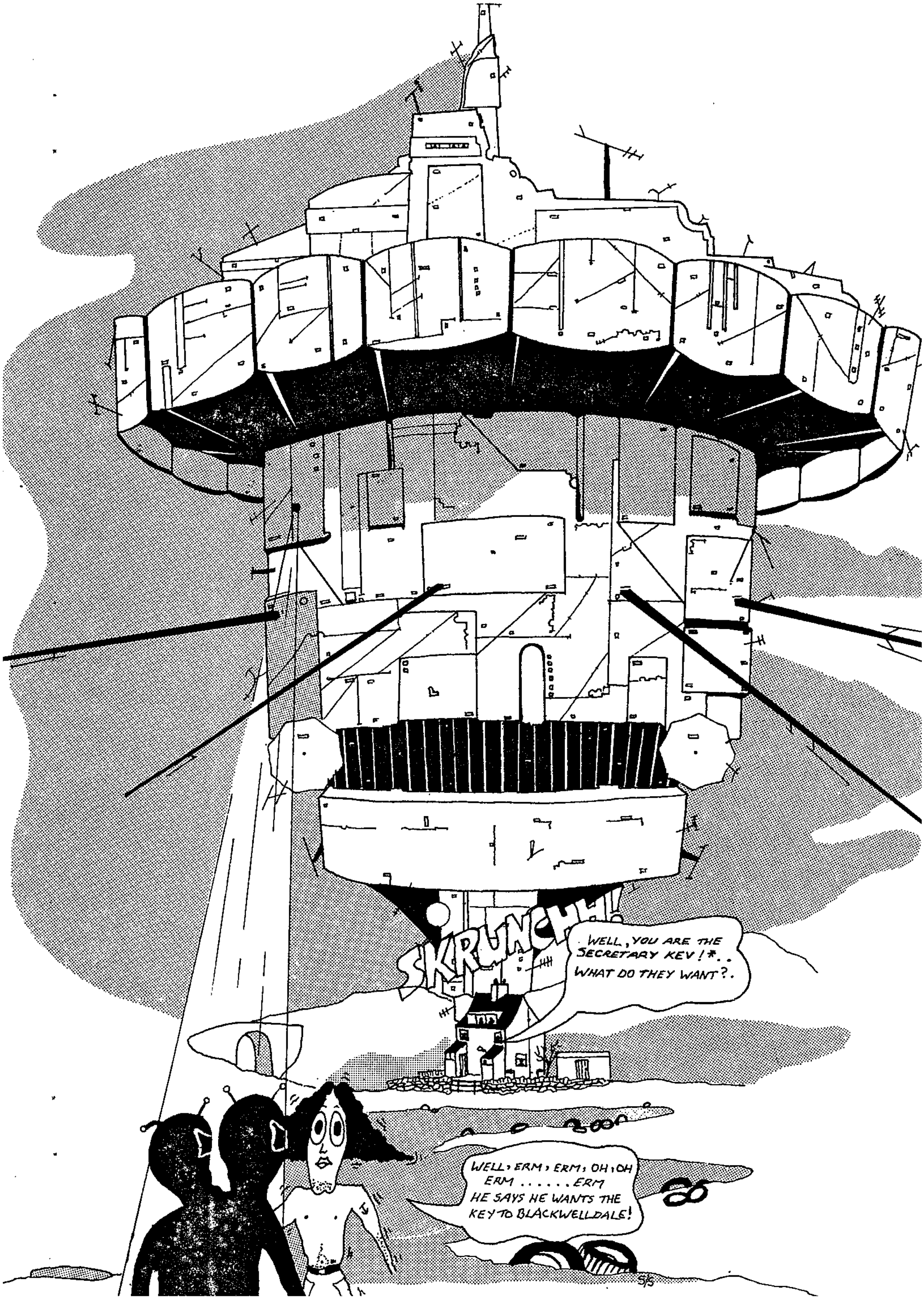
Climbing down from the entrance proved entertaining and very noisy in the dark and as we crept back toward the quarry buildings every boulder hid a burly policeman or a snarling hound. At last we were out of the quarry compound with only the long flog back to Dirtlow and tales of how easy and what a waste of time it had been.

The cag was down now and an endless march eventually brought us back to the waiting bottles of Guinness and their surrounding Landrover. Andy was so relieved he took his boots off - his legs are still walking in different directions!

We arrived back at the cottages at 4.00 a.m. (B.S.T.) jubilant in the thought that we wouldn't have to do it again. Will we?

MICK PHIPPS.


NERVOUS
BREAKDOWN
A CAVE IN ELDON
HILL QUARRY.
S.K. 113811
ALT. 415m
LENGTH 57m
DEPTH 16m
B.C.R.A. Grade 3
PLAN
Nm
0
10m
ELEVATION
British
Summertime
Rift
Choke
Quarry Floor
Snels
Low
B6061
Eldon
Hill
Location
Entered by Orpheus C.C. March 1977


SKRUNCHH!
WELL, YOU ARE THE SECRETARY KEV! *.. WHAT DO THEY WANT?.
WELL, ERM, ERM, OH, OH ERM ......ERM HE SAYS HE WANTS THE KEY TO BLACKWELLDALE!
S/S

"DAYDREAMS."

The gang of three burst through the door into the dimly lit interior, Monica sat facing the bar, her long slender fingers carelessly caressing the sides of a tall glistening glass containing the remains of a few dozen whiskey sours.

"You're late boys, you see I've been expecting you."

"Not so fast Monica, the gang of three are never late." She turned, you could have cut the air with a knife, her expensive silk gown slashed almost to the navel, fell open exposing her long slender leg, erotically clad in a smoke grey stocking, the clip of her suspender belt emphasising the eroticism of the danger we faced.

"Slow down boys, your faces give you away, do you appreciate what you can see?"

The tension was too much, I reached forward and slid my trembling hand into the warm nest of her cleavage.

"I'd like to say we can't see enough" and with a shrug of my shoulders I tore the expensive garment from collar to hem. Monica made no attempt to cover her naked breasts but instead she took another cool sip from her glass.

I slid my hand along her thigh, watching as she rolled her tongue along the rim of the frosted glass. Soon my hands reached their destination, Monica eased her seductive body upwards from the bar stool and motioned me towards a sheepskin rug casually thrown on a huge king size rotating water bed, festooned with mirrors and polaroid cameras which constituted the only furniture in the otherwise empty room. Taking my hand away from her thigh she led me to ....

1. "Take in"
2. "You rotten bastard" A cheerfully bearded face shatters the remnants of my illusion and the constrictions of P8 replace the vastness of the world of my dirty thoughts.

GENE DEFECT.

"A SLAVE FLASH SYNCHRONISATION UNIT."

This is a handy device eliminating the need for people to fire remote flash guns. The unit is simply connected to a flash gun which is then fired via the flash from either a camera-syncronised flash gun or a manually fired flash gun.

After a few weeks experimenting the circuit was finally perfected. It has proved successful with electronic flash guns and should work as well with flash bulbs. The theory of operation of the circuit will not be discussed but a few points are worthy of note.

For the duration that the unit is switched on the current drain from the battery is very low, and only when the flash is triggered does the current taken rise to an appreciable level. This means a very small battery may be used and that a long life can be expected from it.

Several transistors may be used for TR2 (see diagram) according to availability, for example: NKT274, OC72, OC81 or NKT224.

The unit is not triggered by ambient lighting, such as daylight or electric lighting such as mains or caving lights. In a straight passage or a chamber the unit should operate to 9M, depending upon a few factors, mainly the quality of the components used and secondly upon the positioning of the phototransistor TR1 with regards to it receiving the light from the first flash as efficiently as possible. When using electronic flash guns the slaved flash is only microseconds behind the primary flash and thus delay can be discounted. However, with flash bulbs the burn out time of the foil in the bulb (approximately 25 milliseconds) must be allowed for and compensated by altering the shutter speeds. This may not be necessary if the brief setting is used, as is popular in cave photography.

During the connection of the flash lead extension the polarity of the leads must be carefully checked. NOTE the positive lead must be connected to the thyristor anode. Failure to do this will result in no damage but the unit would not function. Also, all electronic flash guns do not have the same polarity leads so a reversing lead may be necessary.

A few final points: The case of the thyristor is at the same potential as the anode in the flash unit which may be up to 250v. When in position the OCP71 should have its active juntion facing outwards, i.e. the photosensitive side is towards you when the collector stripe is on the left.

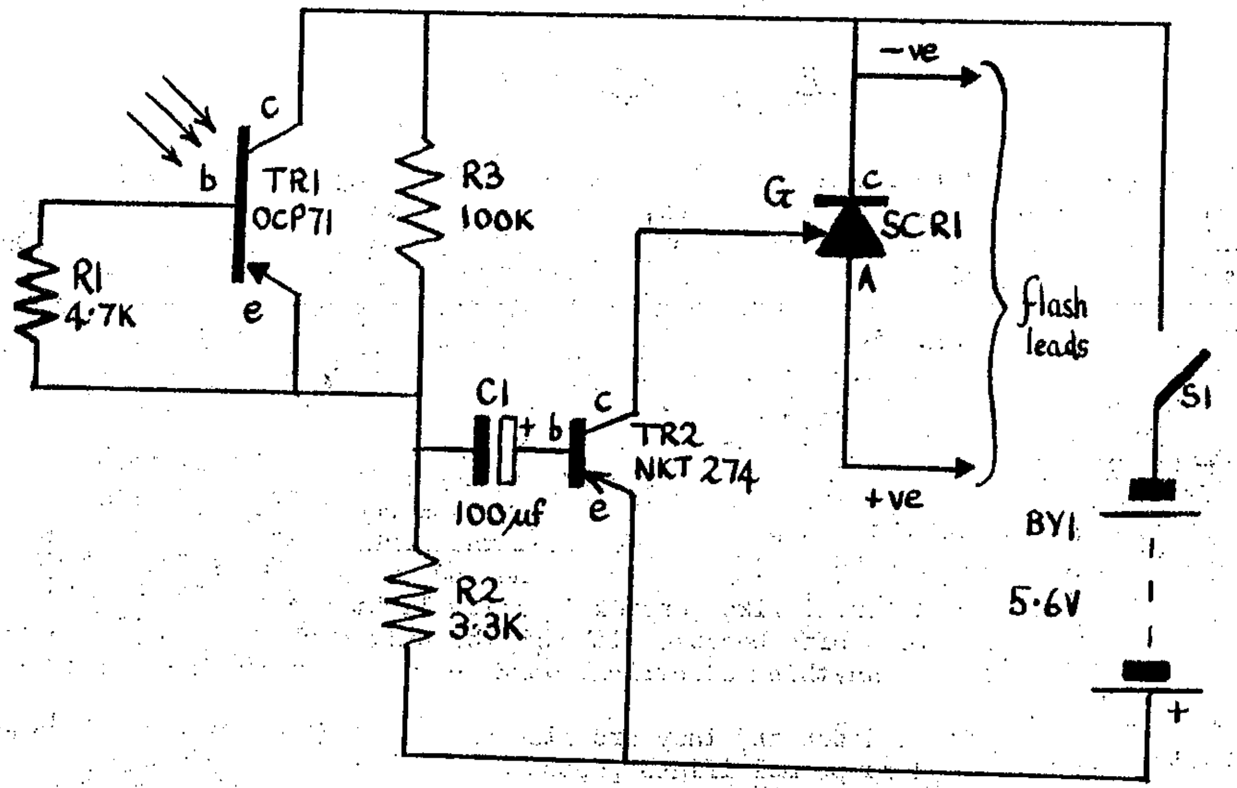
The battery I used was made up from 4 tiny 1.4v deaf aid batteries, though if available a Mallory PX23 can be used.

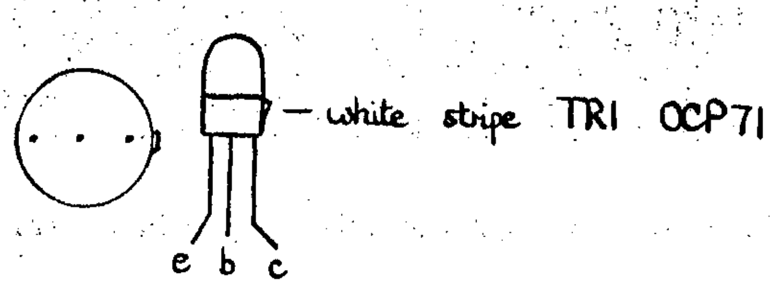
The transistors and thyristor may be obtained from BI-PAX, P.O. BOX 6, 63A HIGH STREET, WARE, HERTS.

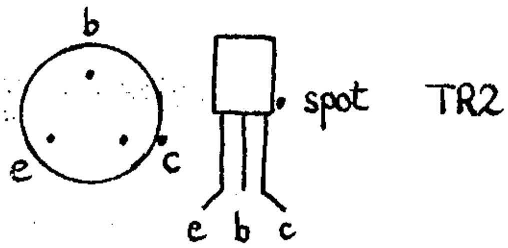
Other components are easily available from most electronic shops. Layout is not critical depending on the size required.

DAVE MALLEY.

Slave Flash Synchronisation Unit Circuit Diagram.







Resistors:
R1 4·7K
R2 3·3K
R3 100K

Capacitors:
C1 16μf 10V
Minature electrolytic

Transistors
TR1 OCP71
TR2 NKT274, OC72, OC81 or NKT 224.

Thyristor:
SCR1 5 Amp. 300V.

Miscellaneous
S1 minature slide on/off switch
BY1 5·6V battery. Flash extension lead.

"UNDERWATER SLAVE UNITS."

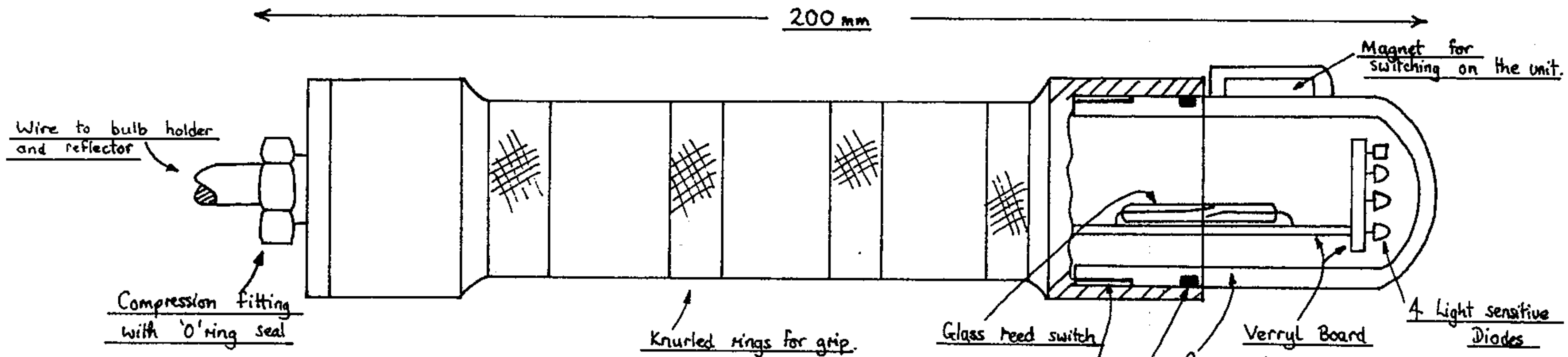
One drunken weekend in South Wales I got chatting to a member of the Welsh section of the C.D.G. Mr. Rodney Beaumont, Bomber for short. He explained how he had designed and made a slave unit for sump photography but he'd got problems with the casing, they sometimes flooded so he was looking for some-one to make him a reliable body. As this type of work is right up my street I told him he didn't need to look any further. Previous to this I had dabbled in sump photos with a Nikonos II and a home made electronic flash unit in a housing, the results of which were OK but it had its limitations. It was the lack of good lighting to give the fram any real depth. All that I could really do was take mug shots of a diver two or three feet away. If the subject was any further away it tended to make them merge into the blackness of the gloomy background so I made the first slave body most of which was simple centre-lathe work. All the slave body consists of is an aluminium tube with a bung at one end and a perspex dome at the other. We had to use a material like perspex to allow light through to the light sensitive bits. I call them bits because although the unit works very well I have not got the first idea how anything electrical works - give me a crowbar anytime!

We have now made half a dozen and they are also proving very popular in ordinary cave photography. Beyond sumps multiflash photos have always been difficult, carrying a land camera through a sump in the ammo can could end up to be rather an expensive dive, if the ammo can leaks. The Nikonos is the perfect type of camera for the cave diver and coupled up with the slave units transforms the camera into a multiflash instanmatic saving time and doing away with a tripod, thus using syncronised shutter speeds 1/30, 1/60 etc. I have also manufactured a syncronised flash unit as the bought job is very expensive and it will not fit into an ammo can anyway.

A rough sketch gives some idea as to what they look like and how they work.

GEOFF ATTWOOD.

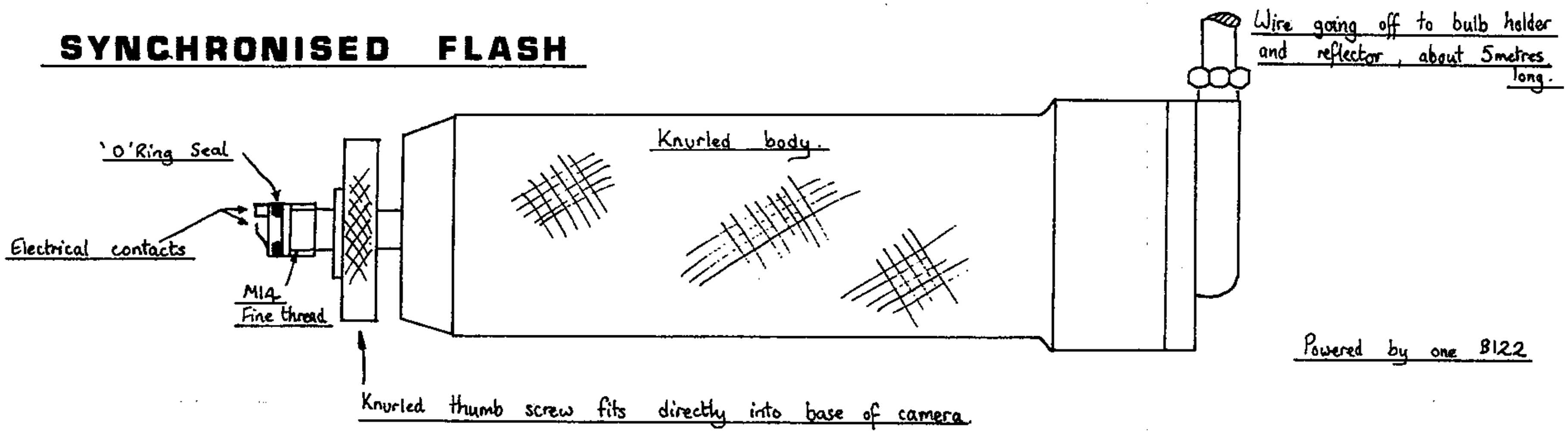
SLAVE UNIT



Powered by two PP4 batteries.

The unit is switched on by turning the perspex dome untill the magnet activates the reed switch.

SYNCHRONISED FLASH



Powered by one B122

THE WATER ICICLE SAGA.

Most people will be aware that Water Icicle Close Cavern was re-opened in the late sixties by the P.D.M.H.S. and there followed over a number of years an hysterical interest in the possibilities of digging the ends of the three large phreatic passages, in search of more of this unusual system.

At the North-West choke (the bouldery one) S.U.S.S. had a rather nasty dig under the right hand wall and efforts had also opened up a chamber, the Mess Room, above the choke. It was here that Steve Worthington was trapped for a while by shifting boulders, and this incident seemed to bring digging to a temporary halt.

In the summer of 1973 the Orifice began to take interest under the auspices of "Bell" Bellamy, who planned on hitting the choke in a big way.

A concentrated effort was soon in action. The floor immediately preceding the choke was cleared, first of all down to bedrock, so that there was sufficient room to extract the boulders. The latter was achieved by adopting the S.U.S.S. method of 'prod and run' (the 'prod' being effected using a length of stream-pipe.)

This was successful and quite exhilarating to say the least, and used in conjunction with the Mk. II "bang-run, prod-run" technique a clear way into the Mess Room was made by the end of September 1973.

It became obvious at this stage, that there was an awful lot more choke to remove then we had anticipated, so digging was really stepped up; there were on average two trips of at least five people each weekend, as well as midweek and Friday night sessions, and at least one two day effort when diggers ate and slept down the hole and dug in shifts.

A trip in November opened up a small enlarged joint in the left-hand wall, offering room for a couple of diggers to shelter safely from the periodic movements of the "Cliffs of Hangover" and progress began to move around the sides of the choke. Bang-fumes at this time cleared almost instantly, helped by a strong inward-blowing draught.

Water Icicle was becoming quite a popular place; the Pegasus had taken to digging in the mud choked North passage and the T.S.G. were tackling South Passage. A log book entry of the time states that an "estimated 66 tons of limestone removed so far 134 to go.......!

A wooden ladder was transported from the cottages to facilitate a climb over the "cliffs" this was of little use but came in handy at a later period when the chamber was scaled to its full height.

By the end of 1973 over 4,000 man-hours had been spent at the dig.

1974 began with a new and quite unsuspected digging hazard: Flying Tirfor Winches. A Tirfor winch was employed to pull boulders out of the chamber , so that they could be broken up in the comparative safety of the passage. Unfortunately the winch could only be belayed to a series of pitons in the passage wall, and whilst this worked well for a time the strain of a particularly large "gnome" (and using a length of scaffolding on the winch handle) proved to be a little excessive and, ripping out all the pegs, the Tirfor shot down the passage at a great rate of knots. This not only made a mess of the borrowed winch, but also came very close to decapitating Messrs. Clayton and Thornber (the later of course being used to such events was totally unperturbed) so "Tirfing" was shelved for the time being.

By now the boulder slope was becoming increasingly dangerous, one member in fact reputedly carrying a spare pair of trousers on every trip; banging and clearing continued as regular as clockwork, one trip involving Bell and others lasting for 25 hours; progress was becoming annoyingly slow.

The thought had occurred, that the dig could prove to be a (greater) fiasco if the Old Man had already sussed out as it were, the other side of the choke from elsewhere, so a surface recce was carried out. This included descents of various neighbouring mineshafts and the successful radio-locating of the three Icicle passages, but didn't really achieve anything. The Mess Room was also scaled to its full height at this time but this again was rather a waste of time.

Thus began the decline of the digging sessions, influenced largely by the disappearance of the draught, which caused bang fumes to hang in the passage for long periods, so that further work could only be carried out if you didn't mind a throbbing brain. General interest, of course, began to move in the direction of Wetton Mill and elsewhere but thats another story.

Sporadic digging has carried on however, write ups such as "Icicle - banged boulder - one more and it'll go - Gene Defect etc.," still appear in the log-book. 1981 has seen a revival of interest in the dig with digging trips most weekends and fire setting has been used to remove some of the bigger boulders in the way. This time its just got to go.

MICK PHIPPS.

DIVING PROGRESS IN PEAK CAVERN.

Cave divers were able to resume activities in Peak Cavern late in 1979 after a long and frustrating absence. Several Orpheus members have played a part in the resultant dives and in the inter-club cameradie which exists in the exploration of Peak, something rarely seen elsewhere.

Steve Tucker (OCC/TSG), Tim Nixon (OCC/TSG) and Jerry Murland (OCC) were initially at the forefront of activities and together with Brian Hague (TSG) John Cordingley (CDG), Chris Rhodes (TSG), Clive Westlake (EPC) and Martyn Farr (S.W.C.C.) have made several interesting discoveries. Other divers involved have been Geoff Attwood, Mick Phipps, Roy Sendor, Kev Drakeley, Rod Beaumont, John Cartledge, Ron Bury, Mike Smith, I. Rennie and R. Turner.

Late '79/80 saw trips to Ink sump by Tucker and to Far by Nixon and Murland; the former reaching 600 ft and the latter 400 ft.

In November 1980 Tucker made two dives in the peculiar Cohesion sump but was beaten back by evil spirits at -13m. Brian Hague later bottomed the sump at -25m, but there was no way on.

Also in 1980 Buxton Water (Tom Brown's) inlet saw a lot of activity under the auspices of John Cordinley, including several banging trips, but problems with the final squeeze have caused work to be suspended here. A dive in the Halfway House sump by Roy Sendor at this time was thwarted by bad visibility and in February 1981 Sendor and Nixon pushed a crawl off the Swine Hole for a total of 68m through a duck to a tight sump which was only investigated for a few metres, although it obviously intersects the Swine Hole/Halfway House water.

In March 1981 Ink sump was finally passed by Brian Hague, supported by Steve Tucker. This was possible after the 'Derbyshire Bomb' technique had been used to sort out the Grand Piano choke at the end. Brian surfaced in a rift chamber with the stream cascading down one wall. This requires bolting.

Carrying trips to Far sump became a regular thing from the beginning of the diving activities, firstly for Nixon and Murland, and later for Farr. On the third of a series of excellent dives Farr passed the sump at 1,350 ft. "Farr-Far" consists of 1,500 ft. of large passage, containing evidence of mining, which ends in sumps and boulder chokes. Although this is close to the upper Speedwell streamway, no way through seems likely at present. A lot of work next season will centre on looking for a way through from Speedwell if it exists.

Throughout the latest period of diving many trips have been made into the "North Streamway" (Speedwell), via Treasury sump.

The lower Bung Hole streamway makes interesting caving in anything but dry conditions and does not let up until Rift Cavern is reached. Here Cordingley, Hague and Rhodes climbed Egnaro Aven into a lot crawl which is obviously associated with similar tubes in Peak, notably Wind Tunnel, where digging is in progress.

Nearby, Window inlet sumps have been pushed by Cordingley and aided by Farr, a Boulder blockage, which must be approaching the Bottomless Pit area, has been reached.

One of the most noteworthy trips through Treasury must be the pushing of the Assault Course by Brian Hague and Chris Rhodes, doubling the known length of the passage to a boulder blockage.

With the concession of the custodian a few off-season (i.e. low water) trips have occured and these have proved fruitful.

On May 6th 1981 Clive Westlake made a recce dive into Whirlpool rising to a depth of 6m here he was surprised to enter a large clean phreatic tube which obviously has great potential. On the same trip a shot line was fixed in the Main Rising, which was plumbed at 20m deep.

On May 30th a strong party under the direction of Clive Westlake carried gear to Main Rising and Brian Hague made a good dive to 31m depth in bad visibility. Murlands recent dive to -46m in Giants East Canal seem to confirm the existence of a deep phreatic system between the two.

This is more or less the record to date (July 1981). Obviously , or at least hopefully, this revue will quickly become dated when Peak re-opens during the winter season, but it should give those not involved in the activities an idea of recent progress.

Apologies to anyone who should have been mentioned and isn't and thank to John Beck, Mr. Gill and the T.S.G. as a whole for arranging acces to the cave.

DIVINING FOR CAVES - A PERSONAL APPRAISAL.

Dowsing or divining, that curious pastime which most people are content to dismiss as mystic, eccentric or idiotic, has been applied to the location of caves by various people in the past who may indeed fit into one or all of those categories.

The first instance of the sport (?) to reach my ears was that of Bill Whitehouse divining over Etches cave, apparently with considerable success. Several other sites were apparently probed at that time but the mystic element, within the Orpheus at least, soon faded away.

Some years later the topic was again raised in idle conversation and Geoff Thornber engaged in the odious task of emptying his rucksack, soon produced a pair of copper handles with roller-bearings set into one end of each.

It materialized that, when used in conjunction with welding rods (set into the roller bearing) these were divining tools and that "any amount" of caves could be found!

A few minutes use in a light wind showed the instruments to be rather ineffective, for although the roller bearings reduced the effect of any subconcious element upon the rods, the elements which are usually more prevalent in Derbyshire sent the devices whirring off like infant helicopters.

Nevertheless, an alternative was found in a pair of stainless steel rods of $\frac{1}{8}$" diameter and shaped thus:

These Mark II rods have, for some completely unknown reason, been the most effective I have used so far.

To cut a long story short, these rods were soon upgraded from tracing electrical cables beneath the factory floor, to wafting about over hillsides tracing everything from cow-pats downwards.

We have tried other methods, including ordinary steel rods (which oddly don't work as well as stainless); hazel twigs, which <u>real</u> dowsers avoid as they break when a strong reaction occurs (in our case their failure to do anything and lastly pendulums only produced a breaking of wind) which don't seem to be very good at all, although "Guru" Steve Tucker claims some success. Unfortunately as he has only succeeded in finding robbers, murderers and other people of the same star-sign as himself, their use seems to be (fairly) limited in the caving world.

A good dowser of course can use any instrument, even his bare hands.

METHOD.

An assistant, first and foremost, is essential. This chap follows you across the area to be investigated armed with a collection of sticks or boulders, depending on the terrain. These he places on, or in, the ground wherever a 'Reaction' occurs, or, failing this, whenever you tell him to.

A group of paid watchers are also very useful provided they are well briefed - a "wow" or "yeah, man!" at the wrong moment can be terribly embarassing, especially if there are any other dowsers watching. To have this band armed with picks, shovels, kango's and so on is very impressive if other caving clubs are in the vicinity.

Holding the rods in a parallel fashion, one in either hand, walk slowly forward. On approaching the "object" the rods will splay slightly outwards (Alan Brook calls this a 'fring-reaction') and then cross. If nothing happens then you're either walking too fast, not trying, or you don't have the 'gift' - hard luck! I fail to see why, if one person can do this magic, another cannot.

With practice it is possible to feel the strength of a reaction and therefore make a guestimate at what lies beneath. The rods tend to remain crossed over the width of a cave passage, but it must be remembered that they also react when there is any sort of unconformity in the ground beneath, including joints, faults, cables, pipes, cavers and so forth. So assessing just what you have found is difficult, if not impossible.

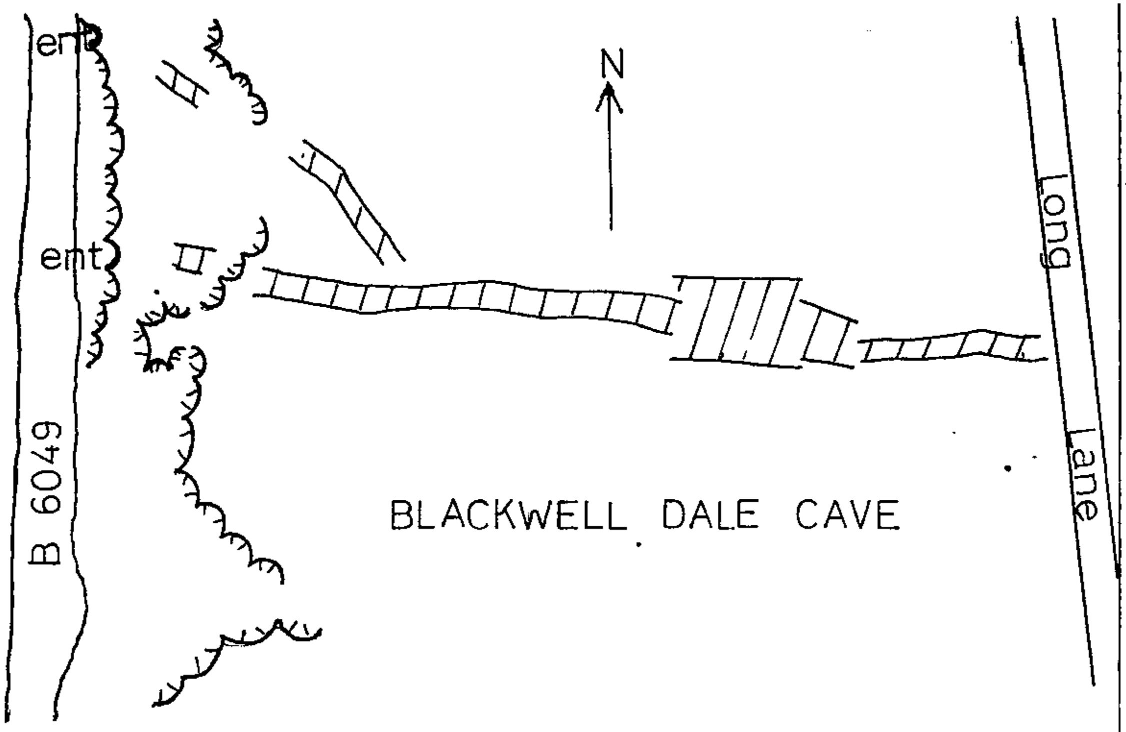
PRACTICE.

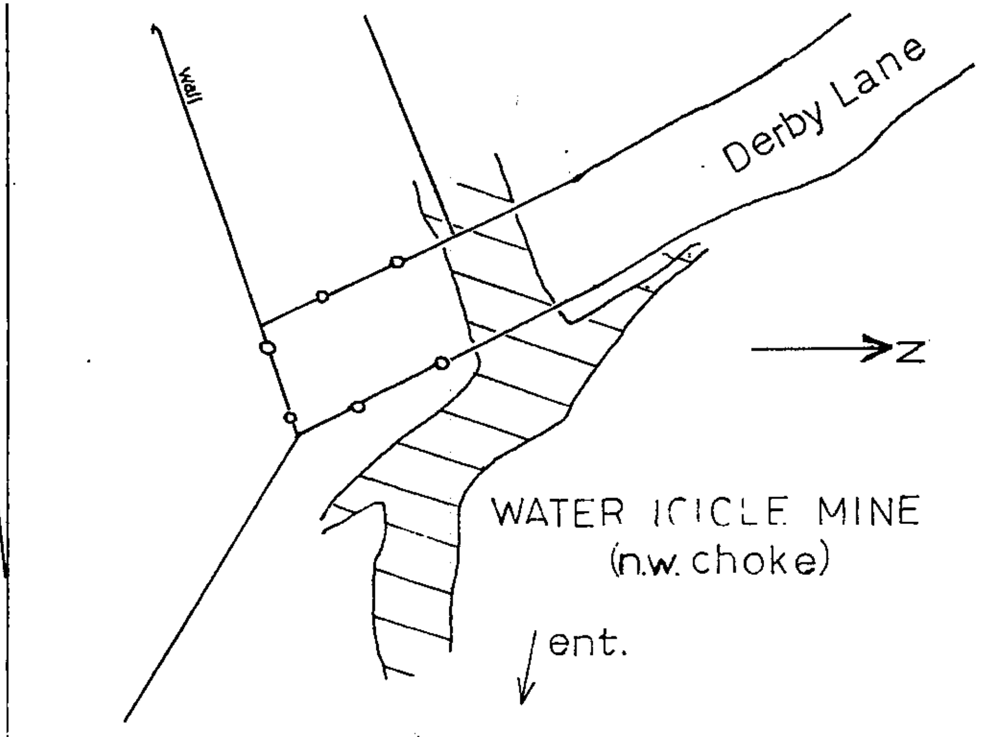
Now, despite having practised this wierd art for some time, many "watchers" were still, to say the least, rather sceptical. But whilst digging at some obscure hole in the bed of the river Manifold, boredom set in and we were reduced to playing with divining rods on the river-bank. A reaction was noted and was followed to the base of Beeston Tor, where, lo and behold, lay a hitherto unnoticed cave entrance amongst the rose bushes. Fair enough, coincidence but once inside it was immediately obvious that the length of the enlarged joint of which this small cave comprised, coincided exactly with the width of the divining traverse - rubbish say the sceptics.

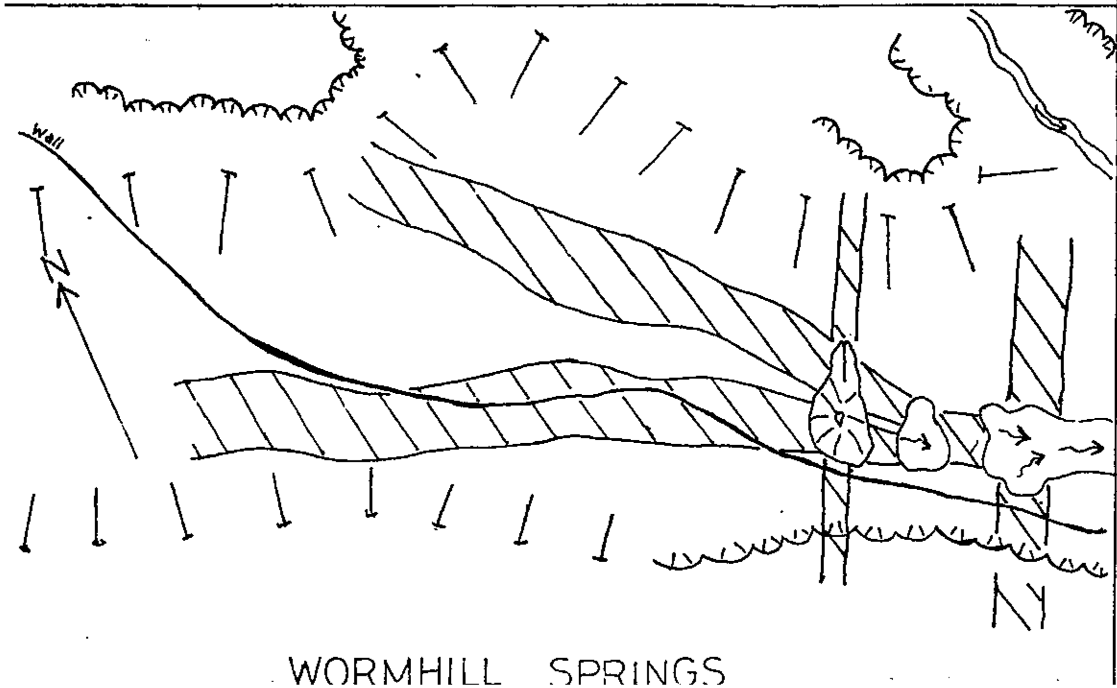
At Parsley Hay divining over a small depression in the hillside showed a strong reaction. A few weeks later a couple of short digging sessions here soon revealed a 50' shaft draughting strongly. Rubbish! say the disbelievers.

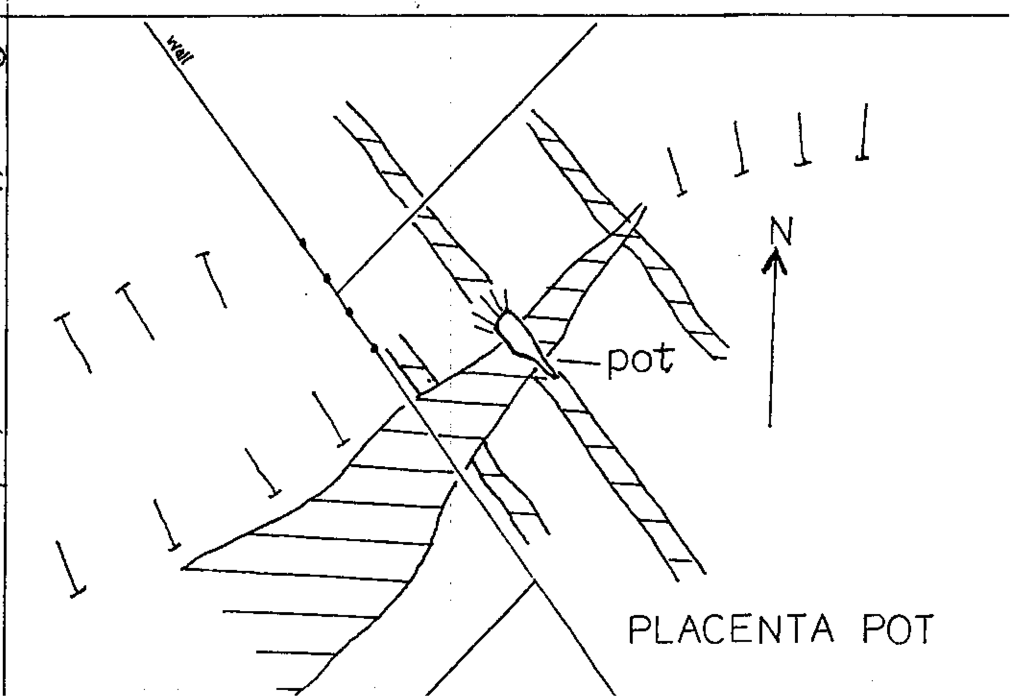
I'm not proposing that there is any connection between these small discoveries and divining, but they're certainly food for thought. Many other sites in the Peak have been "fluenced" since, and some interesting observations made, some of which are shown in sketches here, but the fact remains that if your boot laces won't snap wet-suit won't rip in the right place or your lamp refuses to fail then divining in my experience at least is the best excuse for not going underground. And, of course, the fast-flowing liquid under the floors of certain establishments is easy prey for the proficient dowser!

MICK PHIPPS.


BLACKWELL DALE CAVE
N
Long Lane
B 6049
ent
ent


WATER ICICLE MINE
(n.w. choke)
Derby Lane
N
ent.
wall


WORMHILL SPRINGS
N
wall


PLACENTA POT
N
pot
wall

ELECTRICAL RESISTIVITY METHODS FOR CAVE DETECTION

Introduction.

This article covers the practical aspects of electrical resistivity methods for cave detection and location. A description is given of a simple home-made terrameter and the results of two electrical surveys carried out with this terrameter.

The author is at present involved in work to justify the methods described, both practically and theoretically.

2. Practical Details of Three Electrical Resistivity Methods.

Of the numerous methods available, three are particularly useful for cave detection:

(i) Single Electrode Probe Technique.
(ii) Wenner Traverse.
(iii) Wenner Depth Probe.

The theoretical basis for these is described in the references listed at the end of the article.

(i) The Single Electrode Probe Technique. (after Bristow.)

The practical set up is shown in fig. 1. The ground should be devoid of clints or glacial deposits and should have a uniform soil cover.

The central current electrode is placed, say, 15m from a point below which the suspected cavity lies. The other current electrode is placed, say 60-100m from the first one, on the opposite side of the cavity. The distance between the two electrodes should be the maximum which gives a reasonable deflection on the ammeter. Marker stakes are set out between these electrodes at say, 3m intervals. The interval chosen depends on the detail required; a larger interval gives less detail and vice versa. Two potential electrodes are then inserted in the ground at markers 1 and 2. The power is switched on, and the current, the voltage, and the distances from the central current electrode to the two potential electrodes are noted. This process is repeated, as shown in fig. 2 until the potential electrodes are well to the opposite side of the suspected cavity.

The results are plotted as described in Bristow, 1966.

(ii) The Wenner Traverse.

Assuming the cavity to be in the form of a tunnel, a traverse is carried out with the axis of the electrode array, parallel to the axis of the "tunnel" (See fig. 3.)

The electrode separation is kept constant, unlike the previous method, and the electrode array is moved over the cavity. The electrode separation depends on the suspected depth of the cavity but practically is 5 - 20m.

At each traverse station, the current and the voltage are noted, and the resistivity calculated from the formula below:

$R = \frac{V}{I}$ where R = resistance (in ohms)
V = voltage (in volts)
I = current (in amps)

(S) $L = 2\pi a R$ where L = apparent resistivity (in ohm m)
a = electrode separation (in m)

By plotting L against distance along the traverse path, the graph obtained should show a peak above the cavity as indicated in fig. 4.

(iii) The Wenner Depth Probe.

The Wenner Depth Probe uses the basic Wenner array, viz four electrodes equally spaced. But this time the array is centred over the cavity.

The current and voltage are noted for successive increases in electrode separations (see fig. 5). The resistivity is plotted against the electrode spacing. The resistivity is calculated from $L = 2\pi a R$.

As with the other methods the cavity produces a hump in the graph. However, the graph may take one of several forms dependent on the thickness and relative resistivities of the overburden and prominent limestone layers.

A value for electrode spacing is read off against the hump (see fig. 6). To a very rought approximation, electrode spacing = depth of cavity.

All the above methods may be used in order to check the results obtained from any one of them.

3. A Home Made Terrameter.

A terrameter may be constructed for about £30. The basic requirements are as follows:

100mA D.C. meter
100µA D.C. meter
2 switches - 6 way 2 pole
2 switches - 2 way 4 pole
2 switches - 1 way 2 pole
1 switch - 1 way 4 pole

4 large crocodile clips
4 small jack plug
4 jack plug sockets
4 x 150 feet of single core cable (e.g. ½amp lighting flex.)
4 bright steel or copper stakes.

Resistors:

1 M ohm
100k ohm
10k ohm
100 ohm
10 ohm
} 2% tolerance, 5 watt power rating if possible.

0.75 ohm
0.19 ohm
0.083 ohm
0.015 ohm
} Made from resistance wire. E.g. 14 gauge Eureka imperial standard gauge wire (0.151 ohms per metre)

The circuit diagrams as shown in fig. 7. The two meters should be built into strong weatherproof boxes.

Fig. 1. Bristow electrode configuration

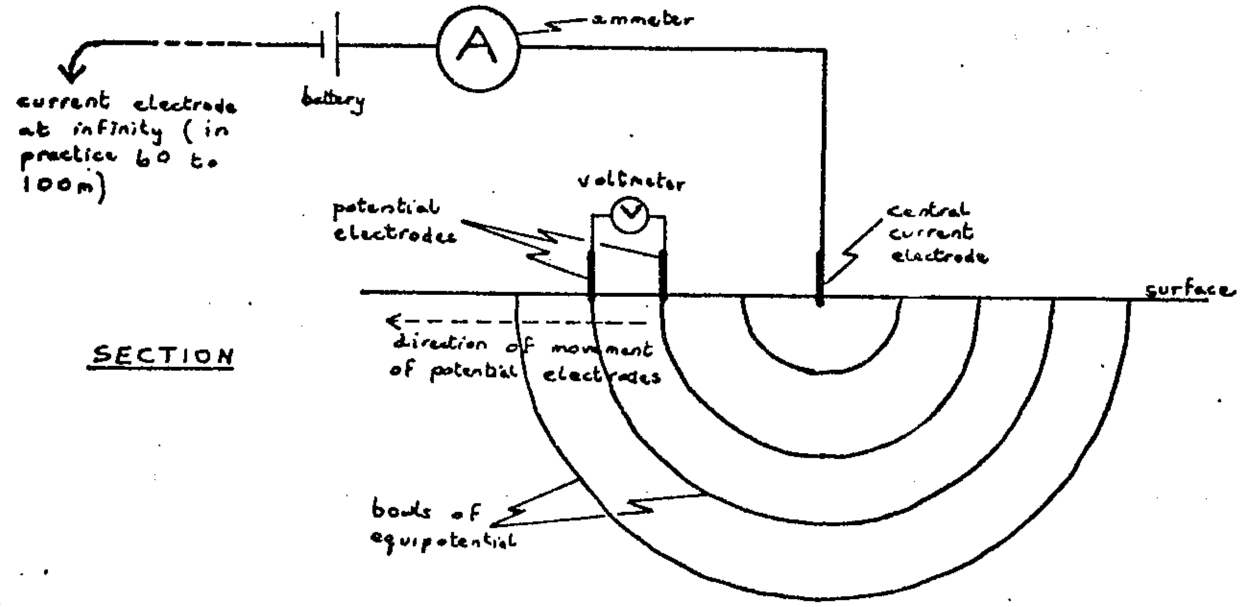


Fig. 2. Successive positions of potential electrodes for Bristow Method

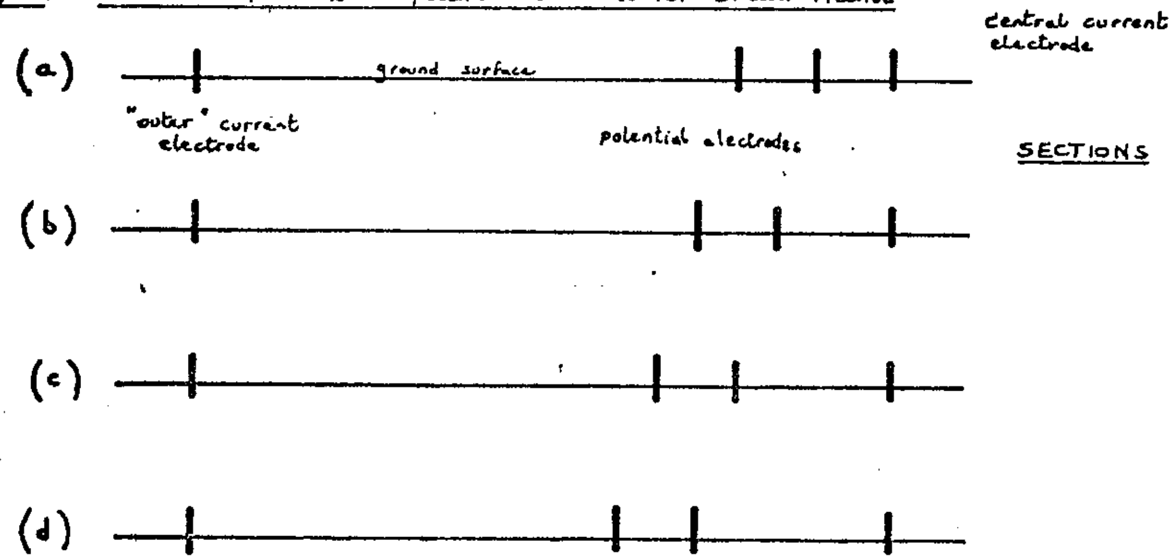


Fig. 3. Successive positions of electrode array for Wenner Traverse

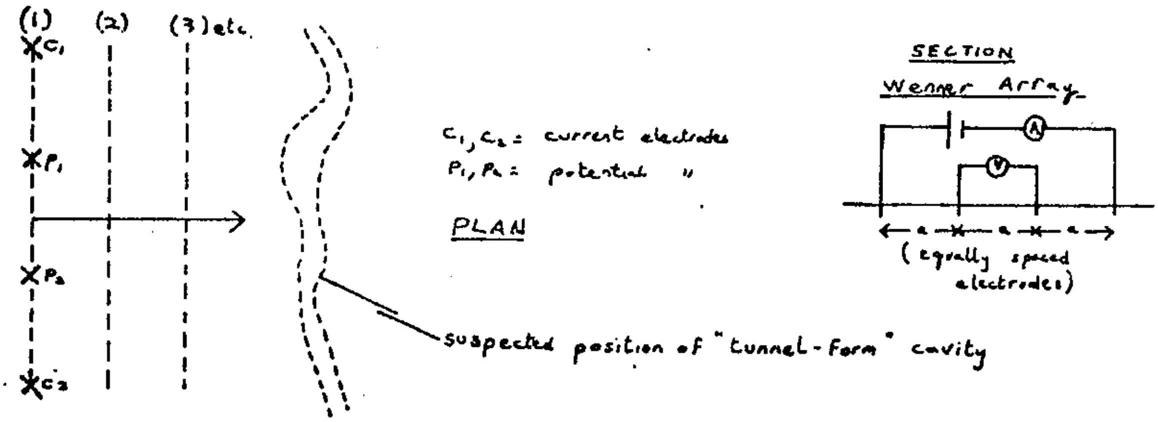


Fig. 4 Schematic graph for Wenner Traverse over cavity in uniform Limestone with thin cover

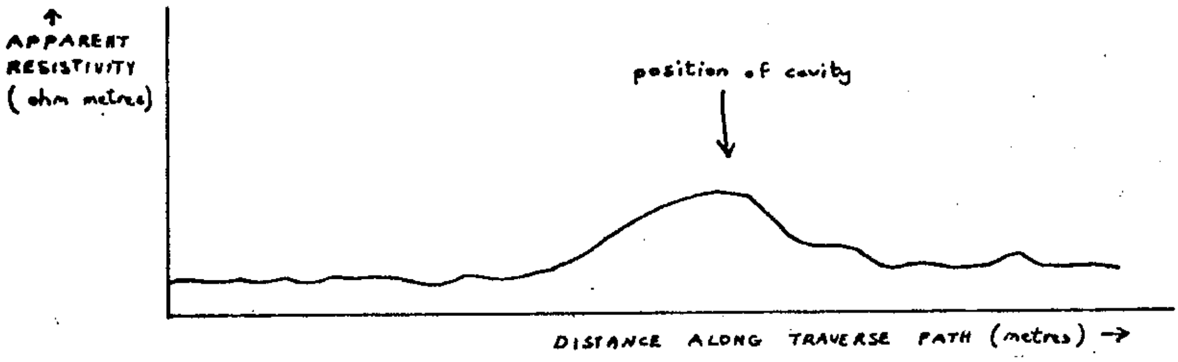
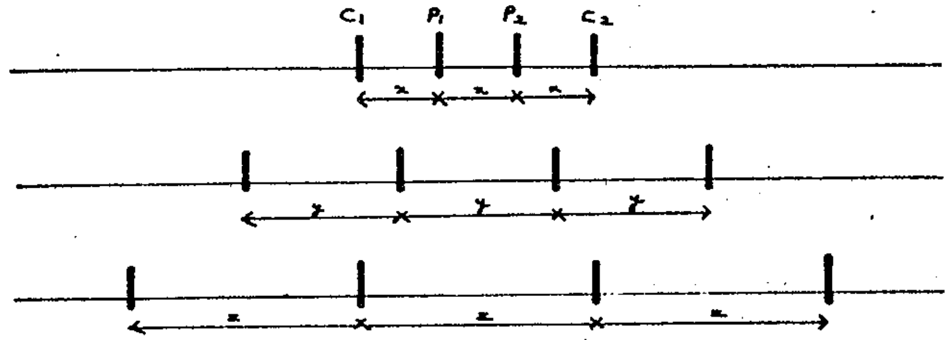


Fig. 5. Successive electrode positions for Wenner Depth Probe



C_1 and C_2 = current electrodes P_1 and P_2 are potential electrodes

Fig. 6. Typical graph for Wenner Depth Probe over shallow cavity

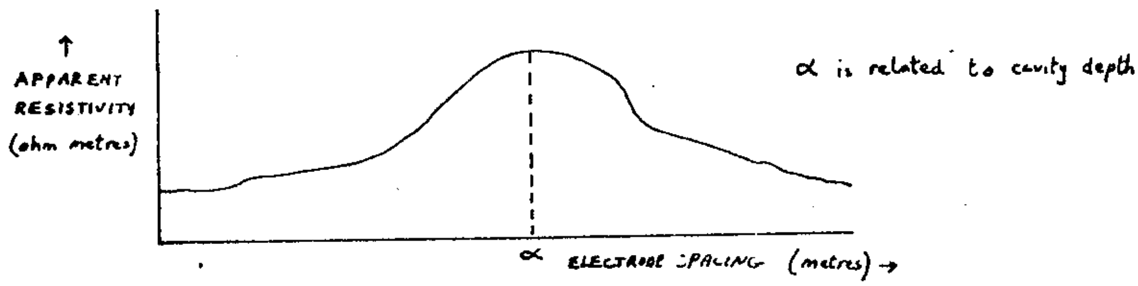


Fig. 7. Circuit diagrams for home-made terrameter

(a). Voltmeter

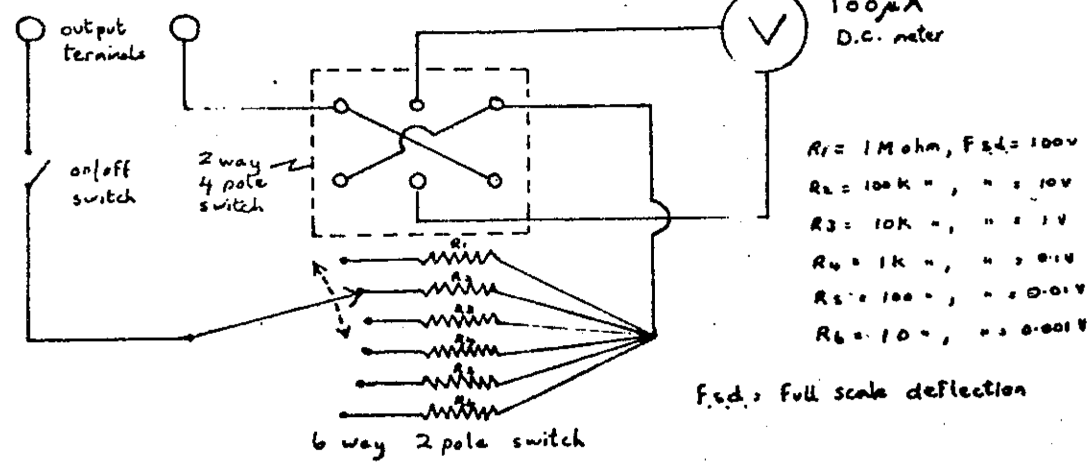
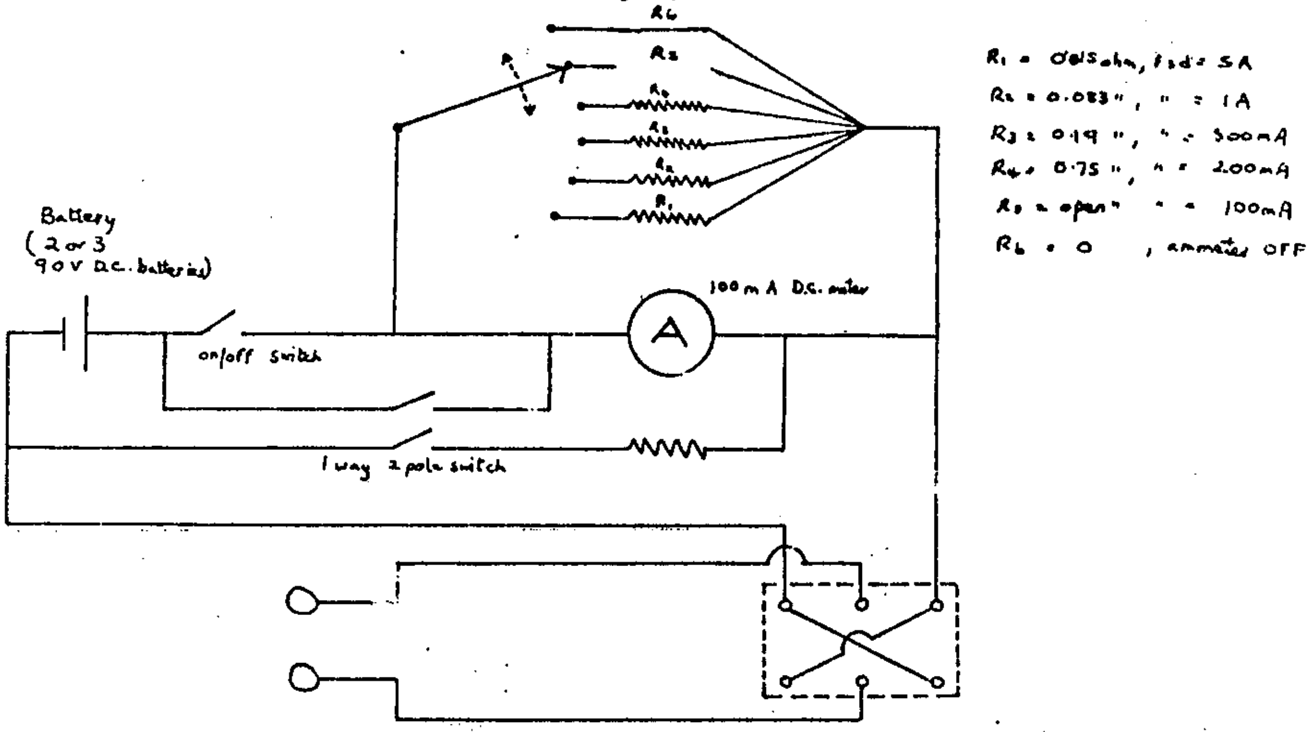


Fig. 7. (b). Ammeter



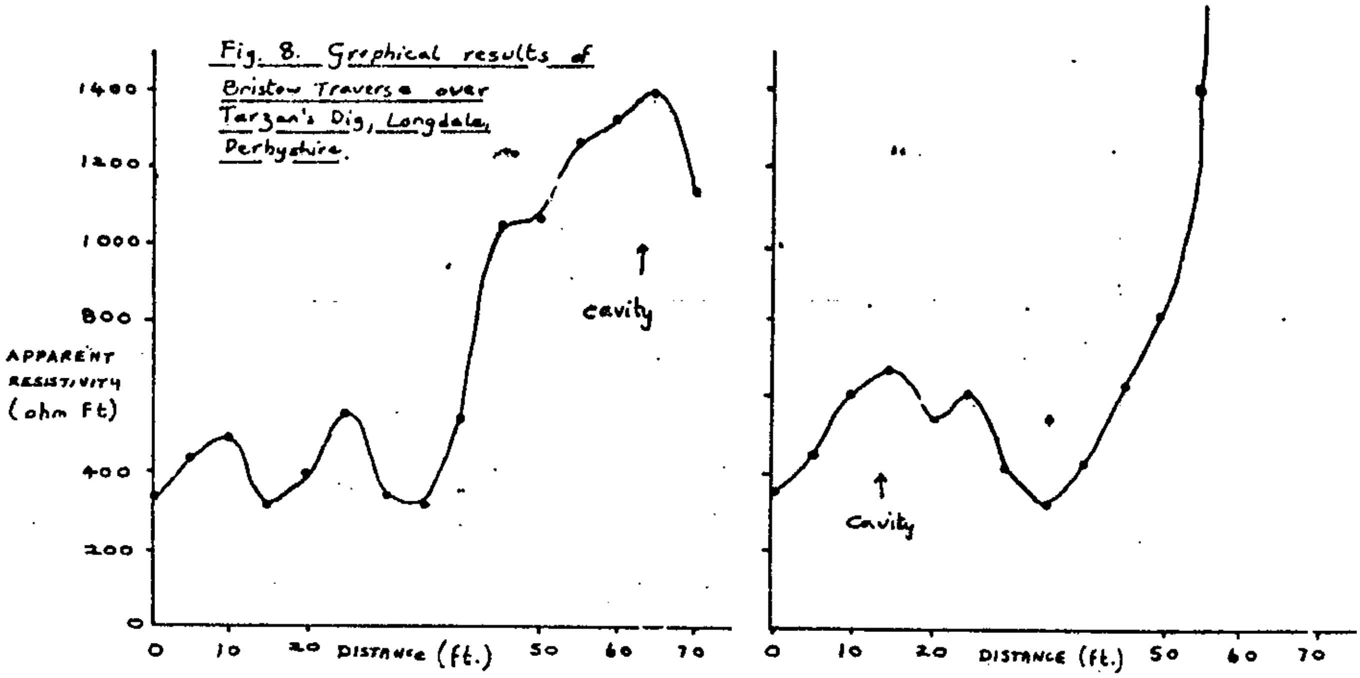


Fig. 8. Graphical results of Bristow Traverse over Tarzan's Dig, Longdale, Derbyshire.

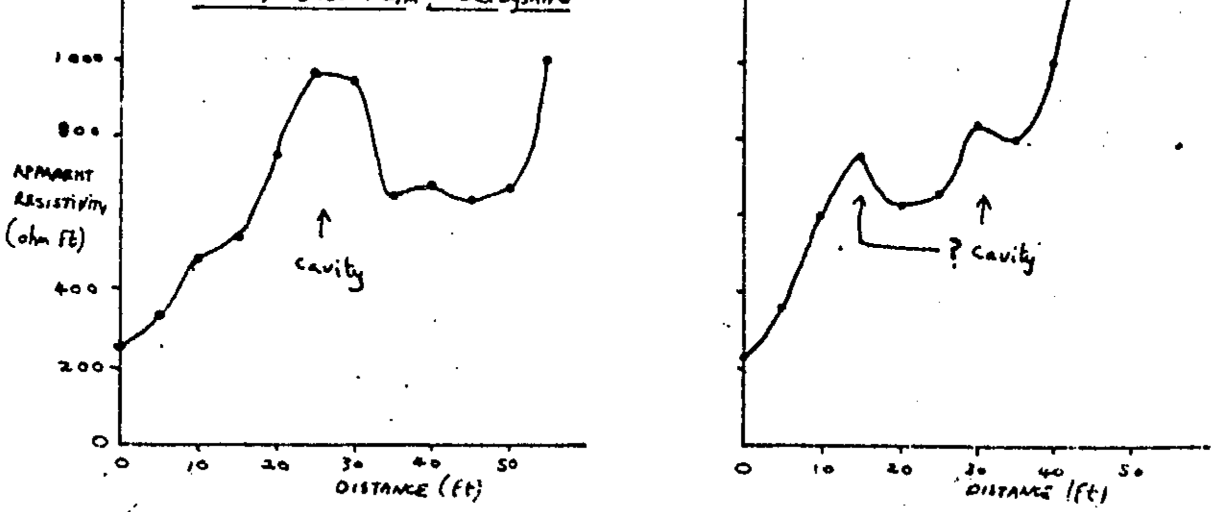


Fig. 9. Graphical Results of Bristow Traverse over Fitches Cave, Dowel Farm, Derbyshire

4. Results of Two Electrical Surveys.

Figures 8 & 9 show results of electrical resistivity traverses over two shallow caves in Derbyshire. Although the results are not conclusive the graph shows the form predicted by Bristow.

5. Conclusion.

Various authors (Creedy 1975, Habberjam and Carpenter 1955, Myers 1975) have discredited the Bristow method on the assumption that the potential electrodes merely detect surface irregularities and not effects at depth.

However, they do not apply the same criticism to other methods, viz. Wenner, Schumberger etc. which also use an in-line array.

The author is carrying out tests to estimate the depth penetration of a D.C. current. This involves placing current electrodes on the surface over a known cavity and measuring the potential (if any) set up on the wall of the cavity.

The results will be published in a future Orpheus Caving Club newsletter.

J.D. Freeman.

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Further information and other useful references can be found in the chapter on the Physics of Caves by T.M.L. Wigley and M.C. Brown in The Science of Speleology edited by T.D. Ford and published by Academic Press, London. (1976.)

DIVING IN DIDO'S.

History.

Dido's Cave is a nice name for a conspicuous hole adjacent to Masson Weir, on the east bank of the Derwent, at Matlock Bath, Derbyshire. It is in fact a lead mine, known as Nether Hagg Mine, which was worked in the mid 1700's. The construction of Masson Weir would seem likely to have caused flooding to the present level and although a pump is rumoured to have been installed it would probably have been at Hagg Mine itself, further up valley and more likely a richer vein containing deeper workings.

Recent Exploration.

The entrance to Didos is fairly obvious and leads up to an easy walking size rift passage (a mineral vein) which within 30 metres narrows to a climb down back under oneself down into the Lake. Immediately to the right is a low duck into a short picked level going back towards the entrance. The Lake itself is 24 metres long, the water being out of ones depth at the far (eastern) end. This was all that was known about the cave before we became interested.

The O.C.C. first became interested in the place in 1970, when the far end of the Lake was unsuccessfully freedived, but the picked level beneath the entrance slope to the Lake was rediscovered using the same method.

Returning in July 1975, John Hall, Kev Drakeley and Mick Phipps passed sump one, establishing that it was a freedive, and proceeded to dive sump two to a blockage after 20m. On the same trip the Coffin Level was discovered, to the divers' surprise; an obvious cross-cut to another vein. It was only dived for three or four metres.(1). Later the same year Dave Morris confirmed these observations and spent some time digging at the end of sump two.(2).

Mick Nelson was next to visit the scene, in May 1977, and he climbed over the boulder blockage at the end of sump two, to push a further sump (later called sump nine) for 40m or so. On the same day, Mick also passed the Coffin level after an 18 metre dive to emerge in a parallel vein containing more sumps.

Keith (Ben) Bentham visited the mine in July and pushed the sumps beyond the Coffin level to a conclusion. Together with Nelson he later explored sumps nine/ten to an unstable shaft in the floor and a low continuation. Ben attempted to push the low bit with little success.(3). He also entered a side passage which surfaced after only 10m into a dry, but muddy passage (lord Nelsons Passage) which ended in a choke coated with red stal after 30m.(4). The dives at the end of the Coffin Level were dead ends in both directions, all easy work apart from the T-Pot which is difficult to reverse when fully kitted. Dives in sumps nine and ten were roomy and marred only by line problems.

Around this time Ben also climbed into the roof at the far end of the Coffin Level, finding an ascending passage containing roots etc. which must be close to the surface. Mick Phippq and Stuart Smith also climbed into the obvious passage above sump two, but found that it rapidly choked.

This concluded the exploratory diving in the mine and subsequent trips have generally been training dives.

Notes.

The mine is a good site for trainee cave divers but although the visibility is good on entering the sumps, it is poor on the return. There is no detectable flow but water levels do vary quite considerably, creating and submerging various airbells which has caused confusion over the numbering of sumps in the past. Some of the water may have a thermal origin as it is sometimes considerably warmer than the River Derwent outside.

The diving is usually easy, in quite uniform passages in the southward-hading veins, but the T-Pot is worthy of mention as several divers have experienced difficulty returning through this section. Perhaps it is best avoided.

The survey, as far as sump one, is to grade 5 but the remainder is based on C.D.G. surveys from 1975 onwards, largely that of Dave Morris and Pete Whatley(5.) The total length of the mine is in the region of 330m. The numbering of sumps seems almost arbitrary in such a place, but an example is represented on the survey. If anyone really enjoys diving in lead mines they're welcome to improve on it. Thanks are due to the Peak District Mines Historical Society who provided the brief history included.

MICK PHIPPS.

References:

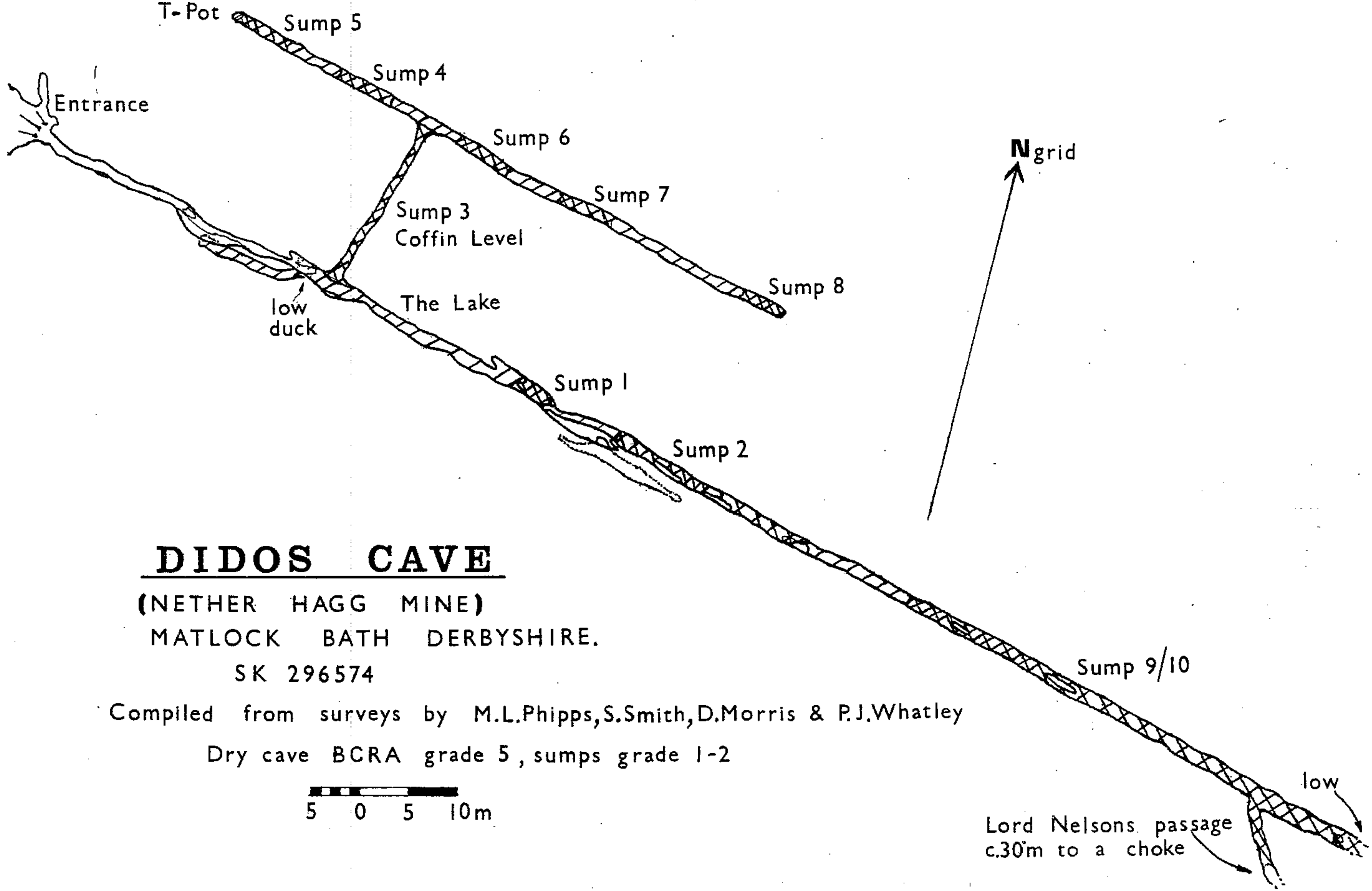
(1) C.D.G. N/L New Series 37

(2) C.D.G. N/L New Series 38

(3) C.D.G. N/L New Series 45

(4) C.D.G. N/L New Series 46

(5) C.D.G. N/L New Series 57

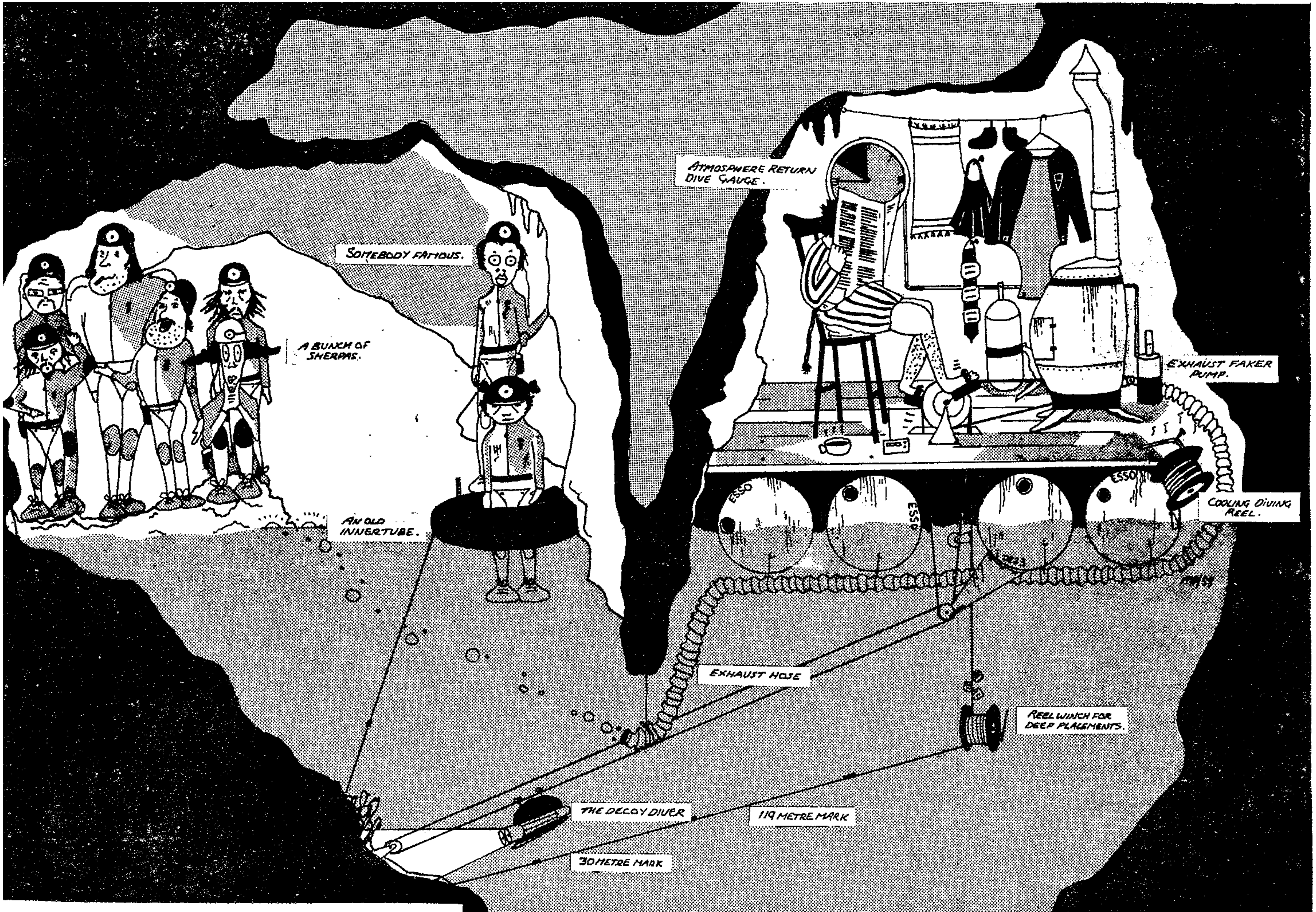


DIDOS CAVE

(NETHER HAGG MINE)
MATLOCK BATH DERBYSHIRE.
SK 296574

Compiled from surveys by M.L.Phipps, S.Smith, D.Morris & P.J.Whatley

Dry cave BCRA grade 5, sumps grade 1-2



CAVE DIVER BREAKS WORLD DEPTH RECORD?

CHURN HOLES.

A brief mention of our digging exploits has appeared elsewhere (Drakeley 1979) so below is presented a more complete account of our activities, for the record. Churn Holes are situated at SK 105 718 at an altitude of 264m. OD at the head of Marl (or Wonder) Dale, a short dry tributary valley of Deepdale near its junction with the Wye Valley at Topley Pike. The head of Marl Dale is almost vertical, rising about 15m up to the shallow dry upstream extension of the valley on the plateau above. At this marked step in the long profile of the valley faults cross the valley, being orientated approximately WNW - ESE, roughly parallel to one of the major faults of the area. This major, partly mineralised fault can clearly be seen at the entrance to Deepdale where it downthrows to the South and is responsible for the capping of Chee Tor Rock of Lower Asbian (D_1) age on Topley Pike (Cope 1967, 1972). A natural rift cave some 7m long is located along one of these faults at the head of Marl Dale, where slickensiding clearly shows there has been some lateral movement. The faulting here appears to have assisted in perpetuating this steep step or knick point in the long profile of the valley. Beneath this step, the valley floor at the head of the dale is littered with large blocks of limestone obviously broken away from the semi-circular shaped head of the valley. It is through these large blocks that a small boulder strewn "Chamber" for the sake of another word, can be entered with two 6m shafts up to the surface. These two shafts are Churn Holes and are situated by the side of the footpath which climbs steeply up to the top of the dale. They appear to lie along a fault.

Further down the valley, the lower valley sides and floor consists of partly vegetated angular scree weathered off the valley sides. This infilling, having no stream to remove it, has accumulated causing the valley to hang slightly above Deepdale.

This was the situation until 25th August, 1979 when John Hall, Dick Robinson, Roy Sendor and I, after crawling around in Thirst House Cave, had a look at Churn and decided it could do with digging. On the 2nd September John, Mick Phipps and myself began digging in the boulders beneath the two surface shafts, with little success at first. After two hours digging a loose, 4m long flat out drawl was opened up between the bedrock wall and boulders into which Mick disappeared. He entered the base of a small aven, 5m high, now substantially modified by digging spoil. A flat out crawl at floor level was followed for 6m over a floor of fine streamwashed gravel to a silt and stal choke in a cross joint. A small hole draughted encouraginly, so on 9th September further digging began. The original three, assisted by Mark Ruane and Mick Chambers succeeded in getting a further 8m of crawl after 5 hours of digging. The first part of the crawl, christened "the Dub", was enlarged so spoil removal was easier. The entrance crawl was also substantially modified to make it safer. Bones now began to be unearthed and everyone thought, especially when part of an antler was found, that the archaeologists would do all the dirty work for us. Not so though, Derby Museum verifying that the bones were not anything particularly unusual. The finds included the following: Sheep, Red Deer, Wild Boar, Dog and others unidentified (including the bones of a large swan sized bird.) These were all found scattered throughout a brown silty clay, which was the dominant deposit in the cave and was generally no more than 50 cm. thick, except in the cross joint, where it was over a metre thick. A note on the sediments appears at the end. It is worthwhile noting thought, that as the domestic dog, sheep, and ox did not appear in the Peak District until well into the Post-Glacial (Bramwell in Ford, 1977) these sediments would appear to have been laid down any time from approximately 4000 - 5000 B.C. to the present. Exactly when we do not know. Spoil removal in the dig was now becoming a problem so on the 23rd Sept. Coke, Mick, Brian Cowie and I tried out a system using 5 gallon plastic containers cut in half as digging trays with a rope pullback system to the aven near the entrance to stack the spoil. This worked very well, especially in such a small passage (generally the passage is never bigger than $1\frac{1}{2}$ metres wide x 1m high, if that, except at the two cross joints where one can stand up). It was fairly apparent now that we were in an old resurgence, consisting of a small phreatic tube gently descending downdip to the S.E. The one enticing thing that has kept us going is the cool draught.

The last visit was very disappointing as a 4m long crawl in water had to be endured to get to the face. Reversing through this was found to be very intimidating and digging was impractical. It was decided, with regret, to leave the dig to dry out until after the worst of the winter. The passage is admittedly not very big, but the draught is encouraging, although on the last trip none was discernable - was the passage sumped up ahead? A trip has been made in the very wet weather but the cave does not appear to resurge today. Although the cave is now 50 - 60m long, most of which is crawling, but the draught, together with the evidence from sediments (see below) appear to indicate that it could go quite a way, although whether it gets any bigger remains to be seen.

A few thoughts on Churn Holes and the surrounding area.

The cave so far descend approximately down dip and is obviously, from its situation, appearance and sedimentary evidence, an old resurgence. From Turners drawing and description of 1899, the cave entrance was originally much bigger, but has since fallen in, as is evident from the large limestone blocks. From the form of the valley above the cave and its entrenched character as it reaches the steep step down at the head of the dale, it is fairly evident that the water once flowed over the head of Marl Dale and so the present day valley form is not due entirely to spring sapping and undercutting. The more likely origin is from the recession of a knick point upstream and down dip due to rejuvenation at some stage in the development of the drainage pattern in the Quaternary period. The head of the valley is thus a fossil knick point left dry as the stream which once flowed here dwindled away due to a change in the climate removing the effect of the frozen impermeable surface cover and by downcutting of the Wye. The logical catchment area for this dry valley is the western side of Chelmorten Low and the surrounding limestone plateau, where the outcrops of the Upper and Lower Millers Dale Lava provide impermeable areas of ground. Two shallow dry valleys do converge on Marl Dale, one terminating upstream near Calton Hill and the other near Chelmorten village. Where the cave fits into this picture in not clear. From a sedimentary evidence it appears to have been infilled and ceased to resurge only recently, geologically speaking.

The sediments of the cave are quite interesting as already hinted at. Throughout the length of the cave dug out so far they are fairly consistent and it is considered very doubtful that they have been washed in from the present entrance or by any other means. They appear to represent stream laid deposits laid down by a stream that once resurged from the cave until quite recently.

The brown silty clay in which most of the bones were found forms the majority of the deposit, being generally between 30-50cm. thick and lies on a creamy coloured bedrock floor. Some small remnant patches of very compact limestone gravel can occassionally be found between this clay and the bedrock wall, the origin and significance of which is not clear. Within this clay occassionally cobbes and small boulders of limestone can be found, most having a distinct white patina probably due to chemical weathering. The creamy colour of the bedrock floor and the weathering crust on the small limestone boulders could thus indicate a preceeding period of chemical weathering prior to the deposition of the clay. On top of the clay, the upper 8-10cm. of sediment consists of a gravel, most of the particles being between 8-16mm in size, which puts it in a class of a medium pebble gravel. A sample was taken from these deposits and approximately 85% of the particles lay in the size range of a medium pebble gravel. 10% lay in the very small to small size categories, whilst 5% lay in the larger gravel sizes. The gravel sampled was of low sphericity and was mostly sub-rounded in appearance. Lithologically, over 95% of the gravel sampled was of igneous origin, consisting of Basalt, Tuff, Pyrite, a little Dolerite and some opaque brick-red Haematite; the latter occurring mostly as staining on the lava material, although two or three discrete pieces were found. The remainder of the material consisted of cream coloured limestone and broken pieces of calcite with the fragments of a small straw stalactite being discernable.

The above analysis indicates that the material is derived from an igneous outcrop not too far away and was depositied in a fairly low energy environment. This fits the picture very well as the nearest and most logical source of such material lies only 0.5km. to the S.E. to the Lower Millers Dale lava, and 1km. to the Upper Millers Dale lava at the foot of Chelmorten Low and the Olivine-Dolerite outcrop of Calton Hill. The traces of dolerite and haematite, the latter of which occurs as inclusions in quartz at Calton Hill, indicates Calton Hill, or at least areas of material derived from off Calton Hill as a part source. The basaltic material with its small dark green and black phenocrysts of olivene and pyroxene indicate the Millers Dale lava outcrops on Chelmorten Flat and the foot of Chelmorten Low. Pyrites, (FeO_2), which is also found, is a byproduct of the alteration of iron minerals in the lavas. Thus a source, at least for the latest phase of water movement through the system is indicated,,and topographically a possible catchment area of roughly 4 sq. km. exists. Shakeholes do exist on Chelmorten Flat, a few of which do look quite interesting although none has yet been dug. References from an old 19th century Ward-Lock Guide book to Buxton makes reference to the small stream which flows through the village of Chelmorten and which has given the village its linear settlement pattern. Its source lies in a small spring at the lava-limestone junction at the head of the village and according to the guide book, sank in a natural swallet after flowing through the village. The location of this swallet and the course of this stream have since been obliterated by culverts and later building, although it may once have flowed to Churn Holes, even if only intermittently, prior to culverting.

Conclusion.

The above discussion presents a few facts and a few thoughts on Churn Holes and its relationship to the surrounding area. Make of it what you will, but it does seem from the evidence that we are entering a small underground fossil drainage system centred on the resurgence at Churn Holes and the sinkholes around Chelmorten Low. Some of these sinkholes appear still to take small trickles in wet weather, although any water sinking underground in this area does not appear to emerge at Churn Holes today. Where it could emerge is open to debate. The water which rises from rubble at the Junction of Marl Dale and Deepdale in wet weather is more than likely just over-flow from culverting of the Deepdale stream underneath the quarry slurry pool at the bottom end of Deepdale. Really there is only one way to find out the answers to the questions apparent from the above discussion, and that is to keep on digging.

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KEV DRAKELEY.

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ILAM RISINGS

The various risings in the area of Ilam Hall although well known and frequently look at, have remained almost impenetrable to cavers. Much more work, especially of a scientific nature, need to be undertaken - this article is merely a brief description of the sites (as none seem to exist) and a resume of diving activities.

If the area is approached by walking downstream along the Manifold from the bridge at Rushley, the river gradually, almost imperceptibly, sweeps from its bed. Passing the lodge into the grounds of Ilam Hall the first major rising, Hamps Spring, is found on the right hand bank looking downstream. This produces a large quantity of water in wet weather, its source being the River Hamps sink at Water Houses (1), but dries up during summer months to leave a muddy depression with nowhere obvious to dig.

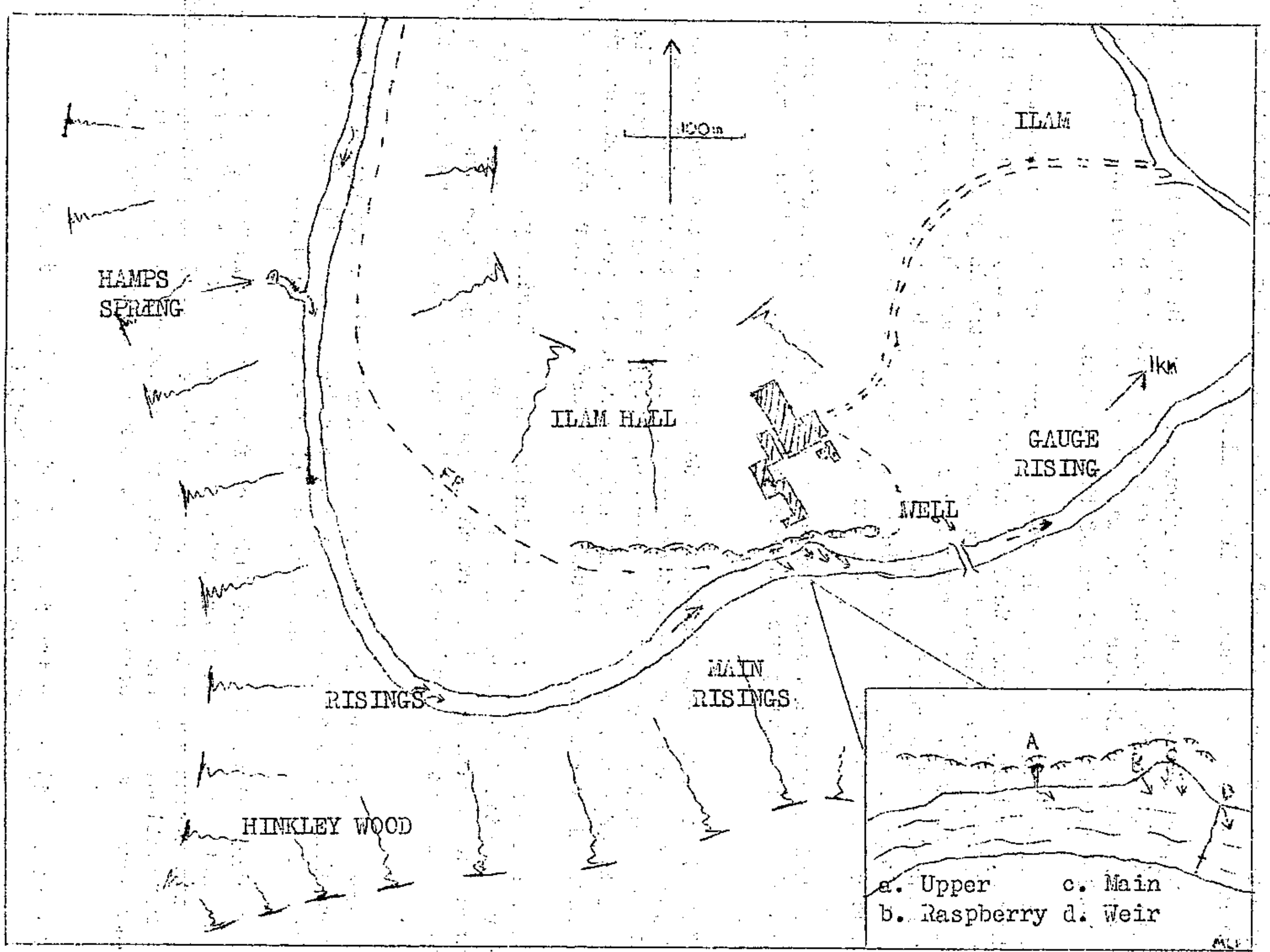
Moving downstream, on the outside (right hand bank) of the big sweeping bend of the river, are the Hinkley Wood risings, where the water from Waterways Swallet emerges (1). It runs out of muddy scree at two points about 6m apart and only a metre or so above river level, as well as from the river bed itself.

There are no further obvious resurgence points until the Main Rising complex is reached, immediately below Ilam Hall, on the left hand bank.

Starting again at the upstream end the first to be met is the Upper Rising, which always issues Hamps water (1), and is situated in an artifical 'grotto' cut into the rock face. The water is culverted beneath the tourist path into the river.

Moving downstream the very obvious Main Rising is soon reached. The entrance is in about 3m of water and periodically blocked by boulders. Adjacent to this and on the upstream side is Raspberry Rising. The Main Rising certainly carries

ILAM RISINGS - LOCATION.



water from Wetton Mill Sink (1) and Redhurst Swallet, but it is not known whether Raspberry Rising does as well. Water also emerges from beneath a large part of the river bank in this area.

A few metres downstream is the weir and immediately next to it the Weir rising; further downstream by St. Bertram's Bridge is the "Well" and 1km. downstream the less than obvious Gauge rising. These last three risings always run clear and have never shown obvious positives in any dye test.

Of all the sites mentioned only those at the Main Rising complex have been entered by cavers and then by diving alone.

The Upper Rising was dug by Orpheus members in 1980 and the flow increased substantially as the opening was enlarged. It was soon possible for a diver to enter a small low chamber where the way on was not obvious amongst the flakes and boulders which are typical of the risings.

Raspberry Rising was dug in 1973 by Bentham and Phipps and later in 1979/80 by Nixon, Tucker, Morris, Sendor and Attwood. A way on can sometimes be seen into a fairly large underwater passage, but entry is prevented by an assortment of loose boulders. Dave Morris had a lucky escape here in August 1980 when a large chunk of the tourist path collapsed onto him as he was digging underwater. Fortunately he managed to remain cool while the others present dug away the boulders and brought him to the surface.

The Main Rising has seen considerable activity from divers over the last ten years or so, including one unfortunate fatality. But little progress has been made.

The dives began when Cobbett and Cheg Chester dug out the entrance in 1969 and Cobbett descended the pot and proceeded for a total of 40m. No further dives took place until May 1975 when Farr proceeded for about the same distance and also noticed a passage going off halfway down the pot. In August this passage was entered by Phipps and found to be a dead end after only ten metres.

Several more dives were made during the following year but there was little progress until 1977 when Bentham and Nelson began systematically to reline and search the bedding. Nelson reached 45m from base after squeezing over a large slab but it was on a subsequent dive to this point that he tragically lost his life.

Brown and Peppard, in October 1977, during the recovery of Nelsons gear, made a very thorough search for a way on, concluding that the flow emerges from a series of lot slots and no further progress can be made.

In conclusion, the possibility of further extension appears to lie in the Upper and Raspberry Risings and more work is planned here by OCC/CDG members. The Main Rising seems to have drawn a blank as well as gaining something of a bad reputation. Of the other risings mentioned, digging at Hinkley Wood and Hamps Spring may be worthwhile yet. Its a long way to the sinks.

Reference: (1) Water tracing in Manifold Valley (in prep.)
C.D.G. Newsletters 1969-1980.

The Speleological Potential of the Manifold Valley - A Brief Outline.

In North East Staffordshire, the river Manifold meanders south from its source on Axe Edge to join the river Dove at Thorpe in Derbyshire. On its way south it flows first over impervious Namurian mudstones, arkosic sandstones and shales of Staffordshire, these giving rise to a broad valley and large expanses of moorland until at Hulme End the river leaves the shales and meanders through a narrow valley of Dinantian limestones. The valley sides rise upto 150m above river level to a general height of around 300 - 330m a.s.l. This gorge like section of the valley finishes at Ilam, 1km above the village of Thorpe.

The River Hamps, the main tributary of the Manifold rises in the west on grit stone at Morridge Edge and flows south and then east until it reaches the limestone at Waterhouses. Here it swings north and meanders through a steep sided valley to join the Manifold at Beeston Tor.

In these carboniferous limestone valleys the rivers Hamps and Manifold disappear for six months or more at Waterhouses and Wetton Mill respectively, both reappearing from separate rising at Ilam, 4kms and 6.3kms. away respectively. (J. Potts per. comm). Along the valley sides many small caves are to be found together with other Karst phenomena. For these reasons cavers have investigated the area in hope of finding the underground channels (or part of them) of the two rivers. In so doing a little more understanding of the morphology and hydrology of the valleys has been gained, but before any speculation can be made as to the whereabouts and form of these underground channels a basic outline of the geology of the area is needed.

Geologically, the limestones containing the caves range in age from Chadian (C_1) and possibly even earlier age (late Courceyan K and Z zones) upto Brigantian (D_2) with most of the Holkerian (S zone) beds cut out by unconformity. These are some of the oldest exposed limestones in the Peak District and they display a complex stratigraphy, lithology and structive indicating a complex geological evolution (Prentice 1951). Limestones of both basinal, massif and reef facies are present and interdigitate with each other. There are two reef belts, the lower one of Chadian (C_1) and Lower Arundian (C_2S_1) age, extending southwards from Wetton Mill through Ossums Crag, Thors Crag to Beeston Tor contains all the major sinks and caves and the upper one of Late Asbian (D_1) age extending eastwards of Wetton Mill containing no caves of any significance (Critchley 1979). Structurally, the principle folds and faults trend approximately N to S with the valley of the river Manifold being incised into the axial region of the generally southerly plunging Manifold anticline, more strictly an anticlinorium with many minor, often quite intense folds. Theories concerning these tectonic movements have been revised by Ludford and Parkinson (1964) who speculate that the structure of the area is an uplift in the form of a generally southerly plunging anticline whose minor fracturings are numerous and complex. Two district tectonic zones are noticeable: firstly a northerly zone where dips of a high order and changes in dip, direction and amount are frequent; secondly a south westerly zone where the dips are fairly high and diverging steadily on either side of the main anticline. Much folding can be seen at Apes Tor, Ecton and large planes of shear are seen at Thors Cave and St. Bertrams Cave, although the actual movement is slight. At the junction of the reef limestones are the bedded limestones violent movement has often taken place producing large fissures or tear faults which can be seen at Redhurst and Beeston Tor. The geological map produced by Ludford and Parkinson shows two major

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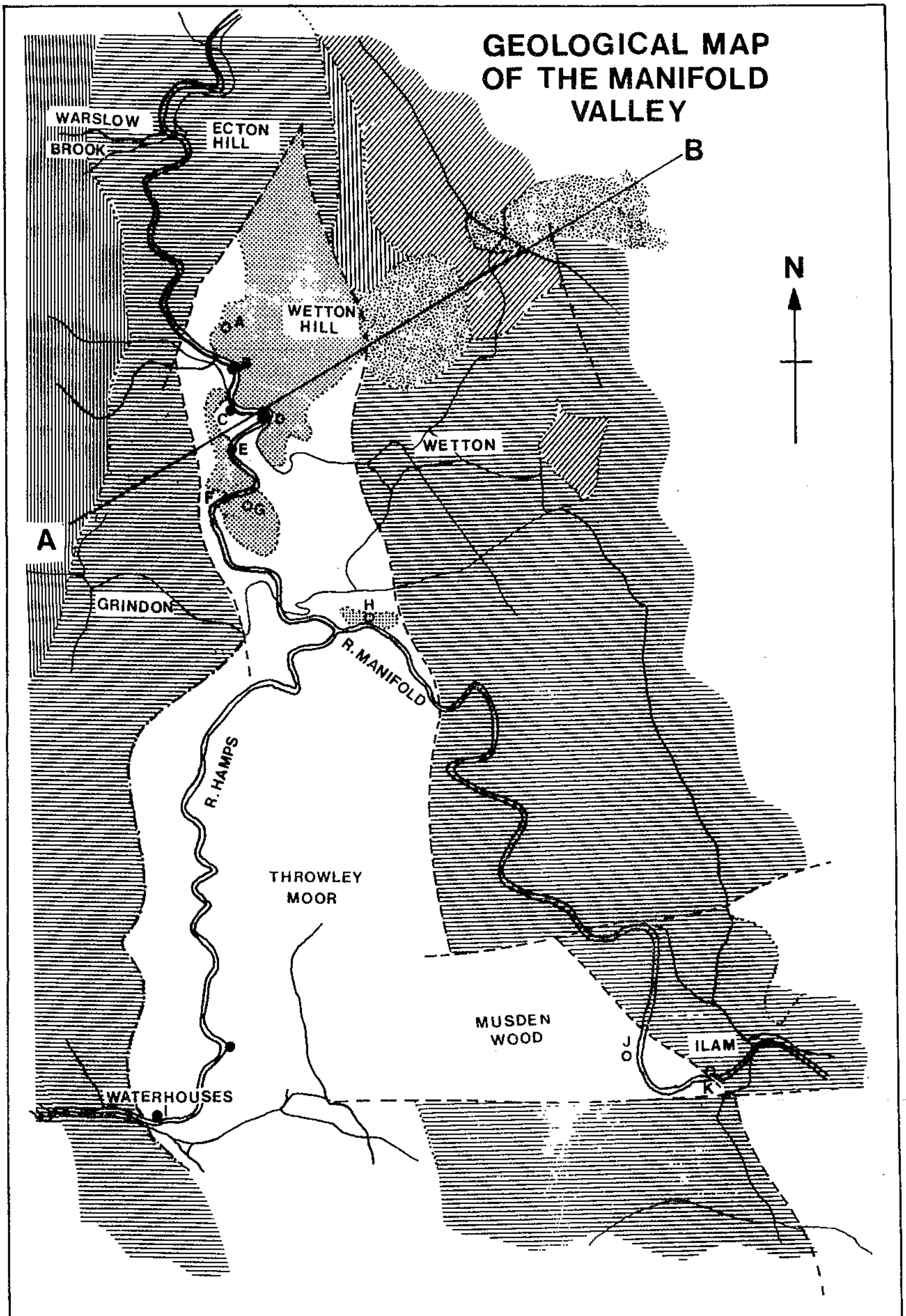
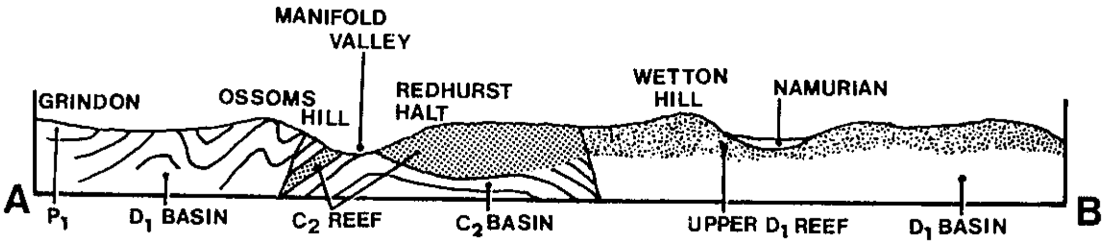


Taken from A. Ludford & D. Parkinson's geological survey

SECTION AB



KEY TO MAP OPPOSITE

- NAMURIAN
- UPPER D_2
- UPPER D_1
- LOWER D_1
- UPPER C_2 (REEF)
- BASIN FACIES

- RIVERS
- FAULTS
- ROADS
- STRATA BOUNDARIES
- FACIES BOUNDARIES

○ A NAN TOR
● B WETTON MILL SINK
● C REDHURST SWALLET
● D WETTON ROAD SINK
● E SNOW HOLE
● F LADYSIDE POT
○ G THOR'S CAVE
○ H BEESTON TOR CAVES
● I WATERHOUSES SINK
○ J BOIL HOLES RESURGENCE
○ K ILAM RISINGS

● ACTIVE SINKS

Some of the sinks in the Manifold Valley have been traced by dye testing to their resurgences (J. Potts - Hydrology of the Manifold Valley). Since the discovery of Ladyside Pot there has been no proof as to where the water in there comes from, however, it seems a near certainty that it is Redhurst Swallet water, along with the water entering the sink near the former Thors Cave Station, now referred to as Snow Hole or Station Sink.

With these facts at our command we can now make a few tentative assumptions. When the river is in partial flood and the water overflows from Wetton Mill Sink to enter Redhurst Swallet and Snow Hole, water may resurge at Ladyside Pot. As the lower end of the main knick point is at present around Ladyside wood, it could be possible that Ladyside Pot is an old sink that is now a resurgence when the phreas is at a high level, and only engulfs water in flash flood with the phreas at a low level.

From the cross section (see adjoining map) it appears that Redhurst Cave is following along and down the anticline. In practice, this seems to be so and Pink Chamber, (the present end of Redhurst) is a breakdown chamber that is on, or approaching the major fault on that side of the valley. In Ladyside Pot the main downstream section is an inclined bedding cave dipping down to the west as with Redhurst. Logically the connection between them ought to be a similar cave following along the bedding or following rifts parallel to the fault with the occasional cross rifts producing inlets, as with Snow Hole. When the river is flowing into Redhurst Swallet, but not past it, water can be heard to flow in Snow Hole and in Ladyside but does not resurge from either and when Redhurst is dry, Snow Hole and Ladyside are also dry. The complex morphology of both Redhurst and Swallet and Ladyside Pot can be explained by the complex fracturing andfflexing that has affected this area, together with the irregular jointing and quaquaversal dips to be found in the reef bioherms. This can be seen in the change of direction, from vertical, of the avens in Ladyside.

It seems that the water in Ladyside has no direct connection upstream with Wetton water, so therefore, as the Redhurst and Wetton waters do join before the rising at Ilam the connection could be downstream in the phreatic zone. As the water in Wetton Mill Sink flows all the year, as opposed to Redhurst and Ladyside, it seem feasible to assume that the Wetton system may offer the chances of larger cave passages. This appears to be born out by recent digging at Wetton Mill Sink by Trent Valley Caving Group who have uncovered 27m of tight joint aligned passage and larger hading rifts ending at the moment in Glory Chamber 2½m wide x 8m long and over 7m high. (Johnson 1980). They have called their find Darfur Pot and when the weather is more settled the chances of a big find are very good and Redhurst is only a tributary system to it.

On the opposite side of the valley to Redhurst, geologically, conditions are similar, the limestones dipping away from the valley and there is also a major fault as on the Redhurst side. Cave development at Wetton Mill then could be similar to Redhurst, as demonstrated in Darfur Pot and in Riverside Swallet, downstream from the Maink Sink, The cave associated with the Main Sink must eventually run parallol to Riverside Swallot away and down from the river bed.

Assuming some similarities to the other side of the Valley, connections to this system could be made at Darfur Swallet, Wetton Road Sink and Beeston Tor. As the continuation of the northerly fault passes through Ilam Risings it could be assumed that this faulting has a major bearing on the caves development. G.T. Warwick (Warwick 1960) shows a minor sink in the valley behind Darfur Ridge and this also could be a possible high level inlet. A possible connection to Nan Tor Cave might be found via Darfur Crag Swallet but it is likely to be completely silted up and downstream from Darfur Swallet would be blocked by what appears to be a major collapse at the main sink although work by the Trent

Valley Caving Group now appears to be making progress.

The drop to the phreas from the surface in Ladyside is over 20m varying with the weather conditions and the drop from the knick point to Redhurst is 5m so it could be possible for this postulated Wetton system to attain a depth of 30-35m below Wetton Mill Sink at some point at a similar distance from Wetton as Ladyside. The possibility of high level inlets into this system cannot be forgotten as Darfur Ridge Cave and Bone Cave are fossil inlets and Old Hannah's Hole could be a side passage of an inlet system in that valley.

Another look at the geological map shows two major faults that run from Waterhouses to Ilam. It seems a reasonable assumption that these could be a controlling factor for the Hamps system as one fault runs very close to its flood rising of Boil Holes or Hamps Spring.

From the evidence it appears that in both valleys the potential for finding several hundreds of metres of cave, negotiable in dry weather, in very high. With these probabilities the job of finding the connections between Ladyside, Snow Hole and Redhurst Swallet, the entrance to the postulated Wetton Mill system and the Waterhouses Sink caves can only be left to enthusiastic cavers and a lot of hard digging.

SIMON AMATT.

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Some Caves and Crags of Peakland (Chesterfield)

Trent Valley Caving Group Review 1980 (Dedicated almost entirely to their work in the Manifold Valley including the finding of Darfur Pot and its likely top entrance Moonmilk Pot and also Rabbits Holes further up valley. Some observations on the hydrology of the Manifold are also made).

THE HYDROLOGY OF THE MANIFOLD VALLEY AREA

Introduction: The Manifold Valley Area.

The map and table which form fig. 1 show the locations of the sites mentioned.

The River Manifold rises on the gritstone of Axe Edge and for the first 13km. of its course runs south over gritstone and shale in a wide shallow valley to Hulme End. At this point its character changes dramatically and it pursues a winding course through a steep-sided valley with shale and limestone on the west and limestone on the east for 4km to Wetton Mill. From here it flows in limestone all the way, still in the narrow valley, for 9km to Ilam, where the valley widens out for the last 2km to the confluence with the Dove below Thorpe.

Immediately below Wetton Mill is the major sink of the river and under normal summer conditions the river is dry from here to Ilam where there is an extensive group of risings. There are other sinks either in the banks of the river or in the river bed itself for at least 4km below Wetton Mill, the lowest one I have ever seen active being the Cheshire Wood Sink. The stretch from Ladyside Wood to Ilam is dry throughout much of the winter and some of the lower sinks may be active on only a few days each year.

During 1910 and 1911 an attempt was made to block the sinks so that the river would flow all the way to Ilam, thus making life easier for the farms in the valley bottom betwwen Wetton and Ilam. (An earlier attempt, evidently unsuccessful, had been made in 1839 - Anon 1839). Initially concrete was poured into the known sinks when the river was dry, but when the river rose again quite suddenly much of this concrete simply burst out with the pressure of air ahead of the rising water. A second attempt was made to overcome the problem, iron pipes some 15cm in diameter were placed upright in the sinks and the concrete poured round them, hoping that the pipes protruding several feet above the river bed would let the air out. This may have had some temporary success but the water soon found its way under the concrete and into the sinks again. Under certain conditions when the river is running fairly high it is possible, even now, to see one of these pipes sticking up above the water in the river with a spout of water coming from the top. A search of the river bed in the area of the present sinks soon reveals the patches of concrete, although in some places, particularly at the foot of the cliff next to Redhurst Swallet, the concrete is so worn that it is difficult to distinguish it from the limestone. In fact the patches of concrete are quite a good guide to the sinks which were known and obvious in 1910 and if investigated may well lead to open cave passages, as happened at Ladyside Pot. (Drakeley 1981).

Some of the holes in the river bed, in particular Ladyside Pot and Weag's Bridge Rising, may act as either sink or rising, depending on the way in which the river starts to flood.

The River Hamps rises on the Morridge Ridge about 7 km south of the source of the Manifold and for the initial 15 km of its course it flows south in a fairly shallow valley across gritstone and shale before it turns east to run onto the limestone at Waterhouses. It normally sinks in its bed here and the remaining 7 km of its course through the narrow, winding limestone valley to its confluence with the River Manifold at Beeston Tor is dry. The Hamps hardly ever runs below Waterhouses: it too has a number of other sinks in its bed between Waterhouses and Beeston Tor but it runs so rarely that I have never seen any of these active and know no record of them. The two sinks which normally take all the water are both in the river bed 100m apart on the eastern outskirts of the village, behind the houses on the main Leek-Ashbourne Road. The upper one is in gravel, but a poke with a branch caused a sizeable hollow to appear when I investigated and there are stories of a "great rift" in the river bed. The lower sink is simply a large shallow pool just below the stone bridge that leads to the quarry, the sides are bedrock but there is gravel in the floor.

The Hamps has a tributary stream which also sinks in its bed just below the Hamlet called 'Back o'th' Brook'. Although the maps show this stream flowing into the Manifold and even mark fords across it below Sparrowlee, in fact, there is not even a sign of a river bed for the last ½km of its course, just a grassed over valley floor. There is no obvious sink here, it just seeps away through boulders about ½km below the ford in the village.

There are two known sinks on the high ground between Wetton and Alstonfield which have been investigated by cavers in the past. Gateham Swallet always takes a small trickle but can take a sizeable stream. It is on a mineral vein of some kind and proved to be too unstable to risk digging properly. Plantation Swallet also takes a considerable flow in wet weather but again proved an unjustifiably suicidal dig when it was tried. These may connect with the Manifold Valley systems or with the Dove Valley resurgences; so far as I know they haven't been tested yet.

Waterways Swallet at Swinscoe is a cave with an associated sink and it is described elsewhere in this journal (Potts 1981).

The main group of risings are in the Ilam area with seven, in or close, to the river in the grounds of the Hall. I have considered Raspberry and Main Risings as one (Phipps 1981) but the detectors were put in the Main flow and owing to the volume of water, fluorescein from Raspberry Rising would not have registered on this. There is no difference in water colour during flood so if they do have different sources they are still probably from the same area of the valley.

Another of the Ilam risings are in the valley below Waterways between the hamlet of Blore and Okeover Hall. The small spring just above Jones' wood acts like a petrifying well and coats leaves and twigs in it with a "sugar-icing" coating of white calcite. There are several springs in this valley below Blore and they feed the small stream which runs into the lakes behind Okeover Hall.

Water Tracing.

In 1970 Dave Gill of Eldon P.C. approached me to ask for help in doing some water tracing experiments in the area. He had approached the then Trent River Authority and obtained permission to use fluorescein to trace the water flow and I had the necessary chemicals and some degree of know how gained in Norway using a method suggested by L.C. Bray (Bray 1968). The technique requires no very expensive chemicals or UV lamps and was, quite literally, carried out on the kitchen table, but does not pretend to be a particularly refined method.

We know of various reports which stated categorically that the water sinking at Wetton Mill rose at the "boil hole" in Ilam (Adam 1851, Anon 1839, Rhodes 1824) and some of these also quoted the Hamps sinks as connecting with the Upper Rising and Hamps Spring at Ilam. These talked vaguely of experiments with cork and chaff and also mentioned the difference of temperatures between the Main and Upper Risings. From the present appearance of Hamps Spring and Upper Rising corks etc. would have been filtered out by the silt and gravel so we were dubious on this one, but in flood conditions the Main Rising issues reddish-brown muddy water while the Upper Rising issues cloudy greyish water so they certainly were different sources. We had also heard of experiements by G.H. Wilson in the late 1920's but could not, at that time, locate a written report on this.

Wetton Mill Sink (A)

We thought we'd start with the easy one so on 20th July, 1970 we put 0.5kg of fluorescein into Wetton Mill Sink (which was taking all the river) and put detectors into Main (1), Upper (2), St. Bertrams (7) and River (5) risings at Ilam. (St. Bertrams well is in the Hall grounds by St. Bertrams Bridge. The other St. Bertrams Well in Ilam is far too high on the side of Bunster to have anything to do with the Wetton or valley sinks).

The weather had been exceptionally dry for 5 weeks and the farmer at Beeston Tor was having to collect water from Wetton Mill in a tanker for his animals. The Hamps Spring was not running at all but water was seeping out of the river bed a few metres downstream from it about SK 1273 5069. It rained overnight on 20th/21st and again on the 22nd with heavy rain overnight on 23rd/24th and again all day on the 24th. The river began to rise at Wetton Mill on the 24th and some time during the night flowed as far as the wiers below Castern Hall before retreating. By mid-afternoon on the 25th the Hamps Spring was running clear water at a rate of about 0.24 cu.m/sec. and the river was rising in its bed at about SK 1280 5170 nearly 1km upstream. There were only light showers on the 26th but at 7.30 p.m. the river, which had been sinking in the swallet in the river bed 50m upstream from Redhurst Swallet suddenly started to rise and within an hour had filled the depression just above Redhurst and began to flow into the cave. There was heavy rain again on the morning of the 27th and at 2.00 p.m. that day the river was seen below Thors Cave starting to run down the dry bed with a roaring noise, travelling very fast with a mass of foam ahead of it the level actually reached to within 1m of the footbridge below Thors Cave.

During this rather spectacular demonstration of what the river could do the detectors were changed and tested after 24 hours, 43 hours and 5 days. Only the detectors taken from Main Rising after 43 hours and 5 days showed a faint positive. The probable reason for the faintness of the trace was the small amount of fluorescein used considering the sudden flood, which by 22nd July was getting through to the risings at Ilam. This did show that the old stories were correct and that the timing appeared to depend on the weather but was generally around 40 hours.

Shortly after doing the test a reference to G.H. Wilsons work came to light (Anon 1927) and this is reprinted to follow this article. Unfortunately Wilson was notorious for not publishing the results of his investigations and archaeological digs and I have been unable to locate any more detailed report than this and the remarks in his two books (Wilson 1926 and 1934).

Hamps Sink, Waterhouses (H)

The next sink to be tried was the Hamps in Waterhouses and we put 2 kg. of fluorescein in the lower sink at 8.00 p.m. on the 4th September, 1970. The sink pool was about 6m long, 3m wide and 1m deep with water running into it at a rate of about 0.06 cu.m/sec. The flow from the Hamps Spring at this time was only about 0.03 cu.m/sec. and there was a barely perceptible flow seeping from the River Rising. Detectors were placed in sites (1), (2), (3), (5), (6) and (7).

Two days later the level of the sink pool in the Hamps had dropped to 0.5m and there was no longer any flow into it, the green colour of the dye still being clearly visible. After 4 days with no rain there was heavy rain on the 9th and 10th September and by 8.00 p.m. on the 10th the water was beginning to rise at all the detector sites - (5) and (7) were still clear, (6) was brownish coloured but clear, (1) was muddy brown and (2) and (3) were cloudy greyish.

There was further heavy rain on the 13th September and by the 15th all the resurgences were in flood. There was a small amount of rain during the next few days and all the levels fell until after 16 days (5) was reduced to a trickle, (2) was back to its original clear flow but (3), the Hamps Spring, remained at around 0.15 cu.m/sec clear but with rising bubbles which had not been there during the main flood.

The detectors were changed and checked after 1 day, 2 days, 3 days, 6 days, 11 days and 16 days. Theoonly positive results obtained were from Upper Rising (2) and Hamps Spring (3) after 6 days and these were strongly positive. Notes are kept of flow rates at (2) and (3) when the detectors were changed, see fig.2.

It seems clear that the Upper Rising is the ordinary resurgence for the Hamps but that there is a maximum flow that it can take. The Hamps Spring acts as the overflow rising, capable of taking a larger flow but dryihg up completely at times.

Redhurst Swallet (B)

We waited until 28th November, 1970 to have a go at Redhurst Swallet and at 1.00 p.m. we put 2 kg. of dye into the water which was flowing into the cave. Some interesting acrobatics were involved here with Dave and myself in goon suits crouched inside the entrance to Redhurst with water pouring past us from the main river outside. We managed to get all the dye into the swallet and none down the main river and afterwards found that although there was such a strong flow past Redhurst that water actually sank completely before it reached Thors Cave.

Detectors were placed in the risings (1) (2) (3) (5) (6) and (7). They were changed at 10.00 a.m. on the 29th (after 21 hours) and those at (1) (2) (3) and (7) were removed at 6.00 p.m. on 29th (after 29 hours). The second detectors at (5) and (6) were lost as the river rose and the flood came right down through Ilam after heavy rain overnight.

In fact we were lucky enough to see the colour start to come through at 9.30 a.m. on the 29th and by 10.00 a.m. it was coming through strongly from the Main Rising (1) and nowhere else. The colour continued to come through for at least 3 hours and only the detectors from 1 showed positive. It was particularly interesting to note that Weir Rising (6) continued to pour out clear but brownish water although only 20m downstream from the green flood coming from the centre of the Main Rising. The Upper Rising too, only 30m upstream, showed only cloudy greyish. The St. Bertrams Well rising (7) through this and other floods never discoloured at all but remained absolutely clear, although it did rise. It is possible that is actually rises very little but that the effect is exaggerated by water backing up into the pool from the river.

Waterways Swallet (J)

We had no idea where the water might go from Waterways but we had to wait until 26th March, 1971 until we could obtain acces to the sink and there was a good flow of water. 1.5kg of fluorescein was put in at 6.00 p.m. at the point where the water was sinking in the pool west of the entrance.

We put detectors in what we felt might be the most likely of the Ilam Risings: Upper Rising (2) and Hamps Spring (3). We then placed three in the main river downstream of these: St. Bertrams Bridge (SK 1328 5055) only just below the risings, Colwall Bridge (SK 1492 4975) 2½km downstream at Thorpe and near Callow (SK 1635 4675) 6½km downstream. We then put detectors in Jones Wood and Cowclose Wood Risings (10) about 2km down the dry valley from the swallet and, to hedge our bets, put one in the stream at Bouldershaw Bridge between Stanton and Mayfield (SK 1380 4625).

MANIFOLD VALLEY AREA, SINKS AND RISINGS

Key to Figure 1, opposite.

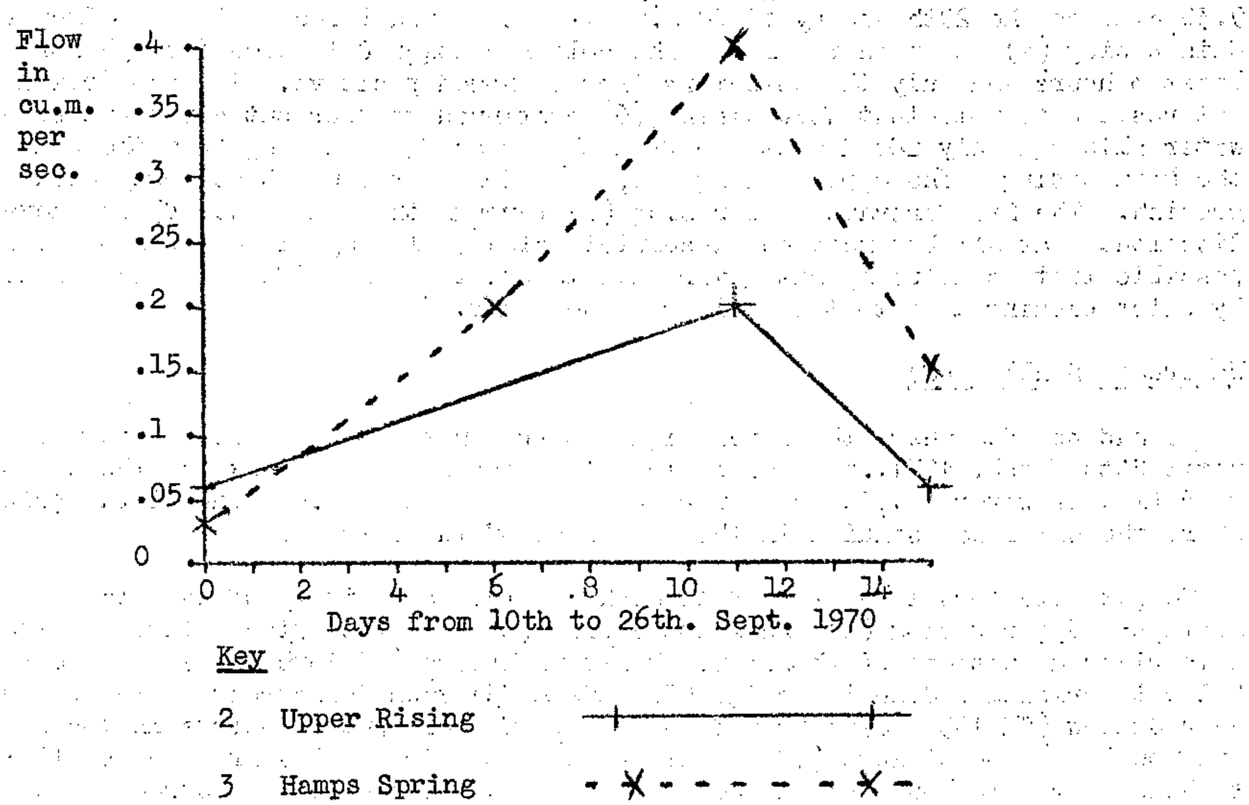
Risings

Ref. No.	Site Name	Grid Ref.	Altitude
1	Main Rising, Ilam	SK13145057	140m
2	Upper Rising, Ilam	SK13115056	140m
3	Hamps Spring, Ilam	SK12685077	140m
4	Hinckley Wood Rising, Ilam	SK12835046	140m
5	Hiver Rising, Ilam	SK12735080	140m
6	Wier Rising, Ilam	SK13165056	140m
7	St. Bertram's Well, Ilam Hall grounds	SK13255060	140m
8	Flow Gauge Rising, Ilam	SK13965074	135m
9	Ilam Village Risings	SK 135 512	155m
10	Okeover Risings: Jones' Wood	SK14404890	183m
	Cowclose Wood	SK 14654850	167m

Sinks

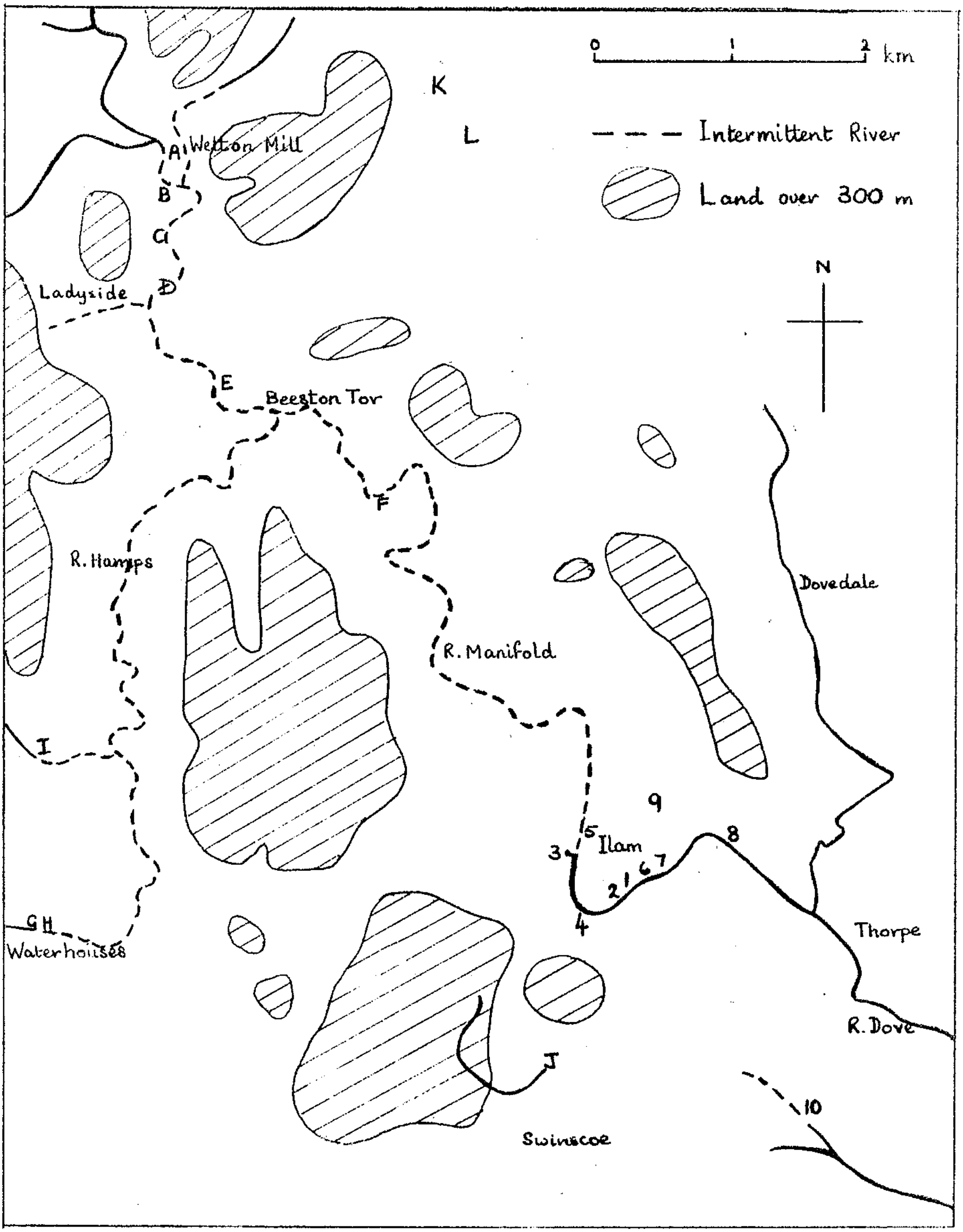
Manifold Area			
A	Wetton Mill Sink	SK09675603	185m
B	Redhurst Swallet	SK09655570	182m
C	Snow Hole (Station Sink)	SK09655537	180m
D	Ladyside Pot	SK09575495	175m
E	Weag's Bridge Cave	SK10005440	170m
F	Cheshire Wood Sink	SK11185336	163m
Hamps Area			
G	Waterhouses Upper Sink	SK08955020	205m
H	Waterhouses Lower Sink	SK09055010	205m
I	Back o' th' Brook Sink	SK08655166	215m
Swinscoe Area			
J	Waterways Swallet	SK12604917	285m
Alstonfield/Wetton Area			
K	Gateham Swallet (The Dumbles)	SK11685632	262m
L	Plantation Swallet	SK11905610	275m

COMPARATIVE FLOW RATES FOR HAMPS SPRING AND UPPER RISING, ILAM   Fig. 2



MANIFOLD VALLEY AREA

Sinks & Risings



Key opposite

Fig. 1

After one day with the water levels falling slightly none of the detectors gave a positive. When we returned to Ilam after 2 days it was to find bright green water stretching up the river from where above the Upper Rising and out of sight round the bend in the river. We inspected all the risings below the Hall and found nothing and then walked up Paradise Walk, across the footbridge and down to the Hamp Spring, to find nother there either. So we set off through the trees to follow the river bank closely downstream from Hamps Spring and eventually found the risings 6m apart and just on the waterline of the river below Hinkley Wood at SK 1283 5046. A strong green colour was coming from both these and also from two points in the river bed near the upstream rising. The flow was so slow that without the bright green to show them up these risings are effectively undetectable and we had never heard or read anything about them before.

We changed the detectors in the river and at (2) and (3) after two days and collected them finally after three days, by which time the greenish colour in the river had shown as far as Coldwall Bridge. The other detectors were also collected after three days. The only positive traces were at St. Bertrams Bridge after two days and at Coldwall Bridge after three days.

The distance from Waterways Swallet to the risings is 1.35 km with a drop of 145m. The area around and above the risings was investigated but it is thickly wooded, on a steep slope and with no bare rock except some gravel at river level so it seems a pretty hopeless dig.

Wetton Mill to Ladyside.

An attempt was made in 1977 to test from Wetton Mill Sink to Ladyside Pot when a flood was coming down but the detector was washed away. Stains on snow and ice in the river bed indicate that Ladyside Pot can act as a rising but since the flood pulse sufficient to cause this then usually overwhelms the entrance as it flows on down the river it is likely to be near impossible to check a direct connection.

Conclusions.

The proved connections are:

Wetton Mill to Ilam Main Rising - time from 1 to 2 days.

Hamps Sink, Waterhouses to both Upper Rising and Hamps Spring, Ilam - time 3 to 6 days

Redhurst Swallet to Ilam Main Rising - time 20½ hours, lasting several hours.

Waterways Swallet, Swinscoe to Hinkley Wood Rising, Ilam - time from 1 to 2 days.

It appears that the main sinks in the river bed in the Wetton area are all likely to go direct to Ilam Main Rising. The time difference between Redhurst and Wetton Mill probably depends more on the amount of water flowing through than the actual distance. The Hamps flows normally to the Upper Rising at Ilam and Hamps Spring is the overflow for this system although it is nearly ½ km away and on the opposite bank of the river. It seems most likely that Back o'th' Brook sink (H) will feed this system also though this has yet to be checked.

The Manifold and Hamps River sinks follow to a certain degree the surface drainage but the Waterways-Hinkley Wood system cuts right across under the surface watershed. Here the flow must find its way round, or under, Hazelton Clump.

Only four of the many risings at Ilam have so far been partly accounted for so there is a good deal of very concentrated work waiting for someone with the time and patience to do it.

My thanks are due to Dave Gill, whose bright idea it all was in the first place and who helped dump dye and rescue detectors. Our thanks are due also to the Trent River Authority and in particular to Mr. Wheatley and Mr. Ades whose assistance was invaluable.

JENNY POTTS.

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WHAT THE PAPERS SAY - A RIVER MYSTERY SOLVED

Course of the Manifold.

(From our Correspondent.)

BAKEWELL, 5th May, 1927.

The mystery of the River Manifold, in the southern extremity of Peakland and just over the Staffordshire border, has at last been solved. The river bed, except during particularly wet seasons, is dry for a distance of from four and a half to five miles, and there has been much speculation as to what actually happens to the stream. The Manifold rises on Axe Edge, about 1,000 ft. above sea level, and it pursues a serpentine course of some 20 miles before it flows into the Dove between Ilam and Thorpe. The river has a strange habit of disappearing at more than one point. The Rev. G.H. Wilson, of Bakewell, the well known Derbyshire archaeologist, has been familiar for many years with this problem and has collected many facts about it. Two years ago he began definite investigations, and last summer and autumn made descents at several points, and in two places sighted the underground stream at depths of 45ft. and 90ft. Since then he has had the help of a geologist and facts as to the stratification of the valley have been studied.

Last September the conclusion was reached that the river does not follow the same course below as above ground, and that it probably passes through a zig-zag course because of the distorted and irregular geological formation. In some places the water probably rushes through narrow fissures and divides into several streams, which rejoin in great caverns or underground lakes. Interest has been added to a recent further stage of the investigations by the presence of an experienced and successful water-diviner and the help of a practical water engineer, who specializes in hydrology and geology.

The water disappears down several sinks or swallets in the river bed, and the sudden emergence of water in the Ilam Hall grounds, between four and five miles farther on, has give some credence to the belief that this is the self-same stream which disappears. The volume of water emerging at Ilam has often been noted to be greater than the amount entering the various swallets, and last September the volume emerging was three times the amount of that entering at Wetton Mill and elsewhere. The hydrologist who assisted Mr. Wilson in his recent investigations estimated the volume at nearly six times greater, which means, of course, that besides the tributaries on the surface joining the Manifold there are other subterranean tributaries. Four of these, at least, have been traced by Mrs. Greig, a Devonshire lady and a water-diviner, who has given much help in tracing the underground streams.

SUCCESSFUL COLOUR TEST.

A novel means has been adopted of proving that the water which goes down the swallets and emerges in Ilam Hall grounds is the same. This is the colour test. It was unsuccessfully tried out last September, the emergence at Ilam being watched for 12 hours without result, but in the more recent investigations more elaborate preparations were made. Messrs. Wm. Sharratt, the colour chemists of Clayton, Manchester, produced a special dye, a strong solution of which was tested on three species of live fish for over a fortnight, with results that satisfied the Conservators of the Trent Fishery Board, that it was quite harmless. Permission was given to Mr. Wilson to use it. Over 16 gallons of concentrated colouring matter was put in - double the quantity used at the previous test. Various stories have been current that chaff, corks etc. have been put down the swallets and seen emerging at Ilam, but none of these cases can be authenticated.

It has now been definitely proved, however, that the stream which emerges at the "boil hole" on the river bed at Ilam is the Manifold, and that the other uprising of water 15 yards away is not the Manifold. Whether it is the Hamps - which is also believed to pursue an underground course - remains to be proved. A considerable volume of water also emerges on the edge of the lawn at St. Bertram's Well. Where this comes from no-one knows, but Mr. Wilson hopes to be able to discover later on.

The colour was put in at 2.30 p.m. and arrangements had been made to watch at Ilam from 5 o'clock the next morning, Mr. McKnight, the Ilam schoolmaster, taking the first six hours. Afterwards the water engineer joined Mr. Wilson and at 4.30 p.m. a tinted water - a vivid green dye was used - first appeared. From that time until 6.50 p.m. the tint was visible. Samples of water in test tubes were taken every 30 minutes from 2.45 p.m. till 7.00 p.m. The period during which the green tint was most marked was from 4.50 p.m. to 6.00 p.m.

Where the water disappears about 200 yards of it had been coloured, taking about 12 minutes. The time it took to emerge - two and a half hours - proved that it had greatly diffused in underground caverns. The speed of the water on the surface was tested for a distance of 100 yards. Before it descended it was flowing at the rate of one mile in 40 minutes. Underground the average time it took to travel a mile was six hours, suggesting a devious course underground and subterranean collections of water retained for long periods.

The diviner generally, Mr. Wilson informs me, used an aluminium rod shaped like the letter Y, and held the two stems firmly in her hands. In tracing the subterranean river the rod began to revolve gently about three feet before reaching the actual stream. When over the water it revolved much more strongly. When the volume of water was great it jerked and seemed difficult to hold, and after crossing the presumed stream the rod revolved more slowly for about three feet and then stopped.

Arrangements are being made for the completion of the investigations, and also for a similar testing of the River Hamps.

THE TIMES.

1927.

LADYSIDE POT

Manifold Valley

Staffordshire

The possibility of a major cave system in this south western corner of the Peak District has for years enticed many cavers to investigate and dig in and around the Manifold valley, concentrating particularly on the main sink of the river Manifold at Wetton Mill. At this point in normal flow conditions, the whole of the river Manifold sinks into boulders under its left bank. Some inspired digging here by Trent Valley Caving Group has revealed 27m of tight joined aligned passages and larger hading rifts, exploration and digging being marred by the unsettled weather (Johnson 1980). They have named their find Darfur Pot.

From here though, all is a mystery as the water is not seen again until it reappears as the main rising at Ilam Hall, just over 6kms. in a straight line to the south east and approximately 45 metres lower in altitude, where it emerges from a tight bedding plane at a depth of 9m and is only penetrable for 45m before closing down. (Cobbett 1969, Farr and Phipps 1975).

Until now the only cave of any significance which has been found in the valley was Redhurst Swallet (Jarvis 1965), when, in flood, takes a considerable amount of the floodwater which overflows from the main sink at Wetton Mill. This situation was altered by the discovery of Ladyside Pot in May and June of 1975 by members of Orpheus and Birmingham Carabiner Club. Although Ladyside is by no means a particularly pleasant cave, it does prove that penetrable cave passage does exist in the limestones underneath the river bed, which many people doubted. It also gives further encouragement and hopes of entering the main underground course of the River Manifold, as possibilities still exist in the cave itself.

A few more digging sites, very similar in appearance to Ladyside, i.e. tight descending joints, were found both upstream and downstream of Ladyside in the dry river bed. It is highly likely that further cave passage could be entered by excavating these joints, such as for example Snow Hole (SK 096554). Recent explorations (September 1981) by Trent Valley Caving Group have proved this to be the case with the discovery of approximately 200m of passage some 6m below the river bed at T-Pot dig. (S. Johnson per. comm.).

The Discovery and Exploration of the Cave.

After being disillusioned with various other digging projects, our attentions were drawn to the Manifold region by Simon Amatt. He obtained permission from the National Trust to dig in the river bed and with a combined effort with the Birmingham Carabiner Club work commenced.

Digging originally began at Wetton Mill Sink, the most obvious place, and a series of rifts were excavated one of which was entered at a depth of 3 metres and followed for 8 metres before it became too unsafe. Flooding the following week caused the whole dig to collapse. A better system of damming was engineered and digging commenced at another site a few yards downstream resulting in the discovery of Riverside Swallet, 45m of muddy phreatic passage ending very abruptly at a depth of 15m with no apparent way on. (Anon 1975).

Meanwhile though the dry river bed downstream from the main sink was investigated and a couple of good digging sites were found. A few more interesting holes were discovered by removing concrete from the river bed, laid down by fishermen in the past in their vain attempts to stop the river going underground.

Whilst work continued on the Main Sink, Snow Hole (SK 096554) a tight descending joint in the river bed, wåth water flowing at the bottom, was being excavated.

A couple of weeks later however, a more promising joint was discovered down stream in the river bed (Ladyside) 150 metres or so below the prominent crag of Thors. Stones appeared to fall quite a distance to land in water, in what sounded like a spacious passage. It had obviously been recently opened up by floodwater, so for the time being, all the digging effort was concentrated on this site. The clubs kango hammer was used and steady progress was made over several weekends, using both bang and wedge and feathers.

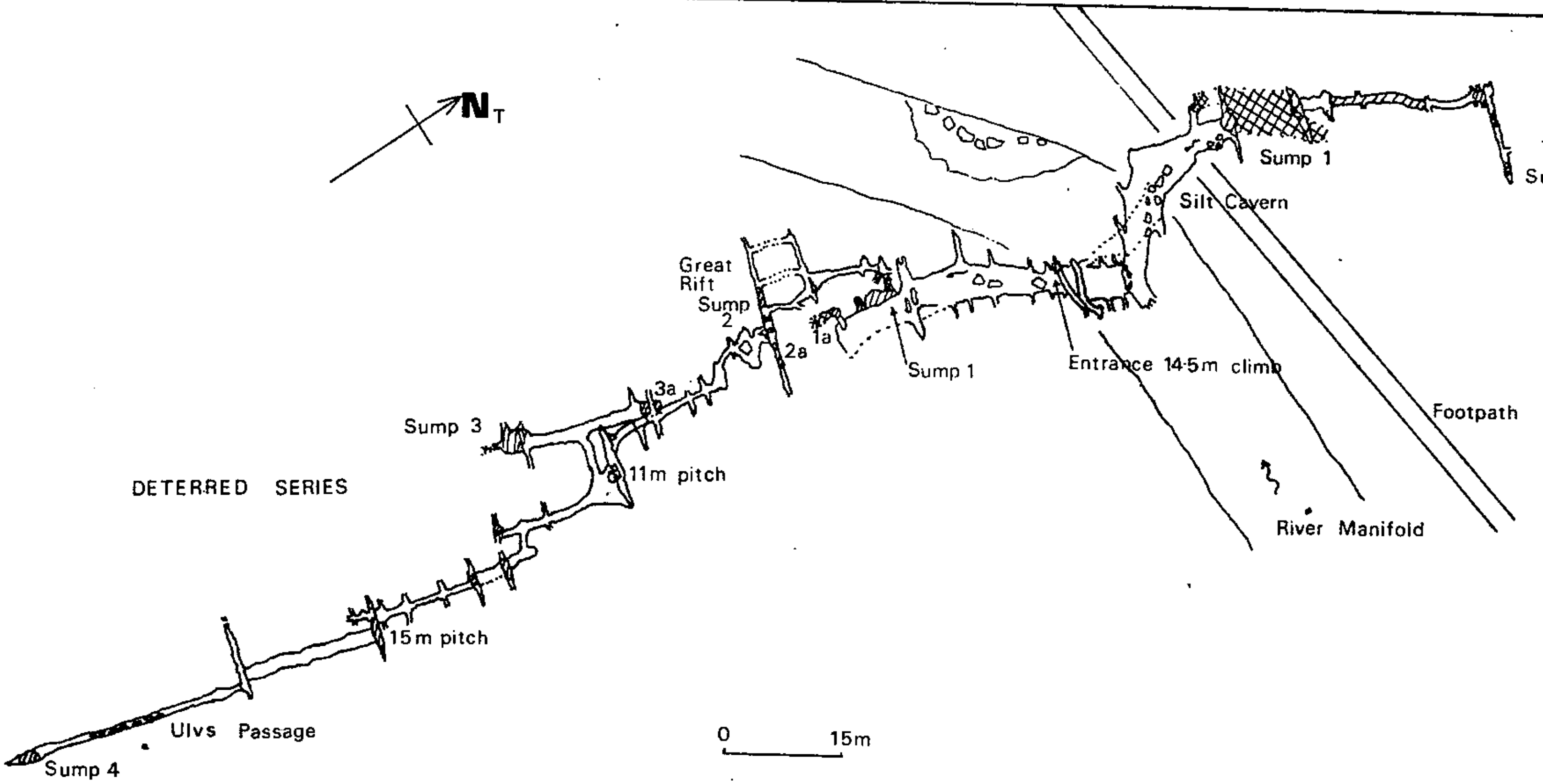
Gradually, the joint was enlarged sufficiently for the top of an extremely tight vertical drop to be reached. Rod Clayton and I were ushered down into this, and after two attempts, a 21cms wide rift was descended for about 2 - 5 metres before it opened out and fell away for a further 4.5 metres. On this occassion, the cave was explored both upstream and downstream to sumps.

Over the next few weekends the tight squeeze was enlarged and the upstream sump dived by John Hall and myself to more passage and a further sump (Drakeley 1975). On the same trip, the downstream sump (sump 1) was passed by Simon Amatt, Mick Phipps, John Hall and myself to over 45 metres of small phreatic passages, not all of which were explored to their conclusions and two further sumps at the bottom of a large rift, christened the Great Rift (Amatt 1975). Exploration terminated in a heavily silted boulder choke (Flake Chamber).

A return could not be made because of the weather until 14th August, 1976 when Simon and Andy Amatt and Pete Allwright, taking advantage of the very dry weather, went to have a look. After a few minutes of muddy digging at the top of Flake Chamber a squeeze led into a phreatic tube inclined upwards with a number of cross rifts in the floor. The widest was descended for a total of 16m to a nice streampassage to sumps 3 and 3a. Near the bottom of the pitch a passage was followed for 30m over cross joints through a squeeze. A return was made here after verifying that a couple of rifts in the floor connected with the lower streampassage. (Amatt 1976). The extension was called Deterred Series for several obvious reasons.

The seriousness of trips into the further reaches was now becoming apparent and in an effort to make entry and exit slightly easier the entrance squeeze was enlarged slightly, not before one of our members though had got himself stuck for two hours in it. On 22nd August, 1976 the 2nd pitch was reached but not descended by Pete Allwright, J. Calcott, and R. Clayton as they had no tackle.

The next pushing trip on the 28th August 1977 was by Roger Adcock, Simon & Andy Amatt and Pete Allwright. The rifts in the floor of the passage that leads off part way down the first pitch were descended and found to be either too tight or blocked by mud and rock after 5m. However, the last one dropped away for 4m at 70° to a small anti-chamber where a 0.5m high crawl led off straight on. Down in the floor though another inclined tube led down a further 3m to a 15m pitch. This was laddered and found to be tight at the bottom and containing thigh deep water. Following the line of the cross rift a climb led into a dry very cherty rift and to another cross joint where coldness and failing lights forced a retreat. (Allwright 1977).



LADYSIDE POT

MANIFOLD VALLEY STAFFORDSHIRE

SK 097549

Orpheus C C Survey. Surveyed by M. Phipps K. Drakeley
A Amatt P. Allwright

Survey Grades. Main Cave 5c
Upstream Sump 2a
Deterred Series 3-4b

Redrawn KWD 22 6 79

The next trip, again dictated by the weather was on 18th September 1977 after the International Conference at Sheffield and proved to be an epic. After $3\frac{1}{2}$ hours Pete Allwright, Rod Clayton and Ulv Holbyt (a Norwegian friend) found themselves at the bottom of the second pitch. A passage 10m high and upto $1\frac{1}{2}$m wide with a silt floor led up and over boulders for 30m to drop disappointingly into a deep sump the present limit of exploration downstream although a possible high level bypass was noted but would need artificial aids to reach it. A small inlet passage was noted but not investigated. This trip was eventful as a complete light failure ensued, exit eventually being made on one emergency light - the tackle being retrieved the following weekend. A nine hour trip, itself a nightmare turned into a horror story when it was realised the car keys were in the ammo can, left at the bottom of the second pitch. An 11 mile, midnight walk back to the cottages followed. (Allwright 1977).

This is the present limit of exploration in the cave. Ladyside now being 460m long and 21m deep, with nine sumps and two pitches.

Explorations since have been marred by various setbacks, but our biggest enemy has been the weather as in flood the entire cave fills with water, backing up to eventually resurge out of the entrance - a frightening thought. Future exploration might well have to wait until very dry summers, as to descend the cave in any unsettled weather would be extremely foolhardy and dangerous.

Description of the Cave.

Entry into the cave is gained down a joint in the middle of the normally dry bed of the river Manifold, approximately 150 metres downstream from the prominent crag of Thors. A vertical drop of 2 metres leads immediately onto a further one of 1.8 metres down the joint. From here the joint narrows and descends steeply down onto the top of a very tight awkward 2.5 metre vertical squeeze. This has since been enlarged somewhat but is still very awkward, tapering down to 21cms. wide part way down. Below this a short inlet passage enters and the joint, now much wider, falls away for 4.5 metres to drop into a low, wide inclined bedding plane.

To the left, (downstream), hands and knees crawling passes under 3 or 4 more joints, all of which must go up to the river bed. A faint voice connection was made with the surface up one of these joints at Concrete Pot, a now filled in dig in the river bed just downstream of the entrance.

Shortly past the Concrete Pot joint, either one of three short crawls can be followed, all of which, within 3 metres, enter another much larger joint aven. The inclined bedding plane continues beyond, but within 2 metres, the downstream sump is reached (sump 1). The second downstream sump (sump 1a) is reached by slithering up over silt to the left. This sump is about 3.6 metres deep and heavily silted up. Both sumps must almost certainly connect.

During the dry spell an airspace appeared in sump 1 and this led via a tight duck into a spacious airbell. The sump could be felt to continue.

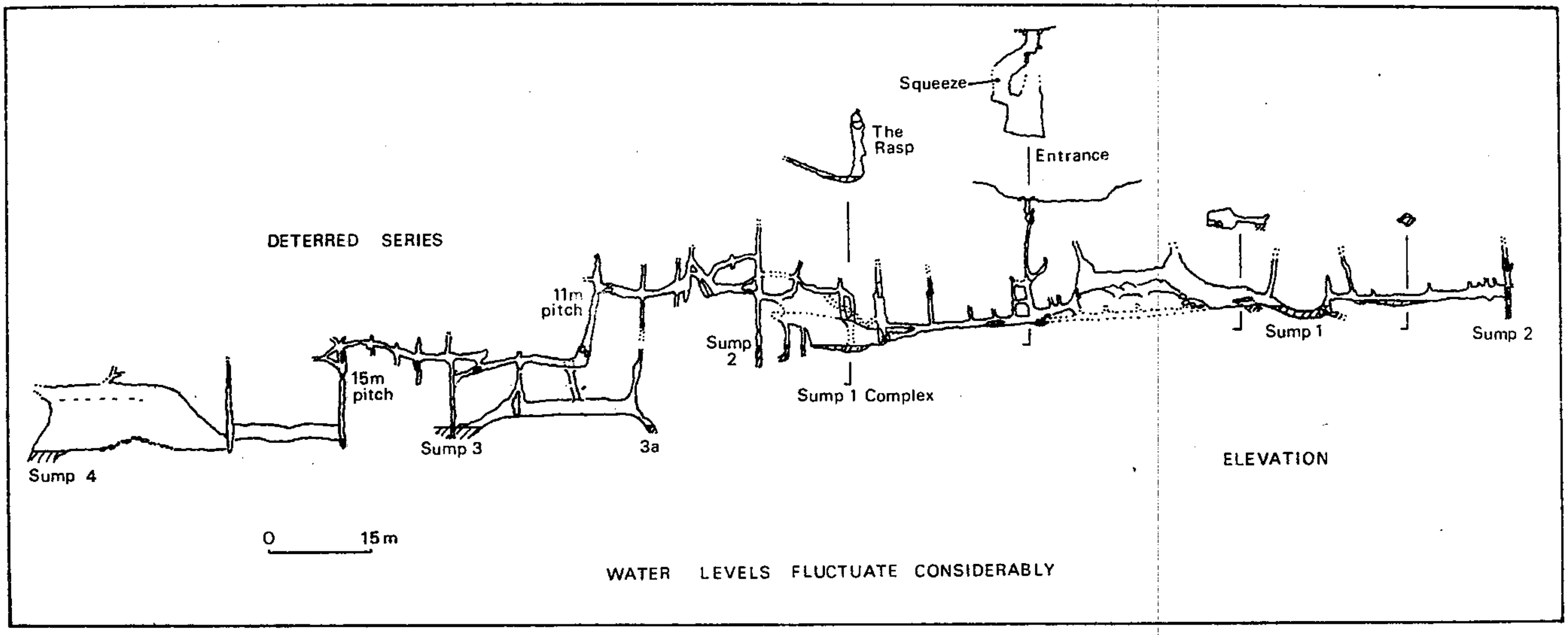
By climbing 3m up out of the water a short crawl is entered which leads steeply up into the bottom of a narrow 4.5 metre high joint, containing many sharp projections (The Rasp).

At the top another hands and knees crawl leads to three possible ways on. Two small tubes or a 1.5 metre deep rift in the floor. The rift leads down into a crawl which unexpectedly enters a large cross joint, over 15 metres in length and about 1.5 metres wide on average and about 8 metres deep. At the bottom are two sumps. By traversing to the left along the joint a further crawl can be entered which, within about 4 metres, reaches a small boulder choke. A squeeze underneath the boulders enters a wide, low, steeply inclined chamber, Flake Chamber, which contains large deposits of silt. A climb and a slither up in the roof enters the large cross joint again. There were two or three possible ways on in Flake Chamber which needed a little digging to enter but it wasn't a very inspiring place and so this was the limit of exploration downstream in 1976.

Digging over the mud in August 1976 uncovered a squeeze down into an upward inclined phreatic tube about 1½m high with deep cross joints in the floor. 18m along this after passing an easy squeeze an 11m pitch is encountered. This needs a 2m strop and 13m of ladder and rope, allowing for the muddy slope at the top. Near the bottom an obvious passage leads off behind you, but dropping down a silt slope to the bottom of the cross joint leads into a short 20m long length of nice inclined streampassage ending both ways in sumps, sump 3a being tight, whilst sump 3 is diveable. Climbing back partway up the ladder the passage behind you, just mentioned, leads on for 35m or so being generally just over a metre high intersecting cross joints and passing through a tight squeeze to the second pitch. Along this passage are several cross-rifts and small tubes worthy of more detailed investigation, including the 0.5m metre high tube leading straight on from the top of the second pitch. The second pitch begins as two steep inclined tubes which drop away for 7m to the top of a large rift 0.75m wide and 15m deep and tight at the bottom. A 3m strop and 22m of ladder is needed and the landing is in thigh high water. Following the cross rift a short climb leads up into a dry, very cherty rift which shreds your wetsuit. After another cross rift the rift passage enlarges to 10m high and upto 1½m, until after 30m a scramble over boulders leads to a deep sump. As previously noted a dry bypass may exist in the roof but needs climbing gear to reach it. The difficulties in getting to this isolated spot, together with the intimidating prospect that it all floods, may deter even the keenest of cavers. A trip to this point and out again, providing you can get that far, and are reasonably competent, may take anything from four to six hours so be prepared if you intend to visit - and watch the weather.

Upstream from the entrance (to the right) a hands and knees crawl leads up to two ways on, a hole down to the left, or a climb of 2m up through choked boulders. The hole down to the left leads into a low wet bedding plane crawl, which eventually emerges from under boulders shortly before the upstream sump. The hole up through choked boulders enters a large inclined joint, and a wide walking size passage leads off. This upper passage contains large deposits of silt so progress is somewhat slippery. In a couple of places there are holes in the floor connecting with the lower bedding plane crawl. The passage soon lowers to disappear into the upstream sump. This sump, as with the downstream sump, fluctuates depending on the weather conditions. A gradual overflow from this sump occurs flowing down the lower bedding plane crawl to the downstream sump before complete flooding of the cave occurs.

The upstream sump is about 6m long and 1.8m deep, emerging up through boulders into a cross joint with deep water out of ones depth. Free-diving is not advised. The sump appears to continue in the right-hand corner. By climbing 1.5m up out of the sump pool a wet hands and knees crawl leads through a duck into a waist deep canal in which Bullyhead Trout could be seen swimming. The canal is very short and a dry, stooping size phreatic passage continues to soon drop into a large cross joint. This is about 8m high with many loose flakes in the roof and about 12m long dropping at the end into a sump which has not yet been explored. This is the present limit upstream.


DETERRED SERIES
Squeeze
The Rasp
Entrance
11m pitch
15m pitch
Sump 2
Sump 1 Complex
Sump 1
Sump 2
Sump 3
3a
Sump 4
ELEVATION
0 15m
WATER LEVELS FLUCTUATE CONSIDERABLY

A Few Thoughts on Ladyside Pot.

The following account presents a few ideas about Ladyside Pot based on limited observations underground and on the surface. The underground observations are very limited as Ladyside is not the place you want to hang about in.

Geologically the cave is situated in well jointed and bedded limestones of the Cementstone Series (Prentice 1951). These beds are probably of Chadian age (approximately equivalent to the C_1 age of the coral/brachiopod zonation scheme), as Ludford records the rare occurrence of the fossil Levitusia humerosa in these beds (Ludford 1951 p215 in George et al 1976). These limestones are some of the oldest exposed beds of the Lower Carboniferous (Dinantian) in this area. They are exposed as an inlier in the floor of the valley from Beeston Tor northwards to just beyond Wetton Mill in association with the Ecton Anticline a broad complex upfold trending approximately N to S. The results of this N-S fold structure are clearly exposed at Ecton Hill, an anticlinorium formed by the E-W compression which has produced the N-S & NW - SE folding seen in this area (Critchley 1979). East-West compression has not only influenced the direction of fold structures but also the pattern of jointing. An inspection of the Ladyside survey clearly shows the dominance of NW - SE jointing and these may be shear joints formed to relieve stresses oblique to the trend of maximum compression. They may also owe some of their origin, orientation and hade due to their proximity to the large outwardly dipping reef masses such as Thors Crag. Other joints trending NE - SW may also be of a similar origin.

Overlying the cementstone beds are lower reef limestones of Upper Chadian (C_1) and Arundian (C_2S_1) age (George et al 1976). These are by contrast more haphazardly jointed and bedded and form spectacular crags such as Thors Crag, on either side of the river at this point.

The river Manifold, flowing from the NW to SE, cuts down through the stratigraphically higher beds, to expose the Cementstones as an inlier, roughly speaking, along the axis of the Ecton Anticline from Wetton Mill to Beeston Tor, where the folding then plunges to the south and south east.

From this simplified geological sketch of the area it is interesting to speculate that Ladyside may lie on, or is associated in some way, with a broad culmination (or doming) around the axis of the fold structure. In such an area fracturing could be expected to be quite considerable and could help explain the large amount of predominantly NW - SE joints, some of which hade quite noticeably, found underground. This hypothesis would help explain some of the anomalies in the hydrological behaviour of the cave discussed below.

Hydrologically, though not yet proven, Ladyside would appear to be part of the downstream continuation of Redhurst and is situated in the same limestones that the Redhurst and main sink water must flow through in order to get to the risings at Ilam. If the simple hypothesis of a generally slight northward plunge of the underlying limestones north of Thors towards Wetton Mill is true, then a large phreas may exist downstream of Redhurst. The large phreas and quick backing up and flooding of Redhurst may indicate this, together with the extremely cold stagnant water found by diving upstream in Layside. This does not preclude some higher level, mostly dry passage such as for example that found in Redhurst and beyond sump 1 in upstream Ladyside and as the recent discoveries at T-Pot indicate.

Water sinking at Redhurst would have to flow along the strike and up any culmination in the fold to get to Ladyside, only overflowing up into Ladyside from its lower course in full flood. This would be one explanation for the fact that Ladyside takes some time to become active when Redhurst is taking water. It can even act as a sink for the main river, indicating it is not flooded even though the river is flowing past it. Ladyside then appears to act as an overflow to the Redhurst, Wetton Mill Sink system only becoming active due to backing up in this lower system. Conversely though the delay in flooding between Redhurst and Ladyside could be due to the existence of a large amount of vadose streampassage between the two thus giving the delay in flooding. This is considered to be not all that likely.

Downstream, accessible open passage and sinks can be expected as for example at Weags Bridge Sink which acts as both a sink and a resurgence depending on the hydrological conditions. The active part of the system may be expected to lie at depth flowing generally southwards down the southerly plunge of the Ecton - Manifold valley anticline. Downstream appears to offer the better chances of finding accessible higher level inactive passages.

The above picture is a simple, higly speculative one which in reality will obviously be very complex. Further folding faulting and other geological structures and disturbances may allow access to other higher accessible levels like Ladyside, and even may be the active streamway. It is hoped the above will be of some use to those who are interested and will stimulate some thought and discussion on this complex and interesting area. Any more thoughts on the area would certainly be welcome.

The Survey.

The main passage between downstream sump 1 and upstream sump 1 was surveyed to BCRA grade 5, but unfortunately the sections beyond the downstream and upstream sumps could not be entered and surveyed as accurately and exploration will continue when the weather improves and enthusiasm can be raised. The grades claimed for the various passages are marked on the survey.

KEV DRAKELEY.

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'SNOW HOLE - MANIFOLD VALLEY.'

(Map Reference Sheet 111 SK096554)

On the bend in the river below Ossons Crag, just before the Thors bend, the river bed is built up in a step with a second step for the light railway. At the beginning of these steps the river sinks into the right hand bend in a series of fissu es, These sinks are sometimes known as Station Sink and were noted by G.T. Warwick. (1953).

In March 1975, O.C.C. members and Carabiner Club members started digging in several places along this bend filling them in as each became too small or were blocked by large boulders. The last hole, in the middle of the steps, was following the sound of running water down a narrow rift. This was dug to a depth of 2½ metres and along for a distance of the same, but further progress was stopped by the rift becoming too tight and flooding started to affect the valley.

Several things were noted before the dig was left for Ladyside Pot. When water entered Redhurst Swallet water could be heard flowing in the rift of Snow Hole and when the water receded back up stream from Redhurst to Wetton Mill Sink the sound of the water was lost from Snow Hole. Also, when the river was in full flood Snow Hole itself took large amounts of water producing a large whirlpool above the hole.

Certainly worthy of a dig in the future.

S.N. AMATT.

Reference: Warwick, G.T. 1953 Premier Congres Int. de Speleologie (Paris) Volume 2, Section 1, Pages 59 - 68.

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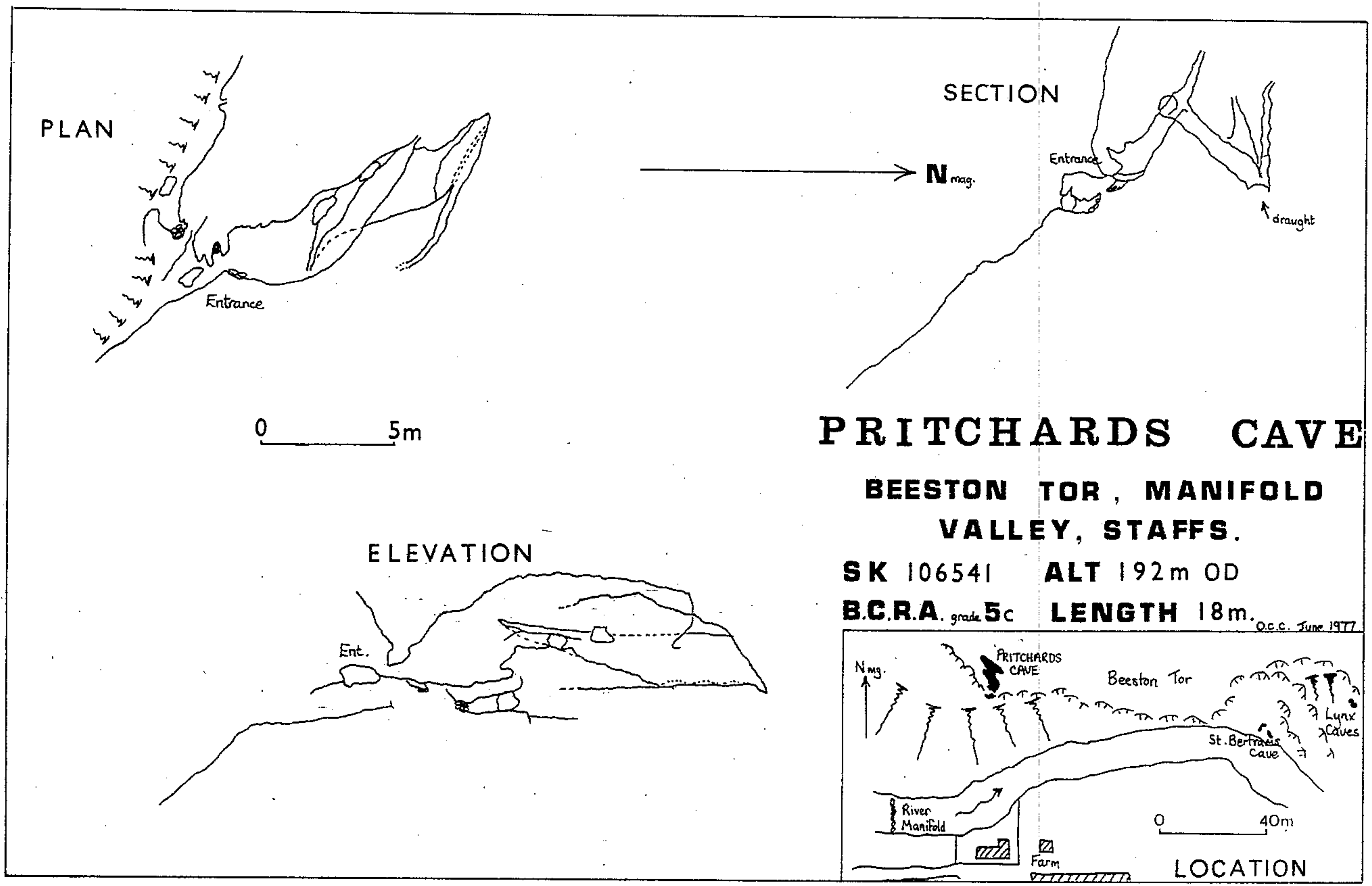
PRITCHARDS CAVE, BEESTON TOR, STAFFORDSHIRE.

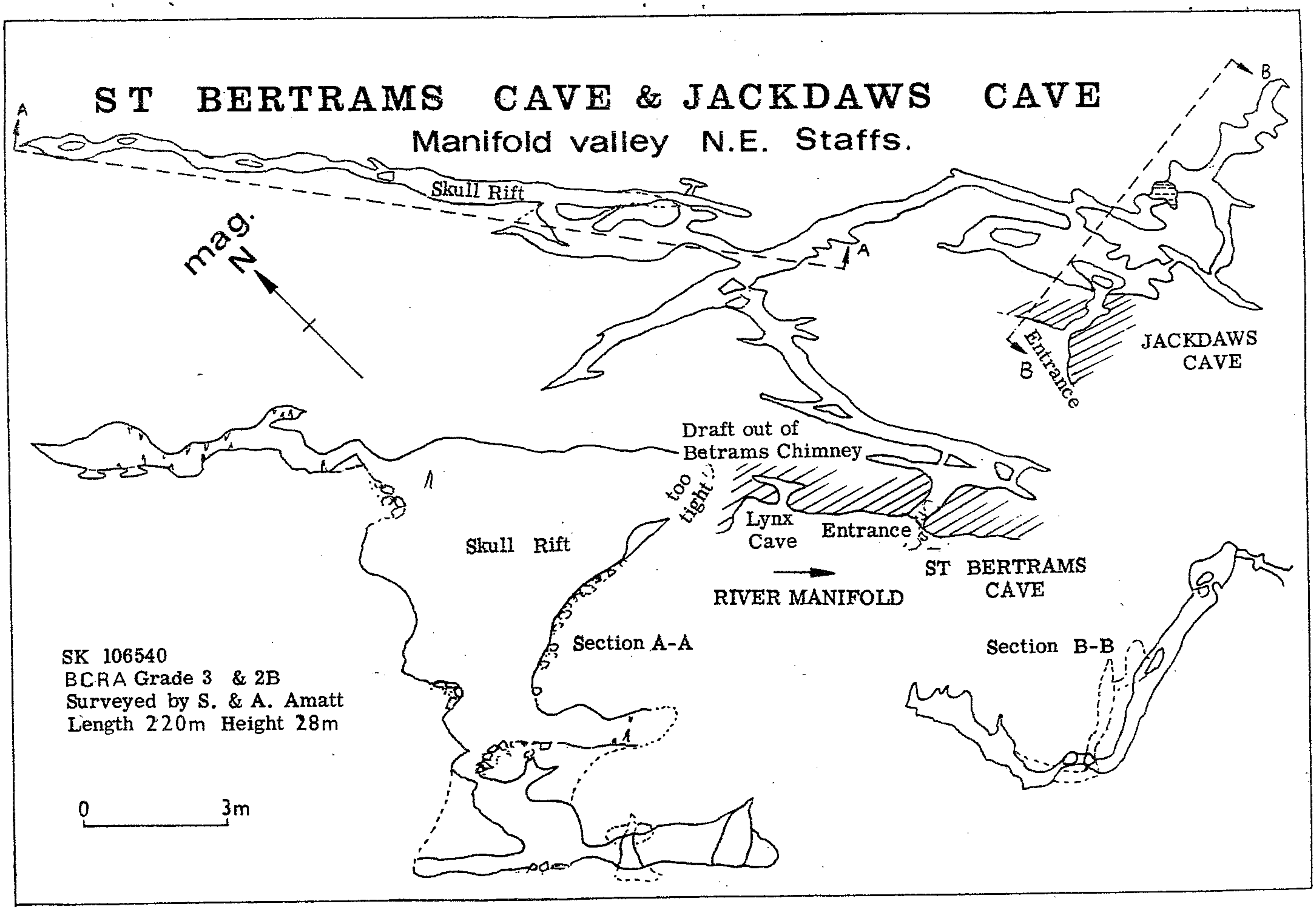
Following Pete Smiths instructions, John Hall and myself started digging at a hole in the river bed opposite Pritchards Farm at Beeston Tor. We dug this for about an hour but made little progress so we decided to do a divining traverse about this 'ole. This proved successful as we traced a passage for about 65 metres up the hillside. We decided to divine as far as the foot of the vertical cliff and to our surprise found a small phreatic tube choked after two metres. To the right and to above this was a hole which looked even more interesting.

This cave has a low and quite inconspicuous entrance which immediately leads into an inclined rift. Thrutching along this about halfway up, a further rift opens in the north wall. Sliding down this gives access to a muddy floor and a further parallel rift. In this mud were various finger prints but strangely no footprints. Decaying calcite on the walls certainly hadn't been disturbed for ages. Neolithic fingerprints?

The Caves of Derbyshire suggested that this could be Lynx Cave but on a subsequent trip Lynx Cave was found so "Pritchards Cave" is a new discovery (for what its worth). The bottom draughts encouragingly but we couldn't trace its source. The cave is 18 metres long.

MICK PHIPPS.


PLAN
Entrance
0 5m
SECTION
N mag.
Entrance
draught
ELEVATION
Ent.
PRITCHARDS CAVE
BEESTON TOR, MANIFOLD VALLEY, STAFFS.
SK 106541 ALT 192m OD
B.C.R.A. grade 5c LENGTH 18m.
O.C.C. June 1977
N mg.
PRITCHARDS CAVE
Beeston Tor
Lynx Caves
St. Bertram's Cave
River Manifold
Farm
0 40m
LOCATION


ST BERTRAMS CAVE & JACKDAWS CAVE
Manifold valley N.E. Staffs.
A
B
Skull Rift
mag. N
Entrance
JACKDAWS CAVE
Draft out of Betrams Chimney
too tight
Lynx Cave
Entrance
Skull Rift
RIVER MANIFOLD
ST BERTRAMS CAVE
Section A-A
Section B-B
SK 106540
BCRA Grade 3 & 2B
Surveyed by S. & A. Amatt
Length 220m Height 28m
0
3m

BEESTON TOR CAVES - EXTENSIONS

In 1974 the writer and his brother, Andrew, visited St. Bertrams cave in the Manifold Valley, Staffordshire with a party of scouts as a beginners trip. During the trip they noticed a draught in a side passage that normally does not draught and had no known extensions. When, in 1975, they returned they tried digging in the floor and at floor level but this only produced two small crawls that became too tight for further progress and had no draught. In order to find the draught they tried prising at the loose boulders perched at the top of the rift and after a couple of weekends this became suicidal but was now the obvious way on.

Two charges of explosive were placed and detonated from outside, minutes later climbers on the rock face shouted that smoke was issuing from the crack at the bottom of St. Bertrams Chimney. When the hubbub had died down the writer re-entered the cave and cleared the debris aside, squeezed through a small hole and found himself looking up at a high rift. At his feet were the remains of some long forgotten animals, these he later collected and took to the Natural History Museum in Birmingham to be identified and dated. Now joined by Andy they climbed the rift to its apex and onto a ledge scattered with a few small stals, here a large boulder had detached itself from the roof behind which a solitary black stal column stood centrally to the entrance of a small passage. Crawling on they came to a tight thrutch down a slot followed by a rib crushing squeeze into a small, well decorated chamber. The floor has two dry crystal pools once fed by the, now dry, stals on the roof and walls but the continuation of the passage was blocked by a calcite flow.

Later the writer returned with members of the Orpheus Caving Club and Carabiner Club to photo and survey the find along with the rest of the cave and in the high level passage small traces of bat guarno were noted. When the bones and skull had been identified as those of a fox or dog around 200 years old they were sent to Derby Museum, and these gave their name to the find as SKULL RIFT.

S. N. AMATT.

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WATERWAYS SWALLET, SWINSCOE.

Location and Access.

The entrance is situated at NGR SK 1260 4917 at an altitude of 282m OD at the head of a dry valley which runs down below Blore to join the Dove valley near Mapleton. No water sinks in the cave entrance but a small stream does sink about 60m to the south, further up the dry valley.

Just to the north of the entrance is a shakehole 40m across and about 10m deeo. There are some outcrops of limestone on the northern and north eastern rim of the shakehole but no evidence of any cave development or water sinking in the shakehole itself.

The cave entrance and the shakehole are on land belonging to Waterings Farm, part of the Okeover Estate. The tenant farmer wishes to have nothing to do with the cave and Okeover Estates have asked Derbyshire Caving Association to deal with access. There is no charge for access but visitors must sign an 'indemnity chit' beforehand, park in the approved spot just up the road and approach the cave via the public footpath. For further information on access send s.a.e. to the Hon. Secretary of D.C.A. c/o 26 Musters Road, West Bridgford, Nottingham. NG22 7PL.

History.

The cave was first entered in 1958 by the Stoke-on-Trent Pothold Club. I have been told by someone involved in this discovery that the entrance to Rift Passage was hidden by boulders and these had to be cleared before it was possible to enter the passage. The entrance was stabilized and various digs started in the Gallery but no accurate survey was published. The plan survey done in 1962 by Brian Foden (Foden 1962) was correct in relative passage orientation but was in fact 180° out in direction and no depths appear to have been recorded. The report by Mayer (Mayer 1962) is ambiguous as regards both length and depth.

During the late 1960's and early 1970's access was denied but after negotiations by DCA the cave was re-opened in 1973. A survey was started in 1974 and various clubs began digs, none of which so far have "gone". The only real extension took place in 1980 when B. Cowie and R. Harrison of Orpheus C.C. entered the tight and unstable Top Passage which had defeated earlier attempts to push it. This added about 30% to the length of the cave.

The total surveyed length of passage is now about 150m (500 ft.) and the depth 43m. (140 ft.)

Description of the Cave.

Entrance Passage.

The entrance descends through boulders (now stabilized by concrete) and the passage, after first heading southeast, doubles back under itself to head northwest. It drops quite steeply through an awkward and rather constricted boulder choke to reach a small chamber in bedrock after about 20m. Here it is possible to stand up for the first time after climbing down a 1.5m drop and in the chamber are the first signs of a bed of dark, rather sandy limestone packed with fossil crinoids.

Immediately after the small chamber the passage becomes a bedding plane, dipping to the northwest and the floor has the appearance of being recently water-worn although no water is present now. A short branch passage of only a few metres heads down dip but the only way on is southwest across the strike in a flat-out crawl. After a few metres a small, heavily mineralized aven is encountered and it is just possible, after some contortions, to stand upright here. There are some drips coming from the aven but no real flow of water and the survey later showed (see figs. 1 & 2) that it is about 4m directly below the point where Top Passage crosses Entrance Passage.

The crawl appears to come to an end about 5m after the aven but closer inspection reveals a 5m step up, followed almost immediately by a series of short climbs which descend altogether about 8m to the floor of the Main Chamber 10m further on.

Main Chamber.

The roof of the chamber is a single bed dipping to the northwest with a span of over 7m and the floor is composed of a series of boulder piles and stepped beds giving a maximum height of about 5m at the north west corner of the rather squarish chamber.

Immediately to the south of the Entrance Passage is a small inlet passage which was pushed by P. Mellors and P. Dransfield in an easterly direction for approximatel 15m before it became dangerously unstable and tight.

In the south west corner of the chamber it is possible to squeeze over the fallen blocks to enter a second small chamber with what appears to be an old inlet at the eastern end. A tight squeeze which has been dug out at the western end comes out just below the top of the 9m pitch.

The top of the pitch is below the western wall of the Main Chamber and it is bridged by boulders, giving it a thoroughly unstable appearance which makes one glad that it is unnesessary to descend it since the lower passage can be reached by an easier, if longer, route. There appears to be some kind of mineralized vein at the top of the pitch running approximately north-south and this may well be the same one that appears in the Rift Passage and the Northern Dig.

The floor of the Main Chamber descends to the north western corner in a series of amphitheatre-like steps and the lowest of these, directly below the Entrance Passage, shows again the 1m bed of dark, sandy limestone packed with crinoid fossils. (Mayer 1962, Mellors 1973).

Rift Passage, Swirl Passage and the Gallery.

Rift Passage leaves the Main Chamber at floor level heading north and immediately descends 8m in a series of climbs until one is standing in a passage nearly 2m wide and 5m high. Immediately to the east of the last climb down is the, now dry, "Waterfall": a pitch of about 5.5m with what appears to be an inlet at the top.

Immediately ahead from the foot of the rift is a small aven up which it is possible to climb to reach Swirl Passage. This narrow winding passage links with the top of the Waterfall and with Main Chamber, giving a total length of some 15m between the climb and the narrow slot immediately east of the point where Rift Passage leaves Main Chamber.

After the Swirl Passage aven the passage bends sharply west and the roof rises to form another aven nearly 6m high. On the outside of the bend a low muddy passage continues for a few metres along the line of the mineral vein which appears earlier in Rift Passage. This is the Northern Dig, which has the merit of taking a small trickle of water.

After the 6m aven the passage slopes down and then swings southeast and climbs back up the dip. At the lowest point of this passage, the Gallery, a trench in the floor continues as a small passage, heading west, to a final drop some 5m further on. A short choked passage, heading west across the top and at the foot of the 2.5m drop two more choked passages lead off. This is the lowest and most westerly point in the cave and is 40m below the level of the floor of the big shakehole and below the southeastern side of it. (See figs. 4a & 4b)

The Gallery is about 20m in length and in its main part is 4m wide and 3m high. The roof is a single bed with small mineralized pockets, in one of which, in 1974, we came across a bat hibernating. The floor has a similar slope and about halfway along the Gallery a second trench in the floor leads into another choked passage heading west.

At the southern end of the Gallery an alcove appears on the western side and a dig in the muddy floor of this again heads west but chokes within a few metres.

The Gallery ends at the foot of the 9m pitch from Main Chamber and the various small avens and inlets in the roof at the southern end are all either closed off or lead back into Main Chamber.

Top Passage.

This begins as a 3m wide, 2m high passage leading off from a ledge above the northwestern corner of Main Chamber and running above Rift Passage. A small tube in the floor behind a boulder 5m along leads back into the roof of Rift Passage and almost opposite to this is a small choked inlet passage. After about 10m Top Passage closes down in a jumble of large blocks and after climbing through these a small chamber is reached which is actually 5m above the Swirl Passage climb and Northern Dig. Top Passage here doubles back and heads up dip through a series of tight crawls and unstable boulder chokes. The passage is heavily mineralized and carries a tiny trickle of a stream which appears to enter at the foot of the 9m aven and disappears under the wall of the chamber above Northern Dig. This tight section proved impassible to the Potts' in 1974 and was first entered in December 1980 by Brian Cowie and Rob Harrison who pushed it and surveyed about 30m of very unpleasant passage which crossed over the Entrance Passage and ended at the 3m high Omega Aven, only a few metres below the entrance and just to the north. A voice connection was later made between Top and Entrance Passages in this area but no attempt was made to dig through. The cave is almost completely devoid of formation but the few that exist are in the avens in Top Passage.

Waterways Swallet

Swinscoe, Staffs. SK 1260 4917
Grade 5C. J E & F B Potts, 1974-75
Top Passage, Grade 4B,
B Cowie & R Harrison, 1980
Drawn by J E Potts

Length 150m; Depth 43m

Plan

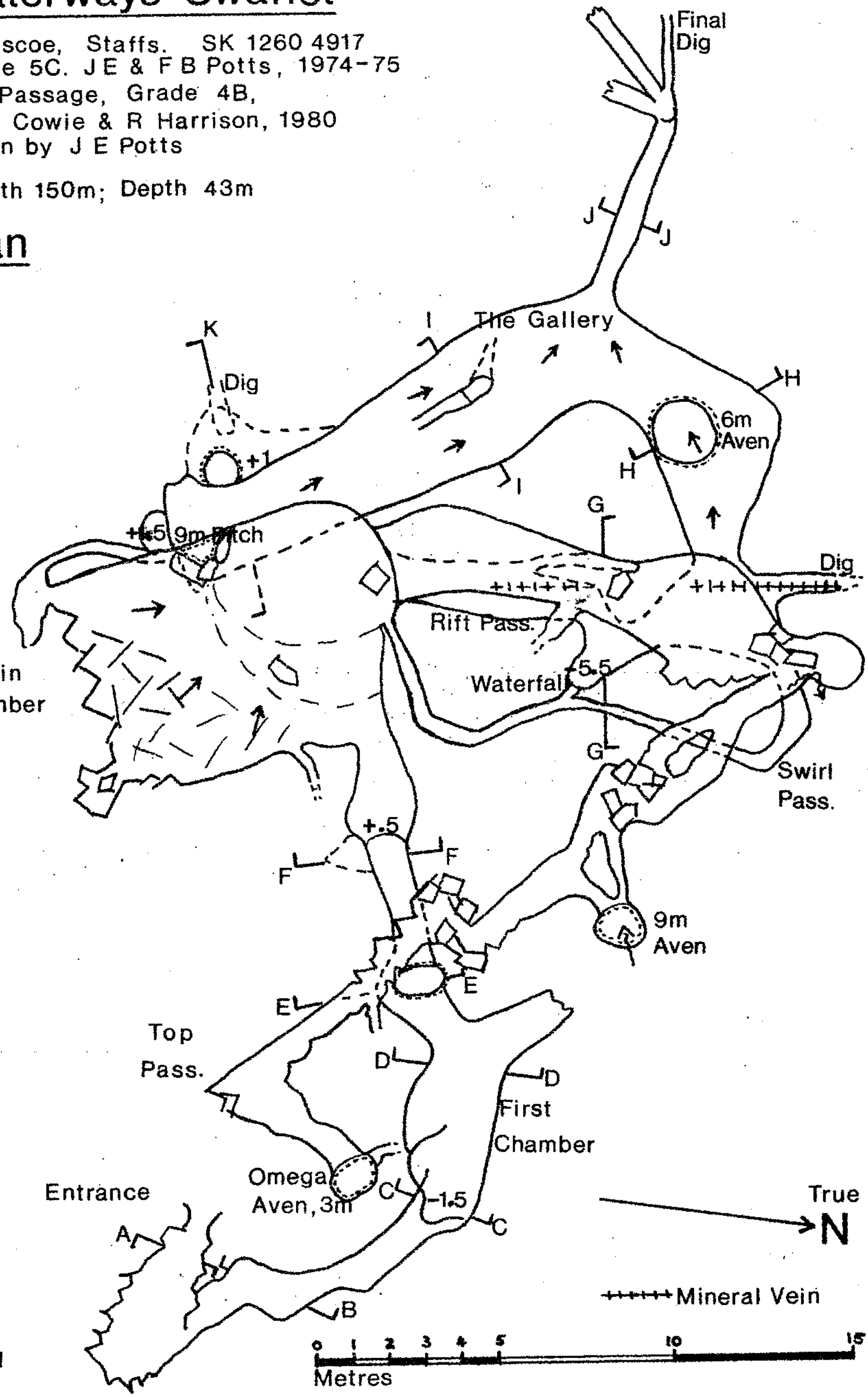

Fig.1

Hydrology.

Waterways Swallet appears now to be completely dry (apart from minor drips and the tiny trickle in Top Passage) and it seems likely that only in exceptional conditions would water ever sink in the entrance. The sink is 60m south of the entrance and is simply a muddy pool with water draining away through silt. In wet weather the sink overflows and water then disappears in a slot under a bramble bush some 5m nearer the cave. There is evidence that in really wet weather the water follows the line of the fence and sinks in a hollow about 20m from the entrance. (See figs. 4a & 4b).

The water has been dye-tested (Potts 1981) and reappears between 24 and 48 hours later at the Hinkley Wood Rising, Ilam, at an altitude of 150m i.e. a drop of 135m and a distance of 1.35km. in a direction slightly east of north.

The water is never seen at any point in the cave and probably, if its present route follows the bedding in the way that the cave passages do, it passes below and to the to the west of the cave under the far side of the shakehole.

Some of the passages in this predominately vadose cave give an impression of only very recent abandonments, most noticeable, perhaps, at the dry waterfall in Rift Passage. A similar impression is given by the bedding plane crawl in the Entrance Passage. In view of the mining activity not far away which certainly did affect local water flows, it is interesting to speculate whether Waterways lost any water when the mines were driven.

Possible Extensions.

Despite the very complicated pattern of the cave, the main passages: Top Passage the Gallery and the first part of Entrance passage, all follow the dip closely and descend at an angle of 20° to 25° to the northwest. (See Fig 5.) The westerly dig at present all end in chokes of broken rock and are heading under the shakehole, although at a depth of 40m below it. Investigations years ago in the shakehole showed no sign of water sinking nor any kind of entrance or cave development.

A better line to take might be to follow the dip more closely and investigate the blind end just below the first chamber in the Entrance Passage. This is heading towards the only area in the cave where any water is known to sink at present but it may be too high up.

So many of the passages and avens are controlled by mineralized joints that the most likely prospect seems to be the Northern Dig, which does follow one of these joints, takes a small trickle of water and is heading in the right direction and may bypass the worst of the collapse area under the shakehole.

JENNY POTTS.

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Waterways Swallet
Elevation on N-S

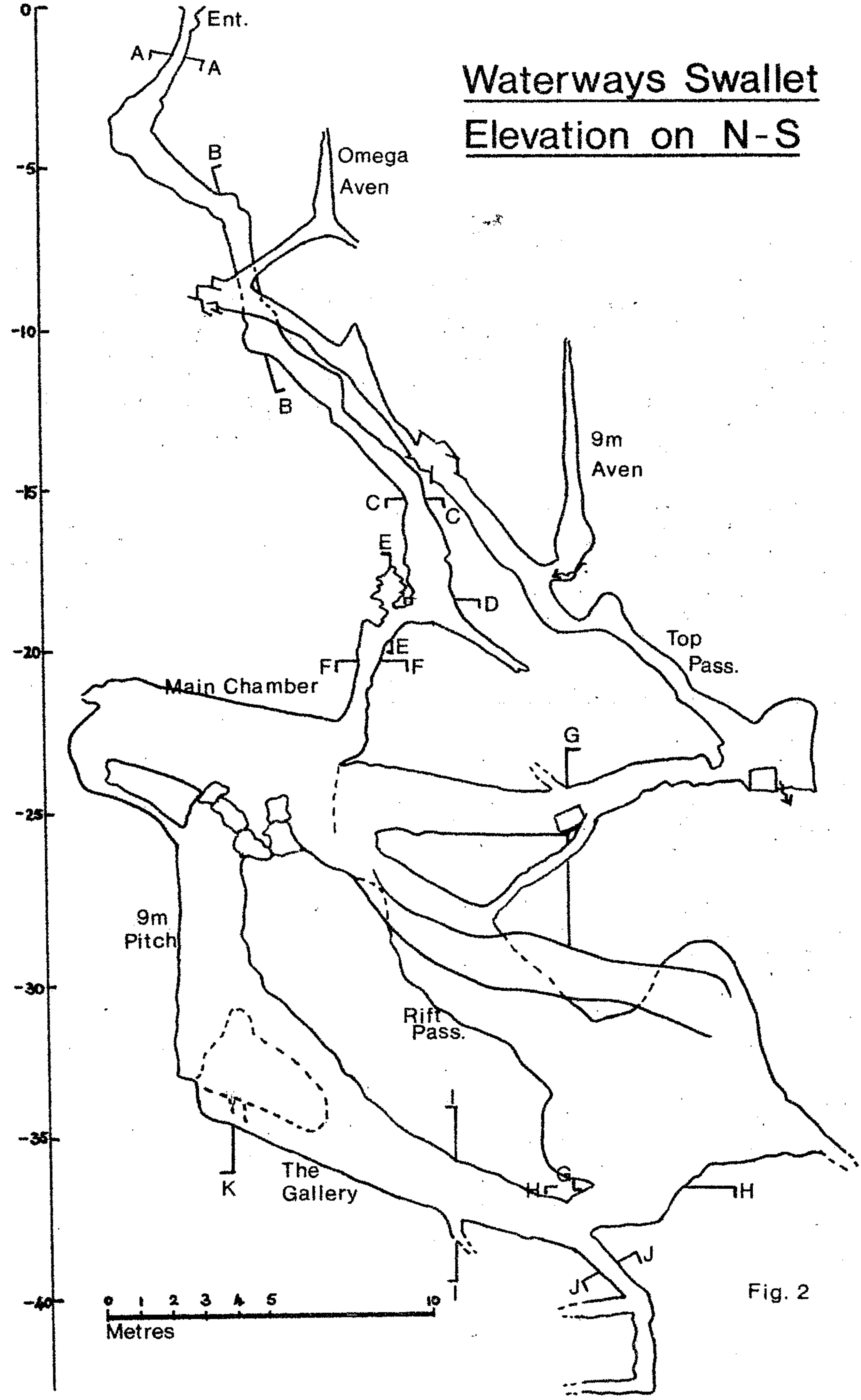

Fig. 2

Some Observations on the Geology and Development of Waterways Swallet.

Waterways Swallet is situated in thinly bedded basinal limestones which are of Lower Asbian (D_1) age, previously referred to as the Gag Lane or Lower Waterhouses Limestone (Ludford 1950, Prentice 1951, Parkinson & Ludford 1964). A marked feature of these beds around the cave and clearly seen in it, is that they dip steeply northwestwards at dips of upto 60° and are quite thinly bedded, beds varying from 5cms. thicks to no more than a metre or so. The steep dip and thin nature of the bedding together with the presence of thin intervening shale beds has resulted in much breakdown, particularly as one might expect around the entrance and in the chamber further down. These geological conditions are the main factors in controlling the caves orientation and morphology.

Lithologically the limestones are predominantly crinoidal calcarenites consisting of scattered crinoid columnals up to 8cms. long, some of which have been partly silicified. The odd rare silicified brachiopod and colonial and solitary coral can occassionally be found. One indeterminate colonial coral had corralites 1.5cms.thick and an overall length of 30cms. A pink or mauve staining is present throughout the rock and this may be due to iron staining as traces of haematite are present in the cave in the calcite veins.

A very noticeable feature that can be observed in limestones in the cave, is the presence of three coarse sandy beds, very much resembling millet seed in texture and dark brown in colour. The two upper beds vary in thickness although are both no more than one metre thick. The upper bed can be observed in the entrance boulder choke and the lower at the climb down into the chamber. The third and stratagraphically lower bed is exposed as a ledge in the main chamber, being just over one metre thick. This bed is very obvious, consisting of very coarse crinoidal calcarenite, dark brown in colour and studded throughout with numerous creamy coloured crinoids, some of which have been silicified. The odd, rare crushed solitary coral has also been seen in it.

Scattered throughout the rock and partly responsible for the alignment of some of the passages, are thin veins of calcite and barytes upto 10cms. in width as at the bottom of the pitch, often containing traces of haematite. These thin veins are generally aligned north to south and occur in some of the jointing, cutting through the strata with no apparent displacement. Jointing, where observed, was in two sets, one orientated north to south and the other east to west.

The main chamber is an interesting area, as apart from exposing the coarse crinoidal bed, as mentioned above, it displays some minor undulations of the strata. Two small anticlines separated by a shallow syncline plunging at about 15° to 20° to the west north west can be seen. What is significant is that to the north, down Rift Passage, the dip on this limb of the anticline steepens. It is thus asymmetrical. This steepening of the dip together with the presence of a calcited joint has resulted in a steeply descending passage to the north (Rift Passage). This shows very clear vadose development.

Waterways Swallet

Passage Cross-Sections

Drawn to same scale as Plan and Elevation on N-S

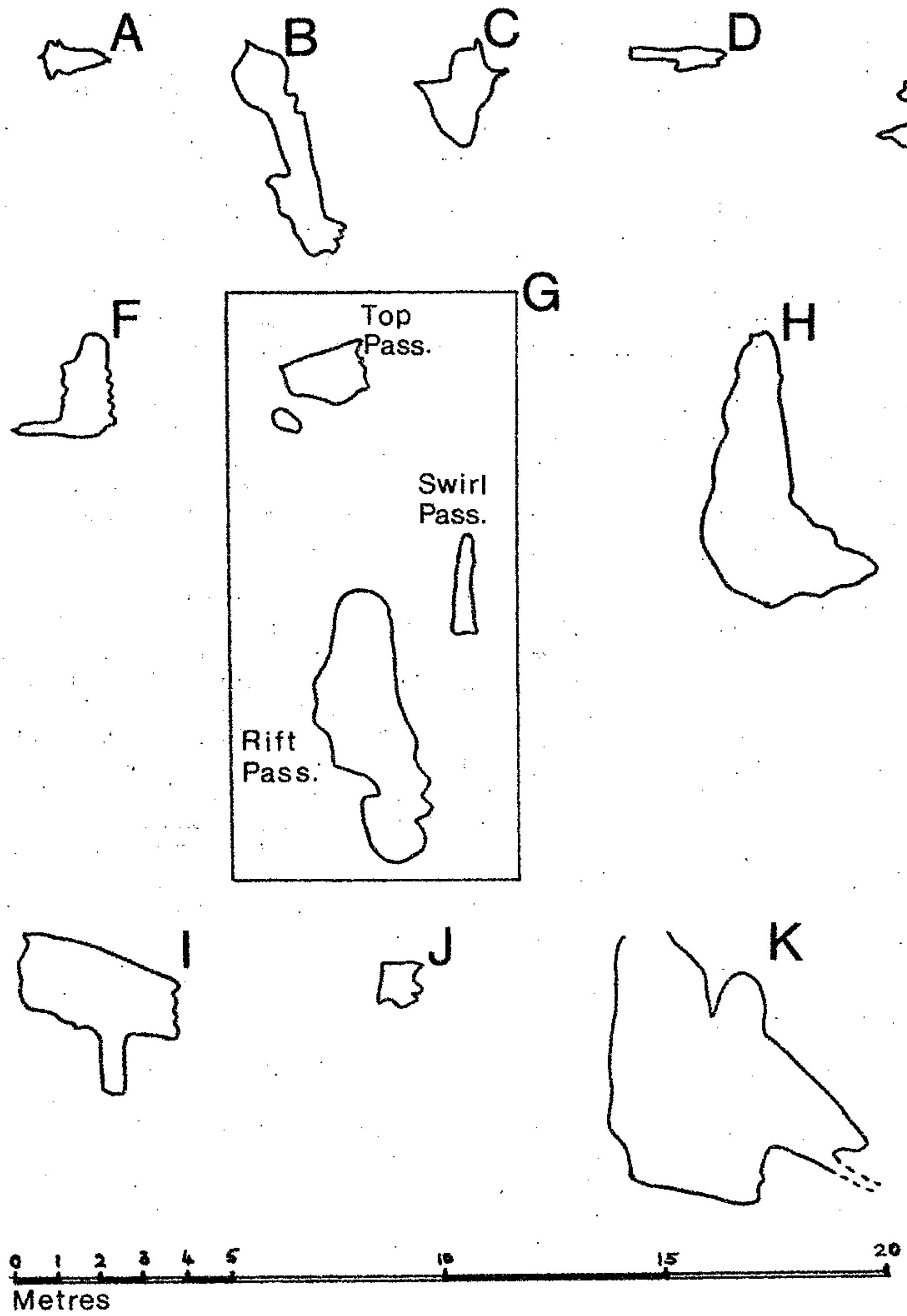

Fig. 3

Development of the Cave.

Much of this is pure speculation because not only is the cave a fragment of something bigger, but much of the evidence has been destroyed by collapse. As is often the case, more questions are posed than answers, but one or two points are worthy of note.

Undoubtedly the steep dip has had the over-riding influence on the orientation of the cave. This together with the thin nature of the bedding and the presence of intervening shale beds has had a very significant influence on the caves morphology, leading to much collapse and breakdown. There are several abandoned passages or inlets that lead into the main chamber only one of which is passable from the surface. The history is one of the utilisation of several beddings close together by the stream, or streams, with much undercutting and collapse resulting in the construction of a number of inlets uniting in or around the chamber.

At this point, several thin veins of calcite and barytes lying in joints, run at roughly right angles to the dip Down one of these the 9m pitch has developed, whilst to the north, along another mineralised joint Rift Passage is developed. This has a stepped, long profile and has clearly been formed mainly by a swift flowing stream flowing under vadose conditions down the steeply dipping northern limb of the small asymmetric anticline noted in the main chamber.

Vadose erosion is clearly indicated by the trenching, oxbows, 'dry' waterfalls and scalloping. Evidence of phreatic erosion is not very clear in the cave. Some small phreatic pockets can be seen in the roof of Rift Passage and some very small phreatic down-dip tubes can be seen in the roof of the entrance passages. The only significant phreatic feature is a one metre diameter roof tube disappearing into the boulders to the right of the dig at the bottom.

As with most caves it seems that the first stage of development was phreatic the extent and significance of which is impossible to determine due to collapse. Most of the present cave, as noted above, is vadose in nature and vadose erosion has been the predominant type of enlargement. From the prominent dry valley downstream from the cave entrance it is fairly evident that the stream in the past was larger in size then today, and more than likely drained a larger outcrop of Upper Asbian shales than it does now. With the wearing back of the shale cover and exposure of the steeply dipping limestones near the shale boundary drainage underground commenced. Down valley of the cave no fossil sinkholes are recognisable, if any existed, and today it is obvious that the stream never flows down this valley. Underground drainage was directed down the steep dip and redirected briefly by mineral veins as seen in the chamber and Rift Passage and by the jointing. Undercutting and collapse obviously occurred both during and after abandonment by the stream. In relatively recent times some small calcite formations have developed, mainly in Top Passage, although some 'dead' flowstone can be seen in Rift Passage.

An interesting feature associated with the cave is the large circular shakehole some 10m deep by 40m across, immediately to the north west of the entrance. Clearly from its present morphology it is a major deep collapse feature which appears to be a major barrier to further progress in the cave. This was the scene of a pre-war dig by Bill Little but nothing of interest was found. What lies beyond it underground is the question everybody would like answered but the structural geology appears to indicate that more of the same - steeply dipping bedding cave could be found, at least for a while.

Regarding the present hydrology, the surface stream is not seen in the known cave although in times of heavy flood it has been known to flow into the cave. Twenty metres before the cave entrance is a likely looking hollow, which as

Waterways Swallet

Relationship to surface features

Elevation on N-S

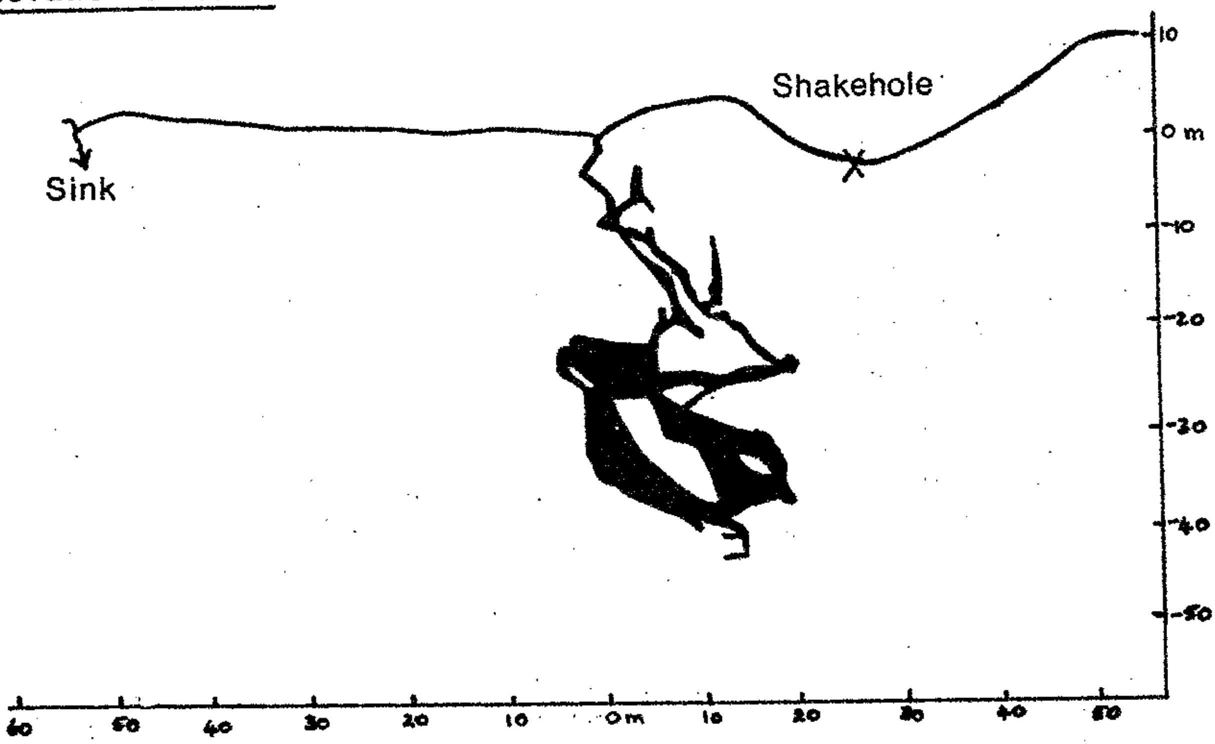

Fig. 4a

Plan

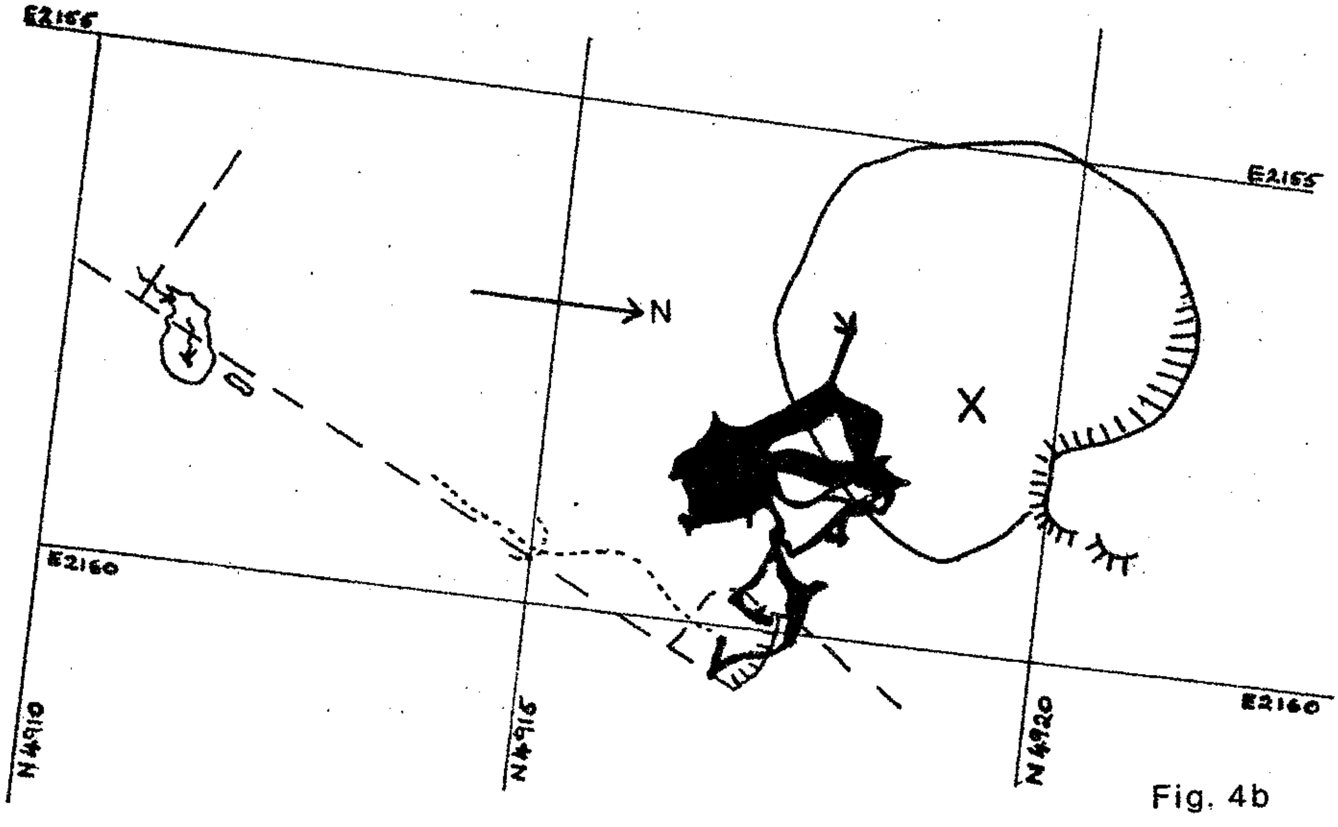

Fig. 4b

suggested by J. Potts in the previous article, probably takes water in flood. This could possibly connect down to an inlet in the chamber. The present underground stream then, as observed by Mellors (1973), is probably migrating westwards. It would be very interesting and no doubt exciting to descend Waterways in heavy flood and see exactly how the cave reacts.

Although there are dangers in using surface geology as a guide to sub-surface water flow patterns a few observations using the surface geology may indicate the most likely direction for the water to flow. The present stream rises from an unconformable boggy covering of Upper Asbian shales. These black shales contain harder and more calcareous or silicious bands and a few thin beds of crinoidal limestones and form an outlier of folded rocks with a generally low pitch to the SSE. From here to its proven risings in the bank of the river Manifold at Hinkley Wood is a total distance of 1.3kms and a drop of 150m. Dye took between 24-48 hours to cover this distance so there is an incentive for digging the present stream sink however immature it may at first seem. This is actively being pursued at the moment.

From an examination of the structure of the area it can be seen that Waterways is on the western limb of an anticline, the northerly continuation of which runs through Hazelton Clump. To the west of Hazelton Clump running from Waterings Farm and between Musden Low and Hazelton Clump is a topographic despression; in reality a structural feature formed by a NNE - SSW orientated asymmetric syncline of Lower Asbian basinal limestones with dips on the western limb obtaining 45°, whilst those on the east obtain 25°. Waterways appears from the dip to be heading down into the axis of this feature and may follow it, turning NW with the dip between Musden Low and Hazelton Clump to encounter the east to west faulted boundary betwwen Arundian and Lower Asbian limestones. This fault runs very close to the river Manifold at the base of Hinkley Wood, exactly where the risings are.

Potential for Further Extension.

The potential for finding more cave is there, but whether entry will be made is another matter. The choke at the bottom of the cave is very solid, although some headway may be gained to the right of it at the bottom end of Rift Passage. The surface sink is another possibility although it does back up and may just be too immature. The dig near the bottom of the pitch may be worthwhile particularly as it is heading to the south west where the present stream is expected to be investigated.

The two risings themselves are very close together on the outside bend of an incised meander of the river Manifold and flow out of a steep, heavily vegetated partly collapsing bank of soil. Bedrock is present in placds and they may be worthy of a trial dig but the chances do not seem that good. Much digging remains to be done and potential is there, but the amount of work needed may deter even the keenest caver.

KEV DRAKELEY.

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Waterways Swallet

True length elevation

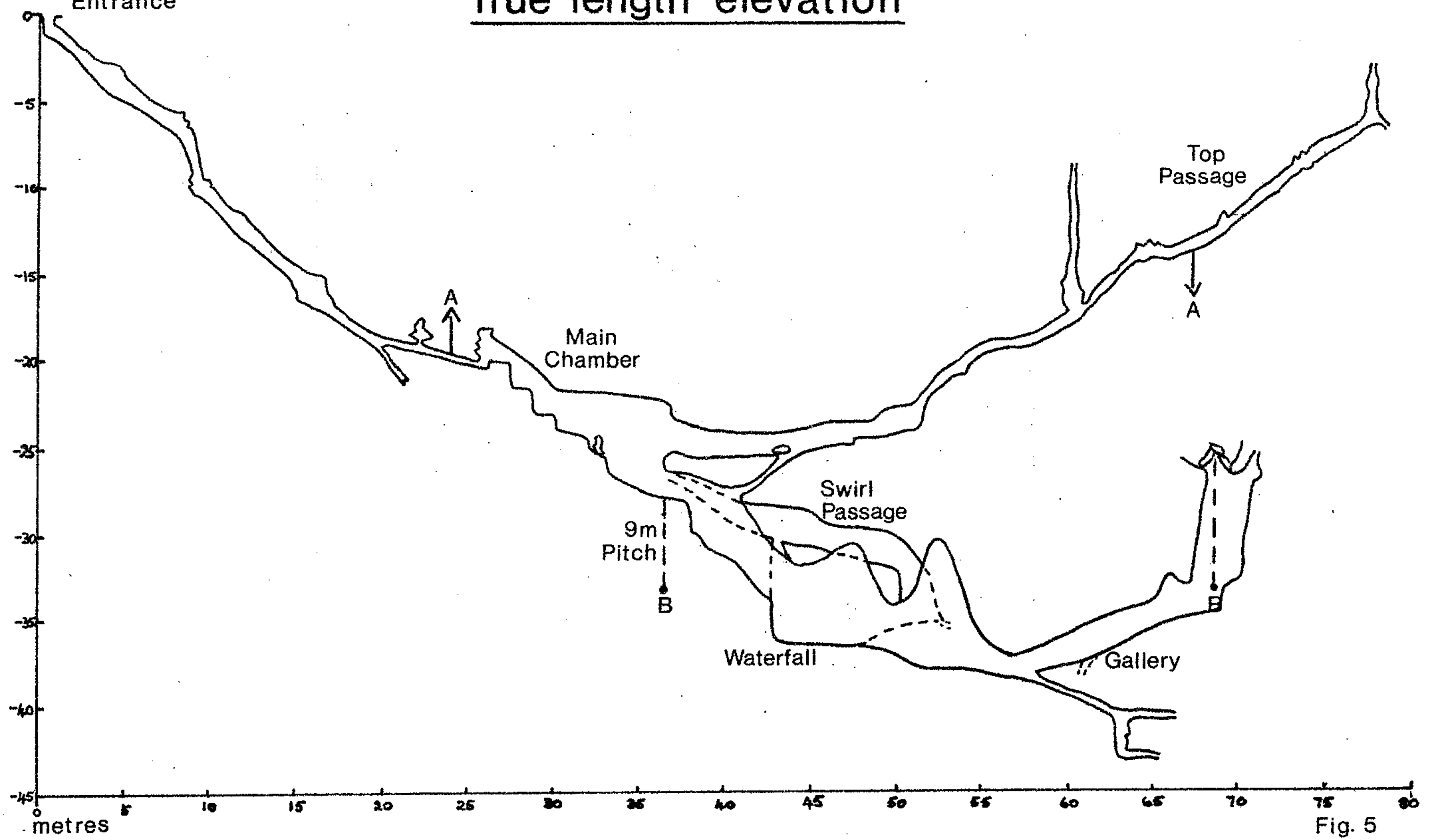


Fig. 5

THE GENE DEFECT SHOW.

And tonight ladies and gentlemen may we introduce your host ... Mr. Gene Defect.........(rounds of applause for this famous man).

DEFECT.........Good evening, good evening and on tonights programme our special guest is that ever popular character and raconteur Mr. Dave Duron, unfortunately due to pressing sporting engagements Dave is unable to be with us tonight in the studio but we do have a film of an interview I made with Dave last year before he went away for the summer break. Due to cuts in our budget we were unable to show the programme at that time, and so now here it is...............

THE DAVE DURON INTERVIEW.. (cut to wall screen where black cross appears, followed by film intro countdown, studio audience begin to chant.....ten, nine, eight, seven etc. Defect picks up studio phone and begins to hurl just audible abuse down it). ...... long shot of row of terraced houses. Defect stands outside with mike in hand.

DEFECT.........As a country Great Britain has only a handful of professional cavers, their exploits and exciting deeds often act as a beacon for us lesser mortals, something to aim for in our own active lives as cavers and potholers. Usually we see only the shiny, rubber exterior of these highly skilled and dedicated individuals on the sports television, but, behind those scared and battered hands, underneath that torn wet-suit and scratched helmet often stands a shy, sensitive, modest man who just happens to make his living out that dangerous game called the 'pro' caving scene.

One such man, well known for his sportsmanship and his benevolent attitude towards the novice teams is Midlands four times champ Dave Duron, when the chance came to do an interview with Dave I was absolutely knocked out and couldn't wait to meet Dave in the comfort of his own terraced home, which Dave himself has quaintly named 'Dun Digging'.

Relaxed in his tastefully furnished front room whose mellow decor perhaps achoes the mature mellowness which he himself has found in recent years. Dave, in dressing gown and carpet slippers could not have looked more unlike the ruthless, tough, speleo pro of the northern circuit (and especially the Hill Inn) that he is. Sitting under what was certainly a Tretchicoff original print I asked Dave the question that everyone has wanted to ask for the past three years.

Cut to inside shot of DURON sitting below ghastly picture of oriental girl lounging on a jungle creeper,........

DEFECT.........Dave, what made you decide to turn pro? After all you were doing quite well on the northern amateur scene.

DURON..........Well, 'err, ah, yes. Yeah, well I was on the dole wasn't I and I couldn't err get a job see, so I fought yeah, err yeah I'll turn pro. So I answered the advert in the magazine for cavers and potholers and, well yeah I fink you know the rest of the story.

DEFECT..........I see, so your decision to become the countries top pro was a spur of the moment decision, did you or your wife have any doubts about that?

DURON..........Well I didn't tell her did I, I mean err agh, the first week end I went away she thought I was going to an annual dinner on the Mendips. No I didn't have no doubts, I knew I was fit enough to be able to cope with the pressures of the pro game, I mean thats what its all about you know, self confidence.

DEFECT..........Self confidence, yes, so you didn't tell your wife of your intentions to become a leading pro, was this to protect her from the worries that professional sportsmanship brings, the nagging worry of death or serious injury and disfigurement?

DURON..........Yes it is true that those worries that you have said are for ever in the back of every pro's and his loved one's minds, I mean its only natural init that you'd get worried about certain deaf and fings like that, but that wasn't my main reason really, it was err, err, modesty.

DEFECT.........You mean that you didn't even want your wife to know of your heroic deeds, seven thousand feet below the windswept Derbyshire pennines?

DURON..........Yeah, oh yeah, that right you see, I didn't want fame and stardom, I'm just a man doing a mans job in the world, or should I say underworld, ha, ha, ha of the pro scene, besides we weren't speaking at the time.

DEFECT.........Then your decision to turn pro upset your marital relations?

DURON..........Quite, yeah me auntie was proper cut up about it, mind you she couldn't understand why I quit the busses, specially with one kiddie and another on the way.

DEFECT.........No, I mean your turning pro upset the harmony between you and your wife.

DURON..........No mate, you see I put the housekeeping money on this 100-1 shot in the 3.15 at Kempton and as a direct result of that my wife and I ceased to talk and other fings for about a week.

DEFECT.........And it was during this time that you turned to the pro game?

DURON..........Well I had to do something didn't I....

DEFECT.........Well what does she think of it now?

DURON..........Ah, ah, err-urm, well she left me really, I think thats what she thought of it really, she bloody well upped and left me see.

DEFECT.........Yes I do see, well Dave to change the subject a little the pro game has developed at an amazing rate in the past years. We've got S.R.T, self lining, free diving to excess and a host of new and technical innovations which make the game more exciting for the average man in the street. How much further do you think we can go?

DURON..........Yeah, I mean I know its difficult to be unbiased when your at he top of your chosen profession, but its right what you say about all these new ideas and things. I know, well I mean you know I know what I want from the game and to get it I know I've got to put a lot into it, I mean I personally like me old carbide lamp, I mean don't think that I belong to the old school, the so called die-hards, I mean I know nickel-cad has brought many a mediocre player to the absolute forefront of the game, I could mention many famous names but my professional integrity will not allow me to, I mean I know who they are, I mean they know who they are, but I mean we, that is, I myself and the other top pros in the game know that these others are merely hiding behind a facade, an exterior image of new fangled technology and fixed aids which only partially disguises their lack of total dedication to the game and their incompetance to do it on their own two feet.

DEFECT.........Do what Dave?

DURON..........Play the game fairly and squarely without resorting to such unsportsmanlike tricks as enlarging all the squeezes to railway tunnel proportions or using some new fangled device which takes all the sport out of conquering what were previously insurmountable obstacles.

DEFECT.........Er yes, quite Dave. Now let me ask you about a subject on which I know you have very strong moral beliefs. You mentioned earlier your professional integrity and your attitude to the game, so can I now ask you Dave, what are your views on the use and abuse of drugs on the pro scene? For instance do you forsee in the near future an urgent need for on the spot random dope tests on cavers?

DURON..........Did I?

DEFECT.........Did you what?

DURON..........Mention my professional integrity?

DEFECT.........Indeed you did Dave, and may I say that it gladdens my heart to hear some-one of your calibre and standing say it.

DURON..........Does it? What does it mean then?

DEFECT.........Ah well, quite, yes you were going to give us your views on the drugs available to sportsmen to boost their performance, it is I know a subject on which you have always been outspoken...

DURON..........It is, yes that is true, I do have these views and I only wish they were shared by some of the other top flight boys in our most dangerous game. The use of drugs is becoming a great problem, and it is not only on the pro scene you know, even some of the amateur boys take the stuff, you see them you know at the top of a pitch, then next minute they're taking a fix 'glug-glug' and over they go.

DEFECT.........'Glug-glug' and over they go, it sounds awful Dave. Glug-glug is this a reference to the liquid stimulants that are often used?

DURON..........Indeed it is, most of the hardened users take a lethal mixture of Newcastle Brown Ale and brewers yeast tablets, it sends them crazy, you know whooping and singing, running down the streamway, some of them hallucinate about going to the Berger next year. It's horrible to see these young boys torture themselves in this way.

DEFECT.........You mention the hallucinations there Dave, does this type of drug wer'e talking about affect the body in any permanent way?

DURON..........Well, yeah it does really, you see it makes those that use it smell bloody awful,really. I mean to say only last week I was on a trip into the Kingsterndale Master Cave and we were just rigging that little pitch you know, when all of a sudden a great crowd came surging around the corner, well the smell very near knocked me out, it was like falling into a drip tray honest!

DEFECT.........You make it sound horrific Dave.

DURON..........Oh it is mate.

DEFECT.........Dave I think I'm right in saying that most of this kind of drug abuse takes place well before an event thought.

DURON..........Again you are right, yes most users tend to overdose on the evening prior to a big event, I mean sometimes they have to due to the constricted nature of some of the passages that are used today, in some cases taking a fix underground is physically impossible I mean, you see most blokes will go to the pub at night, you know the Hill Inn or the Craven Heifer and sit and have a tonic water or a shandy, but sometimes you can see them; a group of strangers from down south or the midlands, you can tell why they do it, you know they've travelled a long way and obviously want to do well in an away fixture so they have a beer and before they know it they're pissed as rats, being carried out of a flooded tent somewhere and shouting "who wants to go to the P.S.M. next year; or; how about an expedition to Peru; Have they called last orders yet?...I tell you it is horrible.

DEFECT.........You mentioned expeditions there a couple of times Dave.

DURON..........Did I?

DEFECT.........Yes you did Dave, have you and your team any plans for an expedition this year?

DURON..........Well I can't really answer that at this moment in time, but I can tell you with some certainty that we are planning a big trip to Bakers Pit down in Devon.

DEFECT.........Bakers Pit?

DURON..........Yeah, we're gonna try to put four men to the bottom, its a sort of warm up event for next years Premiere (plug, plug ha,ha) league cup winners cup.'final if you know what I mean?

DEFECT.........Oh, I see, this trip will be a sort of training exercise?

DURON..........Thats it yeah, besides Iains mum has got a cousin whose amonk in the abbey down there, you know at Buckfastleight, so we're going on a sort of combined trip, killing two birds with one stone as it were, she gets to see her cousin, we go and set a new prescedent in the history of modern British professional caving.

(Close up shot of a bemused looking Defect).

DEFECT..........Err, well thank you Dave for what I'm sure our viewers have found to be an interesting insight into the pro scene, and I know that they will joint me in wishing you well down in Devon and for the rest of the forth coming season.

DURON...........Thank you, it was no trouble, thank you. (kisses finger tips and raises them in salute to an adoring public).

Wildly ecstatic applause.

End credits.

Defect Productions.

Next time Defect reveals all about that toughest of tought games - a heart stopping, breath taking, in depth look at the hurly-burly muscle, blood and beer world of cyclo-caving.

Calculating a Cave Survey

Introduction.

This article is not intended to be a complete explanation of how to survey, merely a note on one method of doing the calculations which produce a finished line survey. It is quite possible to draw up a simple survey without doing any calculations at all by using a protractor and ruler but this has obvious disadvantages when the survey becomes large or complicated and is, in any case, not very accurate. The co-ordinate method of calculation is exact and the actual plotting can be made as accurate as is needful on the scale required, since the calculated figures give exact distances.

I would like to acknowledge my debt to Roy and Maggie Frankum who first showed me the method of doing the basic calculation. I have worked out the loop error routine myself from first principles and, whilst it does work and gives useable answers, there may well be a more sophisticated way of doing this.

For anyone interested in learning more about the actual process of surveying and the instruments used, I have given a short bibliography at the end of the article.

Readings Recorded.

Normal readings from a survey consist of 2 parts:-

(a) Figures giving distance, bearing and dip between survey stations.
(b) Details of passage dimensions including drawings.

The figures from part (a) are used to calculate a set of 3-dimensional co-ordinates, any two of which in combination can be used to plot a line survey on graph paper. Part (b) gives the detailed passage shapes to be filled in to complete the survey.

Bearings.

The part (a) figures are:- (i) Distance, D
(ii) Compass bearing in degrees (magnetic)
(iii) Angle of dip, + or − A in degrees.
($A = 0^\circ$ is horizontal, $A = -90^\circ$ is vertically down).

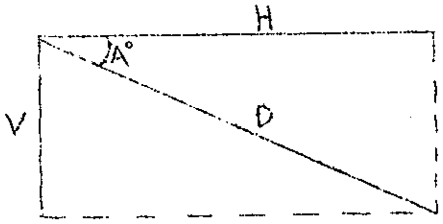
Compass bearings have to be converted to quadrant bearings, i.e. expressed as North or South so many degrees East or West.

Eg: Bearing	Quadrant Bearing, B°		
045°	N	45°	E
124°	S	56°	E
231°	S	51°	W
327°	N	33°	W

The figures used in the calculations are D, B° and A°.

Component Lengths:

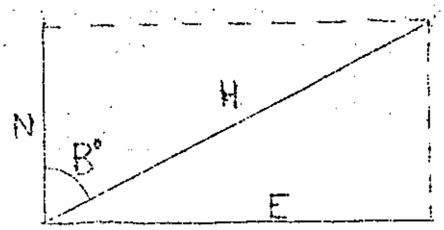
Distance; D, has a horizontal component: H; and a vertical component: V



H is given by D. cos A and is always positive.

V is given by D. sin A and is positive if D is up slope and negative if D is down slope.

The horizontal component, H has itself two components in North and East directions.



The Northing, N is given by H cos B
The Easting, E is given by H sin B
N and E can be positive or negative depending upon which quadrant the compass bearing is in.

Eg:-

Bearing	Quad.	Bearing, B°		N	E
045°	N	45°	E	+ve	+ve
124°	S	56°	E	-ve	+ve
231°	S	51°	W	-ve	-ve
327°	N	33°	W	+ve	-ve

Each distance, D, is therefore split into its three component lengths, any of which may be counted in a positive or negative direction from zero point:

V: vertical; N: North/south; E: East/West.

Plotting.

If the starting point is counted as zero, i.e. the place where the three components are all 0, then successive survey stations can be plotted as 3-dimensional co-ordinates by adding similar components and plotting the successive cumulative totals.

PLAN:- The usual system is to start by plotting a plan using Northings and Eastings. This can then be used to decide which vertical elevation to plot.

VERTICAL ELEVATION:- An elevation along the North/South line can be plotted using N and V. The true length elevation (extended elevation) i.e. the cave "straightened out" can be plotted using H and V, in which case cumulative totals for H will be wanted.

If the survey is of a pothole dropping steeply in a series of large pitches with little horizontal passage it may be easier to plot a vertical elevation only either north/south or east/west before doing the plan.

CALCULATION SHEET.

In order to simplify the calculations I have printed sheets with 12 headed columns as follows:-

Column Number	Heading	Subject of Column.
1	Strat	Number of survey station. Permanent survey stations marked by a triangle. The readings in columns D "Bear" and "A" are those measured to this station.
2	Dist., D.	Length of survey leg given in decimal form, i.e. 3.5ft or 4.82 metres.
3	Bear	Compass bearing in degrees.
4	Dip. A°	Angle of dip in degrees, noting whether + or -
5	Quad. B, B°	Compass bearing converted to quadrant bearing, i.e. stating N or S, no. of degrees, E or W.
6	V. DsinA	Vertical component, stating + for up and - for down.
7	Sig. V	Cumulative total of V to be used in plotting elevations; may be +ve or -ve.
8	H. DcosA	Horizontal component. Used to calculate N & E and may be used in plotting a true length elevation.
9	N. HcosB	Northing, i.e. North/South component of D; +ve for north, -ve for south.
10	Sig. N	Cumulative total of N to be used in plotting; may be +ve or -ve.
11	E. HsinB	Easting, i.e. East/West component of D, +ve for east and -ve for west.
12	Sig. E	Cumulative total of E to be used in plotting; may be +ve or -ve.

Each sheet has at the top a space for entering Cave Name, Passage number, Page number and surveyor's name.

Error Correction.

Where there is a loop in the survey the cumulative total, Sig V, Sig N and Sig E, for the first survey station on the loop should have the same value as for the last point on the loop, i.e. no errors in readings and closure zero. In practice this does not happen and loops almost always misclose by varying amounts.

In order to plot this sensibly, a correction must be made which should vary with the length of the survey leg, i.e. a long leg should need more correction than s hort leg. This will alter the position of each survey station slightly when it is plotted until the first and last station on the loop coincide. The correction is made separately for each of the three components as the misclosure is usually different for each of these. The calculation is exactly the same for each component and is illustrated as follows by the correction for the vertical component:-

eV is the error in the loop given by (1st Sig V - last Sig V). this may be +ve or -ve.

lV is the total length of all the vertical components in the loop; this is always +ve.

cV is the correction per unit length, given by eV ÷ lV; this may be +ve or -ve.

NewV is the new vertical component for each leg, given by ([length of old V] x cV) + old V.

Old V and new V may be +ve or -ve.

E.G. a loop in which the first station has the vertical position 0 and the last station (which should coincide with the first) has the vertical position -5.46 instead of 0. The total length of all th. vertical components of the legs is 15.88

eV = 0 - -5.46
 = + 5.46
lV = 15.88
∴ cV = +5.46 ÷ 15.88
 = + .3438287

So to correct leg V_{29} where old V_{29} is -2.62

$$\text{New } V_{29} = (2.62 \times +.3438287) + -2.62$$
$$= -1.72$$

When the complete set of new components have been worked out they are added to give the new cumulative total and the final point will be the same as the first point, i.e. closure now zero. The new cumulative totals are used for the actual plotting of the survey.

To simplify the calculations I have printed loop error correction sheets where the calculation for each component is detailed and there are columns to fill in station numbers, new components and new totals.

Desciding on a Scale for Plotting.

The survey can be drawn up to any size, depending upon the use to which it is to be put and the paper size available. Basically, for each of the components of the survey one should pick out the large +ve and -ve numbers which ever appear in the totals; add the actual number together and this will give the range needed for that component on the paper.

Eg: Northings go from -37.2 to + 128.6
Eastings go from -431.8 to + 321.7
N - S range needed is 37.2 + 128.6, i.e. approximately 170
E - W range needed is 431.8 + 321.7, i.e. approximately 770

The plan would then be drawn up with zero placed suitably on the graph paper to enable all the co-ordinates to be put in; if necessary more than one sheet can be used.

The choice of graph paper is dictated in practical terms by what is available and a sensible choice of scale to allow easy plotting is important. One should also bear in mind actual passage sizes to be drawn in the final version of the survey because if the scale chosen is too small it may be impossible to draw narrow passages sensibly.

Example of the Calculation Routine for an Imaginary Cave.

As an example I have invented an imaginary cave, Jenhullet, and gone through the necessary calculations to draw up a survey of this simple small cave which has one loop of passage. This shows the loop error correction and four types of plotting which can be done direct from the calculation sheet. The misclosure for the loop on the original survey can be seen to be 1.29 ft vertical, 0.48 ft. North and 0.63 ft. East.

Some Practical Points.

1. No matter how careful the calculations, the survey will be nonsence if the original readings have been taken carelessly. It is also vital that the recording of readings be done in a logical way with numbered survey stations and s systematic ways of distinguishing side passages and loops. Major errors in recording can often be spotted while doing the calculations if one bears in mind a mental picture of what the figures will look like plotted on a graph.

2. For personal preference I work using a soft pencil kept well sharpened as this makes it easy to rub out and put right correct figures or lines on the graph. For the initial drawing of a very complicated survey it may be helpful to plot on a small scale in coloured pencils to relate to the passages to each other; the proper survey may then be done in one colour once the complications have been noted.

3. The actual calculation can be done using log book, slide rule, calculator or computer or any combination of these available. The most important point is to think all the time what the figures mean in terms of cave passages; e.g. figures for bearings should increase going round a right hand bend etc.

4. I find printed survey calculation sheets a great help. The design and printing of these is probably a matter of personal choice but if they are carefully thought out, the headings on the printed sheets can guide one through the steps of the calculation and so help to prevent mistakes.

5. I find it easier to record a survey in the cave on specially printed sheets clipped to a small board. The separate sheets can be stapled together later so that there is a bundle of sheets for each separate passage. This gives the advantage that the survey can be doen in stages and someone can start work on the calculations whilst others survey the rest of the passages.

6. I always work calculations to two decimal points if the measurements are in feet, i.e. to approximately 1/10th inch, although in plotting the accuracy would depend on the scale to be used. This avoids any errors due to rounding off figures in the calculation and enables parts of the survey to be plotted at very large scale if the need arises. I have not done a metric survey yet but would feel I ought to work to three decimal places, i.e. to 1mm, although the actual plotting would be much less accurate.

J.E. POTTS.

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The following books contain a chaper on cave surveying:

C. H. Cullingford (Ed.) British Caving.

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1973 J. C. Dobrilla and G. Marcbach Techniques de la Speleologie Alpine.

SURVEY CALCULATION SHEET (BASIC)

CAVE. Jenhullet, Rana, Norway.

PAGE. 1
PASSAGE. 1
SURVEYOR. JEP & FBP.

STAT	DIST. D	BEAR.	DIP. A°	Quad. B B°	V D sin A	Sig. V	H D cos A	N H cos B	Sig. N	E H sin B	Sig. E
/0\	Entrance					0			0		0
1	8'	024	-15	N 24 E	-2.07	-2.07	7.73	+7.06	+7.06	+3.14	+3.14
/2\	7.5'	073	-45	N 73 E	-5.30	-7.37	5.30	+1.55	+8.61	+5.07	+8.21
3	4'	051	-60	N 51 E	-3.46	-10.83	2.00	+1.26	+9.87	+1.55	+9.76
4	6'	-	-90	-	-6	-16.83	0	0	+9.87	0	+9.76
5	3.5'	305	0	N 55 W	0	-16.83	3.50	+2.01	+11.88	-2.87	+6.89
6	7'	227	+60	S 47 W	+6.06	-10.77	3.50	-2.39	+9.49	-2.56	+4.33
/2\	5'	095	+25	S 85 E	+2.11	-8.66	4.53	-0.40	+9.09	+4.51	+8.84
						Note loop error for station /2\	Total H 26.56		Note loop error for station /2\		Note loop error for station /2\
					LV 17.63	-7.37 − -8.66 = +1.29 eV		LN 6.06	+8.61 − +9.09 = -0.48 eN	LE 11.49	+8.21 − +8.84 = -0.63 eE
						Range 0 → -17 17	Range 0 → 26.56 27		Range 0 → +12 12		Range 0 → +10 10

LOOP ERROR CORRECTION

CAVE. — Jenhullet
SURVEY STATIONS — 3 to /2\

VERTICAL.

eV — Sig.V_1 – Sig.V_2 — $^-7.37 - ^-8.66 = ^+1.29$
LV — Stn. 3 to /2\ — 17.63
cV — eV ÷ LV — $^+1.29 \div 17.63 = ^+0.073$
New V — (|length of old V| x cV) + old V

NORTHING

eN — Sig.N_1 – Sig.N_2 — $^+8.61 - ^+9.09 = ^-0.48$
LN — Stn. 3 to /2\ — 6.06
cN — eN ÷ LN — $^-0.48 \div 6.06 = ^-0.079$
New N — (|length of old N| x cN) + old N

EASTING

eE — Sig.E_1 – Sig.E_2 — $^+8.21 - ^+8.84 = ^-0.63$
LE — Stn. 3 to /2\ — 11.49
cE — eE ÷ LE — $^-0.63 \div 11.49 = ^-0.055$
New E — (|length of old E| x cE) + old E

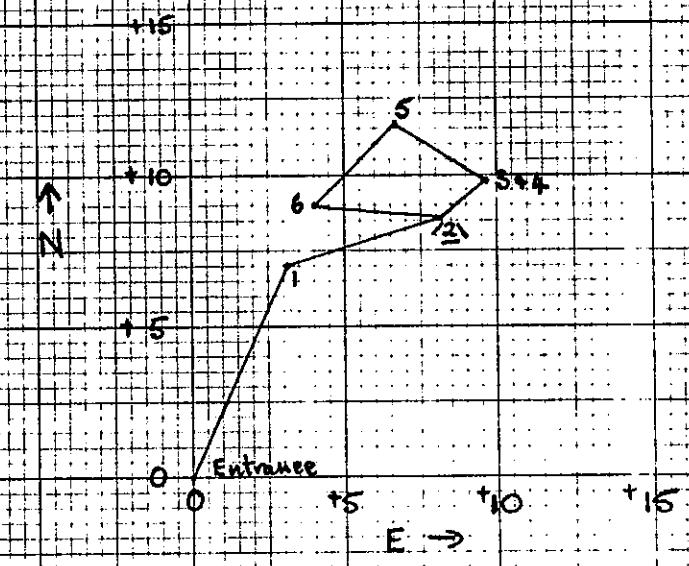
Station No	New V	New Sig. V	New N	New Sig. N	New E	New Sig. E.
/2\	—	– 7.37	—	+ 8.61	—	+ 8.21
3	– 3.21	– 10.58	+ 1.16	+ 9.77	+ 1.47	+ 9.68
4	– 5.56	– 16.14	0	+ 9.77	0	+ 9.68
5	0	– 16.14	+ 1.85	+ 11.62	– 3.03	+ 6.65
6	+ 6.50	– 9.64	– 2.58	+ 9.04	– 2.70	+ 3.95
/2\	+ 2.26	– 7.38	– 0.43	+ 8.61	+ 4.26	+ 8.21

PRELIMINARY LINE SURVEY, "JENHULLET" (1)

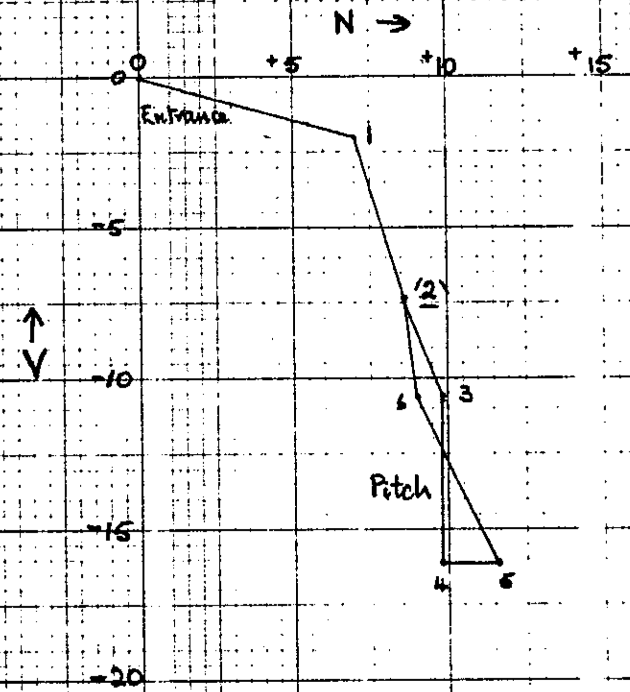
Ranges: V: 0 → +17, 17   N: 0 → +12, 12

H: 0 → 26.56, 27   E: 0 → +10, 10

Plan

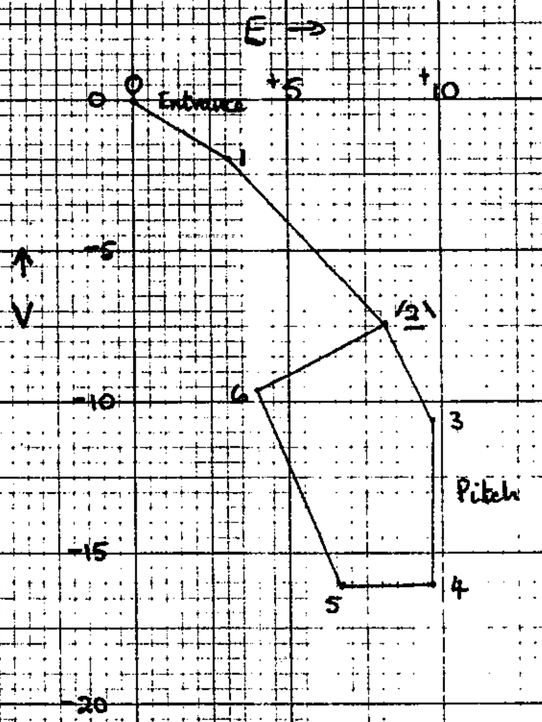


Elevation on N/S

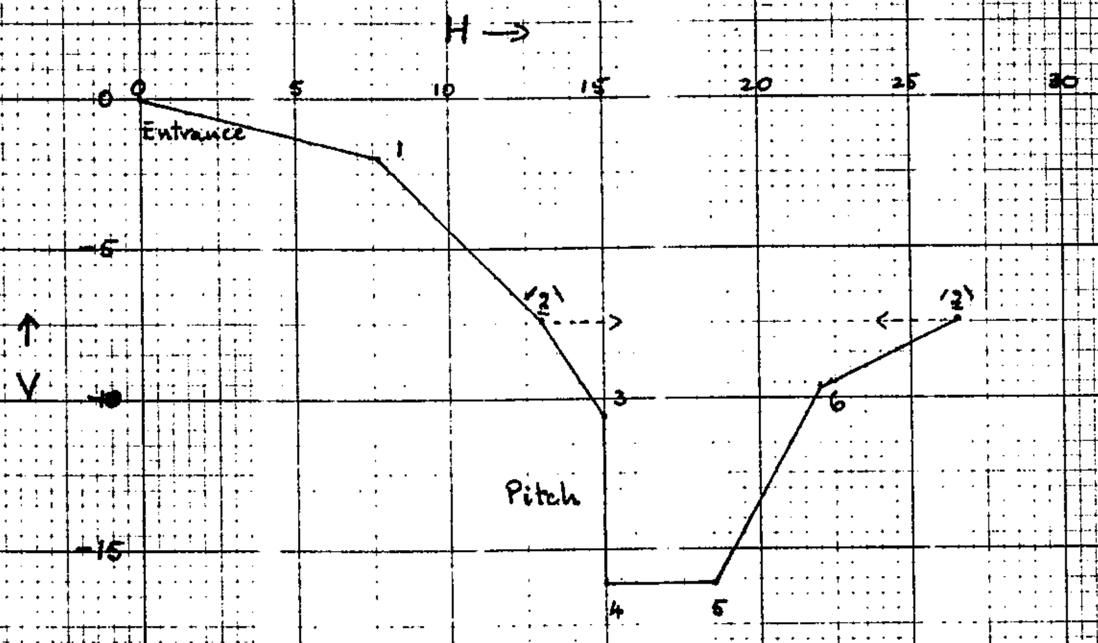


PRELIMINARY LINE SURVEY, "JENHULLET" (2)

Elevation on E/W.



True Length Elevation



SEA CAVES OF THE STOER PENINSULAR, SUTHERLAND

Introduction

These caves were visited and some actually entered during April 1976. There are very brief references to some of them, including the Clachtoll Sea Cave which we did not visit (Jopson, 1972), in caving and climbing literature, but there seems to be no detailed record of most of them and this summarised description is an attempt to put this right so that other cavers may be encouraged to visit and explore them. The first group of caves, Stoer Caves, Balchladich Cave and the Stoer Point Caves, were visited by a group of us but we were only able to enter and explore one of them properly: Stoer Point Cave South. The visit to the Culkein Caves was a solo effort and, again, I was only able to enter and explore one of them: Culkein Cave, No. 1. The other caves noted here were peered into from overhanging cliffs or from a nearby wave bench, but all were impossible to enter without either rope or ladder from the cliff above or a boat. All observations were made within the period of 2 to 3 hours either side of high tide.

Although the rock in which the caves are formed is basically a red sandstone, several of the caves have small calcite formations. Close inspection of the rock near the Stoer Caves disclosed fine layers of what appeared to be calcite interspersed with the sandstone; these layers were less than 2 mm. thick and spaced a few centimetres apart. This definite layering was not obvious at the other sites but it is presumably present to some extent and it is this which allows the formation of the small stalactites.

The map for this area is the OS 1:50 000, No. 15, Loch Assynt.

Stoer Caves, East and West. NC 0325 2865

Two south-facing sea caves about 15 m. apart; ½ km. west of Stoer village.

Stoer Cave, East.

The entrance is approximately 7 m. square with 4 - 5 m. depth of water inside. About 2 m. above the water, just inside the entrance on the eastern side, was a .5 m. square opening with the appearance of an inlet passage. The cave appears to go in at least 15 m. The roof of the entrance dips to the west, following the bedding, as does the roof of the western cave.

Stoer Cave, West.

The entrance is 3 m. wide and 5 m. high with 4 - 5 m. depth of water. The cave goes in at least 15 m. and at the inner end it bends out of sight to the east and appears to have a boulder beach.

Balchladich Cave. NC 0270 2960

This cave is situated about ½ km. south west of Balchladich village.

The entrance faces west and is about 3 m. square with 4 - 5 m. depth of water. A ledge on the northern side just below the roof leads in to where the passage forks after about 10 m. The northern fork appears to continue and may connect with an entrance at the foot of a small inlet about 30 m. to the north east. The roof of the main passage dips almost to water level just beyond the fork but appears to rise again further in.

Stoer Points Caves; South, Middle and North.

A group of caves between ½ and 1 km. north of the lighthouse.

Stoer Point Cave,South. NC 0085 3375.

This cave was entered from the beach to the north after a rather desperate scramble down the cliff. There are two entrances and about 30 m. total length of passage with a right-angle bend halfway along. The north-facing entrance to the beach in the cove is about 5 m. wide and 10 m. high. The west-facing entrance is 5 m. wide and 13 m. high and leads down a boulder slope into the sea. The whole cave is floored with boulders. At the bend in the main passage a rift goes up a slope to the south, ending in a roof rift .2 m. wide containing some stalactites. In the western part of the main passage, 10 m. in from the entrance, is an aven with a small trickle of water entering.

Stoer Point Cave, Middle. NC 0080 3410

The entrance is 5 m. wide and 8 m. high with about 2 m. depth of water and the roof dips to the north with the bedding. The cave narrows to about 2 m. just inside and appears to bend to the south with a boulder-strewn beach at this point.

Stoer Point Cave, North. NC 0090 3425

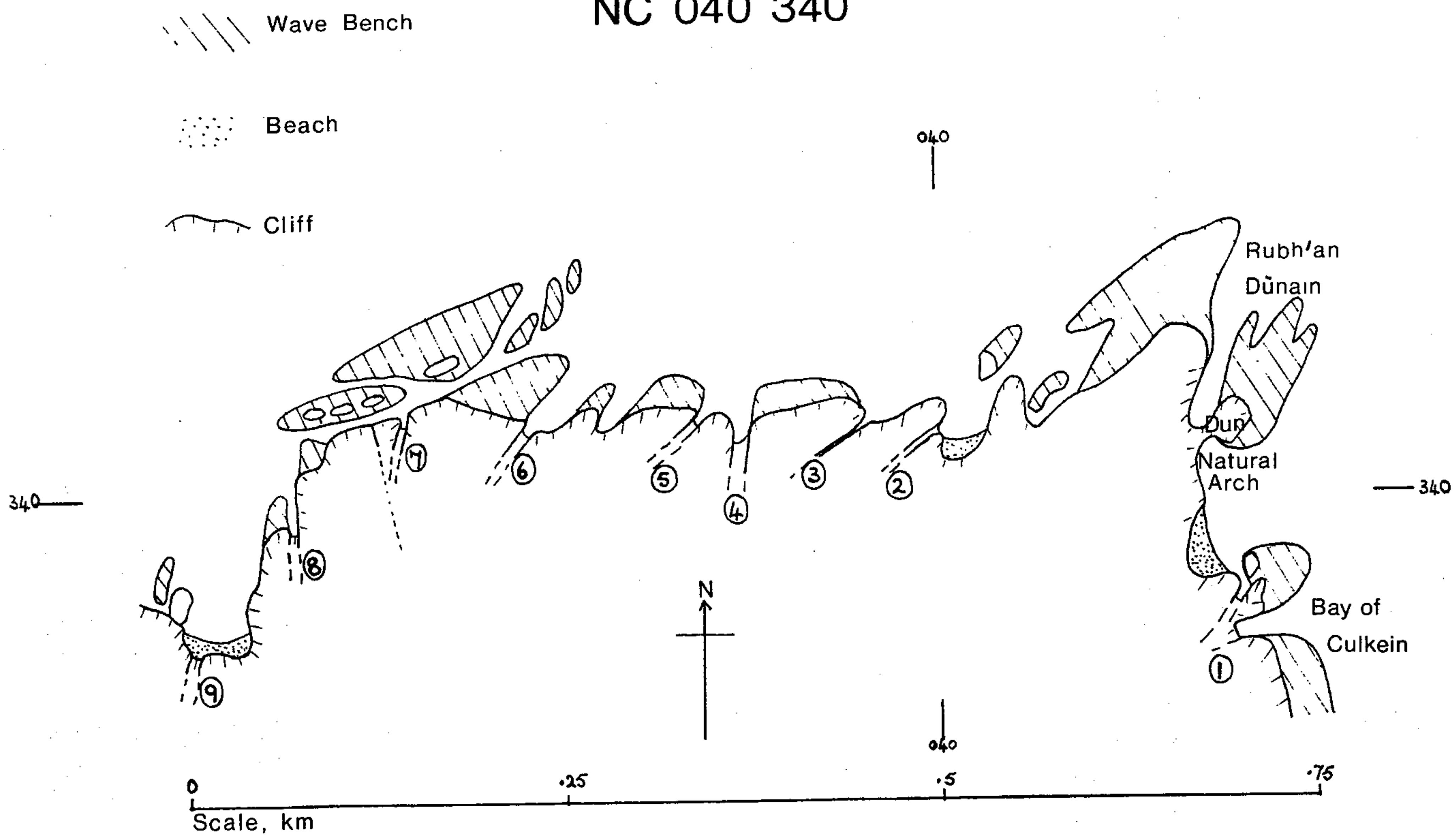
This was an entrance seen from a cliff top, being about 7 m. wide and 15 m. high with deep water going inside it. There appeared to be another entrance 1 m. wide and 2 m. high leading off from a ledge just to the east of the main entrance.

Culkein Caves. NC 040 340

These caves are about ¾ km. north of Culkein Harbour and can be reached by walking round the coast. 9 caves were noted in all and these were numbered from east to west. Of these, only No. 1 could be entered from the beach, although it might be possible to reach some of the others on foot at low tide. The cliffs at the eastern end,near the natural arch, are about 10 m. high but rise to about 30 m. in the region of cave No. 8 and become even higher further to the west. There are

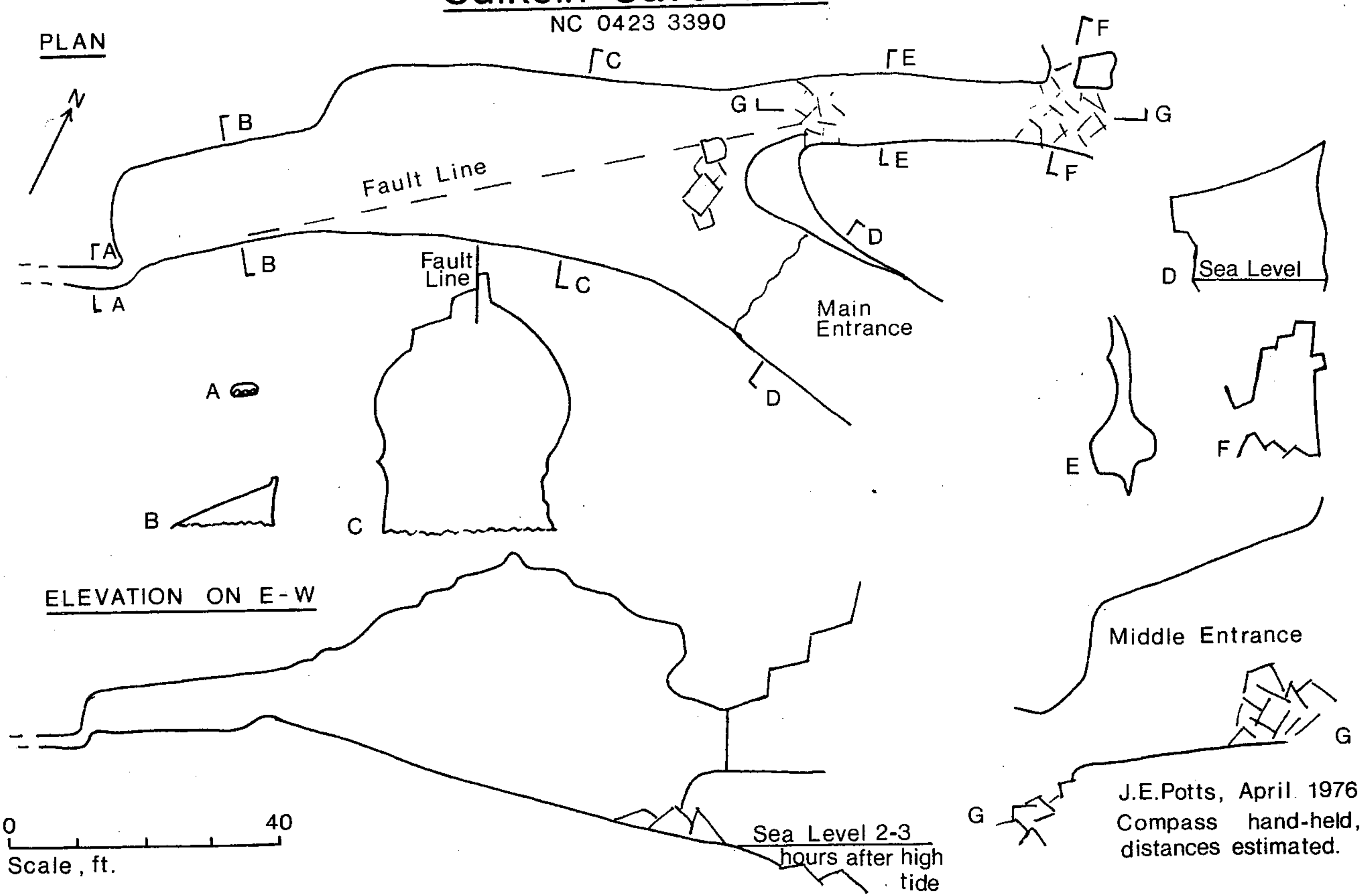
Culkein Caves, Sutherland

NC 040 340



Culkein Cave No.1

NC 0423 3390



J.E.Potts, April 1976
Compass hand-held, distances estimated.

a number of rocks in the sea which would be permanently above high water mark but there is also a very pronounced wave bench almost all the way along this section of coast and this is marked on the map.

Culkein Cave, No. 1. NC 0423 3390.

This was the only cave to be entered and surveyed. (See opposite page.)

It has three entrances; the largest being 7 m. square and facing east. The Middle Entrance is a rift 3 m. wide and 8 m. high, which is divided from the small North Entrance by a stack. The cave can be entered from the beach to the north via the North and Middle Entrances.

Inside the Main Entrance the roof rises so that its highest point is some 11 m. above the boulder slope floor. The boulder slope of the Main Chamber goes back for some 30 m., rising at an angle of about 15^{o}, until it forms a small ridge and the roof drops down to form a passage of triangular cross-section. This passage is about 2 m. high and it goes back for a further 5 m. until the roof drops right down to close off the passage. A hollow in the floor leads into a cobble-floored crawl less than .5 m. high which continues in the same direction as the main passage.

The cave appears to be formed on the line of a fault which runs S.W. - N.E. on a bearing of approximately 050^{o}. This fault can be clearly seen in the roof of the Main Chamber and it seems to form the southern wall of the smaller rear passage.

There were a few small stalactites and flowstone deposits on the south wall of the Main Chamber.

It is possible that the crawl could be pushed further than is shown on the survey as it bent slightly to the north and the far end could not be seen. It would be relatively easy to excavate the cobbles from the floor and the passage was quite dry but very dusty.

Culkein Cave, No. 2. NC 0400 3405.

Entrance 2 m. wide and 5 m. high on the west side of a small bay. A boulder beach inside slopes up in a south-westerly direction for at least 10 m. The cave appears to be formed in a mineralized vein 2 m. wide hading slightly to the south.

Culkein Cave, No. 3. NC 0395 3405.

A rift .5 m. wide goes into the cliff at least 15 m. in a south-westerly direction. The rift is partly roofed over, making a cave some 15 m. high. The sea at the entrance was at least 3 m. deep and waves could be seen travelling along the rift through breaks in the roof 15. m. from the edge of the cliff.

Culkein Cave, No. 4. NC 0387 3405

An impressive entrance 7 m. wide and 13 m. high going straight into the cliff for at least 20 m. Very deep water in the entrance and no beach could be seen. This is probably the cave marked on the 1 : 50 000 map as the entrance would be very obvious from the sea.

Culkein Cave, No. 5. NC 0384 3405

Entrance 2 m. wide and 5 m. high leading into a cave with a boulder beach. Appears to go in at least 7 m. in a south westerly direction.

Culkein Cave, No. 6. NC 0370 3405

Entrance 5 m. wide and 8 m. high with water at least 7 m. deep. Appears to go in at least 10 m. to the south west.

Culkein Cave, No. 7. NC 0363 3405

Entrance 1 m. wide and 3 m. high. A rift with a rock floor which appears to go in at least 3 m. to the south west.

Culkein Cave, No. 8. NC 0355 3400

Entrance 3 m. wide and 7 m. high with 3 m. depth of water in the entrance. There is a very steeply sloping rocky beach inside the cave which then appears to go back at least 13 m. to the south.

Culkein Cave, No. 9. NC 0350 3390

Entrance 5 m. wide and 7 m. high going back to the south from a beach at the foot of the cliffs. It appears to go back at least 5 m. and is actually just above high water mark.

The Survey of No. 1 Cave.

Culkein Cave, No. 1 was surveyed as a solo effort using a Silva Compass to give the bearings of the main passages and the fault as closely as possible. Distances were estimated and a rough sketch survey was drawn up on the spot. A more accurate survey was drawn up the same evening.

J.E.Potts

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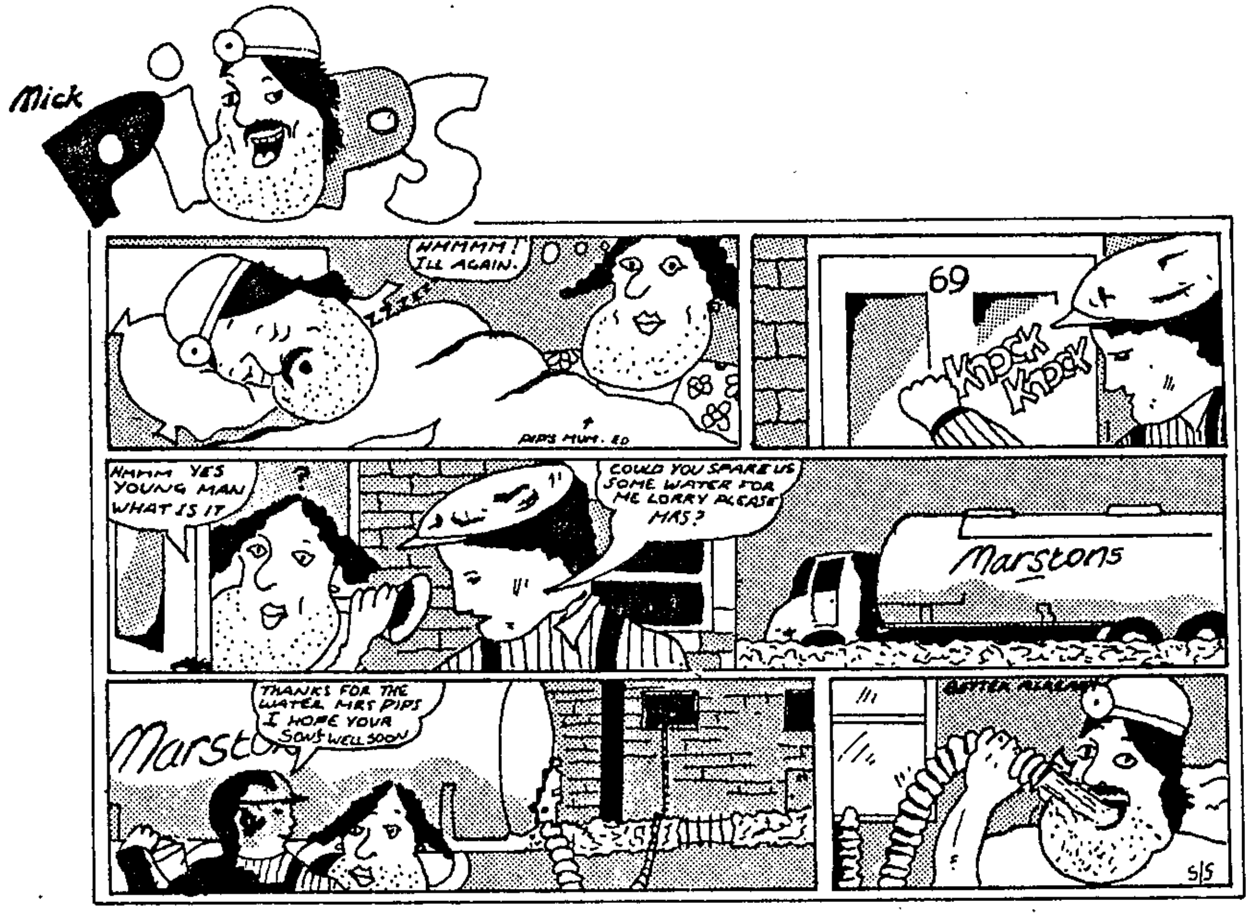
Mick
PIPS
HMMMM! ILL AGAIN.
ZZZZZ
PIPS MUM. ED
69
KNOCK KNOCK
HMMM YES YOUNG MAN WHAT IS IT
?
COULD YOU SPARE US SOME WATER FOR ME LORRY PLEASE MRS?
Marstons
THANKS FOR THE WATER MRS PIPS I HOPE YOUR SONS WELL SOON
Marston
S|S