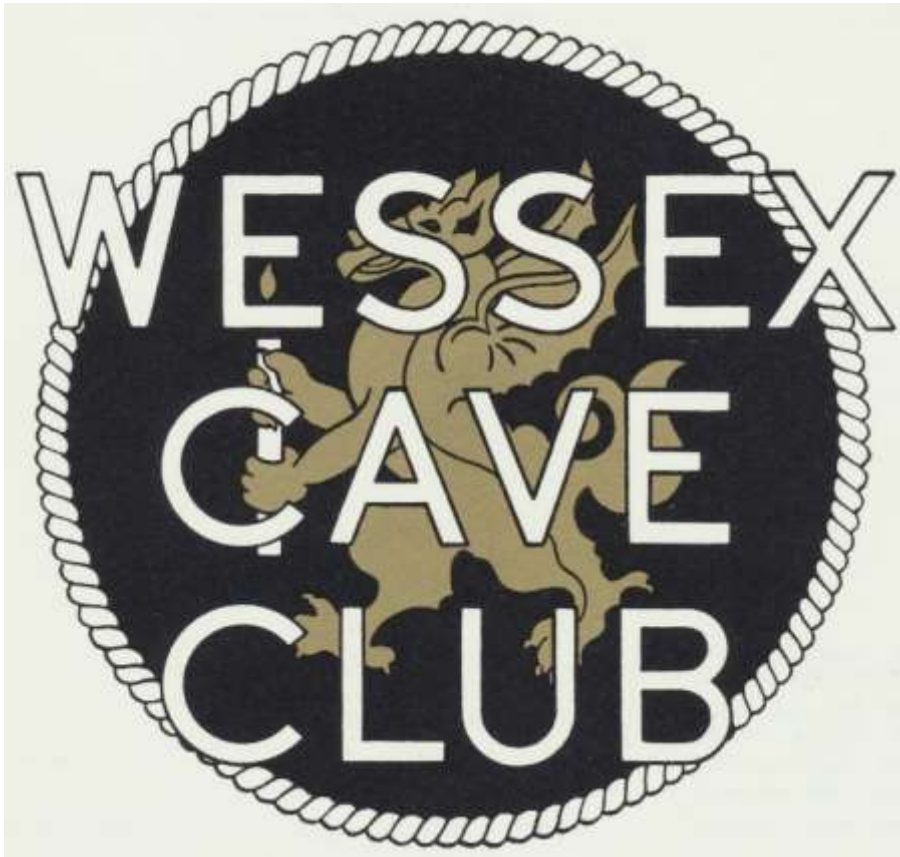

WESSEX
CAVE
CLUB

WESSEX CAVE CLUB

Journal No. 103. Vol. 8. October 1965

CLUB NEWS

The Mendip Cave Registry

Recently we have received the 1964-65 Annual Report from Bryan Ellis, Hon. Sec. to The Cave Registry. The tangible evidence of the Registry's efforts on behalf of all Mendip cavers is to be seen in The Registers; these are housed in the public libraries at Bristol and Wells. In addition, quite recently the "Mendip Cave Bibliography and Survey Catalogue 1901-1963" has been released by the Cave Research Group.

It is fair to say that, in this region, we have pioneered this type of reference literature, but the fact that the bulk of the work has fallen on to the shoulders of a few enthusiasts, is the substance of Bryan's Annual Report. Whilst the shoulders of the few have proved incredibly broad to date, the thoughts of continuing certainly weigh heavy and some of the officers of The Registry are beginning to bow under the strain. What is needed are newcomers prepared to share the load.

The idea of The Mendip Cave Registry originated from Wessex members about ten years ago, and over the difficult period of getting the idea into a working reality we have continued to help, along with most other Mendip Clubs. One would reasonable expect that, as the number of cavers increase, more enthusiasts would emerge who would be interested in the destiny of The Registry. Certainly we can hope this is true from the ranks of our own club, and so your attention is drawn to the Annual Meeting of The Registry at Wells Museum on Saturday, 6th November, 1965 starting 7.0.p.m.

Subscriptions for the Club Year 1965-66.

Members are reminded that their annual subscriptions are now due. These are:-

Full Membership	£1. 0. 0.
Joint Membership	£1. 2. 6.
Affiliated Membership	5. 0.

It would be appreciated if members would make a prompt payment of fees once again this year, to the new Honorary Treasurer:-

Mrs. Barbara Surrall,
216 Evesham Road,
Headless Cross,
REDDITCH,
Worcs.

Please make cheques and postal orders payable to "The Wessex Cave Club".

Membership applications, cave keys and C.C.C. Permits.

Your attention is drawn to the fact that these matters are normally dealt with through the Honorary Assistant Secretary, who is now:-

Mr. L.M. Teasdale,
32 Tonfield Road,
SUTTON,
Surrey.

Mr. T.E. Reynolds, Yew Court, Pangbourne, Berks, will still be dealing with the Survey Scheme, and so members should write to him if they require any cave surveys.

The Gill Memorial, awarded by The Royal Geographical Society.

At the Annual General Meeting of the R.G.S. on 14th June, this summer, the President Sir Dudley Stamp, C.B.E., awarded the Gill Memorial to Dr. G.T. Warwick of Birmingham University for "important contributions to cave research."

Dr. Gordon Warwick has been a member of the Wessex for some years, although, unfortunately for us on Mendip, his main interests lie in the Pennine cave districts. He has always been very active in promoting studies of limestone areas in the Dept. of Geography at his university, and with the C.R.G. We congratulate him and his helpers on receiving this honour, for whilst the R.G.S. itself and other such organisations have sponsored several recent caving expeditions, this is the first real recognition of the scientific contribution of caving from such a great learned society.

New Members

We welcome the following new members to the Club, elected on 3rd October 1965.

R.A. HALE, 13 South View, East Horrington, Wells, Somerset.
P.V.E. MCDONALD, 34 Canford Road, Poole, Dorset.
R.C. MARKING, 3 Kingston Avenue, Chelmsford, Essex.
P.M. REYNOLDS, Riverside, High Street, Kinver, Stourbridge, Worcs.
D.A. TRINGHAM, Northlongwood, Beggarbush Lane, Pailand, Somerset.
Miss K.M. URWIN, 23 Tunbridge Close, Chew Magna, Nr. Bristol.

CLUB MEETS

Saturday October 23rd A.G.M. & Annual Dinner Priddy Village Hall and Caveman Restaurant, Cheddar.

Saturday October 30th G.B. Meet at the cave 2.0.p.m.
Leader: Roy Staynings, 8 Fanshawe Road, Hengrove, Bristol 4.

Saturday November 13th. Longwood Cave. 2.00. p.m.
Leader: Roy Staynings. Address see above.

Saturday November 27th. Evening Film Show. 7.00.p.m. Wookey Hole Inn.
This was originally arranged for Saturday, October 30th, but has now been postponed to the above date.

****

Officers for the Club Year 1965-66.

A complete list of officers will be announced in the next Journal. In the meantime however members are asked to note the following:-

Hon. Secretary: J.D. Hanwell, "Chaumbey", 50 Wells Rd., Wookey Hole, Wells, Som.

Hon. Asst. Secretary: L.M. Teasdale, 32 Tonfield Read, Sutton, Surrey.

Hon. Treasurer: Mrs B. Surrall, 216 Evesham Road, Headless Cross, Redditch, Worcs.

Hut Bookings: P. W. Duck, 13 Goodymoor Avenue, Wells, Som. Tel: Wells 2501

CLUB TRIP TO "BATH STONE" MINES, NEAR BATH. 25/9/65

W. T. Edwards

After a week of lovely weather the rain came on Saturday, as usual, but despite this an enthusiastic party met at Bath Bus Station and departed (on time!) in a fleet of cars for the stone mines near Limpley Stoke. Arriving there we met some more of the party, which now totalled 22 in the age group 3 to 62 years. The number attending, which included several ladies, and the wide range of ages, indicates the popularity of this type of trip, but I hope this does not mean that our members are shunning the more strenuous trips.

Because of its size the party was split into two, and as there was only one map the second party (mine) had to proceed on memory alone.

This particular stone mine, and it is only one of over a hundred in the area, covers many acres and is one of the most extensive of its kind.

Most of the mine is on one level with dozens of main galleries and scores of interconnecting passages, but there are also two lower series which in places run beneath the main workings - and the whole lot is beneath some very expensive bungalows! Little do they know what lies beneath them. So far only one back garden has subsided into the workings.

To get back to the club trip, we explored gallery after gallery and still there were many that we had not the time for. Cave pearls and traces of formations appear in many places, particularly in the wetter parts. There were even some wet pitches because of the heavy rain outside. We passed the other party in one of these galleries and arranged to meet again at the beginning of the lower series.

Our team then entered the most interesting part of the mine, an empty war-time store. Here the floors are dry concrete, all the trash stone has been cleared and one just wanders around in an absolute maze. We always get lost here but just keep going until a way out appears. This area - I estimate it as 2 acres - would make a fine venue for a Club Supper or even the Annual Dinner!

After escaping from this maze we joined the other party and entered the lower series. These workings are in general more shaky than the upper ones but still interesting. One unlikely looking slit leads into another gallery, with some machinery and rails still in position, at the end of which is an exit into somebody's farm yard. Nearby is a 70' pot with water at the bottom that was used as a well when the mines were in operation. This is covered by some rotten timber and requires some caution. The far end of this same gallery was also visited and this showed even more side passages going off, so we have a lot to learn before we know the full extent of this interesting place.

We then gradually made our way back to the entrance and emerged after roughly 2½ hours of almost continuous walking underground. Just before emerging we met a bod with a torch who said he thought the trip was the previous Saturday. I'm still not sure if he had been looking for us for a whole week or not! Anyway, 22 entered and 23 came out.

A SCALLOPED CAVE PASSAGE OF TRIASSIC AGE NEAR CHEDDAR

W. I. Stanton Ph.D. F.G.S.

INTRODUCTION

Half a mile northwest of Gough's Cave at Cheddar lies Chelm's Combe Quarry, in which there are several caves. It was while surveying these, in April of this year that I noticed well developed scalloping on several rock surfaces on the quarry face. The presence of Triassic breccias (Dolomitic Conglomerate) a few feet away, and the lack of comparable scalloping in the caves, seemed interesting enough to merit a more careful examination and the writing of this note.

DESCRIPTION

The site is at the southeast end of the quarry, between the two small phreatic caves that are the remains of Chelm's Combe Quarry Cave (Chapman 1954, Warwick 1955) and from twenty to thirty feet above the quarry floor. Here the Carboniferous Limestone is cut by a nearly vertical fissure developed in one of the prominent NNE-SSW joints or minor wrench faults, filled with reddish angular to sub angular pebble-grade Dolomitic Conglomerate and red and yellow marl, in sub horizontal beds. (At a higher level the bedding appears to dip at up to 30 degrees locally). In the quarry face the fissure reaches a length of about 30 feet and a width of about 10 feet in cross-section, but is generally smaller. In the northern cave remnant, the ceiling of which is partly Conglomerate, the width may be slightly greater and the breccia attains cobble grade. The visible depth of the fissure from the top of the quarry face to the bottom of the cave is about 100 feet. The Trias/Carboniferous unconformity was probably only a few feet above its upper end.

The vertical portions of the fissure walls are mostly obscured by calcite veining, perhaps the result of minor faulting or of slip due to compaction of the filling. However, solutional enlargement of bedding planes has given rise to sloping surfaces, and it is on these that the scalloping is seen. The best exposure is some 2 feet square. Individual scallops are shallow, from half an inch to 2 inches in diameter, their edges sharp and clear, and they completely cover the rock surface in a pattern quite comparable with that in a modern stream passage - Stoke Lane 2 for example. In two exposures 8 feet apart it is directional, showing water flow downwards.

When the Triassic deposits are split away from the limestone surface more scalloping is revealed beneath them.

“Modern” cave development has often followed the line of the fissure. Part of Chelm's Combe Quarry Cave was formed in it, and a network of open tubes may be seen at the Conglomerate/limestone contact at many points in the quarry face.

The fissure passes below the floor of the quarry and its total depth is unknown. It is unlikely to be further quarried during the next 25 years. A specimen of the fissure wall showing scallops packed with fine-grained Triassic breccia was taken and is now in Wells Museum.

DISCUSSION

There can be no doubt that the scalloping was developed before the cave was filled with Dolomitic Conglomerate, which is of Keuper (Upper Triassic) age. The cave was therefore developed in Permo-Triassic times, and in view of the Late Triassic date of the filling it can probably be safely called Triassic.

Insofar as may be judged from the fact that scalloping of this kind is not usually found on the sides of high waterfalls, from the apparent absence of vertical fluting due to vadose trickles, and from the general appearance of the fissure, the cave appears to have been opened out under phreatic conditions. This may seem surprising, in view of its situation on a Triassic hillside, since the Triassic period was a time of arid climates in Britain. However, in deserts past and present, such rain as does fall often comes as heavy storms that cause flash floods capable of filling up a cave system and creating temporary phreatic conditions. Even so, large quantities of water would be unlikely to enter the fissure unless it was situated in the bed of a gully, such as were probably common on the steep sides of Triassic Mendip just as they are today, no traces of such a gully are now visible so it was probably a small one.

While Triassic solution cavities are by no means unknown in the Mendip region (e.g. Warwick 1952) this may be the first record of a Triassic cave passage exhibiting scalloping and opened out by a powerful phreatic flow. The process whereby it controlled cave development some two hundred million years later is likely to have operated at many other places in Mendip.

REFERENCES

CHAPMAN, J. 1954. Chelmscombe Cave, Cheddar. Axbridge Caving Group and Arch. Soc. Journal, 2, No. 2, 21-24.

WARWICK, G.T. 1952. Fossil Cave System. Cave Research Group Newsletter. No. 41, 10-11.

WARWICK, G.T. 1955. Views on the Origin and Development of Chelm's Combe Cave, Cheddar, Axbridge Caving Group and Arch. Soc. Journal, 2, No. 3, 6-13.

LADDERS

C. Pickstone

Introduction

Judging from the number of bent and slipped rungs, the choice of materials and method of construction of ladders has been, and will be, the topic of many conversations among cavers. In this article it is hoped that some of the design considerations will be explained, so lending to a better understanding of the subject.

Materials

In the interests of handling, the weight of the ladder should be kept to a minimum. Since the majority of the weight is in the rungs, a light, but strong material must be used for making them. Considerations of electrolytic action between dissimilar metals in contact in a damp atmosphere should be kept in mind. For this reason, the metals close together in the electro-chemical series are best used so that the voltaic cell action is negligible.

With a view to keeping the ladders light in weight, the rungs are made as small as possible, with the result that the stresses are high; too high in some cases and permanent bending results. The stresses on the rungs can be separated into two types - Tensile and Compressive. The tensile stresses are set up in the outside of the bend, whilst the compressive ones exist on the inside, and since most materials are stronger under compressive loading, the tensile stress is taken as the limiting value.

The search for cheap materials of low density naturally leads to the Aluminium or Magnesium alloys; however, the latter, although having a lower density are not suitable for rungs as high tensile strengths are required. Also there is little voltaic action between aluminium alloys and the galvanised (zinc) steel wires mentioned in the previous article.

Aluminium Alloys

The type of aluminium alloy is specified by symbols. The symbols can be split up into components - prefix, form of supply, number and suffix; these components give the natural and heat treatment etc. that the material has or can receive.

Prefix	N = Non heat treatable alloys	
	H = Heat treatable alloys	
Form of Supply	T =	Drawn Tube
	V =	Extended Round Tube
	E =	Bar Section
Suffixes	O =	Annealed
	M =	As manufactured
	W =	Solution treated, naturally aged
	WP =	Fully heat-treated being Solution and Precipitation treated.

Suffixes (continued)

H = Varying degree of cold working to which the material has been subjected.

For example ¼H

For example an aluminium alloy specified as HT15W is heat-treatable alloy No. 15 in the form of drawn tubing, which has been solution treated.

The wrought aluminium alloys have mechanical properties as follows, defined by B.S. 1471.

Material	Condition	0.1% Proof Stress	Tensile Strength	Elongation on 2"
		Tons/Square Inch.	Tons/Sq.In	%
N5	O	-	14	18
N5	½H	12	16	5
N6	O	-	17	18
N6	½H	14	18	5
H20	W	7	14	12
H20	WP	15	19	7
H30	W	7	14	12
H30	WP	16	20	9
H14	W	18	26	10
H15	W	18	26	10
H15	WP	23	29	8

It will be evident from the table that the "treatment" (cold working or heat-treatment) has the effect of increasing the tensile strength at the expense of the ductility. The material having the highest strength H15WP has insufficient reserve of ductility to withstand the inevitable overloads which occur in use. Also in this condition (fully heat-treated) the corrosion resistance is of a lower value than that of other alloys. The alloys recommended by the Aluminium Federation for this application are H14W or H15W provided the ladders are kept in a clean and thoroughly dry condition when not in use.

The H14W and H15W alloys are similar in mechanical and other characteristics, the H14W probably being the most easiest to obtain from the stockists.

Rung Sections

For a ladder used in the vertical position, the ideal rung section would be I shaped. However, since ladders are often used in a non-vertical position, the circular section is to be preferred since it gives an "all-round" rigidity. By making the rungs hollow, the weight can be considerably reduced.

Width of Rung

In order to keep the weight and stressing to a minimum, the length of the rung between the support wires should be just large enough to accommodate the boot comfortably.

The actual length of the rung between the supports is a matter of personal choice. S.W.C.C. use 5.l", S.M.C.C, use 5.25" and W.C.C. 5.375", indicating perhaps that Wessex members have larger feet! Small differences in rung width do not alter the diameter required significantly. The overall length of the rung is found by allowing twice the diameter of the supporting wire to overhang at each end; this is to prevent the wire tearing out sideways. The overall length of Wessex rungs is 6".

Diameter of rungs

The size of rungs used in caving ladders is probably the most controversial of all aspects of ladder construction.

If the stressing on the rung exceeds the Proof Stress of the material, permanent bending will result, if heat-treated alloys are used; subsequent straightening would run the risk of cracking the material. To calculate the diameter of rung it is necessary to make some assumptions, which are as follows:-

1. The weight of the caver is 200 lbs.
2. Ignore the weight of the ladder.
3. Take the worst possible case i.e. the ladder is caught on a rock projection so that the centre of the rung is taking the weight.
4. The width of the rung is 5.375 ins. between supporting wires.
5. Allow a factor of safety of 2 over the Proof Stress of the material.
6. The bore of the rung is 2/3 of the external diameter.
7. The material is HT14W or HT15W having a U.T.S. of 26 tons/in^2.

Maximum Bending Moment = $\frac{100 \times 5\text{-}375}{2}$ = 268.7 lbs ins.

using the Bending formula $\frac{M}{I} = \frac{f}{y}$

where M = Maximum Bending Moment

I = Moment of Inertia of section $\frac{II}{64}(D^4 - d^4)$

$d = \frac{2D}{3}$

f = Maximum allowable stress in the material which in this case is $\frac{\text{Proof Stress}}{\text{factor of Safety}}$

y = Distance from Neutral axis to the extreme fibres of the material, in this case $\frac{D}{2}$

so $M = 269$ libs ins. $I = 0.0396D^4$ ins^4.

$$f = \frac{18 \times 2240}{2} = 20{,}000 \text{ lbs/ins}^2. \quad y = \frac{D}{2} \text{ ins}$$

using the above formula and solving we have:-

External Diameter D = 0.554 ins.
Internal Diameter d = 0.370 ins.

The nearest size of tubing generally available is 9/16" dia x 14swg. which should be regarded as the minimum size of rung required. Some clubs use 3/8" x 16 swg rungs, which have been proved to have inadequate strength, if the ladder gets caught up on a rock projection. These "ULTRA-Light weight" ladders have to be used very carefully to avoid bending the rungs and for this reason they are not recommended for general use. The possibilities of the condition assumed that of a knife edge loading acting at the centre of the span of the rung, existing in practice, is extremely remote, the loading would be spread over the area of contact of the rock projection, the resultant stress in the material being of a lower value, than that obtained by a point load. If care is taken in rigging pitches the ½" x 14swg should prove satisfactory.

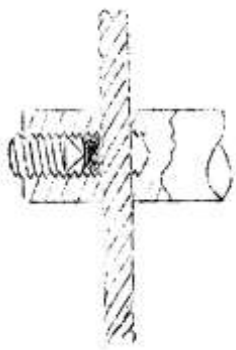
Pitch of Rungs

Although opinions seem to vary tremendously as to the construction of ladders, one dimension generally agreed by all ladder constructors, is, a pitch of l0½" between rungs, being regarded as the most efficient distance.

Rung Fastenings

Having chosen the wire rope (previous article) and the size of rung, the next problem is, that of fastening the rung to the wire rope side supports. As there are various means of accomplishing this, specimens of the most common fastenings were manufactured, using ½ x 14 swg tube, and 10 cwt wire rope, and subject to a tensile test to investigate their method of manufacture and strength.

"ALLEN" SCREWS

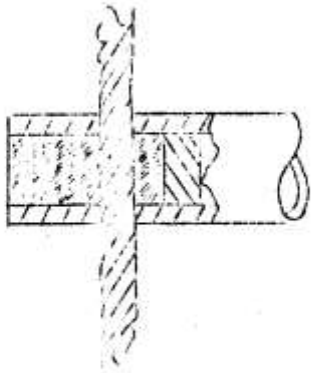


This method is used mainly on solid, but may be adapted for use on hollow rungs.

An "ALLEN" screw is screwed into the end of the rung, having first placed a small disc of soft aluminium in the hole. The soft aluminium prevents the hardened screw cutting the wire rope, which kinks under the action of the screw, thus forming the fastening.

Under the tensile test the rung slipped at 390 lbs

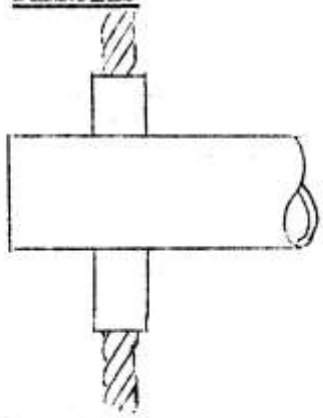
ZINC



Used on hollow rungs, but solid ones can be used, if a large diameter hole is drilled up the end of the rung. A plug of some description is first inserted inside the rung, to prevent the molten metal from filling the entire rung.
Molten zinc (419 C) is poured inside, the zinc penetrating the interstices of the wire rope, and bonding with the zinc plating on the wires.

Under the tensile test the rung slipped at 415 lbs.

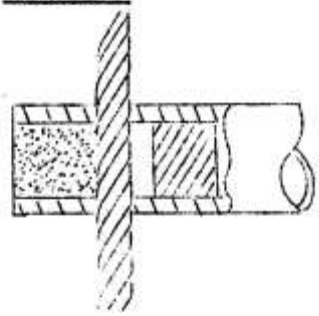
FERRULES



Used for solid or hollow rungs. Two ferrules of annealed aluminium alloy are placed one either side of the rung and compressed by means of a die. The soft metal being forced into the interstices of the wire rope, thus securing the rung.

Under the tensile test the rung slipped at 900 lbs.

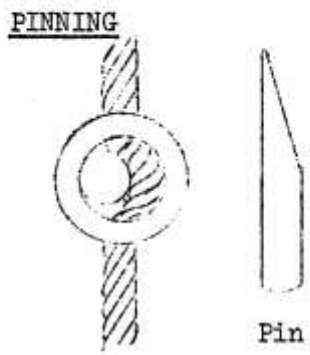
"ARALDITE"



Used for hollow rungs, and follows the method used for zinc, namely insert a plug into the rung and pour a formulated apoxy resin into the cavity. The resin being in a liquid form, it penetrates into the wire rope.

The rung slipped at 482 lbs.

PINNING



This method utilises a rung having an internal diameter a little larger than the pin used. The fastening is effected by trapping the wire rope between the pin and the internal wall of the rung by driving a chamfered pin up the bore of the tube.

The rung slipped at 550 lbs.

All the rung fastening, were strong enough, to withstand the weight of a caver (200/2 = 100 lbs) on each fastening, under normal use as ladder. But occasions may arise where the ladder is hung incorrectly the resulting loading of the rung fastenings being unequal. If the ladder is subject to a shock load in this condition, the high stressed fastening would slip, it has been proved in practice that the weakest fastening - "Allen" screws is not strong enough for general use, although being the easiest to manufacture. The effect of heating the wire up to 419 C envolved in the zinc fastening, could lower the temper of the steel wire in the rope, which would therefore weaken the ladder. The "Araldite" method proved to be very laborious, an oven being necessary to cure the high strength apoxy resins used, also salvaging rungs in the advent of apoxy.

Wire rope failure is practically impossible, as the apoxy resins cannot be dissolved satisfactorily when cured. Producing ladders by pinning the rungs onto the wire rope appears to be the most efficient, although not possessing a strength as great as the ferrules, it combines speed of manufacture with a strength sufficient for its purpose. The ideal fastening for strength, is the ferrule type, but the facilities of a comprehensive workshop are required, to manufacture the equipment necessary to produce ladder economically by this method.

CONCLUSION

In all caving equipment, dissimilar metals are in contact in conditions of high humidity. To avoid a voltaic cell being set, with resulting corrosion, the ELECTRO-CHEMICAL SERIES has to be examined before a particular metal is used. Aluminium, zinc and iron are all close together in the series, therefore there should be negligible corrosion between them, on the other hand, copper is some distance away. For this reason metals having high copper contents, i.e. BRASSES, BRONZES, the high copper aluminium alloys are to be avoided in conditions of high humidity, if in contact with other metals, having differing potentials. Cases have been known of ladders fracturing when brass pins were used to fasten the rungs, the corrosion being hidden from view inside the rung and only coming to light when the ladder breaks or a rung slips.

MENDIP NOTES

Cheramodytes

The iron pipe

Most cavers active on Mendip will by now know of the loss of this pipe at the head of the forty in Swildon's Hole. It was taken on Monday, 6th September, 1965 by some strangers. Bryan Ellis saw the party in the Old Grotto coming out of the cave, but did not appreciate the fact that the iron pipe they had with them had only just been stolen. He did not recognize any faces. This pipe was put in by Luke Devenish and Colin Vowles in about 1948 to replace a smaller one that had been placed there by Old Balch; it thus has quite a long history. Its presence was essential in the days before cavers had protective clothing. Most of the exploration done before 1956, when dry suits came in, would have been impossible without it. Even recently, when the majority of cavers still do not have wet or dry suits, its presence has been making it possible and safe for many of the younger ones to enjoy lower Swildon's.

A feeling has been growing, however, that lower Swildon's is getting overpopulated, and many of our present day tigers, though they resented the manner in which the pipe had been stolen, relished the prospect of not having to queue up at the forty and enjoyed the sporting nature of the descent in the waterfall. At the time of writing the pitch is wet from top to bottom, if the ladder is hung in the usual place. The full force of the water is encountered about halfway down, but the foot of the ladder is about 2ft. inside the plunge point. Climbing against a high stream is indeed exhilarating.

A great many other cavers do not share this opinion. They feel that the tigers are being selfish. Far from keeping away all the weaker cavers, they fear that it may lead to accidents. How right they are was revealed on Sunday, 19th September, when two members of a school party went down the pitch, found the water was a bit heavy, decided not to press on with the rest of the party and began to re-ascend. One of them failed to climb against the force of the water, and a cave rescue was set in motion. M.R.O. was not called out as there were plenty of cavers on the spot, who were able to do all that was necessary. They gave him hot drinks and encouragement, hung the ladder from the iron bar in Suicide's Leap, so that the upper part was out of the waterfall, and with a good pull got him out none the worse. He was not a novice and had been down the pitch three times previously.

Clearly something has got to be done to prevent further accidents of this kind, so on 23.9.65. Howard Kenney and Oliver Lloyd went and had a look at it and considered all the possibilities. If a ladder is hung from a slightly worn stalagmite column on the right of the pitch, the lower half is still in the waterfall. If it is hung from the iron bar only the bottom is in the waterfall. It is however undesirable and unrealistic to expect all parties

to hang their ladders from up there. Undesirable, because the bar-was put there exclusively for rescue purposes, and its continual use will weaken it. Unrealistic, because many cavers can't climb up there to fix the ladder. If it were hung from a rawlbolt fixed in the stal flow opposite, the ladder would be mostly out of the water, but it would be distinctly awkward for the first man up to climb off it, over the gap and onto the lip. A double life line would not help unless it was fixed to the iron bar.

The only alternative seems to be to replace the iron pipe, so they took measurements and went and discussed the matter with Mr. Maine. He told them that he does indeed wish to have the pipe replaced, and he is going to get a new one for this purpose. He doesn't want cavers to be discouraged and he doesn't want any more accidents.

Old iron

It cannot be an accident that the theft of this pipe comes at the crest of a campaign against the use of mechanical aids to caving, a campaign which is marred by an inability to distinguish between the essential and the superfluous. In August last year someone removed Stanton's aids to the Twenty, which were clearly superfluous, and also the ladder in the Greasy Chimney, which was nice but non-essential. They have nearly always respected fixtures which have been put in to promote particular pieces of exploration, such as the peg above Keith's Chamber, various things in Vicarage Passage and the lines through Swildon's sumps. But what is one to think of the individuals who remove the guide wire in Eastwater Swallet? This wire was put in to mark a particular route, which would enable the caver to get to the Canyon without going past a dangerous piece of boulder ruckle. Cavers with long memories will recollect that on 30.7.1960 Alan Hartnell was killed by a fall of rock in that part of the ruckle which lies at the head of the 380 ft. Way. The fall opened up a conical roof of loose rock, which has been dropping at intervals ever since. The farmer closed the cave, and to get it re-opened we marked the alternative route and put warning notices around the danger spot. The notice at the entrance, saying that the cave is in a particularly dangerous condition, is as true today as when it was erected. On 4.8.65. the guide wire, which has been slightly damaged over the years, was repaired.

A few weeks after this, however, some mischievous persons removed three quarters of the guide wire and rolled the rest up into bundles. At the request of the farmer repairs were begun on 17.9.65, but a good deal of new line still has to be laid. It is not certain who stole the line, but it looks like an outside job.

Caves are where you make 'em!

Willie Stanton has, to use his own words (1) "a modicum of cunning", and his "honest face" possesses a long nose for seeking out people who attempt digs on the quiet. Thus it

was no surprise to Mike Thompson and Jim Hanwell when he arrived enthusiastically upon their preserve at North Hill Swallet. Indeed his arrival was welcomed, for the enthusiasm was taken (even more so than the rounded sandstone pebbles) as positive evidence that the dig had something worthwhile. Since then they have been joined on many occasions by other members of the Shepton and Wessex, and things have moved apace, though not without the now inevitable weekly crisis. A more convenient shaft next to the first one has been opened and fitted with concrete pipes. There now exists a 30ft. vertical shaft, and work continues downwards in the rift below.

Larkshall Swallet

During the wet season of this year members of the Severn Valley C.C. turned their interest to Eastern Mendip. Following up the remarks about the drainage of the area in an earlier Journal (2) they noted that the old flood entrance at Springfield Slocker had re-opened and so started to dig. However the local people did not feel so kindly towards cavers as did the landowner concerned, and so they were asked to leave what was undoubtedly a promising site. More as "Hobson's choice" than anything else they vented their feelings upon a small slocker near Midway, and as luck would have it entered a cave after a few hours. Paul Allen describes their find as another Withybrook in both character and size, though a little more unstable. They have named the cave Larkshall Swallet, and hope to extend the system even further in the future.

Biddlecombe dig, Wells.

Many people since Balch have looked at the indeterminate sink south of west Horrington in the deep Biddlecombe Valley leading into Wells, but to date their interest has been confined to turning over a few stones and delighting in seeing the stream gurgle happily underground. Now we hear that Brian Prewer has roused members of the Cerberus S.S. to make a more concerted attack at the sink. At odd times the St. Andrew's Well some two miles away has become discoloured, and it may be that this pollution is connected with the disposal of refuse at a local tip just downslope of the sink in question. If so, then we shall look forward to the results of Brian's dig with great interest.

Control of Swildon's

After the public outcry for adequate control of cavers entering Swildon's during wet weather, Mr. A. Maine told the newspapers that he intended to have a kind of blockhouse built over the entrance. The next week end cavers were to be seen photographing the entrance and coming away saying, "I just wanted to have one more look before it got spoilt." Clearly something more suitable than concrete blocks had to be used and so some architects attached to the Mendip Preservation Society submitted to Mr. Maine a drawing and specification of a structure to be built in stone. The plan is

circular and is based on that of the old Priddy Round House. It is designed to prevent flood water spilling over the entrance, to be open to the sky and to look nice. Mr. Maine likes it very much. He showed it to me and it reminded me rather of the ventilation shafts above railway tunnels, we now await his decision to go ahead and build. Meanwhile everyone wishing to go down Swildon's should seek permission at the farm. Although this seems obvious to us, it is surprising to hear of some responsible young cavers, who had come from a distance, who were quite ignorant of the custom of asking permission and offering a shilling.

Back from Morocco

In spite of newspaper reports to that effect, Mike Wooding really has been sumping in Morocco. He has now returned. The Dai Chikker basin contains a sink called Friouatto, a lower cave called Chikker and a resurgence known as Ras-el-Mar. It is in a much folded and contorted limestone and gets flooded in the rainy season, which is now imminent. At other times it is without a stream, but contains fairly extensive static sumps, four in numbers one at each end of the caves. He and "Fish" Jeanmaire dived through each of these sumps and discovered and surveyed a further 3600ft. of new passage, which nearly doubles the known parts of the caves. The passages are notable for mud and shattered rock. Besides this they contain a fine collection of helictites, finer than any in G.B. Cave. A complete through trip is not possible, as parts of the cave are obstructed by mud fills. The sumps, at over 60° F, are lovely and warm.

Yobs on Mendip?

We have counted ourselves luckier than the North in not having any yobs on Mendip, and I very much hope that the incident on 25.9.65. was an isolated one and not the start of a trend. Walking back to the Sheep Ton from the Hunter's that evening, Bob Craig was set upon by some ruffians who knocked him down, said they were going to kill him, kicked him in the face and left him unconscious. Gordon Tilley, who tried to help Bob, came in for like treatment. Just then up came Nick Hart, so they set about him. Now Nick used to work with a rocker (not a mod), who said that street brawling was not the romantic fisticuffs and the best man van, but the first to put the boot in was the winner. He was a great admirer of Nick's steel toe-capped caving boots. Bearing this in mind Nick landed his assailant a lovely kick in his most sensitive part and sent him away yelping. "It is", says Nick, "the quickest way I know to end a fight."

3.10.65.

REFERENCES

(1) Stanton, 1965, W.C.C. Journal, Vol.8, No.102, p.277.
(2) Hanwell and Thompson, 1961, W.C.C. Journal, Vol.6, No.82, p.319.

Wessex in Pyrenees

A correspondent writes to say that he has just returned from the Club Pyrenean trip and has not yet recovered. The weather was about the worst imaginable: rain, snow, thunder, lightning, hail and one day of sun. It didn't even do these things in moderation; when it rained an inch would fall in about two hours, and the hail stones were an inch across. All this when camping in very small tents was not really much of a holiday. The "usual Wessex chaos" was said to have prevailed over the caving, too. The first week they couldn't get the key to the cave, and the second they couldn't even find Henne Morte without a local guide, and the walk up to it almost finished everyone off. Casteret has gone up in their estimation.

I hear, moreover, that ladders down open potholes make excellent lightning conductors, to the extreme danger of those climbing.

****

LETTERS TO EDITOR

Dear Sir,

I have read with great interest Mr. Kenney's article in the current Wessex Cave Club Journal on the recent rescue in Swildons Hole. On the first of these two occurrences, the cavers lighting equipment is reported as having consisted of 2 hand torches, 2 Acetylene lamps and 1 Nife cell.

It is many years since I personally have done any active caving and since then cavers' equipment and the extent of Swildons Hole has increased beyond the wildest imaginations of we old men; but had the modern cave explorer never heard of a candle?

In my active days this simple piece of equipment was a sine qua non - indeed when I first explored caves it was the only source of light available to us. With the advent of acetylene headlamps a great stride forward was made; but those who were fortunate enough to acquire one always carried a few candle stumps and a box of waterproof matches in case of emergency.

May I respectfully suggest that some publicity be given to this reliable source of illumination, as it may possibly prevent a recurrence of the unfortunate incident referred to above.

To sum up, I would say that the candle is the most reliable source of light (not the most efficient or the most convenient) but an ever present help in trouble. Provided that, (and this is important) a box of waterproof matches is carried:-

(a) It can be saturated, and will still light
(b) Does not cast glaring shadows
(c) Can be stationed on any odd corner of rock, and serve as a beacon to followers in the party.
(d) Takes up so little room in the pocket.

Finally, when "batteries fail, Carbide is lacking, or jets become choked, it is always there - cheap - convenient - and even a slight source of warmth!

I sincerely hope these few remarks will be taken to heart and acted upon; if you can find space in the next Journal to bring the subject up, it may avoid accident or at least unpleasantness for caving parties.

Yours sincerely,

Jack W. Duck.

Founder Member W.C.C.

Dear Sir,

re: Orientation of Longwood/August Survey

I have just recently heard rumours that the orientation of the survey of the above cave has been questioned. I have therefore just checked back to the original survey sheets and the original drawing with the result that the discrepancy has been found. The error does not, however, effect the survey of the cave itself or the relationship with the ground above.

The arrow indicating the direction of true north, is in fact at a bearing of 323 degrees, that is 37 degrees in error. The origin of this mistake is a mystery.

I offer my apologies to any who may have been inconvenienced or misled by this error. If, however, the error could have been pointed out to the author in detail at an earlier date the mistake could have been rectified a little earlier. The copy of the survey held by Hall Harding will be recalled for a few days for the correction to be made.

Yours sincerely,

Mike Rennie.

Mendip Caving Group.

Dear Sir,

Most of your readers will know that the pipe on the 40' drop in Swildon's Hole has been removed recently by persons unknown. This is an action which certainly has the support of several young cavers on the grounds that artificial aids which make a cave easier to descend are undesirable, and that the removal of the pipe will make lower Swildons more exclusive to experienced cavers and so minimise rescues and avoid damage to formations.

I decided to look at the drop under these conditions and descended without a wet suit just to see how it felt. The stream was running at a low winter flow. The climb was very sporting and even enjoyable if one's object was to taste the exhilaration of triumphing over difficulties. But it was clear to me the argument that the removal of the pipe will result in less rescues is a fallacy. It is not difficult to climb down the ladder while still fresh and warm, and no doubt young cavers will do this, but the return journey is much more difficult. Flying spray and the weight of water on the body will cause most people to become short of breath, and there is a good chance of a little experienced ladder climber falling off, or being unable to get up. This has already happened since the pipe was removed, but fortunately without serious consequences. When one remembers that there has already been one fatality on this drop because of wet and exposure, it is clear that the pipe must be replaced.

The argument that artificial aids are undesirable is suspect, for do we not all use artificial aids with ladders, ropes, wires through sumps etc., where safety deems it desirable? Indeed there is a powerful argument in favour of limited artificial aids in Swildons Hole, for if further progress is to be made at the limits of endurance it must be made possible to get to the further reaches of the cave as quickly as possible. There is a limit of endurance even for tigers. William Stanton made his contribution to this end by fixing a traverse wire on the 20' drop, which did not in any way interfere with those who still wished to climb a ladder. This was removed by quite a young caver who posted the bits back to William. (I cannot see the difference between a wire ladder and a wire rope!)

The last argument of those who support the removal of the pipe is however, the most objectionable, and in my opinion should be condemned by all true lovers of caving. The selfishness of those who wish to deny the lower reaches of Swildons to anyone but a tough caver appals me. We can all think of friends who have caved for many years and made a considerable contribution to the knowledge of caving whose physical prowess may not allow them to climb the drop under these conditions. Why should they be denied the right to explore Swildons? Even tigers will eventually become less capable.

When I was a young inexperienced caver I was always treated courteously by older more experienced cavers and I have reason to be grateful to many fine leaders whose names are now legendary, I do not like to see this tradition broken, and even though beginners may sometimes be inconvenient, surely they are not to be discouraged from exploring our finest cave?

And whose cave is it? Were Mr, Main's feelings in this matter considered? He was already upset by recent rescues and the discourtesies of many cavers, and the possibility of closing the cave has been mentioned by him. The attitude of Mendip farmers has hardened against cavers recently and we must take great care that we do not lose our present freedom to enter this great cave without form filling or fuss.

Mr. Main has expressed his wish for the pipe to be replaced, and will buy the necessary materials. Perhaps the culprits, who have not got sufficient courage of their convictions to identify themselves, will at least have the decency to re-fund Mr. Main's expenses.

At the same week-end, the guide wire in Eastwater Swallet was removed. This was placed there after a tragic fatality caused by falling boulders. The wire indicates a course to avoid the danger spot where boulders have fallen since, and there is still a real risk. The wire was placed there after the accident on the instructions of the farmer and is being replaced at the request of the new farmer. The removal of the wire is indefensible, and to be utterly condemned.

I do not feel I will be doing my duty to the club without expressing my opinion on these actions. I feel that this is a matter of such importance to the future of caving, that the opinions of both schools of thought ought to be aired, and I hope other members will send you their comments.

Yours sincerely,

C. Howard Kenney.

Chairman,

****

CORRECTION

Pen Park Hole or The Lovers

At the end of this poem, see Journal 101, Vol. 8 a note was suffixed stating that it was from a manuscript plan in the British Museum etc. etc. This was an error; the poem was copied by T.R, Shaw from a typed transcript held in B.S.A, records. He writes that he has been unable to trace the original, the British Museum does not have a copy of "The Lovers Offering" from which it purports to have come.

Ed.

The Nickel-Iron Alkaline Accumulator

John Church

Nowadays, the number of cavers using alkaline accumulators as their main source of illumination underground seems to be rapidly increasing. This article has been written for the benefit of those using Nickel-Iron batteries who wish to know something about the actual cells. The description given does not relate to a particular cell of any manufacturer, the difference between them being very small. However, the section dealing with recharging is written with particular reference to battery type NC.113C, which was originally manufactured by Alkaline Batteries Ltd., for the National Coal Board. This battery was chosen as I believe it to be the one most commonly used by cavers.

The active materials in the nickel-iron cell are nickel oxide on the positive, and iron oxide on the negative plate. The electrolyte is a 21% solution of potassium hydroxide with the addition of a small quantity of lithium hydroxide. The action of the latter is not yet fully understood but it radically increases the capacity of the cell. The exact formula of the nickel oxide has not yet been established, but the action of the cell can be followed by assuming the peroxide, NiO_2, or its hydrated form, $Ni(OH)_4$. On discharge, the hydroxyl ions of the electrolyte migrate to the negative plate and therefore become oxidised, while the potassium ions migrate to the positive plate, nickel hydroxide being formed by reduction. During charging the reverse occurs, both reactions being represented by the reversible equation: -

$$Ni(OH)_4 + KOH + Fe \qquad Ni(OH)_2 + KOH + Fe(OH)_2$$

It is clear that the electrolyte acts merely as a medium for the transfer of the hydroxyl ions between the plates, itself undergoing no chemical change. Because of this, the density of the electrolyte does not change to the same extent as that of a lead-acid cell.

The positive plate consists of a number of tubes of perforated steel ribbon, wound spirally and held together by steel rings. These tubes are very heavily nickel-plated, packed with alternate layers of nickel hydroxide and flake nickel, and then clamped in a steel frame which is also nickel plated. The flake nickel is added as the hydroxide is rather a poor conductor. The negative plate is made from finely perforated nickelled steel strip stamped into pockets, which are filled with iron oxide. Again the conductivity is not very good, this being improved by the addition of a little mercurous oxide. The two plates are separated by hard rubber strips and are held in a nickel-plated steel container, this forming one complete cell, with the addition of terminals and a vented filler cap. The type of alkaline battery normally used for caving consists of three such cells in a stainless, or nickel-plated, steel case.

The weight of such cells is about 1 lb. for each 10.A.H. which is considerably better than all types of lead-acid cells except those used for traction purposes. However, their efficiency is generally lower than lead-acid cells, average values being 80% for the quantity efficiency and 60% for the energy efficiency. As with lead-acid batteries, a maximum working temperature of 46º C. (115º F.) is recommended. The effect of an increase in temperature is to slightly lower the cell e.m.f. but to increase its capacity. There is a critical temperature of 12º C (53º F), below which the capacity of the cell will fall off rapidly, but this should not cause trouble in normal underground use due to the large thermal inertia of the complete battery. However, I believe some cave-divers have experienced this trouble, and so this fact might be worth noting by anyone contemplating using such batteries in unusually cold caves.

With a new cell, the electrolyte is a 21% solution of potassium hydroxide with the addition of 50 gm. of lithium hydroxide per litre of solution. Initially its specific gravity is 1.22, when measured at 15.5°C. (60°F.), but this quickly falls to about 1.20 and then more slowly to 1.16, when the electrolyte should be renewed. To do this, the cell should be completely discharged and have its terminals shorted out. Then the cell is shaken about to rinse the plates, and emptied. The cell should under no circumstances be flushed out as this will disturb the small quantity of electrolyte remaining in the plates. The cell can then be refilled, the electrolyte used for the first renewal consisting again of a 21% solution of potassium hydroxide but this time containing 30 gm. of lithium hydroxide per litre. The specific gravity of this electrolyte will also slowly fall and, when it reaches 1.16, a further renewal is required. For the second, and subsequent renewal of the electrolyte, a 25% solution of potassium hydroxide is used, containing 15 gm. of lithium hydroxide per litre. After renewal of the electrolyte, the cell should be allowed to stand for 24 hours before charging, which should be carried out at the normal current but for twice the normal time.

The e.m.f. per cell when fully charged is 1.4V. and it is usually allowed to fall to about 1.1V., before recharging. Actually, the cell can be completely discharged, or even short-circuited, without damage, but it is not economic to allow the cell e.m.f. to fall below 1.0V. except when renewing the electrolyte. When recharging such cells, the charging voltage should be between 1.4 and 1.8V./Cell, this corresponding to a charging current of approximately 1.75A. For recharging "Nife" cells, the manufacturers recommend a charging current of 1.75A. sustained for 8 hours (16 hours when the electrolyte has been renewed). Constant current charging is recommended as it is the quickest way of restoring a given charge to a battery. Boost charging is not recommended as the cell will get excessively hot, but the current can be raised to 115% of the manufacturer's figure, without harm being done. Float charging also, is not recommended as, if the current is reduced much below 1.5A., very little of the energy supplied to the battery is retained, it being used in causing gassing. Gassing of the negative plate commences soon after the cell has been placed on charge and is merely a liberation of hydrogen. As the charge

progresses, the positive plate also starts gassing, oxygen being liberated. At the conclusion of the charge, the ratio of the volume of liberated hydrogen to that of oxygen is two to one, showing that the charging current is electrolysing the water present in the cell. It is for this reason that naked flames should never be brought close to a battery on charge, as hydrogen and oxygen in these proportions combine with explosive violence.

During charging the filler caps on the cells should be kept closed as they contain a non-return valve which allows the products of gassing to escape but prevents any absorption, by the electrolyte, of carbon dioxide from the atmosphere. These valves open at a pressure slightly greater than atmospheric and this aids the holding of a charge by the cells. For most efficient charging, the temperature of the cells should be 25º C. (77º F.) However, a capacity of 12-14 A.H. is obtainable even at temperatures differing considerably from this figure, and this should give a useful light for approximately 15 hours.

With careful use and periodic cleaning, nickel-iron cells are practically indestructible; they can be left for long periods in any state of charge without sustaining any damage. It should not be necessary to renew the electrolyte more frequently than about every two years, as long as periodic topping-up with distilled water is not neglected. If the terminals are kept clean, the batteries are trouble free in use but should any spares ever be required, these are easily obtainable from manufacturers. As more batteries of this type become available, more people will, no doubt, use them for caving. Even if this article serves no other useful purpose, I hope it will give these people some idea of the way in which their batteries function and of the correct charging procedure.

Bibliography

"STORAGE BATTERIES" 4th Edition, by G.W. Vinal. Wiley.

Various publications of Alkaline Batteries Ltd.

NOTES ON THE SURVEY: "THE CAVES OF CHEDDAR GORGE AND NEIGHBOURHOOD"

W. I. Stanton

Introduction

The following notes are prepared in accordance with the recommendations of the Mendip Cave Survey Colloquium, 31st August 1963. A report on this Colloquium has been distributed to most Mendip caving clubs.

This is the first attempt at an exhaustive survey of all the caves, about 48 in number, of the Cheddar region. A few of the larger caves have however been mapped in the past, and the results published. Maps of White Spot Cave and Great Oones Hole, by Jack Duck, appeared in the M.N.R.C. report for 1935. A theodolite survey of the tourist regions of Gough's Cave was made professionally for the cave management in the mid-thirties (the north point shown on it was about eight degrees in error), and a nearly complete plan of the same cave, by Stride Bros., was published in Cave Science No. 18 (1951). The M.N.R.C. report for 1952 included a survey of the Gough's group of caverns by myself which, with a few additions, forms part of the present survey. The newly extended Coopers Hole was mapped in 1963 by the M.C.G., and their survey of the western passage, now flooded, is incorporated in the present work with their permission. (The north point on the M.C.G. survey is shown twenty degrees and fifteen minutes west of its proper position, apparently a drawing-office error). This is the only part of the present survey that is not my own work.

The survey is unusual in that the field work was as much on the surface as underground. The same instruments and procedure were used throughout, for convenience, and interesting comparisons may be drawn. The work was begun in 1950, finished in 1965, and drawn up in the latter year. It involved the setting up of 692 survey stations.

The Instruments used

These comprised:

- Ex-W.D. oil-filled prismatic compass graduated in degrees.
- Steel tape 100' long (until 1960).
- Metal-reinforced plastic tape 100' long (1960-1965).
- Home-made clinometer reading to 30 minutes (until 1963).
- Abney level (1963-1965).

The compass and clinometers fitted on to a home-made device which in its final version involved two short swivelling sections of aluminium angle. It was mounted on a brass tripod by means of an all-duralumin photographer's ball-and-socket tripod head. The compass platform carried a levelling bubble, and the Abney level swivelled vertically parallel to the sighting plane of the compass, for which it acted as a telescope on steep sights. A small, presumed negligible, position error was built into this device.

Using the instruments

a. Calibration

The compass was calibrated against 3 wall intersections shown on the 6-inch O.S. map near Priddy Hill Farm before or after each survey trip. The steel tape was assumed to be practically perfect, but the metal reinforced tape was found to be six inches short when tested under reasonable tension against a steel tape. A rough and ready correction was applied to each measurement made with it.

The clinometers were checked, about once a year, by taking foresights and back sights across two points at various vertical angles. The errors found were negligible.

b. Reading the instruments

The compass readings were estimated to the nearest 10 minutes of arc. This is not difficult with practice, though the value of such apparent precision may be small.

The tapes were read to the nearest tenth of a foot.

The Abney level readings were estimated, using the vernier, to the nearest 5 minutes of arc.

c. Surveying procedure and its bearing on the survey grade

Wherever possible the "leapfrogging" technique was used for the centre line or skeleton of the survey, with the instruments mounted on the tripod, and this type of work is considered to merit Grade 6. Further accuracy was obtained on many surface traverses by taking a check back sight or foresight with the compass on all but steeply inclined legs. At a few places the small size of the underground passage necessitated the use of the instruments without the tripod, read to the nearest degree, but such places were not common enough to change the overall grade of the survey.

Passage dimensions were recorded at every survey station, and often between stations on long legs. The detail is therefore classified as Grade B, making the survey as a whole Grade 6B.

Errors

(a) Closures

Sixteen closures were obtained, eight underground and eight on the surface. Five of the latter were vertical only, between benchmarks.

Traverse (Cave)	Legs	Length Feet	Horizontal Misclosure ft	% error	Vertical Misclosure ft	% error
1	16	961'	2.1'	0.2	1.3'	0.1
2	11	750'	1.1'	0.1	1.1'	0.1
3	10	214'	4.2'	2.0	0.4'	0.2
4	16	323'	2.1'	0.6	1.7'	0.5
5	4	237'	3.1'	1.3	1.9'	0.8
6	8	328'	6.3'	1.9	0.3'	0.1

Traverse (Cave)	Legs	Length Feet	Horizontal Misclosure ft	% error	Vertical Misclosure ft	% error
7	7	196'	1.4'	0.7	1.1'	0.6
8	12	570'	7.0'	1.2	1.3'	0.2
9	19	2,100'	4.1'	0.2	2.7'	0.1
10	53	7,400'	14.0'	0.2	0.8'	0.0
11	37	3,100'	-	-	0.5'	0.0
12	20	1,800'	-	-	0.8'	0.0
13	28	2,300'	-	-	1.0'	0.0
14	14	1,150'	-	-	0.5'	0.0
15	30	2,450'	3.7'	0.2	0.6'	0.0
16	44	3,250'	-	-	0.6'	0.0

Traverse 1: Guide Room – Swiss Village – Guide Room (Gough's Cave)
Traverse 2: Swiss Village – Black Cat – Swiss Village (Gough's Cave)
Traverse 3: 40' Drop – Boulder Chamber – Sand Chamber - 40' Drop (Gough's Cave)
Traverse 4: St. Paul's – Muddy Oxbow - Pixie Forest (Gough's Cave)
Traverse 5: Round Pixie Forest Oxbow (Gough's Cave)
Traverse 6: Round the Oxbow (Gough's Cave)
Traverse 7: In Gough's Old Cave
Traverse 8: Round Cox's Cave
Traverse 9: Gough's Cave – Great Oone's Hole – Gough's Cave
Traverse 10: Gough's Cave – White Spot Cave – Gough's Cave
Traverse 11: White Spot Cave – B.M.502.6
Traverse 12: B.M.502.6 – B.M.550.93
Traverse 13: B.M.550.93 – B.M.624.63
Traverse 14: B.M.624.63 – B.M.653.51
Traverse 15: B.M.653.51 – Blackbird Fissure – B.M.653.51
Traverse 16: Gough's Cave to T.B.M.489.00 in Chelm's Combe Quarry

It will be noted that the vertical closures are consistently better than the horizontal ones, and the surface closures are consistently better than the underground ones. The rather poor horizontal closures off the main passage in Gough's Cave may be due to old iron scattered about or buried in the floor, and the ironwork in Cox's Cave is certainly the cause of the poor horizontal closure there.

(b) Distribution of errors

Errors determined by closed traverses were normally distributed round the whole traverse in the usual way. However in Gough's Cave the main route from the entrance to the Black Cat was compensated first and was then treated as accurate. The other misclosures in Gough's were calculated and then compensated on this assumption. This may have slightly increased their apparent error.

(c) Probable error of the survey

In view of the proved errors, and assuming no undetected gross errors, it seems reasonable to suppose that the position error of any point on the survey relative to any other point is less than

1% horizontally and 0.5% vertically of the traverse distance between them. Considering also the relatively greater accuracy of the surface traverses joining caves, the above percentages probably become much smaller when the traverse distance is measured in thousands of feet.

An independent check on accuracy was obtained when National Grid lines were superimposed on the small scale plan "The Caves in Relation to Each Other". This plan was drawn entirely from survey data, without recourse to O.S. maps, and when the Grid lines were transferred on to it (by scaling off from benchmarks marked on the six-inch O.S. map) the angular difference between Grid North and True North was found to be correct to within 15 minutes of arc.

(d) Correlation between surface and underground surveys

Since surface and underground surveys were carried out using the same instruments and the sane methods the problem of correlation did not arise.

Calculation and Plotting

Reduction of measurements to horizontal and vertical components, and calculation of co-ordinates, was done by slide rule. The method allows determinations to the nearest tenth of a foot, which is compatible with the accuracy of the instrument readings.

For convenience the data were plotted on good quality graph paper, from which the plan was transferred in large squares on to a properly drawn grid on tracing paper. The section was similarly transferred on to pre-drawn altitude lines.

The original drawing on tracing paper was photographically reproduced professionally at two-thirds size on transparent film, and copies were made from the photo-reduction.

On the survey all grid and altitude lines are either parallel or at right angles to each other, except for the National Grid lines.

Permanent Survey Stations

A large number of these are marked on the ground and in the caves, mostly by a hole about one-third of an inch deep made by a three-eighths-inch Stardrill. Some are shown on the plan by a solid triangle, and their vital statistics follow:-

Eastings	Northings	Altitude	Description
3,705.3	6,606.7	239.8	Box Cave. Candlesmoke mark on wall at foot of chocolate coloured stal flow.
3,720.6	4,644.4	100.3	Flint Jack's Cave. Drillmark 3' above floor in wall facing northeast.
4,053.3	4,851.8	72.4	Top of perforated iron spike, 6' from east end of road wall, 3' above road level.
4,154.5	4,767.5	148.1	Pavey's Working. Drillmark in cliff 2.5' over top of entrance.
4,129.0	4,886.5	81.8	Cox's Cave. Knob on top bar of railings opposite cave exit.
4,306.6	4,963.1	84.3	Drillmark 3' up in roadside cliff.

4,707.3	5,931.0	367.7	The Bake Hole. Drillmark 6' above floor on south side of entrance.
4,853.3	5,760.6	345.6	Yew Cleft Hole. Drillmark in cliff facing south, 4' above entrance.
4,880.5	5,697.5	355.5	Bridged Rift Cave. Drillmark in cliff above entrance, 5' above floor.
5,094.0	5,544.4	277.2	Sun Hole. Drillmark in northeast wall of entrance, 4' above floor.
5,216.3	5,566.9	319.4	Pride Evans' Attic. Drillmark 5' above floor in cliff facing south.
4,882.8	5,372.6	215.9	Ivy Cliff Half-cave, southwest end. Drillmark 2' above floor.
4,957.7	5,493.5	248.3	Ivy Cliff Half-cave, northeast end. Drillmark 5' above floor, over low tunnel.
5,119.7	5,446.6	220.1	Slitter Hole. Drillmark in cliff facing southwest, 5' above floor.
5,330.7	5,470.7	200.1	Pride Evans' Hole. Drillmark in west wall 5' above floor.
4,957.5	5,256.2	119.2	Roadside Hole. Drillmark in north wall of entrance, 5' above floor.
5,000.0	5,000.0	107.7	Gough's Cave entrance. Outside corner of guides room, at ground level.
5,832.0	4,884.3	140.4	Gough's Gave, Boulder Chanber. Rawlbolt hole in east wall, 5' above floor, over pit.
5,324.7	5,157.0	223.5	Rift. Drillmark in cliff 3' above floor.
5,370.7	5,337.8	140.3	Cooper's Hole. Drillmark in cliff 2' above top of steps, over railing.
5,933.2	6,275.7	351.3	Canyon Cave, top entrance. In north wall, 3' above ground level.
7,072.6	6,559.7	368.9	Scalloped Hole entrance. Drillmark on east side near roof.
7,289.8	6,383.2	705.5	Brock Hole. Drillmark on east wall, 5' above floor.
7,305.7	6,389.9	703.8	Whitebeam Slitter Cave entrance. Drillmark on east wall 2' above floor, below overhang.
7,258.4	6,708.0	402.7	White Spot Cave entrance. Lower bolt holding gate hinge.
7,439.1	6,754.5	374.9	Reservoir Hole. Drillmark 3' above floor in west wall of chamber.
7,743.9	6,877.7	454.8	Pittard's Crawls. Drillmark 5' above floor, 2' in from overhang.
8,054.2	8,271.2	765.9	Nod's Pot. Chisel nick in rim of drum at top of shaft, on north side, 0.5' west of seam.
8,296.3	7,125.0	438.2	Pig's Hole. Drillmark in cliff below overhang, 5' above floor.
8,721.6	7,170.2	457.7	Sow's Hole. Drillmark 6' up in cliff over centre of entrance.
9,348.5	7,615.6	604.1	Bone Hole. Drillmark 6' up in cliff on west side of entrance to ravine.
9,750.5	7,334.1	518.4	Black Rock Rift. Drillmark in cliff just above of entrance.

9,392.5	6,098.3	599.9	Spider Hole, Drillmark in roof at cave entrance, right of centre, 3' above floor.
10,103.0	3,964.6	782.2	Totty Pot. Drillmark in protruding ledge on north wall, 2' below roof.
10,105.3	3,927.5	785.6	Totty Pot. Drillmark in tufa flow on south wall, 2' below roof.
10,579.1	3,798.8	784.8	Blackbird Fissure. Drillmark in east cliff at entrance, 1' below cliff top.

The positions of any other permanently marked survey stations, not shown on the plan, may be obtained from the writer.

Availability of the survey

The survey may be purchased in the usual way from Tim Reynolds, Yew Court, Pangbourne, Berks., price 4s 3d.

LIBRARY NOTES

Donald Thomson

Several publications of general interest have been received in the past few months. We exchange with most of the Mendip clubs, and with quite a few further afield.

The Speleologist issue No. 4 has arrived, and we hope to receive No. 3 in due course. It is smaller and cheaper than previous issues but produced in much the same way. We hope they are now established. I enjoy particularly the pages devoted to readers' letters, "Down to Earth". Either the Editor is short of letters or, like the "Daily Telegraph" editor, he prints the most outrageous. For sheer misinformed and irrelevant accusation the comments of Mr. Goodhart remain unsurpassed; he appears to demand that everyone else shall fix his belays for him. Selected for supreme irresponsibility is the defence offered by John Steere one of those of the night of July 25th. Although he does not specify to what accusations he is answering he would have us believe at least six preposterous premises. To whit, that a member of a major Mendip club was able to express an opinion on the safety of a Swildon's trip without seeing the entrance, that paying the farmer one shilling entitled him to a trouble free trip, that a party coming out was better able to assess danger than one going in, that the number of vehicles in the Sandhurst car park was an index of low water conditions, and that it was not his responsibility to make up his own mind anyway. John Steere et al. must get it quite straight; they were not blamed for their inability to forecast thunderstorms, they were blamed for going down in defiance of Mr. Main's warning that conditions were dangerous and further rain was expected. So much for that. An article on underground photography seems to have been published in too many short instalments. A useful Maypoling device, quicker to use than the South Walesian "Uppit", is described, and there is an account of an Australian cave fatality. This is of some importance, as the cause was not satisfactorily determined despite a very full inquiry at the inquest, but it was suggested that bowlines slip easily out of polyethylene ropes. Caving abroad is certainly well represented. From Jamaica comes a description of Jackson's Bay Great Cave, with two very fine photographs, and some interesting observations on the formation of helectites from New Zealand. I am not sure that most of us would agree that the disposition of calcite is due to evaporation rather than the decomposition of calcium bicarbonate, but the rest of the article is relevant to Mendip erratics.

The Plymouth Caving Group have written up the Caves of Yealhampton (Special Publication No. 3). Their June Newsletter says that this publication has been well received and this is doubtless so, as it would be very useful to anyone visiting the area as it contains numerous sketch plans of small caves in the area. Perhaps of more archaeological than speleological interest is Dr. A.J. Sutcliffe's survey of Eastern Torr's quarry Cave.

A lot of bumf has arrived about the Czech commercial caves. It is interesting to know where these caves are, but in some ways it is disappointing, as were the photographs in the Bristol Museum, both in quantity and quality.

The May edition of the N.S.S. News, Volume 23 No. 5 carries an account of a rescue from Rowlands Cave, Arkansas. Three aspects of this rescue have never even been considered by M.R.O. A party was trapped by flooding. One of its number was a diabetic with no insulin in his spares bag. Then the show cave electricity was turned on, despite the fact that the wiring was covered by flood water, thus making the divers run the gauntlet of electrocution. Finally, one of the divers had a fatal coronary thrombosis after the rescue. The March and April editions have also arrived, and the latest N.S.S. Bulletin, with an article on karstic towers in China and Vietnam. One of the recent Chelsea Speleo. Soc. newsletters mentions a Soviet caving expedition. This is unusual as one rarely hears of caving activity beyond the Curtain.

The Westminster newsletters of May and June describe caving in Cyprus.

I notice the B.S.A. Speleological Abstracts Service is getting underway. They seem to be working forwards and backwards from 1962. Copies would be very useful when they are published.

BOOK REVIEWS

MENDIP CAVE BIBLIOGRAPHY & SURVEY CATALOGUE 1901-1963
Compiled by R.W. Mansfield, T.E. Reynolds and I.J. Standing
(Cave Research Group of Great Britain Publication No.13) (1965)

(Obtainable from "Upleadon", Trumpet, Ledbury, Herefordshire, at 25/-)

Part 1 of the long-awaited Mendip Cave Bibliography has now been issued. Its publication is a most important event, not only because of its usefulness in this area, but because it is the first British attempt to produce a comprehensive regional bibliography. European cavers have long found such publications necessary as a basis for further work, once the original generation of explorers has retired. Even in England, where extensive exploration started later than on the continent, the sheer quantity of published reports is such that no-one can remember the whereabouts of all the information he requires. In this situation, then, some form of listing and indexing becomes essential if previous work is not to be overlooked.

The full value of a bibliography and its various uses are discussed later; but first the present volume must be described.

Although it is nowhere stated explicitly, this volume is only the first part of the Bibliography and it has been compiled only from articles published by local Mendip caving groups and by the national groups. The term ‘Mendip’ in this context, as in the scope of the bibliography itself, denotes north-west Somerset from Bristol to the Quantocks and including Steepholm. All books, MSS, and other periodicals (i.e. those not primarily concerned with caves, and also those issued by caving clubs in other regions) have been deliberately omitted from the first volume and will form the subject of later parts, at present being prepared.

The core of the book is the bibliography proper, a list of some 790 articles, together with their sources, arranged in alphabetical order under authors. Metalliferous mines are included as well as caves. There is no resume for each article, but additional information is sometimes added in brackets to make the title self-explanatory.

What might be called the co-core of the book is the Survey Catalogue. It is independent of the list of published articles already mentioned and each of the 353 items in the catalogue describes a separate survey or version of a survey. Included are all plans and sections published in periodicals and also those issued separately and those in certain books and MSS. The most interesting of the MS. surveys mentioned are those in the records of the Sidcot School Caving Club. Particulars are given of scale and grade (if known) and in some cases a note draws attention to points of special interest.

The list of caving articles and the survey catalogue form the basis of the bibliography, then, and the rest of the book is largely occupied by comprehensive indexes to enable full use to be made of the main lists. There are two main indexes: one of cave names and the other of subjects. The entries under each cave name are subdivided in great detail so that articles dealing with a particular aspect or part of a cave can be distinguished quickly; thus there are 121 sub-headings

for Swildon's Hole! The subject index, also, is very detailed. The item numbers of the list of articles and the survey catalogue run consecutively, so they are indexed together.

Besides the lists and indexes already mentioned, there is a statement of all the issues of every periodical searched, noting the year of publication (if not given in the publication itself) and such abnormalities as mis-numbering of issues, numbers never published at all, etc. The whereabouts of at least two sets of every publication is also given.

So much for a description of the new bibliography; now to assess its real worth.

But before this can be done it is necessary to be quite clear about the full purposes of a bibliography. They are three:-

a) to provide an index to existing information. This is no doubt the use that concerns most people.
b) to provide a permanent record of publications and of unpublished material, so that the existence of even the most ephemeral item will always be known however scarce it may become. Already certain issues of the Wessex Cave Club Circular about 1940 cannot be traced and all knowledge of their contents is now lost.
c) to solve certain problems associated with the items listed (e.g. to identify anonymous authors or users of pseudonym; to establish publication dates where not stated, and to correct those dates that are printed wrongly; to identify caves described but not named in the text; to expand non-explanatory titles). Many of these problems can be solved with comparative ease while the publication is still new, but in course of time they become almost insoluble.

To achieve each one of these objects, there must be absolute accuracy of detail and precision of description to attain reliability and avoid any risk of ambiguity. A clear layout and presentation is most desirable, too, to make reference easy and to prevent inadvertent misreading.

Now, to what extent does the present volume meet these requirements? To assess the reliability of the book and to see what openings it may leave for ambiguity, the reviewer has had to examine it in the greatest detail and it has undergone a much severer scrutiny than a normal publication.

Perhaps the most obvious fault is that the printers have used round brackets both for their normal purpose and also in place of the square brackets conventionally used to distinguish editorial additions. In consequence it is never clear whether words occurring in brackets existed in the original or whether they form an explanatory note by the compilers. Thus the editor might have been (wrongly) suspected of facetiousness in item 249, "Plantation Stream (Is it a Misnomer?)". Similarly it cannot be seen if a publication date was printed in the original or if it has been supplied from the compilers' researches. I understand that the original typescript was correct in this respect and that the substitution was done without the knowledge of the authors.

No attempt seems to have been made to identify the real names of authors, so future cavers will be left in doubt about 'Alfie'. The list of anonymous articles is unnecessarily long, for the same

reason. Platten is listed as the author of the extracts included in his British Caver compilations, resulting in his apparently having written several articles before he was born.

Entries for the U.B.S.S. Proceedings have confused the year of publication with the year for which the issue was published.

Nine misprints were noticed. Alphabetical misprints (as these are) do not often cause confusion, but they leave one suspicious of the numerals.

Very careful and critical reading has not been able to uncover any other faults of any significance.

Summing up then: this bibliography has, with one exception, met all the requirements listed above and met them with remarkable accuracy and clarity. The amount of labour involved in the compilation, indexing, checking and rechecking of all this material must have been immense. Even if the names of Reynolds, Standing and Mansfield had not been known already for other reasons, they would be remembered for this book alone.

T.R.S.