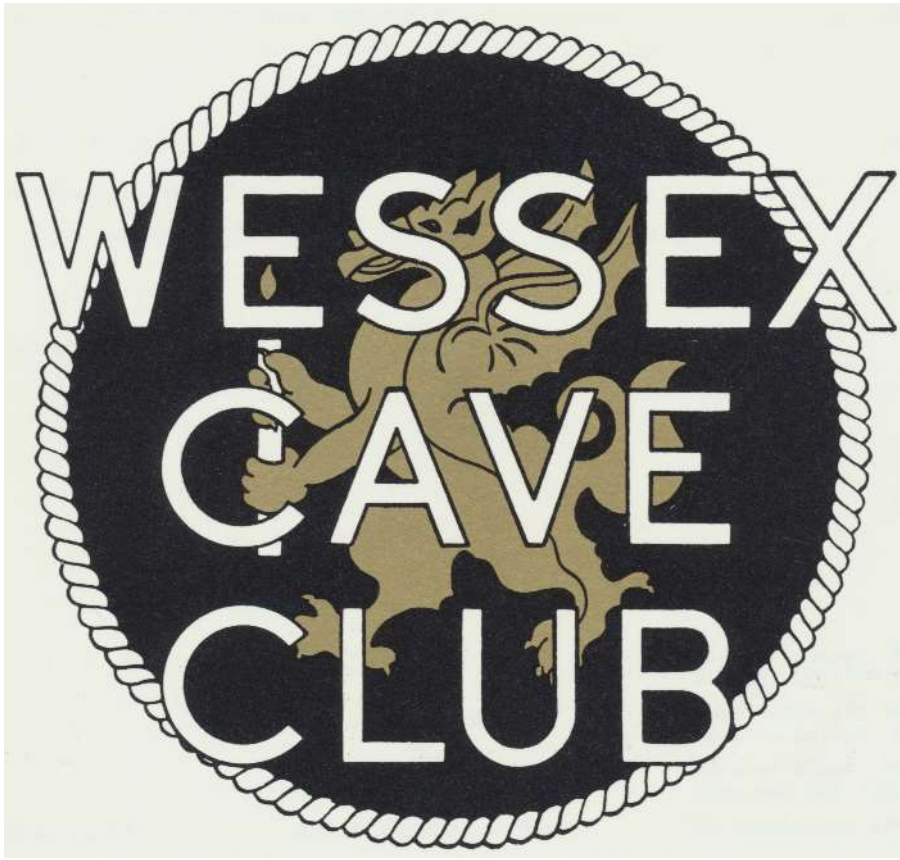
WESSEX
CAVE
CLUB

WESSEX CAVE CLUB

Journal No. 123, Vol. 10. June 1969

CLUB NEWS

A prospective buyer has been found for our Hillgrove Hut, and, subject to a satisfactory purchase price and arrangements for its removal, we have decided on 30th June 1969 for the transfer to Upper Pitts. At the time of writing there are still a number of jobs outstanding to make Upper Pitts reasonably habitable, and thus a great deal of practical help will be required over the next few months. Much of the work to date has fallen onto the (fortunately) broad shoulders of about a dozen members at the most. We expect Upper Pitts to become far more of a headquarters for all the Club than Hillgrove could possibly ever have been, and so members are urged to get the place off to a good positive start. Why not start now! It has been designed to be an obvious meeting place on Mendip for members and their guests whether you want to cave, chat, remain in residence or better still all three. Even if you live in Wells, Bristol, London or Canada we would like to see you at Upper Pitts whenever you visit Mendip. Don't forget to bring your caving kit with you!

Full details of access and administration of Upper Pitts will be published in the August issue of the Journal. As far as possible those arrangements which operated at Hillgrove will be used, including the scale of hut fees. During the interim period such details will be posted at Upper Pitts.

As one job is half completed another appears. For some time we have been committed to repairing the timbers on the Lamb Leer main pitch platform on behalf of the three clubs looking after the cave. Alan Surrall has very kindly agreed to organise the work as soon as his electrical wiring is finished at Upper Pitts. Assistance will be required of course, so please go along and find Alan at Upper Pitts one weekend soon to discuss the matter. While you're there you can help out with some of the jobs that need doing!

In the last issue of the Journal it was announced that the electric meter at Hillgrove had been rifled. This time it is with a mixture of anger and disappointment that the theft of the hut fees box is recorded. Anger because one is more than ever convinced that this is the work of a caver who knows Mendip well, and disappointment that such unsavoury incidents should conclude our long and happy association with Hillgrove. The Police have been informed and as full an investigation made as possible in the circumstances. It appears that about the same time valuables were stolen from Priddy Church. Once again we appeal to members to take extra precautions to protect personal and Club equipment.

Many members will have heard that yet another extensive and well decorated cave has been discovered in Fairy Cave Quarry. A brief note about it appears elsewhere in this Journal. The quarry owners are requiring visitors to hold access permits since the entrance is in the quarry and potentially unstable. Those interested should acquire permits through Roy Staynings the Assistant Secretary. Since caving is understandably restricted to hours when the quarry is not working you are advised to contact Brian Prewer, East View, West Horrington, Wells,

Somerset, or Bob Whitacker, 2 Rockcliffe Road, Bathampton, Bath for information.

In the August issue of the Journal the complete 1969 Club Membership and Address List will be published. Apart from the usual plea to notify the Hon. Secretary of any changes of address as soon as possible, it is requested that you forward Peter Cousins details of any Postal Code Number you have been allotted. In the future of course these codes will be necessary for the prompt delivery of Journals and other communications to members.

When you are thinking of somewhere to get rid of those unwanted items left over from your spring cleaning at home do please take note of the following:-

1. Non-ferrous Scrap Metal. The Club are anxious to collect as much old brass, copper, and aluminium as possible to swell the Hut Fund. Individuals might not have much, but it all mounts up when pooled. Please contact the Hut Warden for details of its storage on Mendip.

2. October Jumble Sale. Tony Philpott, 3 Kings Drive, Bishopston, Bristol 7, is organising a Jumble Sale on Saturday 11th October next in Bristol. Here is a chance for the many members in and around Bristol to rise to the occasion and make this a record turn-out. Please get in touch With Tony as soon as you can to help in the collection of jumble and to offer assistance at the sale.

The monthly Library Nights with Christopher Hawkes in Clifton have now closed down for the summer, but it is hoped to start afresh in the Autumn. The response from members in the area was disappointing, for this was thought the ideal opportunity for mid-week get-togethers. Those who may have been put off a little by the title "Library Night" should note that the last meeting in May was in fact a well enjoyed ladder practice! Do let Christopher have your ideas for the 1969-70 session.

Members who are keen to dig any site under the control of the Charterhouse Caving Committee are reminded that permission must be obtained by writing to the Hon Secretary, Donald Thomson, in the first instance. The Club Committee will then forward the application to the C.C.C.

You are asked to make a note of the following important dates later in the year:-

1. Late August-early September. An Upper Pitts Hut Warming evening.
2. October 18th 1969- The Club Annual General Meeting and Dinner.

Full details of both events will be published in the August Journal.

Some of the Club's 10' and 20' lengths of ladder, normally stored for trips away from Mendip by Jim Hanwell at Wookey Hole, have gone astray. Would members make sure that they have not inadvertently retained any such ladders after a trip, and please return it once found.

Roy Staynings reports difficulties arising from the late return of cave keys. For example this has

resulted in a couple of trips having to be cancelled through no fault of their own making. Do please ensure that other cavers have the same opportunity to get down a cave that you had and return all cave keys immediately to the person or club who issued them to you.

On 13th April 1969 a 1 x 120' (approx) 1⅜" circ. Nylon rope was found in the tackle store at Hillgrove which does not belong to the Club. Would anyone claiming this rope please contact the Gear Curator, giving a full description, at 3 Kinver Road, SYDENHAM, London, S.E.26.

We welcome the following new members:- Elected 23-3-69:-

Pollocks House Caving Club, Clifton College, Bristol 8.
R.L. Bland, Clifton College, Bristol 8.
A.R. Jarratt, Alwyn Cottage, Station Road, Congresbury, Somerset.
A.J. White, 17 Asjleigh Road, Weston-super-Mare.

Elected 11-5-69:-

Connaught Caving Club, Connaught Secondary School, Knowle, Bristol 4.
A.J. Green,
J.W. Stuckey, "Saskatoon", South View Close, Coalpit Heath, Bristol.

CLUB MEETS

Weekend 7th/8th June		Devon. Leader: D.M.M. Thomson, "Pinkacre", Leigh-on-Mendip, Bath. Camping 3 miles from Buckfastleigh.
Sunday 15th June	1030 hrs.	G.B. Cavern. Leader: J.D. Hanwell, 50 Wells Rd., Wookey Hole, Wells, Somerset.
Sunday 13th July	1100 hrs.	Swildon's I. Leader: K. Goverd, 101 Westerleigh Park, Hengrove, Bristol 4.
Saturday 26th July	1500 hrs	Pine Tree Pot Rescue Practice. Leader: R.J. Staynings, 8 Fanshawe Rd., Hengrove, Bristol
Wednesday 6th August	1800 hrs.	Lamb Leer. Leader: R. Woolley, 64 Devonshire Road, Bristol 6.
Saturday 16th August	1430 hrs.	Longwood Swallet (August Hole). Leader: R.A. Phillpott, 5 King's Drive, Bishopston, Bristol 7.
Sunday 5th October	1400 hrs.	G.B. Cavern. Leader: P. Gibbs, 40 Hollywood Road, Brislington, Bristol 4.
Saturday 11th October	1400 hrs.	Jumble Sale, Bristol. Organiser: R.A. Phillpott.

Please write to the Leader named giving plenty of advanced notice of which trip you propose to attend. It will be assumed that no letters mean that a trip will be cancelled.

Proposed Meets (Please contact Leaders for details and dates).

August or September. Steep Holm Weekend. Leader: R.J. Staynings.
September or October. Portland Caves. Leader: M.W. Dewdeney-York, (address page 310).

Club Dig Thrupe Lane Swallet. Leader: A.E. Dingle (address page 310). Digging will take place on most weekends throughout the Summer.

EXPEDITION RESERVE AND EMERGENCY RATIONS

By A. de Jong

The selection of expedition food supplies depends on many factors but, in order to support life in the human body, three fundamentals are necessary. In order of importance these are air, water and food. The first is obvious, but the second is the key to the whole problem since the quantity of water available dictates completely the types of food which should be provided.

To maintain the nutritional status of the members of any expedition, provisioning must be based on a pre-planned ration scale. The composition of the scale depends on several factors including the size of the party, its load carrying capacity, the terrain and climate in which it will be operating, and the amount of physical exertion anticipated.

Sufficient Calories must be provided for Basal Metabolism and Energy Expenditure, the need varying according to the level of physical activity and climatic conditions. For sedentary work in temperate or hot climates the figure may be as low as 2,500 Calories, whereas it may exceed 5,000 Calories in cold climates. For most expeditions it is usual to aim at a figure of 4,000 Calories daily which is adequate unless exceptionally heavy work is contemplated.

Food should be provided in balanced quantities so that, of the total Calories, 11 to 14 per cent. are afforded by Protein, 25 to 35 per cent. by Fat, the balance being supplied by Carbohydrate. For cold weather work one should tend towards the upper limits stated, and for high altitudes and desert conditions the lower values should be used. It is important that the diet should also afford sufficient Mineral Salts and Vitamins, and if fresh foods are not available in the necessary quantities, supplements should be considered.

The diet should be sufficiently bulky to satisfy appetite, and must be digestible, varied, and capable of being attractively cooked and served. It must also be acceptable on racial and religious grounds. The rations should be reasonably economic and, when feasible, procured locally. Storage and portability problems sometimes require the provision of preserved foods and special ration packs, the latter being of particular use as reserve supplies.

The other essential in any ration scale is water. For most normal expeditions the daily per capita water requirement is of the order of 5 to 6 pints. At high altitude the body will lose large amounts of water by breathing and it is therefore necessary to increase the daily intake to a figure of from 8 to 10 pints daily. In extreme cases of very heavy work and excessively high temperatures, intakes of 25 pints a day have been recorded, but for most desert regions a useful guide is that the intake should consist of a basic allowance of 10 pints daily, supplemented by 1 pint for each hour of physical activity.

Footnote: Mr. A. de Jong is Development Physicist for Messrs. Horlicks Ltd. This paper was first published in "Exploration Review" (Feb.1963) the Journal of the Imperial College Exploration Society, London. It is reprinted here by kind permission of the author and original publishers.

If the body is short of salt it cannot retain water, and it is advisable to take extra salt when the fluid intake exceeds 10 pints daily, in order to replace losses of salt in the sweat. This can be conveniently done by dissolving one 10 grain tablet in each pint of water, giving a 0.1% solution. In order to avoid gastro-intestinal upsets the extra salt should not be taken in the solid form.

If water consumption is in excess of requirements, the kidneys, normally exercise an automatic control and the body-water balance is maintained by passing the unwanted water through the kidneys in the urine. If, however, consumption is below requirements there will be a loss of water from the body tissues, and, if continued, this will lead to dehydration. Immediate symptoms of this are not readily apparent, and it should be noted that lack of the sensation of thirst is not necessarily evidence of the lack of dehydration. When the body is short of water, the kidneys conserve it by concentrating the urine to the maximum extent to which they are capable. Consequently, the volume of urine that continues to be formed is determined by the total quantity of soluble material being excreted. Hence, during water shortage, foods with a minimum of soluble material for removal are preferable, and the protein intake should be minimised.

For a normal man in temperate surroundings, water losses from breathing and from the skin without excessive sweating due to hard work, are about 1½ pints, water passed as urine 1 pint, in faeces about ¼ pint, giving a total loss of about 2¾ pints. Allowing ½ pint provided by combustion of food, this gives a final requirement from external sources of at least 1¾ pints per day. This may be further reduced to about 1½ pints, during water deprivation, due to the water in the body becoming available. If this amount is not provided, a severe water deficit will result and will finally prove fatal.

It will thus be seen that in an extreme emergency the minimal water requirement is 1 to 2 pints daily under favourable conditions and may be increased considerably unless care is taken to minimise excessive loss by sweating and other sources. Under these conditions of water scarcity the only food which will provide the necessary requirements is carbohydrate. Protein must be reduced to under 7 per cent. of the Calories and only small amounts of fat can be tolerated, except under arctic conditions where it may be increased somewhat, provided sugar is also available. If 100 grammes of sugar are taken, the daily minimal water requirement may be reduced to 1 pint. It must be stressed that this is an absolute emergency level of diet, making no provision for energy expenditure, and cannot be maintained for a period much in excess of 10 days.

If water can be obtained in quantities in excess of 3 pints daily, the prospects for the survivor are much more promising, and energy expenditure is then dependent on his being able to obtain sufficient balanced foods for this purpose. Most of the energy will be derived quickly from carbohydrate although, by virtue of weight considerations, fat will also play an important part in his diet. For short periods protein is not of such great importance, although it is desirable to provide sufficient to avoid a call on the reserves of body protein. Generally protein is always kept fairly low in Emergency Rations, as distinct from Reserve Rations, since in most cases there may always be doubts as to the free availability of water.

On the other hand Reserve Rations, which may have to be used for normal or heavy work expenditure, should consist of a balanced diet, but be packed in such a way that they will have as long a shelf life as possible, be compact for easy stowage, and as light as possible. These requirements usually demand the use of dehydrated foods, and in compressed form. By careful design and selection a moderately palatable and varied diet can still be achieved, but of course some sacrifice of the more exotic menus may have to be accepted. Nowadays, the development of new packaging techniques and new methods of food preservation, permit great savings in weight and bulk to be made. The tin-opener of a few years ago has almost given way to a strong set of teeth or, at worst, a razor blade for opening the modern flexible package except, perhaps, at base camp where lightness of supplies may not be so important and the well fed explorer yearns for tinned food and variety.

In Table 1, three ration scales have been worked out to cover a general purpose ration, a high altitude mountain assault (or desert) ration and a cold-weather ration. Approximately 4,000 kilocalories are provided daily, equivalent to a fairly heavy work expenditure. Table 2 (below) gives a break-down of the percentages of protein, fat and carbohydrate in each ration.

	GS/1/10/62			PH /1/10/61			M.C.R. MK. V 1960		
	Protein	Fat	Carbo-hydrate	Protein	Fat	Carbo-hydrate	Protein	Fat	Carbo-hydrate
	g.	g.	g.	g.	g.	g.	g.	g.	g.
Food weight	126.2	142.4	535.7	74.3	116.4	623.6	131	234	431
K-calories	517	1324	2196	305	1083	2557	539	2173	1767
Calories p.cent	12.8	32.8	54.4	7.73	27.45	64.82	12.0	48.5	39.5
Ratio P:F:C	1	1.13	4.24	1	1.57	8.39	1	1.8	3.3

Table 2. P:F:C percentages in ratio-scale of Table 1.

All three packs occupy a volume approximately 10 x 4 x 3 inches with a gross weight of about 3 lb. All the rations have been tested in the field by several expeditions and the food items are all commercially available. Other items additional to the packs include matches, toilet paper, razor blades and vitamin capsules (C,A,B,etc.).

Unfortunately, due to optimism and the feeling of "It won't happen to me!" many expeditions do not cater for emergencies. The temptation is always there to keep personal kit to a minimum, particularly when only a short absence from camp is contemplated. Yet, every year one or two cases are reported of accidents and deaths that could have been avoided, or the consequences minimised, by the expedition leader insisting that at all times when away from base all members of his party should carry a personal Emergency Pack. The problem is often on our own doorstep. After all, a cracked ankle whilst walking on open moorland can often immobilise a man for several hours whilst help is obtained, and if adverse weather conditions set in during this period the results of exposure without adequate shelter, warmth, food and drink can be severe, if not fatal.

For use in this country the pack need not be elaborate. Always carry a reserve of food above your normal requirements, also a full 2-pint water bottle containing any drink you prefer except

alcohol. In addition carry 7 or 8 ounces of food containing a high proportion of sugar and make sure it is in a tightly sealed container which you never open except in the case of emergency. For cold weather work the above supplies should be supplemented by a further sealed pack of about 6 ounces containing a fair proportion of fat, which will help conserve body warmth. The quantities stated will allow a minimal personal survival ration for a 48-hour period. Extra water should be carried for hot weather or desert work.

	Temperate-High Energy Expenditure Ration GS/1/10/62	High Altitude Ration PH/1/10/61	Medical Research Council Summer Sledging Ration MK. V 1960
	oz.	oz.	oz.
Oatmeal	1½	2	1½
Skin Milk Powder	1	2	1
Tea/Milk/Sugar Powder	1	-	-
Tea (Leaf)	-	½	-
Tea (Powder),	-	-	¼
Nescafe	¼	-	¼
Drinking Chocolate	-	-	1-1/5
Glucose/Lemon DrinkPowder	1	2	1
Expedition Biscuits Plain	3	)	2
Expedition Biscuits Wholemeal	3	) 3	2
Butter	-	1	2
Processed Cheddar Cheese	2	1	2
Chocolate	2	3	4
A.F.D. Fruit	2½	1½	-
Sultanas	1	1	1
Dehydrated Meat Bar	2	-	5
Meat & Vegetable Bar	4	4	-
A.F.D. Vegetables	1	-	1
Potato Powder	2	-	-
Sugar, granulated	3	6	3
Sugar, lump	-	3	-
Enerzade Glucose Tablets	1½	-	-
Rum Flavoured Fudge No. 18	-	1	-
Sweets	-	-	1½
Jam	1	1	2/5
Soup Powder	-	½	1
Salt	½	¼	2/5
Curry Powder	-	-	1/20
Marmite	-	-	1/10
Onion Flakes	-	-	1/10
Total food weight and	33¼ oz.	32¾oz.	30¾oz.
total K. calories	4037 K.cal	3945 K.cal	4479 K.cal

Table 1. Three typical modern ration scales (All 1 man/lday)

It may be of interest to consider the developments which have taken place in concentrated rations since the early expeditions of Scott and Shackleton. The following gives nutritional data of typical rations covering the period 1912-1960.

	Nutrients g.			Food Weight oz.	Total K.cals.	% K.cals for P F C	P F C ratios
	Protein	Fat	Carbo-hydrate				
Scott 1912 (Winter Man Hauling)	211.4	160.7	438.7	33.3	4161	20.8,35.9,43.3	1:0.8:2.1
Shackleton 1923 (Winter Dog Sledging)	184.3	346.0	372.8	35.5	5503	13.7,58.5,27.8	1:1.9:2.0
Watkins 1930 (Winter Dog Sledging)	228.6	377.4	387.7	39.4	6037	15.5,58.1,26.4	1:1.4:1.5
Courtauld 1935 (Summer Man Hauling and Climbing-Short Period)	127	270	269	27.7	4135	12.6,60.7,26.7	1:2.1:2.1
Medical Research Council MK. V 1960 (Summer Dog Sledging)	131	234	431	30.75	4479	12.0,48.5,39.5	1:1.8:3.3
Theoretical Ideal	154	169	560	32	4500	14 35 51	1:1.1:3.6

Scott's ration of 1912 was largely based on pemmican and biscuit with only small amounts of other foods such as bacon, cheese, milk products, chocolate, pea flour, oatmeal and sugar. In this ration the protein was excessively high and carbohydrate low; the calories were barely sufficient for winter dog sledging, let alone man-hauling of sledges and there was also almost a complete lack of vitamins.

The Shackleton ration was somewhat improved by the use of a special pemmican which was compounded from various ingredients so as to be almost a complete food in its own right. However, the ration was still largely based on pemmican and biscuit although some consideration was given to the vitamin problem. The fat content was still probably slightly high at the expense of carbohydrate, and although the total calories were high enough, these were provided at the expense of added weight.

The first of the modern polar rations was that of Watkins in 1930 and gave a much more balanced diet with a greater variety of foods although pemmican was still retained. The protein content was perhaps slightly high, as well as the fat.

The ration of Courtauld 1935 gave a better protein balance although the fat was still rather high for summer sledging and climbing.

Perhaps the biggest break-through since the 1930's has been the new technique of accelerated freeze drying which has enabled the manufacture of special meat bars, vegetables and fruit, as well as the adoption of light weight packaging, and these factors combined have enabled rations to be developed with a much greater variety of foodstuffs. The Medical Research Council Polar Sledging Ration MK.V 1960 is a good example of this trend.

MENDIP RESCUE ORGANISATION

Extracts from the Report of the Hon. Secretary & Treasurer Dr. Oliver C. Lloyd for the year ending 31st January, 1969

Cave Rescues and Incidents

There were six of these in the twelve months, which is again an improvement on last year. The most notable change has been an absence of Swildon's Hole rescues, since the loss of the 40 ft pitch due to the floods of July 10th. It must, however, not be assumed that the present route taken by the stream and by cavers would be passable in the event of a real flood. The bar and pulley over the 40' in Suicides' Leap were carried away by the flood. Arrangements will be made to replace them.

1. Cuckoo Cleeves, 10.3.68.

A party from the Axbridge Caving Group found a large party of juvenile novices led by Adventure Unlimited, which had got into difficulties. They were ill-equipped and were having difficulty in reascending the 13 ft pot by their knotted rope. The Axbridge party helped them to the surface. M.R.O. was not called out.

2. Sidcot Swallet, 13.4.68.

Colin Clarke, a member of the 1st Kingston Hill Venture Unit, got stuck in the squeeze at the head of the final drop. M.R.O. was alerted at 1.55 p.m. and by 2.20 p.m. a party from the B.E.C. had reached the cave and brought Clarke to the surface at 3 p.m.

3. Sump Rescue Turnout to Pontypool, Mon. 22.4.68.

At 8.10 p.m. Dr. Lloyd received a telephone call from Mel Davies in Pontpool to say that sump rescue apparatus and divers were needed to explore a flooded conduit, in which two children were believed to have been lost.

With help from E.K.T., Dave Savage was alerted by the Police at Downend. 8.45 p.m. Lloyd left the University to collect sump rescue kit and diving apparatus, and picked up Savage at Downend at 9.20 p.m. They reached Pontypool Police Station at 10 p.m. and learnt that the incident had been concluded: it was a false alarm.

This is the first time the Mark 2 Sump Rescue Apparatus has been called for on a rescue, and it is satisfactory to note that it took only 1 hour 50 minutes to get a fully kitted party to that part of Wales.

4. Nine Barrows Swallet, 12.5.68.

John Benham, aged 34, caving with the East Somerset Caving Club, was climbing in the Crystal Chamber when he fell and broke his tibia and fibula in one leg. At 2.50 p.m. Dr. Thomson was called out, getting there at about 3.10 p.m. He splinted both legs together and put him in the carrying sheet. He had morphia gr. ¼ at about 3.30 p.m. It took about an hour to get him out.

Brian Prewer laid a telephone line, Fred Davies did most of the pushing and Mike York most of the heaving.

5. Swildon's Hole, 26.5.68.

John Martyn, a novice caver with more enterprise than resources, having had his first caving experience the previous day in Burrington, descended Swildon's Hole in a party of three led by Peter Webb. He had no wet suit, but in spite of delay at the 40' he went down to and through Sump 1, only to find that on his return he was too cold to climb the ladder on the 40'. The cave had been entered at 12.30 p.m. and the incident began at about 4 p.m.

At 4.40 p.m. M.R.O. was called out, the advance party going to the cave at 5.10 p.m.

Meanwhile, with help of a party from Clifton College, Mr. Webb rigged the pulley in Suicide's Leap and pulled up Martyn on a double line. He climbed easily with this help. A man was sent out to give M.R.O. the stand down sometime between 4.30 and 5.15 p.m. The subject and his party emerged at 5.30 p.m. and were met at the top by a reporter.

Webb had been a member of the Chelsea College Caving Club, but this was not one of the club's trips. A certain amount of ill feeling resulted from inaccurate reporting of the incident. Reference to the Warden's log shows that the inaccuracies did not stem from there.

6. Swildon's Hole, 2.7.68.

At 9.30 p.m. Robin Main called at the Belfry to say that two cavers, who had entered Swildon's at 12 noon to do the Upper Series had not returned the keys, and might still be down there. Dave Turner and his party, after checking at all the local pubs, descended the cave at 10.45 p.m. and had checked the whole of the Upper Series by 11.30 p.m. (there was no ladder on the 40'). They then reported to Mr. Main, who had waited up for them.

Cave Rescue Practices.

The policy of M.R.O., which is to encourage clubs to carry out rescue practices under supervision, is still paying dividends. Not only is it easier to find cavers who know enough rescue techniques to be useful, or even to take charge, but as the foregoing records show, rescues are being performed spontaneously, often without calling out M.R.O.

Clubs wishing to carry out rescue practice should fix the date well ahead (about 2 months) and notify the Hon. Sec. of M.R.O. They should arrange the time and the cave, provide a team of 8 strong men, a small "victim" and the caving tackle. M.R.O. will provide a member of Committee to act as umpire and the special rescue equipment.

Clubs which establish a rescue team are allowed to have the leader of their team co-opted onto the Committee of M.R.O. The appointment is for a year, only, but may be renewed if the team continues to function.

The following cave rescue practices were held:-

21.4.68	B.E.C.	St. Cuthbert's
4.5.68	M.C.G.	Longwood
2.6.68	Oxford Univ. C.C.	Longwood
30.6.68	Westminster S.G.	Swildon's
7.7.68	Ordnance Survey C.C.	Swildon's
21.7.68	Shepton Mallet C.C.	Swildon's

15.9.68	B.E.C., Wessex, W.S.G., Shepton	St. Cuthberts
5.10.68	Border C.G.	Swildon's
6.10.68	Wessex C.C.	Swildons
30.11.68	U.B.S.S.	G.B. Cave

Besides these, on various dates, baths practices were held with the new neoprene bag and the Sump Rescue Apparatus Mark 2.

The practice held on 21.7.68 was the first on the "new 40 ft". Bob Craig tells me that for the first 10 feet three people are necessary in the chamber below the 40'. Two people on the ledge above the 10 ft drop and below the squeeze at the rift end are essential. As there is no room to pass in the rift, 4 people should then take over and be prepared to carry up the new rift. The waterfall pitch below the water chamber creates no problems but a person halfway up this 15 ft drop is useful to guide the "victim" and supply some pull.

Cave Rescue Council

The Council had its first annual meeting in Cheltenham on 28.9.68, the Gloucestershire Cave Rescue Group being the hosts. Dr. Lloyd attended on behalf of M.R.O. The Gloucestershire and Somerset Constabulary were also represented.

It was established as entirely proper for the Police to meet the out-of-pocket expenses of those called to assist them, because of the services given.

Contact between the Hon. Sec. of the C.R.G. (Mr. John Plowes) and the Association of Chief Police Officers was satisfactory. So also were international contacts.

Mr. Eric Catherine, in pursuit of the commission given him by M.R.O. in March 1968 had called meetings of the Border Caving Group, Chelsea Spelaeo Society, Westminster Spelaeological Group, Mendip Caving Group and Croydon Caving Club with a view to establishing rescue coverage for the chalk areas. They had formed an independent rescue organisation called the "South East Cave Rescue Organisation" and had satisfactory contacts with the Metropolitan Police and that of Surrey, Kent, Essex and Sussex.

The Cave Rescue Council at each Annual Meeting will decide the anticipated expenses of the following year and request assistance to meet these costs in the form of a levy from its constituent members. The levy for 1969 would be £1 from each organisation.

The next meeting will be held in Derbyshire on 20.9.69.

Conference of Cave Rescue Organisations

This has become an annual event and followed that of the C.R.C. at Cheltenham on 28.9.68.

Various ingenious but (to cavers) useless pieces of apparatus were demonstrated. The only item of conceivable utility was rescue harness made by Irving Air Chute, Astmoor, Runcorn, Cheshire.

The high light of the Conference was undoubtedly the demonstration which the South Wales Cave Rescue Organisation gave in a swimming pool of their self-contained sump rescue apparatus. This is based upon that already elaborated by M.R.O. in 1965, but worked out in detail and perfected by themselves.

Next meeting 20.9-69 in Derbyshire.

Finance

This year we had a reasonable excess of income over expenditure. Donations amounted to £43, including two donations of £10 from organisations. Among our supporters we number not only caving clubs and cavers whom we have managed to help, but also the Wells Police Ball Committee. To all of them many thanks.

March 18th 1969-

Oliver C. Lloyd, M.D.

Hon. Secretary & Treasurer
Mendip Rescue Organisation
Withey House, Withey Close West,
Bristol, BS9 3SX.

Hon. Secretary:	D.M.M. Thomson, "Pinkacre", Leigh-on-Mendip, Bath.
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Subs. Treasurer:	A.E. Dingle, 32 Lillian Road, London, S.W.13.
Hut Warden:	M.W. Dewdney-York, Oddset, Alfred Place, Cotham, Bristol 2.
Journal Distribution:	P.R. Cousins, 3 Kinver Road, Sydenham, London S.E.26.
Club Meets:	Jenny Murrell, 1 Clifton Hill, Bristol BS8 1BN.
Editor:	J.D. Hanwell, 50 Wells Road, Wookey Hole, Wells, Som.

CHIPONGWE CAVE, ZAMBIA

by Brian Hansford

Unfortunately the caves in Zambia are not well known and people who can tell you their whereabouts are equally rare. Ordnance maps do show some caves, mainly of archaeological interest; but, I never found one, even after tramping round, up, and over a small hill wherein a cave should have been. However, I found someone willing to go down with me if we could find a cave, Bob Nash, who when he's at home explores disused Cornish tin mines. Bob brought along Jill Heywood-Jones who knew about a system called Chipongwe Cave. It was situated 18 miles south of Lusaka off a dirt track, through an indigenous village and ½ mile into the bush. Look for a big fig tree and there is Chipongwe Cave; at least the main entrance to the system, as there are three entrances. The main one seems to be the result of a major collapse, being 40-50ft. deep. The second entrance is a 55ft. narrow shaft with a circular pothole at the bottom, while the third is rather like Sidcot Swallet entrance. We descended all three and found that they linked with the main chamber.

The main entrance is an oval shaped hole, with a boulder slope ending in a 40ft. cliff. Two passages lead down to the main chamber; the left hand one starting a little higher in the wall than the right hand one, and being almost tubular. It descends fairly steeply for 35ft. and exits into the main chamber. The other route enters the chamber about 6ft.higher.

At the entrance end of the main chamber is a boulder floor which slopes down for a further 40ft. to a lake which is in an ante-chamber on a direct line from the entrance passage. It is reached by going under a low archway at the foot of the boulder slope. To the left of the archway a larger mud floored passage slopes gently to a point where the bedding dips steeply. Here it is choked and water-filled. The approximate length of this passage is 200ft., and it varies considerably in width and height. Nearly at the end, to the right, is a shelf entrenched with a vadose channel. This leads into a tube, which in turn exits through a squeeze into a circular dome-chamber some 15ft. in diameter. The mud floor is covered in guano but not so thickly as in the main chamber.

Back to the main chamber (which is about 72ft. long, 20-30ft. wide, and 40-50ft. high), two large stalactites hang from the right hand wall, and at the far end is a narrow rift with a flowstone floor. To the right of the rift is a passage at floor level sloping gently downwards. Water action has sculpted the walls into curious flakes, looking rather like coral. The passage continues for about 50ft. then ends. However, about 35ft. along the passage is a squeeze to the right like half a dozen bricks knocked out of a wall. This squeeze gives access to a small chamber with great possibilities for digging. A hole in the floor leads into a low silted passage, less than 2ft. high, 8-10ft. wide, and of unknown length. To the left of this entrance is a circular hole in the chamber wall with a short drop down a 6ft. pot with a gravel and silt floor. It appears that this could link with the low passage, but a connection was not made because of a glutinous mud choke.

Once again, we returned to the main chamber. Some 20ft. up on the right wall is a small dead end "attic" chamber, while opposite is a similar opening which is at the bottom of the 55ft.

second entrance shaft.

Thus ended our first visit to Chipongwe Cave. Curiously we could not relocate either of the two alternative ways out on our second visit to the system.

Apart from the static water the whole system is dry, though it seems likely to flood in the rainy season. This might account for the roominess of the system, the fresh mud and silt chokes and the lack of formations. The inhabitants include two species of insect and at least three species of bats; the largest being the fruit bats who were found in the main chamber only on our visits. There were also a sprinkling of leaf-nosed and horseshoe bats, and these occupied most parts of the system. At the bottom of the 55ft. entrance shaft a family of owls were in residence; both parents and three chicks!

A fortnight after our first visit Bob Nash was admitted into hospital, suffering from what is called Caves Disease. Not much appears to be known about this complaint although a South African professor is supposed to have written a paper on it. As far as I can gather, it is contracted from the bats and affects the lungs. In effect a fungus grows on the walls of the lung, so that when X-rayed it looks very much like a tuberculosis infection. So, lack of time, equipment and knowledge of Caves Disease put an end to more caving in Zambia, for the time being at least.

SEA CAVES OF GREAT BRITAIN

by R.R. Kenney

I know of six caves that should be shown on the Ordnance Survey 1" series. So, recently when I had a few days enforced idleness at home I decided to list all those that are shown. At least I now know where to send the Steep Holm specialists.

In the table below I have listed the data in the following way: -

C :	The word ‘cave’ or ‘caves’	
N:	A named cave	Prince Charles' Cave seems to be popular.
H:	A named hole	This is a bad example of mapping because unless it is supported by the use of the word 'cave' there is much doubt. 'Hole' in the mariners sense could be gap in the onshore rocks affording a landing place for a rowing boat.
O:	A named ogof	Source 2 lists 'ogof' as 'cave, cavity' so there may be some similarity with 'hole' above.
U:	A named uamh	Source 3 lists 'uamh' as 'a cave, a grave'.
S:	The words 'subterranean passage'. This sounds intriguing,	
A:	the words 'arch' 'arches' 'natural arch' 'natural arches'	You take your choice here for an arch could be formed from the joining of two or more caves.

Source 3 contains the Gaelic 'Geodha', a narrow creek, chasm, rift or cove; also, the Norse 'Gio', a chasm or rift. There are many 'Geo's shown for the Orkneys, but as the word 'cave' appears frequently I assume that 'geo’ has the same connotation as 'hole' above.

This list works anti-clockwise from Lands End. Counties not shown have no recorded caves.

	C	N	H	O	U	S	A
Devon south	-	-	1	-	-	-	-
Dorset	-	2	1	-	-	-	-
Yorkshire	-	-	6	-	-	-	-
Durham	-	-	2	-	-	-	-
Northumberland	-	-	7	-	-	-	-
Berwick	-	-	1	-	-	-	-
Fife	2	-	1	-	-	-	-
Angus	-	1	-	-	-	-	-
Kincardine	2	1	-	-	-	-	-
Aberdeen	9	3	1	-	-	-	-
Banff	3	-	-	-	-	-	-
Moray	3	-	-	-	-	-	-
Ross and Cromarty east	4	2	-	-	-	-	-
Sutherland east	3	-	-	-	-	-	-
Caithness east	3	-	-	-	1	-	-
Caithness north	5	-	-	-	-	-	-
Orkney	24	2	2	-	-	-	5
Shetland	59	1	4	-	-	3	23
Sutherland north	1	-	-	-	1	-	3
Outer Hebrides	1	-	-	-	-	-	2
Ross and Cromarty west	3	-	-	-	-	-	2
Inverness west	14	5	-	-	1	-	-
Argyll	37	8	-	-	2	-	6
Bute	-	2	1	-	1	-	-
Ayr	1	1	2	-	-	-	-
Kirkcudbright	-	2	1	-	-	-	-
Isle of Man	1	-	-	-	-	-	-
Anglesey	3	-	-	-	-	-	-
Caernarvon	4	1	-	4	-	-	-
Cardigan	1	1	-	-	-	-	-
Pembroke	4	1	2	2	-	-	-
Glamorgan	1	1	4	-	-	-	-
Devon north	-	3	1	-	-	-	-
Cornwall north	-	-	5	-	-	-	-
TOTALS	183	37	42	6	6	3	41

Conclusions

The low frequency for south-west England and south-west Wales seems suspicious to me as a layman. My guess is that in the past there has been no clear requirement for caves to be shown; we know that that was the case for inland caves.

There are several instances where the word 'cave' on the map starts on the land and carries onto the sea. Again I feel that there is no defined standard. I feel that if a cave is within reach of high tide then the name should always appear over the sea. The opposite should also apply. There are some interesting locations in Scotland where the map hints at caves on raised beaches close to the present beach. Where a Welsh, Gaelic or Norse name is used the name should be accompanied by '(cave)'.

I have sent extracts from this article to the Ordnance Survey giving them specific examples of my queries. Weston's only cave may yet be shown!

If anyone cares to send me a few thousand pounds I will do a definitive survey from Admiralty charts and the 6" map!

Sources

1. O.S. 7th Series 1" revision dates 1948 to current.
2. C.R.G. Publication No. 4 'A brief glossary of Welsh topographic names for walkers and cavers'.
3. Bartholomew, Edinburgh. 'Glossary of Gaelic and Norse words in the place-names of Scotland'.

Other possible sources for additional data are the Admiralty charts and Pilots for Coastal Waters. The latter books often contain sketches and photos of the coastal aspect, but I have not seen the ones relevant to this country.

Note

Colonel F.M. Sexton of the Ordnance Survey tells me that the name 'cave' is used where the subterranean passage "is substantial".

LETTERS TO THE EDITOR

Dept. of Geography,
Univ. of Saskatchewan,
Regina, Saskatchewan,
Canada.

1st April. 1969.

Dear Sir,

"The last conversation I had with him was about poltergeists. He had some theory about their being connected with the water-table." Iris Murdoch ‘The Nice and the Good’.

Another attempt at exorcism of this particular poltergeist seems due in view of Willie Stanton's hypothesis of 'hosepipe' drainage for certain Mendip swallets. (W.C.C. J. No. 122).

It should be remarked that all the rates of flow established for Mendip Swallet streams are minimum rates, based on the straight line distance sink to rising. These rates, therefore are probably less, by several orders of magnitude, than the actual flow rates. For example the straight - line distance of the explored section of the Swildon’s streamway (entrance to Sump 12) is c. 2000 feet; whereas the actual length of the stream passage is over 5000 feet. Also, the stream meanders within the passage itself (especially in the lower streamway) thus further increasing the actual distance traversed. The true flow rate may thus be c. 1300 feet/hour as against 430 feet/hour suggested as the minimum rate. There would seem to be no reason why this factor (c. 3-fold) should not be applied to all other subterranean flow rates: the near Concorde/speed of Ubley Hill Pot water in this case becomes rather alarming!

Might it be that one possible explanation of the anomalous rates of flow is that the above generalisations do not hold true for all subterranean streams? If we suppose that some swallet streams follow relatively direct paths sink to rising, then the flow rates obtained from water tracing will approximate to the true rates of travel. If this is the case then the rate of flow of (for example) Ubley Hill Pot water - 2800 feet/hour - could represent the true rate of flow and not a minimum rate and thus the flow rate is not out of line with that of other swallet streams. The only sink - rising connections showing markedly high flow rates are Reads to Rickford c. 1700 feet/hour,- Ellick Farm sink to Rickford c. 1500 feet/hour, Ellick Farm sink to Langford c. 2600 feet/hour and Midway Slocker to St. Dunstan's Well c. 1600 feet/hour. Is it possible that in each of these cases a relatively direct underground course is followed by the stream? In the case of Midway Slocker to St. Dunstan's Well the cave passage could well follow the fault line which runs almost directly from the stream sink to the resurgence and may therefore provide a direct route. Under these circumstances a hosepipe drainage network would not be necessary, although it may be that during the initial stages of speleogenesis, underground channels do follow more direct paths and that the meandering tendency becomes more pronounced as the system develops (as with surface streams).

The factors liable to influence flow rates of cave streams would seem to be: mean hydraulic gradient, geological structure, stream discharge and local passage morphology (including depositional features). Of these factors, mean hydraulic gradient and discharge do not appear to be significant in governing flow rates in the thirty Mendip swallet traces so far undertaken. Attempting to correlate increasing flow rate with increasing hydraulic gradient for these streams shows a correlation coefficient of -0.01; correlating increasing flow rates with decreasing stream discharges shows a correlation coefficient of -0.3, both suggesting no significant correlation. In fact although some dribbles (for example Ellick, Ubley) have high flow rates, others (Pitten Street, Manor Farm, Brickdales etc.) do not. Also some of the larger streams (for example Reads-Rickford) have very rapid rates of flow.

Obstructions in the passages will doubtless lower rate of flow under normal hydrologic conditions but would not the argument "Little fleas have lesser fleas and so ad infinitum" apply in this case. I see no reason why the small conduits would not have their own diminutive shoals, pools, bars etc. Presumably the hosepipe would not be functioning as an active conduit for some of the time and thus differential silting would be inevitable. To embrace a theory which visualises a multitude of discrete hosepipes connecting sinks and risings with high flow rates (and therefore presumably correspondingly high corrasion/ corrosion rates) would involve radically rethinking present notions concerning drainage initiation in karst areas. For example, would the Ubley hosepipe be directly genetically related to the upper portion of the cave? Again, the initial pulse of Ubley spores emerging at the rising which Willie suggests supports a hosepipe hypothesis, is not found in other mini-streams - in Ellick there is a long drawn out peak, whilst Manor Farm (which seems likely to flow in a large passage) does show the sharp initial pulse. The meaningful interpretation of the concentration curves for Lycopodium spores at resurgences, seems to become more abstruse the more traces that are carried out.

Thus I would dispute the validity of the hosepipe theory on the grounds that (a) overall, small streams do not flow more quickly than their larger brethren and (b) that the underpowered stream is not necessarily likely to yield faster mean flow rates.

To be more constructive, is not the overriding factor in determining flow rates (irrespective of stage), the uniformity of the hydraulic gradient as opposed to the mean hydraulic gradient. Other things being equal if two streams have the same overall hydraulic gradient, the stream whose gradient deviates least from the mean value will have the faster flow rate, i.e. the evenness of the sink to rising gradient is of paramount importance. Thus, a stream answering to the siren call of "the water table" (or the "WHAT BALCH USED TO CALL SATURATION LEVEL" – ‘Butocsal’ - as the latest cunning Stanton euphemism has it) and plummeting sharply down in its initial course will have a high deviation from its mean hydraulic gradient. It might be argued that the evenness of the grade of a cave stream is largely governed - at least in the initial stages of development - by the structure of the strata between the sink and the rising. On Mendip the initial steep descents of many swallets seem dip controlled or dip guided; whereas strike orientated passages are not likely to influence passage gradient so directly and the stream is more likely to be able to approach a graded

state in such zones. Using the data available for eastern Mendip only and attempting to correlate increasing flow rates with increasing percentages of strike orientated passage as a proportion of total sink-rising distance a correlation coefficient of +0.7 is obtained. If the correlation is repeated omitting the Midway to St. Dunstan's trace, a coefficient of +0.84 results - both values suggesting significant positive correlations. It must be admitted that no such correlation appears to hold on central Mendip, but all the swallet streams in the Burrington area, exhibiting high flow rates, (Reads to Rickford, Ellick to Rickford, Ubley Hill to Rickford, Ellick to Langford) have high strike components - in excess of 60%.

Thus I think the hosepipe hypothesis can only, at best, be a partial explanation of high flow rates and would therefore (from a safe distance of 6000 miles) urge the St. Cuthbert's sump diggers on!

Yours sincerely,

Dave Drew.

Department of Geography,
University of Bristol.

5th May, 1969“

Dear Sir,

Willie Stanton's "Hosepipe Fantasia" in the last issue of the Journal demands a reply. By adding my voice, perhaps Willie's letter and Dave Drew's (this Journal) may be turned from a Karstic duet for Opposing Voices (the Stanton Bass against the Drew Falsetto) into a Rondeau.

As I understand it, the "Hosepipe Hypothesis" suggests that very small streams will descend swiftly to the "water table" - whatever that is - and thereafter cover the remaining distance to their rising(s) remarkably quickly by flowing in a channel whose cross sectional area is well adjusted to their discharge. The hypothesis therefore includes two components, a swift descent initially, and a prolonged rush through a flooded pipe under a very small hydraulic head. Surely, however, this model is not likely to produce very fast average flow velocities. When tested in January, 1967, spores from Longwood Swallet took about 21 hours to reach Cheddar, at an average velocity of 560 ft. per hour. This cave drops very steeply initially, and the altitude of the deepest point yet reached is 255 ft. O.D. according to the survey. When testing stream connections in the upper part of the cave in 1966, I noted that Fluorescein put into the stream in the Wet Gallery of the Upstream Series took approximately half an hour to reach the bottom of the cave, giving an average velocity of the order of 2 - 3000ft. per hour, roughly four to six times the overall average speed of flow to the rising. I imagine that this very fast initial flow rate is due to the steep gradient of the cave between Wet Gallery and the bottom. Presumably, therefore, the water must flow relatively slowly over the remaining, flooded? part of its course to Cheddar. The behaviour

of a "hosepipe" model of the type suggested would exaggerate this trend, as in pipes of smaller diameter the effect of frictional resistance on channel walls is relatively greater.

At this stage it is probably wise to separate small streams into two classes - those which flow in caves originally formed by much larger streams, and those which flow in channels formed by streams of a size similar to those of the present day. All of the small streams tested so far in the recent series of water traces fall into the former category, with the possible exception of those on East Mendip. Certainly, the streams at Burrington, which show such remarkably fast flow through times, are all tiny under fits to the caves in which they are found. In most caves of this type (Ubley Hill Pot, Pine Tree Pot, Hunters Hole, etc.) the accessible part of the cave ends in a choke completely blocking a passage leading on. Such digging as has taken place, as in Hunters Hole, generally shows that the passage is filled with waterborne deposits of various size grades. Presumably, the stream flowing into the choke flows above these deposits. The uppermost portions of such deposits are usually fine sand or silt, of a particle size small enough to be transported by a trickle which is large enough to put lycopodium spores into. Thus, it is likely that the stream will excavate for itself a channel similar to that of a surface stream. Its cross sectional area will be determined by the relationship between the stream's erosive power at different discharges, and by the total duration in a given period of years of the various values of discharge which occur. Thus, the channel cross sectional area will be adjusted to a discharge somewhat below a certain value. This value is the discharge at or below which most of the erosion takes place. It will have a frequency of recurrence of perhaps two or three times a year. Discharges greater than this will occur, but so rarely that their contribution to the total amount of erosion of sediment will be small. Sudden large floods may temporarily alter the cross section, but on the average it should always return to a value determined by the modal discharge. In other words, the channel cross section is "graded" to the overall regime of the stream.

In fact, one of the controls on channel cross section, in addition to discharge, is the gradient of the channel at any particular cross section. This will control the velocity of flow at that point, and thus the discharge that can be accommodated in a channel of given size. In a similar way, the gradient of the channel over its whole length will control the velocity of the stream. If we consider a particle of water at the head of a channel, it is obvious that it has only a certain amount of potential energy which must be expended in reaching the bottom of the channel (in this case, the rising). The overall velocity will be greatest if this energy is expended evenly throughout the length of the channel. This is clear if we consider the example of a waterfall. In pouring over the waterfall, the stream loses a considerable amount of potential energy, but covers very little distance horizontally in a downstream direction. The kinetic energy which it gains in falling is largely expended in turbulence in the plunge pool. Thus, at the base of the waterfall, the stream has almost as far to travel horizontally as before, but must do so with a smaller potential energy at the start, and over a decreased gradient. It must, therefore, travel more slowly than it would have done had it flowed down a constant gradient from the point at the top of the waterfall. Thus, if the channel cross sectional area is controlled, that stream which has the most nearly constant gradient throughout its course will flow with the greatest average velocity.

In fact, this argument is a simplification, because, as mentioned above, channel cross sectional area at any point is determined by the gradient. Also, it is assumed that the stream has no tributaries or distributaries in its course, an assumption which is obviously unjustified, However, as an approximation it is probably true to say that those streams which most nearly follow a constant gradient from swallet to rising will have the fastest flow rates.

If we accept this argument, it is clear that the high correlation between flow rate and the percentage of the swallet to rising distance that can be resolved into a component along the strike is highly significant. Dave Drew quotes a correlation coefficient of +0.7 for the East Mendip area (i.e. 70% of the variation in flow rate may be accounted for by control by dip and strike). As is well known, the roofs of many Mendip caves tend to be controlled by the dip, and only those passages which run along the strike will be entirely free from such control. Since the long profile of channels cut into the fill of a completely filled cave passage will be controlled by the initial roof level (at least as long as the channel is not deeply incised into the sediments), the requirement of even gradient in the stream channel will be more easily met in strike passages whose roofs fall at an even gradient than they will in passages formed as a series of U-tubes controlled by joint and bedding planes. Thus, in systems which have a potentially large strike-controlled component small stream channels are more likely to approach a well-graded long profile than in systems with a small strike component.

The second type of small stream - that flowing in a channel formed by a stream of approximately the same size as itself - normally flows in caves too small to admit a man. I would tentatively suggest that Cross Swallet and the Hillgrove Group of swallets might be examples of this type. In this context, it may be instructive to compare the values of flow rate for the Hillgrove swallets tested in January, 1969. Hillgrove Swallet itself was tested by artificially pumping water into the old shaft, so it should be discounted from this discussion. Of the others, Easter and Whitsun Holes, and Rock Swallet, have very small streams, and may be regarded as potential "hosepipes", while the Zoo Swallet (or Doubleback) stream is larger. The flow rates have not been accurately calculated, but they are of the following orders of magnitude, between the swallets and Wookey Hole.

Whitsun	1000	ft.	per	hour	Rock	150	ft.	per	hour
Easter	2000	ft.	per	hour	Zoo	200	ft.	per	hour

Spores from all three swallets were still emerging in very small numbers from Wookey in April, about three months after the tests began. According to Stanton, this is not the behaviour that would be expected in a "hosepipe". The different flow rates for Whitsun and Easter Holes suggest that they follow different paths to the rising, and this is confirmed by the fact that Whitsun also feeds risings in Biddleeombe, whereas Easter does not. The difference in flow rate, therefore, reflects a difference in the grading of the channels, as the streams are both of the same size. Both fell into the "hosepipe" category, and both have

fairly fast flow rates, but then the other "hosepipe" stream, Rock Swallet, flows at only 150 ft. per hour, which is even slower than the non-"hosepipe", Zoo Swallet.

Yours sincerely,
Tim Atkinson.

32 Lillian Road,
Barnes,
London, S.W.13.
12th April, 1969.

Dear Jim,

I expect that members would like to be kept informed of progress at the Club dig at Thrupe, the last work there being over Easter. We are now 12 feet below what was ground level at the time of the subsidence fifteen months ago. Digging towards the cliff has now stopped as we have reached solid rock. A vertical shaft has been started, and last Monday afternoon Alan Clarke and myself uncovered open space between boulders and solid rock; large enough to lose a crowbar in!

The solid rock is deeply eroded with projecting fossils and chert nodules. It is very encouraging to find this so near the surface. As Mendip digs do sometimes "go" within 20 ft. of the surface, I think we would quite possibly be in to cave by the end of the summer.

This dig should, I think, be called Thrupe Lane Swallet (not Thrupe Farm as already indicated) since the nearby public highway is known as Thrupe Lane and because, even if abbreviated to "Thrupe Lane", it would not be confused with the Club's earlier dig at Thrupe Swallet just over the brow of the next hill.

I hope later in the spring to have a team working every weekend at the site. While I shall be there on alternate weekends, Alan Clarke of Bristol and Keith Barber of Shepton Mallet are well able to take charge in my absence.

Yours sincerely,
Tony Dingle.

MENDIP NOTES

by Schizomycetes

Shatter Cave, Fairy Cave Quarry

Over the Easter holiday Ray Saxton and Peter Conway of the Cerberus Spelaeological Society were having a good look at likely holes in the quarry, and found a small fissure with stalagmite

flows at the foot of the working face. Digging away the waste and rubble they found the entrance to this new cave, which lies less than 100 feet to the west of the Balch Cave extension explored by Bob Whitacker and Jerry Lavis over a year ago. Subsequent enquiries showed that the quarrymen were well aware of something big in this area but had previously infilled any openings found.

The unstable but roomy entrance series was explored for about 600 feet on the occasion of the breakthrough and Richard Vaughan joined the two diggers. Although most of the formations here are depressingly shattered there are, nevertheless, some attractive unspoilt grottoes in phreatic avens and loops off the bigger chambers. The largest chamber smells strongly of diesel oil which has clearly seeped in from outside. Later, Jerry Lavis and Brian Prewer pushed along an obvious side rift for another 100 feet or so into a narrow but marked old streamway. On the flowstone terraces an exquisite "nest" of helictites was found. Progress on that occasion ended at a boulder ruckle where large slabs had peeled off the steeply dipping bed broken up in the Withybrook Fault Zone.

On Monday 14th April Bob Whitacker and Willie Stanton took the quarry manager and the owner on a tour of inspection. Lured on by his native cunning and a strong draught Willie thread his way through the terminal ruckle to emerge into perhaps the biggest chamber yet discovered in the whole quarry system. The way on along this banana-shaped chamber led up and over an enormous boulder cone majestically capped with a large stalagmite pillar. Since then this has been aptly named Tor Chamber. Despite a clear way on Willie, stricken by his conscience as but a visitor, turned back to leave the glory to the cave discoverers at a later date.

The following Wednesday evening saw a large Cerberus party assembled to continue the exploration. They were joined by the North Hill Consortium who decided to take a "works outing" for the occasion. While the latter discretely lurked in the background and Bob Whitacker started the survey, Jerry Lavis and Brian Prewer went on ahead. Past Tor Chamber the pace inevitably quickened with the gaggle of visitors ferreting around in likely side passages. Fred Davies, Dave Causer and Ray Mansfield explored a pretty offshoot while Jim Hanwell and Mike York pursued the distant sounds of excitement arising out of Jerry and Brian's discoveries. In doing so they appear to have pioneered a low level route. Mike Thompson, Marcus Barton, Tim Reynolds et al followed the more commodious higher level passage which gave clear signs of having been a significant old streamway. Both routes eventually joined through squeezes into a low fabulously decorated grotto, now called Pillar Chamber. At the far end a stalled-in low arch prevented further progress that night, although the distinct draught gave clear indications of a way on.

Later, the arch was carefully enlarged to allow Dave Irwin and colleagues to enter yet another chamber with one of the four side passages leading along a muddy rift. About 200 feet gradually upwards through jammed boulders the route ended in a chamber floored with collapse debris. The draught emerged from a small hole choked with scree-like gravel. Subsequently this has been cleared through to allow the less fullsome to pass. After an inclined slide and a well decorated chamber, the way on drops into the obvious continuation of the old streamway seen earlier in the cave. This can be followed upstream and downstream for a short distance. Here the first parties lost the draught, but on Wednesday 14th May Mike Thompson, Tim Reynolds,

Dave Causer and Bob Lewis located it howling out of a choked way on in the upstream section. At the time of writing it is understood that the Cerberus are planning a big digging trip to this part of the cave, and one imagines that yet more discoveries will be made.

To date there must be over 1,500 feet of passage in the system. The survey shows that it is basically a large abandoned streamway developed within the shatter zone bounding the Withybrook Fault. This fault is aligned southwest-northeast with a throw to the west, and the cave trends across it towards the south east in general, according to the survey. The development is in the Hotwells Limestone being a course crinoidal limestone dipping at 45° to 50° N.N.E. in the area. However, the furthermost reaches of the system may extend into the more granular or oolitic basal beds of this limestone which outcrops between Batch Farm and Hyatt's Hill. Immediately to the south lies the older Clifton Down Group of limestones. These variations may well help in determining the different character of the more recently discovered inner parts of the cave. What is of great interest is that the system goes well outside the limits of the quarry concession towards Frog Lane and the old Hyatt's Hill Dig. Perhaps this richly decorated cave will yet survive the fate of its less fortunate predecessors in the quarry. Who knows, a back way in may be found? Access arrangements are detailed in Club News of this Journal.

Reservoir Hole

Not to be thwarted by his self-denial in Shatter Cave, Willie Stanton returned to his own preserve to meet with some success. After a short breakthrough his lovingly engineered and carefully "grouted" boulder shaft, even more openings began to appear. Jim Hanwell paid one of his rare visits to the place at the time, but had to be content as builder's labourer for the evening despite the tantalising holes yawning below. Having been graciously lectured at some length on the virtues of Stanton's Shatter Cave ethics, a useful time was spent preparing sound footings to ensure the safety of the intrepid regulars who deserved to savour the fruits of their labours unblemished by a casual stranger.

George Brown was given the honour of leading the assault later in the week. After a short climb and low arch, a high rift chamber, offset from the main shaft, was entered. Apparently this chamber is reminiscent of those in Goughs. Smoke flares revealed the now famous Reservoir Hole draught to emerge from one end of the rift through mud and boulders. Pronouncements were made as to the significance of the scalloping, and digging recommenced with renewed vigour. More spaces are beginning to appear, but there we're afraid this episode in the continuing story of Reservoir Hole must end for Willie is off to Portugal yet again. Still, one imagines his willing band of supporters will secretly welcome the rest, and the chance for the cement to cure!

Meanwhile, exchanging a trowel in the dark for a pen in the sun, we hope later to read a more authentic version of the 1969 Chapter in the Reservoir Hole Saga from no less than William himself. Perhaps this engineering epic is nearing a glorious finale after all.

Twin T's Dig

Amidst all the success stories there is a tale of woe to record. Our ardent diggers at Twin T's have been set back by the collapse of their shoring with the spring rains. Nothing daunted however (digging at North Hill has taught them the virtues of persistence if nothing else) a mammoth assault is planned over Whitsun. A 25 feet shaft will be sunk through the adjacent solid rock using South Wales Tunnel Cave tactics. Surely they must have been on to something good to justify such an effort? It can't just be revenge.

It seems that an alternative field name has been found for the new shaft. Perhaps the gods will look more favourably on a dig with a more dignified name!

Rhino Rift

We understand that John Cornwell is at it again. This time Rhino Rift comes under the spell of Mendip's most ubiquitous and successful diggers of recent years. Let's hope that the magic touch works yet again, for this cave must be in one of the district's most promising areas for a potentially big system.

Access to the Cheddar Caves

It was with pleasure that your scribe heard of the good sense of Colin Venus and the M.N.R.C. in being prepared to withdraw the arrangements made for them to control the caves at Cheddar. Colin explained what had happened at a recent Council of Southern Caving Clubs Committee Meeting at Priddy.

For the time being at least the matter is on ice. Full consultations will be made with all clubs interested should an alternative system prove necessary.

Centenary of the Birth of the late Mr. H.E. Balch

Next November 4th will mark the centenary of the birth of Mendip's pioneer of caving and first President of the Wessex Cave Club. For some time now we have been preparing to pay tribute to the memory and work of Mr. Balch on this occasion. With the help of Jack Duck, Harry Ashworth, and many others who recall Mr. Balch, William Stanton is writing an appreciation of his life in the form of an illustrated biography. This will be published in a Wessex Occasional Publication to be on sale in October.

Jim Hanwell, who is editing the publication, tells me that a considerable amount of information has been accumulated which will be an invaluable record of early Mendip caving amongst many other things. However, it is felt that there may be members and other readers of the Journal who have recollections and contacts which could be of interest. Please get in touch with Jim, or direct to William Stanton (Biarro Nunes, Grandola, Portugal) if you have any information you feel is significant.

THE BRITISH ASSOCIATION OF CAVING INSTRUCTORS

On March 22nd-23rd 1969 the British Association of Caving Instructors was formed. Although primarily arising from the need to establish acceptable standards amongst the growing range of teachers, youth leaders and outdoor activities leaders, etc. introducing young people to caving as part of their professional duties, the B.A.C.I. is in fact open to any caver willing to undergo training to become a certified caving Instructor. It seems meet to look at the events which occasioned the formation of this body, and to detail some of its intentions.

The initial meeting from which the B.A.C.I. eventually evolved was convened by M.K. Lyon at The Woodlands Outdoor Centre, Glasbury-on-Wye, Hereford, on 6th-7th January 1968. Sixteen delegates "actively concerned with instruction in caving" were present. A widely circulated report was issued after the meeting for comment and suggestions from interested bodies. Subsequently, the various Regional Councils have considered the matter, both independently and jointly through their National Caving Association. The following extracts are taken from the Glasbury-on-Wye Meeting of January 1968 by kind permission of M.K. Lyon who is now Chairman of the B.A.C.I.

> "An increasing number of Outdoor Centres undertake caving with their students. Unlike every other major outdoor activity in Britain there exists as yet no National Caving Body to lay down commonly accepted standards of conduct and procedure. The situation is made serious by the special nature of underground exploration. It is potentially hazardous pursuit, with a very poor public image. In addition it requires more careful control for the preservation of natural phenomena than any other outdoor activity."
>
> "A number of people concerned with caving in full-time Outdoor Centres felt that the Centres themselves should formulate agreed standards which it was hoped would be acceptable to the caving world, and public opinion."
>
> "All the Centres represented agreed that the aim of their caving activities was to give their students the experience of caving, and not to produce a mass of inexperienced cavers. Although most students enjoy their underground activities the vast majority are not interested in continuing further with it. This minority, probably less than 1%, are given every assistance to put them on the right path. This did not mean purely giving them a talk on caving clubs etc., but in giving individual guidance. The Centres represented felt strongly that their instruction was more likely to lead to a responsible attitude to caving among young people, and to spread a healthy knowledge of the risks involved."
>
> "The meeting agreed that the most important factor in Centre caving was the calibre of instructors. At present there are no standards applicable to caving instructors in this country. The following statement reflects the feeling of the meeting on the general level of competence required of a professional caving instructor:-
>
> Any instructor leading a party underground should have considerable experience of caving itself, and of the leadership of young people. He must be sufficiently experienced to be able to recognize and avoid all unreasonable hazards, and be able to deal effectively with any contingency which may arise. His personality must be such that the welfare of his party is his chief concern at all times. He should have a real interest in, and a knowledge of, the

formation of caves and the features they contain, and be able to transmit this interest"

Much time was spent in a thorough examination of such aspects as safety, access, insurance, equipment, clothing, cave preservation and relationships with existing caving organisations. Finally, detailed recommendations were drafted as follows:-

Recommendations of the meeting held at The Woodlands, Glasbury-on-Wye, on 6th-7th January 1968 to discuss underground exploration as an instructed pursuit at Outdoor Centres.

A. Safety

1. The safety of the party underground depends primarily on the judgement and skill of the leading instructor. He must be qualified for the job.

2. No instructor should take a party on a trip which he would personally find extending. The instructor must be able to make his own decision on this, and must never be under an obligation to lead or accompany a party when he feels unfit to do so.

3. No instructor should lead a party down a system with which he is personally unfamiliar.

4. Every party must be accompanied by at least two adult instructors.

5. The minimum standard of capability required of the assistant instructor on a trip underground is that in an emergency he would be able to get the party back to the surface safely without the leader, and has a thorough knowledge of relevant cave rescue procedure.

6. The upper recommended size limit of a party on an underground trip is ten plus two adults. This is the maximum safe number with two instructors in specified easy systems. This ratio must be lowered if the system demands it.

7. An easy trip underground is defined as one on which the party should be able to get out safely, at any stage, without an instructor.

8. The party must consist of a minimum of four people.

9. Before going underground the instructor must brief the party as to all the relevant safety and cave preservation precautions (physical and biological) they must observe, giving details of the route to be followed and the features which will be encountered.
   N.B. If the party is incapable of assimilating these precautions, and acting on them, it is unfit to make the trip.

10. No person should be taken on an underground trip against their free will. The instructor must have the right to exclude from the party anyone who might be prejudicial to its safe or proper conduct. On their first trip, which must not be of an extending or extended nature, novices must be checked for signs of physical weakness, reckless behaviour, claustrophobia, poor reaction to wet/cold, or other symptoms which would hinder their progress on subsequent trips.

11. Before entering a cave the instructor must:-

    a) Check the equipment of all members of the party, with special reference to adequate clothing and essential supplies, and the correct fitting of helmets and functioning of lights.
    b) Check the condition of the party.
    c) Leave note of the passages to be followed, and time of return.
    d) Leave an identifying object, or a person, at the entrance to the cave, unless this is clearly irrelevant.
    e) Be absolutely certain by means of weather forecasts and direct observation that there is no chance of the system flooding.
       N.B. A wider margin of safety must be taken in this respect on a normal caving club trip.

12. In the system the instructors must have a comprehensive awareness of all the possible hazards to an instructed party, and guard against them. In particular:-

    a) The instructors should always be at the front and. rear of the party.
    b) Keep a running check on the morale and condition of the party. Be prepared to turn back at any stage.
    c) Be aware and warn the party of the dangers of loose chokes, falling rock (especially below pitches), static and flowing sumps, false flooring etc.
    d) Take specific care to avoid minor injuries which could result in a major rescue.
    e) All places where a slip could lead to injury must be protected by a lifeline, handline, or any other method which is efficient in the circumstances.
    f) As with flood precautions, in judging the objective dangers on an instructional trip, the instructor must allow a greater safety margin than he would on a normal caving trip.

13. On an underground trip the minimum equipment for each individual should be:-

    Warm clothing and protective over-garment.
    Protective helmet - with chin strap, lamp bracket and cable clip. Boots, without hook lacing and preferably with commando type soles.
    An efficient headlamp, preferably electric.

    The party must carry spare lamps and light spares, and emergency food in addition to that which may be eaten on the trip. Instructors must have a first aid kit and a whistle each. Ropes, ladders and other gear will of course be taken as necessary, bearing in mind that the leading instructor will have a comprehensive knowledge of the tackle required. An exposure suit, wet suit, or other suitable gear must be worn by the whole party if there is any possibility of prolonged exposure to water.

14. Vertical pitches
    a) Parties which will encounter ladder pitches or roped sections underground should first be taught, and practise the relevant techniques. This surface training, in particular ladder practice, should be carried out in caving gear.
    b) The time each ladder pitch will take will be estimated in advance from the surface practice, and the trip and/or party size planned accordingly,, Long waits underground should be avoided particularly when wet.

c) All ladder pitches must be lifelined using accepted safe techniques. Lifelines must be held by instructors, or competent pupils under constant supervision. No person must ever be allowed on wire ladder in hook-lacing boots. Instructors must ascend and descend first and last.

15. Mines

Mines often present totally different dangers and problems than those encountered in natural systems. They must be treated with the greatest respect. Familiarity with a mine, as defined in 3 must include a thorough knowledge of its geological history and properties, possible gas risks, and mining methods. Only in this way can its safety or danger be assessed.
As a general guide, mines in Britain may be classified as:-

a) coal
b) mineral
c) slate

These should be used on instructed courses as:-
a) never
b) with extreme caution
c) with great caution

16. Cave preservation cannot be divorced from considerations of safety, and instructors must be ever-mindful of the obligation to preserve caves in their pre-discovery condition.

17. The underground not only holds most of the dangers of mountains, but also those of water. To these are added hazards of its own. Rescue can be almost impossible, even in systems which are easy to negotiate with a fit party. It is with this in mind that instructors must always plan their trips. Caving can rarely be absolutely safe, but make sure that the hazards are acceptable by observing not only the letter, but also the spirit, of these safety recommendations.

B. Cave Preservation

1. Centres should teach and observe the standard cave preservation measures.
2. Centres should not approach caving as a purely physical activity. By teaching their pupils the mode of formation of caves, and cave features, they should convey a respect for caves as irreplaceable natural phenomena.
3. Centres should undertake never to leave spent carbide underground, even if running water is available. Spent carbide should always be disposed of on return to the Centre and not before. (The use of carbide lamps will be phased out of use as rapidly as possible).
4. Centres should undertake the removal of litter or other disfigurements when these have been left by previous cavers.

C. Equipment

The recommendations in this section are not intended to cover every possible items of equipment, and are based on the best information available at the time of the meeting.

1. Lights: Centres are recommended to equip all parties with lead-acid type miners' batteries and cap lamps. Carbide lamps should be phased out of use as fast as is practicable.
2. Helmets: Helmets should be designed for underground use. The best on the market is the 'TEXOLEX No. 2 N.C.B.' model. For Centre use helmets should be supplied with an easily adjustable head cradle, and an adjustable chin strap. Head cradles should be disinfected regularly.
3. Boots: Centres buying boots specifically for caving are recommended to buy boots with commando or similar cleated rubber soles, rot-proofed leather, and a reinforced toe-cap. Boots must not have hook lacing. Nails are not advisable on cave preservation grounds.
4. Protective Garments: The best garment on the market is the 'Gouffre Berger suit' made by Ladysmith Busywear, Leeds 9. This is a one piece overall garment in orange nylon material with no pockets and a full-length zip protected by a 'velcro' flap. Personal adjustment is by means of internal tapes. This suit is said to have the life of ten boiler suits. If boiler suits are to be worn, it is recommended that they should be secured at the ankle with an elasticated cuff.
5. Equipment for cave study: Centres undertaking caving are recommended to obtain a comprehensive library on the subject. The obtaining, and use, of equipment for scientific and survey work should be encouraged.

D. Ropes, Ladders and their use

1. Ropes considered acceptable for underground use in general are Viking Nylon No.4 and Ulstron 'full-weight'.
2. Ladders should meet the following specifications:-
   10" rung spacing.
   C-links for joining ladders.
   0.5" minimum rung diameter.
   0.125" minimum wire diameter.
   1 ton minimum breaking strain.
   They should be used with wire tethers of greater strength than the wire of the ladder, fitted with C-links.
3. For tying directly onto a rope the bowline with full hitch is recommended: where a waistline (nylon) is used, a screw gate karabiner of minimum breaking strain 2 tons and a double 'figure-of-eight' knot.
4. Wherever possible students should be lifelined directly by an instructor belayed (separately from the ladder belay) at the top of the pitch. Double lifelining from the bottom should be avoided if at all possible. There must, in any case, be an instructor at the top and bottom of the pitch while the students negotiate it.
5. Ropes and ladders must be inspected regularly for wear or corrosion, and also given a definite working life. Ladders should be tested regularly during this working life.

N.B. The recommendations in this section are not intended to be a complete guide on technical matters.

Suggestions on Caving Instructor Standards, and possible moves towards certification

The meeting saw the role and responsibility of the instructor in the following terms:-

Any instructor leading a party underground should have considerable experience of caving itself, and of the leadership of young people. He must be able to deal effectively with any contingency which may arise. His personality must be such that the welfare of his party is his chief concern at all times. He should have a real interest in, and a knowledge of, the formation of caves and the features they contain, and be able to transmit this interest.

Caving Instructor List

The caving instructors at the meeting resolved to start a list of caving instructors working full-time at Outdoor Centres. It is hoped that all other qualifying instructors will send their names in the inclusion on the list. Any further moves will depend entirely on the reactions of all interested caving instructors.

Qualifications

The meeting considered the question of certification of caving instructors, on the lines of existing schemes for other outdoor activities. It was suggested that certification as a full professional instructor should be preceded by two other stages on the lines of:-

1. Enrolled instructor
2. Junior instructor
3. Professional instructor

The meeting considered that the standard of experience and skills required for the professional instructor should be fully discussed by all interested parties, and give their own suggested standards to instigate this discussion below:-

Experience The candidate must have:-

a) Substantial underground experience in one major limestone area, and practical knowledge of at least two others, over a period of at least three years.
b) Practical knowledge of a variety of mines.
c) Practical experience of cave rescue techniques.
d) Completed a minimum of two years at a recognised outdoor centre.

Knowledge and Skills The candidate must:-

a) Hold a current adult First Aid certificate.
b) Be competent to lead an underground rescue team.
c) Have the following physical abilities,

    (i) be able to lead rock climbs to V. Diff standard in underground conditions
    (ii) be able to swim 50 yards without strain in normal wet-cave gear

(iii) be able to ascend 200 feet of free hanging flexible ladder (10" rung spacing) without distress
(iv) be able to pass recognised free-dive sumps (e.g. those in Swildons, Giants, etc.).

d) Have a thorough and up-to-date knowledge of underground clothing and equipment.
e) Have a thorough knowledge of the use of ropes, ladders and other mechanical aids in general use.
f) Have a thorough knowledge, based on experience, of the possible hazards of mines, dry caves and wet caves.
g) Have a knowledge of meteorology, with particular reference to the possibility of rainfall in any weather conditions.
h) Have a thorough knowledge of the underground environment. (This includes the formation of karst features, subterranean hydrology, cave flora and fauna, and cave survey, at least to the standard of the information in 'British Caving'; also basic geology, minerology and mining techniques especially methods of safeguarding workings- to a similar standard).
i) Have a knowledge of the history of British caving, and the present caving world (Clubs, guidebooks, Cave Rescue Organisations etc.).
j) Have a specialised interest, developed to a reasonable standard, in at least one aspect of speleology in its widest context, for example:-

The scientific study of any cave phenomenon
Cave photography
Cave diving
Cave survey etc.

k) Have the practical ability to transmit his knowledge and enthusiasm to parties in his charge.
l) Have a knowledge of the physical and mental capabilities of young people based on practical and theoretical knowledge,
m) Have the ability to lecture on any aspect of caving.

In a personal communication dated 2nd May 1969 Malcolm Lyon states that,

> "As a <u>general recommendation</u> the Association (B.A.C.I.) wished to substitute a ratio of 2:6 instructors to novices in place of the 2:10 (ratio suggested in the Jan. 1968 recommendations), with a rider that the ratio is sometimes increased in practice".

Thus the newly formed association is now preparing a syllabus for training qualified cave leaders. The current Secretary of the British Association of Caving Instructors is:-

David Allsop,
Glenbrook,
Bamford,
SHEFFIELD.

WIRE ROPES FOR CAVING USE

by P.R. Cousins

The prime subject of this article is wire for 'Electron Ladder'. In fact it has been written mainly to clarify previous articles on the subject; although, some of the material presented is new in that the conclusions reached are at variance with those previously presented by Carl Pickstone (see W.C.C. Journal No. 101. Vol 8. pp 256-9).

Stainless Steel Wire Rope

Stainless steels are subject to severe corrosion in contact with aluminium and its alloys. Corrosion also occurs when stainless steels are in contact with mild steel, and many other metals. An exception, owing to a little understood effect, is copper with which corrosion does not occur. On the other hand copper causes dramatic corrosion on mild steel. Hence all 'Talurit' splicing on stainless steel must be done with copper and never aluminium, whereas all splicing on mild steel must be done with aluminium and never copper ferrules. It is obvious that, while aluminium alloy rungs are being used, stainless steel wire cannot be considered for use in ladders; although it may have uses in other equipment.

General comments

Of the wide range of rope constructions possible for larger cables (above 1" circumference) only a small selection are normally manufactured in the small size range (up to about ¾" circ.). The possibility of using ropes made in Langs Lay does not normally arise, though small surplus batches of unusual constructions do occasionally appear; for instance, the layered nonrotating construction used by one club. Similarly, the choice of Preformed cable is normally lost since most cable is now preformed; so if either of the types described below were required not in a preformed condition a special order might be necessary. The two types of cable available as small cords are distinguished by the different grades of steel used, for the different sizing arrangements confuse direct comparison.

Aircraft Cords

Wire rope made from 120/130 ton per sq. inch steel to Specification W 9 is available in a large range of sizes down to 3 cwt. nominal Breaking Load (B.L.). The sizes of interest are 10 cwt. and 15 cwt. otherwise known as 5P and 6P.

	B.L.	Construction
5P	10 cwt	7 x 14 0.12 in. diameter
6P	15 cwt	7 x 19 0.15 in. diameter

The construction column is in standard notation; briefly 7 x 19 implies a rope of seven strands each containing 19 filaments. In practice the strands are arranged as six round a single core, whilst the filaments are in layers, twelve around six over one core (written 12/6/1). Aircraft cords are not available other than with a wire core.

Regular Small Cords

A somewhat unwieldy title for ordinary wire rope. Small cords are made from 110/120 tons/in^2 steel and are only approximately sized; the same cord being nominally termed ⅜ in circumference, ⅛ in diameter, or now 3 mm diameter! These ropes can be made with either a wire strand or a hemp fibre core, and can have hemp fibres replacing the central filament of each strand. To accommodate this the notation is now modified slightly so that the core of the main cable is always specified separately; as Wire Strand Core (W.S.C.) or Fibre Main Core (F.M.C.).

In addition the wire core may be of different construction to the strands - usually containing more filaments - when it is technically an Independent Wire Rope Core (I.W.R.C.). As an alternative to Hemp a stranded P.V.C. core is available in stainless wire ropes, and presumably could be used in small galvanised cords.

The constructions available are:

6x7	F.M.C. W.S.C.	6 x 19	F.M.C. W.S.C.
6 x 12	F.M.C. (12/F).	6 x 24	F.M.C. (15/9/F).

The 6 x 7 constructions - known to yachtsmen as 'standing rigging' - are extremely inflexible and completely unsuitable for ladder making. The 6 x 19 constructions, known as 'running wire' or 'flexible cord' are, as their names imply, suitable for use where flexing occurs and in general would satisfy caving requirements. Both the remaining two types have hemp cored strands, as the strand notations given in the table shew; but, whereas the 6 x 12 (having only 12 relatively coarse filaments per strand) is stiff and inflexible, the 6 x 24 (often known as 'fully flexible') is the most flexible of all the above constructions.

Flexibility is probably the most desirable property of wire rope used in caving ladder and the natural choice would apparently be 6 x 24 construction. Unfortunately, the strength of 'Talurit' ferrules is somewhat suspect on this very soft cord and it is inadvisable to use these cables unless hand splicing is contemplated.

Which Construction?

In general a wire core contributes only 7½% extra to the strength of a rope yet costs 14% extra. The hemp core will retain a dewatering grease (e.g. Lanolin) to keep the rope in good condition, if a preservative solution is applied regularly. Thus, where its crushable nature is not a disadvantage a Hemp cored rope should always be used; namely in Belays, and taper-pinned ladders. But, where an ‘uncrushable’ core is required, as appears to be the case with ladder made by the 'Araldite' and Pin method, wire cored rope must be used.

The choice between 6 x 19 W.S.C. and Aero Cable is more difficult since the disparity in sizes already noted makes direct comparison difficult. The range available should cover anyone's theoretical needs, there being proportional differences in size and cost. As all three choices are

reasonably flexible, strength requirements alone must decide. The relevant safe working loads are equally unhelpful; but, for the record, I prefer the 6 x 19 W.S.C.

		B.L.	S.W.L.	o/dia
5P	Aero Cable	10 cwt.	1.7 cwt.	0.12 in.
3 mm.	6 x 19 W.S.C.	13.7 cwt.	2.2 cwt.	c0.13 in.
6P	Aero Cable	15 cwt.	2.5 cwt.	0.15 in.

Summary

For general purposes Hemp cored 6 x 19 cords should be used, the 3 mm. size being suitable for ladders, and probably a larger size for belays. For 'Araldite' construction where an uncrushable core is preferable, the same 3 mm. 6 x 19 can be used with a wire core, or for ultra light weight ladder the 10 cwt. Aero Cable. * If galvanised ropes become available with a P.V.C. core which is relatively firm it may be possible to use this instead of wire cored rope.
* (see following article).

RUNG FIXINGS FOR ELECTRON LADDER

by P.R. Cousins

Recent years have seen a number of articles, including some by myself, in caving journals on the use of various resins to affix the duralumin rungs of electron ladder to the wire sides. This idea is not new, though it lay undeveloped from Railton's [1] experiment in 1952 to H. Lord's precise work [2] 1963. These reports described the use of Polyester, and Epoxy resins respectively. However, as yet no report has included data on both types of resin under comparable conditions. The most recent paper, by the Kendal Caving Club [3] again recommends epoxy resin.

Method of Fixing

Although variations have been tried [4] most experimenters finally chose a system in which one thin pin separates the wire strands within the rung. This does no possible damage to the wire, but conveniently locates the rung so that resin can be added outside any assembling or rung spacing jig. To prevent rungs being wastefully filled with resin small bungs of wood, paper, foam rubber, or cork may be pushed ½ in from each end of the rungs before assembling them onto the wires. Resins are poured in from a can and left to cure in a warm room; they could be oven-cured if necessary. During this time the resin will seep out through the wire rung holes and these must be completely sealed. A satisfactory, although time-consuming way of doing this is to squeeze plasticene round the wires where they enter the rung holes.

Experiments with Polyester Resin

After writing a review [5] which recommended using a resin method of ladder construction, I bought some Polyester resin from Sheffield. This chemically is a simple alkyd resin with

plasticiser and Cobalt Napthenate, which is mixed with a peroxide hardener. Unfortunately, these chemical details were not known to the distributors, and we were not warned that the peroxide initiator decomposed on storing. Hence, although early samples were satisfactory, a later batch made with partially decomposed initiator were no good. [6]

To use up the remainder of this polyester resin Maurice Hewins and I prepared twelve more samples with a fresh peroxide initiator. These samples were made with four different constructions of wire cable, and one of each set was degreased initially. This degreasing, a simple wash in Carbon Tetrachloride or similar solvent, has been variously recommended (or scorned) by other authorities.

Test Results with Polyester Resin

Wire Construction	6 x 24 7 FC	6 x 19 F.M.C.	6 x 19 W.S.C.	10 cwt. Aero Cable
Load at which rung slip occurred:				
Fully Degreased	5.6 cwt.	3.9 cwt.	6.6 cwt.	3.9 cwt.
Not Degreased	4.8	4.2	4.9	3.6
Not Degreased	5.7	3.4	6.6	3.6
Average Loading	5.4	3.8	6.0	3.7

The tests were performed on a Hounsfield Tensometer, read to the 0.1 ton; the load being applied slowly by hand taking about two minutes to reach slipping loads. The figures represent the load at which rung slip occurred.

In every case the results with degreased wire are better than average. Though the improvement is only marginal further tests may show that there is also less variation of slipping load with degreased wire.

Clearly, the worst results are those with 10 cwt. Aero Cable. A possible explanation for this seems to be that the surface area of this small cable is inadequate to withstand higher loadings. In confirmation the results with 6 x 24 cable are much higher than those with 6 x 19 F.M.C. cable; for, although these 'soft cored' cables have the same nominal diameter, the 6 x 24 (having finer filaments) has a greater surface area. As expected the wire cored version of 6 x 19 is superior to the Hemp cored, presumably due to the ease with which a hemp core can be crushed so weakening the bond.

In view of the difficulties encountered with decaying peroxide initiator, these experiments with Polyester Resin were discontinued.

Experiments With 'Araldite' Epoxy Resin

The article by Dr. H. Lord in 1963 [2] described the use of Araldite MY 753 / HY 951 and later workers have followed his lead [3]. This resin is not the usual handyman's 'twin pack', but a liquid combination which takes about 6 hours to gell and at least 24 hours to cold cure. First a set of

four test samples were prepared; two degreased, and two with the wire oiled as manufactured. The results were so encouraging that a complete specimen ladder length was made; four test samples being made concurrently with each side so that three batches of resin had now been mixed in all and twelve test samples prepared. Before testing, four of the six new degreased samples were dipped in wire preservative. It is important to simulate this treatment (since it will be applied to any completed ladder during its service) in case it has any weakening effect on the joints. Of these four samples, two were retained for later treatment, and the other two tested immediately. A red dye was incorporated in the resin for these eight samples which visually identifies the completed ladder. The wire used throughout was 3 mm 6 x 19 W.S.C. The test results with ‘Araldite’ Epoxy Resin are as follows:-

	Wire Degreased		Wire Not Degreased	
Resin Batch	Slip	Draw	Slip	Draw
1	7.4 cwt.	5.2 cwt.	6 4 cwt.	3.6 cwt.
1	7.4	6.0	6.6	4.4
2	7.2	7.2	7.0	6.4
3	8.4	6.2	5.8	5.2
2	5.8	5.0	These four samples had been dipped	
3	7.2	6.8	in wire preservative before testing.	
2	7.8	6.8	The latter two were tested after a	
3	8.2	6.8	second dip, and delay of one month.	
Averages	7.4 cwt.	6.1 cwt.	6.5 cwt.	4.9 cwt.

NB. The test were made on a Hounsfield Tensometer as before.

The Columns headed “Draw” were the mean loadings required to continue the gradual slip until about ⅛" of wire had been pulled through the rung.

The effect of degreasing the wire is now seen to be an improvement of 0.9 cwt. in the slip loadings. Although some scatter is apparent in even the degreased wire samples, the normal slipping load stands out as 7.2 - 7.4 cwt. This, coupled with a load always over 5 cwt. to continue the slip without damage to the wire, is very satisfactory. Whilst it is difficult to be sure on but four tests, treatment with wire preservative does not seem to weaken the joint; at least the White Spirit/Lanolin mixture used does not. In fact, a slight improvement is apparent in the last two samples which may be an ageing effect as previously reported 2.

Test Samples of Stainless Wire

In mistake a sample of 6 x 19 Stainless wire with a stranded P.V.C, core was obtained. Although the stranded P.V.C. core is not yet available in galvanised steel wire, it has replaced Hemp in some brands of Stainless wire. So that a comparison could be made between the crushability of P.V.C. and Hemp cores two samples were made up, using Araldite batches 2 & 3. Both behaved identically when tested, the first slip occurring at 6.2 cwt and a load of 3.4 cwt. continuing the draw. Interestingly, the first slip occurred with a bang in both cases and a sudden jump. This has been accounted for by assuming the wire unsticks from its resin matrix, collapsing inwards onto

the core; it is then free to slip out suddenly. Similar events had occurred with some of the Polyester tests, but were not fully recorded.

Summary

It appears from the tests conducted that only wire cored cables can be used; the only satisfactory results being with 3 mm, 6 x 19 W.S.C. galvanised wire cord. Primarily due to its inconvenient Peroxide initiator Polyester resins are not to be recommended. Superior results have been obtained with 'Araldite' MY 753, HY 951. Should a rung slip under emergency shock loads the wire will not be damaged, and the rung will not slip further under normal use. It would be an advantage if a resin less mobile or quicker gelling than this 'Araldite' could be used

Although others have used various fillers, none have been added in the present series of tests. They probably offer no advantage in strength, but may in cost.

References

1) C.L. Railton. Trans. C.R.G. Vol.2, No.2. (1952)
2) H. Lord Cave Science No. 33, B.S.A. (1963)
3) E. Acland Proc. B.S.A. No, 6, (1968)
4) D. Brandon, et al Newsletters C.R.G. Nos. 94 & 95 (1965)
5) P.R. Cousins The SPELAEOLOGIST Vol. 2, No. 7 (1966)
6) P.R. Cousins Journal, Devon S.S. No.102, (1968)
7) C. Pickstone Journal, Wessex C.C. No.109, Vol. 9 (Nov.1966) pp 134-138.

A complete list of references to this method of rung fixing will be found in the forthcoming book 'A Manual of Caving Techniques' published for the C.R.G. by Routledge & Kegan Paul.

Suppliers

Polyester Resin was obtained from:
E. Chapman & Son, 58-60 Trinity Street, SHEFFIELD 3.
'Araldite' MY 753 / HY 951 was obtained from:
C.I.B.A. (A.R.L.) Ltd., Duxford, CAMBRIDGE.

Acknowledgements

Mr. Mahler of Forest Hill School, who tested all the samples.
Mr. M. Hewins of the Wessex C.C. who made up Polyester samples.
Mr. C. Calder and the Chelsea C.C. for 'Talurit' splicing on test samples.
Messrs, Latch & Batchelor Ltd., of Hay Mills, BIRMINGHAM 25, who supplied a sample of Stainless Wire with stranded P.V.C. core.

Biologie der Meereshöhlen. Topographie, Faunistik und Ökologie eines unterseeischen Lebensraumes. Eine Monographic. By Prof. Rupert Riedl, Zoological Institute, University of Vienna.

636 pages, 350 illustrations 16 coloured plates and 30 tables, author and species index, bibliography. Printed on art paper, Lexicon Format, 16.5 x 25.5 cm. in cloth. 186 DM (about £19. 15s. 0d.). Published by Verlag Paul Parey, Hamburg and Berlin, 1966.

From time immemorial man had been fascinated by the world beneath the waves; and, for the past two decades, Prof. Riedl has devoted himself to an intensive study of the almost neglected world of the sea caves and their shadowy inhabitants. This culminated in the book under review, a magnificent monograph on the animal life of the sea caves. It is unique for a scientific book to be of interest to such a diverse range of specialists as zoologists, divers, marine geomorphologists and cave explorers, etc. It describes the methods and results of the comparatively new science of "Littoral exploration" the investigation of that little known coastal region, the sea shore.

The book is divided into seven parts and in the forward Riedl mentions that this book is the culmination of 20 years work. In the introduction he discusses the need for nature reserves in the sea shore areas, together with suggestions for a field station for on the spot research.

The first part, Problems and Methods, describes some of the difficulties in exploring an underwater environment. From the start it was necessary to use diving equipment and Prof. Riedl describes the elaborate training required in the swimming bath etc., before they ventured into the caves beneath the surface of the sea. He also explains how the superb colour photographs were taken - using a pack of six photofloods run off a generator, in other cases using a waterproof electronic flash.

The second part concerns the topography of the caves, no mean task when most of the survey work is carried out underwater. There are numerous surveys of the caves and maps of the areas showing the various cave locations; an invaluable guide for anyone thinking of spending a holiday in the Mediterranean or the Adriatic.

Part three lists and describes the inhabitants of the caves including both fauna and flora. It is in this chapter that the magnificent colour plates come into their own, with the gorgeous reds and yellows of the marine plants. As most of the caves are below sea level there is a natural bias towards aquatic animals, fish, crustacia etc., but where there are air spaces seals have also been recorded. The absence of bats in these latter caves is commented upon, and this is attributed to the high amounts of salt in the atmosphere.

The fourth part is devoted to the ecology of the sea caves and how they are populated. The author has made some interesting discoveries; certain plants have a preference for various zones in a cave (also the deeper the cave beneath the surface) and more plant life is concentrated at the entrance. A lot of this, of course, is dependent on sub-marine "Meteorology" - the effect of light,

temperature, currents and so on. This is discussed in detail in part five.

Part six goes into the ecology of the cave fauna in some detail, and Part seven discusses the caves as part of the Littoral System.

The bibliography, which runs to nearly 27 pages and includes over 700 references, needs no further comment!

This book is something new in bibliographical monographs, the result of two decades toil. It is not just another text book, but a pioneering work that has opened up new horizons for the biologist and at the same time added a new chapter to Speleology; a chapter, the existence of which was formally neglected or overlooked. Prof. Riedl has undoubtedly produced a tome which will remain a standard work on the subject for many years to come.

ADO

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On the Origin of Springs by Pierre Perrault (Hafner Pub. Co. N.Y.) 1967

This 209 page $15 publication of Perrault's original text written in 1674 is a typical example of the resourcefulness of American publishing companies in bringing old classics to a wider public. Often claimed as the first book on hydrology, it is, therefore, invaluable to have such a translation into English. This has been done by Aurele La Rocque.

Starting with a lengthy review of authorities such as Plato and Polissy, the author then introduces his own concepts and ideas about springs. The book concludes with surprisingly advanced methods and scientific experiments with springs, many of which are still applicable.
The translator adds his own notes and comments to clarify the original text.

J.D.H.

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Pits and Caves in the Shephelah of Israel compared with similar pits in East Anglia, by Y. Ben-Arieh. Paper in "Geography". Jnl. of the Geographical Assoc. Vol. 54, Pt. 2, No. 243 (April 1968).

This short paper by Dr. Ben-Arieh, Dept. of Geography, Hebrew University, Jerusalem, considers the origin of some 3,000 pits and small caves in the Eocene marls and "shoft" chalk hills of western Israel. The pits are defined as bell-shaped cavities (similar to our own dene holes) sometimes in excess of 10 metres deep, while the caves are no more than several adjacent pits merged together underground.

Solutional formation is dismissed on geological grounds and man-made origins appealed to using archaeological evidence. The absence of spoil is convincingly explained by the fact that it was used elsewhere; in fact, the pits and caves are quarries dating from the start of the Roman occupation c.100 B.C. Curiously, in just the area where one would expect to find some historical records of such digs, none have yet come to light. Unlike similar chalk pits in this country, the author argues that those in Israel were not for agricultural fertiliser, namely lime or nitrate.

After a careful examination of many historic buildings since Roman times it is concluded that

this district provided cement and plaster for most of the surrounding regions. If only our present-day quarry owners would consider mining limestone thus rather than removing whole hillsides, perhaps many areas would not be so spoilt! One wonders to what extent our own Chalk pits or dene holes were really "cement" or lime-mortar mines. After all, even today there are extensive Chalk mines near Beer, Devon, for this very purpose. On being removed from the mines the Beer Chalk actually "hardens" in the same way that Ben-Arieh observes from the Bet Guvrin caves.

J.D.H.

Carbonate Sedimentology in Central Europe. Edited by G. Müller and G.M. Friedman. (Springer-Verlag) 1968.

An expensive, profusely illustrated 255-page volume summarising 30 papers on carbonates and carbonate rock formation originally presented to an international seminar held in Heidelberg University in July 1967. Current investigations and methods of analysis are detailed to bring the reader up-to-date over a wide field of carbonate sedimentology.

The book is divided into five convenient sections. Section A, on the Processes of Carbonate Formation and Diagenesis is naturally one of the most extensive of the five. The papers by H.E. Usdowski on The Formation of Dolomite in Sediments and G. Ebhardt on The Experimental Compaction of Carbonate Sediments are particularly relevant to researchers seeking information on the origin and nature of the various types of limestone. However, the contributions by E. Flügel, H.E. Franz, W.F. Ott and D. Heling in Section B (on the Microtexture and Microporosity of Carbonate Rocks) would seem even more applicable to speleologists. On the other hand, the papers in sections C and D, on carbonate geochemistry and regional studies respectively, are disappointingly obscure so far as cave studies in this country are concerned. Much emphasis to the fossil component of carbonate rocks is found in the former, while the latter avoids Carboniferous Limestone in favour of the Mesozoic limestones which abound in Central Europe. How on earth did "Appalachian" papers creep in to this particular book? Section E on Applied Carbonate Petrology contains one paper only by H. Schettler on analysing cuttings from drill holes.

In general this book will prove a useful source of reference for those attempting to relate limestone lithology with the nature and distribution of particular surface landforms.

J.D.H.

SHORTER NOTICES

The Sunday Times 2nd February 1969. p. 10. "Spectrum" report by Adam Hopkins, Patricia Connor, and Frank Herrman, on Cave-Paintings.

An illustrated half-page report on the "painted" Ribadasella Cave. Northern Spain, discovered in April 1968. This region has more than its fair share of caves rich in Palaeolithic art forms, and this latest addition seems a fitting rival to the celebrated Altamira further east in Santander

Province. Yet another piece of knowledge is fitted in to the ancient regional "schools of art" pattern emerging in Southern Europe.

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Contributions to The Study of Karst by P.W. Williams and J.N. Jennings. Pub. of Research School of Pacific Studies, Dept. of Geography, Publ. G/5 (1968) Canberra: Australian National Univ. Price $A. 2.50.

Each author contributes a separate paper. While it is a little odd to find P.W. William's study of limestone solution rates in the Fergus River Basin, Ireland, in an issue ostensibly devoted to the Pacific, the paper by Jennings is more appropriate, being on calcareous sands and rocks along parts of the Australian coastline. The former follows the currently fashionable approach of calculating rates of solutional denudation from a limestone catchment by measuring dissolved amounts discharged at risings over a period of time. Both papers were originally read to the 20th International Geographical Congress in London, 1967.

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Ground Water Problems. Proc. of International Symposium, Stockholm, October 1966, Edited by E. Eriksson et al (Pergamon) 1968.

For £5.0.0. this 223 page book will probably only ever be an occasionally referred to library text so far as cavers are concerned. Nevertheless, there is much in its wide ranging scope to be of particular value to the growing number of speleologists interested in hydrogeological problems. The clear illustrations are one of the outstanding features of this carefully edited volume.

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Lead Mining in the Peak District. Edited by T.D. Ford and J.H. Rieuwerts. (Peak District Planning Board). 1969.

This volume in the nature of a handbook has been compiled by members of the Peak District Mines Historical Society. The local Planning Board has published the book, and their address is Aldern House, Baslow Road, Bakewell DE4 1AE. Since caves and mines are so closely connected in this area, this is a book to have in any caver's library.

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Cerberus Spelaeological Society Newsletter No. 18 (Feb. 1969).

The article on "Some Devon Caves" in this publication is of interest. Sixty-five caves are listed with a brief note for most of the bigger ones. It is a pity that the authors, Nick Chipchase, Peter Glanville and Peter Rose, did not list 8-figure Grid References for each site; some have been thus located, others given a 3-figure reference, but the remainder nothing but a place name.

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