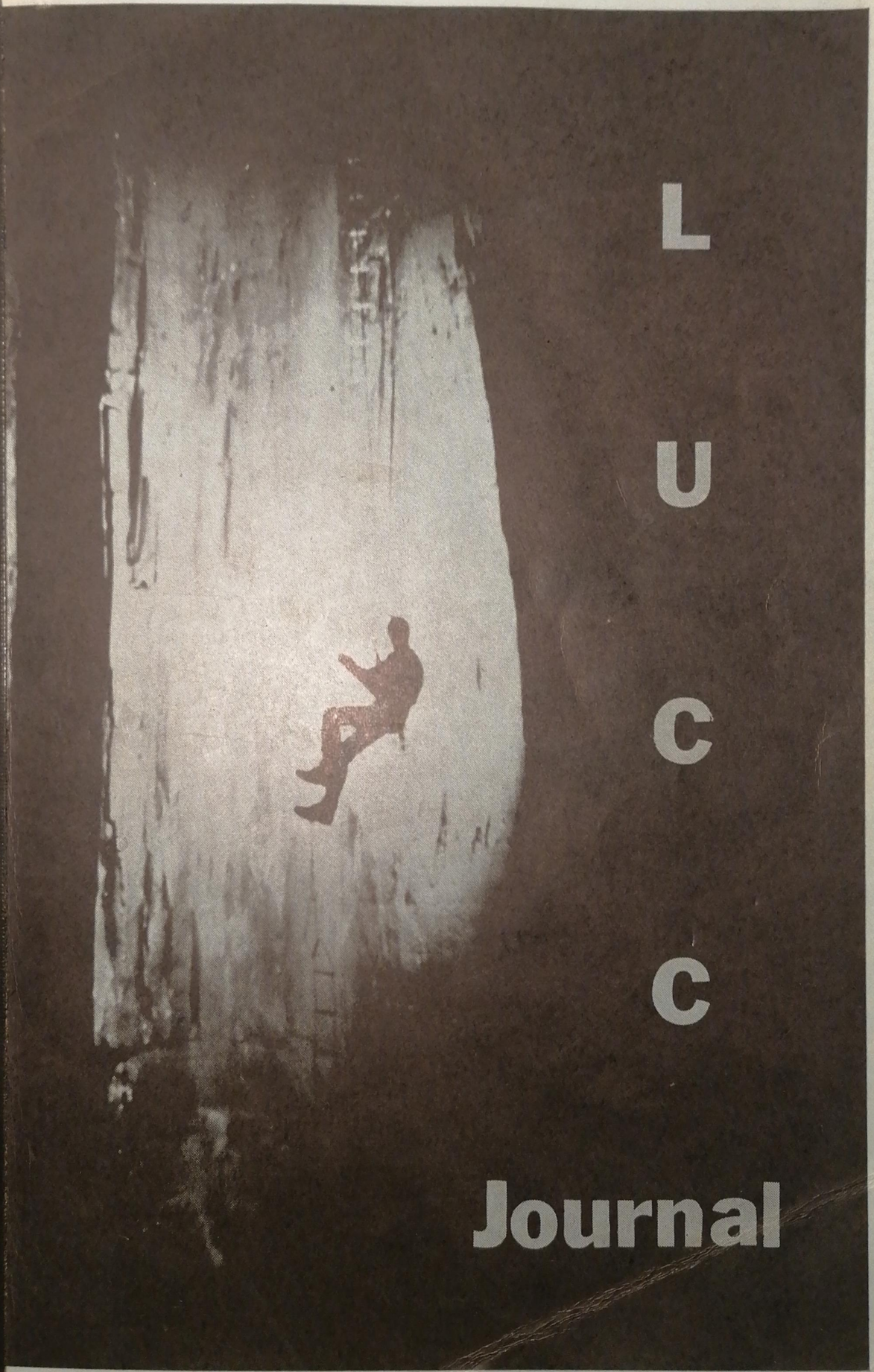

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EDITORIAL

During the past year there have been persistent rumblings from Mendip on the subject of survey grading. Some vocal Mendip cavers think that the grading system should be scrapped and replaced by a few qualitative terms. Northern cavers were quick to oppose this, not only are some of the Mendip suppositions inapplicable in Yorkshire's linear systems but also confusion would reign amongt the world s cavers using the system.

A meeting was held and the inevitable compromise was reached. It is, however, a good compromise, grading remains and the better Mendip ideas are incorporated. The new grades and definitions are printed on page 37. The major modifications are demoting grades 2 and 4 to non-preferred and the introduction of station position error. This will certainly help to define the accuracy of a survey but it is still up to the surveyors to minimise the systematic error in a survey. A case of this recently occured with the Lost Johns' survey. Although the original main line was probably surveyed to within the new definition of grade 5 the end result was 10% out vertically because the surveyors had not leap-frogged, this is not always possible but certainly is so in Lost Johns . Hence systematic station position errors had added up to the sum of 15m.

The new survey grades are a considerable improvement upon the old ones and providing they are used within the wider context of good survey practice future cave surveys should benefit.

Rog Bowser.

Many thans to all the contributors for their articles and to the IC Geology Department for producing the surveys.

In addition to the Edit or, R.J.Bowser, Chemical Engineering Dept., Imperial College, London, S.W.7. the following can supply copies of this journal:

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Cover Photo: Juniper Gulf, Last pitch by-pass by Tony Waltham.

A VISIT TO STRANS GILL

Mid-September, and still not thinking too clearly after a rather unusual summer, I let it slip that I wouldn't mind doing Strans Gill. For a few moments the stories of the cave's superb decorations had managed to override thoughts about the notorious tightness of the entrance. John Middleton and Bill Renshaw immediately said the trip was on - so I was committed. Then we roped in Arthur Champion; he had led an earlier epic to Strans Gill by the Craven Pothole Club, so that we knew that at least he would be able to get out and call in Wimpey's when we got stuck.

We arrived at the entrance - an idiotic little rift in a dry streambed. Twelve metres deep with the top four metres of ludicrous proportions. Arthur, John, the tackle and Bill all disappeared down with varying degrees of difficulty. Then my turn, I'd earlier decided that a dry suit would never go down, so I had borrowed a wet suit. Consequently my level of enthusiasm was raised as I hurled my sleek neoprene-covered body down the hole - and stuck solid. Movement downwards merely increased the pain; so very slowly I retreated to the surface. Something had to be altered. The wet suit jacket came off and was thrown down the shaft. Thoughts on how to get out were abandoned, and again I jumped down - this time with success.

At the bottom of the ladder, the way on was clearly visible - a few metres on minute little rift passage to the next pitch (5m). At the end of this rift there is precious little space for the ladderer to contort and attach the belay to a big thread on the left, but at least there is no danger of falling down the pitch - it's far too tight for that. The pitch looks impossible; but by sliding out from the ladder the tight bit is only very short. At the bottom I thankfully donned my wet suit jacket and lamp which I had laboriously dragged this far.

The others were ahead so I looked for a way on - a jolly little grovel in a muddy washed-out shale bed - such fun. Needless to say it soon got tighter and then the passage turned a corner, and developed as a classic keyhole section. The slot in the floor was too narrow which meant that we had to thrutch through the roof opening - up through a squeeze and down again. Not all that tight but technically probably the hardest bit in the cave and a menace with tackle.

One more contortion and then we were all in a little chamber laddering the next pitch of 50m. Arthur went down first but just below the lip he found some massive loose blocks which he then trundled, with magnificent sound effects. The pitch is superb, in a large rift; an easy 15m to a wide ledge then free to the floor and barely touched by the adjacent waterfall. Bill came last, abseiling as we only had a single lifeline.

Then we were in the easy bit. A low wet crawl in the stream led on for some distance. It ended at a boulder blocking the way. Up and over, then contort feet first along a narrow rift and down a 3m climb to the top of the fourth pitch. Only 10m deep but ridiculously wet and of course tight at the top. At the bottom, down through boulders, along a few metres of pleasant streamway and there was the next pitch. But we weren't going there; the last three pitches are short and close together and the visit to the sump is barely worthwhile. Instead we turned right, into a high level passage. It started as a crawl over an incredibly deeply eroded rock floor and then enlarged a little. It was very quiet and thick mud banks told us we were in an old abandoned passage. A deep slot in the floor had to be traversed but soon ended and then we were in the Passage of Time.

This passage is unbelievable. Seven metres wide and three high it is immaculately decorated. Hundreds on long clean straws contrast with the dull black walls and there is a selection of larger stalactites,

pillars, gewgaws and crystal pools. It must be the finest passage in the Dales, and is well worth the contortions to get to it.

The end of the Passage of Time degenerates into a filthy crawl and Arthur and John went for a wallow while Bill and I relaxed and enjoyed the formations. They were soon back and we set off out. John and Arthur again diverted to scramble down the 20m deep rift in the floor while Bill and I progressed. Up the wet pitch and along the stream passage, and I then realised I'd made a mistake. I was in front, which meant first up the big pitch towing a jumar instead of getting a friendly lifeline. But it is an easy climb and we were soon all at the top rolling up ladder. Then into the contortions.

The squeeze through the keyhole proved interesting as there is very little to push on with the feet. However it is just possible without aid and we could then enjoy getting the tackle through. Along the crawl and to the bottom of the second pitch where the real fun starts. Off came all our lamps and my wet suit jacket. But it really isn't too bad. Only the top is tight and there one has to leave the ladder because of the shape of the squeeze; but at the critical spot someone from below can pull the ladder out so that one foot hold can be gained which is enough to extrude upwards and over the top. This does of course provide a bit of a problem for the last man, who happened to be John. His length added to the difficulty because the available rungs were in the wrong position so a bit of juggling and heaving on the ladder was needed but then he easily came up. The tackle has to be handed up this pitch and along the crawl by a chain of people - which would make the pot rather more difficult with less than four in the party.

And so to the notorious entrance. Arthur went up first with minimal delay. Bill followed minus his wet suit jacket again with little trouble and the tackle was easily hauled up on a rope. Reasoning that going up would be harder than descending I had meanwhile been

divesting myself of neoprene. Consequently I set off up the pitch wearing almost nothing except a single Damart vest and a pair of boots. But the ascent is much easier than it looks. The lower squeeze round a flake is quite passable in the right position, and then one merely stands on the flake and pushes up through the top squeeze. One more thrutch and exit - though admittedly its easier to write about it than to actually do it.

The trip had taken 6½ hours, and it is a classic. Rather surprised that we had actually made it, we rolled up the ladder and disappeared in the direction of the cars.

Tony Waltham.

HEATOR HOLE

Discovery

On the west side of Dodd Fell Hill there is a line of shake-holes running approximately north-south, the northern end terminating on the Pennine Way track. These shake-holes were examined several years ago by some U.C. cavers who spent a little time digging in one of them. One of these cavers was Jon Hallam and as the years passed by the memory festered in his mind until one Spring day in 1972. On that day Jon Hallam was attempting the Hawes to Horton directissimo by Land Rover accompanied by Robin Thomson and Roger Bowser. The trip was unsuccessful; the Land Rover sank, but before then Dodd Fell had been passed and the old dig revisited. This dig lies at the south end of the line of shake-holes, is the biggest of the lot, and the only one to take a reasonable stream. Robin returned to the dig in the early summer with Martin Leach and Bill Frost, and the trio soon convinced themselves both of the instability of the dig and the futility of digging without mechanical aids. In October the three returned with the necessary equipment; ropes,

bolts, block and tackle, and Roger Rowson. A shaft was soon dug through loose rock at the bottom of the shake-hole and a rock floor reached. Robin descended on a ladder and passed through a squeeze at the bottom to find a short free climb down into a small stream passage. The passage was of passable proportions, but as part of the shaft had fallen in onto the explorer's head during the descent, inducing a state of fear into said head, a retreat was made until the entrance could be made safer. This was done the next week using an oil drum which really offers very little protection and none at all against a suspicious looking gritstone block perched above the entrance and weighing in at around twenty tons. Robin and Bill descended, and walked and slithered along about 100m of muddy passage, climbing over the occasional boulder until a large block barred the way. A crawl was dug through the mud on top of this boulder and the stream regained, only to become too low almost immediately. An exit was made and Roger and Martin were so disgusted at the muddyness of the two explorers that they put off their surveying trip until Christmas. They found the shaft partially collapsed and conditions too wet to redig it. This will be done soon and a survey will appear in the next issue of the journal. An interim description is given below.

Description

National Grid Reference: SD 83218381

Altitude 557.4m OD (1829') Length 100m Depth 16m.

The grid reference and altitude were surveyed to the entrance from a nearby bench mark. The length and depth are estimates.

The entrance lies at the bottom of a large shake-hole which is at the south end of a line of shake-holes running north-south along the west side of Dodd Fell Hill, in Hoator Pasture. The line of shake-holes marks the contact between the Lower Howgate Edge Grit, which caps Dodd Fell Hill, and the Main Limestone, which lies underneath. After the entrance pitch the passage is a vadose

trench carrying a small stream. The cave ends at a possibly faulted area where the passage becomes bedding plane like and too low; the stream may be running over shale here. It is estimated that the passage is bearing east. No inlets were noticed and this was thought surprising in view of the number of nearby shake-holes. It is not yet known where the water resurges. Dip appears to be north-east, if this is the case and the water flows down dip then it will resurge in Sleddale, at least one mile from the sink. It seems unlikely that further passage will be found via Heater Hole; the consistently thick layer of mud found everywhere indicates that the hole floods completely in wet weather and only drains slowly to its normal state, so there is something very constricting or almost impermeable between sink and resurgence. Heater Hole is the first and so far the only cave to have been discovered on Dodd Fell.

Tackle: Entrance pitch 8m ladder, belay to bolt.

Robin Thomson.

THE THREE COUNTIES SYSTEM

Since the conception of the Three Counties System (1) much work has been done to substantiate it, so that it is now accepted as a reality (2,3). The work described here adds further weight to the argument by providing evidence for links between Ireby and Lock Folls. The work was carried out in two sections concerning altitudes and hydrology on Lock Fell.

Altitudes on Lock Fell.

During New Year 1972 a surface survey was carried out on Lock Fell which suggested a probable error in the Lock Foll survey (4,5). With this thought in mind Lost Johns' was resurveyed to grade 5 (6)

using tape and clino. The computed altitudes are tabulated below, to the nearest .5m or foot.

Lost Johns' Entrance	353m OD	1158' OD
Top of Centipede pitch	321	1051
Top of Battle Axe pitch	264.5	868
Groundsheet Junction	222	729
Lost Johns' lake	220	723
End of High Levels in Notts Pot	315.5	1033
Lost Johns' Lyle Cavern High Avon Tube	299	980
Rumbling Hole terminal sump	232.5	763
Lost Johns' Rumbling Hole inlet sump	232.5	763
Death's Head Hole terminal boulder sink	258.5	847
Lost Johns Death's Head inlet top avon	241.5	792
Notts Pot terminal sump	249	817
Gavel Pot inlet and outlet sump	214.5	703
Lost Johns' terminal sump	215	705
Lock Beck Head	213.5	700

Comparison of these figures with previously accepted ones shows the Lock Fell Survey to be in considerable error. It is currently being redrawn and it is hoped to publish it this summer. The new figures for Lock Fell simplify the hydrology and also support some postulated links in the Three Counties System.

Gavel and Lost Johns' sumps are at the level of Lock Beck Head, within the survey error, so there is no need to postulate a rising further down Lock Beck (7). The Rumbling Hole sumps are now seen to be at the same level. There is a reasonable downhill gradient on the proglacial (undiscovered) passage from Lost Johns' New Roof

Traverse to the South Inlet in Short Drop Cave (8). The sumps in Sink Chamber and upstream Battle Axe are on the same level, as proved by Phil Collett's dive (9). The choke at the end of Maypole Passage is at the same level as the roof of the Master Cave and so not worth digging (10). The end of the High Level Series in Notts (11) is 16m above the dig in the High Level Series in Lost Johns' (12,13) and 500m away. This suggests a phreatic tube running down dip and promising a connection for the persistant digger. By far the most interesting aspect is that the Notts sump is perched 33m above the Gavel sump - more about this later.

Lock and Casterton Hydrology.

A hydrological survey was carried out on Lock and Casterton Fells on 30-12-72. The aim of the survey was to check that the flow at Lock Beck Head was sufficient to account for all the known drainage on Lock and Casterton Fells (14).

The test was carried out under dry conditions, the Kingsdale Beck was not flowing, after a week of stable weather. Stream flows were measured using the 'Gulp Dilution Technique' (15). Common salt containing 1% Rhodamine B was used as the solute, the samples were analysed by flame photometry (16). Rhodamine is a useful indicator of peak salt concentration as it contains no metal ion. If the time between samples is short enough and a dye is used as an indicator, then the sample tubes need not be numbered. By plotting sodium ion concentration from minimum to maximum against time a 'stopped half-curve' is produced the area of which is a close approximation to that of the true curve. The results obtained are tabulated below.

The figures for runoff should of course be constant. The correlation here is quite adequate bearing in mind the impossibility of drawing accurate catchments and the differing regression rates on the stage decays of the different streams, even though conditions were as

near static as could be hoped for. The figure for Casterton Fell is fairly low however. There are two possible reasons for this (17), the sump in the Earby extension to Lancaster was not taken into account and some of the Bull Pot-Aygill water may bypass the Lancaster sump.

	Flow ls^{-1}	Catchment km^2(a)	Runoff $ls^{-1}km^{-2}$
Gavel Pot main stream	2.8	.58	4.8
Notts Pot below Ireby inlet	5.7	1.32	4.3
Lost Johns' at sump	7.4	1.44	5.1
Pippikin entrance stream below Ratbag	1.0	.20	5.0
Pippikin Cigalore stream	8.0	1.65	4.9
Lancaster Hole stream at sump	42.8	10.48	4.1
Total Lock Fell caves	24.9	5.19	4.8
Total untraced area (b)	7.9(c)	1.56	5.1
Lock Bock Head	75.6	17.23	4.4

The mean base sodium ion concentration was found to be 7.0 ppm.

Notes.

(a) Estimated boundaries of catchment areas drawn on and then measured off a 6" map.

(b) The fell area near Lock Bock Head whose drainage misses all known caves - mainly the lower reaches of Lock Fell.

(c) By subtraction.

Other tests have been carried out: Lost Johns' has been dye tested to Lock Bock Head (14) and also pulse tested (18). The Notts water has been tested to Gavel and is assumed to flow from there to Lock Bock Head, this was done at the same time as the flow measurements The dye from Lost Johns' took a week to reach Lock Beck Head, the pulse was instantaneous considering the time taken for it to reach the sump from the lake. The dye from Notts took five hours to reach Gavel, with peak concentration probably arriving an hour

later. Several interesting deductions can be made from these figures.

Using the Notts flow rate and assuming the length of passage between the sumps is 1.5km - the straight line distance is 1.47km, then the average cross sectional area of the connecting stream is 840cm^2. Assuming that the passage between the sumps is similar in character to Notts, ie. small vadose - a reasonable assumption considering there is 34.5m to drop, then the average cross section of the stream here can be taken as 200cm^2 - the estimated value in Notts at the time. Also taking the average cross section of the Gavel sump to 1m^2 this gives the length of the sump as 96m. It has already been dived upstream for 55m (19) and more recently for 85m (20), in this case the diver was under the impression that he was nearing the surface. The divers' impressions were that the sump was larger in area than 1m^2, taking into account the already dived length of the sump and the so far unconsidered time lag in the Notts sump the stream in the interconnecting passage must have considerably less area than the 200cm^2 assumed. This suggests a very fast flowing stream - flowing down dip with no pitches - the expected dip is about 30m in 1.5km.

The Lost Johns' pulse and dye tests confirm the two are linked and that there is little or no airspace inbetween. The average passage cross section is calculated as 4.5m^2 - a reasonable figure. The passage probably flows down dip to Lock Back Head giving a deep resurgence of 15m or so.

Gavel sump also at the level of Lock Back Head provides an interesting example of a vadose passage intersecting an active phreatic tube. The depth below water level of the Notts inlet, 1.5m, suggests that the sump cannot be more than 100m long as it is going up dip.

Although the above contains a few assumptions it seems fairly probable that great things await the diver upstream Gavel - a sump in the order of 100m and 1.5km of fine cave passage giving a sure Ireby-Lock connection in the Three Counties System. If as anticipated another dive in Gavel reveals a connecting passage, one possibility of making it accessible to non-divers would be to lower Lock Bock Head a little. Such a project is of course physically possible, it only remains to be seen whether cavers consider it ethical.

References.

1. Brook D., ULSA Rev. 3 15 (1968).
2. Latham J., Cambridge Univ. CC.J. 2 (1) 4 (1971).
3. Waltham A.C., Cave Sci. 48 29 (1971).
4. Bowser R.J., J.LUCC 13 29 (1972).
5. Waltham A.C., The Lock Fell Survey (1970).
6. Ellis B.M., CRG N/L. 132 14 (1973).
7. Latham J. Descent 7.
8. Waltham A.C., Trans CRG 12 185 (1970).
9. Collett P., J.LUCC 11 7 (1971).
10. Walkington J., J.LUCC 13 26 (1972).
11. Proctor A., LUSS J. 1 (1) 7 (1971).
12. Bowser R.J., J.LUCC 10 10 (1969).
13. Thomson R., J.LUCC 12 10 (1971).
14. Waltham A.C., J.LUCC 12 11 (1971).
15. Gascoyne M., LUSS J. 1 (2) 23 (1972).
16. Vogel A.I., A Text Book of Quantitative Inorganic Analysis, 3rd. edition, Longmans, London 1962.
17. Brook D., Personal Communication.
18. Creedy D., RRCPC J. 6 7 (1972).
19. Anon., J.LUCC 12 27 (1971).
20. Cooper A.J.R., CDG N/L. 26 9 (1973).

Rog Bowser.

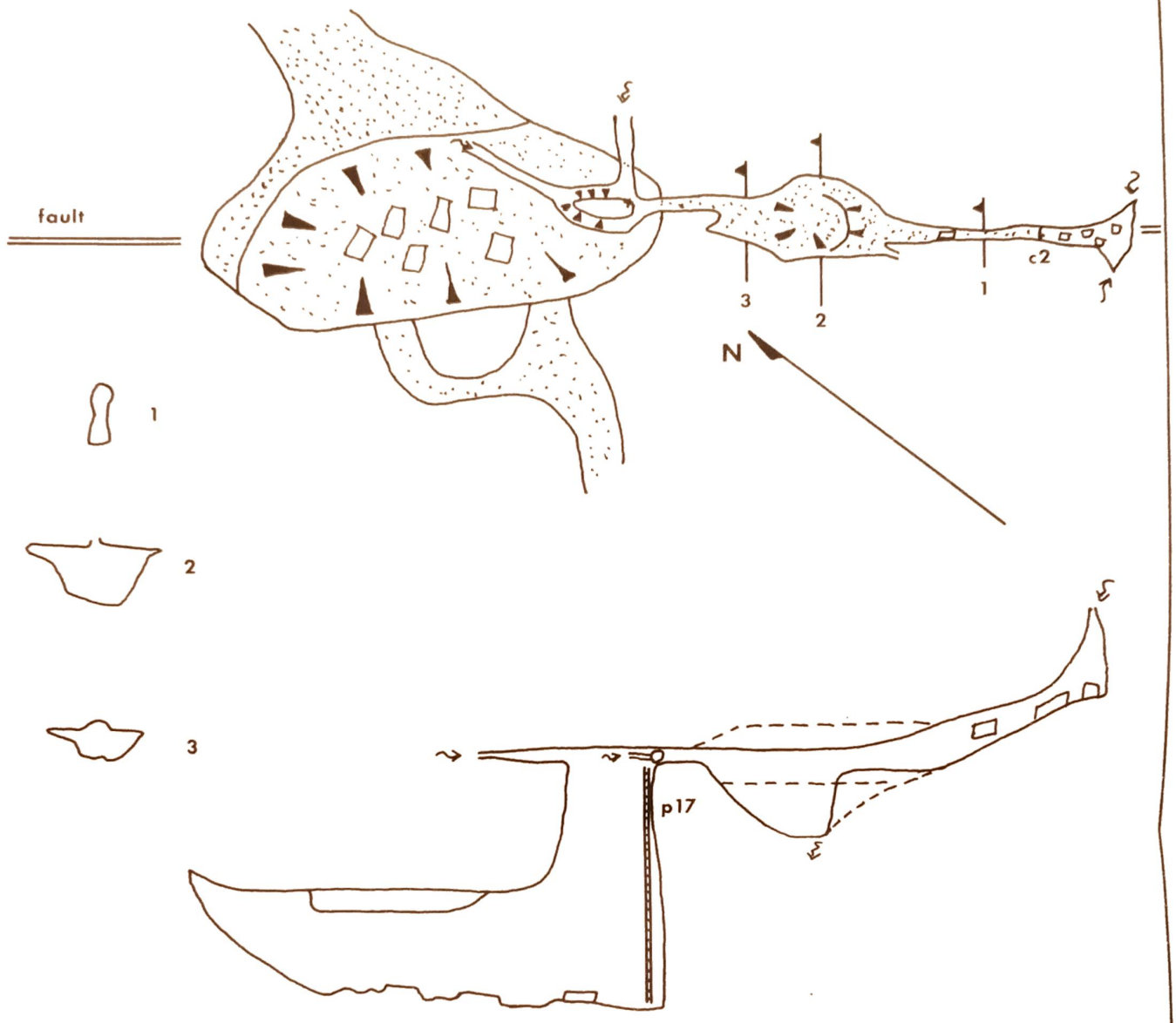
PIPPIKIN HOLE - CROSS HALL EXTENSION

The aven at the south side of Cross Hall, Pippikin Hole, was climbed at the end of last year to discover the short extension described below. The ascent began one November Saturday when Roger Bowser, Alan (ULSA), Jon Berry (guest) and Robin Thomson

visited Cross Hall. The aven could not be climbed direct because of an overhang of dubious rock, so bolting began up the wall to the left of the aven. Roger and Robin descended Pip the next day and with the help of a peg inserted the day before by Alan of the Long Reach, attained a ledge above the initial overhang. Bolting recommenced from the ledge up a clean and slightly overhanging face and the top was reached when the aven was next revisited a fortnight later, to give a pleasant, mainly free-hanging pitch of 17m.

The first discovery was the presence of large flow marks in the roof above the top of the pitch - evidence of phreatic activity 18m above the floor of Cross Hall. The north-east inlet which carries the trickle which runs down the pitch was first investigated and was found to be too tight after a few metres. Back to the top of the pitch and a flat out crawl over dried mud and through many straws was found to end in the roof of a small hall. Only the roof and south-east end of the hall are limestone - all else is fill. A traverse round one side of the hall led to a passage at the south-east end. This proved to be a vadose inlet passage leading to a couple of avens via a Pip type constriction. Back at the top of the pitch, a bolt was inserted in the roof to enable the aven to be traversed. Another small inlet passage was found; whatever else is there is obscured by yet more fill.

From the survey it seems that the extension described above is formed along the north-west south-east disturbance visible in the roof of Cross Hall. It is not clear whether the high level phreatic flow connected directly with that through Cross Hall, or if the flows were independant with the pitch being formed by the later vadose inlets. The small hall will have been formed by the inlet to the south-east washing out fill through a choked exit in the floor; the direction in which the now choked phreatic passage lies is undetermined. Any speculation about Cross Hall



PIPPIKIN HOLE

Cross Hall Extension

LUCC 1972

CRG grade 3b

0 25m

should presumably include the observation that it lies in a direct line with Far Streamway.

The pitch has been detackled but of course the bolts (drill anchors) remain embedded in the rock. Should anybody wish to visit the top of the pitch they need two or three 3/8" diameter, $\frac{3}{4}$" length, Whitworth thread bolts and plates to match.

Robin Thomson.

Another view on the formation of the Extension.

It is clearly a very old passage containing its glaciofluvial fill, but it is only locally developed along the fault plane. There is no evidence of a large phreatic tube - in fact there is plenty of evidence against it - so we can discount the idea of it being Far Far Streamway. It probably just formed as a roof pocket in the Gour Hall passage phreatic route. The level of the passage is structurally controlled - not water table. Minor later inlets have reworked the sediments.

A.C.W.

CAR POT - 'EXTENSION'

One day last Autumn found Bill Frost, Martin Leach and Robin Thomson down Car Pot at the bottom of an aven which they were going to climb. They had decided to do this some months previously on being told that an ICCC party had seen a passage at the top of it a few years ago. A further incentive was the presence of a number of maypoles hidden nearby.

Naturally the maypoles had not been found and so with the help of two short sections they had brought themselves and a box of useless connectors they bolted up the aven and into the passage which

did exist. The passage, a short crawl, led into a rift enabling them to stand. At the end of the rift was a precipitous pile of boulders 4m high. Chimneying above the boulders it could be seen that further exploration was useless, the rift narrowing in all directions. The total length of passage is 8m with the rift 8-10m high.

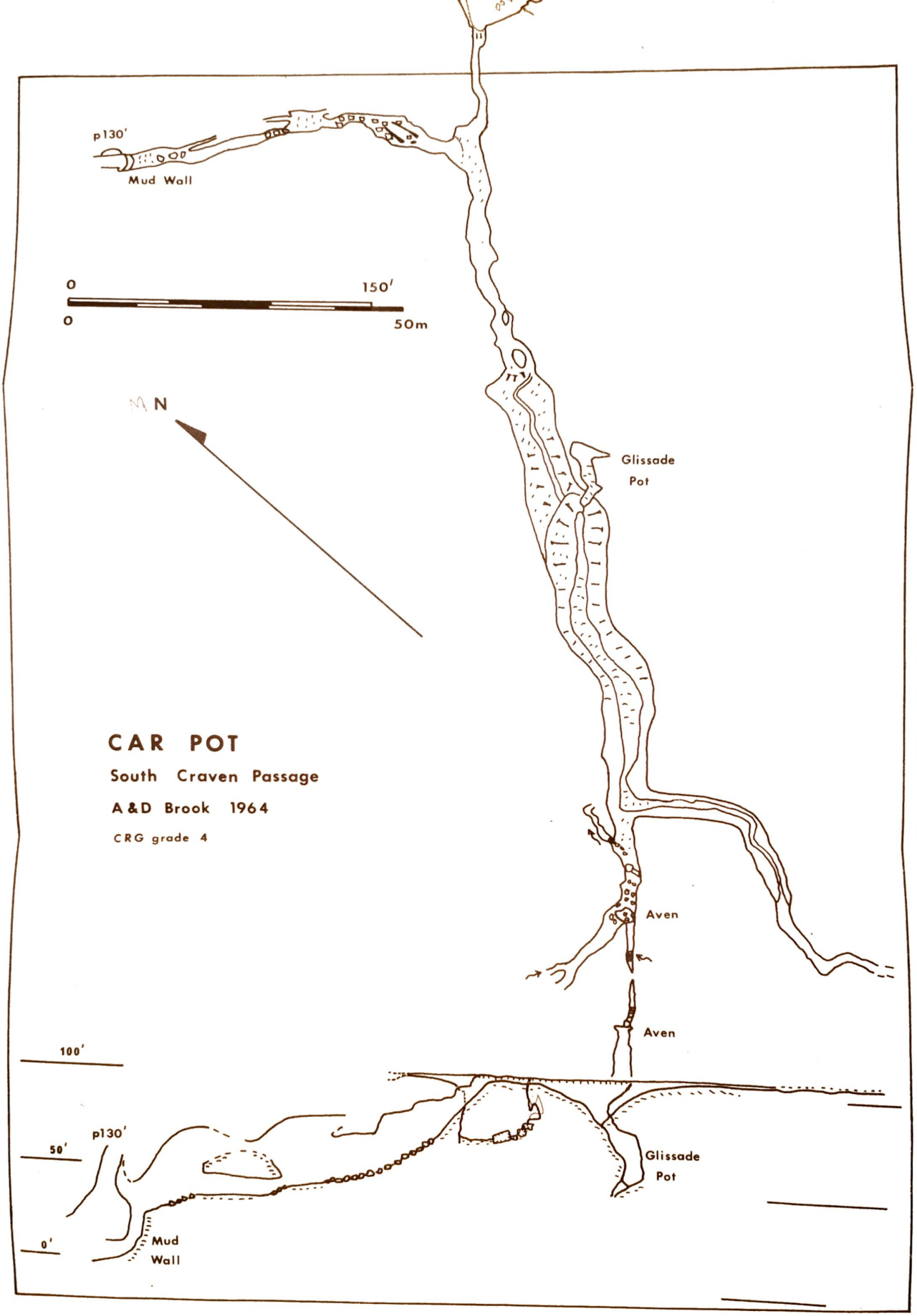
Bill Frost.

ABSEILING AND PRUSSIKING - TECHNIQUES AND EQUIPMENT

The arguments for and against abseiling and prussiking were discussed in the last issue of this journal (1). Now that the technique is being used more frequently in this country it was thought appropiate to discuss some of the techniques and equipment.

Whatever modern technique is being used a sit sling or harness will be required. This enables one to sit down comfortably attached to the rope. Commercial seat harnesses are available, eg. the Whillans harness, and are comfortable but fairly expensive. It is possible, as is the custom in Canada, to make ones own harness using car seat belt materail stitched with nylon cord, these have the advantage of being cheap, easy to make and can be tailor made to ones particular dimensions. A somewhat less satisfactory substitute is a tape loop made into a figure eight and crabbed to a waistlength. Whatever harness is used a separate waistlength should be worn, crabbed to the harness in case of failure of the latter.

The type of rope used has some bearing on the ease and safety of abseiling and prussiking. The best rope from the performance and cost view is plaited ulstrom; this suffers from the disadvantage


p130'
Mud Wall
0
150'
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50m
N
Glissade
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CAR POT
South Craven Passage
A&D Brook 1964
CRG grade 4
Aven
Aven
100'
50'
0'
p130'
Mud
Wall
Glissade
Pot

of a slightly lower melting point than nylon, 170°C against 215°C. Nylon should not be used above 130°C and ulstrom above 110°C, plaited nylon can be used if preferred. A non-hawser laid rope is desirable otherwise it is very difficult to avoid spinning on the rope. It is also best if a non-stretch rope is used, falls of more than half a metre cannot occur with the technique and prussiking on a stretchy rope is tiring - the more the rope stretches the further one has to prussik. Kernamantel construction rope should not be used. The sheath wears rapidly and if broken will slide off the inner rope. One such accident occurred in the USA - fortunately without injury. Blue Water - an American brand of kernamantel rope is safe however,- the rope is designed so that if the sheath breaks it grips the inner core of the rope.

The simplest abseiling technique is using a sinle crab on a harness, the rope runs through the crab, over the shoulder and round the back. The disadvantages of this method are, the crab wears out fast, care must be taken to ensure the rope is put through the correct way or it will unscrew the gate of a screw-gate crab, it is difficult to control on ling pitches as the rope has to be lifted and if the abseiler falls unconcious he won't wake up again

The most popular form of descendeur in the UK is the figureof eight - these may be obtained commercially. They have the advantage of being light and simple to use. Disadvantages are: they are expensive, wear out quickly under caving conditions, it is easy to get clothing caught in them, they tend to kink the rope, the rope has to be pulled up before they slip giving a tiring or jerky descent - especially noticable on pitches longer than 50m and they also have poor heat dissapation.

By far the most satisfactory descendeur for caving is a rack or brake bars. This device is used almost exclusively in the Americas where abseiling and prussiking is universally used. The method

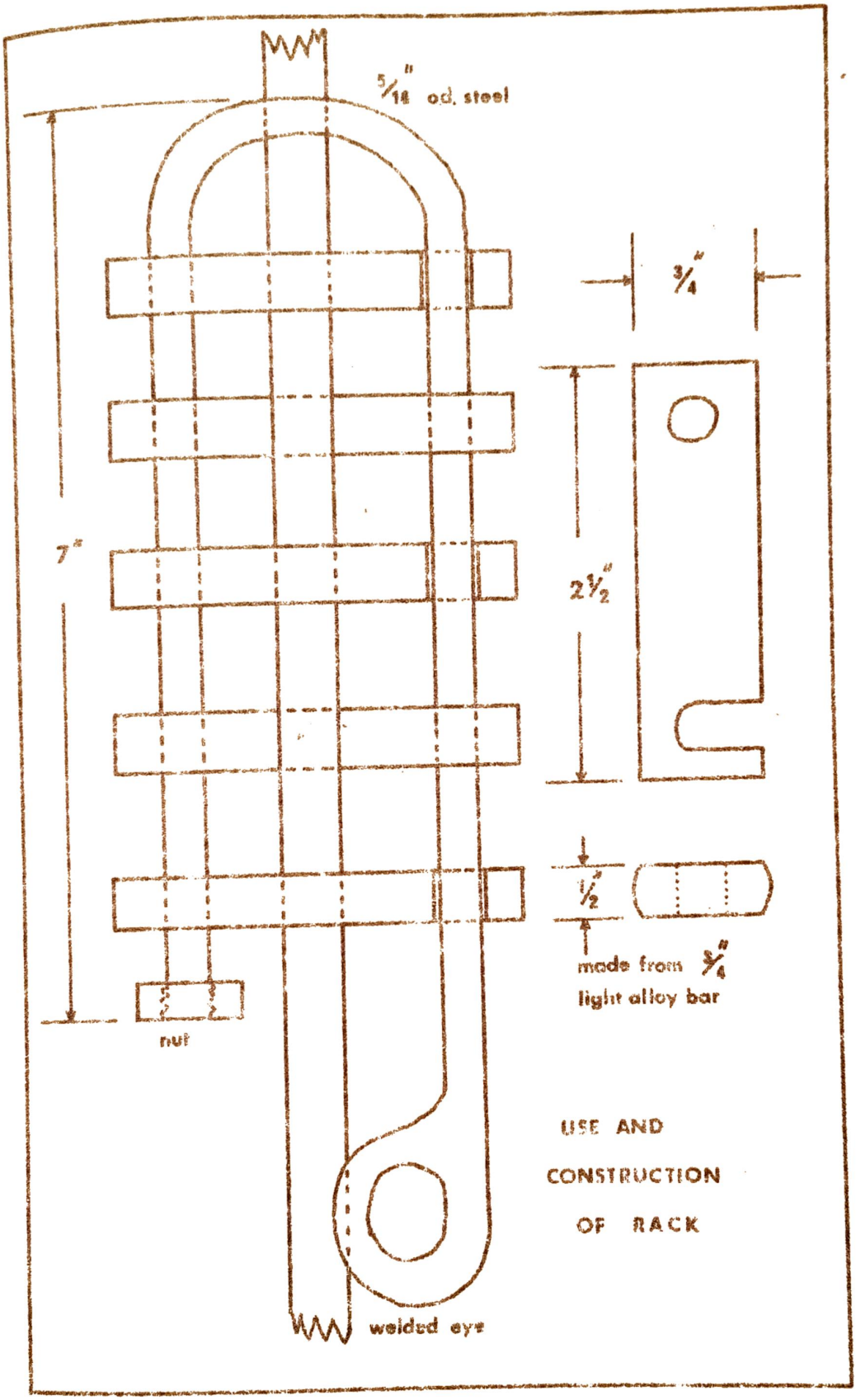
of construction and use is shown in the diagram. Racks have several advantages. They are cheap and easy to construct, as soon as the bars wear out they are easy to replace, heat dissapation is fairly good and they do not kink the rope. Their main advantage is that they are the only practical descendeur for long pitches. They are designed so that it is easy to vary the friction during an abseil. The user does not have to pull up the rope from underneath him - merely slightly alter the tension in it. Say on a 100m pitch one would use three bars at the top changing over to four bars halfway down and at no time having to heave on the rope underneath. It is also possible to stop conpletely on the rope using no hands or feet by putting four or five bars in depending on the height above ground and the condition of the rope. The only disadvantage of a rack is that it is possible for long haired people to get their hair caught in it.

Other types of descendeur include drum and Petzl type. These have the advantage of being smooth, the drum has very good heat dissapation but it is heavy, both types suffer from the disadvantage that they are easily choked by grit or mud.

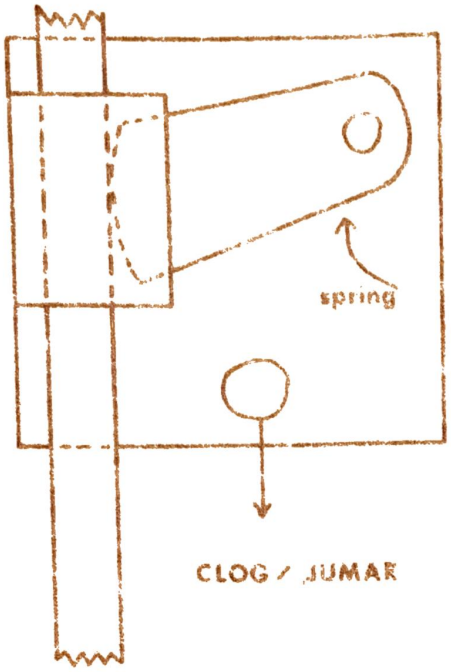
The earilest prussiking technique developed ia that using knots. Knots have the advantage over modern methods of producing little wear on the rope, disadvantages are extreme slowness and danger of the knots slipping on a muddy rope.

Mechanical prussiking devices fall into two types; spring loaded types eg. Clogs and Jumars and gravity operated types such as Gibbs and Heiblers. Similarly the prussiking techniques used fall into two basic types depending on the design of ascendeur.

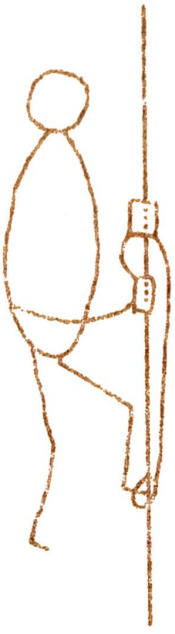
The best known devices in the UK are Clogs and Jumars. Jumars are more expensive but are easier to use and quicker than Clogs, they also do not wear out so quickly or slip so easily and are



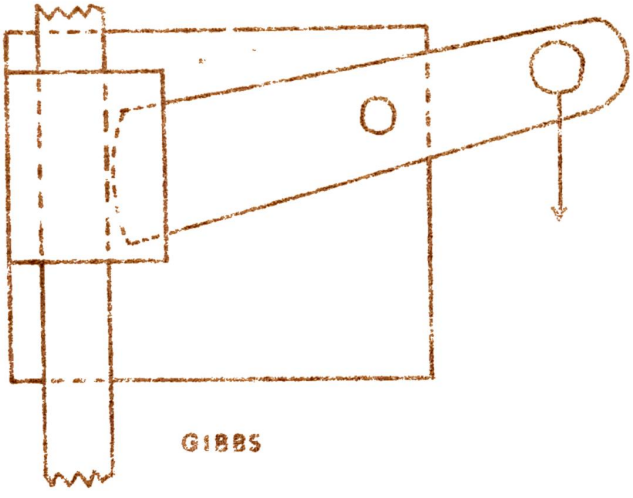
USE AND CONSTRUCTION OF RACK



CLOG / JUMAR



Methods of using Jumars



GIBBS

Principles of prussik devices

(safety features omitted)

easier for the last man up. The Clog is safer on horizontal traverses as the rope cannot pull out.

There are two common methods of using Jumars. The most straightfoward method is to connect the lower Jumar to the sit sling and the upper to a foot sling, see diagram. Variations on this include use of two foot slings and one for both feet. The length of the foot sling and sit sling connection are varied for maximum comfort. The other popular method, which offers somewhat quicker ascents is to have two Jumars each with a separate foot sling and a chest harness is used to hold the body upright, see diagram. This method is more tiring than the former and the prussiker cannot rest unless a separate arrangement is made.

By far the fastest method is that using Gibbs or Heiblers. Gibbs are to be preferred to Heiblers. The latter can easily slip off the rope and are intended for emergency prussiking only. The method here is to have three devices. One on a foot, another on the opposite knee and the other on the shoulders. One then literally walks up the rope, there being no drag as the devices are automatically disengaged by lifting them. They are extremely fast, rates as high as 30m in 12 seconds have been claimed. They have certain disadvantages - they cannot be used on traverses and are difficult to use under some circumstances eg. at the top of a pitch with the rope running over the lip - also there is no way of resting on them unless a sit sling/Jumar is used as well.

When abseiling and prussiking certain safety precautions should always be observed. When abseiling prussik gear should always be carried - clothing may get caught in the device. A knot should be tied 3m from the bottom end of the rope if it is not certain that the rope is at the bottom of the pitch. When prussiking an abseiler should always be carried and the prussikers should be tied together in case of failure of one - imagine yourself

dangling upside-down from a foot loop or worse.

Abseiling and prussiking used in the right context make caving trips much more enjoyable and speedier - 11 ladders less through the crawl in Black Shiver. Generally whenever a pitch would be lifelined it is easier and often safer to prussik it - you can't fall off a rope.

Rog Bowser.

GOUFFRE BERGER 1972

The intrepid trio from London, Bill, Robin and Martin, arrived on the Sornin Plateau late one Saturday night in July after a leisurely drive through France, savouring their wine, bread and pate. The next morning be were awoken by Northern accents declaring, "Oh, those must be the blokes from London." We crawled out of our tent to meet the first of the main party who had driven non-stop from Calais.

The following two days were spent in setting up a surface camp-site and ferrying tackle to the entrance; whilst the evenings were spent in getting acquainted with the local bar keeper, his booze and his snails. On the second evening a party of six set off to start laddering the Berger whilst the three of us with Norman from Newcastle and Keith Turnbull voluntoered to start out the next day and continue the laddering, with an overnight stop at Camp 1, down to Camp 2.

The following morning we arose just as the laddering party returned with the news that they had got all the tackle to the bottom of Aldo's. We quickly made our final preparations and arrived at the entrance at 10am with five bulky rucsacs and an

inflatable dinghy. All went well until the Meanders when it was discovered that the ex-army packframes that we were carrying were just too wide to fit along the passage. This caused a lot of humping before arriving at the top of Garby's.

Once at the bottom of Aldo's we picked up the tackle and set off for Camp 1. Lake Cadoux was walked across as it was completely dry and the dinghy was left on a sand bank at the far side. Even having heard all the stories about the enormous size of the boulder slope with its house sized boulders, we were all overawed by the sight as we made our way down to camp. Having changed into dry warm clothes we set about preparing an excellent three course meal, followed by ample mugs of tea before bedding down for the night, after 10 hours underground.

In the morning Robin and Keith got up early and went to retrieve the dinghy left at Lake Cadoux, since we would need it to cross the canals. They arrived back at camp just in time for breakfast. After eating, we continued our journey down, laddering as we went, through the Hall of the Thirteen, past the Water Spout, and so to the bottom of Claudines. Here we ran out of tackle still with one 6m pitch before Camp 2. Feeling a little disappointed about this shortage of tackle we made our way back to Camp 1 where Robin, Norman and Martin went on a photographic trip in the Hall of the Thirteen before settling down for the night. However we were soon woken by the clatter of rocks coming from the boulder slope, and opened our eyes to see lights bobbing up and down as the main bottoming party arrived. They stayed in camp long enough to have a brew and bring us news from the surface as we had no telephone, this having dropped down Aldo's. This party went on to Camp 2 with further supplies of tackle, leaving us once more in the darkness.

When we awoke we prepared breakfast and set off for the surface

with only two rucsacs as we decided to leave most of our gear at Camp 1 hoping to return in an attempt for the bottom. We arrived back on the plateau in the early evening of the Thursday having been underground 54 hours.

The next two days were spent in the local towns and in wandering around the old town of Gronoble. During this time the bottoming party arrived back on the plateau with news that the tackle had run out soon after Camp 2. With this in mind Bill, Robin, Norman, Bill Renshaw frm Nottingham and myself agreed to make an attempt for the bottom by reorganising the tackle and leaving people stationed at the top of pitches to reladder them. Various other groups planned to join us at different times and the chances of success seemed fairly high.

We set off underground at lunchtime on Sunday and arrived at Camp 1 in six hours. Next morning, whilst eating breakfast a party of three passed camp stopping only for a cuppa and arranging to meet us at Camp 2. This we did and by careful rearranging of tackle all arrived at the top of the Grand Cascade. Here Norman, Bill and myself remained as there was a shortage of electric torches. The remaining five continued on down removing the ladder from the Grand Cascade for use lower down. Whilst we were waiting for their return two of the Kendal members dashed past us on their record breaking attempt at the bottom. These two and two others managed to get to the bottom. Unfortunately neither of our party managed to reach the bottom. We later learned that a new record of just over nine hours was established for a trip to the bottom and out. After a wait of five hours at the Grand Cascade the rest returned and we set off back to Camp 1 detackling as we went. This was the longest working day underground at about nineteen hours before we arrived back at camp with a mountain of tackle.

After slooping for a few hours we awoke not knowing what time of

day or even what day it was as our watches had stopped. However feeling fit we packed up and set off for the surface, leaving the tackle for another party. We arrived back on the surface Tousday evening having spent 10 hours getting out. We all agreed that the Gouffre Berger was the finest trip any of us had been on having spent a total of 108 hours underground.

Martin Leach.

GHAR PARAU - THE BIG ONE THAT WASN'T

In 1971, John Middleton, an eminent Sheffield seed merchant and member of the Y.R.C., decided to look for caves in the Zagros mountains of Iran. Consequently he assembled an expedition and in August of that year they found Ghar Parau cave only a few kilometres from Kermanash. Explored to 740m in depth, with exploration stopped by a pitch, and perched 1600m above the resurgence, it had the makings of a record breaker.

Consequently a new expedition was arranged for 1972 - this time led by Lord Judson of Cravon. The main result is probably now well-known in that the cave did the proverbial - it sumped just round the corner. So the expedition ended. (The full story of the expeditions will appear in the near future in the various media, yet to be finalised, and will be illustrated by a set of magnificent photographs taken by John Whalley during this year's visit.)

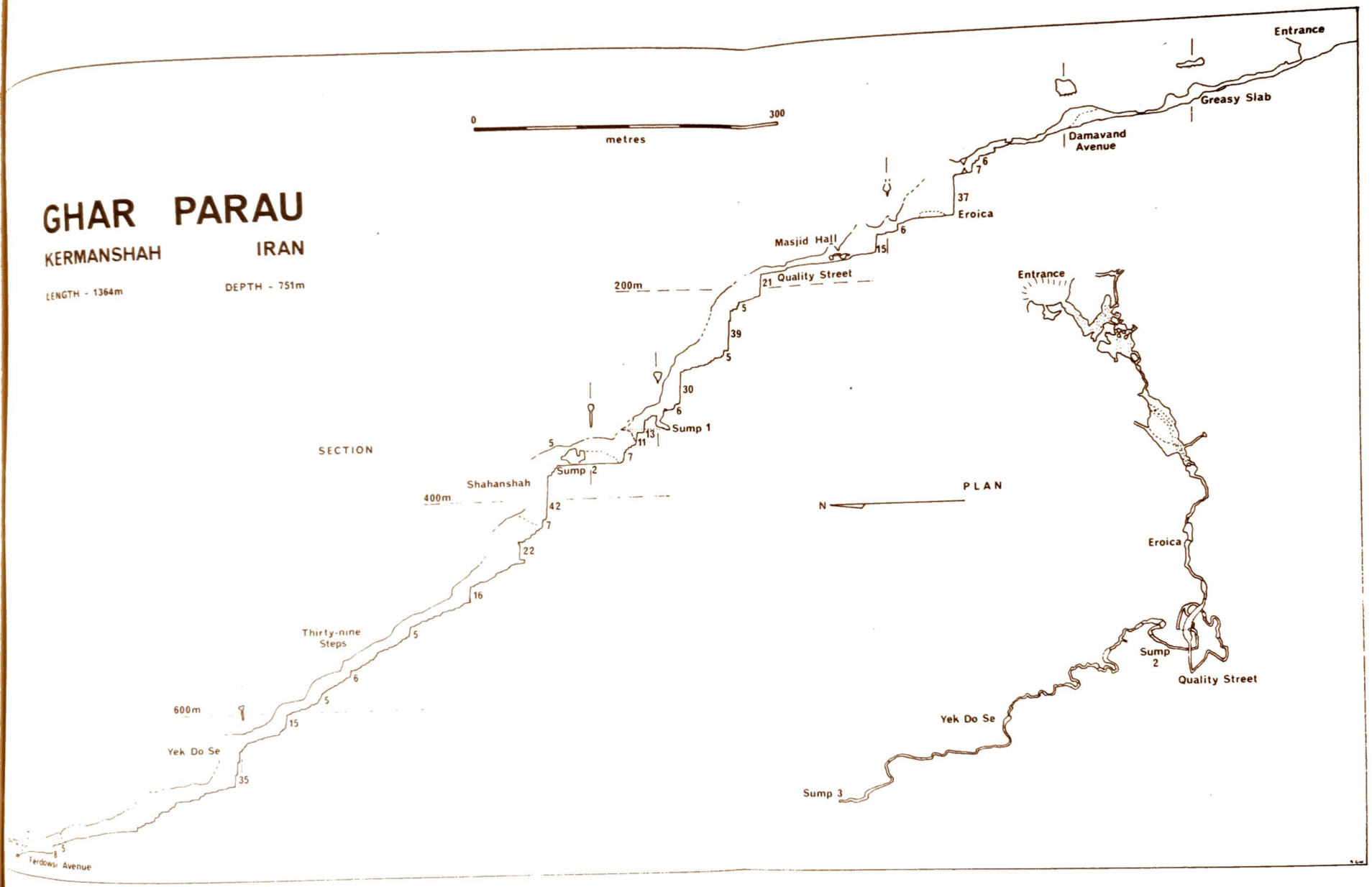
By some stroke of fate the writer happened to be a member of the 1972 expedition; the invitation had run something like - "We need a geologist, any old one will do, how about you?" It was with such words of praise reverberating in the hollowness of my scull (in the spot where the brain should be) that I found myself on top

of this hideously hot Iranian mountain looking down at a dirty black hole. I had spent the previous few days creeping round the mountain "studying the karst". So I hadn't yet actually been down the cave, and the news was already back that it had sumped. I ended up on the photographic trip.

Now John Whalley takes excellent photographs underground and it is most interesting to see him at work. But there is one other advantage of caving with John - you are never last to get changed if John is in the party. I think it took him $3\frac{1}{2}$ hours to get ready that day. For much of that time Harvey and Bob (the other half of the photographic trip) lay around like dehydrated fish - sweating in their plastic waterproof boilersuits.

Then we had all the gear together - camera bag, camera box 1, 3 cameras, two tripods, 5 flash guns, cameraman and camera box 2. So we were off, tripping across the mountain and falling down the snow slope into the cave. Once out of the brilliant sunlight, we could see nothing in the gloomy entrance chamber. So we lit our carbides. We could still see nothing, but psychologically fortified at least, we stumbled down into the darkness.

Once our eyes adjusted we progressed more steadily through a mass of breakdown blocks in comfortably large passage. Harvey seemed to know the way and we just followed like sheep. Down the greasy slab, through and over more breakdown and into a crawl. Short and muddy and after it the passage took on grander dimensions. A stop for photographs - hold this flash, stand on that boulder, look the other way, light that wall - John acted like a stage producer as he started clicking away. Then on again, down the chamber, between some mudbanks and through the squeeze. That was a bit of a contortion between some flowstone blocks; it had a bend in it so that the long thin Whalley cursed quietly as he inched through with his knee caps halfway up his thighs.


GHAR PARAU
KERMANSHAH IRAN
LENGTH - 1364m
DEPTH - 751m
0
300
metres
SECTION
PLAN
N
Entrance
Greasy Slab
Damavand Avenue
Eroica
Masjid Hall
Quality Street
200m
Sump 1
Sump 2
Shahanshah
400m
Thirty-nine Steps
600m
Yek Do Se
Ferdowsi Avenue
Entrance
Eroica
Sump 2
Quality Street
Yek Do Se
Sump 3

A trench develops in the floor and the cave changes character. We climb down and then continue in a narrow winding canyon to two small pitches. Just beyond the second there is a big stalagmite boss so out come the cameras again, and at the end of the chamber is another pitch - 40m this time. We all abseil down the single rope but then we have to photograph the pitch. So I climb up 15m and hang there, then down a bit, then up a bit etc. The shaft is lighted from the top and from the floor, the camera is at the bottom and the side, colour and monochrome on different cameras. Years later we move on. Along a traverse, down a climb and then down a pitch. At the bottom of that, just a narrow little rift in the floor. A tiny stream has appeared and the only way on is full length on one side in the water, thrutching. Down another pitch (15m) and into the best bit of passage in the cave. Well decorated high level chambers with gours, crystal pools and large stalagmites lead to another stream canyon with its roof adorned with lines of stalactites.

But that was the end for the day. We left the camera gear (except for the cameraman) in a pile and hurried outwards but it was dark as we walked across to the campsite. The next day we were back.

The end of the decorated section is marked by a 20m pitch and after that the passage descends a whole series of water filled potholes. Most are climbable, but in quick succession are two short pitches and another one of 40m. Then jump down onto a ledge with a black space immediately in front. Careful, its a 30m shaft - but quickly descended by abseiling.

A few days earlier Bob had been abseiling one of these pitches when he got caught in the ladder. He tried to free himself with his lower hand - and consequently hit the floor at quite a spectacular speed. I suppose that's one way of doing it, but at least he now knows more about the mechanics of the abseil technique.

The cave continues with more short pitches and climbable potholes. The water turns off into a sump and we follow an oxbow which contains two more shafts. The second lands us in a chamber, crossed by the reappearing stream which has cut a deep slot in the floor. We follow it down and descend another pitch to where the stream sumps again. The way on is a muddy ascending traverse; but we stopped there for we now had to slowly work our way out taking photographs. We were about 350m down and the cave goes as deep again, though with slightly less passage which is also less inspiring for photographs.

The presence of the cameras sets a slow pace for the ascent. The pitches are not too effortful as nearly all the ladders hang against the wall. Most strenuous of all is heaving tackle up the dozens of short climbs, fishing it out of deep pools and ramming it through the narrow sections. By the time we arrive at the sixth pitch we have been down nearly ten hours. But now John has the bit between his teeth and can't wait to use his camera in the decorated passage and chambers. Bob and Harvey rebel, and disappear towards fresh air carrying huge loads of spare gear. Another hour and even John is satisfied. Fifty colour photos and twenty monochromes are in the bag so now we continue outwards. The only energetic pitch is the third - free for its whole 40m. But John feels keen so he goes up first self-liflining, and for me a pleasant climb with a top rope. We reached the surface 12½ hours after leaving it and immediately disappeared into our sleeping bags.

Tony Waltham.

CAVING IN BELGIUM

As far as most British cavers are concerned, caving on the other side of the Channel tends to mean large scale Summer expeditions to the big caves of France, Italy and farther afield. This is natural enough as we must all have been exposed to a selection of those bowel stirring accounts of explorations carried out by those intrepid Continentals. However there are some good caving trips to be had after just two to three hours drive down the autoroute from Ostend. None of these are worth a major expedition but they can make a very pleasant change for those who are sated with the joys of Yorkshire and have a long weekend to spare. The intention of this article is, therefore, to give some practical information on the type of caving there is, the formalities involved, the people to write to and the places to stay.

In the Guidebook (1) which is currently being prepared, there are over 150 caves listed in the Belgian Ardennes. As may be seen from the map, they are located throughout the region which stretches from south of Namur to Verviers close to the border with Germany. However, very few of the caves to the east are of any great length and those which are most worthwhile from a purely 'tourist' standpoint are in the area between Namur and Marche.

Some of the more interesting ones are listed below:
Grottes de Han: at Han sur Lesse, a very impressive show cave boasting an underground cafe; the show section is good, as it should be at £1 per head, but there is also a magnificent non-tourist section known as the 'Réseau Sud'. [Access is controlled by S.C.U.C.L. (2).]

Grotte du Père Noël à Belvaux: beautifully decorated and quite sporting cave in the same massif as Grottes de Han.

Trou des Crevés à Belvaux: fairly short but sporting cave in same area. [Access to both above is controlled by C.Y.R.E.S.(3).]

Trou Bernard à Mont sur Meuse: deepest cave in Belgium about 20km south of Namur; dry but quite sporting with some short ladder pitches and nasty, tight rope pitches.

Grotte de Rosée à Ehein: in Liège area.

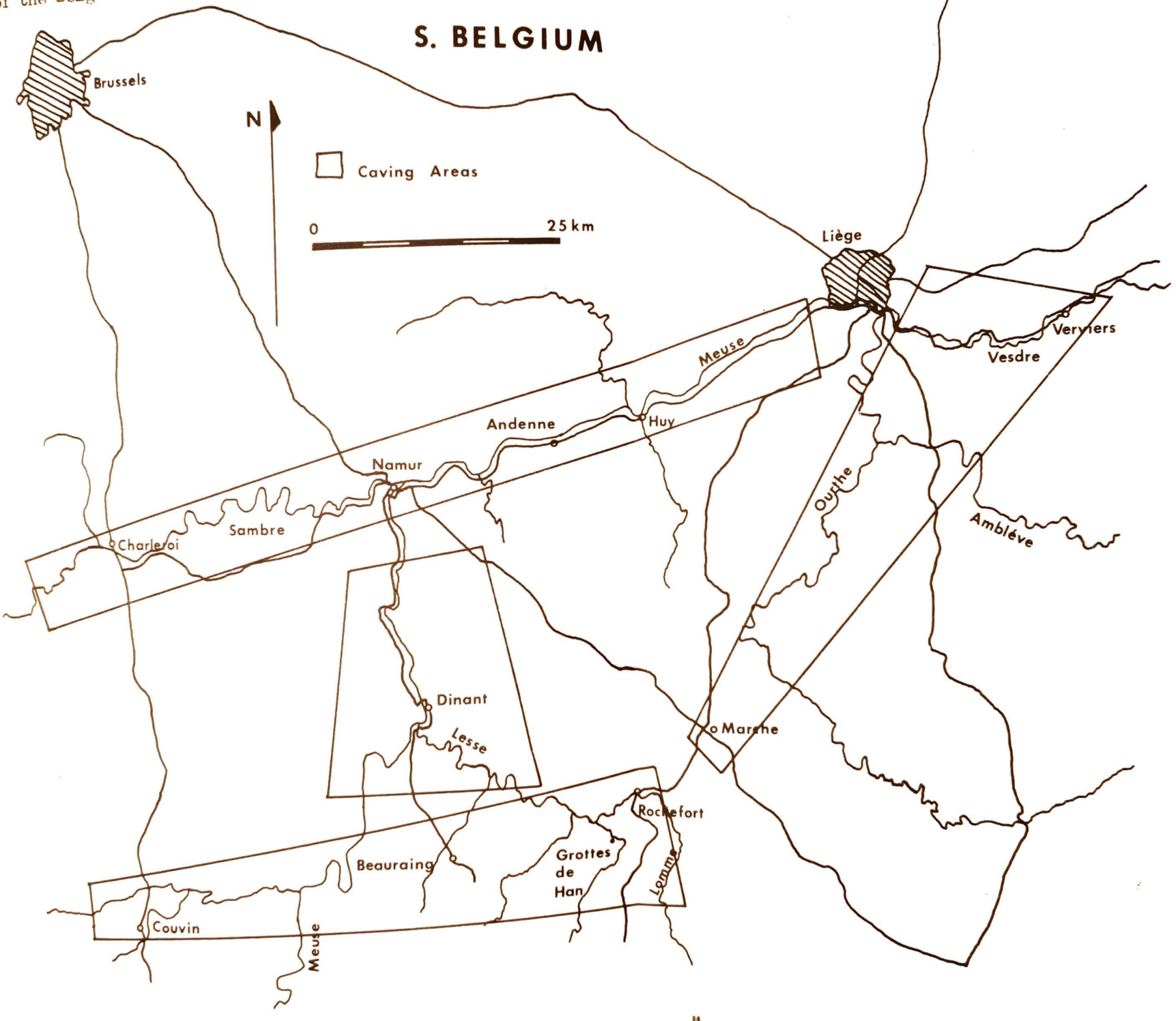
Grotte de Hotton: a miserable show cave (near to Marche) with some reasonable and well decorated extensions beyond the tourist section. [Access is controlled by S.C.B. (4).]

Trou de Wérou.

Very few caves in Belgium are of any depth - the deepest are Trou Bernard at -120m and Trou Wérou at -75m - and none of them present any serious technical difficulties. Thus, although some of them are quite sporting it is quite easy to do a couple in a day.

As may already be apparent from the above list the only real problem is that access to many of the caves is controlled by the clubs, each one of which has its own (tacitly agreed) sphere of influence. This is a phenomenon not unknown to British cavers and one might well hypothsise that access controls bear a direct relationship to the number of caves available and the number of frustrated bureaucrats in the caving ranks. But, be that as it may, it is essential to obtain permission in advance. This is not only for reasons of international diplomacy but also because, from a purely practical standpoint, it is often not possible to sneak in.

Provided that one does go through the hoops of officialdom, most


S. BELGIUM
Brussels
N
Caving Areas
0
25 km
Liège
Verviers
Vesdre
Meuse
Andenne
Huy
Namur
Sambre
Charleroi
Ourthe
Amblève
Dinant
Lesse
Marche
Rochefort
Grottes de Han
Lomme
Beauraing
Couvin
Meuse

of the Belgian clubs are very helpful. Some may insist on the party being guided by someone from their club - which can be something of a mixed blessing. If they do not insist on this they will invariably have available the most reliable surveys of the caves in their own area. Also, most of the major clubs have cottages in their own caving areas. Some of the better ones are listed at the end of this article together with the addresses of the clubs which control access.

Finally, a word of warning. In Belgium, as in France, individuals who are involved in a cave rescue or who cause a rescue (even though the may not need rescuing themselves) are required to pay the costs involved. These can be very high as even the caving teams that carry out the rescue may require some payment. Fortunately, however, insurance to cover this liability is quite cheap (about 20p per person per day) and it can usually be arranged simply by paying this amount to the Belgian club in whose area, or with whom, you are caving. Although this sounds like a useful way to swell club funds the premiums are eventually handed over to the insurance company.

It should be clear from the above that a trip to Belgium does need some advance preparation for it to be worthwhile. For any cavers who are contemplating such a trip, however, the writer can only say that it should be worthwhile and enjoyable and, in spite of all their rules, Belgian cavers are a very decent bunch in the hole.

With that here are some useful names, addresses etc.

1) Guidebook now being prepared by:
   Paul Vandersleyen, Avenue de Paradisiers, 66, 1080 Brussels.
   There also exist two books which are a little out of date but contain a large number of surveys. They are tomes 1 and 2 of 'L'Atlas des grottes de Belgique'.

2) Spéléo Club de l'Université Catholique de Louvain (S.C.U.C.L.)
Secretary: J.P.Kuypers, 300 Gaadenstraal,85, 3000 Leuven.
3) C.Y.R.E.S. Secretary: Guy Deflandre, 8,Rue Albert 1er, 1650 Tubize.
(cottage available near Han-sur-Lesse)
4) Spéléo Club de Belgique (S.C.B.) Secretary: Guy Wanbecq,
486 Chaussée de Haecht, 1030 Brussels.
Headquarters: square Ambioux 37, 1040 Brussels.
(Cottage at Holton near to Marche.)

John Carney.

CAVING IN SOUTH AMERICA

The study of caves in South Amerlac is still in its infancy, perhaps because geographically it is a long way from Western Europe. American and Canadian groups over the past years have opened up North America but they are still involved in investigating their discoveries. So far, some groups have reached Mexico and Guatemala, with some quite exiting results. Even for North Americans to reach the South involves long trips, almost expeditions.

One such trip-cum-expedition, (moreexpedition) went to South America in summer 1972 from Imperial College. The aim was to investigate and explore Karst features in a typical limestone region of Peru.

Previous geological work had been done by Dr.E.J.Cobbing of the Institute of Geological Sciences, and whilst working in a region 120km NE of Lima found some good looking limestone. Unfortunately he did not cover the area with particular detail but did notice sizeable shakeholes and dry valleys which would indicate the presence of cave systems. The annual rainfall compares favourably with the average English climate - 30" per year, so in London primary

feelers were put out for more information in the way of maps, aerial photographs etc.

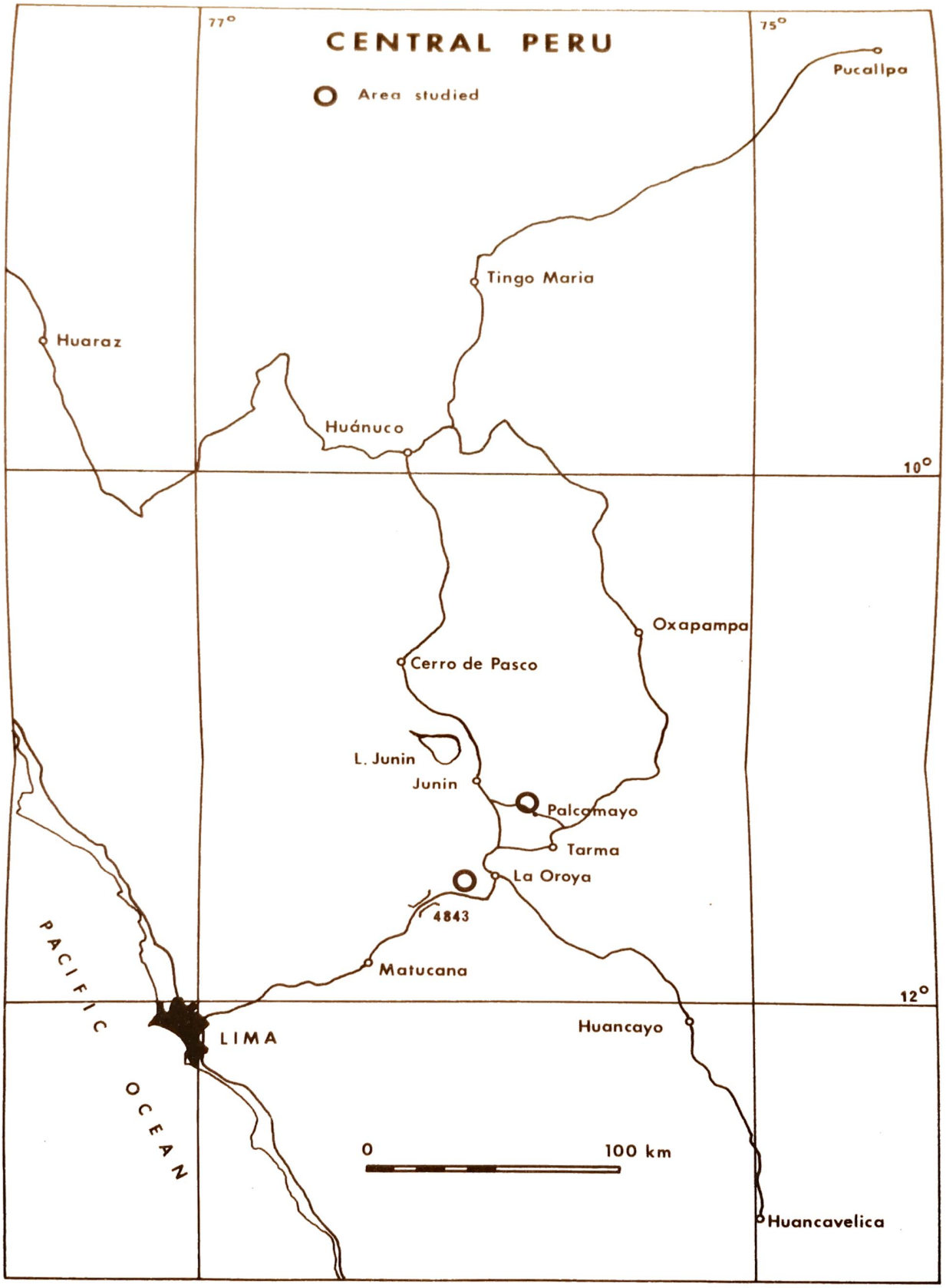
With some information gathered it was decided to press on, obtaining money, food, equipment and people - four from London and two from Hamilton. The expedition arrived in Peru early in July and made a rough reconnaissance of the area. First impressions were disappointing and later promised to be so. The limestone was thinly bedded, mainly Liassic quite unsuited for cave systems. The area investigated measured 8km x 5km and formed a valley ridden plateau just exceeding 4000m above sea level. Geologically it was a gold-mine, one of the best finds being a forest of fossilised trees, some more than 13m in length. Generally the limestone was heavily folded and where it was unfolded it was either too steep, too thinly bedded or too Dolomitic. Six weeks elapsed and no sign of cave systems, so the expedition moved 60km SE to a known area of caves. Five weeks were spent here and it turned out to be highly profitable indeed.

On arrival we found that a Polish expedition had called there six months previously and investigated a cave for 1½km, though not producing a survey. The local population was very superstitious about our arrival and intentions. There are many Inca remains and even more stories about Inca gold. The first cave explored was known as Huagapo and had been explored by the Polish expedition. The first day's trip took us to the end, a sump as reported by the Poles. They had done the trip in 22 hours - we did it in three. The cave ran nearly horizontal through a canal and deep pools. Decorations were superb and plentiful. No diving equipment was taken but attempts to lower the sump by stream excavation were encouraging. Free dives on a line were done to 6m and the roof dipped for ¾m and then rose quite sharply. Perhaps some further exploration would reveal more passage. Higher up was a pothole, La Sima de Millpo, unexplored to date, so off we went. It descended

over 400m and ended in two sumps, one considerably higher than the other. Perhaps this pothole connects up with the cave Huagapo. Huagapo has a good outward flow from the sump which indicates a large stream or reservoir feeding it. La Sima de Millpo showed signs of a sizeable stream so sink and resurgence were surveyed together, the end result was that the linear separation underground is 1¾km and 17m in height. Other potholes were explored bu none of great significance, ie. most of them being short and terminating in sumps.

Most days local people came to us with stories of caves and the best one of a huge bottomless pit which at first was scorned with laughter and was later known to exist as a huge hole perhaps 500m deep. Time did not permit us to visit it. Time was very short now and many trips did not materialise, in a region of very good limestone capped with volcanics.

The final trip took us more than 300km east to Tingo Maria, a small university town trading in tourists, bannanas and coffee. Here we found a cave unparalled by any in the Western World. It is only 400m above sea level and on the edge of the Amazon jungle. In some ways it resembles Huagapo, a huge entrance, rising slowly with the stream appearing below the cave entrance. The entrance itself was draped in creepers and the whole valley draped in thick jungle inhabited by many species of insect, bird and mammal; the most colourful we saw being a type of parrot, brightly coloured in yellow, blues, grrens and reds. The water emerges from a sumped resurgence and so entry was made through the dry cave. A small climb took us to the entrance, upon which we were met by hordes of small green parrots. Inside, the floor was covered by guano and nut shells. The previous night we had stayed at the university and heard tales of people disappearing inside and returning mad - well he heard our first signs of the warnings. The noise inside was tremendous. Apparently it was made by a rare species


CENTRAL PERU
Area studied
77°
75°
Pucallpa
Tingo Maria
Huaraz
Huánuco
10°
Oxapampa
Cerro de Pasco
L. Junin
Junin
Palcamayo
Tarma
La Oroya
4843
Matucana
PACIFIC OCEAN
LIMA
12°
Huancayo
0
100 km
Huancavelica

of bird known as Guachoros. They are known to occupy only a few places in South America and to our fright this was one of them. They inhabit the inner region of the cave and only go out to hunt for food in the form of nuts. They take them back to the cave, break the shells, eat the kernel and drop the shells on the floor. As soon as we entered they burst into their hideous noise which reverberated inside the cave to produce some horror movie effects less the visual part. To add to the discomfort the birds continually 'buzzed' past, sometimes actually colliding with quite a force. It was very unhealthy in there because of the danger of cave disease, the smell being quite undescribable. A hasty survey was made using compass and tape showing a cave nearly 300m long, cylindrical with a height of 40m and width of 50m. No way on could be found for two reasons, first the overwhelming noise and second the depths of guano which covered the floor completely. In addition to the guano and nut shells there were insects of enormous size, cockroaches, beetles, spiders and millipedes. These were almost as plentiful as the nutshells, covering more than 20% of the floor, some sight.

We did have assurances from the students that there was a way on, which followed the stream but had not been followed due to 'dangers', what these are we do not know. The most interesting part of this visit was that we were told that a river disappears into the ground 15km up and over the mountainside. To make a trip to this would take days through the jungle and we did not have the time.

That concluded the expeditions explorations of caves in Peru. Limestone regions do exist in Venezuela and an expedition is going there this summer, there is also a Chezh one going to Peru perhaps to Tingo Maria, one thing is for certain there is plenty of scope for anyone who goes.

A full report of the expedition together with maps, surveys, photographs and surveys will appear as an issue of Cave Science around June 1973.

John Walkington.

REVIEWS

Karst Landforms by Marjorie M. Sweeting
MacMillan 1972 xvi+362pp. £15

It seems silly to review a book costing fifteen quid in a publication costing one percent of that price when the odds are that you are reading someone else's copy because you are too mean to buy one for yourself. There is, however, enough of interest to the caver in this book to make it worth his while obtaining it from a library. The book is global in its description of karst landforms and the perusor will learn interesting facts like the existance of caves in China. I say perusor because the liberal sprinkling of pictures and maps are in themselves an adequate description of Karst landforms to all but the most devout limestone addict. It is nice to see the Dales well represented with maps of the fells and occasional cave surveys. Finally, I can't resist the following quote. It comes from page 315, which preceedes a nice map of the sinks, resurgances and surface drainage of the Ingleborough-Whernside area. Sweeting states that some fellow has studied the area and made conclusions like:

> "When swallow holes are examined and plotted against the log. of number, it suggests that the number of swallow holes of different orders in a different area tend to approximate to an inverse geometric series."

I'll leave it to you to read the above in context before deciding if it might be sometimes silly to apply quantitative methods to

what is surely a basically qualitative subject.

R.M.T.

Karst , J.N.Jonnings, 1971, M.I.T. Press, 252pp, £4.20.

It is only really the great contrast in prices which prevents Jonnings' "Karst" from having to compete with Marjorie Sweeting's "Karst Landforms". Both cover basically the same ground (calcereous), but "Karst" is considerably smaller and therefore less ex haustive than its competitor. It is, however, an extremely readable book, and is comprehensive, informative and very well illustrated, and page for page does give better value than the competition. Even though it is still rather expensive any caver would find it a worthwhile purchase, and club libraries should consider it essential. Not only does the volume tell all the secrets of karst and caves, but it also provides most enjoyable reading.

A.C.W.

Important Karst Regions of the Northern Hemisphere.
M.Herak and V.T.Stringfield (Editors), 1972, Elsevier, 551pp, £10.50.

This weighty volume provides an extensive and useful review of a large proportion of the world's karst. However it suffers from being grossly unbalanced, poorly illustrated and burdened with excessive amounts of geological detail. Its useful ness to the caver is also limited in that most of its chapters (one per country) deal more with the surface karst than the underground. Naturally it should provide good background material for the foreign explorer, but it does tend to concentrate on the well studied areas - the great unknowns remain unmentioned.

A.C.W.

NOTES AND NEWS

On the first Saturday in January Martin, Roger and Robin had a look at Black Shiver. Six ladders were taken for the short pitches and the two long pitches were done on ropes. The belays at the top of the 26m pitch were thought not perfect for ropes only and Martin stayed and nursed them while Roger and Robin descended the cave to the sump and returned. With relatively little equipment to carry progress was rapid and the whole trip took about five and a half hours. For a small party with rope experience the trip is enjoyable, sporting and not hard. It is hoped that by the time this article appears bolts will have been placed on the long pitches.

On a Lost Johns' incursion early last summer by Dave Yeandle, Norman Bell and Robin, Rough Pot Inlet was visited with a view to pushing the crawl which leads into it (see LUCC J. no 13). Penetration proceeded by Dave but after a couple of rightangled bends the crawl closed in and became "too silly".

The cave at the top of Kold Head Nook has received a little attention. A small bang and some boulder removal revealed a short climb down to a choked rift floor. The cave is now about 7m deep and is probably formed by solutional widening of the obvious fault running right across Kingsdale through Kold Head. Digging proceeds, and whilst the cave may or may not lead into fossil passages behind Kold Head it seems clear that this extension is not an ancient resurgence associated with the shallow pots on the bench above.

News from the climbing world: Gaping Ghyll Main shaft has been climbed. A report in the January edition of Mountain, a climbers magazine, states that during "exceptionally dry conditions" a team made a rock climb up to the entrance. They have called the

climb GG. Rider, it's 90m and graded hard ~~very severe~~. To this we can add that rumours have been heard echoing about Malham Cove saying that five pegs were used and the climb was done for £1000, this is probably rubbish.

Kentucky USA. A survey and exploration party in Flint Ridge Cave followed a downstream lead in a comfortable walking passage late 1972. With no hindrance to progress they suddenly found themselves in the Mammoth Cave tourist section - where exploration has not been done due to its commercialisation. The new system is therefore in the order of 180km long.

Cave survey Grades have recently been redefined, a summary of the new grading system is given below.

	DEFINITION	NOTES
Grade1	A sketch of low accuracy where no measurements have been made.	
Grade2	May be used, if necessary, to describe a sketch that is intermediate in accuracy between grades 1 and 3.	Not a preferred grade.
Grade3	A rough magnetic survey. Horizontal and vertical angles to the nearest 5°; distances to within 1m,; station position error less than 1m.	Intended for use when the time available for surveying is limited.
Grade4	May be used, if necessary, to describe a survey that fails to reach all the requirements of grade 5, but is more accurate than grade 3.	Not a preferred grade.

Grade5	A magnetic survey. Horizontal and vertical angles ACCURATE to 1°; distances ACCURATE to 20cm; station position error less than 20cm.	The preferred grade. To attain this grade it is essential for the instruments to be calibrated.
Grade6	A magnetic survey that is more accurate than grade 5.	At the present state of surveying compass bearings cannot reasonably be made more accurate than to ½°; clinometer readings should be to the same accuracy; distances and station position should be accurate to 5cm.
GradeX	A survey that is based primarily on the use of a theodolite instead of a compass.	All grade X surveys must quote an estimate of their accuracy (given by means of a comparison with grades 3 to 6), and also details of the methods and instruments used.

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