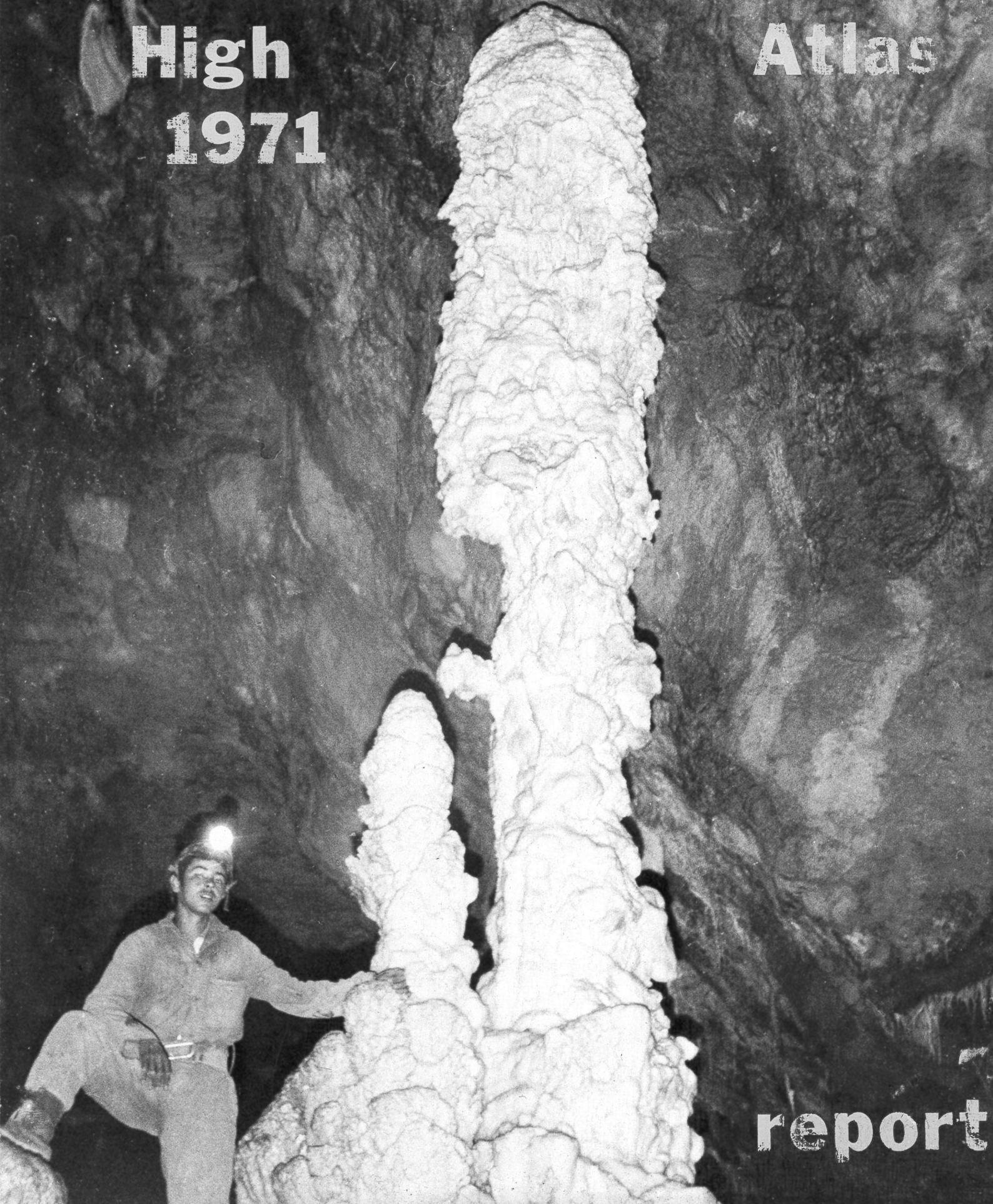


Imperial College Caving Club Expedition to the High Atlas 1971



report

IMPERIAL COLLEGE EXPLORATION BOARD

IMPERIAL COLLEGE CAVING CLUB EXPEDITION

TO THE HIGH ATLAS

1971

Original report compiled in 1971. Current report re-typed; photos and maps scanned from original and formatted in 2018.

IMPERIAL COLLEGE CAVING CLUB EXPEDITION TO THE
HIGH ATLAS 1971 – FINAL REPORT

CONTENTS

INTRODUCTION

SECTION ONE - Diary

SECTION TWO - Reports

1. Transport

2. Surveyor

3. Geologist

4. Quartermaster

5. Medical

6. Photographer

SECTION THREE - Appendices

1. Practical cave telephone

2. Ladder building

3. Caves investigated

ACKNOWLEDGEMENTS

INDEX TO MAPS, SURVEYS AND PHOTOGRAPHS

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Steve PALMER

Mike POWELL

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Joan PRIME

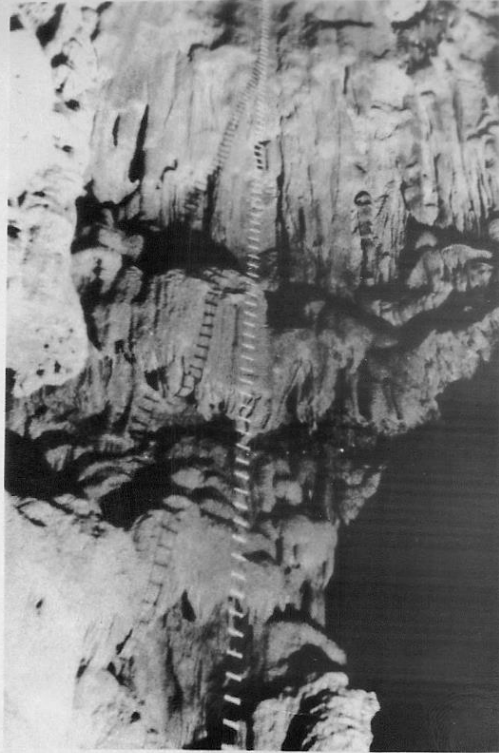
Lloyd TUNBRIDGE

PLATE 1

TROU D'ANAFED



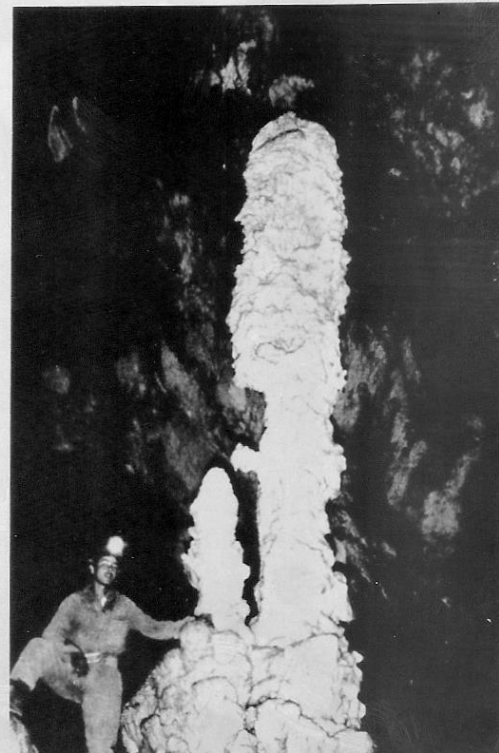
Andy Chalkey at the top of the entrance pitch.



2. The 320' deep entrance pitch from the bottom.



3. Surveying at top of the second pitch



4. FRIQUATA – The famous stalagmite in the entrance chamber

INTRODUCTION

Imperial College Caving Club had originally planned an expedition to Peru for the summer of 1971. Due to a variety of reasons this was postponed and it was thought that an interim expedition to Morocco would be useful for training personnel for future ventures.

A whole series of British caving expeditions have been organised to Morocco. Invariably these have gone to a small area in the Middle Atlas Mountains and most of their caving has been done in the Chiker – Friouata system. Much of the High Atlas Mountains are also limestone and hence can be expected to contain cave systems. Since this region was unexplored speleologically it was decided that the expedition should, in the first place, go to the High Atlas. If the area we were to investigate did not contain many suitable caves, the expedition would shift to the Bab Bou Idir area of the Middle Atlas to complete the exploration of the Trou d'Anaffed. The latter was a cave first explored by the Sheffield University expedition of 1967, but about which no details have been published. On completion of this task the expedition was to make its way back to England, investigating other areas in the High Atlas Mountains en route.

This report is divided into three sections: reports of the organisation of the expedition, a diary of events, and surveys and descriptions of caves investigated.

SECTION ONE

DIARY

This section of the report consists of a brief day-to-day description of the activities of the expedition. References refer to descriptions in Section 3.

SATURDAY 7TH AUGUST

Left London at 16.00 crossing the channel at 20.00 by hovercraft.

SUNDAY 8TH AUGUST to WEDNESDAY 11th AUGUST

Drove through France and Spain to arrive at Algeciras on Wednesday evening.

THURSDAY 12TH AUGUST

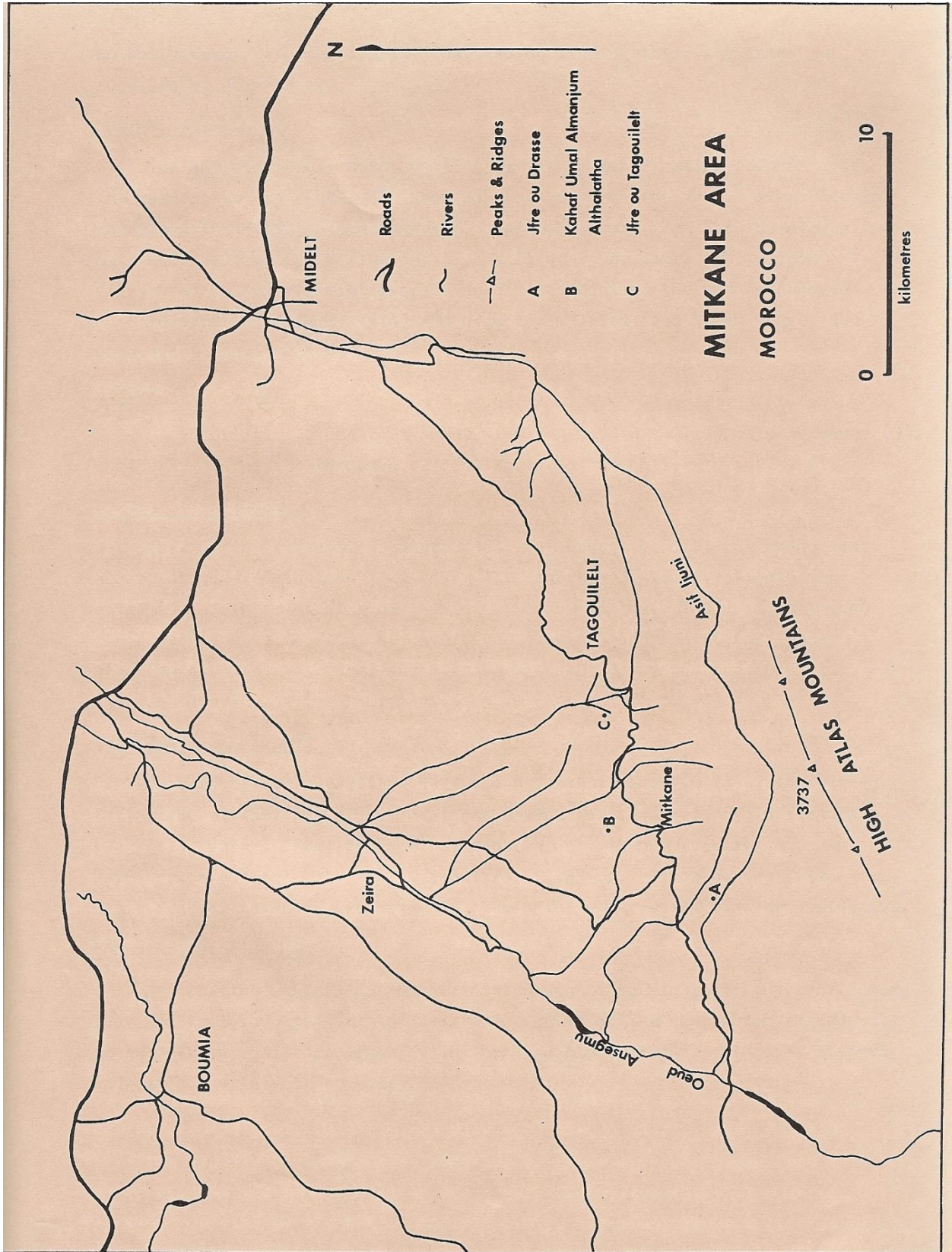
Crossed on the 13.00 hour ferry to Ceuta and drove through Morocco to Fez.

FRIDAY 13TH AUGUST

Being superstitious, we rested for a day in Fez.

SATURDAY 14TH AUGUST

We travelled to Midelt in the High Atlas Mountains. From Midelt we drove over unsurfaced "roads" some 35 km to Mitkane, our proposed base camp. We called at the Maison de Fôret to see the area warden in order to ask permission to camp. The responsibility of the warden is to control water supplies, forest areas and grazing in a particular area. Since these three items are the only ones of importance, the warden is all powerful in his area. It is, therefore, particularly important to get in contact with the warden before anything else. Unfortunately, the warden was away on business, but we were told that it would be alright for us to camp near the Maison de Fôret and to use their water source. Base camp was pitched at the edge of a mixed wood of oak and cedar at an altitude of 2000 metres. This camp site was excellent, save for two things. Firstly, the area was fairly windy and the air was dust-laden. The tree provided some shelter but soil tended to get into tents and food. Secondly, the fauna was rather spectacular and varied. In some cases this was an added attraction. Birds around the camp site included Kestrels, Golden Eagles, Hobbies, various Swallows, Wagtails, Flycatchers, Partridges, Hoopes, Woodpeckers (one Lesser Spotted was seen), Magpies and a pair of Rollers that lived in an old cedar just below the camp. Unfortunately, the presence of a wide range of insects and scorpions rather upset the balance. Scorpions were particularly plentiful (under about every third rock and there were lots of rocks) and moths (attracted by the lights) insisted on finding their way into food cooked after dusk.



SUNDAY 15TH AUGUST

The day was mainly spent setting up the camp and making friends with the warden, who said he would show us some caves in the area. Mike, Dennis and Steve investigated some caves (1) near the camp. Some of the others were shown a cave (2) on the top of a hill near the camp. The warden discovered we enjoyed mint tea and we discovered that the warden enjoyed our liqueurs (especially Anise) and cigars (imported from Spain where they were exceptionally cheap).

MONDAY 16TH AUGUST

06.45 hr start. One party went with the warden to look at some caves (3). Another went back to the cave (2) on the top of the hill, to survey it.

TUESDAY 17TH AUGUST

Most of the expedition members went to survey the Jfri ou Drasse (4), a cave discovered the previous day. The others went to investigate the caves (5) on the east side of the Imi n'Thand valley. The Jfri ou Drasse party were unable to find the cave (even though at one point they were standing over the entrance) and spent a pleasant day wandering round in the sun carrying caving equipment.

WEDNESDAY 18TH AUGUST

Members of the expedition were shown further caves (6, 7) by the warden. During the exploration of one of these caves, Paul had two of his fingers lacerated, when a large boulder was dropped onto them. Luckily no bones were broken but the cuts really required stitching. Since no one felt qualified for this job, we used the "New Skin" spray which was very effective.

THURSDAY 19TH AUGUST

Most of the members of the expedition went into Midelt to buy provisions. Tony and Paul investigated an area to the south of the camp which turned out to be most unpromising. Paul, with the handicap of injured fingers, slipped and cut his wrist rather badly.

FRIDAY 20TH AUGUST

One party went to survey the Jfri ou Drasse (4) (again)! Some of the others went to a place where the warden had said there was a cave (8). The Jfri ou Drasse was located after one and a half hours searching and surveyed.

SATURDAY 21ST AUGUST to MONDAY 23RD AUGUST

We spent these days investigating an area (9) on our map which had “caves” marked on it.

TUESDAY 24TH AUGUST

We broke camp and cleared up.

WEDNESDAY 25TH AUGUST

Travelled to Bab Bou Idir in the Middle Atlas Mountains and pitched a temporary camp.

THURSDAY 26TH AUGUST

We set up a base camp in Bab Bou Idir after contacting the local warden. One party went to explore a cave (10) just off the road that had been discovered the previous day. Others went to locate the Trou d’Anaffed (11). We were shown the entrance of this cave and another (12) by Rami ben Ahreol Mohammed, who stayed with the expedition for the rest of its time in Morocco.

FRIDAY 27TH AUGUST to SATURDAY 28TH AUGUST

Exploration of the Trou d’Anaffed (11)

SUNDAY 29TH AUGUST

Rest day. Most people went to Taza to buy food. Tony, Dave and Mustapha (a local) walked over to the summit of the hill behind the camp. They located the Trou des Trois Sœurs (13), discovered by the Sheffield University Expedition in 1968 and found a few other small caves in the neighbourhood.

MONDAY 30TH AUGUST

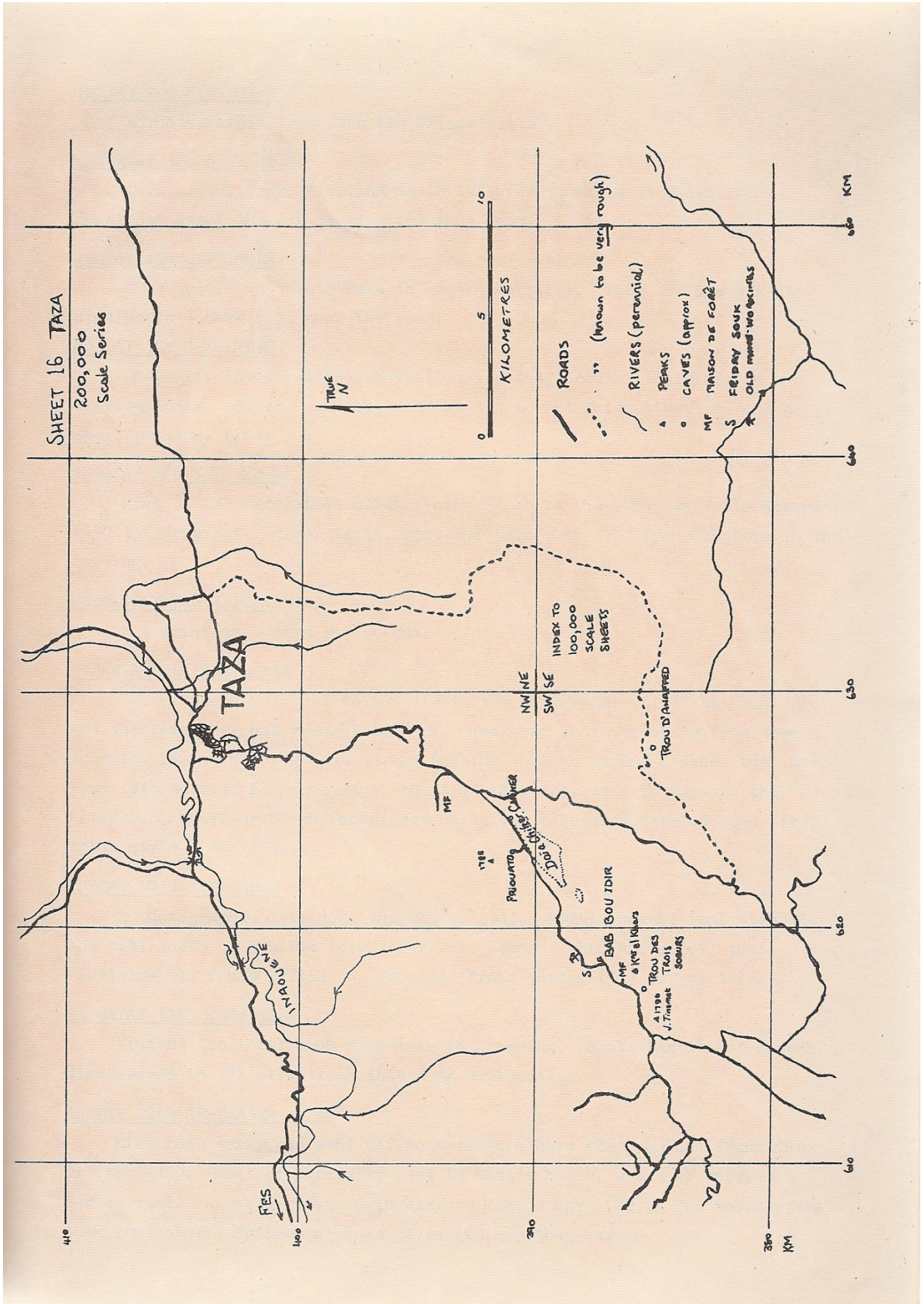
Commenced surveying the Trou d’Anaffed (11)

TUESDAY 31ST AUGUST

A tourist trip down the Chiker cave (14)

WEDNESDAY 1ST SEPTEMBER to THURSDAY 2ND SEPTEMBER

Most of the expedition members spent two days surveying the Trou d’Anaffed (11). Dave, Steve and Paul remained behind and investigated the resurgence (15) at Bab Bou Idir. No caves of any promise were found on walks in the neighbourhood of the camp site (18).



FRIDAY 3RD SEPTEMBER

A photographic trip down the Friouata (16)

SATURDAY 4TH SEPTEMBER

Dave, Joan, Tony, Mike and Sarah left for Tangiers at 8 a.m. The remainder spent the day tidying the base camp.

SUNDAY 5TH SEPTEMBER

Some people went into Taza to obtain supplies. Tony and Steve went digging in a cave (17) near the road.

MONDAY 6TH SEPTEMBER

One party investigated a cave (19) sighted through binoculars on a previous walk. Others went back to the dig in the Daia Chiker to push a small passage (20).

TUESDAY 7TH SEPTEMBER

Most of the expedition members climbed up to the Trou des Trois Sœurs (13) to survey it. Mike, Sarah, Tony and Angela arrived from Tangiers in the evening.

WEDNESDAY 8TH SEPTEMBER

A tourist trip down the Firouato (16)

THURSDAY 9TH SEPTEMBER

Some members returned to the dig in the Chiker Daia (17), but could not get the lamp they had brought to work. Tony had an interesting time when a scorpion ran up his leg when he was putting on some caving clothes that had been left outside for some days. Most of the party went to Taza in the afternoon, where we bought some beef which was barbequed over an open fire, kebab style. Delicious!

FRIDAY 10TH SEPTEMBER

A photographic trip down the Chiker (14)

Madeleine and Paul climbed the hill north of Bab Bou Idir to explore some of the shafts (21) that Madeleine had found during the Trou des Trois Sœurs (13) survey trip.

SATURDAY 11TH SEPTEMBER

We visited the local souk market in the morning. Small parties of cavers disappeared in all directions intent on exploration.

SUNDAY 12TH SEPTEMBER

Mike rose early and went off to explore a cave (22) he had found the previous day. Most of the party went to Rami's house, where we enjoyed a Berber meal. A party returned to explore Mike's cave (22). Two shopkeepers took some others to look at some caves (23, 24) they knew.

MONDAY 13TH SEPTEMBER

Packed up base camp and were ready to leave by 9 a.m. We travelled via Taza, Fez and Midelt to some 20 km north of Ksar es Souk where we camped for the night.

TUESDAY 14TH SEPTEMBER

We drove on to Ksar es Souk for shopping and repairs; then into Tinerhir and up the Gorges du Todra (25) on a dirt track. Found suitable camp site on the opposite side of a dry riverbed from the road on some cultivated plots. Heavy rain during the night.

WEDNESDAY 15TH SEPTEMBER

Woke up to find ourselves cut off by the river, which was not quite a torrent. Our camp site was a sea of mud. Managed to carry our equipment through the river under the scrutiny of several dozen children and left the area quickly. Drove off to the Gorges du Dades via Tinerhir and Boulmaine. We set up camp on the track to the gorges.

THURSDAY 16TH SEPTEMBER

The van was taken to explore an area of Boulmaine on the Jbel Sarhro, reached by a desert track. On the map were many blue spots with "PTS" which turned out to be wells. The others explored the vicinity of the camp site. No limestone was found by either party in this part of the valley and the road was too rough to take the van, especially as we did not have a spare tyre.

FRIDAY 17TH SEPTEMBER

Drove on to Marrakech. On the road were many stalls selling various minerals, mostly amethyst and crystal quartz. A favourite trick is to paint quartz with permanganate, which gives it a beautiful metallic copper colour, and to sell this at inflated prices. Camped about 5 km outside Marrakech.

SATURDAY 18TH SEPTEMBER

Spent the morning in the medina in Marrakech and travelled to Bin-el-Ouidane in the afternoon.

SUNDAY 19TH SEPTEMBER

Found a permanent camp site built by soldiers on the lake shore. Had a young goat butchered for us as our tinned meat was running low. Most of the party found swimming in the lake preferable to exploration and after a weeks' travelling the wash was badly needed.

MONDAY 20TH SEPTEMBER

Went to find the warden of the Maison de Fôret, but did not succeed. Then spent the day walking in the hills finding several shelters and sinkholes but nothing wet.

TUESDAY 21ST SEPTEMBER

Took the van to Oizarte for provisions. Thanks to the unfriendliness of the locals, apart from the soldiers, we decided to leave the next day.

WEDNESDAY 22ND SEPTEMBER

Travelled to Casablanca, where we left Rami, and spent hours in the Medina. Some found that they could sell their caving clothes for good money. Most of us were on a spending spree to get rid of our dirhams. Drove overnight to Ceuta.

THURSDAY 23RD SEPTEMBER

We had to throw away our stock of fresh food at Ceuta because of customs regulations. The boat trip was uneventful and we drove all day through Spain, stopping at Écija, where there was a street fair. Drove all night again.

FRIDAY 24TH SEPTEMBER

Arrived in San Sebastian and retrieved our camping carnet which Lloyd left on our way out. Camped there for the night.

SATURDAY 25TH SEPTEMBER

Travelled through France all day. Had no trouble with French customs and filled up our jerry cans with petrol in Spain to save money. Drove all night.

SUNDAY 26TH SEPTEMBER

Arrived in Calais about 8.30 having spent some hours on garage forecourt, waiting to buy petrol when they opened. Left Madeleine at railway station and took the first hovercraft to England. No trouble with customs and drove to London for a final meal at the "Parkview Café" (Greasy Pete's) and so spent the last of the Expedition money.

TROU D'ANAFED

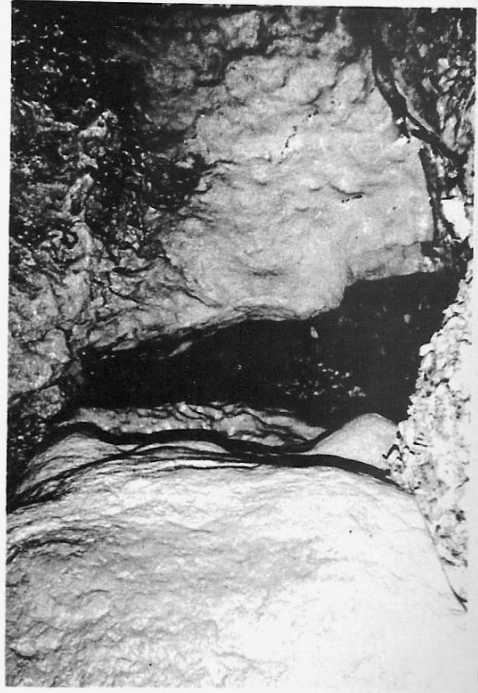
PLATE 2



1. Andy Chalkey on the entrance pitch. Note telephone line on the left.



2. Communications centre at the bottom of the 320' entrance pitch.



3 Exit from entrance pitch to the Boulder Chamber.



4. Dennis Friend surveying in the crawls to the second pitch.

SECTION 2

REPORTS

1. TRANSPORT REPORT

The I.C. 35 cwt Transit crewbus was used to transport the 13 members of the expedition to the Atlas Mountains. The Channel was crossed by hovercraft from Ramsgate to Calais and we drove continuously through France, making our first halt at San Sebastian. Since about half the expedition were qualified to drive in France and Morocco, we were able to drive more or less continuously when need arose. On arrival at Algeciras, we found that we had covered 1400 miles without trouble except for a little brake fade!

We took advantage of the AA 5 star scheme and, at the time, the only people issuing a green card for Morocco were operating through the AA. Thus we did not have to go out and bargain for insurance which we had heard could happen. After filling up with petrol at Idh (about 8p a gallon) in Ceuta, we set off to Fez, and eventually Midelt. At Midelt we had a rude awakening. Until then the roads had been first class. Now, however, setting off for Mitkane in the High Atlas, a distance of 37 kms, the road degenerated into two irregular ruts about 18" deep. This forced us to keep the transit with one wheel in the centre and one in the side. This had the entertaining effect of shaking some of the 'holiday' atmosphere which until now was prevalent. These final 37 kms took more than 3 hours.

The next few weeks were spent driving in such conditions. The only mishap was a bent track rod which Andy straightened-out in a repair shop in Midelt. In fact, it is still on the van.

After three weeks Steve, Lloyd, Dave, Tony and Paul set off for a trip up in the mountains west of Rich with Andy and Liz coming along to look after the van. The van got a much needed wash on this trip which, apart from a lack of petrol, went without mishap. One worst trouble after this was due to two punctures which destroyed our spare tyres. We do not recommend radials for rough tracks! After this the van was restricted to good roads. This proved to be a nuisance.

No further trouble occurred, and on return we had used only the spare points, plugs and air cleaner out of the parts taken. On our return we drove more or less continuously, the transit performing well enough to get us into a pub in South London in time for lunch closing and then along to 'Greasy Pete's'. Final mileage was around 7000 miles.

2. SURVEYOR'S REPORT

Five caves were surveyed during the expedition. Those in the Midelt area had not been explored before. The first published surveys of the Trou des Trois Sœurs and the Trou d'Anaffed in the Taza area are included in this report.

The surveys conform to Cave Research Group standard based on the accuracy of the survey.

These grades are:

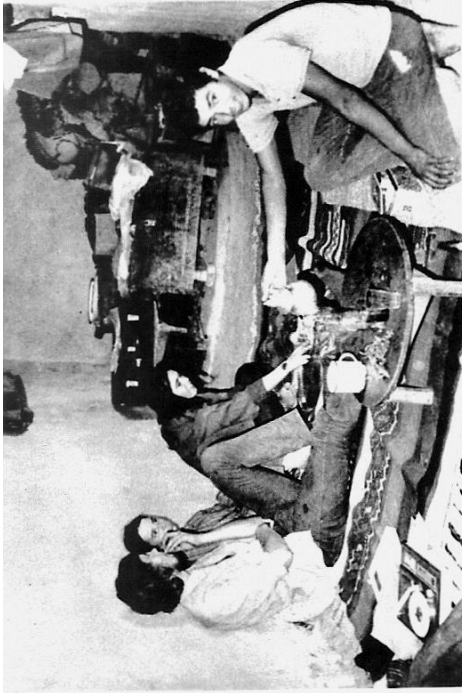
1. Rough diagrams from memory – not to scale.
2. Sketch plan roughly to scale – no instruments used, direction and distance estimated.
3. Rough plan survey – small compass graduated to 10^0 – lengths of marked cord or stick of known length.
4. Prismatic compass graduated in single degrees (error not known), measuring tape or marked cord.
5. Calibrated prismatic compass, clinometer, metallic or steel tape bearings to nearest degree.
6. Calibrated prismatic compass and clinometer or tripods, chain or steel tape.
7. Theodolite for bearings and slopes, distance by steel tapes or chain or by tachometry or by any more accurate method.

We used a Suunto compass and clinometer, which are better than prismatic compass and Abney level in caving conditions. They are graduated in $\frac{1}{2}^0$ intervals. For distances we used a 30 metre fibron tape. All our measurements were recorded in the metric system. The surveys are claimed as CRG grade 4 since we did not use a steel tape or calibrated instruments. However, the measurements are of greater accuracy than demanded for this grade.

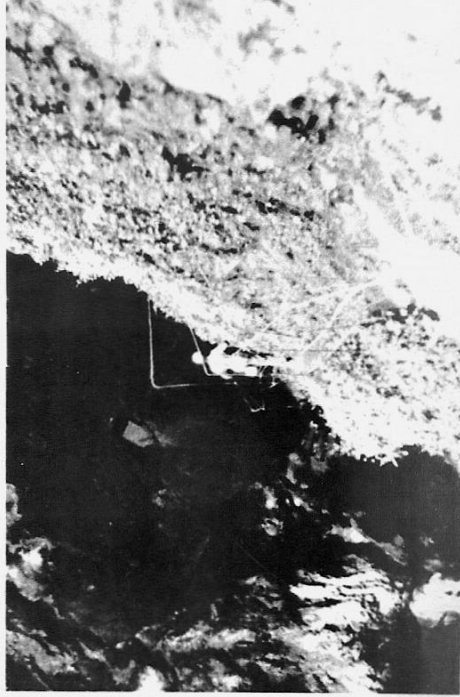
The surveys were drawn up at approximately the size they are reproduced in this report except for the Trou d'Anaffed which was drawn up at a scale of 1:250 and reduced for inclusion in the report. The surveys were printed by offset Litho for which we are most grateful to Mr J. Gee of Imperial College, Geology Department.



1 Camp site by the Trou D'Anaffed.



2 Mint tea at Rami's house during a trip to the Trou D'Anaffed.



3 The old tourist route down the Friouata entrance shaft.



4 Changing film in the Friouata entrance chamber

3. GEOLOGIST'S REPORT

The Atlas Mountains consist of continental and marine deposits of Lias and Jurassic age. Structurally, they were slightly folded during the Alpine orogeny and subsequently peneplained. Later uplift and erosion have given rise to the present topography.

The Lower Lias consists of massive limestone which is covered by alternate calcareous and marly formations of the Upper Lias and Jurassic. Near Bab Bou Idir there is some development of Karst features in the Lower Lias limestone. These features include large dolines, an extensive cave network, and the Chiker Daia. This is a beautiful example of a polje or flat area with underground drainage, being flooded in winter and cultivated in summer. Some of these caves have been known for some time; the Chiker and Friouata were first explored by N. Casteret and have been well surveyed and even used as show caves. Several expeditions have concentrated on these two caves in an attempt to connect them. Others, such as the Trou d'Anaffed, are not so well-known and the first published survey is included in this report.

Outcrops of the Lower Lias occur through the Middle and High Atlas and the purpose of the expedition was to investigate some of these areas in order to discover some new cave systems. The main area of investigation was chosen as Midelt where there are several outcrops of Lower Lias. Three caves were explored in the area around Mitkane, two of which occurred in calcareous bands in the Jurassic; the other in a small outcrop of Middle or Upper Lias limestone. The Lower Lias in this area outcropped behind a range of mountains with summits around 11,000 ft., and we were unable to approach this because of this difficulty of access. Similarly, we were falsely persuaded to the area around Amouger which also consisted of Jurassic with a calcareous horizon.

After several weeks in the Taza area we returned to the High Atlas and drove along the southern flank to the Gorges du Todra which is an immense limestone gorge in the Lower Lias. Although this looked promising, we were forced to abandon this area before we had time to explore it properly. There were no further outcrops in accessible areas along the southern flank of the High Atlas and we returned again to the Middle Atlas at Bin el Oudane near Beni Mellal. Here, unfortunately, we missed the band of Lower Lias by Afourer, through driving at night. Here there is a classic limestone range rising abruptly of a flat plain in much the same way as the Mendip Hills. We explored the area around Bin el Oudane which proved to be Upper Lias and Jurassic shaley limestones with some development of such Karstic features as small dolines and large rock shelters, though we found no extensive cave formation.

The Geological map of the Atlas Mountains shows that several outcrops of Lower Lias are

accessible along tracks. A truck or four-wheel-drive vehicle would be able to negotiate most of these, though in the Middle Atlas between Azrou and Beni-Mellal, there is a reasonable network of major roads which would enable any vehicle to reach outcrops of Lower Lias limestone.

(References: 1: 500,000 geological map of Morocco available in Geological Museum Library and Geological Society Library)

4. QUARTERMASTER'S REPORT

It was anticipated that people would spend only a few days at the most away from the base camp as we relied on local supplies of excellent, extremely cheap fruit and vegetables and local bread. We therefore only took with us tinned meat, sugar, preserves and cereal, together with detergent and kitchen utensils. Such items are very expensive in Morocco.

£50 worth of tinned and dehydrated food was purchased from a wholesale warehouse mostly in catering sizes. We also had invaluable gifts of Tate and Lyle's sugar and syrup; Ryvita, Ostermilk, Glucodin, Fray Bentos corned beef, Weetabix, Blue Band margarine, a variety of Shippams products and herbs and spices from Stokes and Daltons. However, several mistakes occurred in the last minute rush and the following should be carefully considered:

- a. Carefully allow for enough meat and take extra.
- b. Try to buy egg powder early, as it may be difficult to obtain
- c. A large amount of 'luxury' items become welcome additions to the diet e.g. steam sponge pudding and jam.

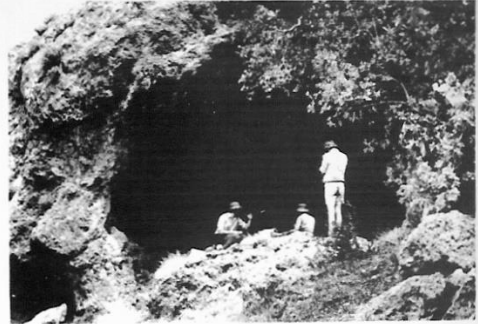
Camp duties and cooking were done on a rota basis which fortunately only resulted in a few disastrous meals.

Cooking was greatly facilitated by a camping-gas, double-burner stove. Camping gas cylinders were easily available and cheap. (We bought an extra cylinder in Spain at one quarter the British price!) Also two pressure cookers proved very useful saving both time and fuel.

PLATE 4



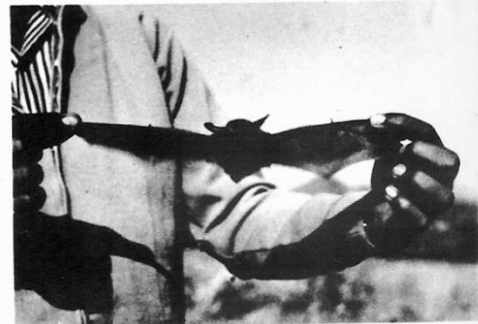
1. Surveying in the large entrance chamber of the Djire ou Draïse.



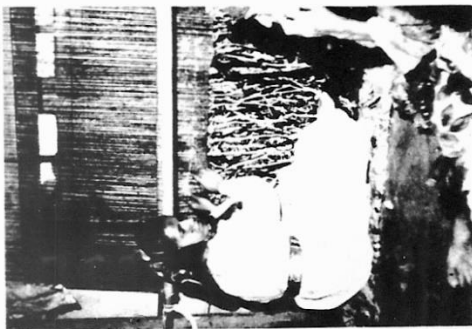
2. The entrance to the Djire ou Drasse.



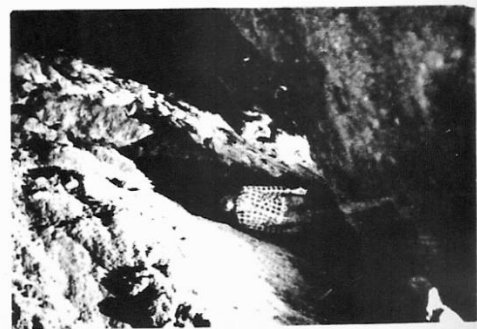
3. The entrance to the Djire ou Tagoulet, Mitkane.



4. A bat caught at the Maison des Forêts, Mitkane.



5. Vertical. Traditional weaving at the Maison des Forêts, Mitkane.



6. Vertical. Steve Palmer in the main rift of Kahaf Amal Almanjum Althalatha, Mitkane.

5. *MEDICAL REPORT*

A large supply of medical equipment was taken thanks to the generous support of pharmaceutical firms and the assistance of the Student Health Service of Imperial College.

Before leaving each member of the expedition had the full course of injections for:

- Tetanus
- Typhoid and Paratyphoid A and B
- Cholera
- Smallpox

Also they were persuaded to visit the dentist.

A full range of antiseptics, antibiotics, bandages etc. were taken as advised in the expedition medical summary prepared for the 1967 Sheffield expedition. These were packed in a series of polythene boxes so that kits were available in the base camp and the van. A small first aid kit was taken down each cave.

Sylvasun and Streptotriad tablets were taken by everyone on the journey down to Morocco for prophylactic purposes. Streptotriads also proved necessary to curb the persistent bouts of diarrhoea. (Kaolin and morphine were also absolutely indispensable for the same purpose). Antihistamine cream was in great demand in Mitkane, where we appeared to attract all the mosquitoes for kilometres around.

Fly repellent cream was also invaluable, though particular care had to be taken to ensure it was not applied to wind burnt or sunburnt skin. The fly sprays were also essential even though they were mostly used against ant invasions of the stores' tent and on scorpion hunts.

The combination of Sulfratulle, Octoflex and Netelast proved invaluable when one member managed to cut his wrist on some rocks and crushed his fingers under a large boulder. We did not have problems of lacerations turning septic as was anticipated from previous experience.

No major injuries were incurred. The expedition did suffer from an assortment of 'flu like symptoms and diarrhoea over most of the stay in Morocco, but we were amazed to discover on our return one member had suspected typhoid. However at the time of writing 3 months later we appear to have recovered.

6. PHOTOGRAPHER'S REPORT

Messrs Kodak Ltd. Kindly supplied us with 30 cassettes of Kodachrome II, 20 cassettes of HS Ektachrome, 20 cassettes of black and white film (Tri-X Pan and Pan X) and five 126 Kodachrome X cartridges for trade prices, less tax, as they arranged for us to pick the films up at Ramsgate customs. This cost just over £50 which represented a considerable saving over shop prices. Unfortunately Kodak has recently increased their minimum order to £100.

Our original plan was to use HS Ektachrome and Tri X pan for underground photography. However, having only one camera, and it not being desirable to have several half used films getting mixed up with the exposed films, resulted in occasionally using a slow film in caves and fast film in broad daylight. It was unfortunate that we were unable to afford the luxury of a separate camera for cave photography.

Very little black and white film was used. This was fortunate as the developing and printing is tedious, especially if one does not possess a darkroom. However, black and white film is far superior for cave photography. Its wide exposure latitude allows one to obtain much better lighting effects than can be achieved with colour slides.

Six member of the expedition took cameras, all of which turned out to be 35 mm so leaving a surplus of 126 film. They used about 3 colour slide films each, though Paul Hartland and Lloyd Tunbridge used about 10 films each which have been edited down to about 200 slides each, making a record of the expedition.

For underground photography we used both electronic and bulb flash with PF1B and AG1B bulbs. Unfortunately one bulb flash gun developed a loose connection which resulted in intermittent failure with the loss of several frames before it was finally abandoned. The electronic gun was a complete success in the small dry caves at Midelt but was not really powerful enough for large chambers such as the Chiker and Friouata. Both synchronised and open flash were used, the latter mainly in attempts at multiple flash. The favoured system was to mount the camera and flash gun on a flash bracket. This combination fitted into an ammunition box, and could be withdrawn and repacked very quickly. This lessened the delay to the party and the resultant impatience with photographers.

Outside metering work was performed by various members' "Weston Masters" of varying antiquity. However, we had no trouble, apart from one meter being dropped, and exposures were generally accurate. Westons have repaired the damaged meter very reasonably and their service is recommended.

The photographs in this report were printed on document paper, as this was readily obtainable at low cost, mounted on board and re-photographed on 120 size roll film for reproduction in this report. Kentmere Ltd. kindly gave us 50% discount on photographic paper for the production of the journal.

Experiments have been carried out in copying slides, with an electronic flash fired direct through white paper. The aperture was found to be too large for accurate focusing, and colour reproduction was poor. (Greens suffered particularly badly). Experiments with blue sky as illumination without diffusing, allowed smaller apertures at long exposures but similar colour rendering.

The Kodak black and white films were developed in Microphen. This gave good results and is at times recommended for Ilford films of the same speed.

SECTION 3
APPENDICES

APPENDIX 1

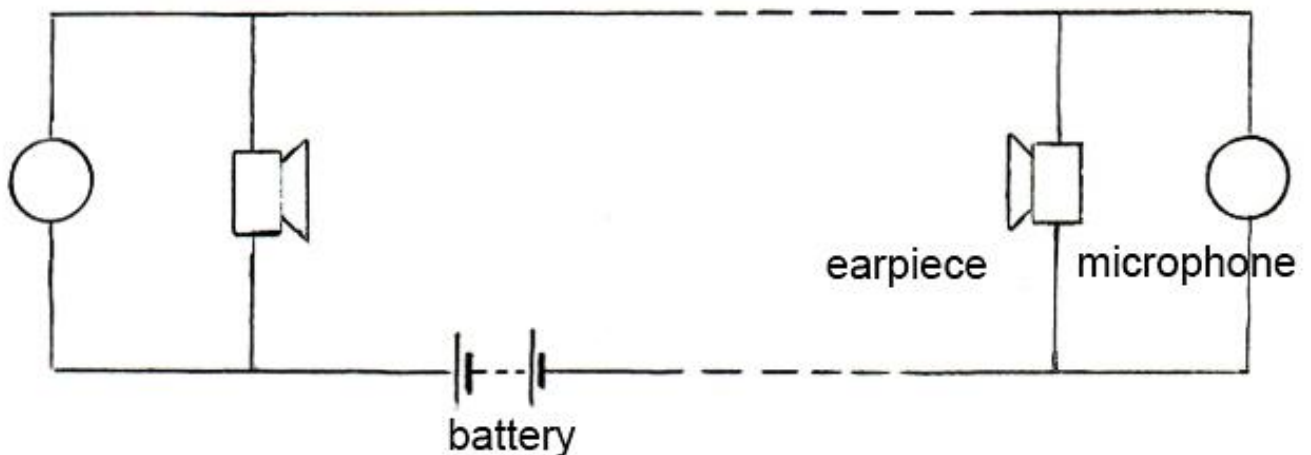
4. PRACTICAL CAVE TELEPHONES

Most cave telephones consist simply of two G.P.O. earphones connected together with a length of wire. This method is very cheap and does not require a battery, but suffers from a few disadvantages.

- a. The output is very low, and conversation can easily be lost in the sound of an adjacent waterfall.
- b. Confusion inevitably arises in who is supposed to be speaking to whom (or what) and then the end result is usually the person at one end shouting 'yer what' or some equivalent while the person at the other end is still speaking. Alternatively both parties end up listening attentively to the other person, also listening attentively.

These faults can be overcome by using G.P.O. handsets wired in the normal manner. These require 3 wires between the stations and something more competent than a freezing idiot to connect them, as it does matter which wire goes to where.

An alternative which has given excellent results (over 200m) is shown below. G.P.O. handsets with the mouthpiece and earpiece wired in parallel were used and are simply connected as with the normal type telephone, but a Nife cell put in a convenient position anywhere along the wire. The current drain is a mere 5mA.



APPENDIX 2

LADDER BUILDING

Caving ladder has several special requirements. The major ones being that it should be light, flexible and capable of being joined to similar ladders to form longer lengths.

The ladder used by most cavers at present meets these requirements, having been evolved over many years. It consists of tubular alloy rungs with galvanised steel side cables. The ends of the wires are 'swaged' to form eyes, which are fitted with 'c' links to connect other ladders. Two standard ladder lengths were used on the expedition, these being 25' and 15' long.

The rung spacing was 10", giving 30 or 18 rungs per ladder and the side wire was placed 6" apart (as is standard with most British clubs). Unfortunately these sizes do not lend themselves to convenient metrication. A rung spacing of 30 cm could be adopted with ladder lengths in multiples of 3 m. Convenient lengths for carrying would be 6 m and 9 m; 10 and 5 m ladders (useful for measuring pitch heights) could be built using 25 cm rung spacing, but this gives too short a step for most people.

MATERIAL

The rungs consisted of approximately 7" lengths of ½" outside diameter aluminium alloy tube and were attached to the 15 cwt aero-cord side wires as shown on Fig. 1.

The function of the pin is to spread the wire, allowing Araldite epoxy resin to penetrate. The pin takes little stress in use if the ladders are built correctly. The 'c' links are attached as shown on Fig. 2.

'c' links should be cut on the join of side-welded stainless steel or galvanised chain. End-welded chain must not be used.

CONSTRUCTIONAL NOTES

Although it is cheaper to buy large lengths of aero-cord, it may be bought in ready-cut lengths with bound ends. This prevents fraying as the rungs are threaded on. These are virtually essential if more than two rungs per ladder are used.

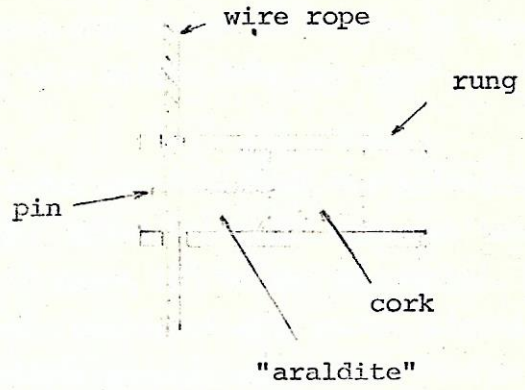
A 'paste' type Araldite recommended by the manufacturers was used for stopping the ends of the rungs. Great difficulty was experienced in getting this behind the wires. This was eventually solved by using plastic syringes to insert the Araldite. The ladders constructed without using syringes suffered from frequent slipped rungs. These were later repaired using a liquid resin

which could be poured in.

Fig 1

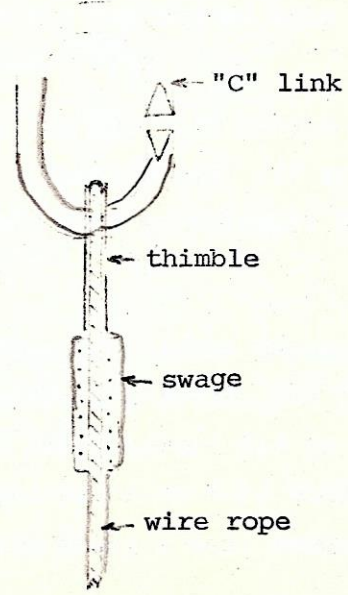


End View Section



Side View Section

Fig 2



wire rope

APPENDIX 3

CAVES INVESTIGATED

1. An area between N 96° and N 105° of the camp, at a maximum distance of 2 kms was investigated. One small cave six metres long was discovered; also a mine containing six metres of passage to a blockage.

2. KAHAF UMAL AMANJUM ALTHALATHA

This was first shown to us by the warden of the Maison de Fôret who said that it had a depth of 30 metres and two passages leading off from the bottom. A miner had been let down on a rope but had not explored the passages. The pothole was situated right on top of the hill, within 10 metres of a lead mine which was worked by hand. The entrance was quite tight and due to a slight bend one could not see very far down it.

We returned the next day with some ladder and descended the entrance pitch, which was about 30 metres deep. After the tight entrance this opened out into a wide rift sloping at about 70° to the horizontal. At the bottom, the passages were richly decorated with white calcite and stalagmites and stalactites. The one passage was constricted due to these decorations but progress could be made at two levels in the rift by crawling. This way was pushed through several tight spots for about 50 metres. The other passage was more open and we were able to walk along it for most of its length. Towards the end it was quite large and the floor consisted of boulders. At the far end of this passage some unidentified small bones were found.

The survey showed the cave to be very straight and the rift nature of the cave suggest it may have originated along a fault plane. If projected, the passage would extend across a gorge and into another entrance that we were told about but did not see.

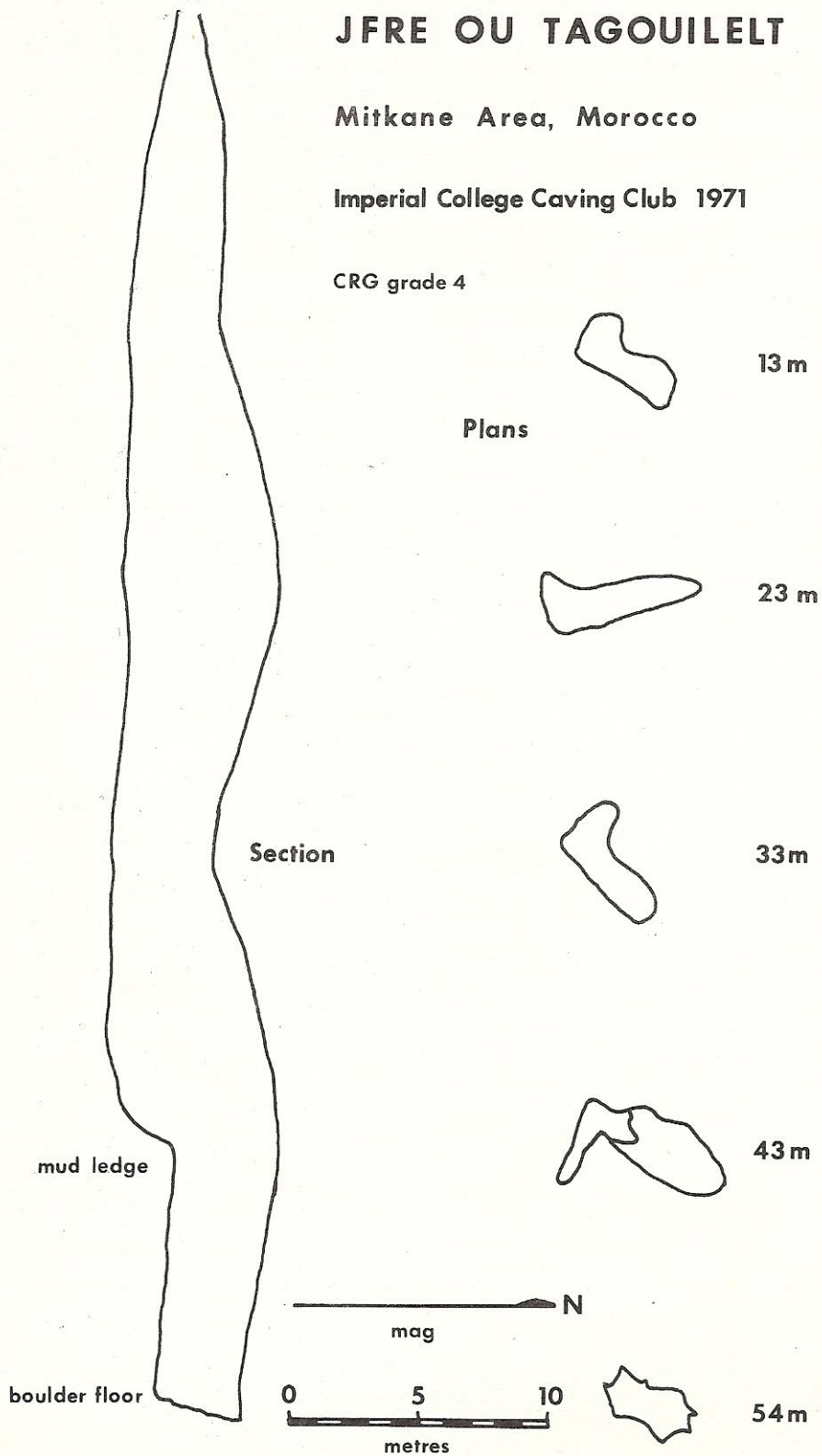
3. Due to persistent questioning of the local Berbers, numerous reports of caves came to our ears via our very helpful friend and guide, the Forest Warden. These were viewed both with suspicion and interest due to the exaggerated dimensions usually involved. It was one such tale that provided the inspiration for a 17½ mile trek; a most memorable journey.

JFRE OU TAGOULELT

Mitkane Area, Morocco

Imperial College Caving Club 1971

CRG grade 4

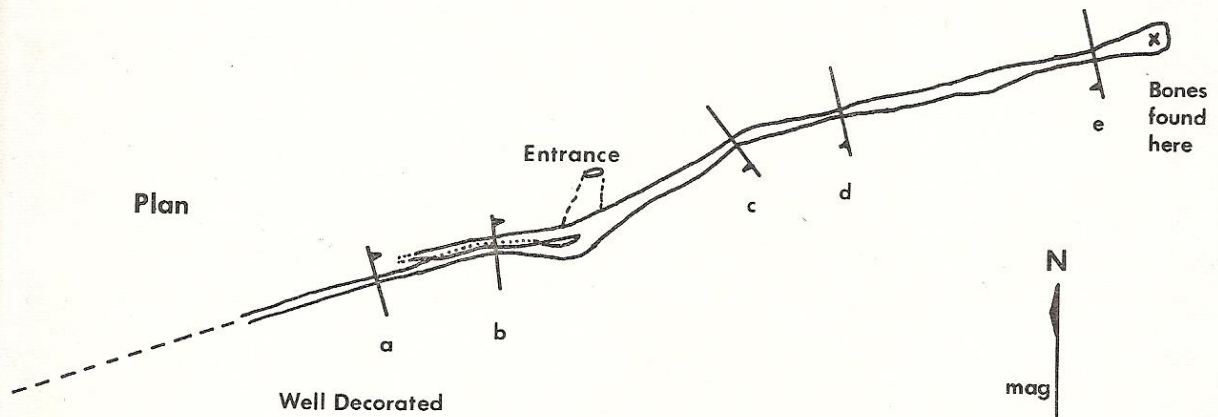
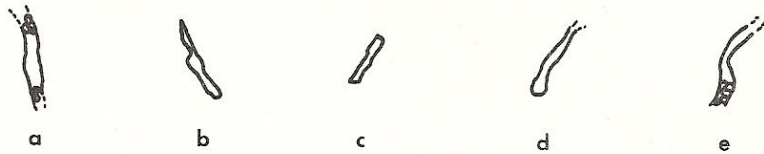


KAHAF UMAL ALMANJUM ALTHALATHA

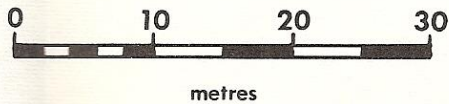
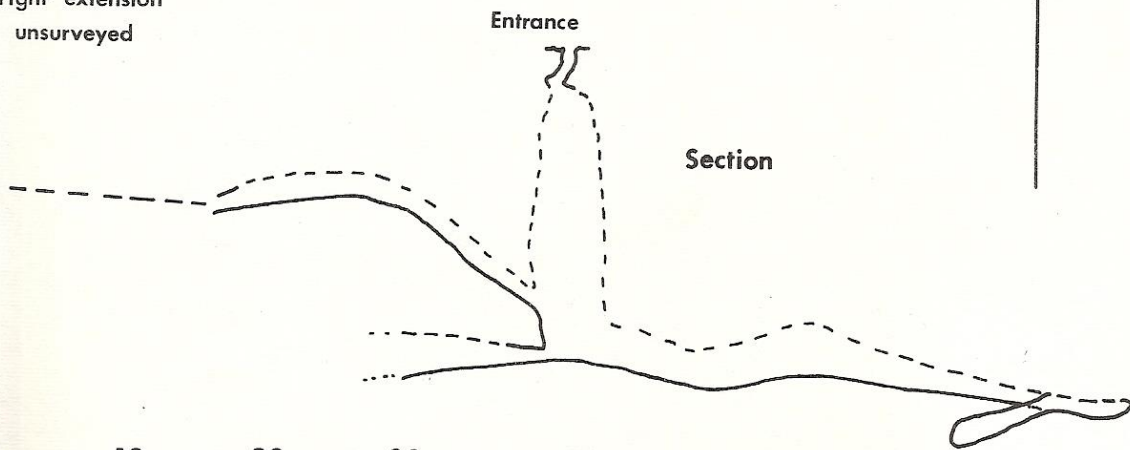
Mirkane Area, Morocco

Imperial College Caving Club 1971

CRG grade 4



Tight extension
unsurveyed



Guided by the Forest Warden, the crewbus was abandoned at a very early stage near the base of a vast mountain gorge known as the Cirque de Jaffa. From here, our party consisting of the Forest Ranger, his protégé, Joan, Madeleine, Dave, Mike and Paul walked on foot up the boulder floor of the Cirque de Jaffa. A small stream, following the course of what must be rapids in the wet season, disappeared under the boulders fairly early on. After about an hour's scramble we entered a narrow limestone gorge with steep cliffs about 40 m high. It was here that we made our first discovery - small cave about 3 m up on the left wall. This was explored for a total length of 30 m, and was found to be choked with boulders and numerous flying insects. The cave was probably a phreatic tube, part of a very ancient and now collapsed system. Mike discovered another similar cave higher in the gorge, and again of short length. It was at this point that the boy, Joan and Madeleine returned to the vehicle in order to meet the party on their descent from the 3000 m pass which now lay ahead.

After filling our water bottle from a small muddy source, a long and arduous climb up the Arif Ijmn was begun, under the relentless heat of the midday sun. It was at about 2750 m that we made our first contact with Bedouin Berbers, now far from their winter home in the Sahara and using the relatively good grazing ground on the mountain slopes to feed their goats. Following the normal Berber custom, refreshments were offered and we were invited to sit down. A ragged woman appeared and held a vociferous conversation with the Forest Ranger. Small drinking glasses were produced and filled with very refreshing mint tea. It is impolite not to drink at least three glasses and is as much a social custom as a refreshment. After this ceremony was performed a large jug containing curdled goat's milk was passed round (and by some, passed over). It has a taste very much like sour yoghurt with lumps in it and is for hardened drinkers only!

A very tiring climb, made difficult by the altitude was undertaken until we reached snow at about 3000 m. At this point Dave and Paul were suffering from the altitude, its effect being a general weakness in the legs and very rapid pulse rate which disappears instantly on resting.

After a flat plateau region, we descended the other side of the pass and came upon yet another Berber camp. In this particular camp, we were invited in for a meal; a truly remarkable experience. The tent consisted of a lovely woven black material supported in the middle by two poles which formed the basis of a hand loom and were held in tension by numerous guys round the perimeter. A forked twig was used to tension the guys by twisting the fork with two ropes attached to the upper ends of the Y. The tent was thus divided into two sections; one section acting as a kitchen and animal house, the other was the main living area. The living area had a thick carpet upon which we all sat and was possibly woven by

the same loom that divided the two sections. The meal consisted of a large bowl filled with a liquid that can only be described as like hot syrup with globules of fat floating in it. Into this liquid, pieces of bread were dipped and tossed quickly into the mouth. Finally of course we finished with mint tea and as an extra measure, a raw onion. This was the recommended cure for the effects of dehydration.

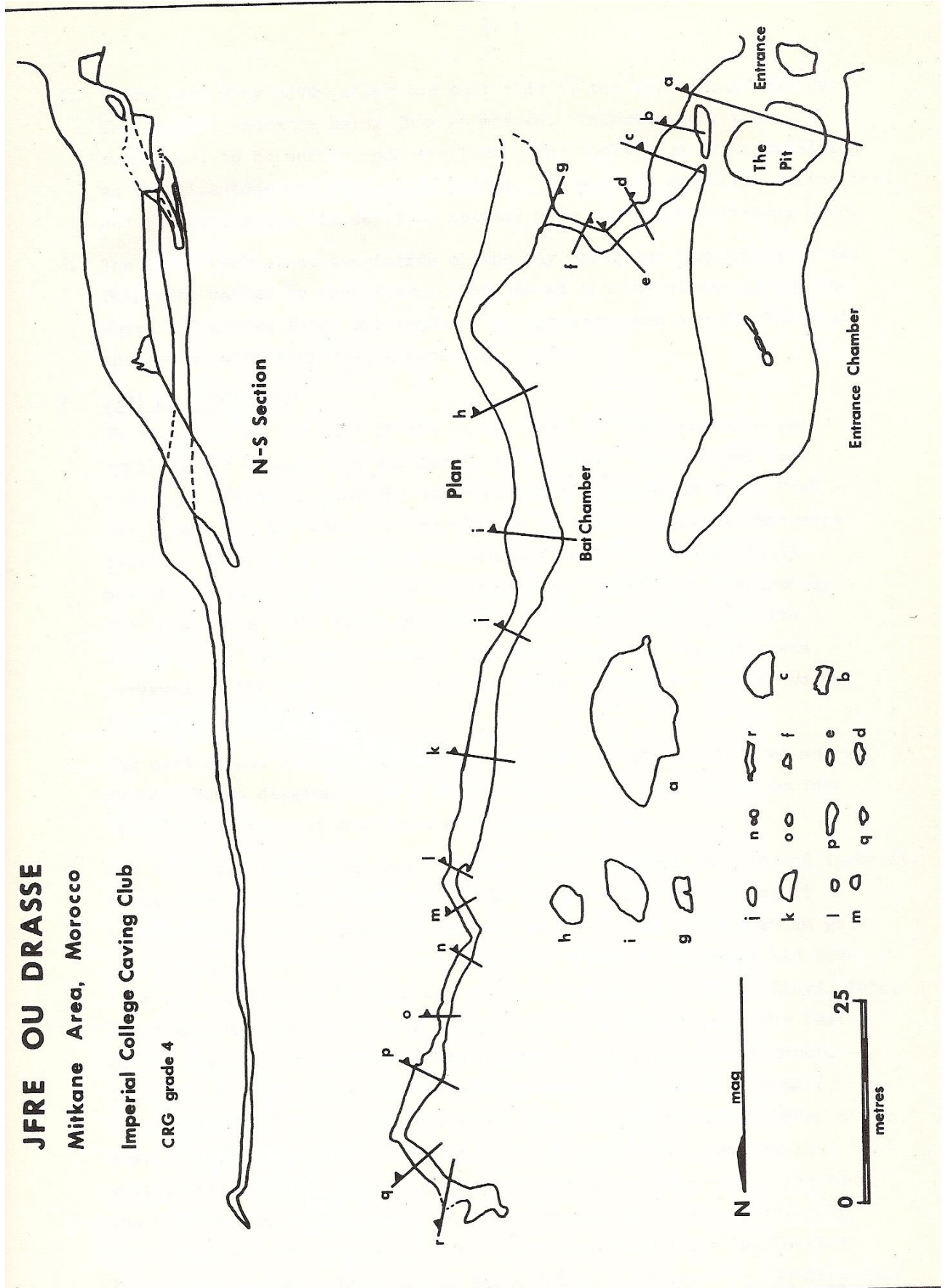
After the meal we bade our hosts farewell and proceeded down the valley of Imi n'Thand. The scenery was magnificent; large cedars grew on the valley floor and numerous caves were seen high in the cliffs of the valley walls. Numerous camels were seen as well as mules, and in the lower parts of the valley we were directed to a large natural cave which is described in detail later (Jfri ou Drasse).

Due the effects of dehydration and exhaustion intensive exploration was left for another day. The impressions gained were very memorable due to the very hospitable nature of the Bedouin which is entirely different from that of the Arab in a city such as Fez or along the coast.

4. JFRI OU DRASSE

This cave is formed in a thin cap of brecciated limestone, containing a large entrance chamber with some formations. The floor was covered in bat guano. A small side-passage has been enlarged by mining but is obviously solutional in origin since there are several decorations and the floor is quite smooth. This side-passage is about one metre high for most of its length.

The Bat Chamber has a guano floor and hundreds of bats on the ceiling. The warden of the Maison de Fôret said that mining had ceased when a miner was killed by a rock fall at the far end. The rock there looked unstable and there was a wall of miners' 'deads' to one side. At the end of the passage the mud floor met the roof. The restricted amount of limestone and the instability of the rock suggest that a dig would not be worthwhile.



5. There were many caves along the east side of the lmi n'Thand valley. The largest entrance being 30 x 25 metres. Unfortunately these all turned out to be merely rock shelters. The

whole area was unpromising as the limestone was vertically banded. No-one was properly acclimatised and the heat and altitude (3000 metres) made the going extremely hard.

6. The caves were about two-thirds of the way along the Tagouilelt gorge. Both were marked by sack flags. The one at the top of the valley was short (30 metres long) but impressive. It comprised a rift choked at the bottom with boulders; a good dig.

7. JFRI OU TAGOUILELT

This was nearer the base of the valley (see 6). The entrance was vertical and a large boulder had to be removed. The dropped rock technique indicated that the depth was considerable and Andy, Paul and Dennis had to return to the vehicle (3 kms) to collect some more tackle. Dave, Mike and Lloyd descended firstly to a ledge at 43 metres and then to the bottom at 53 metres. Apart from 2 metres by the ledge, the whole pitch was free. The bottom was choked with boulders and there was no chance of a continuation. The hole was surveyed on the way out. A few other short caves were also found in the area.

8. The cave turned out to be a shaft which was blocked after three metres. Several hours digging added a further two metres but a large boulder could not be removed and the dig was abandoned.
9. The caves were marked in the vicinity of the towns of Tazarin and Tarborit. These were some 50 km south of Midelt and according to the map it appeared that the closest approach by vehicle would leave a 25 km walk to the area. However, the map dated from 1922 and the roads had been improved. Only a 10 km walk was therefore necessary. Mike, Lloyd, Tony, Steve and Dave got up at dawn (05.00 hrs) in order to avoid the heat of the day, and walked the 10 kms carrying tents, caving equipment, food etc. in 2½ hours. The terrain was semi-desert with no shade. On locating the valley containing the caves we had breakfast under a small bush. Tony and Mike then set off to investigate part of the valley whilst Steve, Lloyd and Dave set off to another area. The rock was totally unsuitable for caves, being pencil shale with a thin cap of limestone. No caves were found and neither could the two parties locate one another. When Lloyd, Steve and Dave returned to the breakfast site at dusk there was no sign of the others. They, having waited at the site for 2 hours, had decided that Lloyd, Steve and Dave had started to walk back. They therefore set out back to the van and did not locate it until the following day after bivouacking overnight.

Meanwhile, Lloyd, Steve and Dave camped (very worried) at the breakfast site. Camping was complicated since, although this party had the tent, the others had the poles. Eating

was also complicated. Lloyd, Steve and Dave had most of the food but no cooking utensils or stoves. Luckily enough, wood was found for an open fire. The next day as one party located the van, the others set off back towards the van. A passing Arab indicated by sign language that he had seen the others too. The walk back was complicated by Dave being ill with a stomach upset. The frequent stops required meant that they reached the place where the van should have been at around 11.00 hrs. The inhabitants of Anfagane turned out to watch the three and treated them to mint tea. Lloyd was able to hire a chauffeur driven mule for some 2.26 Dh and given 0.01 Dh change after much haggling. After an hour or so the van was located and after returning to pick up Dave and Tony we set out back to the base camp at Mitkane.

10. The cave near the mine (619 388) at Bab Bou Idir was found to be filled with mud after about 30 metres. This mud looked recent but several hours digging was not successful.

11. THE TROU D'ANAFED

This cave lies several kilometres south west of Bab Bou Idir, and is marked on the map as a stream sink. It can be approached to within 200 m by road, preferably by Landover. The cave was first explored in 1967 by Sheffield University but was not surveyed and has since remained undescended until our arrival.

We set off on Thursday 26th August in search of the cave (without a map). Several hours elapsed before we were asked by a local if we were looking for the cave. He then escorted us over a small hill to a dry stream bed which terminated in a shakehole with a large black slit at the bottom. A few rocks thrown down indicated that the entrance pitch was quite deep.

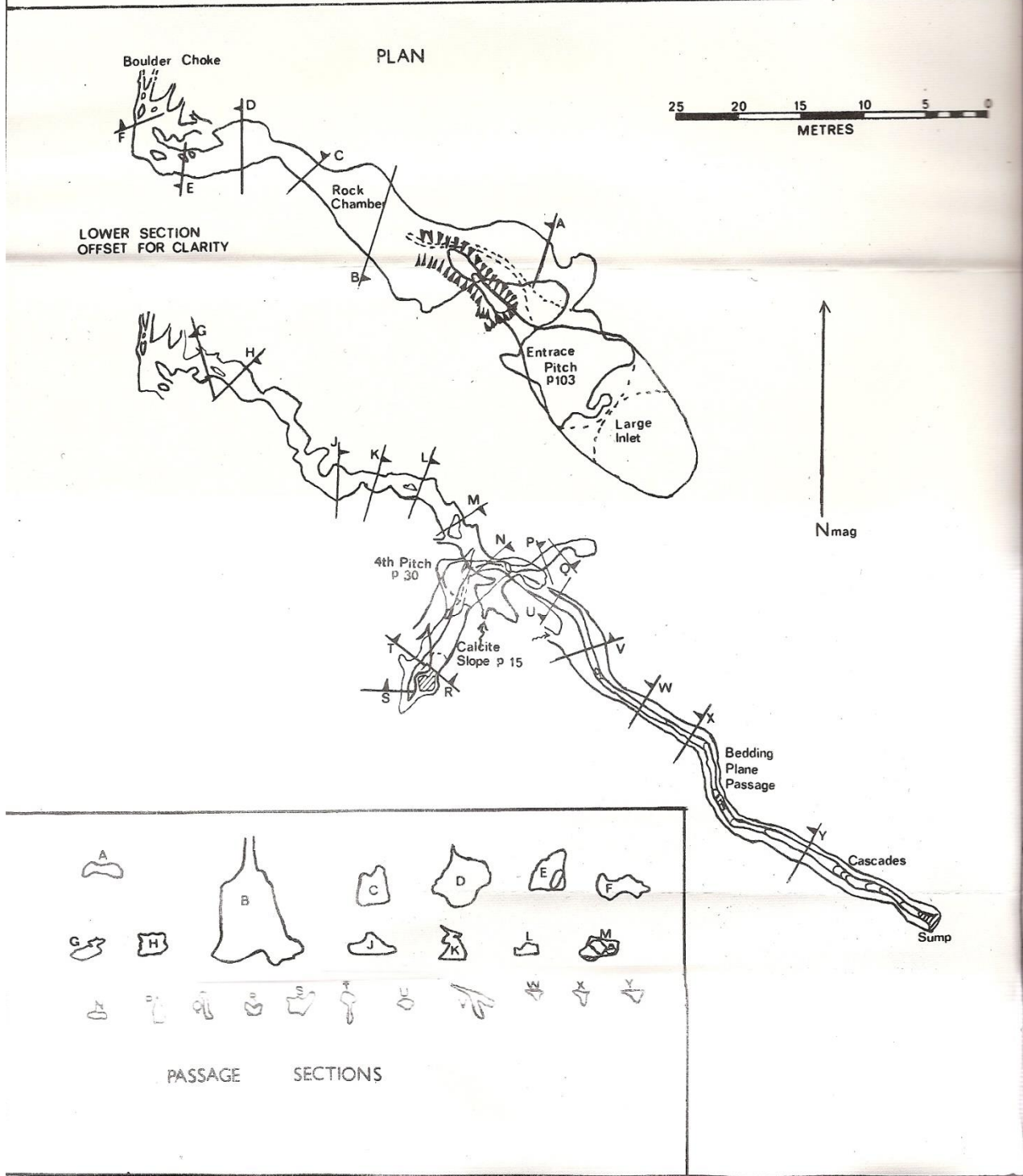
We returned the next day with all the expedition tackle, to be greeted by 40 or so interested locals. The pitch was laddered in the afternoon (the delay being due to a puncture) and was found to be 108 m deep, giving a fine climb. The first 35 m was down a very steep

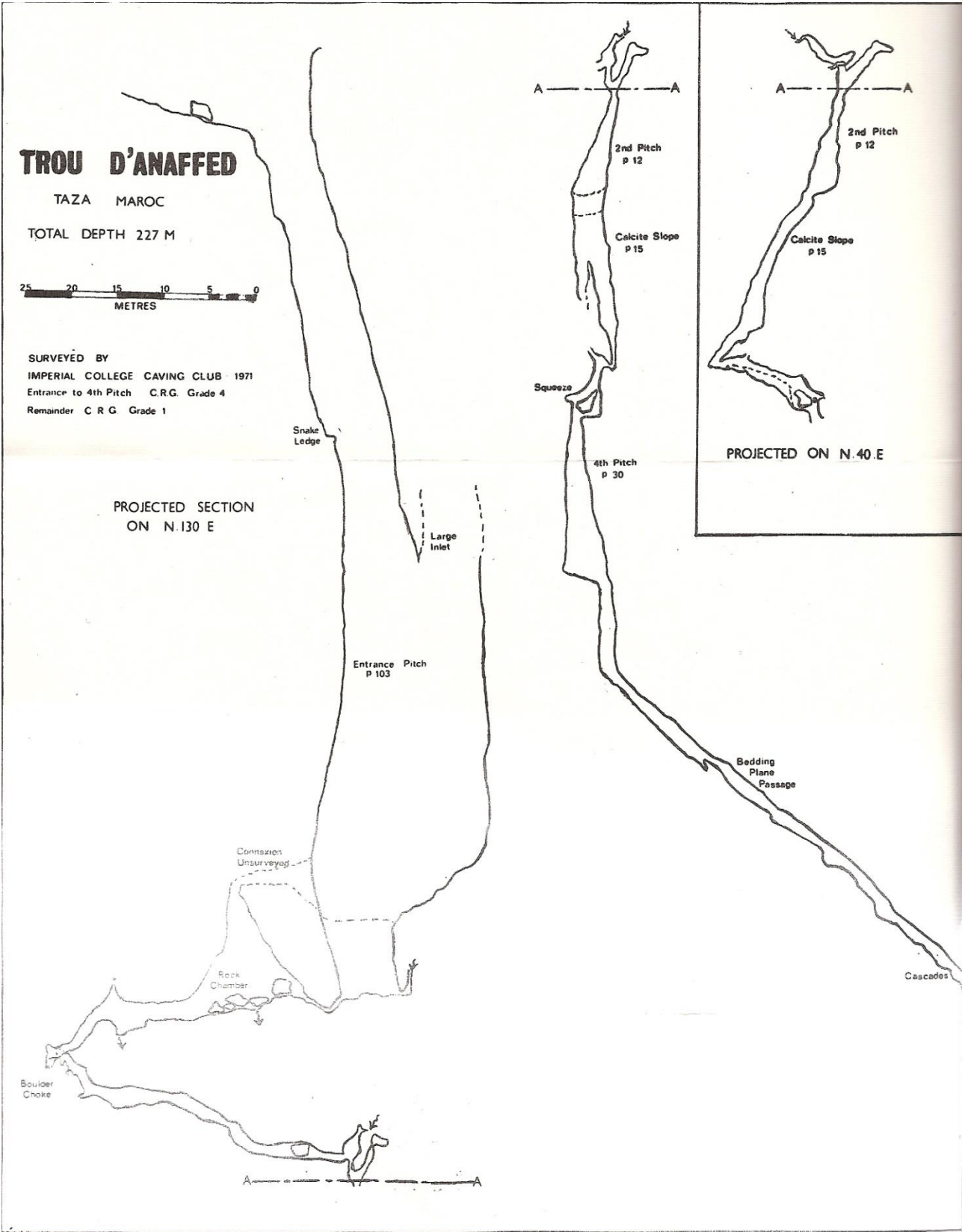
TROU D'ARRAPÉ

TAZA MAROC

TOTAL DEPTH 227 M

SURVEYED BY
IMPERIAL COLLEGE CAVING CLUB 1971
Entrance to 4th Pitch C.R.G. Grade 4
Remainder C.R.G. Grade 1





slope to a ledge with sufficient room for two people to stand in comfort. The shaft now became vertical and elliptical in section with the ladder hanging down the wall at one end. After 20 m or so, the shaft became suddenly wider due to intersecting another similar but larger shaft (the large 'inlet') and the ladder eventually left the wall leaving a magnificent last 30 m suspended in a vast chamber. Little outside light filtered to the bottom because of the change in direction at the ledge. While others were descending the pitch a telephone system was set up, which proved useful for giving directions to the life-liners on the surface. At this stage the S.U.S.S. telephone wire was unearthed and followed on down the cave.

A small passage, littered with trees, was the way on from the entrance chamber and led, after a few feet of stooping, into a large chamber with boulders covering the floor. At the other end, the roof gradually became lower with the boulders almost blocking further progress. However, a route was seen dropping through the boulders and was followed for several metres, until a couple of crawls under boulders gave access to the top of the second pitch. At this point the telephone wire ended. Everyone then turned back to the entrance and the exodus began after one of the ladders had been replaced because of a slipped rung. While this was taking place a route into the boulder chamber was found by climbing up to a large ledge 10 m above the floor of the entrance pitch and following a small meandering passage which gave a 10 m pitch into the chamber. (This was not descended.) Another sign of S.U.S.S. activity was found in the form of a fly spray can on the large ledge.

In view of the time taking in descending and ascending the pitch it was decided to leave the ladders and ropes belayed at the ledge, removing only the top section. Consequently we returned the next morning to a scene of destruction.

The locals had indulged in the time honoured practice of trundling* and every moveable rock (plus a few immovable ones and some trees) in the vicinity of the entrance had been hurled to the bottom causing considerable damage to our tackle. Several hours later we managed to descend and split into two groups, one surveying and one exploring.

*ref MY CAVES – N. CASTERET p20 (Temple Press)

The second pitch was fairly constricted at its top but opened out after a ledge giving an easy descend onto a calcite floor which dropped away to form the third pitch. The glittering orange crystals of this section of the cave were a welcome relief from the somewhat muddy condition of the previous parts.

The calcite slope steepened to a 15 m drop into a tight vadose passage. This continued for a few metres until it shrank to a few centimetres width which was assumed to be the end. A short climb up at this point led to a small chamber with no obvious exit apart from a small hole in the floor communicating with the lower passage. This section was left laddered for the surveying party and an exit made. The surveying was progressing well but becoming more difficult in the boulder choke.

No caving was done on the next day because of the necessity of sending the van to Taza for petrol, however, Dave and Tony spent an interesting day exploring the hills behind the camp site. These showed all the usual karst features and had some interesting looking holes.

After a days' idleness everyone was keen to get down the cave again (joke). Surveying was the order of the day with Dave and Paul tackling the entrance pitch while Mike, Lloyd and Tony did the main route down. By the time we reached the second pitch we felt quite exhausted and made our way out.

By this time it was obvious that the surveying was not progressing as quickly as had been hoped, consequently the next day was spent on a trip down the Chiker (described elsewhere). In the evening it was decided to send the members of the expedition who were not suffering from dysentery to camp by the cave until it was finished or they too caught dysentery. Three days' supplies were thought to be sufficient.

The next trip comprised Lloyd, Andy and Dennis surveying and Mike and Tony exploring the boulder choke. Several routes were followed to no obvious conclusion and abandoned because of tightness or loose boulders. Lloyd and company found that the end of the cave was in fact the top of a large pitch, but they were unable to enter because of the tight nature of the passage. The exit was more speedy than usual with all the tackle being left in place. Lloyd discovered a snake on the entrance pitch ledge which he managed to mistake at first for a carbide lamp. (I know they are supposed to be camouflaged but). We pitched the tent in the nearest convenient place which happened to be the middle of the road. This was alright until 3 a.m. when some Arabs on horses tripped over the guy lines.

Mike and Tony decided to take a look at the fourth pitch, and so we set off next morning with all the remaining ladder and surveying gear. We spent some time threading the ladder down a small hole and Tony set off down. The tight section was only a metre or so long and then the pitch opened into a large cross rift giving a splendid free climb of 20 m to a ledge and a short further drop to a bedding plane with a vadose trench. This descended steeply for 150 m in a series of dry cascades until a sump was encountered.

The sump offered no signs of being short so Tony surveyed the way back to the pitch and we made our way out. The rest of the afternoon was spent in de-laddering which proved to be a tiring job.

The total depth of 227 m makes the Trou d'Anaffed the second deepest cave in North Africa. The entrance pitch has some quite interesting life-forms; choughs, frogs, lizards, a centipede and a snake being observed. The cave is in two major sections, these being the entrance, boulder choke section and the lower series. The lower series is quite recent and was doubtless formed after the boulder choke section became blocked. There is plenty of scope for extensions in the boulder choke and good prospects of a large system rivalling the Friouata and the Chiker. The descent is very enjoyable and nowhere particularly difficult except at the top of the fourth pitch.

12. A pothole investigated by a French expedition the year previously. It proved to be 60 metres deep.

13. TROU DES TROIS SŒURS

This was named and explored by the 1967 Sheffield Expedition, but no survey has been published. We decided to survey the pot and consequently carried some 300' of ladder and rope up the steep hill behind the camp.

The cave is situated on the sides of a large chocked shakehole. The entrance is rather constricted and not very obvious.

The pot is in relatively good limestone and fluting on the walls suggests that its origin was by erosion by water. The surveying was facilitated by there being ledges at regular 16 m intervals. The upper part of the pot was quite large, but was not quite vertical and the ladder was on the wall most of the way down.

At the bottom the shaft became quite constricted where a small side-shaft led off the bottom of the main shaft. This led to a boulder choke in the bottom of the main shaft which was impassable and would be very difficult to clear.

The depth was surveyed at 92 m, there being no side passages. The entire ladder was against the wall except for about 8 m which was free. However, the abundance of ledges made the climb quite easy.

14. THE CHIKER CAVE

There are two entrances to the Chiker Cave in the Chiker Daia, 60 metres down the slope from the Taza – Bab Bou Idir road. Both entrance shafts can be negotiated, one being 22 m and a natural pot, the other a 10 m mined pitch.

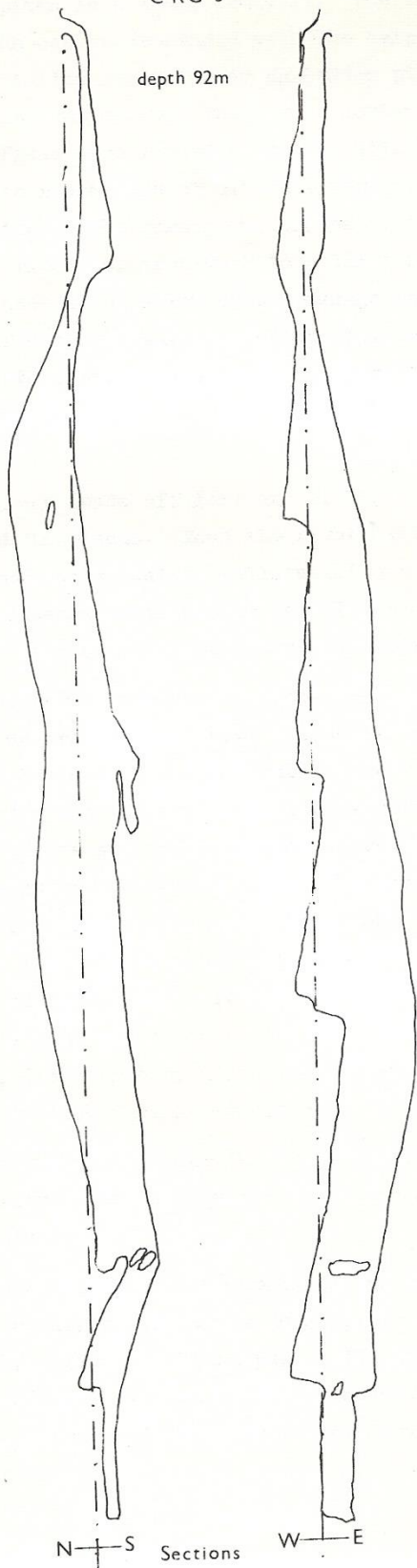
Around this pitch is a small dam wall. The easier access is via the mined entrance which can be descended with the help of an 8 m ladder. Several short climbs follow including an 8 m ladder pitch, which joins the bottom of the 22 m entrance shaft. The way on continues for 20 m to a 20 m pitch which has a fixed iron ladder with a catwalk half way down. An 8 m ladder is required to reach this or alternatively a 22 m ladder may be used to reach the bottom. The passage continues by traversing along several wires and bits and pieces of ironwork to a 12 m fixed iron ladder pitch. The way on continues along a low sandy passage for 60 m to a series of three deep pools of stagnant water in which it is necessary to swim. The passage continues on to a three-ways' junction where a large stal flow rises vertically out of the flooded passage. This is negotiated with the aid of a waterlogged plank.

The main gallery leads off left and right, varying up to 15 m wide and over 30 m high in places. Down the right-hand passage the way continues for 60 m through huge boulder falls until one reaches the giant rimstone pools. The passage continues to the 'Terminal Pool' where it finished up in a confusion of large boulders and calcite.

Trou des Trois Soeurs Taza Morocco

CRG 3

depth 92m



0m



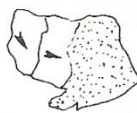
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30



45



60



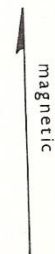
76



85



Plans



Imperial College Caving Club Expedition to the High Atlas 1971

Left from the three-ways' junction the passage continues in large proportions, beautifully decorated, for 300 m. Beyond this, 100 m past various stalagmite formations, a boulder fall is reached. The way on meanders for another 300 metres into the mud chasm. After this, giant rimstone pools span the passage until the sump pool chamber is reached. The sump pool is free diveable, being only 2 metres deep. The passage continues beyond this to a huge boulder slope. The most likely route to the Friouata system is somewhere in this gigantic boulder maze. There is an extension to this in a northerly direction which leads to some active streamway which has not been properly explored or surveyed. The total length of the system is 3203 metres, discovered by M'Paille and team in 1931 to 1939 and beyond the sump by British caving expeditions. The depth is 161 metres.

The greatest possibility for further discovery would be in the boulder choke in Chiker 2, which requires close and more systematic investigation due to its size.

15. The resurgence located to the north of the town was active even in midsummer. It has been enlarged and it was possible to swim across a small lake (the water was extremely cold) to a blank wall. The water emerged into the lake below the surface of the lake and there were no obvious passages. This water was much used by the expedition members for showers.

16. FRIQUATA

The artificial entrance tunnel is at the top of the wide stone steps out of the car park. The opening is a concrete portal from which stone steps lead down through a tunnel to the 'balcony'. From this point the 'Great Chamber' can be fully observed. The artificial aids can be followed down to the top of the scree slope. The ironwork at the beginning of the traverse is rather shaky and a lifeline was rigged. (This proved to be very embarrassing when a party of tourists just walked past us). Concrete steps lead down the scree slope to the corkscrew squeeze into 'Bison Chamber'. Steps lead through this chamber, but a detour to the right to view the 40' stalagmites and other decorations is worthwhile.

The way forward is marked by steps and various other artificial aids through a restricted small passage to another large chamber. The passage from this point is mainly of large horizontal extent. It continues past an awkward mud floor sloping into a deep pool until the catwalks over the rimstone pools are reached. These generally provide entertainment in their traversing. More catwalks lead down a depression and up through a hole with iron ladder work which is difficult to find on the way out. The passage continues over more catwalks over deep rimstone pools past some huge curtains on the right, through an awkward climb of 'Helictite Chamber'. This was the limit of our exploration. Beyond, there

is a junction with sump one down the right-hand passage. The sump is 10-13 metres long and can only be passed by divers. The left-hand passage ends in a large chamber where exhaustive exploration might find a bypass to the sump. Beyond sump 1 is sump 2, 4 metres long, and sump 3 which are just ducks in dry weather. The way on is through large passages leading to a rift of deep water which leads to the terminal 'Boulder Choke' The total length of the system is 2178 metres. It was originally discovered by Norbert Casteret and team in 1931 and lengthened to its present form by British caving expeditions in 1965, 66 and 69. The total depth is 271 metres.

The top of the entrance chamber can be reached by climbing round to the right of the entrance portal along a well-defined path. There is a large doline some 40 metres in diameter. From here we hung 140 metres of ladder and climbed down to the top of the scree slope – a distance of only 75 metres, but all completely free and in daylight. It might be possible to rig a 100 metre pitch from the other side of the doline. The rumours of 180 metres entrance pitch must refer to the depth from the bottom of the scree slope which is not possible to reach directly from the surface.

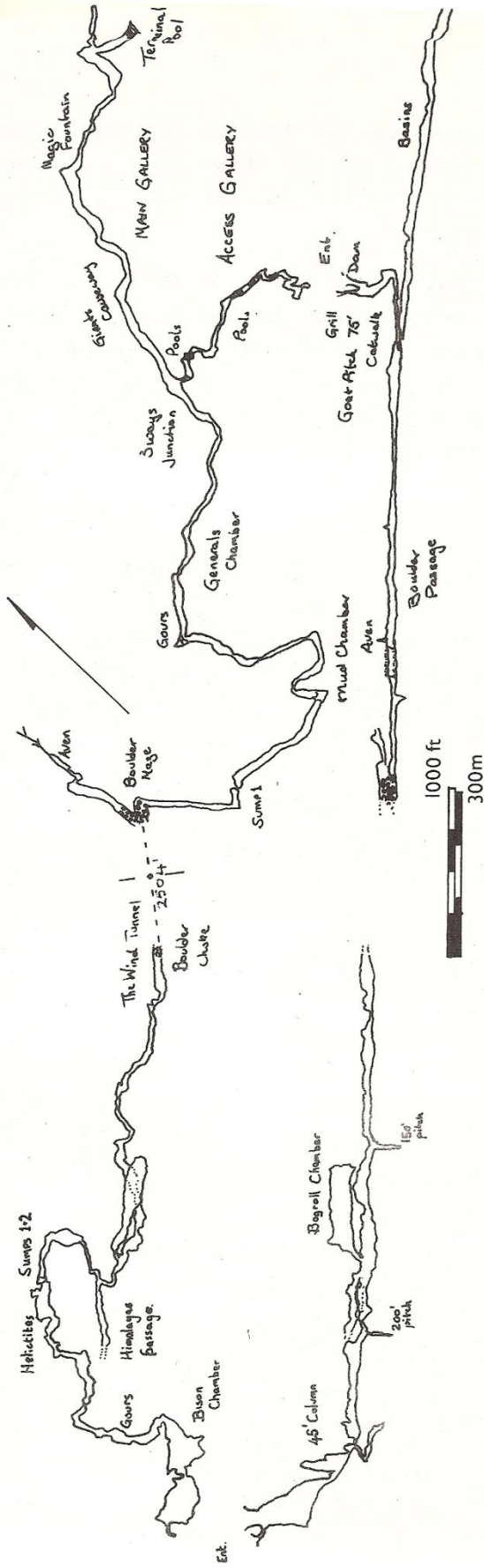
The system is exceedingly well decorated and well worth a trip for the beauty alone. The 40' stalagmite is shown on the front cover of this report.

The system has been proved to connect with the Chiker system by dye testing. The boulder choke at the end of the system is the obvious connection but is difficult to reach due to the length of sump 1. Various unsuccessful attempts have been made to drain this sump, but a syphon and trench would work given sufficient time. However, there is a chance of a bypass to the sump in the chamber mentioned previously. At present most of the work to connect the cave systems has been done from the Chiker end as this is more accessible to non-divers. The distance between the caves was calculated at 763 metres by the 1969 British Expedition.

Gaverns of the Chikker Basin, Morocco

FRIOATO

CHIKKER



from the survey by The British Spelæological Expedition to Morocco 1969

17. About 1 km (619387) along the road from Bab Bou Idir to Taza there is a large depression to the right. This consists of a dry valley about 100 m across containing a muddy stream bed which terminates at a small cliff (5 m high). The lowest point of the stream bed was dug by Steve and Tony for 2 hours producing a large muddy hole with no prospects of clearing in the foreseeable future (see Note 20).

A slit on the left wall was investigated after being cleared of bushes and flies and a very constricted passage entered. A tight right turn after 5 m led to a four-way junction which proved too tight in all directions.

18. CAVES ON THE EASTERN SIDE OF THE DAIA CHIKER

- a. Cliff on El Haya Tonna (6250 3903). A series of rock shelters at the northwest end. The final leads to a chamber of 8 metres in diameter with a smaller chamber to one side.
- b. Gorge ½ km south of El Haya Tonna, north end, a rock shelter. 25 metres further on, a small cave entrance with a passage for six metres which closed down completely.
- c. Continuing southeast from El Haya Tonna by Merja Aliel Bachir. Series of caves in a cliff. The first one being 30 metres from the gorge. Large entrance inhabited by family with large hostile dog. A further five caves nearby all turned out to be rock shelters or to contain very small passages. Cliff now got much smaller and then reappeared.
- d. Large cave entrance, merely a rock shelter. Visible from this entrance was another:
- e. Entrance 10 metres x 3 metres lead to a collapsed chamber 20 metres x 8 metres. A passage lead out of the chamber but soon closed down.
- f. Two small shelters together immediately precede a cut in the cliff. This cut contained two further entrances:
- g. Arch with low wide passage which closed down after six metres.
- h. Horseshoe shaped entrance 5 metres high x 3 metres wide, continued with some dimensions for 10 metres. Ended in an area spiralling to the right. The cliff now became more broken again and a small entrance 1 metre high was found.
- i. The presence of an animal in this cave discouraged further exploration.
- j. On the same level as the previous cave was an entrance 1½ metre's high. After a short passage this lead to a chimney opening on the cliff.
- k. Further along the cliff, opposite a house, a small hole partially hidden by shrubs. A passage 1 metre high lead to a small chamber with a possible low continuation on.

- l. Rock shelter 4 metres high. Upper and lower sections petered out after 2 metres.
- m. Not readily seen but 10 metres up the cliff, northeast of the last cave was a large entrance 5 metres x 5 metres. This continued upwards for 10 metres and then closed down.
- n. An interesting blocked sink was discovered on the edge of the Daia a short distance past the settlement.

19. Report not submitted.

20. This cave was visited for the second time in the hope of forcing a way through the tight sections (see note 17). Tony managed the first two right-angle bends and arrived at 4-ways' junction. The straight ahead and right exits were choked, and the left passage proved too tight to enter although it continued for some distance.

21. Further to the investigation and survey of 'Trou des Trois Sœurs', an exploratory sortie, led and investigated by Madeleine was made on the southwest slopes of the K^{at} el Khars. Enthusiasm for this venture was somewhat lacking due to an unfortunate clash with further exploration of the Chiker.

The area by the very nature of its size and geological structure would make a thorough and systematic exploration very prolonged. The horizontal strata of the limestone beds has produced a deeply dissected clint zone with faulting on the southeast side of the hill resulting in a vertical limestone outcrop of approximately 50 m.

Exploration was further hindered by the very dense thorn and dwarf oak scrub, which has somehow managed to gain a foothold in the depressions and cracks etched out of the limestone basement.

The first cave visited was an earlier discovery found by Madeleine on a previous visit to the 'Trou des Trois Sœurs', and its position can be most easily found by continuing westward, along the back of the ridge from the 'Trou des Trois Sœurs' until a large depression can be seen in the ground a few kilometres away.

Access down to this depression can be made with difficulty (and even more difficulty if one carries a 300 foot rope) until a large shakehole presents itself. Continuing towards the deepest point in the shakehole, an open shaft approximately 2 x 2 m was found and descent made on the 300 foot rope using a reverse pursik technique. Abseiling was not used due to

the possibility of running out of rope (optimism?). Descent was terminated at 24 m by a boulder choke filling the shaft. The pothole was surveyed on exit but due to the unstable position of the survey point, not a great deal of accuracy can be attached to this.

Another shaft higher in the shakehole was investigated but this was found to be even shallower (11 m) than the first discovery and similarly blocked with large boulders. A spectacular view from the bottom showed that the entrance was in fact very wide (10 m), but its apparent smallness on the surface was due to large boulders suspended in the entrance and to which the rope was belayed.

A further shaft was discovered on our way back up the hill and upon first examination appeared to be very deep. The shaft was descended to an estimated depth of 50 m, but again was found to be blocked with boulders. The walls were smooth and had a constant small cross-section (1½ m x 1½ m). Some difficulty was experienced on the way out due to stretch in the long rope runout, and one jumar jamming.

If the shafts discovered in the very limited area are representative of other potholes to be found there, they appear to offer very little hope for discovery of large systems. The blockage of all the potholes with large boulders has been the result of collapse after the era of vadose and solutional activity.

It is possible that a more extensive survey of the area might yield more productive results, but the difficult nature of the terrain makes a complete investigation difficult.

22. Towards the end of our stay in the Middle Atlas, after the surveying of the Trou d'Anaffed had been completed, Paul and others were spending their time exploring the numerous shafts which were discovered in the limestone outcrop behind the camp site at Bab Bou Idir. However, these were proving to have been long since dead. The obvious reason for this being their elevated situation which resulted in a very small catchment area and hence only a minimal flow of water.

It seemed likely that the place to be exploring should be situated in a similar manner to the Chiker, i.e. where the rocky outcrop comes down to meet the central plateau. Here, all the water falling on the hills converges forming sizeable streams which then find their way down through the plateau to the water table. Such streams would be easily traceable to their sinks in countryside with very little vegetation.

Thinking along these lines, we set out one afternoon in the direction of the 'shower' and continued down the hillside onto the plateau for a distance of about 2 miles, making numerous diversions to investigate green outcrops and to avoid native dogs. We eventually arrived at what appeared to be a small 'garden' which turned out to be a spring in a dry stream bed used to irrigate a patch of land. The stream bed was followed downhill for a hundred metres until it ended in a funnel 7 m deep, exposing the bedrock. The bedrock was polished limestone and down through this was a very tight vertical shaft. Having lit a carbide lamp, Mike poked his head down the shaft. His lamp immediately fell off and landed about 5 m down, illuminating a passage off to the right. As we were short of lamps, Mike felt committed to retrieve the lamp and so squeezed down the shaft. After a little struggle he found the lamp in a small chamber and then continued on down a passage. This passage was circular; about 60 cm across and sloping down. After 3 m and a sharp right-hand bend, the passage abruptly opened into a rift about 5 m deep. Having negotiated the rift (he fell down it), he discovered that the same pattern repeated itself. Lacking a rope, and with poor light, he decided to retreat and 15 minutes and a few scrapes later, returned to the tunnel. The entrance shaft was a bit awkward and required a half-mantelshelf-swing-onto-a-ledge-and-thrutch technique to reverse.

The next day Mike returned with a rope, a Steve (or was it a Steve and Rope – one of the two has a frayed and frizzy end), and soon passed the second rift finding the cave to be a series of 5 m drops down successive levels and as there were many choices of route, they took the obvious downward one, marking the return route. After eight such levels, the passage became extremely muddy. The nature of the rock also changed from good, polished limestone to brittle, abrasive rock. It was here that they realized the cave was not a virgin as, perched on a small ledge, were two U2 torch batteries.

After a lot of thrutching around in the mud, Mike came upon a mud sump. An effort was made to by-pass this but in such a maze and with only two in the party, they decided the risk of getting lost was too great. They 'decided' to make a 'leisurely' exit and, if possible, to return with a larger party to explore the obviously extensive system. This was unfortunately never realized as we all set off for the High Atlas the next day.

We were later informed by our friend and guide, Rami, that some English expedition had been down the cave the previous year. We wonder who they could have been. In fact, Dave reported that the cave had been explored by S.U.S.S.; George Mitchell being most active in this exploration. S.U.S.S. also had to leave the area before completing exploration

but subsequent Sheffield expeditions may well have made a further investigation.

23. About 4 km on the road to Taza from Bab Bou Idir we left the van and walked up a track for about 20 minutes. The entrance was quite large and led into a series of chambers which were obviously used as shelter by humans and animals. A large lake stopped casual exploration but was easily traversed using stalagmites and stalactites as hand holes. The passages were quite large; generally about 150 metres, there being a division into two passages, both with mud floors after about 60 metres. Just before this division, there is a large aven with a boulder pile on the floor beneath it. This looked interesting but would require maypoling. The two passages both choked up with mud at the end.

There was ample evidence of previous exploration by a caving party; spent carbide, reflective tape etc. and the legend 'CHENAF 15-6-58 SCR' was written on the wall.

The cave was well decorated with flowstone and stalagmites and stalactites, and the lake was of beautiful crystal clear water and quite deep.

24. The second cave shown to us by the shopkeeper was a short walk up a track just opposite the old mine workings.

This consisted of an open rift-like entrance pitch of 8 metres. At the bottom, a passage led off to the left. After 15 m of walking, a climb over a deep sump led to a streamway. The streamway disappeared into boulders after about 15 m in a chamber reminiscent of the far reaches of the Chiker. Very large mud-coated boulders were strewn around the chamber making progress difficult and dangerous. After 30 metres of this, there was a pitch, probably about 15 m but the top cannot be seen as a very slippery, steep slope leads to it. At the bottom, running water could be heard; probably the reappearance of the stream.

The roof is very high and there are several places where one could climb up to possible inlets.

This is a very interesting cave with possibilities of extension. No evidence was found of previous exploration although this would be expected as the cave is easily found and quite near the road.

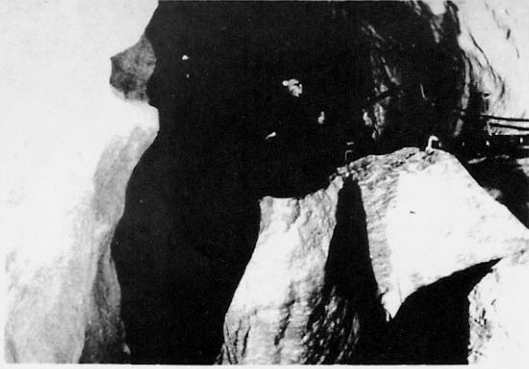
25. GORGES DU TODRA

A very narrow winding gorge, nearly 200 metres high with a stream resurging halfway along.

We had to ford the river several times until we arrived at the resurgence where there was a tourist café. Paul, Mike and Rami climbed up to a cave entrance in the side of the gorge but could not see anything without lights. We drove several kilometres out of the gorge and camped on a piece of cultivated land on the other side of the dry riverbed. Unfortunately, it rained heavily during the night, flooding our camp site. When we awoke, it was to find the previously dry riverbed a raging torrent which we had to ford with all our equipment, under stares of many locals. We abandoned the area somewhat damp and embarrassed.

The area looked very promising with a large resurgence, unfortunately bricked-up, and several cave entrances in the gorge side. This would repay further exploration. A four-wheel drive vehicle would be useful as the road is very poor beyond the tourist café. A route through the mountains to the Gorges du Dades would then be possible.

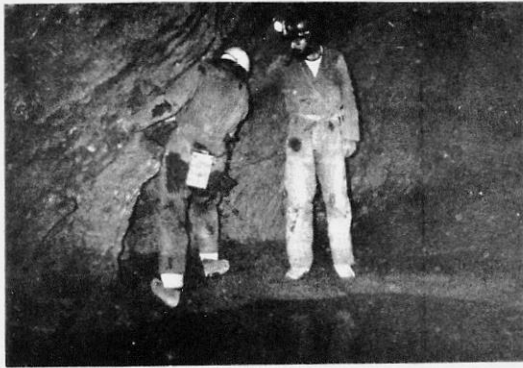
PLATE 5.



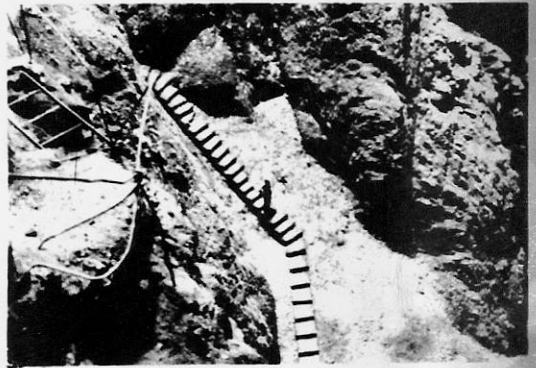
1. The "Cat Walk" in the entrance series of the Chikker.



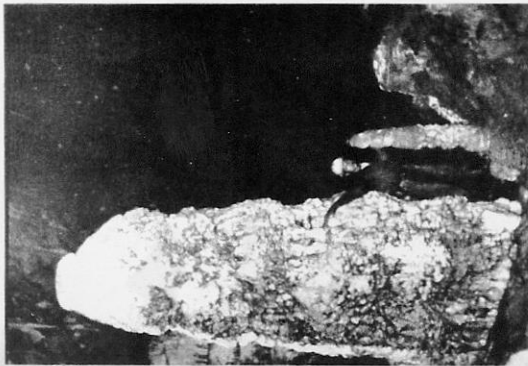
2. The Chikker Dyer from the hill above Bab Bou Idir.



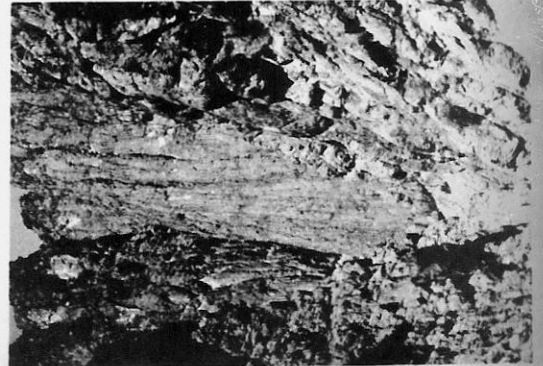
4. Negotiating the gour pools in the Friouato.



4. The top few steps on the boulder slope of the Friouato entrance chamber.

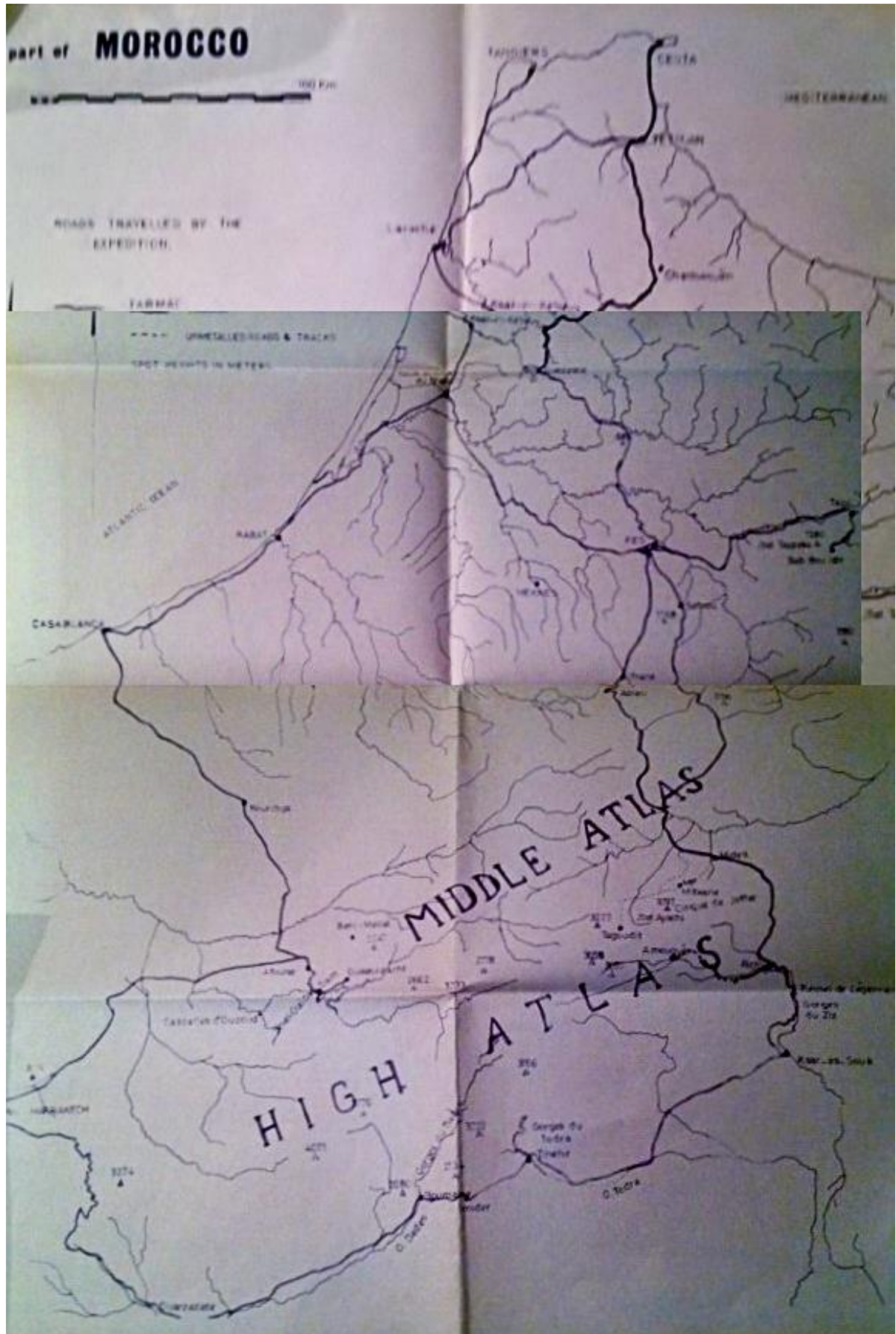


5. Vertical. Decorations in the downstream series of the Chikker.



6. Vertical. The sheer Todra Gorge continues round to the left through apparent solid

Maps of Morocco



ACKNOWLEDGEMENTS

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- Reckitt & Coleman
- Nicholas Products Ltd.
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- W.B. Pharmaceuticals Ltd.
- Imperial Chemical Industries Ltd.
- Burroughs Wellcome & Co.
- Stokes & Dalton Ltd.
- The Ryvita Co. Ltd.

INDEX TO MAPS, SURVEYS AND PHOTOGRAPHS

Maps

- Map of Mitkane area
- Map of Bab Bou Idir area
- Map of Morocco

Surveys

- Kahaf Umal Amanjum Althalatha
- Jfre ou Tagouilelt
- Jfre ou Drasse
- Trou d'Anaffed (2 sheets)
- Trou des Trois Sœurs
- Caverns of the Chiker Basin

Photographs

1. Trou d'Anaffed
2. Trou d'Anaffed
3. Taza area
4. Mitkane area
5. Taza area