UNIVERSITY OF BRISTOL SPELAEOLOGICAL SOCIETY EXPEDITION TO YUGOSLAVIA 1972

By

A. G. WILKINS AND C. A. SELF

CONTENTS

PERSONNEL

The ten expedition members were as follows:

Adrian G. Wilkins	expedition leader
Julian D. Walford	treasurer
Antony Boycott	secretary
Aldwyn J. R. Cooper	quartermaster
Martin J. Grinsted	photographer
Stephen E. C. Warr	asst. photographer
Charles A. Self	geologist
Graham J. Mullan	tacklemaster
Robert A. Churcher	
Nick Dallman	

All were students or postgraduates at Bristol University in 1972, and members of the University of Bristol Speleological Society. In addition, AGW, JDW and RAC were qualified members of the Cave Diving Group (Somerset Section), and AB and AJRC were trainees in the same organisation.

INTRODUCTION

The UBSS annual summer expedition in 1972, was diverted away from its traditional hunting ground to North Yugoslavia. The expedition covered four weeks, from 20 July to 16 August inclusive of travelling.

The usual traumas of pre-expeditionary planning were met, but most arrangements were settled in good time. Considerable alarm was generated when the UBSS tackle was checked three months prior to departure. It was found that a great deal of ladder had been stolen from the UBSS premises, and that much of the remainder was in an appalling condition. Funds were obtained (p. 247) and there followed three months intense activity in ladder manufacture. The last items of expedition tackle were in fact only completed 5 minutes before departure!

Physical fitness and prusiking ability were laid down as requirements for all expedition members, and to this end several intensive weekends in Yorkshire were arranged. The wisdom of such a policy was well manifest, though we were to learn that 65m Yorkshire pitches are poor practice for 200m Yugoslavia potholes. Ladder practice over the edge of Bristol's Avon Gorge became a common activity in the weeks before departure, once accompanied by a camera team from the local television company. The popular media were also involved when, due to a mix-up by the University Information Service, the press and radio reported that we were attempting to break the world depth record in Yugoslavia. The confusion had arisen because P. A. Standing was representing the UBSS on the British Expedition to Ghar Parau in Iran —which really was a depth record attempt, though this expedition had no connection with our own.

One of the hardest problems was to arrange an expedition programme. It was our desire to be involved in some original work in Slovenia, in addition to "tourist" trips round the major cave systems. Guide books written in English are virtually non-existent, and our Slovene contacts seemed reluctant to divulge any information. The only publications of any use are the Handbook to the 4th International Speleological Congress (1965); occasional papers written in English in *Nase Jama*—the publication of the Cave Exploration Society of Slovenia, and various club expedition reports including the Chelsea Speleological Society Expedition to Trigulav Pothole, the Queen Mary College Caving Club 1971 expedition, and various others which tend to be more like logbooks than guidelines to caving in Yugoslavia. The information problem was not finally solved until after over a week in Slovenia when we were befriended by Mitja Strukelj (known as "Kent") of the Jamarski Klub Ljubljana Matica (JKLM) and who speaks almost perfect English.

Maps of Slovenia are a headache even to the Slovenians. The only topographical maps suitable for detailed surface surveying are a series of 1:25000 Italian maps dating from the first world war, or at best 1936. Contour information is very often incomplete, roads have been rebuilt, forests planted, and Italian names changed to Slovene since the maps were published. Moreover the grid reference origin seems to be unique to each map, and thus the grid references given in this report are somewhat arbitrary.

Our arrival in Yugoslavia was greeted with much amusement from the populace, as our minibus was inscribed "Bristol" and many of us were wearing "Bristol" T-shirts. It was not until later that we learnt the "Bristol" is a Slovene brand of "toilet-paper". Why ten mad Englishmen wanted to advertise a foreign toilet paper by their underground exploits they could not imagine!

Our 25 days in Yugoslavia were geographically divided into three sections. Firstly we explored and toured many impressive caves in the low-lying basins between Postojna and Ljubljana. This district is referred to as the Menisija area. During this time we were based at a camp site at Vhrnika, (foreigners are not allowed to camp other than at recognised sites in Yugoslavia), which had, apart from a cheap bar, the added attractions of a swimming pool, football pitch, moles and mosquitoes. The second area we explored was a range of mountains southeast of Postojna known as the Javorniki. Here we were accommodated in an abandoned villa (but quite habitable) called Debeli Kamen. The roads here were unmetalled forestry tracks winding their way round enormous dolinas, providing ample opportunity for the various drivers to demonstrate, (to the terror of the passengers), their cornering abilities in the minibus. The forests were dotted with open shafts, three of which descended 200m in one drop. Although usually only one man was sent to the bottom of these, the whole party was involved in tackle hauling, rope coiling, and exploration round about. Lastly a week was spent in the Julian Alps exploring the Kriski Podi—a high altitude karst plateau—where all members acquired magnificent tans in the blistering sunshine.

The full activities are recorded in the appropriate sections of this report. The major original caving work accomplished, in the Javorniki and Kriski Podi, is given in separate sections. Minor discoveries in Najdena Jama, etc. are discussed in the Logbook.

ACKNOWLEDGEMENTS

Mounting the expedition was initially made possible by an exceedingly generous grant from the University of Bristol Expeditions Society, amounting to over one quarter of the whole budget. In addition eight of the ten members were recipients of travelling awards from the Knowlson Trust.

The University of Bristol Students Union gave a large grant of £240 to the UBSS to bring the standard and quantity of its caving tackle up to the requirements of the expedition.

Several local and national companies donated generous, in some cases vast, supplies of their products, which were instrumental in considerably lowering our budget. We would like to express our thanks and appreciation to the following:—

Allinson Ltd
Brooke Bond Oxo Ltd
Gateway Foodmarkets Ltd
Unilever Export Ltd
Tate & Lyle Refineries Ltd
H. Huntriss & Son Ltd
Weetabix Ltd
Procter & Gamble Ltd
G. Costa & Co Ltd
Imperial Chemical Industries Ltd
Joseph Heap & Sons Ltd
Bryant & May Ltd

These companies were all offered free advertising space in this report. Many other British companies offered substantial discounts.

Dr. Jan Swallow and the sisters at the University Students Health Service kindly gave a crash course in first aid and rudimentary medicine, and ensured that our first aid kit carried everything that could conceivably become necessary.

The amateur Radio Society at Brunel University lent the expedition a Honda generator for a month free of charge, and Mr. Clive Neville of the Education Department of Brunel University loaned much of the photographic gear.

In Yugoslavia we were entertained by the Jamarski Klub Ljubljana Matica, under the leadership of Mr. France Sustersic, to whom pre- and post-expeditionary correspondence was directed. We are most grateful to our two guides Daniel Rojsek and Mitja Strukelj for their cheerful company and assistance. Our thanks are especially due to the Slovenian Alpine Club (Planinsko Drustvo Radoljca) for permission to stay at their hostels, and to the warden and his wife at the Pogacnikov Dom on Kriski Podi for their warm welcome and extraordinary hospitality.

Thanks are also due to Art and Peg Palmer of the Department of Earth Sciences, New York State University, for useful discussions on the hydrology of Najdena Jama, and for their sherparing support in the same cave.

Mr. John Chatterton (Queen Mary College, London), Dr. Malcolm Newson, Roy Musgrove (Chelsea Speleological Society), and the Cave Research Group gave much helpful advice.

TRAVEL REPORT

The suitability of a Ford Transit minibus for caving expeditions had already been shown by numerous excursions in Britain, and it was decided to hire such a vehicle locally. Only one company was located which was willing to hire a minibus for European use, and kindly agreed to order a new vehicle to coincide with our expedition. When we received it it had been fully run-in with only 500 miles on the clock, and had been completely serviced, and was therefore about the most reliable vehicle an expedition could hope to acquire.

Fully comprehensive insurance was arranged for three drivers (AGW, MJG, JDW) through an insurance group in Belgium. No British insurer was willing to take the risk!

Three of the twelve seats were removed to provide storage space for equipment. Whilst touring in Yugoslavia the tenth expedition member had to sit on the first-aid box, but the long journey across Europe did not require such discomfort. Only seven members travelled in the minibus on the outward journey. This enabled us to transport our entire consignment of foodstuffs from various donating companies in the minibus, and by doing so save a great deal more money than was paid in extra fares for the other three. On the return journey nine members travelled in the minibus, as one wished to stay in Yugoslavia for a further period of time. His air flight was reimbursed.

The adaptability of the Transit to rough forestry tracks, steep alpine passes, and long-distance high-speed autobahns was well demonstrated. In the Alps fuel consumption for the vehicle laden to capacity was under 8 m.p.g., but overall 4,433 miles were covered for 218 gallons, giving an overall average of 20.3 m.p.g. There were no accidents and only one breakdown; this occured on the homeward journey in southeast London when three out of five wheel bolts sheared, thus losing a rear wheel. Fortunately, one member's parents lived nearby. They kindly afforded us shelter for the night while spares were located and fitted by ourselves on the spot.

The total transport budget of nearly £350 (i.e. £35 per person) seems quite a large sum. The hire of the miniuus accounted for a high proportion of this, but at 0.8 pence per person per mile it is hard to conceive of any cheaper methods of transport for an expedition of this size.

CATERING REPORT

The expedition was largely self catering. Cooking for ten or eleven persons on petrol stoves required some degree of organisation; only one man was in command—the quartermaster. Shopping, a weekly activity at the local supermarkets, required more sherpas than a diving trip underground as 200 man-meals weigh several hundred pounds. In general the standard of eating was kept high in order to maintain (or improve) stamina and health. Breakfast of mixed cereals for the entire trip came entirely from donated supplies; only lunch (portable) and supper were bought, at a cost of about 50p per person. This was supplemented by various extras, such as chocolate for caving, and a bottle of Pivo (Slovene beer) for morale. Personal funds supplied the majority of beer money which reached staggering proportions.

Some meals were taken at cafes and hostels for convenience, either when travelling long distances, or when walking in the Alps.

MEDICAL REPORT

Fortunately the expedition sustained no major injuries, and illness was restricted to 'continental tummy'. Some members were not affected by the latter at all, most suffered mildly, two had symptoms lasting 10 days. Initially Kaolin and Morphine were given, Thalazole tablets being used additionally after four days persistent trouble.

Wounds, inevitable in some Slovene caves, were bathed in antiseptic and dressed variously. There was found to be no cure for gnat and mosquito bites, though "Flypel" kept the brutes off in the first instance. The expedition made short work of 48 tubes of repellant, which came from ICI, in 10 days; future expeditions of this size and duration are advised to double or triple this quantity.

PHOTOGRAPHY REPORT

By Martin Grinsted

The main objectives of the photographic side of the expedition were as follows: firstly to obtain an extensive collection of slides and photos illustrating the activities of the expedition, both underground and on the surface; secondly to depict the types of entrances, passages and formations present in the caves visited; and thirdly to obtain a photographic record of the surface features of the Kriski Podi plateau and surrounding area.

The expedition was well endowed with photographic equipment. Most photographs were taken using an EXA 500 camera with very good results. It was decided to use mainly Kodak High Speed Ektachrome (160 ASA) film because of its adaptability to both underground and surface photography. Kodak Tri-X Pan (400 ASA) was also used underground to provide some material for publication, and to ensure that the larger Slovenian caves would be adequately photographed. The guide numbers used were calculated before the expedition for average cave conditions (*e.g.* 35 m and 65 m for ASA 160 and 400 respectively). Corrections of a stop or two were estimated as appropriate for each photograph. Overall a 50% success rate was achieved for underground shots.

Of the various photographic techniques tried on the expedition perhaps the most successful was that of using a flash directed at but positioned behind the subject when photographing ice formations. Another technique utilised with success was to use two or even three cameras simultaneously when taking multiple-flash photographs of large passages.

All three objectives were achieved; Najdena Jama, Krisna Jama, and Razor cave no. 3774 were extensively photographed.

TACKLE REPORT

Lighting: The necessity of providing electric lighting for the divers allowed us all to use NiFe cells for the whole expedition. These were kept charged by a portable Honda generator, petrol driven, lent to us. A home-made "string and sealing wax" multiple rheostat enabled up to nine batteries to be charged at once, usually overnight at a good distance from the tents. Except on Kriski Podi, carbide lamps were used purely as reserve lighting, though in common with most continental cavers, the Slovenes carry waist-mounted "Berger" carbides which produce a most impressive flame for about twenty hours.

Diving: Standard British cave diving gear was taken and used. Six 40 or 45 cu.ft. cylinders and two-stage valves were deemed sufficient for the diving team; half of this equipment was loaned by the CDG, the remainder was personally owned. One thousand feet of expendable line was entirely used in only three dives. Yugoslavian sumps are of huge dimensions, frighteningly so in fact, and the light delivered by a NiFe cell was usually found to be insufficient. Battery-powered beam-guns should be considered a must by future visiting divers.

Protective clothing: Wet-suits were worn by all members for the entire expedition except the high alpine work. Yugoslavians regard neoprene as a luxury not to be enjoyed, and this leads to a marked phobia of water. In fact many of their explorations stop when water depth reaches 1 metre. The intensity of caving in the first couple of weeks meant that some wet-suits were practically wrecked. On Kriski Podi nylon boilersuits were worn over normal clothes, and some people preferred this dress on the Javorniki too.

Potholing tackle: 800 ft. of wire ladder (10-inch spacing between rungs, and in 25-ft. lengths), along with 800 ft. $1\frac{1}{4}$-inch circ. Ulstron rope in various lengths as life-lines, formed the standard tackle. In addition abseiling and prusiking equipment was added: two 500-ft. lengths of 8-strand platted polyester rope, diameter $1\frac{1}{4}$ inches: this material and method of construction give a rope of low elasticity, a factor causing difficulty on long lengths of kernmantle rope, and no tendency to spin, unlike hawser-laid ropes; "figure-of-eight" descenders and various prusiking devices completed the tackle. In the Javorniki district, the wisdom of this decision was demonstrated on several occasions. It is doubtful whether any member of the party could have climbed over 600 ft. on ladder without a great deal of assistance from above. Yet even the less experienced found no difficulty in prusiking this distance. The tackling and detackling time is greatly reduced, as is the effort required.

For pitches over 150 m, two (sometimes three) ropes were knotted together by a double fisherman's. This imposed minor difficulties in abseiling: the caver had to stop three feet above the knot, transfer to jumars, reverse prusik over the knot, transfer back to descendeur and continue. This manoeuvre was delicate, nerve-wracking and time wasting. A large figure-of-eight, such as that manufactured by Clog, would allow the knot to pass through the descendeur; unfortunately most of us owned homemade versions which were smaller and flatter. Their less uniform section did however give a more controllable descent, especially when locking the rope.

A comparison of the Jumar and Clog prusikers is relevant here, as both makes were used. The Jumars, although very much more expensive, were by far the superior: they are easy to manipulate on and off the rope (e.g. past a knot), as there is no need to remove the karabiner attaching the device to one's body, and for this reason they are also safer; they have no tendency to jam (the Clog was particularly bad in this respect), either open (which is positively frightening) or closed (which is a sheer nuisance); the Jumar also slides up more smoothly than the Clog, thus using less effort and losing less patience; in ice caves the Clog had a tendency to ice up, a feature not shared by the Jumar.Short lengths of tape should be attached to both ends of the Jumar, not karabiners. Direct attachment of a karabiner can result in fouling the gate and locking it half-open, whence the device will cease to function. As an additional safeguard the harness should clip loosely into one footloop.

The most popular system employed in prusiking was to use three Jumars: one atached to both sit-sling and chest harness which runs on its own accord, and the other two hand-manipulated with foot-loops. Some persons preferred only two Jumars, dispensing with one of the foot-loops. These systems were probably not the fastest, but were least tiring and allowed resting in as much comfort as the harness allowed—

both essentials on long pitches. They also have a high safety factor built-in, in that one's body is permanently attached to at least one device.

Due to the finite time involved in each member of the party attaching prusikers to the rope, such techniques are only deemed useful on pitches longer than 30 m. At all other times ladder is still recommended.

FINANCIAL REPORT

By

JULIAN WALFORD

EXPENDITURE

	£ p	£ p	Notes
Transport:			
Minibus hire	150 00		
Insurance ...	40 00		
Hovercraft ...	39 50		
Fares ...	43 50		A
Petrol:			
England ...	9 55		
Belgium ...	9 00		
W. Germany	24 50		
Austria ...	6 20		
Yugoslavia ...	27 25		
		349 50	
Living expenses (Yugoslavia);			
Meals bought	21 75		B
Self-catering	180 30		C
Sundry expenses (camp site and hostel fees) ...	29 40		
		231 45	
Stock food purchased in England		12 79	D
Personal insurance ...		15 00	
Insurance of equipment ...		20 00	
Expendable tackle and equipment		25 35	E
Photographic items ...		28 46	F
Medical supplies		3 55	
Postages and stationery ...		4 10	
Expedition report ...		60 00	G
		750 20	H
Balance of income over expenditure		1 80	
		752 00	

INCOME

	£ p	Notes
Personal contributions ...	360 00	I
Grant from Expeditions Society	200 00	
Knowlson Awards ...	120 00	J
Donations	72 00	
TOTAL ...	752 00	

NOTES

A. Fares are made up as follows:
2 train fares from London to Ljubljana
1 train fare from Cortina to Ljubljana
1 air flight from Ljubljana to London (see Travel report).

B. Two main meals were taken at Yugoslavian hostels, and light snacks whilst travelling.

C. Even including a modest beer allowance, the cost of 230 man day meals was only 75p per head per day. Actual beer consumption (personal funds) exceeded this by about £120, i.e. 800 litres!

D. Various items thought unobtainable in Slovenia were bought prior to the expedition in England.

E. This is only for items bought which were expendable, such as diving line (left *in situ*), boot dubbin, compressed air, generator fuel, etc.

F. Includes processing charges back in England.

G. To UBSS as part cost of producing the report in "Proceedings of the UBSS".

H. Total budget was £75 per person for one month. This figure compares very favourably indeed to budgets of other recent overseas expeditions.

I. A personal contribution of £36 from each member was just under half the cost.

J. Although these awards were made to individuals, they were pooled to facilitate handling, exchange, etc.

GEOLOGY

Geology of the Dinaric Alps in Slovenia

The Alpine-Himalayan orogenic belt was formed by the northward drift of the continents of Africa and India against the continental mass of Eurasia. The geosynclines of the Tethys Sea were subjected to lateral pressure, and the result of this is today seen as a high mountain chain with complex internal structure.

The core of the mountain chain constituting the Alps lies a little south of Villach (in Austria) and runs in an east-west line, the Gailtal Line. To the north of this line lies the Eastern Alps, with northward facing nappes and folds. To the south lie the southern Alps, with south facing tectonic structures. The Southern Alps pass into the Dinaric Alps of Yugoslavia with no major difference of facies. The Dinaric structures face the Adriatic Sea with a north-west/south-east axial orientation, known as the Dinaric Trend. The Gailtal Line not only separates north and south facing tectonic structures, but the facies themselves are very different, not only in rock type, but also in thickness deposited. Thus the limestones in which Swiss and Austrian caves are situated are very different from those of Italy and Yugoslavia.

The rocks now comprising the southern and Dinaric Alps belong to a marginal geosyncline to the south of the Inner Pennine Belt, eugeosynclinal in its early stages as determined by the presence of igneous rocks of the ophiolitic suite—highly altered basic and ultra-basic intrusive and extrusive rocks—of Permian and Triassic ages. Eugeosynclines are defined as containing intermittent volcanic material; their lithology is usually of dark shales and flysch deposits—greywackes derived from turbidity currents and often showing graded bedding—are usually associated with vigorously eroded borderlands. The main part of the geosynclinal succession however is more characteristic of a

Miogeosyncline, being a Calc-Alpine facies of thick carbonate and reef-complex deposits; their lithology is of well-sorted sandstones, quartzites, limestones and dolomites. They are usually associated with stable lowland platforms. The closing stages of the geosyncline are represented by Eocene flysch deposits, and it is therefore impossible to class the sediments as either entirely *eu-* or *mio-* in form.

Key to Fig. 75

Legend

(blank)	Quaternary, and areas beyond the boundary of the survey
m1	Eocene
c2	Upper Cretaceous
c1	Lower Cretaceous
i3	Upper Jurassic
i1	Lower Jurassic
t3	Upper Triassic
t1	Lower and Middle Triassic
h2	Upper Carboniferous

Lithology of the Slovenian Succession

The oldest rocks in Slovenia are of Upper Carboniferous age, and belong to the Hercynian basement of the Alpine belt. They consist of predominantly clastic sediments, mica schists, sandstones and conglomerates with only minor limestone sequences. Associated with them are rocks of Permian age containing a much larger proportion of carbonates, but usually dolomitic.

The Permian however is not exposed in Slovenia. These late Palaeozoic sediments are impermeable and have considerable hydrological influence when in a suitable tectonic position. But in Slovenia these rocks are allochthonous, lying above Mesozoic carbonates, and so their hydrological importance is very limited.

The Triassic deposits are more extensively developed. Igneous rocks of granite porphyry composition occur in a few places, but they are relatively unimportant. The Lower Trias consists of sandy shales and sandstones, with some limestone and dolomite. It is generally impermeable and so forms a hydrological barrier.

In the Middle Trias limestones and dolomites predominate. They are widespread and several hundred metres thick. Having been tectonically disturbed, they are suitable for the development of all karstic features, and are the lowest true members of the Dinaric karst succession.

Clastic deposits are fairly rare in the Upper Trias, and are normally only present as thin flysch beds within the massive limestone and dolomite series. The Dachstein limestone alone is at least two thousand metres thick, and forms the massive limestone block of the Triglav Massif in the Julian Alps. In places the Lower and Middle Trias is unrepresented, and the Upper Trias lies unconformably on the Palaeozoic basement.

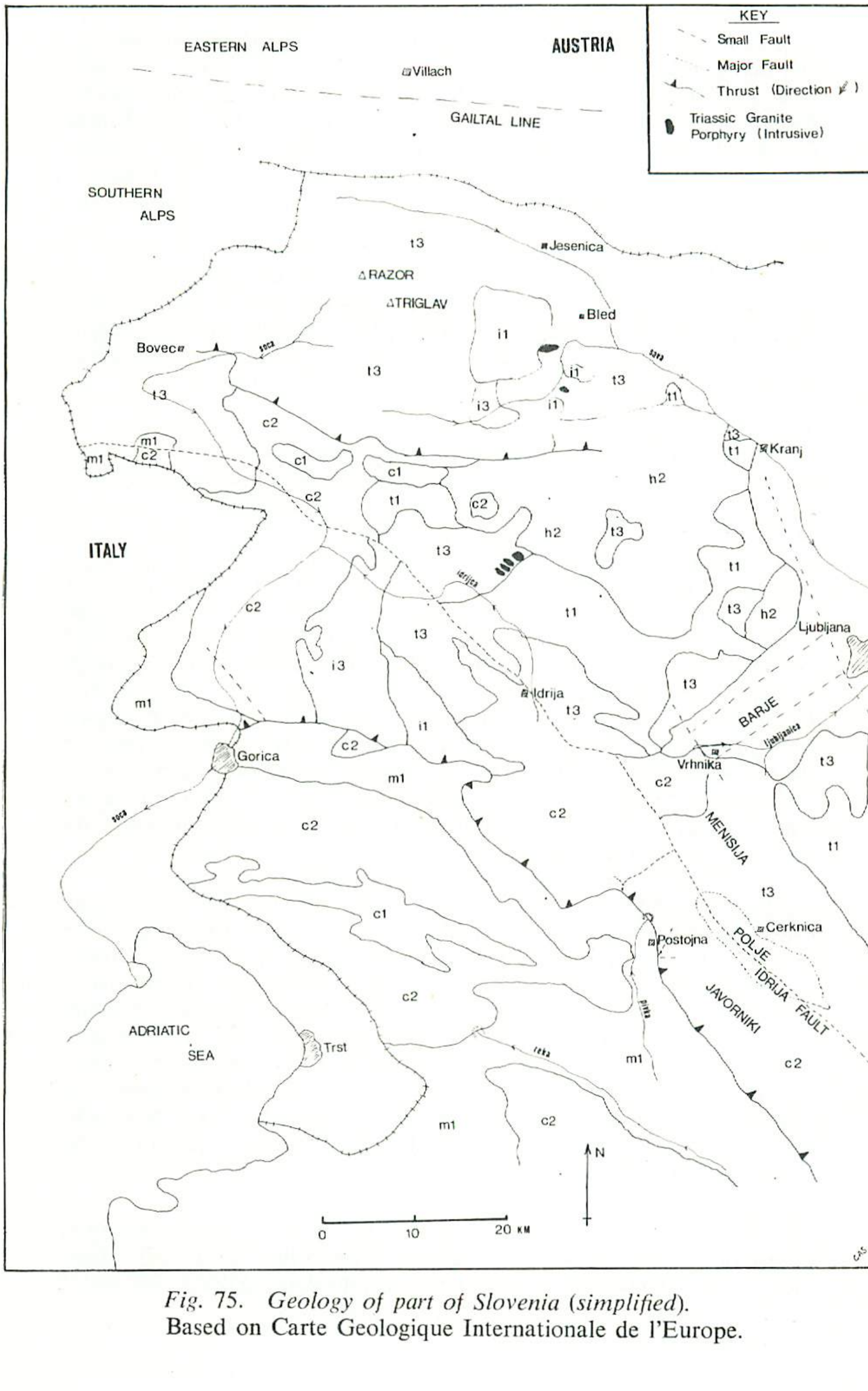


Fig. 75. Geology of part of Slovenia (simplified).
Based on Carte Geologique Internationale de l'Europe.

With the exception of a few thin marly elements, the Jurassic consists entirely of limestones and dolomites of total thickness between one and two thousand metres. The Lower Cretaceous is exclusively limestones and dolomites, and follows the Jurassic conformably in some places, though not in others. Unconformities also occur within the Lower Cretaceous, often evidenced by carbonate conglomerates and breccias. The Upper Cretaceous follows without interruption. A total thickness of between two and three thousand metres is estimated for the Cretaceous.

Bituminous limestones of Palaeozoic age are not represented in Slovenia. The final infilling occurred during the Eocene period with the deposition of flysch. The Alpine Orogeny followed, and the sediments were disturbed into the structures seen today. Since then the only depositional activity has been the infilling of karstic poljes and river valleys by Neocene and Quaternary clays and alluvium (Fig. 75).

The Effect of Geology on Cavern Development

The purity and exceptional thickness of the Mesozoic limestones in Slovenia, combined with a high annual rainfall (which is locally as much as 3000 mm/year), provide very favourable conditions for cavern development. In the district of the Javorniki mountains there are on average two sites of speleological interest per square kilometre (and the area is by no means fully explored yet), whilst in the Julian Alps there are small areas of true podi where it is impossible to walk in a straight line in any direction for more than a few paces due to the concentration of small potholes. However the geological succession contains large thicknesses of dolomite, in which cave development is very limited. The Carboniferous and Lower Trias, and in particular the Eocene flysch form hydrological barriers which have a major effect on the courses of the Slovenian river systems. Only where these rocks are exposed at the surface, as in the basin of Postojna, or when the hydrological base level has been reached, as in the Ljubljana Barje and in the Karstic poljes, do the rivers flow on the surface.

Passage cross-sections in limestone caves tend to be elliptical to subrectangular, with elongation in the direction of local dip (as is to be expected), but this is usually modified by minor collapse due to the presence of myriads of small joints which has made the rock very brittle compared with British limestones. On the surface, the dip is partly obscured by these joints which are almost random in both direction and inclination. Small faults are very common, and more than one is usually observed in each hundred metres of cave passage. The local dip changes considerably as each fault is crossed, so the relationship between dip and cave passage orientation is complex. Yugoslavian cave plans and sections usually contain local dip angles as a normal addition to the survey in their publications.

Hydrology

The hydrology of Slovenia is complex, incompletely understood, poorly documented, and thus we cannot hope to describe it fully. However in the Menisija, the hydrological connections between the major cave systems are well known, although many British cavers seem to tour these impressive river caves without realising the fact! A simplified map of the hydrology of this region is given in figure 76, though it must be emphasised that only 10 out of nearly 1000 sites have been marked.

EXPEDITION LOG

Thursday 20th July, 1972—main party left Bristol in minibus at 13.00 hours. Arrived in Ramsgate in good time for the hovercraft. Very smooth crossing to Calais, then started the slog across Europe. Driving was practically non-stop, except for filling with petrol etc, which is the great advantage of three drivers. Belgium, Germany and Austria were crossed, and the minibus drove over the Wurzenpass into Yugoslavia exactly 24 hours after leaving Calais.

Friday 21st July—camped for one night in a forest in the Velika Pisnica, near Kranjska Gora.

Saturday 22nd July—Up at 6 a.m., struck camp, and drove to Ljubljana to meet the other three expedition members at the station. Also contacted France Sustersic and Daniel Rojsek of the JKLM. Apparently our caving programme was to begin immediately, for we found ourselves driving to Logatec to descend Gradisnica (fig. 76(10)). Language difficulties led to our misunderstanding the size of this pot-hole; an entrance pitch of 80 m when all we expected was 18 m! Most of the party were immediately put off the descent, but AGW, JDW, MJG, CAS and Daniel went underground. A free hanging 80-m pitch turns into a steep canyon which cork-screws its way down to drop by a further 35-m pitch into the largest underground cavern one is ever likely to observe; our combined lights would not traverse one half of it. The river Unica flows through this chamber in flood, entering via a sump at one end. Camped night in a hay barn (by permission) in Laze.

Sunday 23rd July—Drove to Planinska Jama (fig. 76(8)), where all members changed into wetsuits. The entrance is a magnificent arch about six times larger than Porth-yr-Ogof in Wales, and with a tremendous river emerging. In the cave a short show-cave section leads to a junction where two rivers meet. The left branch carries the river Rak from Tkalca Jama, and is called Rakov Rov. Several cascades have to be passed upstream before a long canal section is reached. The upstream sump has been dived to an airbell, but there is difficulty finding a way on due to the large size of the passage. The right-hand branch, the Pivka Rov, carries the water from the Postojnska Jama systems and is much colder. An aerial walkway built during the war still exists for some of the way.

Monday 24th July—Collected France Susteric from Ljubljana, and drove past Postojna to Kacja Jama, the dolina Pisnik (about $\frac{1}{3}$ mile diameter), and 3 old show caves: Divaska Jama, Vilenica Jama, and Lipiska Jama. These are fossil, very finely decorated, and are part of the Skocjanska Jama hydrology.

Tuesday 25th July—A rest day in camp at Vhrnika to organise stores. Some members went off in search of a pitch for ladder practice.

Wednesday 26th July—The whole expedition, bar ND, joined by Art and Peg Palmer (two American cavers from New York), descended Najdena Jama (fig. 76(9)). Diving gear was carried into the cave as there were about 16 sumps, all undived (fig. 77). The first sump we chose was passed after 30 m by RAC, followed by AGW and JDW who explored. 180 m of new passage were found (fig. 78).

Thursday 27th July—All except AGW, CAS back down Najdena Jama. Yesterday's sump was redived and the extensions surveyed, and much of the rest of the cave explored. Only two more diving sites were chosen as looking promising. Much photography was accomplished.

Friday 28th July—Those still fit went to two show caves, Skocjanske Jama and Postojnska Jama. The former with its 100-m deep river gorge was infinitely more impressive than the railway and chandeliers in Postojnska Jama. Skocjanske Jama is the swallet for the river Reka (see fig. 75), and the resurgence is not until the sea 20 km northwest of Trieste.

Key to major caves

1.	Krisna Jama	6.	Pivka Jama
2.	Velika Karlovica	7.	Predjamska Jama
3.	Zelska Jama	8.	Planinska Jama
4.	Tkalca Jama	9.	Najdena Jama
5.	Postojnska Jama	10.	Gradisnica

Sat 29th July—Najdena Jama again. AGW dived the active streamway sump upstream for 40 m to an airbell, followed by JDW. At no time was either a left wall or a floor visible in the sump. Neither diver felt like continuing past the airbell due to acute underwater agrophobia.

Sunday 30th July—Najdena Jama again for some (JDW, RAC, AJRC, SECW, CAS). More diving kit was carried in, plus extra tackle to rig on the climbs near the big room. The sump that was dived had an attractive entrance pool. RAC and JDW both dived, but neither passed the 40 m mark as the line kept jamming in flakes on the right wall. However at the end of the dive mud banks were found, which may indicate open passage nearby. The party detackled the entire cave on the way out, making an 8 hour trip for some.

Meanwhile AGW and ND were exploring sites in Rakov Skocjan, namely Tkalca Jama and Zelske Jama. At the latter there are several interconnecting dolines about 50 m deep, an excellent site for abseil/prusik practice.

Monday 31st July—AGW, MJG, ND back to Tkalca Jama to explore a side pasage which (according to the JKLM) had not been entered before. The reason for this was soon apparent—a 2 m deep pool with strong current, 0.3 m of airspace. Non-wetsuited Yugoslavian cavers tend to turn back at such obstacles, but not us! Unfortunately the passage only went a further 18 m where it turned right and ended under

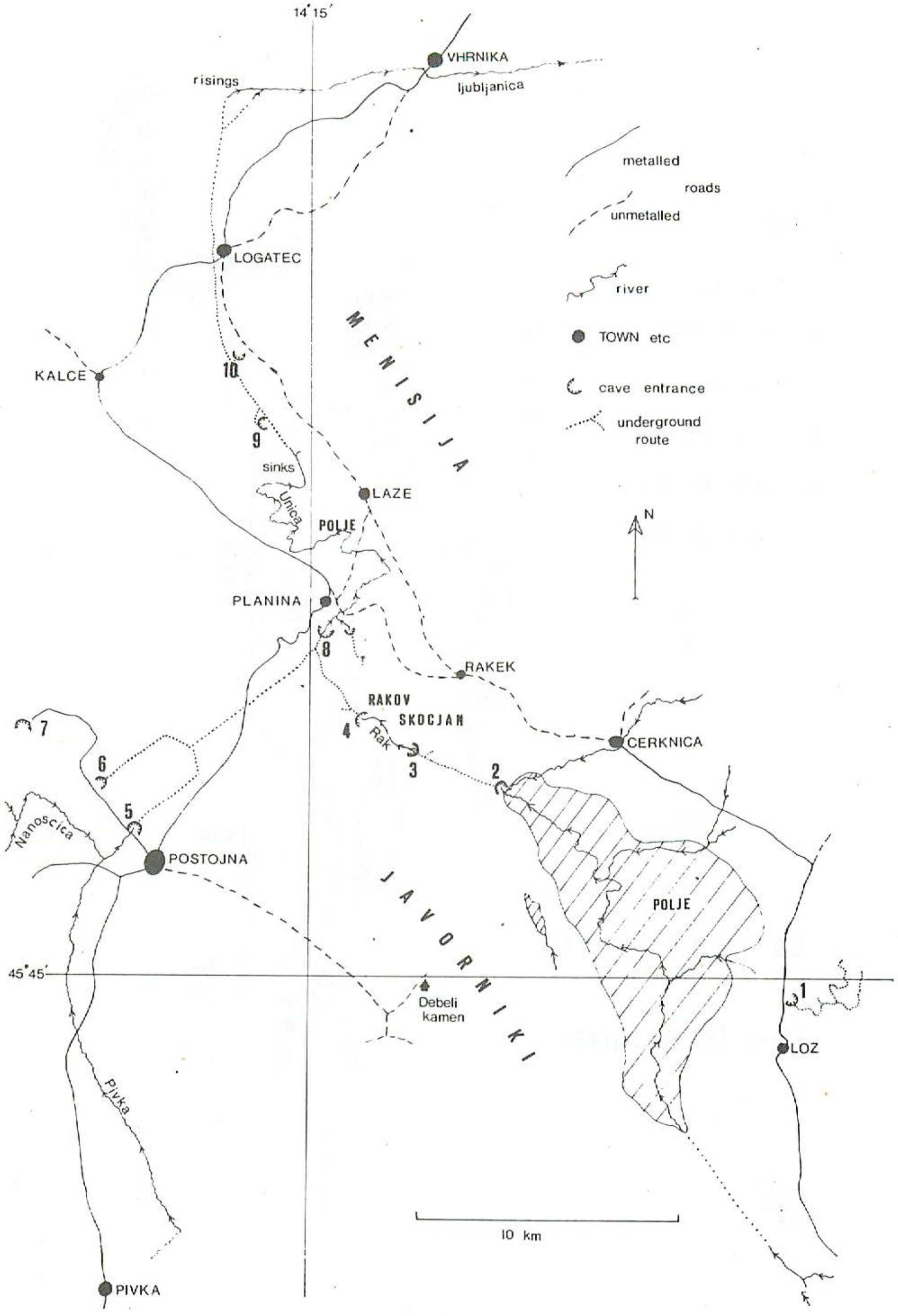


Fig. 76. Hydrology of the major water courses forming the source of the River Ljubljanica.

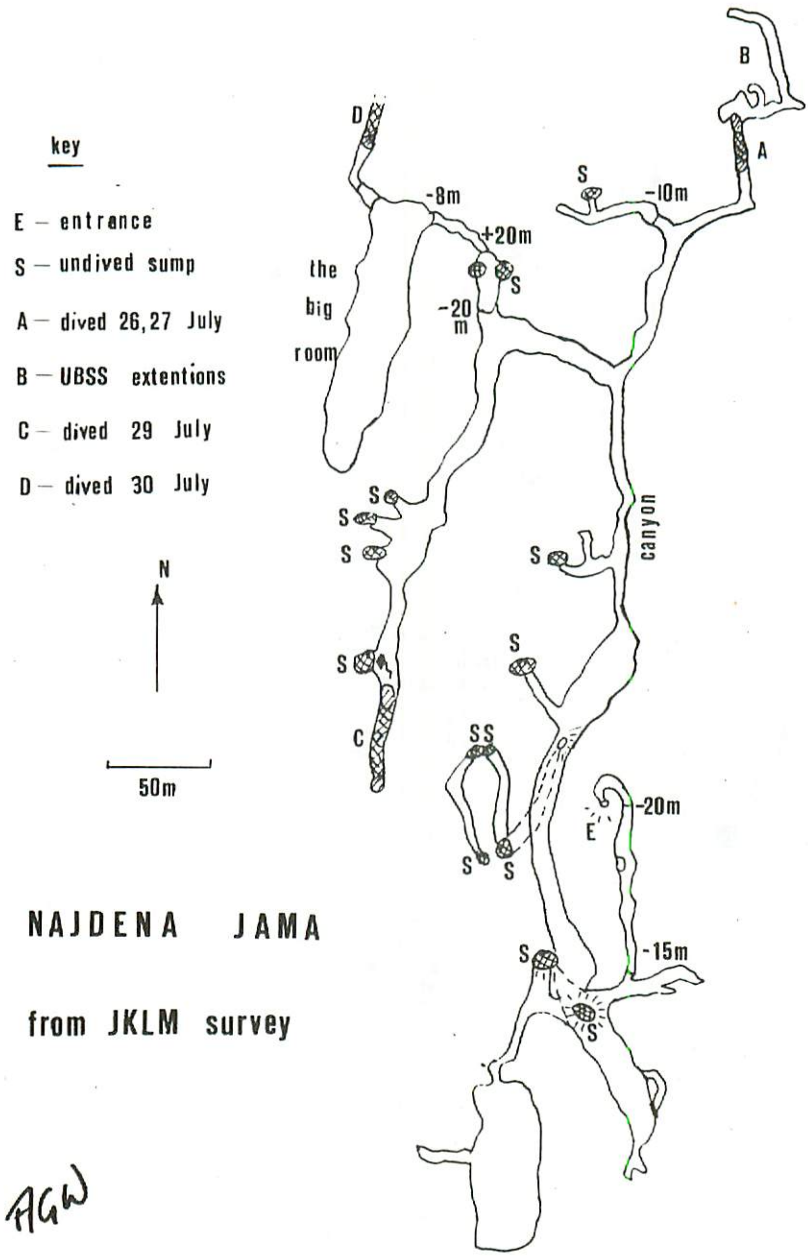
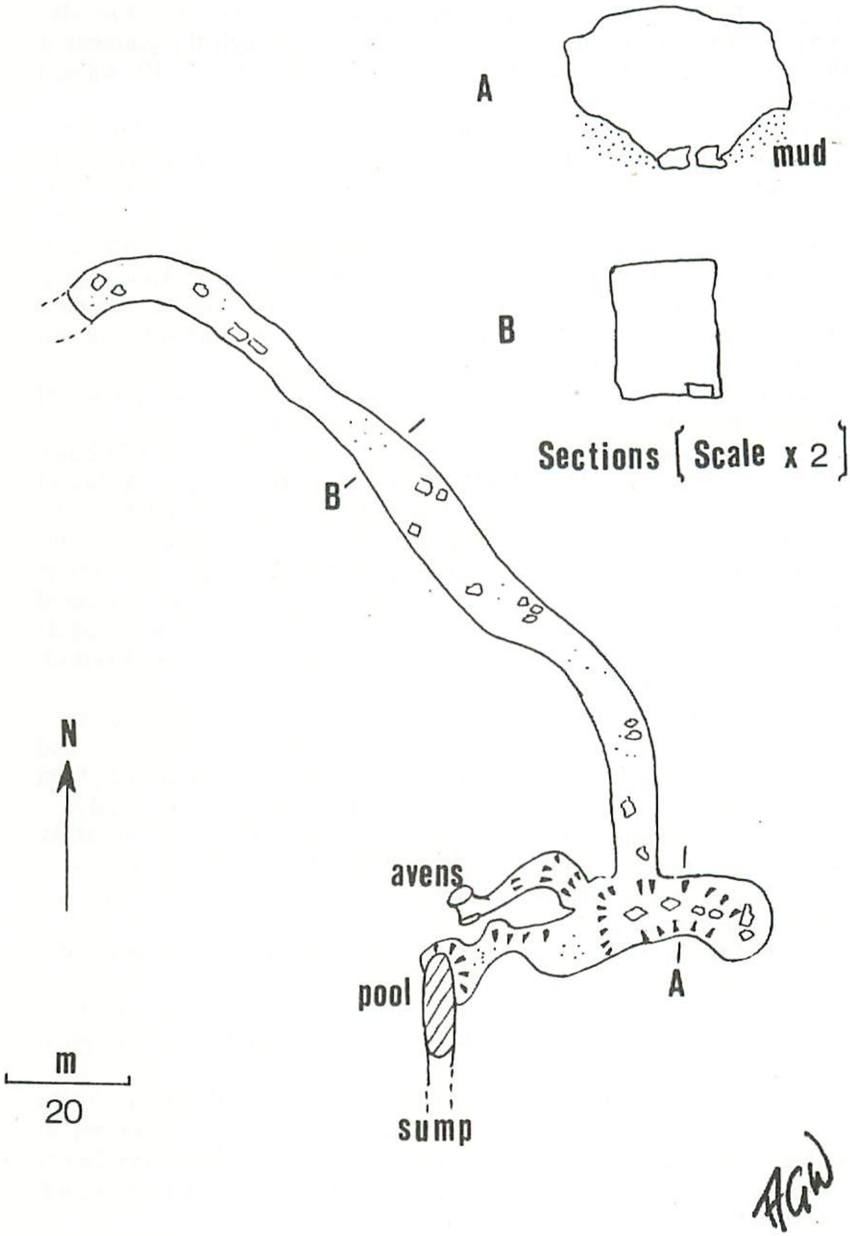

key
E – entrance
S – undived sump
A – dived 26, 27 July
B – UBSS extentions
C – dived 29 July
D – dived 30 July
N
50m
NAJDENA JAMA
from JKLM survey
AGW
B
A
D
S
-10m
-8m
+20m
the
big
room
S
-20
m
canyon
S
S
S
S
S
S
S
C
SS
-20m
E
S
S
-15m
S
S

Fig. 77



NAJDENA JAMA EXTENSIONS

Fig. 78

an aven. However the strong stream disappeared under the left wall. A short duck with 5 cm airspace was passed to a sump which would repay diving. A roped descent of the main streamway in the cave was also attempted but abandoned due to lack of time. Although the gradient is only a few degrees the flow rate is enormous (estimated at 10 cumecs) and swimming or wading impossible.

Tuesday 1st August—The whole expedition back to Tkalca Jama with all our ropes. The terminal sump, a frightening torrent flowing into a log and tree-trunk choke, was reached. Apparently later in the year the flow decreases and diving would be possible.

Wednesday 2nd August—Base camp was moved from Vhrnika to an abandoned villa in the Javorniki, called Debeli Kamen. After setting up home, several charted but unexplored caves were visited, namely: Jama pri Cesti (literally, Hole in the Road). Must claim world record for ease of access! Unfortunately it choked after 8 m.
Brezno pri Vojasnici (Pothole near the Barracks) which was laddered and abseiled to the bottom. See section on the Javorniki.

Thursday 3rd August—The whole party plus Mitja, Mare, France and some others from the JKLM drove up to Brezno pri Oglenicah (Charcoal-pile Pot). The JKLM had already descended this pot to the limit of their tackle without reaching the bottom of the first pitch. Our combined ladders were rigged and Rene descended—with walkie talkie and a team of eight lifelining. After 30 minutes descent it was gathered that he'd reached the bottom. His ascent took 45 minutes with assistance. Back on the surface it was announced that a second pitch led off which he had not descended, and that there was a waterfall entering the pitch after 70 m. As AGW was the only one with a wet-suit, he quickly changed, rigged the standard UBSS 260-m knotted rope (170 + 90), and abseiled down. The knot was passed by reverse jumaring and bottom reached at 190 m. After rebelaying, the second pitch was descended—14 m to a 2 m deep sump pool. There being no other way on AGW reascended, a process taking about 1 hour. The neoprene was very restricting and quite unnecessary, especially as the "waterfall" was no more than a steady drip!

Friday 4th August—Drove to Lescova Dolina (Dolina del Noccioli), to visit several cave sites, namely:
990: (GR 511508) 5 m deep and completely choked at the bottom.
989: (GR 513507) A total of 20 m depth, including a 17-m pitch (fig. 79).
1016: (GR 606489) Entrance again in the edge of the road; rocks dropped in bounced for a full 14 seconds before hitting the bottom. It was for CAS to descend this shaft, again on the standard UBSS 260-m knotted rope. The abseil and prusik took 40 minutes each. (See section on Javorniki).

The others meanwhile had found two new caves, and explored a third: No. 3566 at GR 607486 (fig: 79).

Saturday 5th August—The party to Tobacco Dolina in search of potholes. Only one was found and descended, 20 m deep. In retrospect this was probably the site coded 722 (GR 504648).

In the evening RAC found the much searched-for 719, only 200 m from where it was supposed to be. (GR 772666). It was 2 m long!

Sunday 6th August—We searched fruitlessly for several recorded caves around Pivka before abandoning the attempt. Back south at Leskova Dolina a friendly native lumberjack was encountered who volunteered to navigate us to a deep cave. The usual rocks thrown down took 8 seconds free fall to hit bottom. Unfortunately the standard UBSS rope had been left behind. AJRC abseiled down two shorter ropes (90 + 85 m) but found himself still dangling in space, so prusiked back up. Further lengths were added and JDW descended, reaching the bottom at 184 m.

Meanwhile a foraging party had found two more caves. See section on Javorniki.

Monday 7th August—The entire party descended Krisna Jama (fig. 76(1)). A very fine river cave with 24 lakes, many too deep to wade. Contrary to popular opinion rubber inflatable dinghies are not required if one has a wet-suit. A survey of this cave was published by the QMCCC 1971 expedition which explored several new extensions.

Tuesday 8th August—Last day in the Javorniki, and several parties were arranged. RAC set off with CAS (sherpa) to descend Brezno pri Oglenicah again, with the intention of diving the sump at the bottom (see 3rd August). Having lowered all the diving gear and reached the bottom himself, RAC found that the sump had dried up leaving a flat floor of calcited pebbles and not a drop of water in sight!

AB, MJG, SECW returned to Krisna Jama on a photographic trip. Many excellent photos were taken of the stalagmites at the junction of the main stream with the Blata Rov.

GJM, ND, JDW revisited Rakov Skocjan to explore Zelske Jama and practice yet more prusiking from the abseil arch.

AGW, AJRC and Mitja were meanwhile in Ljubljana on a mammoth shopping spree for the next section of our expedition—the alpine work on Kriski Podi.

Wednesday 9th August—Everyone was up at 6 a.m., packed by 8.30, and rendezvous at Idrija. The bus drove up the Trenta Valley, stopped for a brief look at the Soca resurgence which despite two weeks drought was still flowing impressively, and finally topped the Vrsic Pass (50 hairpin bends) to arrive at the Vrata Valley. One night was stayed at the Aljazev Dom.

Thursday 10th August—All out of bed at 5.50 a.m. (getting earlier!) to start the walk up the alpine path to Kriski Podi. Although we were to stay four days at the Pogacnikov Dom, we still had to carry 44 man-day rations, all caving gear, walking boots, etc. Considering that rucksac loads ranged from 40 to 85 lbs., the short time of 4½ hours for a recommended 3½ hour walk was very fair. Well over 1,000 m of altitude had to be ascended.

Friday 11th to Sunday 13th August—Exploration in several groups on and around the Podi. The non-participation of some members in this exercise was unfortunate. Most of us had the opportunity to climb some of the higher Slovenian peaks in the course of explorations. (See section on Kriski Podi).

Monday 14th August—Up at 5 a.m. (a UBSS record) showed two parties out on the karst before breakfast. A rapid descent was then made down off the Alpsback to the Aljazev Dom, whence we departed mid-afternoon.

Tuesday 15th August—Another fast non-stop run across Europe saw us on the 17.30 hovercraft at Calais, and then a brief halt for faggots and pease-pudding in Ramsgate. Driving into London at 21.00 a chorus of mutters from the passengers forced the driver to halt, when it was discovered that a wheel was about to drop off. AB, who lived nearby, fetched a car; his parents put most of us up for the night whilst spares were located.

Wednesday August 16th—Arrived back in Bristol mid-afternoon.

CAVES OF THE JAVORNIKI MOUNTAINS

Introduction

The Javorniki mountains are a highland region of Upper Cretaceous limestones, deeply dissected by dry river valleys. The vertical range between crests and valley bottoms is commonly 300-400 metres, and characteristically the hillsides slope at 30 degrees. The highest point of the range (which is northwest-southeast orientated) is the Javornik mountain which rises to 1268 metres. All the hillsides are densely forested, mostly with conifers, signifying the heavy rainfall and shallow soil of this region. Most of this area, particularly the northeast side, drains directly or indirectly to Cerknica Polje (Cernisko Jezero), which is a major source of the waters of the Ljubljanica. The western margins probably drain to the river Pivka.

The surface of the Javorniki is riddled with dolines which can be any size from ten metres to 1 kilometre in diameter. They are in varying stages of development, and sometimes contain caves in their bases or sides.

Apart from a few minor karst hollows in this region, horizontal cave development is rare, and horizontal passages are mostly entered via vertical collapse holes from the surface. The most common speleological features of the area are potholes with several shafts, each ending on a ledge from which the next shaft descends. Inevitably, the shafts found and descended on the expedition were choked at the bottom with small stones, and never exhibited horizontal passages at the base. Twin or even triple shafts are often found, and vertical fluting is usually well developed, but the corrosive action of the percolation water noticeably decreases with depth. Shafts are commonly 10-30 metres deep, though three shafts were found in excess of 180 metres. Near the bottom of these deep shafts stalactite deposits are observed, showing that the corrosive power of the trickles is exhausted at this depth. In one of these potholes (Brezno Pri Oglenicah, fig. 80, 3197) a second shaft descends in a joint at one corner of the flat base of the first shaft, and may represent a rejuvenation of the system by a lowering of the piezometric surface. Indeed the ponding of water at the bottom, even under moderate rainfall conditions, indicates that it lies on the present piezometric level. The corrosive activity of the percolation water being minimal, and mechanical power being very small, horizontal passages of negotiatble dimensions are not to be expected. The resurgence of water from this area as seepages into Cerknica polje supports this opinion. Because a very high proportion of the total depth of descent of the water is accounted for by the vertical entrance pitches, slow seepage along an inclined water table in this highly fractured rock would preclude the need for further pitches. One may calculate that this would involve water flow just below the surface of nearby valleys.

However the termination of the entrance pitches by the presence of flysch or dolomite bands cannot be excluded as an alternative hypothesis, especially as flysch bands 0.5 m thick were observed in the area.

Two features of speleological interest per square kilometre is quoted as the cave density in the Javorniki, but many more must be present beneath the scant soil cover. Road widening operations often uncover new caves. This density is sure to increase when the area is more extensively examined.

Original explorations in the Javorniki

The following caves or potholes were all either discovered by our party, or in the instances where the site was already known, our parties were the first to explore them fully (figs. 79, 80).

Jama pri cesti: 8 metres long and as many deep. Translated the name means "hole in the road" since its entrance lies in the gutter and was discovered by workmen digging a ditch.

Brezno pri vojasnici: (fig. 79). 44 metres deep. 30-m abseil (free) in entrance pitch may be rigged for ladder climbers making a 25-m pitch. Second pitch is 14 m, and is completely choked with stones and unexploded mortar bombs from the last war. A few cave pearls were also found.

Brezno pri oglenicah: (fig. 80, 3197). 206 metres deep. First pitch is mostly vertical or free-hanging for 190 m. The base of the pitch is flat, covered in hefty logs and small stones. There was no trace of the boulders we tipped in the entrance and which hit the bottom after 11 seconds. The second pitch of 16 m begins as a rift in one corner of the base of the main shaft. The bottom is completely choked with small stones, though under moderate rainfall conditions a 2 m pool was seen backed up in the shaft.

Cave no. 1016 (no name known) (fig. 80). 184 metres deep. The pothole was discovered during road-widening operations on a forestry track. Care should be taken not to dislodge stones from the road or cutting. The pothole consists of a single pitch, interrupted by three small ledges. Only the third ledge is large enough for a resting place, and there is an awkward overhang below the first ledge. The bottom is choked with small stones (they took 14 seconds to bounce to the bottom) and logs.

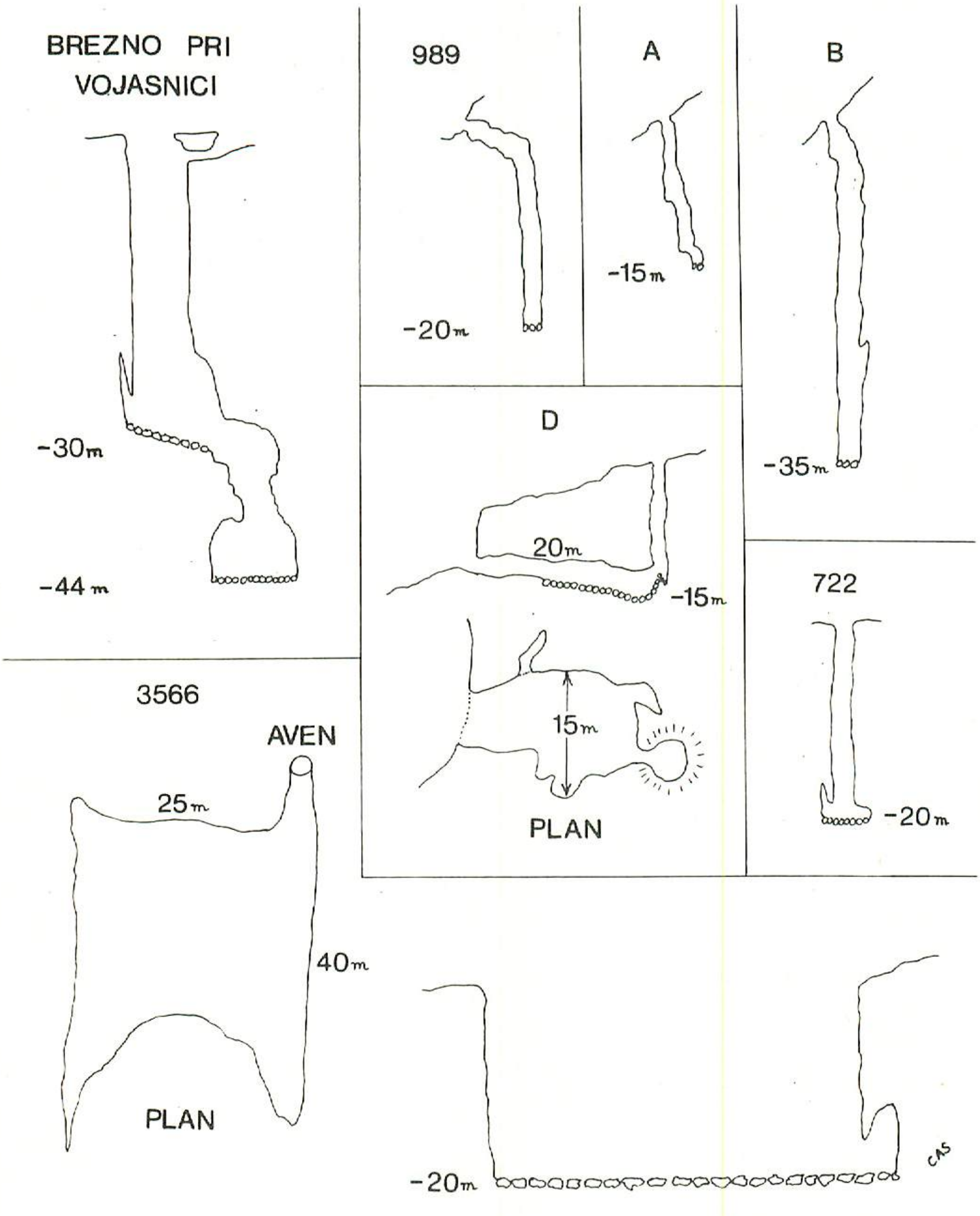

BREZNO PRI
VOJASNICI
-30m
-44m
989
-20m
A
-15m
B
-35m
D
20m
-15m
15m
PLAN
722
-20m
3566
AVEN
25m
40m
PLAN
-20m
CAS

Fig. 79

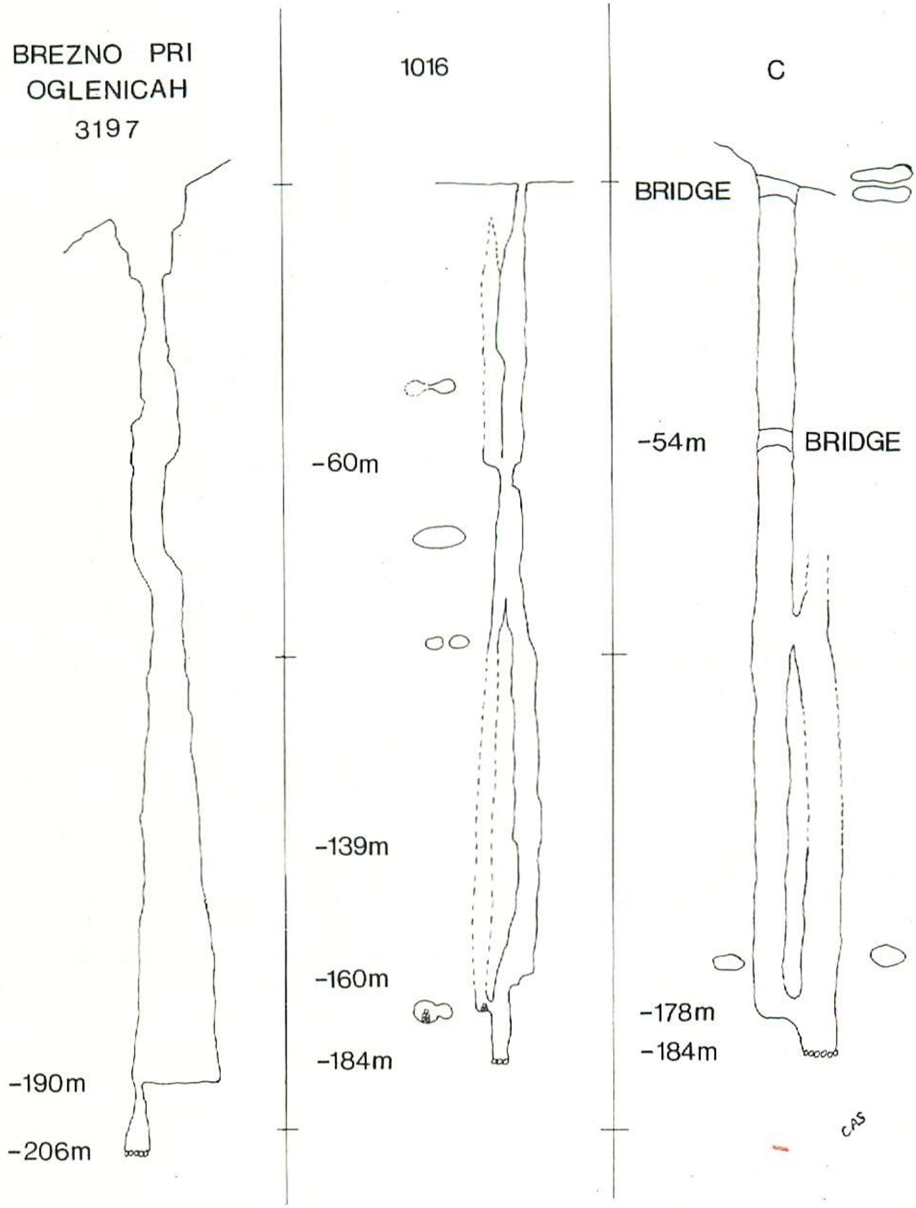

BREZNO PRI
OGLENICAH
3197
-190m
-206m
1016
-60m
-139m
-160m
-184m
C
BRIDGE
-54m
BRIDGE
-178m
-184m
CAS

Fig. 80

A discontinuous twin shaft can sometimes be seen during the descent, but its angular position is uncertain.

Cave 300 *m south of* 1016 (fig. 79, diagram A). 15 metres deep, choked with stones.

Cave 100 *m southwest of* 1016 (fig 79, diagram B). 35 m deep, choked with boulders. Named Bristol Pot due to the continuing alimentary problems of some of the expedition members and the Slovene interpretation of the word Bristol.

Cave no. 3566 (fig. 79). A 20 m pitch into a large collapse feature. The promising "cave entrance" in one corner turned out to be the base of an aven.

Cave no. 722 (fig. 79). 20 m deep, and choked with stones.

Cave no. 719. 2 metres long. A tiny old resurgence.

Cave at GR 572517 (fig. 80, diagram C). 184 m deep. A rock bridge separates twin shafts which descend 54 m to a second rock bridge. The shaft then continues its uniform vertical descent to 178 m depth where it is choked with logs. By climbing down 6 m, the base of a further shaft is reached. This further shaft may also be seen at points down the main shaft. Sunlight illuminates the entrance pitch as far as the second bridge.

Cave at GR 572516. By walking uphill from the last cave, a small pothole is passed. It is choked at 8 m depth by moss and leaves.

Cave at GR 572515. Continuing uphill, a large doline is reached where the gradient abruptly slackens. The doline has three vertical sides, and measures 60×40 m, 25 m deep. Located in the base of one wall is a 20 m long cave, partially filled with snow, leading to a 15 m high aven connecting with the surface. (Fig. 79, diagram D).

Cave at GR 576514. A pothole completely choked with snow. Diameter 6 metres.

Note: Caves in the above account referred to by name or number are now well documented by the Jamarski Klub Ljubljana Matica. Those assigned a grid reference are new sites without (at the time of exploration) any name or number. The grid reference is somewhat arbitrary as it refers to a 1:25000 Italian map of the area to the immediate southwest of Leskova Dolina published in 1936. This map and others in the vicinity are also kept by the JKLM.

CAVES ON KRISKI PODI

(Figs. 85 and 86)

Introduction

Kriski Podi is a high level basin at a little above 2000 metres altitude, ringed on three sides by mountains, and with a steep lip on the down valley (southwest) side. High-level side valleys and corries lie on the sides. Both vegetation and soil cover are negligible. Cliffs, scree slopes, and extensive tracts of bare rock form the scenery.

Kriski Podi has been carved from the thick Dachstein limestones of Triassic age which have suffered small scale patchy replacement by dolomite, a process known as dolomitisation brecciation. The rock is of very fine grain size, a micrite. The bedding is massive, several metres in thickness, and the rock dips eastsoutheast at angles between 5 and 25 degrees. The rock is highly fractured by complex and discontinuous jointing orientated in most directions and inclinations. Faulting is present with strikes of 160 and 110 degrees true, but is a minor structural element as far as cave development is concerned. Precipitation is mainly as snow, and snow fields are present until late summer. Surface water is restricted to three small lakes.

A few caves are present on Kriski Podi itself, but most occur in the "tributary" valleys to the north, particularly around the peak Razor (fig. 85), which stands at 2601 m altitude. All water in this area must drain to one of the three major river valleys which lie below the thousand metre level, to the north (Pisnica, 4 km distant), to the southwest (Soca-Trenta, 1 km), or the east (Vrata, 3 km).

The most likely drainage route is to the Soca-Trenta, by means of the series of springs located between 1500 and 1700 m altitude in the Beli Potok Valley. It is unfortunate that the existence of these springs was not realised until after the expedition's return, and thus were not examined. The caves are on average about 1 km distant, and at altitudes generally 2200-2300 m; drainage down dip and along the strike with loss of height by descent down joints is probable. A spring also occurs at 1900 m in a valley to the northwest of Razor, but being up-dip of the Kriski Podi caves it probably drains a different region. The depth potential of the area thus appears to be small compared with the thickness of limestone and the difference in relief of the Podi and the major valleys.

The famous tourist attraction of the Soca resurgence in Zadnja Trenta is not believed to be part of the drainage from the Kriski Podi basin. However its strong flow rate, low temperature and high hardness value (as monitored by the Q.M. College 1971 expedition) do indicate a very extensive cave system behind the rising. But being on the opposite side of the Trenta Valley it most likely drains the area to the north and northwest, a hydrologically separate unit.

The overwhelming majority of caves in the Kriski Podi area consist of cylindrical shafts invariably choked with snow plugs or rock fragments. Snow is present in most shafts, particularly the larger ones, but it is usually possible to climb down between the snow plug and rock wall for as much as 20 m before it becomes completely choked. The shafts are often circular, but where several co-developing shafts have amalgamated, the long axis diameter can be tens of metres. Small poorly developed shafts are sometimes fissure-like in form, showing their development along joints in the rock, similar to (though larger than) karstic grikes. Joint development of the larger shafts is not so obvious, due mainly to the complexity of the joint pattern.

These small shafts are locally very numerous; in places it is impossible to walk more than a few paces in any one direction without having to make a detour round these shafts. These localities are tracts of true "podi"—a glacially smoothed, almost level rock surface free even from loose stones. Cave development probably occurred beneath an ice cover during glacial retreat, from the melt-water beneath the glacier. This probably occurred in the relatively recent past, since even now the climate is harsh enough for permanent ice-fields. All these potholes may now be regarded as fossil. except for a few found taking water from small icefields. In one of these a small stream could be heard beneath a choked base, even at 6 a.m. when all surface water was frozen.

The second most numerous cave type consists of small horizontal phreatic holes located a few metres high in the valley walls. Very poorly developed, few are negotiable for a length worth recording. Small tortuously descending potholes of similar development are associated with these in some localities where there are benches on the valley sides.

Also present in the area studied are some caves which, by their position, must predate the present topographic features. They are located high on the valley sides, and even on the steep flanks of Razor itself. One particularly interesting cave (fig. 84, 3763) is situated on the saddle of a sharp ridge between the peaks Razor and Golicica. The north side of the ridge drops steeply for several hundred metres, and the south side is a steep scree. The small horizontal entrance passage, a vadose canyon, spirals down in a series of acute left and right hand bends, finally dropping into the roof of a large chamber which must be in the centre of the ridge to have any rock walls at all (fig. 84). The ice plugs in this chamber and that directly below it are highly stratified; this was taken as an indication that a thin layer of ice about 1-2 cm is deposited each year from the freezing of water dripping from the roof in summer months. The air temperature in this cave was well below freezing point, and the cave therefore seems to be slowly filling up. Other caves located high on the valley sides consist of high, wide avens rising immediately inside a short horizontal entrance. There are also caves with small pitches in series with very short horizontal sections; exploration was always stopped by an impassably tight horizontal passage between pitches.

Direction of drainage of these caves is difficult to declare, but they nearly all appear to be orientated down dip (southeast). One cave (3774) high on Razor actually follows a bedding plane for 40 m, the only example of this type. It is significant that the most northerly cave found (3776) drains along the strike i.e. northeast towards the Pisnica.

During the three full days and a few hours of one morning that the expedition was based on Kriski Podi, exploration was conducted in parties of two or three persons. Some parties recorded all sites in excess of 5 m, others only when in excess of 10 m. Since most potholes terminated in snow chokes, a visit to the area in late September would present a totally different picture of the development of these caves to the descriptions below. A hollow filled with snow almost to the surface might not be recorded as a cave site by this expedition, though there may well be a deep shaft below.

A Yugoslavian expedition to Kriski Podi in 1965 recorded the cave Romekovo Brezno to consist of three shafts connecting underground to form one large shaft choked with snow and ice at 94 m depth. This site could not be located by our expedition, the deepest shaft in the immediate vicinity being 42 m deep. It is significant that a snow choke existed even under the favourable conditions of the Slovene exploration.

All cave sites recorded by our expedition were numbered with red paint according to the numerical system of the caving club JKLM. The results are described below, either in text or as diagrams.

Original work

For the locations of these caves see figs. 85 and 86, where only the last two digits are printed. The diagrams appear in figs. 81-83 and 84. Key on fig. 81.

3731—see diagram.

3732—see diagram.

3733—10 m deep to snow choke.

3734—5 m pitch ,to scree slope 9 m long. Daylight connection to nearby rock shelter.

3735—4 m pitch with daylight connection. A further 4 m pitch to a second daylight connection.

3736—7 m pitch to 5 m of horizontal development, choked by stones.

3737—10 m deep grike, an open rock joint.

3738—16 m deep grike.

3739—V-shaped grike, 15 m deep, blocked by snow.

3740—10 m deep to snow choke.

3741—5 m deep to snow plug, choked with stones at 15 m depth.

3742—Small holes filled with mud.

3743—3 m deep to snow plug. A further 12 m depth between snow plug and wall.

3744—12 m deep to stone choke.

3745—see diagram.

3746—see diagram.

3747—two shafts blocked by snow. A small chamber 5 m in diameter is entered from one shaft at 5 m depth.

3748—see diagram.

3749—Cave on the east face of Razor at the top of a scree slope. A high aven occurs just inside the entrance, but is unclimable. Two other blind avens occur nearby under an overhanging cliff face, of heights 8 m and 5 m. One of them requires a 10 m climb to reach it.

3750—Very large entrance on south buttress of Razor, 15 m square. Four small extensions occur inside the cave mouth, one of which connects to the surface a little higher on the cliff face.

3751—7 m deep to stone choke, with 4 m horizontal development.

3752—3 m deep to snow plug. A further 3 m depth between plug and wall.

3753—3 m deep to stone choke.

3754—3 m deep to snow choke. Double shafts.

3755—see diagram.

3756—8 m deep to snow choke.

3757—see diagram.

3758—see diagram.

3759—8 m deep to snow choke.

3760—8 m deep. Twin shafts.

3762—16 m deep, with 12 m horizontal passage.

3761—10 m long in a passage 4 m high. An extension of 3 m was found in the roof.

3763—Kriski Podi (fig. 84). The entrance is situated in a small depression on the sharp ridge between Golicica and Razor. The entrance passage is a tight vadose stream canyon about 1 m high, which changes after a 2 m drop to a low sandy crawl. A drop of 4 m leads to a larger steeply descending passage ending in a boulder choke, presumably a run-in from a surface scree. A tricky climb up one wall leads to a short crawl, the right branch of which goes to a small rift chamber with no way on. The left fork ends at the top of a loose boulder slope to an 8 m pot. At the bottom a low twisting passage enters a small chamber (2 m high by 3 m long) in very shattered rock. A natural arch in this chamber affords the only belay for the pitches encountered in this cave. The first, 13 m, follows after a squeeze down a boulder-strewn rift which enters the roof of a magnificent ice-floored chamber (15×10 m). From the floor of the chamber several holes between the ice and the rock may be descended for varying distances; only one of these, located by an impressive ice pillar under an aven, leads to further territory, being an awkward 25 m pitch where it opens out among massive ice formations into an even more impressive chamber of similar dimensions. No bare rock could be found anywhere in it. A further hole in the floor, next to a dome-shaped ice bank, descended a further 6 m into a pool of water with no way on. The depth at this point is 84 m below the entrance.

3764—Three rift caves, terminated by snow plugs at 12 m depth. Two of these connect underground.

3765—see diagram.

3766—20 m cave, descending a 45 degree snow slope, through a rock squeeze, and further snow slope to a boulder choke.

3767—10 m deep to ice plug, with 50 m horizontal development at the top of the plug to two small entrances from the surface.

3768—A narrow grike 15 m deep.

3769—20 m long and 5 m deep, with twin entrances.

3770—A large shaft completely ice-filled (23 m depth between ice-plug and one wall.

3771—10 m long to stone choke.

3772—20 m long loop between two entrances, at the head of an ice field at the base of the Razor east face.

3773—6 m long, at the base of Razor east face.

3774—see diagram. Extensively formed down dip in a bedding plane. Noteworthy for its beautiful ice stalactites and verglace false floor.

3775—15 m deep to a snow choke.

3776—see diagram. Further exploration stopped by a narrow crack 7 cm wide wide which forms the top of the third pitch.

3777—25 m deep to a snow choke.

3778—7 m deep to snow choke. Twin shafts connect underground in a chamber 40 m across.

3779—12 m deep to snow choke.

3780—10 m deep to snow choke.

3781—10 m deep to stone choke.

3782—5 m long to stone choke.

3783—6 m deep to snow and stone choke.

3784—5 m deep double shaft.

3785—7 m deep to snow choke.

3786—8 m deep.

3787—8 m deep; three interconnecting shafts.

3788—Several shafts 10 m deep in the same rift.

3789—10 m deep to stone choke.

3790—Rift 25 m long and 10 m deep.

3791—10 m deep to a snow choke in an open joint.

3792—8 m long, on top of a snow blockage, with a 5 m high aven at the back of the cave.

3793—10 m deep.

3794—12 m deep to snow choke.

3795—12 m deep.

3796—12 m deep to snow blockage.

3797—8 m deep to snow choke.

3798—see diagram.

3799—A line of small potholes, one of which was 6 m deep.

3800—One of the upper holes of 3799 was dug for 1.5 m depth since a sizeable stream could be heard beneath. The stream was still audible at 6 a.m. when the stone and snow blockage was frozen solid and undiggable.

3801—10 m deep to snow choke.

3802—15 m deep to snow choke.

3803—12 m deep to snow blockage.

3804—10 m deep to snow plug, but unable to descend between plug and wall without tackle.

3805—see diagram. The second shaft was not descended, since the top of the pitch is a small tube. It might be possible to descend on ladder.

3806—10 m deep; small horizontal extension at the bottom.

Jama nad Jezerom (cave above a lake). This cave had been previously explored by the DZRJS. An entrance shaft 62 m deep led to a descending stream passage which meandered for 80 m to a boulder choke. The total depth of the cave was estimated at 88 m. This site is marked DZRJS on fig. 85.

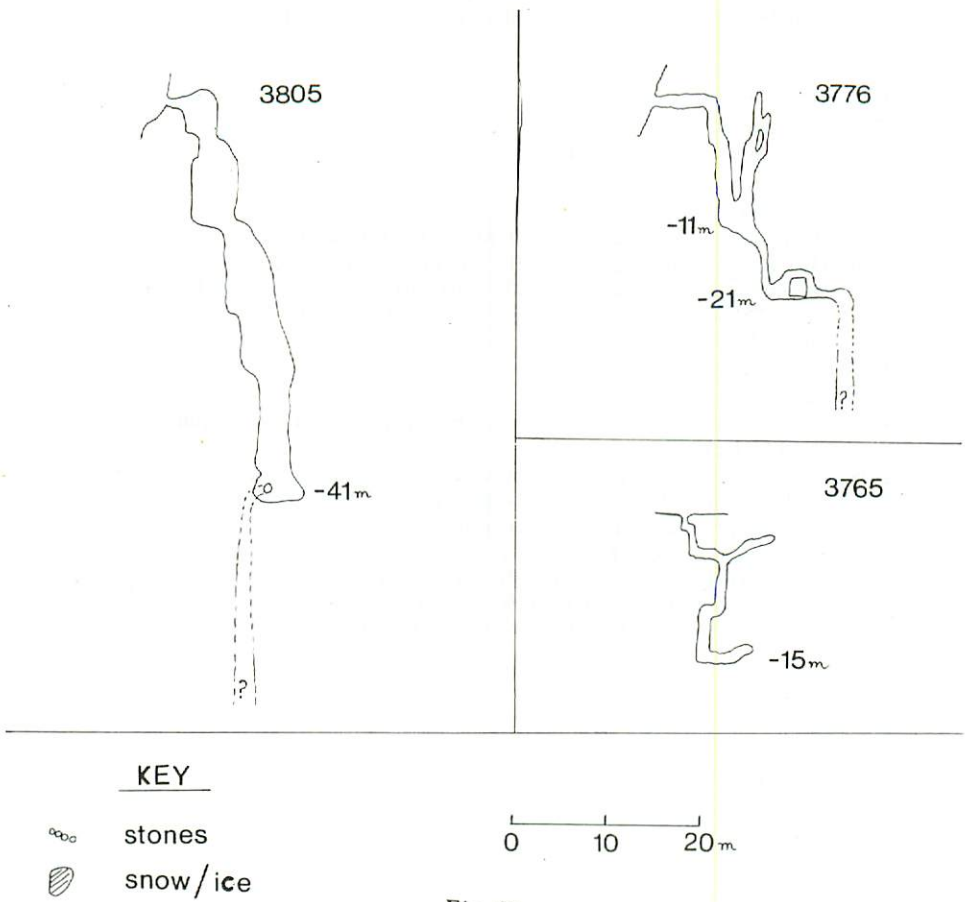


Fig. 81

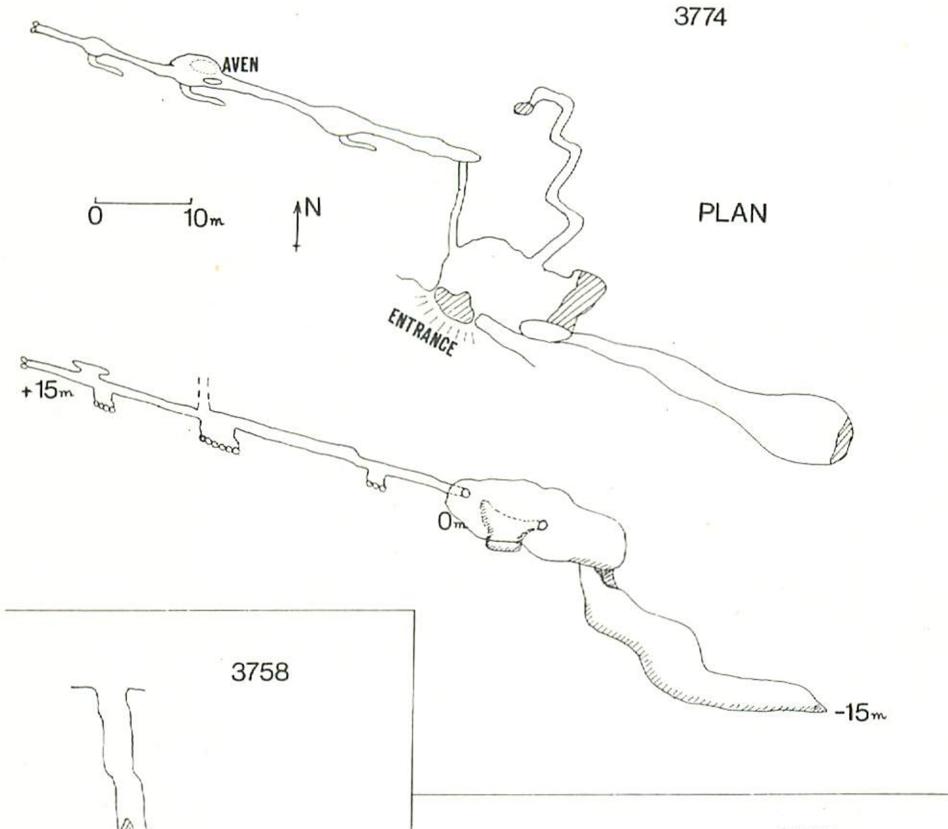

3774
AVEN
0
10m
N
PLAN
ENTRANCE
+15m
0m
-15m
3758
-25m
-42m
3798
PLAN
30m
SHAFT
-8m
CAS

Fig. 82

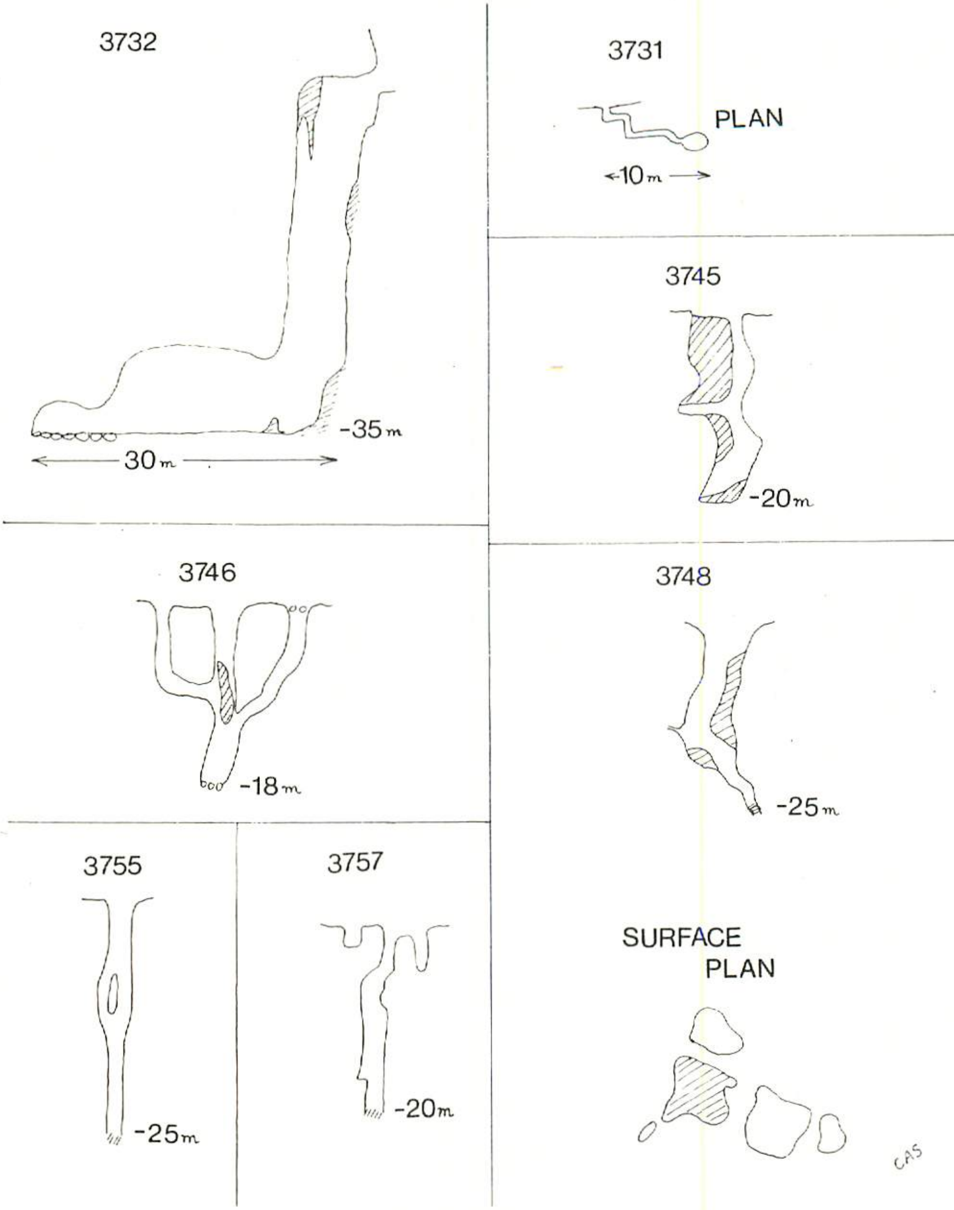

3732
-35m
30m
3731
PLAN
10m
3745
-20m
3746
-18m
3748
-25m
3755
-25m
3757
-20m
SURFACE
PLAN
CAS

Fig. 83

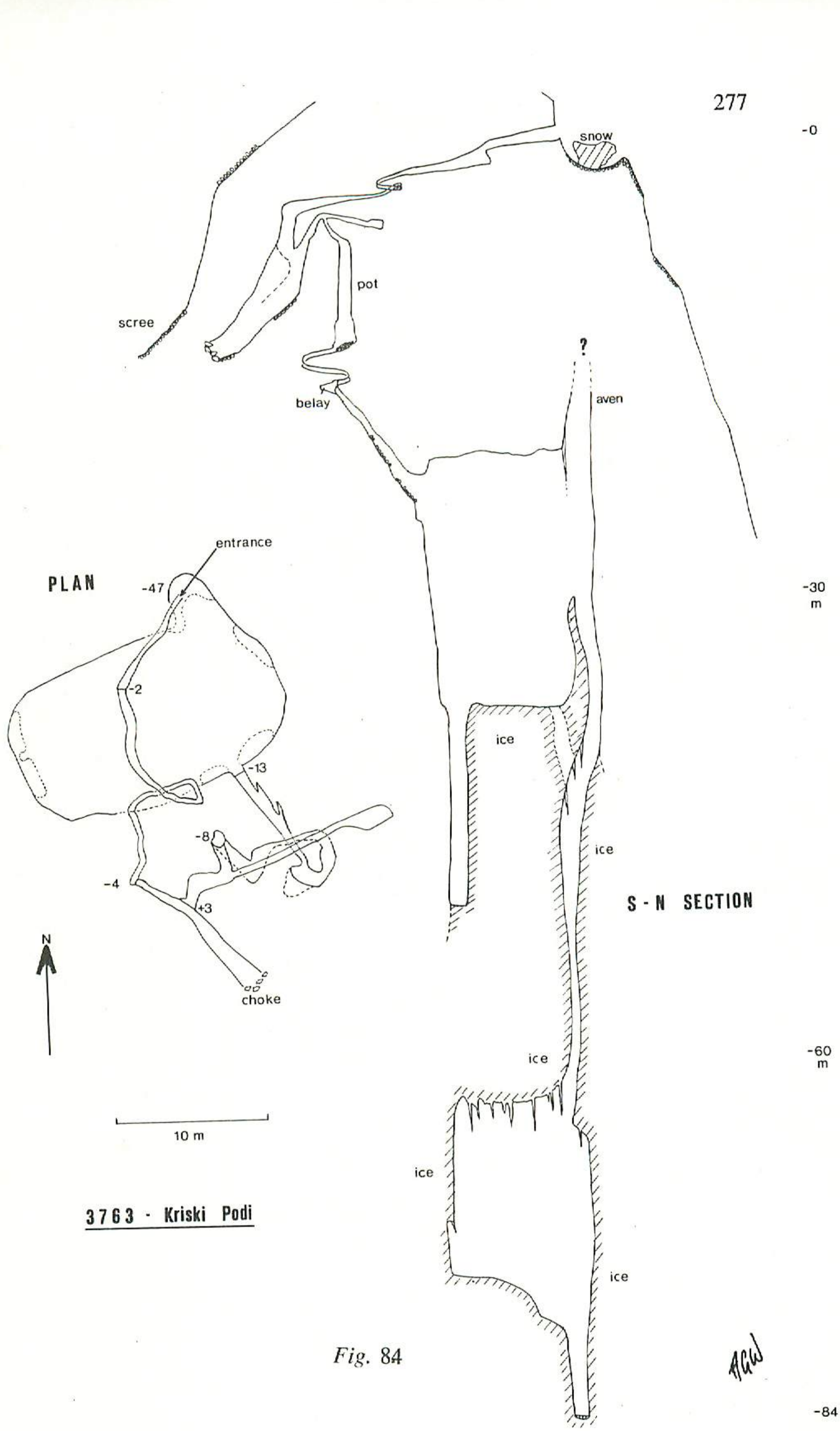

-0
snow
scree
pot
belay
?
aven
-30
m
PLAN
entrance
-47
-2
-13
-8
-4
+3
choke
N
10 m
ice
ice
S - N SECTION
ice
-60
m
ice
ice
3763 - Kriski Podi
AGW
-84

Fig. 84

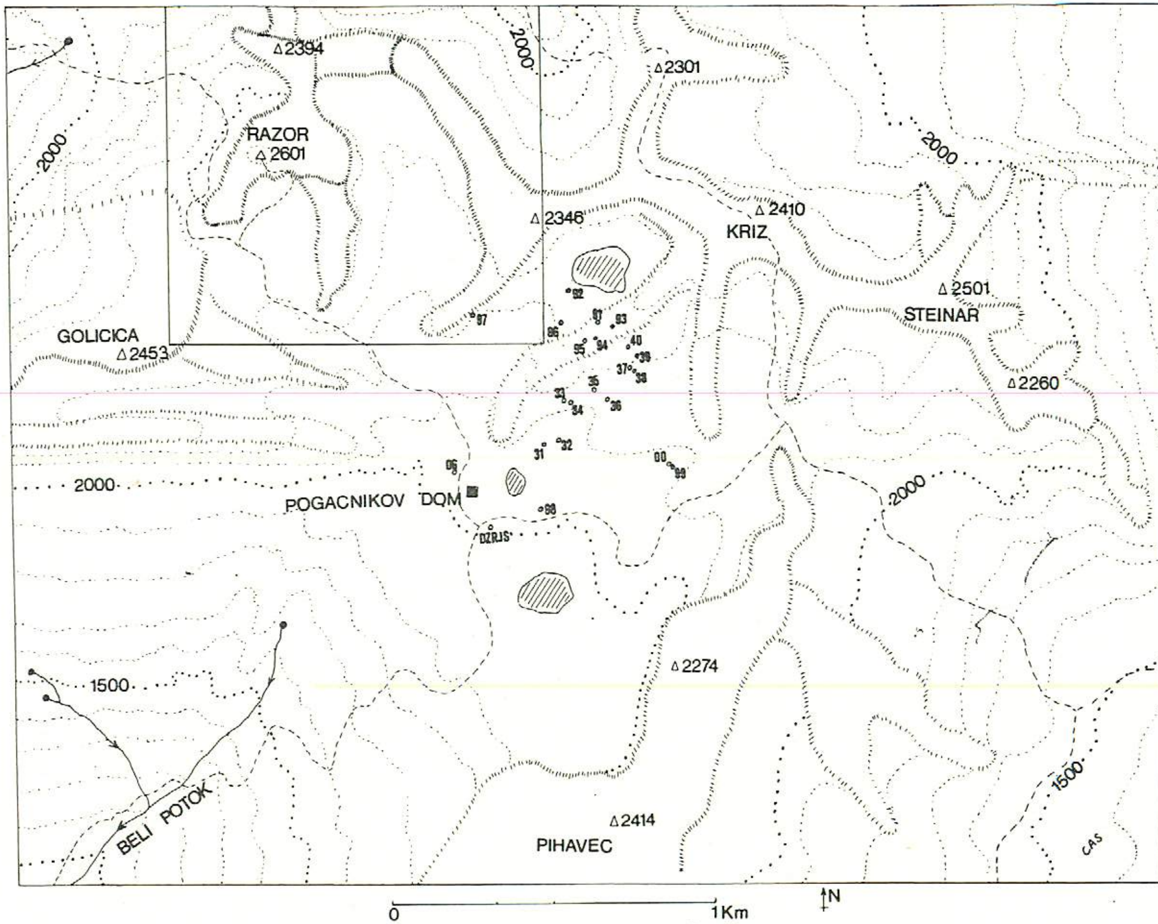


Fig. 85. Caves of Kriski Podi

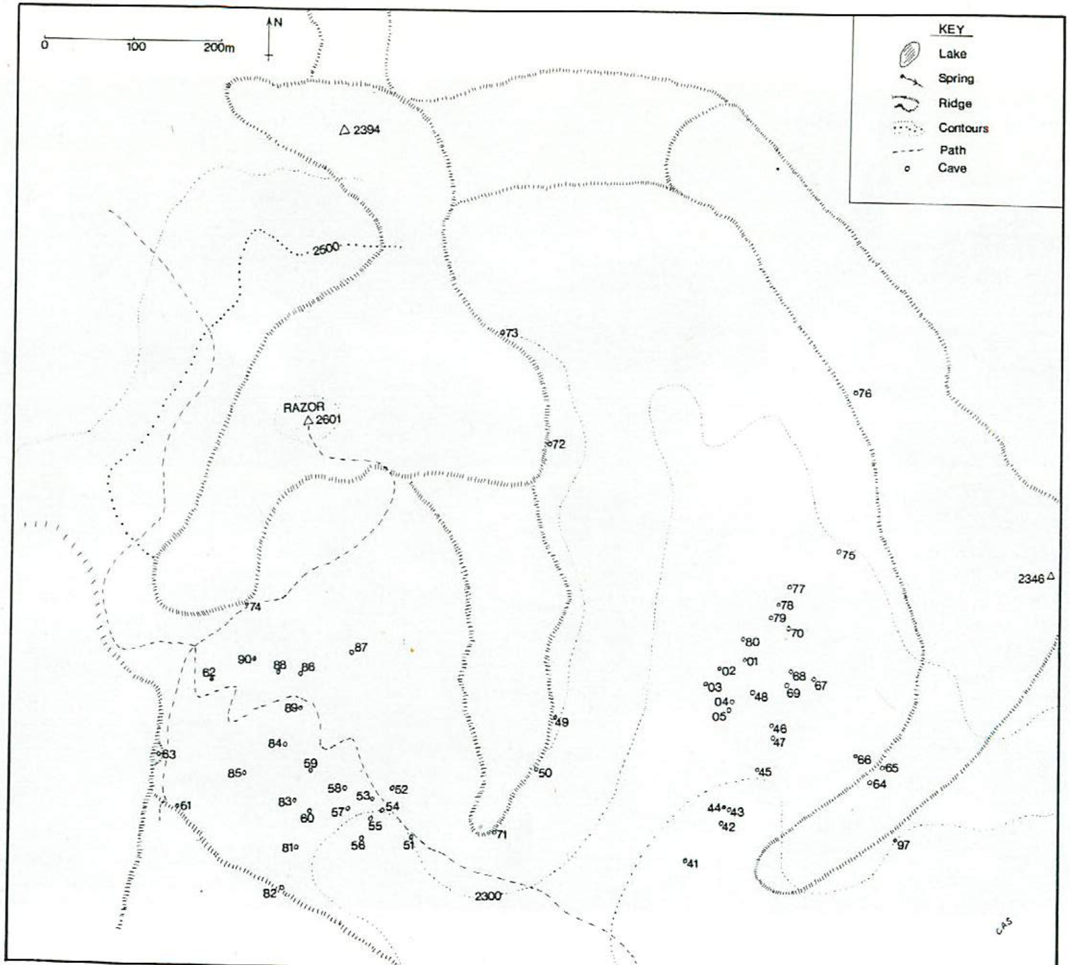


Fig. 86. Inset from Fig. 85

Plate 20 Natural arch over the river Rak, near Tkalca Jama in Rakov Skocjan.

Plate 21 Typical Slovene speleotherms, river junction, Krisna Jama.

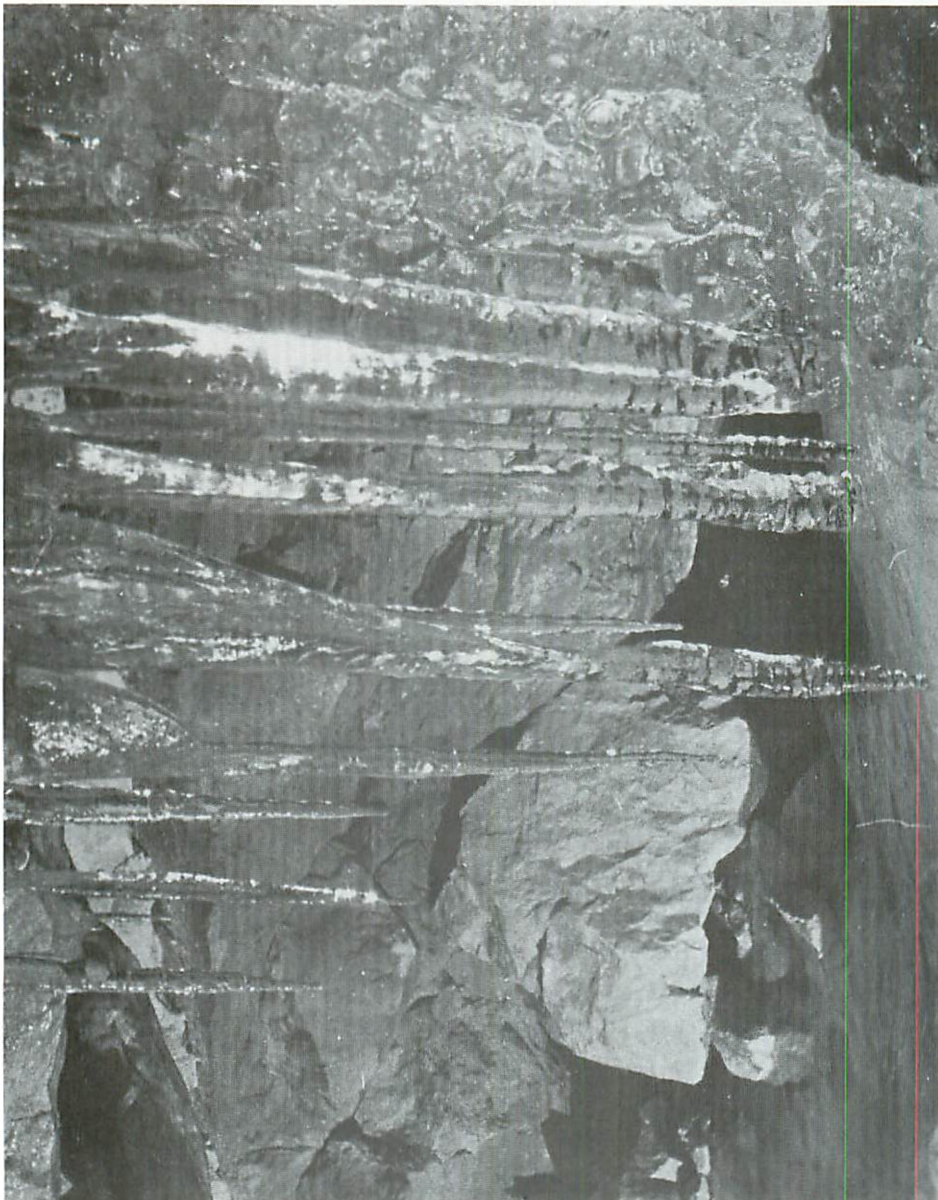


Plate 22 Ice stalactites and verglas in cave 3774, Kriski Podi.