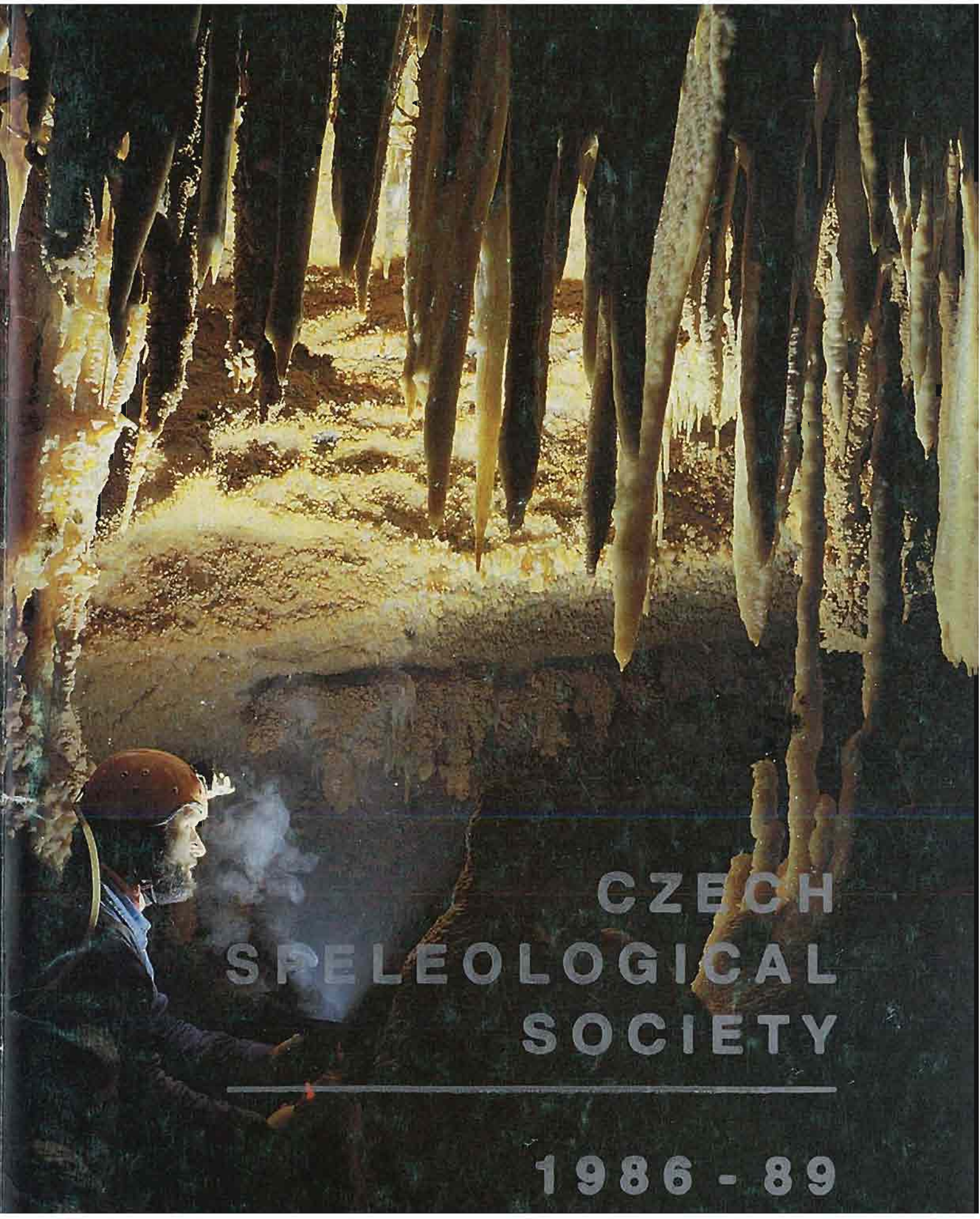
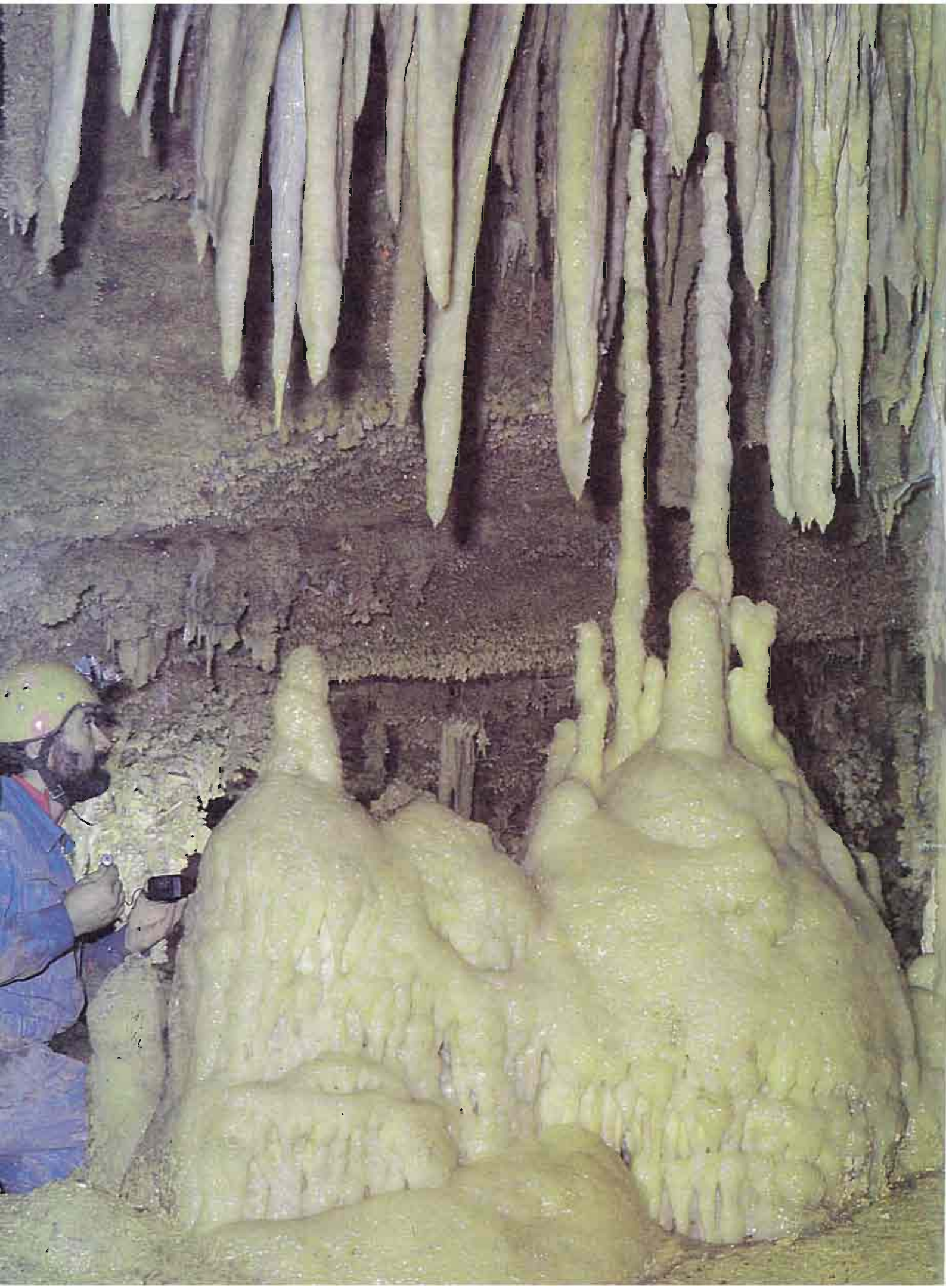


CZECH SPELEOLOGICAL SOCIETY

1986 - 89



Czech Speleological Society
1986 - 1989

Published on the occasion of 10th International Speleological Congress Hungary 1989

Česká speleologická společnost
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Contents

THE CZECH SPELEOLOGICAL SOCIETY GREETS THE 10th INTERNATIONAL SPELEOLOGICAL CONGRESS 1989

The foundations of the Czech Speleological Society were laid down at the time of the preparation for the 6th International Speleological Congress in 1973 which, 16 years ago, brought to Czechoslovakia about 1 000 delegates from most of the then member countries of the International Speleological Union.

In 1989, when the speleological world meets in another central European country, brotherly Hungaria, the Czech speleologists want to summarize the results of their activities and thus contribute to the greatest possible success of this top meeting.

The Czech Speleological Society is a young national organization, but it considers itself to be a heir and successor of a long and great tradition which in our country is a manysided interest in the karst, in the solution of its scientific and practical problems as well as discovering and experiencing its romantic secrets. As early as in the latter half of last century the foremost Bohemian and Moravian research workers as well as numerous lay enthusiasts from all social atrata of the Czech nation devoted their efforts to this interest. They joined in this way the pioneer from other European countries who stood at the cradle of speleology as a set of sciences about the karst and a socially important special-interest activity.

This treasure-box of the national cultural heritage is the staring point of the activity of the Czech Speleological Society. It fosters the uniform development of both research and interest activities in the karst, the versatile education and technical instruction of all its members and the development of the publication activity. In the sphere of scientific research the Czech speleologists have recently achieved important success above all in the geology, geomorphology and hydrogeology of the massifs of karst rocks, in the comprehensive study of the problems of a reasonable utilization and protection of the Karst landscape, in archeology and speleotherapy. A number of results have been successfully utilized in social practice. In the special-interest activity remarkable progress has been made in vertical caving, speleodiving and speleorescue activity.

Czech speleologists have spontaneously joined the activities of the whole universal speleological movement. As constituting of the top international speleological organization they participate in the work of all components of its structure and under its auspices they have organized numerous international meetings in the period of 1973 - 1989. Those meetings have contributed not only to the Development of practical branches of speleology and karsology, but also to establishing and utilizing international friendly contacts. Czech speleologists have availed themselves of all possibilities to make it possible for them to actively take part in those meetings held in the other member countries of the International Speleological Union. Independently or in

collaboration with foreign partners they have carried out many research and exploring expeditions into countries of the whole world.

The greatest successful activities achieved by Czech speleology in its activity since the last international congress held in Spain include the results of exploring expeditions to southeast Africa, the Himalayas, Australia and Tasmania, completing the karsological map of Cuba after eight years of close cooperation with Cuban speleologists, granting technical assistance in introducing speleotherapy in Greece and Yugoslavia, the preparation and publication of an international monograph concerning the problems of the Paleokarst, and many other actions.

This enthusiastic and unceasing activity has not, unfortunately, been without the highest sacrifices. Almost ten Czech speleologists have sacrificed their lives to the altar of their greatest love during the recent years.

Also on behalf of them Czech speleologists greet the 10th International Speleological Congress 1989 in Budapest, wishing it the greatest possible scientific as well as social success. Let it become another important milestone in the development of scientific and special-interest speleology and karsology as well as in the development of brotherly international cooperation. Czech speleologists congratulate their Hungarian colleagues, members of the Hungarian Society for the Reserach of the Karst and Caves on the organization of the Congress in their country and wish them the success of the Congress to become a deserved reward and acknowledgement for their hitherto work.

Asst. Professor Dr. Vladimír Panoš
Chairman,
Czech Speleological Society

ACTIVITY OF THE CZECH SPELEOLOGICAL SOCIETY IN 1986 - 1989

The Czech Speleological Society /further CSS/ is a voluntary organization associating at present about 1,600 members. Its activity is controlled by a 13-member Central Comettee headed by the chairman, Asst. Prof. Dr. Vladimír Panoš, CSc., two vice-chairmen - Asst. Prof. Dr. Jaromír Demek, DrSc., and RNDr. František Skřivánek. The Central Committee controls the CSS sections : Comissions, regional committees and the local organizations.

Comissions are technical advisors of the Central Committee. At present there are 8 commissions of the CSS. They are :

C for education - chairman Asst.Prof.Dr. Jaromír Demek, DrSc.
scientific C - chairman RNDr. Vojen Ložek, DrSc.
C for documentation - chairman RNDr. Bohumil Kučera
Technical commission - chairman Radomil Matýsek
C for safety, health protection and speleo service - chairman Svatopluk Cigánek
C for speleodiving - chairman Ing. František Piškula
C for speleotherapy - chairman MUDr. Stanislav Boháč
C for international cooperation - chairman RNDr. David Havlíček, CSc.

The commissions assist above all in solving the individual special problems, on the basis of their experience they elaborate technical methodologies and regulations or issue independent publications. At the same time they are coorganizers of professional, central actions, symposia, seminars.

The activity of local organizations from the Central Committee is controlled directly by the regional committees. The CSS has 7 regional committes, according to the administrative division of the CSR. Regional committees coordinate the activity of local organizations on the territory of their regions and participate in organizing central actions.

The bulk of the practical activity in the field rests on the local organizations (further only LO) whose number is 59. At present they operate in 168 localities of Karst character, 33 localities of the pseudokarst character and at 59 localities of historical mining works and other man-made underground spaces. Localities of the karst character are concentrated particularly in the regions of the Moravian Karst and the Bohemian Karst, others are found in small karst islets all over the territory of the CSR. Pseudokarst localities and anthropogenic underground works are spread all over the territory of the CSR. In those localities the LO carry out the reconnaissance of the terrain, exploratory and research activities, probes, prolongation and blasting works, documentation works, such as determination of surveying points, surveying, mapping, photodocumentation and or shooting films. Almost all LO currently deal with adaptations and closing of cave entrances, repairing and

maintenance of their closed entrances and cleaning the caves. From among more specialized works carried out by only some LO we can name hydrographical and hydrological research actions, pumping and tracing experiments, following the microclimate, measuring temperatures, radiotests, studying the occurrence of bats, geological, sedimentological, paleontological and geophysical research.

Several LO have joined the solution of special scientific tasks (frequently in collaboration with further technical institutions and research institutes), such as the study of operation and utilization of speleotherapy, the study of chemism of cave fillings, the interpretation of air photographs oriented at the tectonics of the Bohemian Karst, the hydrographical research into surface and subterranean streams and caves linked with them, the research into geophysical prospecting of karst structures with respect to water filled and water conducting structures and others.

Thanks to the intense activity of LO about 300 m of new underground spaces and caves were discovered in 1986 and 214 m in 1987.

The sections of the CSS organize, in cooperation with each other, the so--called "central actions" in the form of special seminars, meetings, schooling and/or social actions. The objective of the special actions is to get the participants acquainted with the problems by means of lectures and practical exercises in the field. Traditional are particularly "Meetings of speleologists in the Bohemian Karst with international participation" held annually, consisting of field excursions and social meetings, "Speleoforum" or an overview of expeditions or discoveries of Czechoslovak speleologists at home and abroad, "Instructions of technicians of local organizations" with the objective of getting CSS members acquainted with the use of speleotechnology and the utilization of technical possibilities in work in caves, "Instructions of the speleological minimum" which must be passed by all members of the CSS, "Instructions of speleologists of Ist degree and speleologists-specialists" (such as cave divers, documentarists and others) proceed according to the needs of the Society.

According to the requirements of CSS members the following actions were organized: "Rescue on the rope", "Karst archeology", "Cave atmosphere", "Mapping and documentation of the paleokarst", "Seminars on historical underground", "New trends in speleology", "Instructions of explosive managers", "Activity in cave accidents", "Education course in one-rope technique", "Symposium about the karst of the Krkonoše Mts.- Jeseníky Mts. system".

Actions of social character are, particularly the "March around the Ještěd holes", "RNDr Burghardt memorial", "March Krapas" and organizing of balls.

In 1986 the CSS started publishing papers oriented at the individual trends of the activity under the summary name "Library of the Czech Speleological Society". 11 volumes have appeared so far (28.2.1989):

Vol. I - Study texts, speleologist of Ist degree, part I (Praha 1986)
Vol. 2 - Bibliography of the pseudokarst in the CSR (Praha 1986)
Vol. 3 - Study texts - speleologist of Ist degree - part II (Praha 1986)

Vol. 4 - Introduction to the one-rope technique (Praha 1987)
Vol. 5 - The Guidebook to the excursion of the IIIrd symposium about the karst of the Krkonoše-Jeseníky system (Praha 1987)
Vol.6 - IIIrd symposium about the karst of the Krkonoše-Jeseníky system (Praha 1987)
Vol. 7 - Photography in the underground (Praha 1989)
Vol. 8 - Fundamentals of speleological mapping (Praha 1988)
Vol. 9 - IIIrd seminar on the historical underground Stříbro 1987 (Praha 1989)
Vol.10 - 2nd symposium on the pseudokarst (Praha 1989)
Vol.11 - Local Organisation CSS 6-08 Dagmar (Praha 1988).
Independently the textbook "Rescue on a rope" was published as well as the proceedings from "Speleoforum" and the book "Speleology in theory and practice".

For its activity the CSS receives every year funds from the Ministry of Culture. From these funds it covers the expenses of the activity of the Central Committee, the commissions and the regional committees, publishing of the internal journal Stalagmite, insurance, equipment of speleorescue centres in the CSR and a part of the expenses of the central actions. Local organizations cover their activity either from the personal means of their members or from their own economic activity carried out on the basis of economic contracts. The means thus obtained are utilized for buying the necessary equipment and material, for getting acquainted with the karst abroad and for establishing their bases. The spectrum of the activities of CSS members must be completed by the organization of lectures for the public, by the guiding service in caves, by collecting special technical publications and by close cooperation with bodies of the State Protection of Nature, such as the cooperation in sentry service in the protected territories, building instructive pathways, assistance in planting trees, etc.

Ing. Dana Bílková
Scientific Secretary.
Central Committee,
Czech Speleological Society

SCIENTIFIC PROGRAMME OF THE CZECH SPELEOLOGICAL SOCIETY

The karst and the karst region are a complex set of factors influencing each other, requiring both corresponding research and exploring methods and a suitable regulation of socioeconomic influences. For these reasons most of the important Karst phenomena and units in the Czech Lands are protected by the Act of Nature Protection of 1956. This fact, on the other hand, also affects the activities of speleological research and karsological exploration to some extent.

The Czech Speleological Society organizes mostly amateurs interested in the karst and the karst phenomena. It prepares its members theoretically and practically for research, exploration and discoveries of karst phenomena, for the most part underground.Those interested in the karst, according to the Regulations of the CSS, should cooperate in the scientific evaluation, protection and utilization of the karst. To grant the order of this activity of the members of the CSS, Central Commissions were set up as advisory or executive bodies of the Central Committee of the CSS. The objective of the Commissions is to regulate the content of work of the local organizations and the elaboration of methodological hints for such activity.

The Central Scientific Commission of the CSS was set up with the objective of regulating and coordinating the activity of the local organizations at the alotted localities and regions, of carrying out technical education and cultural activity among people interested in karst research and of performing advisory activity. For that purpose several important educational programmes were set up, oriented particularly at the study and protection of cave fillings of all kinds, at speleoclimatology and further regions of problems. The exploratory activity of members and committee co-workers has always been oriented at topical problems which gradually arose in the activity of speleological groups in the field. In many cases it was a saving research at the localities being excavated.

The membership in the Scientific Commission is voluntary, the members need not be organized in the CSS. Mostly, however, they are professional workers (geologists, sedimentologists, mineralogists, paleontologists, zoologists, chemists, physicists, archaeologists, etc.) associated in several subcommissions whlch partly link up with the structure of the Commissions of the International Union of Speleology within its Department of Research. Thus the contact with those commission is safeguarded, which is necessary for the exchange of information, experience and literature.

The Scientific Commission of the CSS is headed by Dr. Vojen Ložek, DrSc. (chairman), Dr. Pavel Bosák, CSc. (vicechairman) and Dr. Ivan Horáček, CSc. (secretary). It has the following structure: /1/ subcommission for physical and geochemical research and Karst hydrology (head: Ing. Josef Slačík), /2/ subcommission for speleochronology and paleokarst (Dr. Pavel Bosák, CSc. and Dr. Dušan Hypr), /3/ subcommission for karst geomorphology (Dr. Jan

Přibyl, CSc.), /4/ subcommission for the fauna and flora of karst regions (Dr. Ivan Horáček, CSc. and Dr. Jaroslav Vašátko), /5/ subcommission for karst geophysics (Dr. Libor Kraus), /6/ subcommission for karst archaeology (graduated historian Václav Matoušek) and /7/ subcommission for the evaluation of the karst as a landscape phenomenon (Dr. Vojen Ložek, DrSc.).

By the analysis of actual problems solved by the units and members of the CSS it was found that above all spheres of theoretical and practical problems are being solved which are oriented at /1/ karst geology and tectonics, /2/ karst geochemistry and mineralogy, deposits of mineral raw materials, /3/ karst and pseudokarst geomorphology, /4/ the origin, development and fossilization of the karst and paleokarst, /6/ the biology, ecology, paleobiology and paleoecology of the karst, and /7/ the karst as a landscape phenomenon and the protection of its natural environment. These are the fundamental scientific and research programmes of the CSS included in the main programme of the scientific research of the CSS called: THE ROLE OF THE KARST IN THE FORMATION AND DEVELOPMENT OF THE LANDSCAPE AND THE ENVIRONMENT.

The basic problem of the organized research in the CSS is the lack of financial sources, which is not only our specific problem, but e.g. UIS commissions meet similar problems as well. The members of the commission, although professionals in their scientific disciplines, solve the problems of karsological research as amateurs organized in the CSS. That is why we more and more frequently look for official collaboration with research institutes, the State Geological Survey of the CSR and the individual geological exploration companies. We solve practical problems in deposits of mineral raw materials with the occurrence of karst and pseudokarst phenomena which often complicate the mining, such as in the deposits of fluorite and graphite. We cooperate in hydrogeological activities. With museum organizations we deal with zoological problems, above all monitoring of bats and other animals in the karst. Thus we get access to professional equipment, instrumental and laboratory technology as well as financial means for further karsological research.

In close international cooperation problems are being solved at present concerning the pseudokarst around the frontier with the GDR, particulary sandstones. An important international project includes an extensive research into the Lusitanian region along the northern border of the Czech Socialist Republic with important localities of dispersed karst (karst in small islets). This task is being solved in cooperation with universities and the Geological Survey in Poland. The results of those works are regularly discussed within symposia, such as traditional symposia on the karst of the Giant Mountains - Jeseníky system or symposia on pseudokarst, or the New Trends in Speleology symposia. Proceedings are published for all those actions.

The publishing activity of the Commission for Science as well as of further Commissions dealing with research is oriented. above all on the education of the membership (e.g. the series of the Czech Speleological Society Library). From among important project of recent years it is necessary to mention the

publication Speleology in Theory and Practice (autumn 1988), intended for the first, fundamental stage of education, and the international monograph in collaboration with the UIS Commission for Speleochronology and Paleokarst entitled Paleokarst: A Systematic and Regional Review. It summarizes the hitherto extensive activity of this Commission and thus concludes one stage of its activity, it is prepared to the 10th International Congres on Speleology in Budapest.

Dr. Pavel Bosák, CSc.,
vice chairman
Central Scientific Commission

TECHNICAL COMMISSION OF THE CSS

The objective of the activity of the Technical Commission of the CSS is to see to high quality technical equipment (outfit and gear) and the technical readiness of the CSS members in their activity in the underground.

The Commission must start from the conditions in which Czech speleologists develop their activity. In the CSSR there are so far few producers specialized in the production of speleological material and the import is not carried out. Thus, material is used that is intended for mountaineers (ropes, carbines, climbing devices, etc.). The members are thus dependent on their own forces, material sources and technical invention in producing aids and equipment elements. The Commission supports this volunteer activity, coordinating it and seeing to it that these devices thus produced should be safe, functional and simple. The prototypes produced are tested by the Commission which works out or helps to work out technical documentation which is then spread among the members through the CSS - the Stalagmite. At the same time the Commission grants or mediates technical judgements, gives consultations and advice to members and organizations of the CSS.

According to the solutions by the members the Commission succeeded, after negotiations with professional producers, in starting the production of some speleological devices.

For illustration some successful amateur solutions: sitting hangers, actylene developers, speleological bags, overalls, etc. Particularly in acetylene developers new progressive constructions have been applied - the dosing of water by a combined gravitational and injection way. In the crawling galleries the injection system is of advantage, in verticals, on the other hand, the gravitational system.

Among the preferential activities is the education of technicians of the local organizations. Besides the current cooperation the Technical Commition organizes every year instructions of technicians in the Moravian Karst. The participants get acquainted with technical devices from abroad and, particularly, with technical news in the region of speleotechnology (producers, products, materials, new technical solutions further with the problems of technical activities in the underground (timbering, mining operations, simple mining machines, etc.), including the principles of their safety. Practical skills of the participants are developed in underground excursions, but also in the training in the simulator.

Last year the Commission established the cooperation of a psychologist; it appears that the development and application of technical and sporting skills depends not only on the physical level of the individual and his material and technical equipment, but it is also in close coordination with the psychical readiness and resistance. The information from the psychology of sport was applied in the sphere of speleoalpinism in the Instruction.

Increasing the technical readiness of the members is carried out and has been processed by preparing special publication oriented at speleoalpinism.

The "Introduction to One-Rope Technique" has been published, further publications are being prepared. Together with the Commission for Education the Technical Commission takes part in preparing technical manuals for acquiring qualification degrees of the members of the CSS.

The Commission develops active collaboration with the Technical Commission of the Slovac Speleological Society in the lecturing activity, in exchanging experience, in material mutual help, etc. Within the given possibilities it cooperates with colleagues from abroad /France, Austria, Italy, USA, Hungary/. The Commission participates in processing the solutions of topical technical problems discussed at the 9th World Congres of the UIS in the sphere of adverse influences affecting speleological ropes.

Radomír Matýsek
Chairman
Technical Commission
Czech Speleological Society

NEW DISCOVERIES IN THE BERAN QUARRY IN THE BOHEMIAN KARST

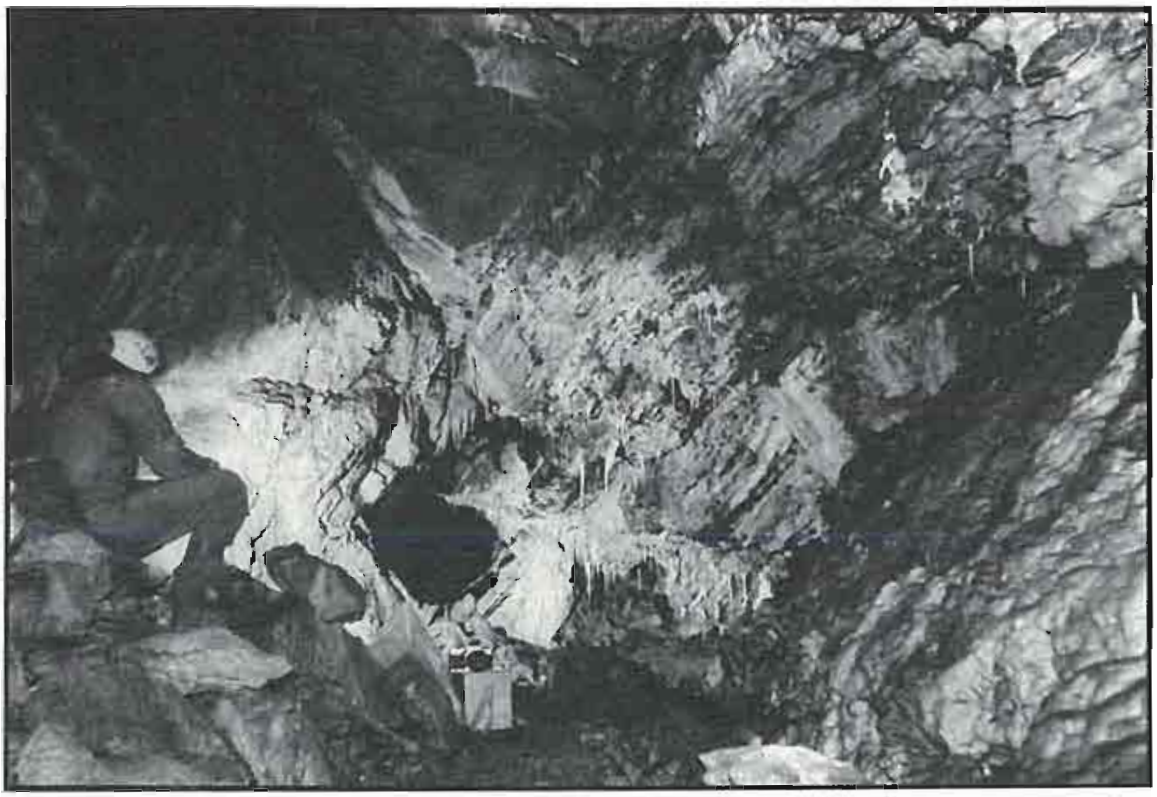
The Bohemian Karst is a small, but geologically, paleontologically and archeologically important karst territory southwest from Prague. The geological structure did not make it possible for extensive cave systems to be formed (the largest are the Koněprusy Caves with the overall length of galleries of about 2 km and depth over 7O m). There are no deep abysses (the deepest abyss is the one called "Na Čeřince" with the depth of 81 m) nor any rich dripstone decoration (the most beautiful decoration is in the Koněprusy Caves and in the cave called Martina). The whole region has been well explored from the speleological aspect and the possibility of finding free open underground karst cavities is practically excluded. Many such spaces, howerer, exist, but they are filled secondarily with sediments. Very hopeful for prolongation appeared sediments of the filled karst cavity in the abandoned Beran quarry between Srbsko and Karlštejn. In 1987 a group of speleologists belonging to the local organization of the Speleological Club 1-06 of the CSS Prague started work there and at the end of that year they succeeded - by digging through a sediment-filled crawling gallery - in penetrating into free spaces with incredibly rich dripstone decoration, into a cave later called Marie.

In the cave Marie several domes have been known up to now, as well as narrow galleries and manholes with the overall length of about 90 m and the denivelation of 11 m. The biggest Main dome is about 10 m long, 2-3 m wide and 6 m high. The cave has a rich decoration. There are many spaghetti stalactites there (the longest 34 cm), thin stalactites, taper formed stalagmites, papillate sinters, sinter curtains, different sinter films with colours ranging from white over pink, orange, violet up to black. Very frequent are floor sinters with small pools. In the cave there are still several possibilities of prolongation, but the work is prevented by the difficulty of transporting the mined material and the danger of damaging the decoration.

The members of the group have concentrated their attention to further cavities in the above quarry. The performed biolocation probing /by means of a divining rod/ hinted at the existence of further spaces. By digging through a narrow crawling gallery difficult to get through in the opposite face of the quarry the Northern cave was discovered. It is constituted by three dome-like spaces interconnected by narrow vents and a labyrinth of narrow crawling galleries. The overall length reaches 40 m with the denivelation of 4 m. The cave has no decoration.

In May, 1988 a manhole was opened not far from the Northern cave and thus it was possible to penetrate into the abyss system of the cave Dynamitka. It has /so far/ the overall length of 90 m with the denivelation of 18 m. It consists of 2 levels in the depths of 8 and 18 m below the surface conected by a fissure chasm and several hardly penetrable openings. The

upper level is constituted by low spaces with a number of blind manholes, the lower floor by a dome with the dimensions 6 by 7 by 3 m with two pools, the



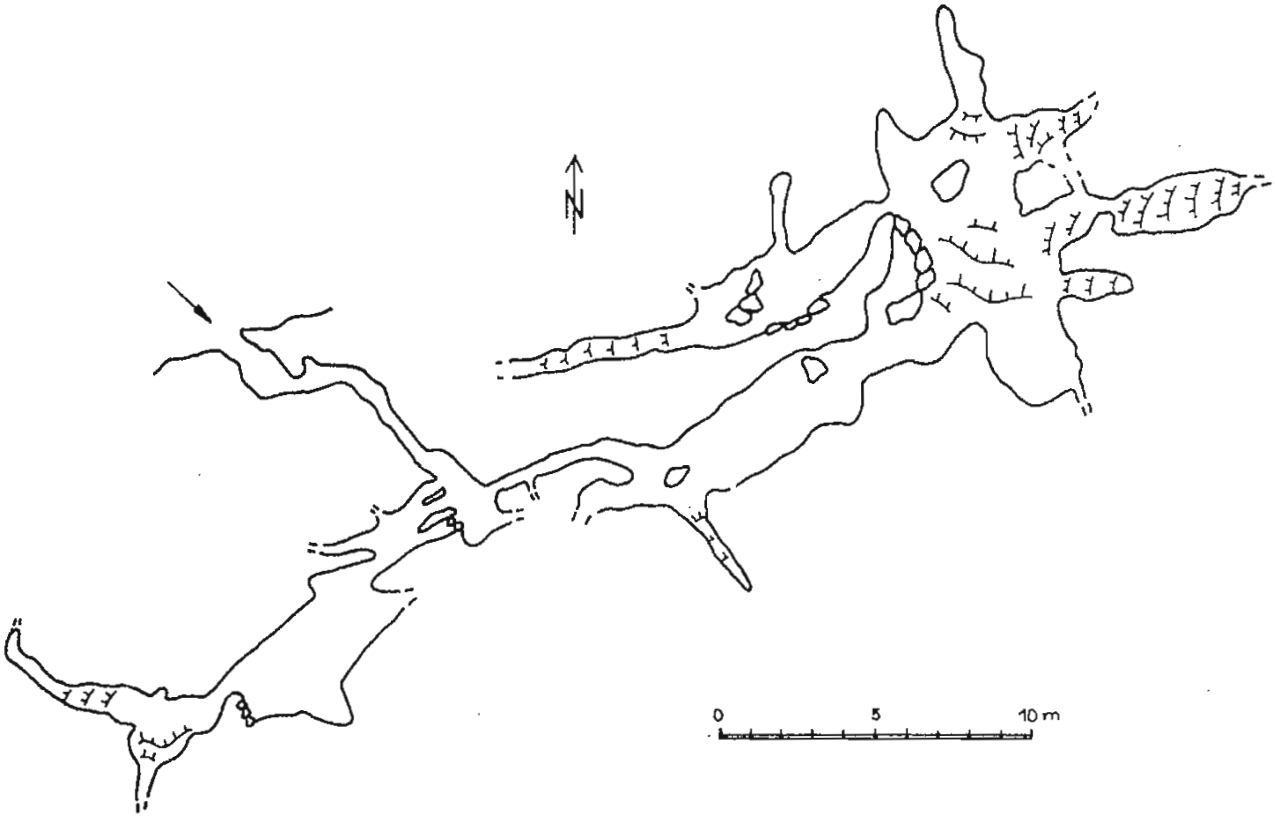
Cave Marie in Bohemian Karst. Photo Jiří Novotný.

larger having the surface of about 2 by 4 m and the depth of 3 m. The diver exploration has not been carried out so far, but it is supposed to be a siphon. The cave has almost no decoration, only in one space of the upper level there are several snow white stalactites and sinter films. If the connection of the Northern cave with Dynamitka is proved, the Northern cave will be the highest level of Dynamitka.

Some more unknown spaces are supposed to be in the area of the Beran quarry. New discoveries are, however, paid for by hand work and very difficult material transport through narrow spaces to the surface. Nevertheless, the discoveries made so far are exceptional, the cave Marie belonging by its decoration among the most beautiful caves of the Bohemian Karst.

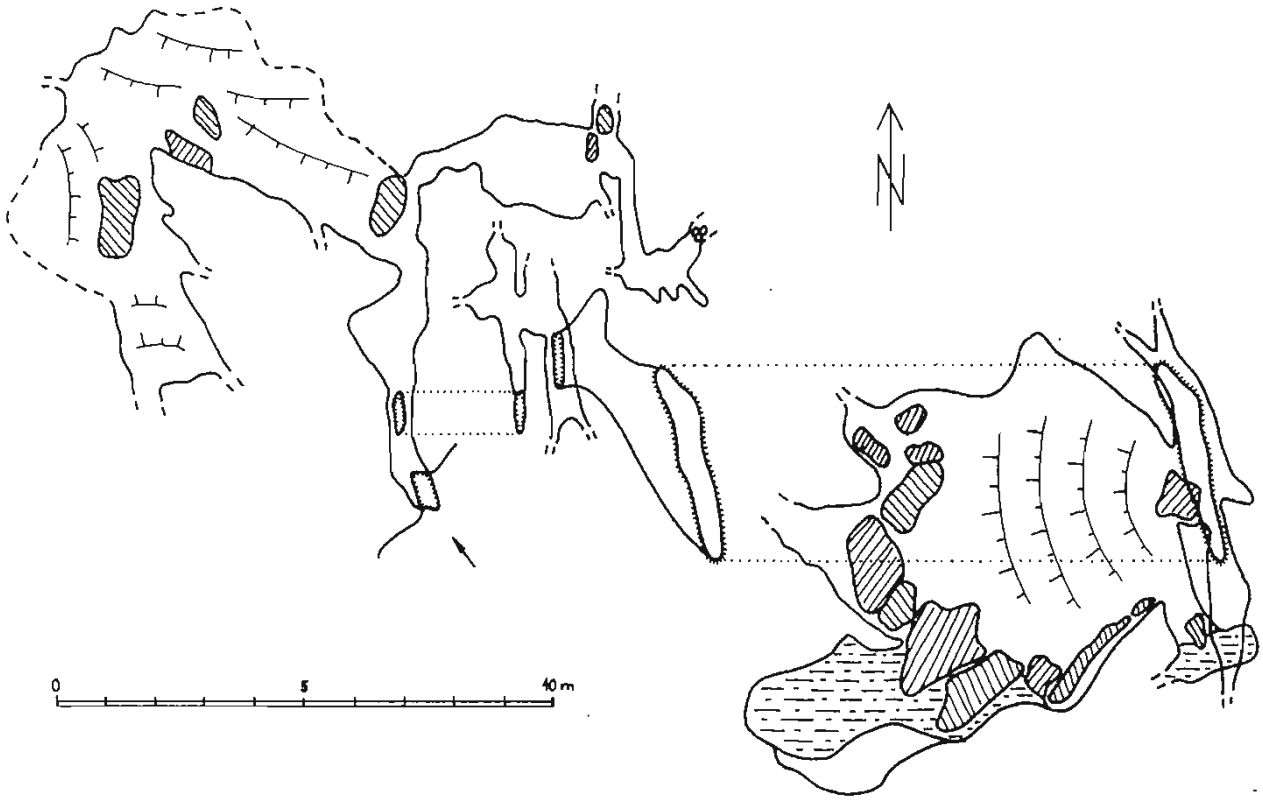
Ing. Jiří Novotný
Local Organisation 1-06
Czech Speleological
Society /CSS/.

Plans:



1. Cave Marie in Bohemian Karst. Groundplan.

2. Cave Severní in Bohemian Karst. Groundplan.



3. Cave Dynamitka in Bohemian Karst. Groundplan. In plan overlapping parts are designed separately and connection is marked by dotted line.

KARST PROCESSES IN COLD CLIMATE (on the example of the Moravian Karst)

Roughly 25 % of land surface exhibit negative thermal balance. They are regions in the cold climate with the occurrence of permafrost. Permafrost are rocks whose temperature has been permanently below the freezing point (0 °C) for more than 2 years. Typical of permafrost is the occurrence of water in the form of underground ice. The presence of permafrost gives rise to different cryogenic processes. Those territories are usually denoted as periglacial regions. In periglacial regions large parts are constituted by karst rocks. Large karst territories are found in the periglacial regions of Siberia, Canada and Alaska.

Climatic conditions of cold regions and the occurrence of permafrost do not support the formation of karst in periglacial regions. On the other hand, permafrost concentrates surface runoff and cold climate increases the solubility of carbonates. The dissolution of carbonates in cold climate is relatively intense and it has been observed in all regions. The values of chemical erosion in cold climate are relatively high. At present a number of observations confirm the fact that karst processes are in progress in permafrost at different depths below the Earths surface and with different intensity.

Karst regions at the present-day periglacial zone can be divided into low platform territories (such as in the northern parts of Siberia and Canada) and, on the other hand, into mountain karst territories. Karst forms in present periglacial regions can in turn be divided into contemporary forms and fossil forms (paleoforms).

The progress of karst processes in cold climate can be illustratively shown on the example of the Moravian Karst in the central part of Czechoslovakia which in the cold periods of Pleistocene was situated in a periglacial climatomorphogenetic zone.

The Moravian Karst is a karst territory 25 km long and 3 - 6 km wide. It is constituted by folded Devonian and Lower Carboniferous limestones. Folded karst rocks were planated and karstified. The earliest karst forms in the Moravian Karst are depressions on the Pre-Cretaceous planation surface. The depressions are filled with Jurassic and Cretaceous deposits. In the Tertiary Period the planated surface was dissected by deep karst canyons and caves were formed at several levels.

In the cold periods of the Pleistocene the whole of the Moravian Karst was situated in a periglacial climatomorphogenetic zone. In the Moravian Karst there is evidence that in the last 2 million years permafrost was repeatedly formed in the cold periods of the Pleistocene and subsequently it thawed again. The thickness of permafrost in the Moravian Karst surpassed 130 m, probably reaching as much as 300 m. In many caves synchronous periods were found of considerably falling of big angular blocks from the roof of caves. Even in very deep caves stratified cave deposits were found. In the

profiles layers of angular fragments alternate with positions of cave loams. In accordance with the experience from other European countries (such as France - J.J.Blanc, 1985) the falling of angular fragments from cave roofs is linked up with the thawing of permafrost at the end of cold periods of Pleistocene. Probably also at the end of stadials of the last glacial period (Würmian) permafrost thawed at the end of stadials W1 and W2. Frost weathering in the cold periods resulted in the damaging of cave roofs and the formation of frost fissures. Underground ice, however, strengthened the loosened rocks and only during its thawing in connection with permafrost degradation the individual angular blocks fell from the cave roofs.

Cryogenic processes considerably affected the development of the Moravian Karst in Pleistocene. Firstly, permafrost caused the formation of ice plugs in the caves. Ice plugs prevented the movement of karst water in the caves. At the same time permafrost formed an impermeable table for surface water and in karst valleys surface (at least intermittent) water streams originated. In karst valleys we often come across erosion forms created by those streams as well as fluvial deposits (mainly only partly rounded gravels). Secondly, permafrost led to a considerable increase in the intensity of slope processes. Frost weathering remoulded karst rocks and resulted in the formation of a large amount of angular fragments. Solifluction and slope wash transported angular fragments to the valley bottom. Braided streams transported angular fragments through the valleys. In blind and semi-blind valleys fluvial and lacustrine sediments accumulated. Thus, a blind valley near Sloup is filled with fluvial and lacustrine deposits 80 m thick (L. Slezák in Moravský kras, 1984, p. 63). In blind valleys near Holštejn and Jedovnice (Rudice) sediments of intermittent periglacial lakes can be observed. Some blind valleys were completely filled with those fluvial and lacustrine deposits. The blind valley near Sloup thus changed into a semiblind one and during floods the water flows over to the canyon of Pustý žleb. The sediments blocked the original ponors in the bottoms of blind valleys, new ponors originating at the level of sediments at much higher level than had been the original ponors at the beginning of the Quaternary Period. Also earlier Tertiary Period ponors may have been activated. Some caves were completely or prevailingly filled with fluvial sediments (such as in the blind valley near Holštejn).

Debris and deposits also stopped karst springs. The deposits at the bottoms of karst valleys made the karst water levels rise. In the interglacials the lowest karst level bound to the bottom of karst canyons was filled with water. New karst springs arose (or earlier karst springs were activated) at the level of deposit surface at the bottoms of karst canyons. A new karst level began to be formed which was bound to the surface of deposits at the valley bottoms (J. Přibyl, 1986). Thirdly, frost weathering in the cold periods of the Pleistocene changed some cave entrances. In the caves debris cones were formed consisting of angular fragments. I have mentioned the fact that also in deep caves the aggradation and the degradation of permafrost formed stratified cave deposits. In some caves pseudomorphoses after ice wedges were formed (e.g. in the Ochoz cave). Frost weathering also damaged

speleothems. In rough scree dripstone fragments are found. Fourthly, cryogenic processes changed the surface forms of the Moravian Karst. Besides the accumulation forms mentioned above also erosion forms originated. On the slopes cryoplanation terraces were formed (such as in the southern part of the Moravian Karst on the slopes of Hády Hill). Karst pediments are bound to the surface of sedimentary filling of blind and semiblind valleys (V. Panoš, 1961, p. 85). Due to the fact that they are bound to the surface of Pleistocene accumulation filling of a blind valley, they are evidently cryopediments. The upper surface of the permafrost table impermeable for water and a lot of material descending from the slopes caused the braiding of streams and supported the side erosion and undercutting of slopes.

Karst processes in periglacial regions with the occurrence of permafrost are characterized by a specificity which has not been completely known up to the present. The study of the development of karst regions under periglacial conditions is thus a very important task of karsology and speleology. The knowledge of the operation of karst processes under periglacial conditions with permafrost is important not only for the recognition of karst development in present-day cold climates, but also for the explanation of the development of the karst under periglacial conditions in the Pleistocene.

The conclusions following from the study of contemporary karst regions with permafrost as well as karst regions in Pleistocene cold regions can be summarized as follows: First, karst processes take place also in periglacial regions with the presence of permafrost. Even in continuous permafrost there are unfrozen aquifers (the so-called taliks) at different depths and water circulates in karst rocks. The circulating water is usually bound to deep-seated faults and fissure zones. Very frequent are taliks in valley bottoms. I have already mentioned the fact that permafrost concentrates the runoff and in the valleys of the present periglacial zone there are water streams (at least intermittent). Due to the heat brought by the surface water streams taliks are formed under the bottoms of karst valleys (closed or even open taliks). Second, frost weathering, formation of ice wedges and further cryogenic processes widen the fissures in karst rocks. The opening of fissures increases the intensity of karst processes. In open fissures surface waters, underpermafrost waters and waters of open taliks in permafrost circulate. This water circulates along the fissures, widening them and forming karst cavities even in permafrost. Third, permafrost slows down karst processes. Karst cavities are sealed with cave ice. Cave ice forms ice plugs in caves and in other karst cavities (such as ponors). Frost weathering produces large amounts of angular fragments which fill in ponors and in places they fill the caves up to their roofs.

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BULL ROCK CAVE /MORAVIAN KARST/: PROGRESS REPORT

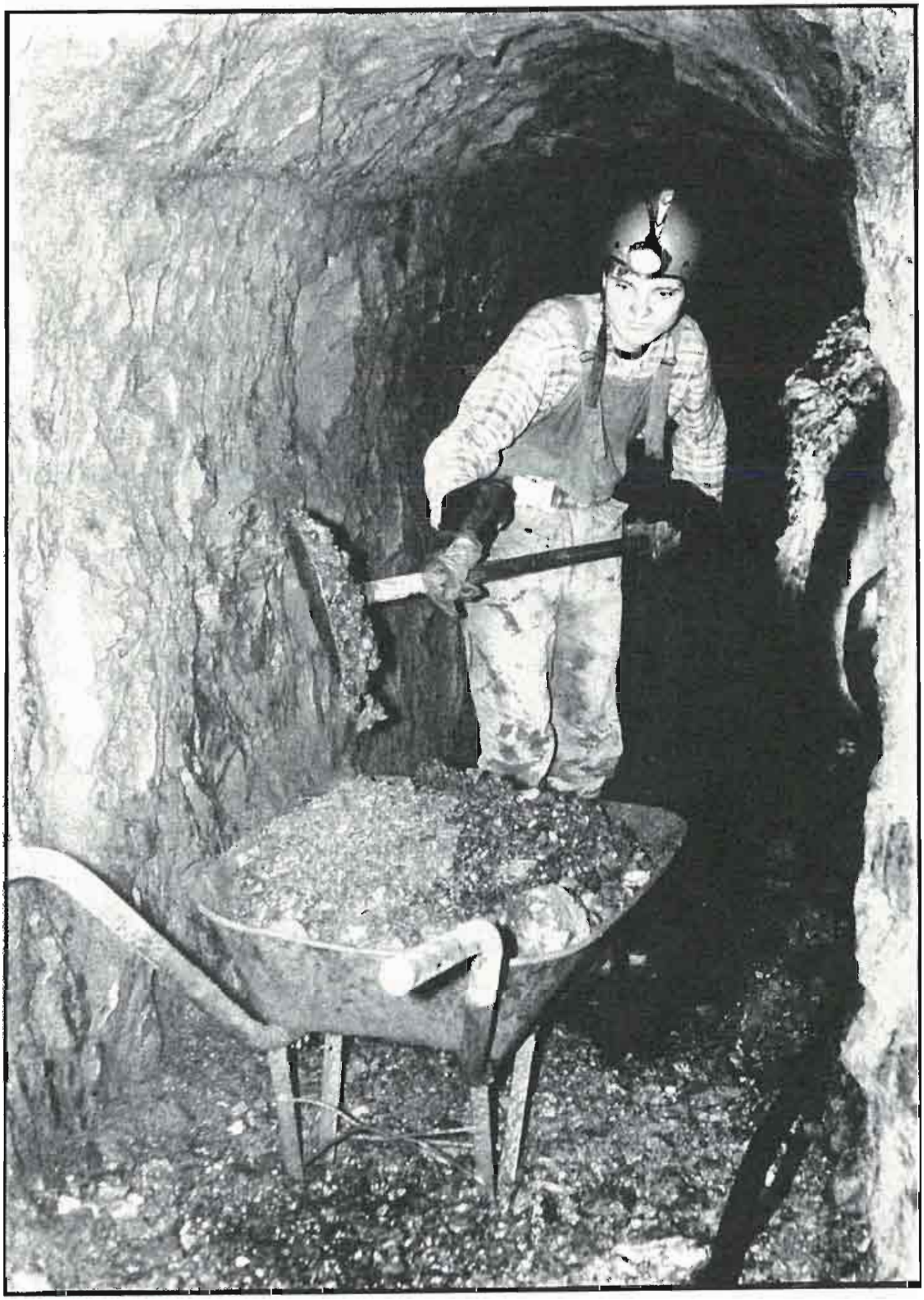
Bull Rock Cave is situated in the central part of the Moravian Karst. It belongs to the cave system of the Jedovnický potok Brook. Czech Speleological Society, Local Group 6 - 01 Býčí skála is studying the cave system during last 35 years. Great discoveries were made mainly in the last 5 years. The large group of Members of the Czech Speleological Society (including members of other Local Groups and cave divers of the Local Group 6 - 09 called Labyrinth) is working hard in this cave. This Progress Report is prolongation of the report in the publication of the Czech Speleological Society published on occasion of the 9th International Speleological Congress, Spain 1986.

The way upstreams in the cave was closed by several siphons. Siphons were opened. Now only the last siphon called Srbský siphon is not possible to pass by dry foot. Srbský siphon is dividing the Ponor of Rudice and the Bull Rock Cave. In the past, the biggest problem was Šenkův siphon. This siphon was known for many years. The effort of speleologists in the past finished just in this siphon. In the year 1920 this siphon was pumped dry by the group of the Club of German Tourists. Than, the second siphon called Sifon dřiny - was large obstacle for 64 years. In October 1984 the way into new caves was opened by the exploration gallery made by the Local Groups 6 - 01 Býčí skála. The exploration gallery is 37 m long and the blasting took 3 years. The third siphon - Sifon potápěčů - was opened also by exploration gallery 55 m long. The driving of this gallery took 11 months.

The important role during the research was played by cave divers. Already in the year 1912 the cave diver G. Nouackh tried to pass Šenkův siphon. He was the first cave diver not only in Moravian Karst, but in the whole world. Cave divers of the Local Group 6-09 Labyrinth passed the next siphon Sifon dřiny only partly, but the map they made was the guidance for the exploration gallery into the Prolomená skála (Break Rock). Siphon of Cave divers (Sifon potápěčů) was most difficult task for cave divers. This siphon is 110 m long. It is also very narrow and special techniques were used. During diving December 30th, 1984 the cave diver M. Měkota used 2 cylinders situated on both sides of his body. He showed the way to Proplavaná skála cave (1,9 km long) upstream to the last siphon - Srbský sifon. Srbský siphon was passed by M. Mičán on February l6th, 1985.

The diver after passing the siphon came into Velikonoční jeskyně Cave, which is a part of the Ponor of Rudice. Cave system of Jedovnický potok is now 13 km long.

In the year 1985 the project of exploration gallery through Siphon of Cave divers (Sifon potápěčů) was approved. The base for project was the map made by cave divers. For a more precise delimitation of direction and lenghts of the gallery supplementary research was needed. Members of the Local group 6-01 pumped out sediment from narrow parts of the Siphon of Cave Divers in the year 1987.

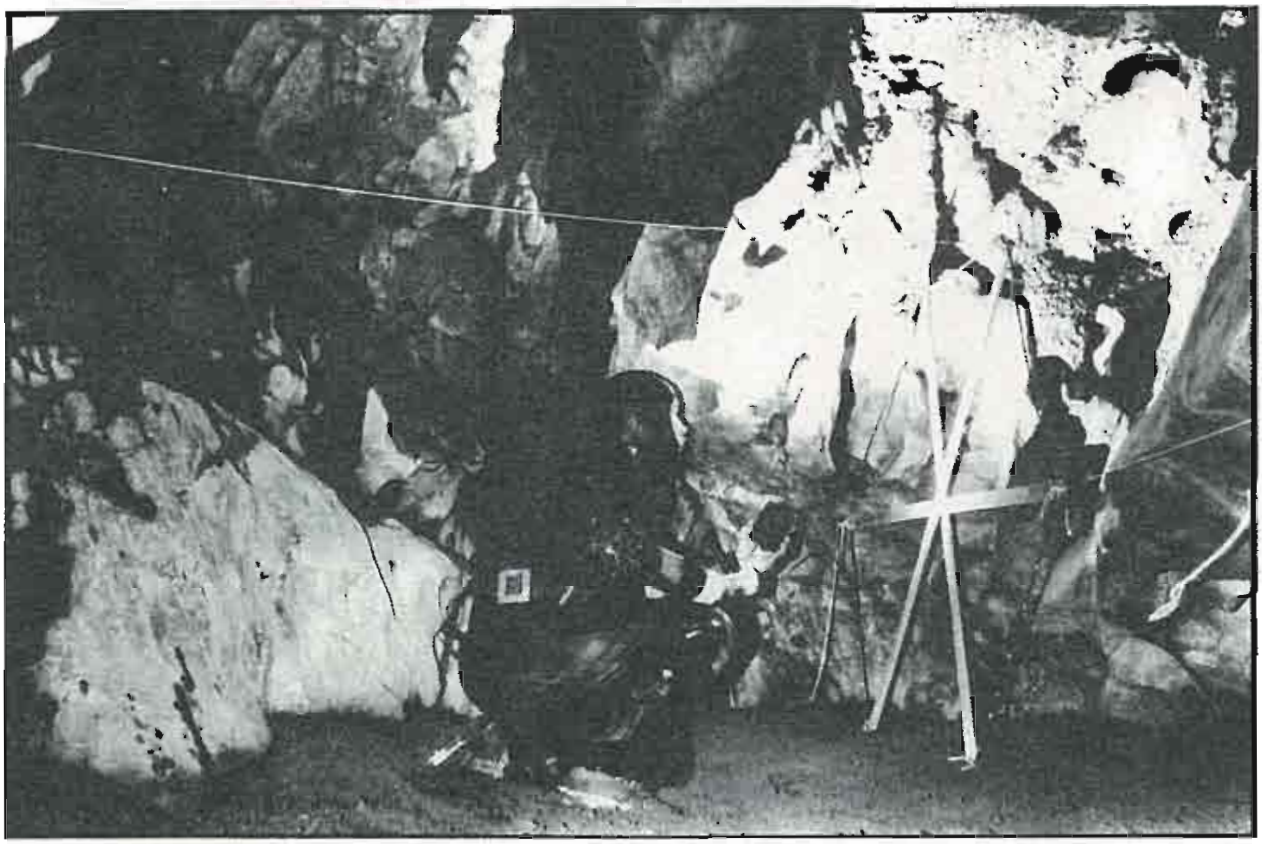


Member of the Basic Group 6 - 01 CSS working in the exploration gallery in the vicinity of the Siphon of Cave Divers, Bull Rock Cave.

The exact direction of the gallery was also established by the low frequency radio localizer constructed by Z.Šerebl. Cave divers pulled through the cable and in the Dome of Cave Divers the transmitting aerial was installed on the place of the proposed end of the exploration gallery. The measurements showed the precised mapping of cave divers.

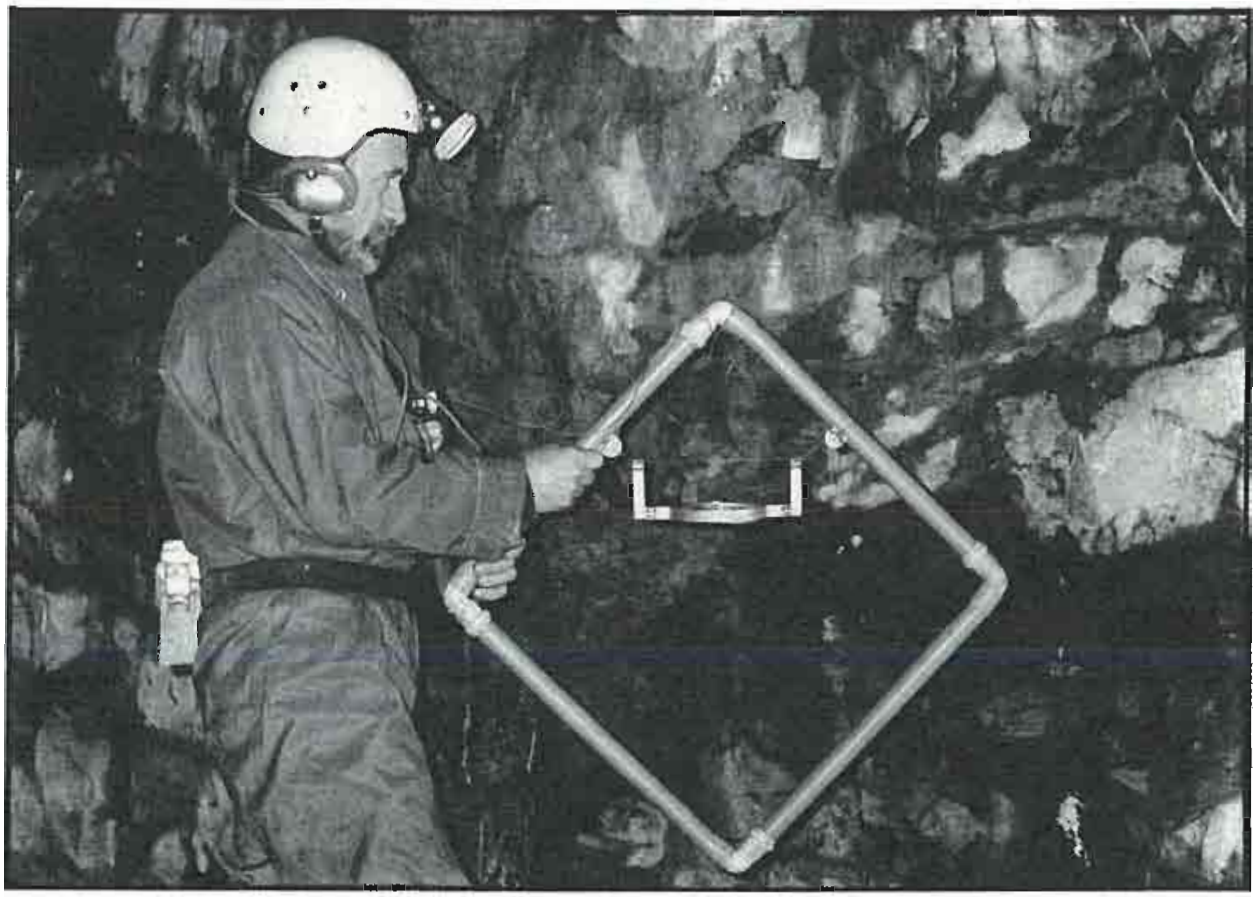
Before the beginning of the blasting in the surroundings of the Siphon of Cave Divers the distribution system of the pressure air, electric cable 3x 380 Volts and telephone cable 1200 m long were installed. The driving of the gallery started in October 1987. The profile of the gallery was 2 x 1.1 m. For boring members used driller Permon VK 22.

During the preparation of driving, members studied the ponor in the Bull Rock Cave. In May 1988 it was established that siphon is 45 m long and 11 m deep. Speleologists discovered 240 m long galleries mostly inundated by Jedovnický potok Brook. Newly discovered May Cave (Májová jeskyně) is closed by the siphon, not yet passed. New discoveries are situated between Bull Rock Cave and Sobol Cave.



Cave diver is installing transmitting aerial of the radio localizer in the Dome of Cave Divers (Dóm potápěčů)

The blasting of the exploration gallery was influenced by the structure of Devonian limestones and their jointing. Limestones are thinly - bedded. Bedding joints and fissures were filled by clay. The direction of the gallery was controlled by radio localizer. The gallery ended January 15th, 1989 exactly on the place of transmitting aerial of the radio localizer. Driving of galleries



Receiving serial of the radio localizer in the Bull Rock Cave

through siphons of the Jedovnický potok Brook is just on the edge of possibilities of the Local Groups, Czechoslovak Speleological Society. But by driving the secure way into caves was opened, earlier visited by cave divers only. New caves are studied now and new scientific discoveries and prolongations are expected.

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Zdeněk Šerebl
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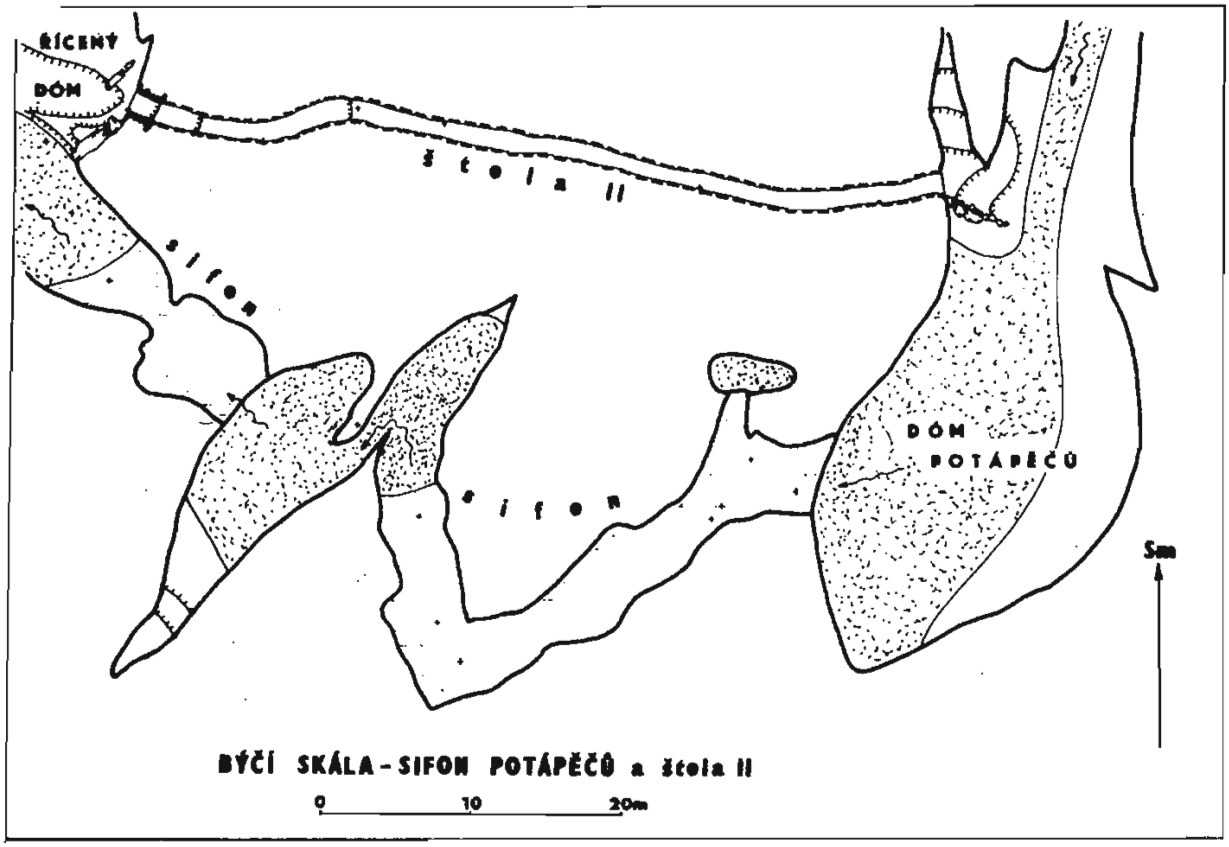
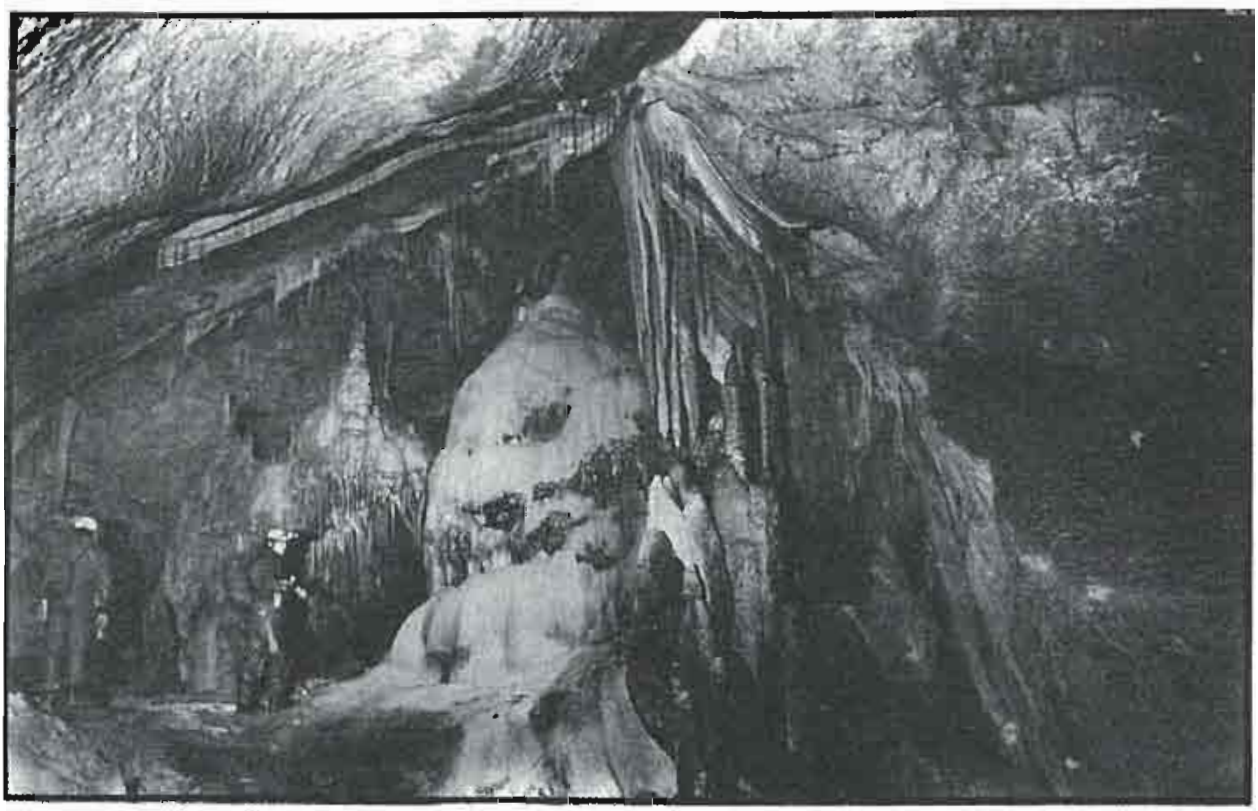

RÍCENÝ
DÓM
štola II
sifon
sifon
DÓM
POTÁPĚČŮ
5m
BÝČÍ SKÁLA - SIFON POTÁPĚČŮ a štola II
0
10
20m

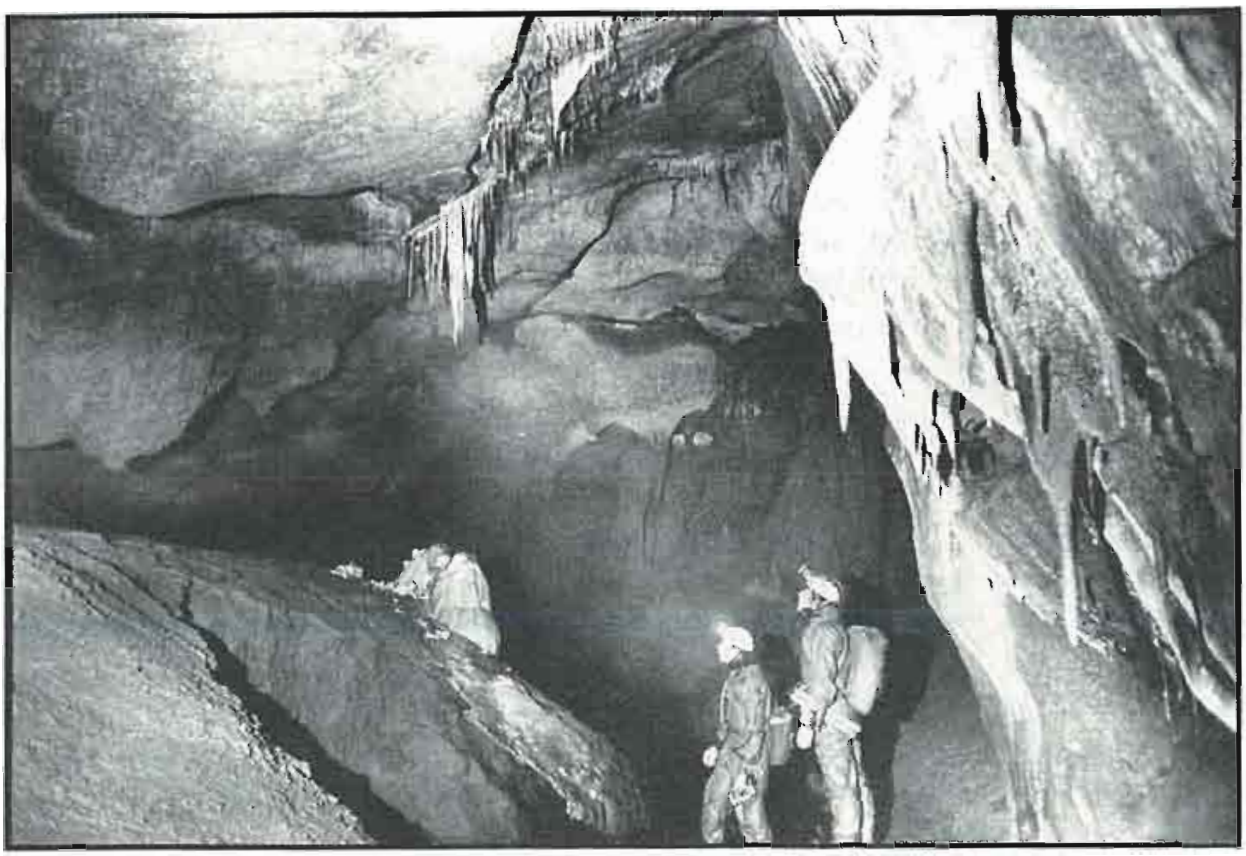
CAVE DIVING EXPLORATION OF THE ČIERNY POTOK BROOK

/The Slovak Karst, the Slovak Socialist Republic/

The most extensive karst region in Czechoslovakia is the Slovak Karst in the Slovak Socialist Republic, dissected by river valleys into 8 plateaus. The largest of them - the Silica Plateau - with its 150 km² of Middle Triassic limestones is characterized above all by a large amount of sinkholes and abysses and a lower number of caves. From the hydrographical point of view there are only three small karst lakes on the surface with impermeable underlying Werfenian slates. Surface streams are missing, all precipitation becomes immediately a component of ground waters which spring up 400 m lower below the steep edges of the Silica Plateau in several springs. All ground water is of autochthonous origin. The most important drainage of the central part of the plateau is the catchment area of about 11 km² of the submerged Čierný potok Brook which starts at the karst lake Fararova jama, flowing through the cave called Silická l'adnica, takes water from the intermittent ponor in the blind valley of Červený kamen and also from the Ponor abyss. In the end the Čierný potok Brook flows through the Gombasek Cave (discovered in 1951) at the western foot of the Silica Plateau and later made accessible for the public. There it also flows out as the Čierna vyvieračka with a mean discharge rate of 70 l/s about 5 km beeline distance from its origin.



Cave »Silicská l'adnica«



The large cave with abysses called Silická l'adnica was described as early as in 1944. It is characterized by the year-round glaciation in the imposing entrance part of a very small altitude above sea level of 500 m. In speleological exploration the explorers succeeded in extending the cave to 300 m with its depth of 91 m, thus discovering the archeological Dome with the culture of Buková hora (Neolith) and also for the first time see the underground flow of the Čierný potok. Progressing downstream many semisiphons were overcome, siphons were bypassed by through-outs in clayey sediments and sinter plates, and the exploration ended at a siphon under a compact rock. The first and last attempts in penetrating in were carried out in 1967 by divers from the Cave Diving Group, Bristol University.

Twenty years later a cavediving group of the CSS, local organization 1-10 Speleoaquanaut from Prague started working there. After a year of exploration at the locality 600 km away from Prague and after developing new diving methods Mr. V. Jansa succeeded by a solo penetration to reach a free continuation of the gallery. This was the most difficult siphon in the history of the operation of Speleoaquanaut. Difficult was also the transport of diving material from a road 2 km away, then by means of a sledge along the ice fall, through crawling galleries built to the plateau and from there the progress of equipped divers through the semisiphons and the crawling galleries to the outlet siphon proper.

The original mighty gallery is at present filled with clayey sediments

almost up to a flatroof where there is a wide space, in the siphon it is filled with water which in these sediments cut a bed (cuvette) with a cross section corresponding to the cross section of man. In diving it was not possible to use the usual cylinders in the backpack and even cylinders at the side had to be pushed through water-bearing clay, even though the beginning of the siphon was deepened. Besides, these solo penetrations were carried out at zero visibility, when not even a wrist watch could be seen, the same as the compass or manometer indicating the supply of air. The lights were no good and everything was covered with the ubiquitous and adhesive clay. Under those extreme conditions the rate of progress was only 1 m/min^{-1}. For further exploration attempts and their completion plastic boxes were made ("trunks", "submarines", "sledges") in which there were cylinders, other diving equipment and the load to be used behind the siphon, with only two automatics jutting out. Inside the boxes there is water, but the equipment and the payload are protected from getting dirty, polystyrene plates providing neutral upthrust and rounded forms with a handle easy pushing through the bed of the siphon. The difficulty of the exploration on the other side of the siphon was slightly reduced by the depth, three air pockets and one small dome and mainly the reserve of air for 4.5 hrs. Even though today there is a fixed rope there, a telephone, the course of the siphon is known as its dimensions (0.3 - 0.4 x 0.7 x 65 m), it remains always psychically the most requiring siphon, in essence a muddy crawling gallery in the darkness flooded with cold water.

Immediately behind the end of the siphon the Čierny potok Brook flows through a mighty gallery about 10 m wide and 5 m high. The bottom is completely filled with loamy sediments, in places covered with a thin layer of sinter, from time to time with dripstones. They occur in a larger amount in several tectonically broken places, e.g. behind the siphon at a place where a fossil gallery of a right bank tributary now flowing 5 m lower at the level of the Čierny potok Brook joins. Numerous is also the occurrence of excentric and straw stalactites, the longest about 180 cm. Eighty meters behind the siphon the bed of the Čierný potok Brook was stopped by big blocks fallen from the roof but the siphons thus formed can be by-passed around the rich dripstone decoration. Cracked sinters and straw stalactites fallen down witness the instalabity in this region. The river gallery often widens to 20 m, but in some places the roof is so low that it is necessary to go through semisiphons. About 350 m behind the Siphon the character of the cave changes suddenly, the water continues through siphons below big blocks between which it is possible to get into a confused collapsed Karina dome /dimensions 30 by 40 m/ and the measured height of 43 m. The biggest rock block reaches up to the half of this height. From there the brook continues with slight inclination between clayey sediments up to 450 m, where it breaks through old, horizontally situated sinter plates, and some tens of meters further it suddenly disappears in the draining semisiphon by cascades 10 m lower. Those narrow beds are filled with sharp angular sinter fragments. For the time being it is impossible to get through, it will be necessary to dig through further sinter

layers. A fossil gallery of a large cross section continues then horizontally about 60 m, then the roof becomes lower until it gets joined with the floor sinter. This gallery touches the last dome called in Czech language "U hříbku", dimensions 50 x 15 x 15 m, where flood rubble drains can be observed. Otherwise, along the whole stream there are no perceptible water level marks witnessing the increase in the water level during intense precipitation, although at the clayey deposits there are mud cracks with almost imperceptible ripple marks. On the walls up to the height of 4 m there got stuck small carbon fractions from Neolithic fireplaces in the Archeological Dome. An interesting find is a sediment layer very rich in mollusc shells of Batynella and two species of Pisidiae, which witnesses the existence of the permanent paleostream at the surface of the Silica Plateau.

The 300 m of the hitherto known cave Silická l'adnica has thus been extended by 65 m of the siphon called "Kufr" and then by about 600 m of new galleries with formidable domes. 2.5 km beeline distance from there and 100 m lower the Čierný potok Brook flows, after 68 h, through the Gombasek Cave, where the divers of the Speleoaquanaut have not yet succeeded in removing by means of an air lift sandy sediments in the narrow part of the influx siphon at the depth of 10 m. According to the conclusions of the fractal analysis at least km of the unknown riverbed of the Čierný potok Brook expects in the Silica-Gombasek Cave system.

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FOREIGN CONTACTS OF THE CZECH SPELEOLOGICAL SOCIETY 1986 - 1988

An important sphere of the CSS activity is the cooperation with the International Speleological Union, national speleological organizations abroad and the Society's speleological activity proper abroad. In 1986 - 1988 the Society organized a number of actions with international participation in the CSSR including several actions organized directly by the ISU Commission and a variety of actions abroad oriented at the participation in specialized conferences, symposia, campings, in exploratory, research and documentation works organized within speleological expeditions abroad and study trips and excursions about foreign karst regions. In cooperation with foreign speleological organizations also speleologists from abroad were invited to Czechoslovakia. During their stays they got acquainted with the CSS activity and with the karst regions and caves in the CSSR. Excursions abroad as well as receiving guests from abroad are formally organized through the Ministry of Culture of the CSR which meets the demands of the Society as much as possible.

The objective of the present contribution is to give a brief overview about the important actions with international participation held in 1986 - 1988 in the CSR and, above all, the activity of the CSS in the past period abroad.

At the IXth International Speleological Congress in Barcelona Asst. Prof. Vladimír Panoš was again elected vice-president of the ISU. Among other functions, he also holds the function of maintaining contacts of the ISU with the UNESCO Centre. Further, Dr. Pavel Bosák works in the function of the chairman of the Commission on Paleokarst and Speleochronology, and Ing. František Tomáš Piškula is the chairman of the Commission of Cave-Diving. Besides, Czech speleologists collaborate with almost all ISU committees as their active members. That is why three important ISU actions were organized in the CSR in the past period. In 1986 it was the International Symposium on Speleotherapy and the session of the respective committee, in 1988 the session of the Commission of Cave Diving and the symposium New Trends in Speleology connected with the session of the Commission on Paleokarst and Speleochronology.

Besides those actions organized at the instigation of ISU bodies, the CSS organized important symposia, seminars and meetings with ample international participation. They are above all actions like the traditional Meeting of Speleologists in the Bohemian Karst, symposia on historical underground, pseudokarst, the Krkonoše - Jeseníky Mts. system, and, "Speleoforum", an action organized every year, oriented at the overview of the activity of the CSS in the past year.

Not taking into consideration the participation of the ISU functionaries at the sessions of the respective bodies, Czech Speleologists took part in the following actions:

1986:
- 7th international camp of cave diving in Italy,
- 7th international conference on speleorescue in Italy,
- IVth international speleological school connected with the session of the ISU Commission of physico-chemistry and hydrology of karst in Bulgaria,
- the international symposium "Karst Systems of the Atlantic Border" in Portugal,
- the international symposium "Problems of the Comprehensive Karst Studies of the Mountain Regions" and the session of the Commissions and ISU Bureau at Tbilisi /USSR/,
- 14th international festival of underwater photography and film in France,

1988:
- symposium "Hundred Years of French Speleology" at Millau,
- international symposium about the physicochemical, chemical and hydrological exploration of the karst at Košice (Slovakia, CSSR),
- a meeting with international participation on speleological explorations, rational utilization and protection of the karst region and caves of the Western Caucasus at Sochi (USSR),
- celebration of the Postojnska jama cave connected with the session of the Commission for cave protection and cave tourism in Yugoslavia,
- international seminary on technical problems of cave diving in Italy.

The speleological activity proper of the local organizations of the CSS abroad was performed mostly in close cooperation with foreign partner organizations, usually at the direct invitation of those organizations. Thus it was made possible to carry out expeditions and study trips to important karst regions of almost all European countries and to Australia. The following overview lists the results achieved during the above trips:

AUSTRALIA

In 1987 the local organization 5-02 Albeřice, on the invitation of The Sydney Speleological Society and in direct cooperation with the Tasmanian Caverneering Club organized the expedition "Tasmania 87" whose exploratory, research and documentation activities were oriented at the northern projection of the karst plain below Mt. Anne in the southwest of Tasmania. In the region of interest neither speleological nor thorough geological research had been carried out before. The expedition counting seven members built up the basic camp in the entrance dome of what is today the second largest Australian cave Anne-a-Kananda, from where one-day working actions were organized into the region of interest. More than twenty caves were discovered, 11 important ones being documented. The largest discovered cave is the one called "Goggled Eyes" with the overall

length of 575 m and the depth of 76 m. It has two entrances and its lower parts are formed by giant domes strongly tectonically affected. The presence of sediments in this and also in other caves and the modelling of the galleries witness a polycyclic development. The origin of the caves falls most probably into a period when the territory did not have its mountainous character. Horizontal sections were developed in a shallow phreatic zone, the active development continuing later in the vadose zone. Vertical sections are relatively young, old parts being partly filled with sediments (clays, sands) which are now being transported into the lower, so far unknown, parts.

The expedition operated in the region for one month, the remaining month was devoted to the recognition of important caves and karst regions of Tasmania (Hastings, Mole Creek, pseudokarst at Mt. Wellington, the abrasion cave of the Tasman Peninsula). A separate report was published about the expedition. It includes all the important data. The information about the results proper of the expedition have been translated into English and they will be published by the CSS.

AUSTRIA

In 1987 Austria was visited by two members of the technical commission of the CSS. Besides problems of technical character they dealt with the Austrian partner with exploratory and documentation actions in the abyss Hochlecken Grosshöhle and in the cave Unterwelt, where more than 600 m new spaces were discovered. The surface exploration was caried out at the plain below the summit of Raucher in the chain the Totes Gebirge Mts., in which several new abysses were discovered.

In 1988 a group of Czech specialists in the problems of mapping and photography in caves stayed in Austria. Consultations with Austrian partners were universally useful.

BELGIUM

Exchange contacts with both the Belgian and the Flemish Speleological Federations belong among the traditional foreign contacts of the CSS. The members of the two federations spent some time in Czechoslovakia, being invited by the CSS, Belgian karst regions were several times visited by groups of speleologists from the local organizations 6-12, 6-08 and 6-05.

BULGARIA

Also Bulgaria with its karst phenomena belongs among countries frequently visited by Czech speleologists. In that country important international actions often take place. Besides the IVth international speleological school mentioned in the introduction it is necessary to remember the International Speleological Meeting "Pestera 87", in which also several members of the CSS participated. Further groups from the local organizations of the CSS visited the region of Rila-Rhodopes Mts., the Vracan platean and the well-known cave Dukhlata. The actions had an excursion

character. Of considerable value is the imported photodocumentation material from Dukhlata Cave.

FEDERAL REPUBLIC OF GERMANY

In the FRG there were excursion visits above all to the region of Schwäbische Alb, also visited by a group of speleodivers from the Prague club Speleoaquanaut, further the region of Laubenstein in Upper Bavaria. The actions had a cognitive character. Speleologists from the FRG are also frequent guests of the local organizations of the CSS and regularly participate in several central actions organized by the Society in the course of every calendar year.

FRANCE

In 1986 France was several times visited by Czech speleologists on the occasion of their trip to the IXth International Speleological Congress in Spain. These trips had all excursion, sport or cave diving character. The interest in French karst regions continued also in further years, but it was rather oriented at exploratory works in collaboration with the French partner organizations. They were performed in the region of the French Jura Mts., including the zoospeleological research in the cave Grotte des Cavotes. Altogether, the CSS organized at least 8 expeditions in the years 1986 - 1988. In those expeditions the caves Gouffre Berger, the vertical Pot II and a number of further were penetrated in the sporting way.

GERMAN DEMOCRATIC REPUBLIC

The GDR is interesting for Czech speleologists not only from the karst viewpoint, but the cooperation between the local organizations of the CSS and clubs in the GDR is carried out on the actual basis of exploration of pseudokarst border sandstone regions. Also the "Third Symposium on Pseudokarst" with international participation took place in the GDR in 1988. As for further partial actions organized in the GDR and in which Czech speleologists participated very much, one can choose the Festival week and the speleological camp in Rübeland on the occasion of the 450th anniversary of the discovery of the cave Baumanshöhle and 120 years since the discovery of the cave Hermanshöhle. Another sphere of activity developing actively in collaboration with the GDR are documentation and exploratory works in historical underground.

GREECE

Three important expeditions of the CSS went to Greece in 1988. While from two of them we have not received the necessary data so far (one group is still working in Greece), the third one consisted of physicians - specialists in speleotherapy. After the International Symposium on Speleotherapy held in Czechoslovakia in 1986 the universal interest in Czechoslovak speleotherapy has grown considerably. The direct consequence of this interest was also the invitation of Czech doctors to Greece.

HUNGARY

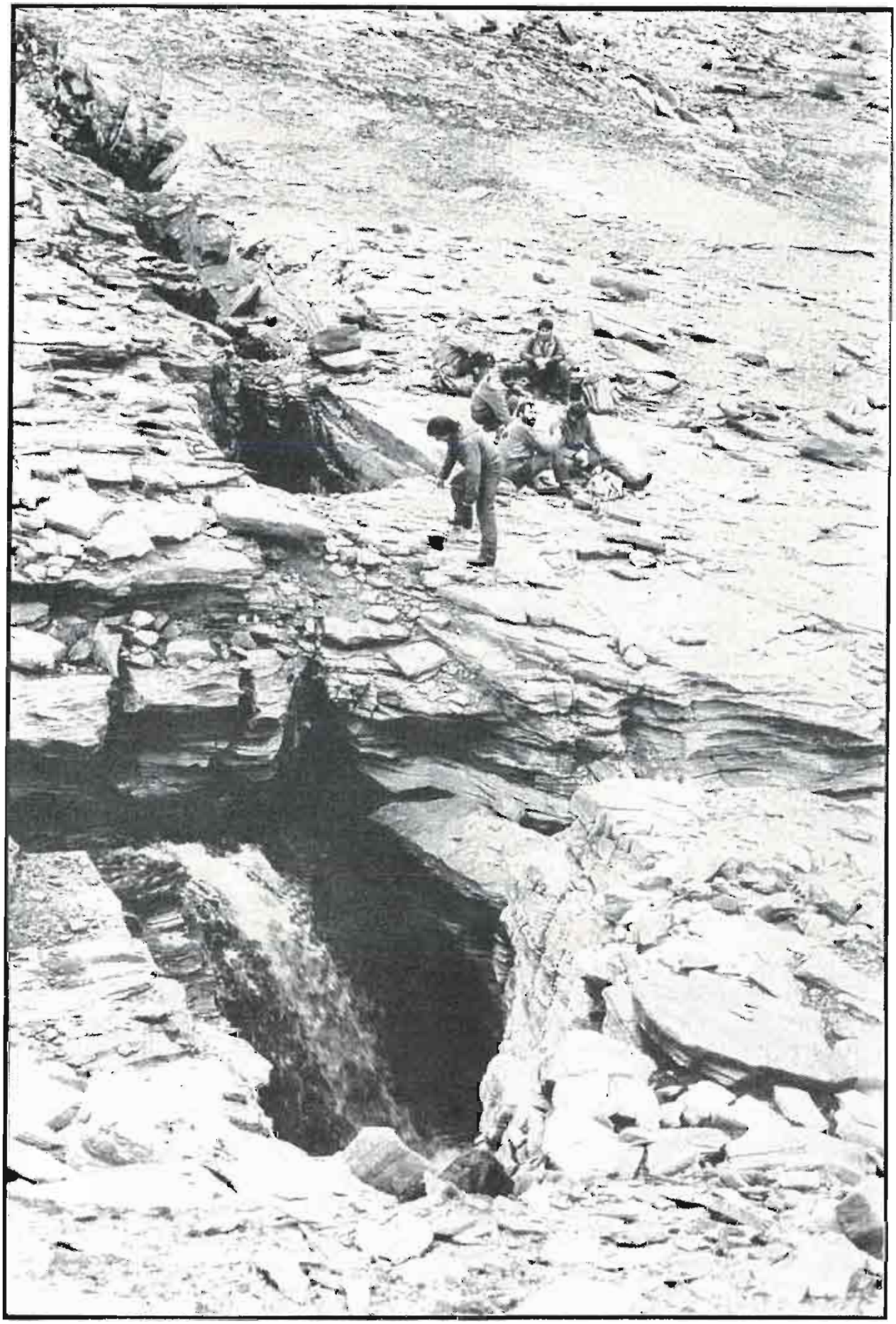
Also in the case of Hungary we can speak about actual cooperation between the CSS and the MKTB in the karst frontier regions. It is above all the territory of Dolný Vrch Hill which is situated on the Slovak-Hungarian frontier, but a great share in its exploration was that of the local organization of the CSS 1-06, the Speleological Club Prague which, in 1988, organized two expeditions into that region. The activity was oriented above all on documentation works at localities discovered in 1985. Besides, several local organizations of the CSS organized excursions and informative actions into different regions of Hungary. This concerns above all the hydrothermal caves in Budapest, the pseudokarst of the Matra and the region of Bükk Plateau with the deepest Hungarian cave called István Lápa.

ITALY

In the period followed Italy belongs among countries most frequently visited by Czech speleologists. The expedition of local organization 7-01 Orcus worked in the cave Spluga della Preta in 1986, Prague cave divers achieved remarkable results in exploring seepage flow below the sea level in Sardinia and in the siphons of the system of Su Ventu and Sa Oche in 1987. In that year Italy was visited by a record number of Czech speleologists on the occasion of the 7th International Cave Rescue Conference and the 7th International Cave diving Camp. In the same year there was a tragic accident in the cave Michele Gortani in which three Czech speleologist lost their lives. They were Jaromír Musil, Miroslav Pešek and Zdeněk Nigrin. Despite this tragic event we can speak about very good relations between the CSS and the speleological section of the CAI which develop not only in the sphere of field explorations, but also in the sphere of culture. In April 1988 local organization 7-01 Orcus organized an exhibition of photographs oriented at the exploration of the karst in the USSR by Czech speleologists in Trieste. The exhibition aroused broad interest and was much visited.

NORWAY

The CSS organized altogether three expeditions in the territory of Norway in the years 1986 and 1988. Two of them took place in the Spitsbergen in the form of participation in Polish polar expeditions. In 1986 the attention was concentrated at Werenskioldbreen Glacier, where hydrological, hydrochemical, glaciological and speleoglaciological research on the surface and inside the glacier was carried out and at the limestone region below Gnal in the range Sofiekammen. In those exploratory activities the hitherto largest ice cave of Spitsbergen was discovered and documented. It is 640 m long and the explorers succeeded in descending through a glacier shaft 71 m deep and discovering and documenting 430 m in glacial channels and documenting contact areas of the glacier and its underlying rocks. This action confirmed the assumption of a relatively high temperature under the glacier



The entries to the N - 1 system which was discovery by Czech expedition in the north of Norway

The topography documentation of the N - 1 cave which was discovery in the area Jieganlakko in the north of Norway

The stone bridge is relict of old cave levels which was explored by Czech expedition in the area Jiegnalakko in the north of Norway

(+ 0.8°C), when everywhere in the surroundings the ground is frozen up to the depth of 300 m.

The glaciological expedition worked in the year 1988 at the glaciers Werenskiold, Torell and Hans, where it discovered and documented 10 extensive glacier caves and descended through glacier shafts to the underlying beds into depths over 100 m (see the report by Josef Řehák).

The third expedition of the CSS to the territory of Norway selected the region of the western coast of Norway between the towns of Trondheim and Fauske for studying abrasion caves and further the district Bones in the region Troms lying on the Norwegian-Swedish frontier at 68°3O' northern latitude and 18°05' eastern longitude in the surroundings of the glacier lake Isvatnet between the crests Istind and Noevertind. During the activity of the speleological expedition TROMS 88 in the nordic karst of Norway a karst region was discovered above the village of Bonnes, about 80 km north of Narvik. The karst region formed in marbles is situated at the elevation of about 900 m between the peaks Noevertind (1420 m above sea level) and Istind (1455 m above sea level). It was the first exploration of this region, considerably distant and requiring. More than 20 caves were discovered, those longer than 30 m were documented. Altogether 9 caves were explored, mapped and documented. Their total length is 2,240 m. The longest cave was the one marked J-5 (777 m long) and the cave N-2, 702 m long. Most of the explored caves were flown through by active streams originating from thawing glaciers and snow fields.

The expedition explored several other regions with the occurrence of marbles, but with a negative result.

POLAND

The most useful act of cooperation with Polish partners can be considered the participation of Czech speleologists in two Polish polar expeditions in Spitsbergen which were mentioned in the section Norway. Besides, the CSS participated in the common exploration of border karst and pseudokarst regions (Králický Sněžník Mt., the Beskydy Mts.) local organizations 7-04 and 7-08 visited several times the Bear Cave at Kletno, local organization 5 - 04 descended in the sporting way to Bandzioch Kominarski, the cave called Czarna was visited and Czech speleologists participated in the International Speleological School at Mezihoří.

PORTUGAL

With the exception of Asst. Prof. Panoš at the international symposium "Karst Systems of the Atlantic Region" the CSS did not make any further trip to Portugal.

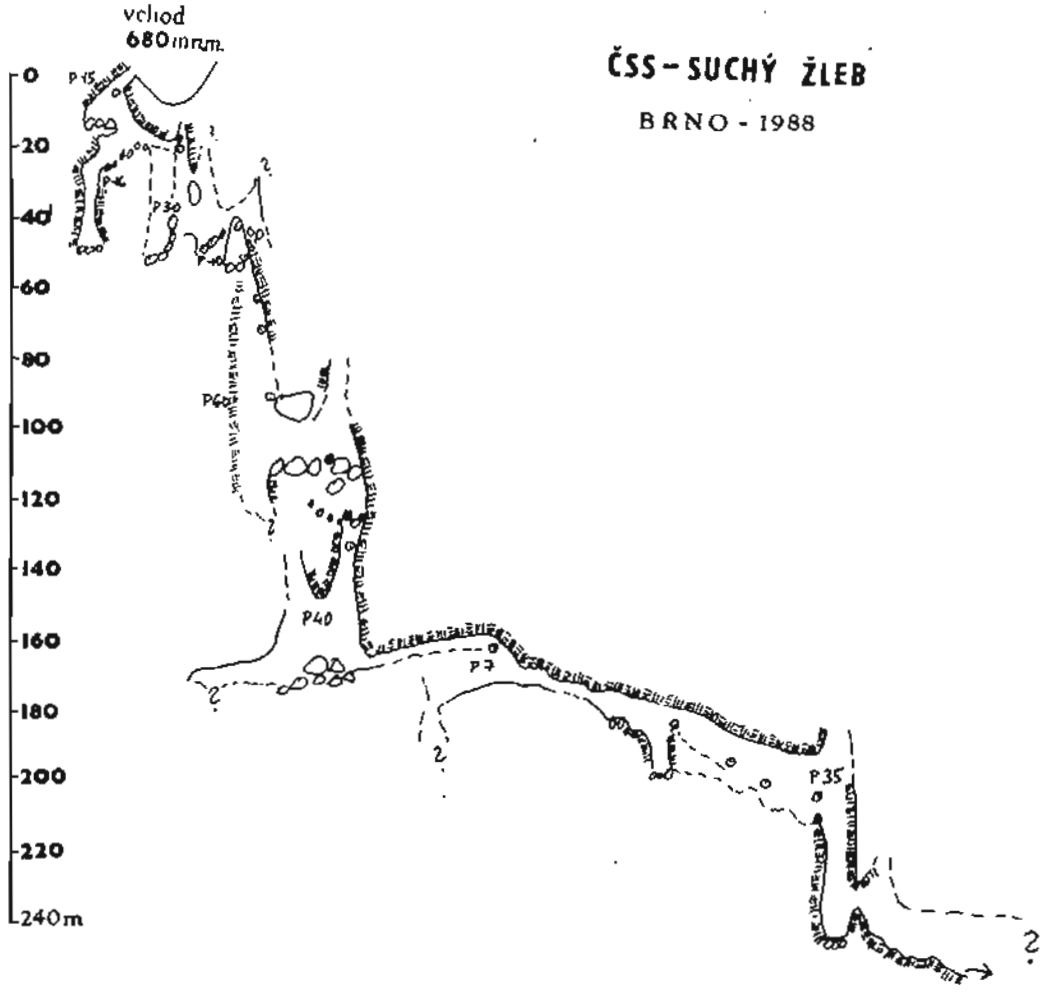
ROMANIA

In Romania local organization 6-09 of the CSS continued in 1987 and 1988 in cavediving explorations, organization 1-03 worked in the mountans Rodna,

6-17 at Padis. An important discovery was the progress by 650 m in the cave Zgurasti carried out by local organization 5-04 Osiris. In March 1988 the collaboration between the CSS and the Speleological Institute of E. Rakovica in Bucharest was specified in a special contract between the two organizations.

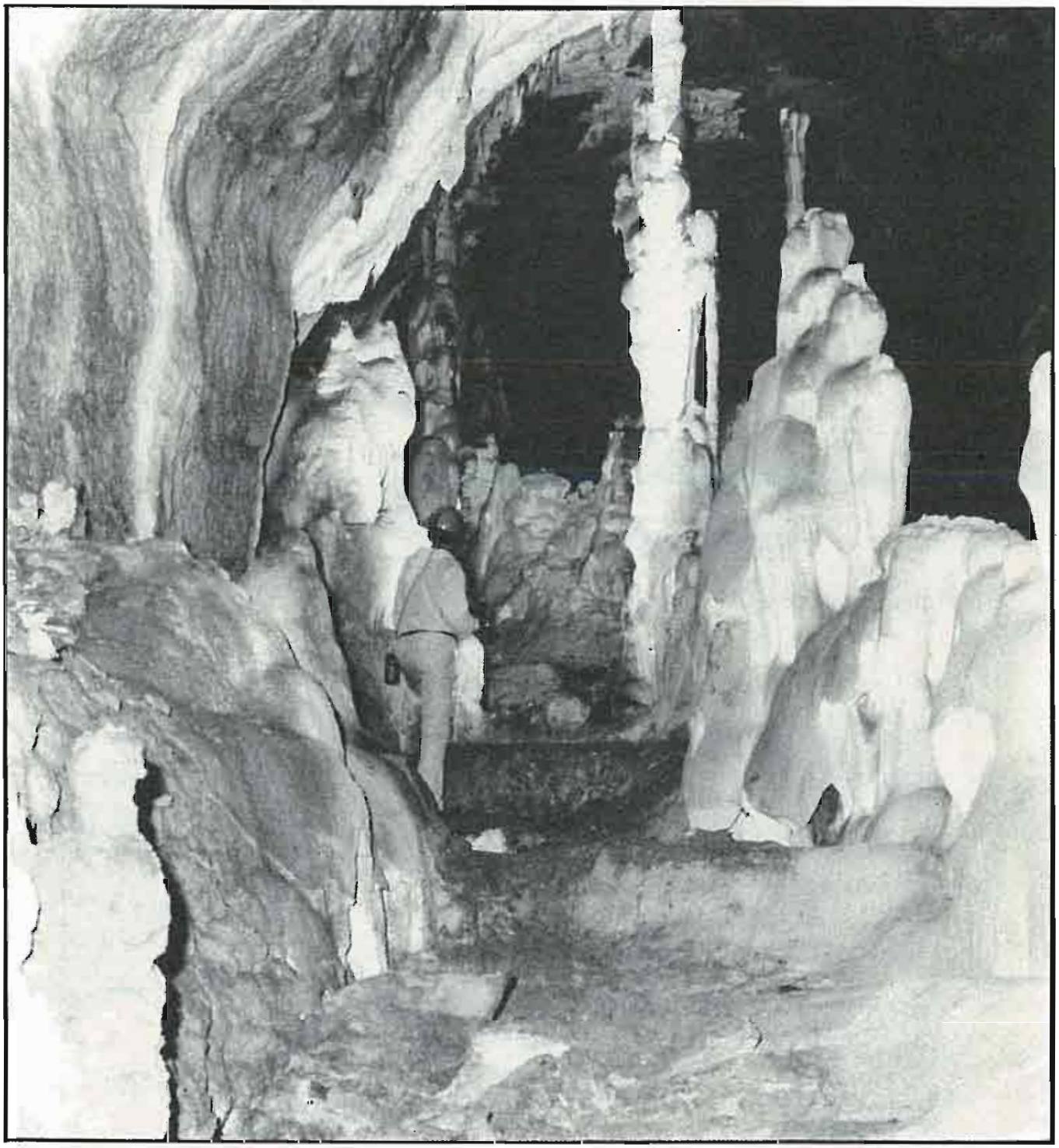
PROPAST PEMA

section



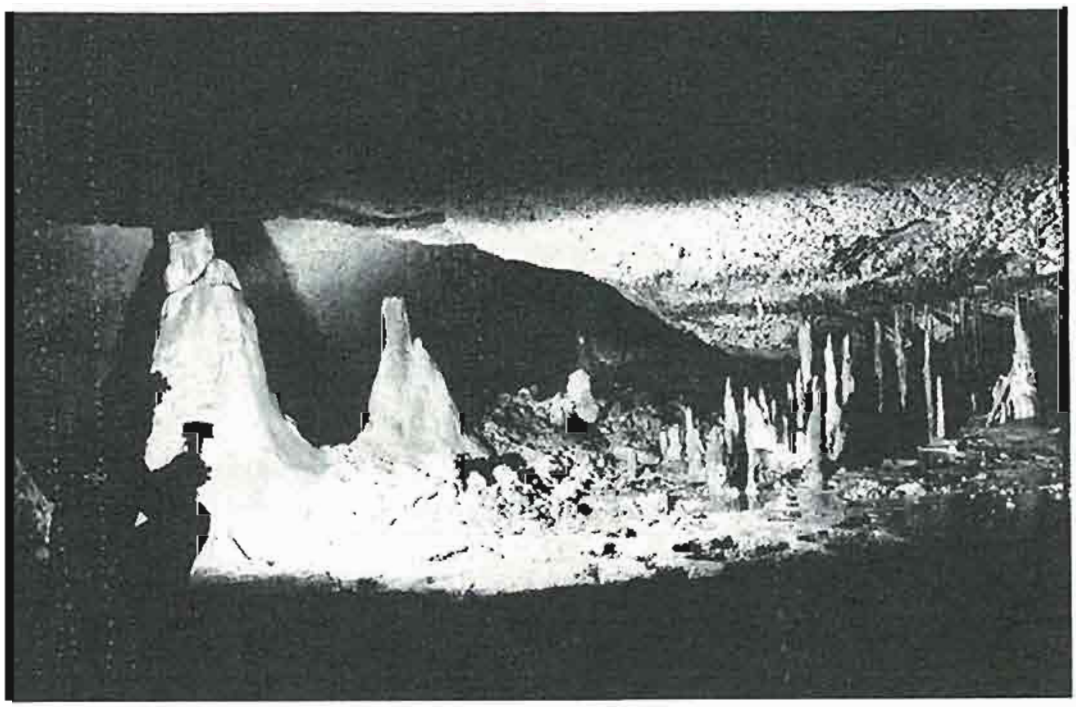
SOVIET UNION

Local organization of the CSS 7-01 Orcus organized two expeditions in the period followed. They were oriented to the karst of the Crimean Peninsula. The first, in 1987, operated at the upper plateau Čatyr Dag in the Crimea and discovered there 8 new caves and abysses. The second expedition linked up with the results of the first one in 1988 and continued in the exploration above all in the cave Mramornaya.



The entry to the "Fairy-tale dome" in the "Krystalnaja" cave in the Crimea karst, USSR

In the "Krystalnaja" cave - plateau Čatyr-Dag in the Crimea karst, USSR



The rich secondary forms in a newly discovered cave "Krystalnaja" in the Crimea karst in the USSR

SPAIN

The karst regions of Spain were much visited by Czech speleologists in 1986, when the 9th International Speleological Congress took place in Barcelona. In the excursion manner regions near the town of Villanova and in the chain Picos de Europa were visited. In 1987 cave divers from organization 7-02 organized an exploratory expedition to the Balearic Islands, where they worked above all in Mallorca and the islands of Islas Medas near the small town of L'Estartit. In the Balearic Islands the expedition worked in the cueva de los Estudiantes at Sollero. In the conclusion of the stay they succeeded in exploring the deep and difficult third siphon.

SWEDEN

Local organization of the CSS 7-01 Orcus cooperated with the Swedish Speleological Federation in connection with an expedition to karst regions situated at the Norwegian-Swedish frontier, which is mentioned in detail in the section NORWAY. During the expedition excursions were made to the Swedish regions of the national park Hamra and the Hällingsafallet canyon.

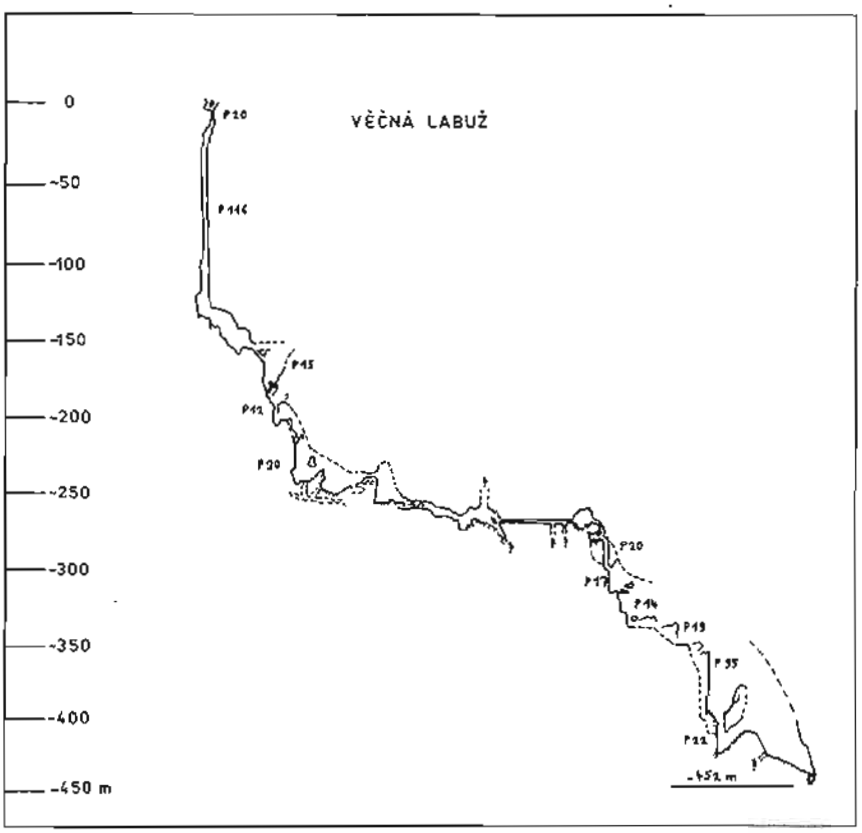
SWITZERLAND

Switzerland was visited in 1988 by two groups of Czech speleologists. They made excursions to the cave systems of Sieben Hengste - Innerbergli - Faustloch, Hölloch, Bärenschacht, Beatushöhle and others. Prolongation excavation work in sediments was carried out in the cave Laubloch, unfortunately without the expected result.

YUGOSLAVIA

In 1983 - 1988 the members of the CSS, organization 5-02 Albeřice, made five expeditions to the plain near Krn Mountain south of the Julian Alps. The terrain above all in the surroundings of the mounts Skutnik and Griva (height above sea level 1850 - 2100 m) was studied. The region is built up of upper Triassic limestones with the inclination of bedrocks 30 - 60° NE. From an immense number of tiny galeries and different cavities only those deeper than 50 m were documented or those interesting from another point of view. From 23 documented abysses and caves 4 are deeper than 100 m.

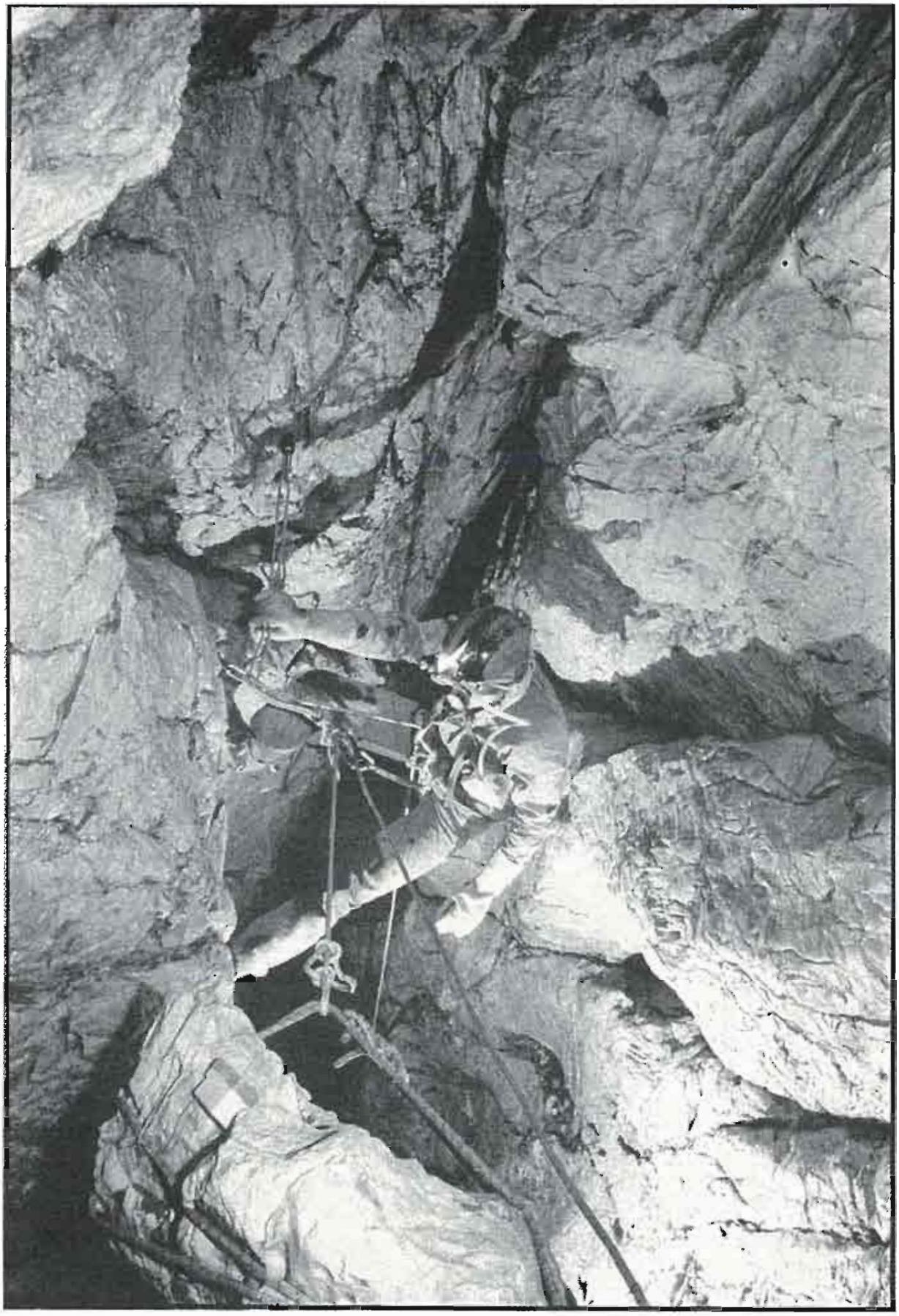
Brezno pod Skutnikem is 234 m deep (-214, +20). It was discovered before 1986 and it is described in a booklet issued on the occasion of the 9th International Speleological Congress in Barcelona. Abyss called "Otazník" is 229 deep. Also this abyss was discovered in 1985, but only to the depth to 120 m. The members of DZRJ Ljubljana deepened it in 1986 to 229 m. Abyss called by Czech speleologist "Zbrojnice" is 108 m deep, being discovered during the expedition in 1988. It is a system of mostly fissure shafts with snow bridges. At the bottom of the entrance shaft under the snow there are lots of cartridges and other ammunition from World War I. Abyss caled by Czech speleologist "Věčná Labuž" has a present depth of 452 m.



The orifice was discovered in 1984, but due to lack of time the exploration was not carried out. In 1985 a layer of snow several metres thick did not allow the exploration to be made and only in 1986 the depth of 265 m was reached. In 1988 the exploration continued us far as an extensive dome at the depth of 452 m with a possibility of continuation. The whole system of abysses of "Věčná Labuž" represents probably the main part of the underground drainage system of the surroundings of Mt. Griva and Mt. Skutnik. In the upper and middle parts there are above all fossil spaces dissected by recent narrow meanders and numerous small tributaries from light holes and steep rubble drains. In the lower part there is a meandering cascading canyon of unknown height with an active stream (at the time of exploration the discharge rate about 5 l/s^{-1}) with several tributaries.

Although the exploration of the whole system is only at its beginning it can be said that by its importance it belongs among the greatest discoveries of the CSS in the past period. This is the first discovered water collector in that region.

The CSS group of organization 6 - 14 worked since 1983 in the region of Mt. Orjen and the Bay of Kotor. The first important succesful actions were reached in 1984 by discovering the abysses "Za meandrem" (170 m deep)



Yugoslavia, abyss called by Czech speleologists "Věčná Labuž" upper part of the 116 m deep abyss

Yugoslavia - plateau at the foot of the Mt. Krno, beginning of the examination of an unknown shaft

and "Ferda" (110 m deep).In 1987 the abyss Pema was discovered and partly documented. The 1988 expedition prolonged the abyss up to the depth of 240 m with the length of more than 500 m. Cave Pema thus became the deepest and longest cave in the region of Dragaljsko polje. In the abyss a small brook was discovered which continues in the depth of 240 m by a meander. The objective of the explorations in that region is the penetration into the system draining the Grahovsko polje and Dragaljsko polje into the outflows Sopot and Spila in the bay of Risan.

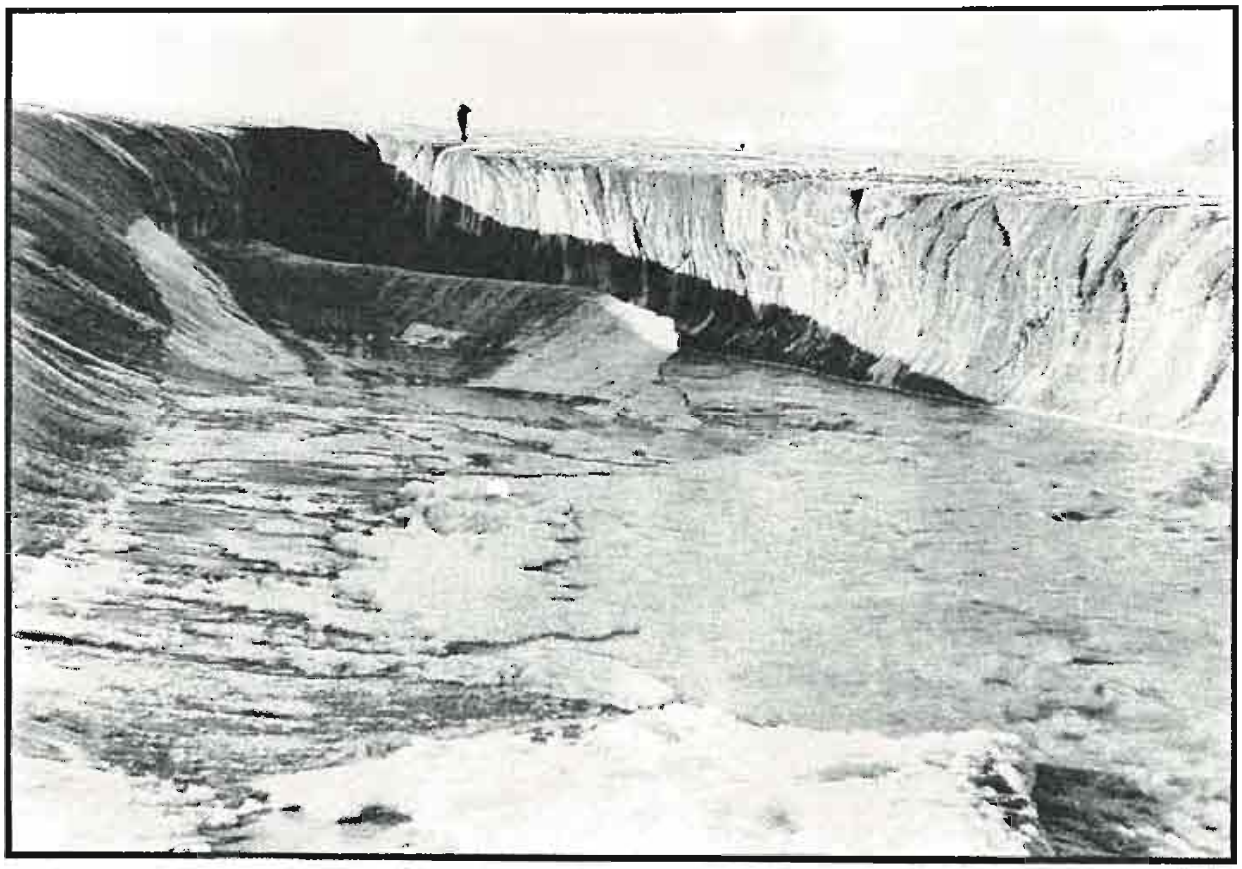
To the above outline which sufficiently characterizes the activity and successful actions of Czech speleologists abroad it is perhaps necessary to add that every year almost 300 speleologists go abroad and approximately the same number of foreigners are accepted by the Czech Speleological Society.

The overview was elaborated on the basis of reports from trips abroad and according to the contributions of R. Tásler and J. Otava.

Dr. David Havlíček, CSc.
Chairman,
Commission for International Cooperation,
Czech Speleological Society

THE EXPLORATION OF GLACIAL KARST IN THE SOUTHWEST SPITSBERGEN

The Czech Speleological Society, local organization 5 - 01 Bozkov, has for many years cooperated with the University of Silesia, Department of Geomorphology of Karst at Sosnowiec (Poland) in the exploration of karst regions of the Jeseníky Mts. and the Giant Mts. This cooperation resulted in the invitation of local organization of the CSS, 5 - 01, to explore the glacial karst in the region of the southwest Spitsbergen. Two polar expeditions were organized. One member of our organization was invited to the first expedition held in 1986 to get acquainted with the research programme which was under way at that time. In close cooperation glaciologists, hydrologists, hydrochemists and speleologists succeeded in acquiring new information concerning the processes and character of the draining systems in subpolar glaciers. Work of this character linked up with the results of Polish and Soviet polar expeditions to that region in the years 1971 to 1983. The utilization of speleology for the research and exploration of the inside of glaciers instigated the preparation of the second common scientific expedition which was carried out in 1988.



Glacier opening of the outflow cave of the river Isfjellelva Western Torell glacier

The aim of the polar expeditions was the region of the southwest Spitsbergen belonging to the Wedel Jarlsberg Land, the surroundings of the Hornsund fjord where the Polish polar station is situated.

The region of interest is characterized by subpolar climate with a low amount of precipitation, affected by the Northatlantic Stream. The greater part of the territory is covered with glaciers and the remaining part of the non-glaciated territory is represented by permafrost, reaching the thickness of several hundred metres. The glaciers whose heads terminate both on land and in the sea are in the state of intense retreat, which is the reason of increased hydrological processes on the glaciers and in their surroundings. The most intense hydrological processes go on during a very short polar spring and summer in the polar day. They cease all over the surface during the polar night with the exception of subglacial draining which forms icings during the winter. The increased dynamics of hydrological processes in the spring and summer months supports in the glaciers the formation and development of surface and inside morphostructures, comparable with karst morphostructures. From this point of view the glacial karst or hypokarst is being discussed nowadays.

Up to the past decade glacial karst was relatively little explored with respect to its specific conditions and a relatively short time space making it possible to enter its inside. In the period of intense ablation, during the spring and summer months, only the surface forms can be studied. The entrance into the glaciers is prevented by a great amount of ablation waters and the increased dynamics of the glaciers. On the other hand, in the winter, during the polar night, the snow and wind close the entrances into the glaciers by heavy snow plugs. All the surface forms on the glaciers are levelled and it is very difficult and dangerous to find the orifices of moulins and ponors. The outflows and glacial gates freeze and are closed with icings ice forming impenetrable plugs. For the exploration of the inside of glaciers only a short time space between the end of ablation and the onset of winter can be utilized.

A considerable distance of the localities from polar bases, hard climatic conditions and a difficult transport of material pose requiring conditions on the exploration of the glacier karst from the viewpoint of organization, material equipment, essential safety measures and, last but not least, good psychic and physical readiness of the group.

Meltwater from the ablation surface parts of glaciers and waters from the unglaciated slopes truncate by means of supraglacial streams into the core of the glaciers through moulins, blind and semiblind ponor valleys or through cascading glacier channels. The draining of waters from the glacier cores goes through pressure outflows below glacial heads or in the form of glacier rivers flowing out from glacier gates. Between ponors and outflows systems of englacial and subglacial channels are formed.

From the point of view of characteristics and assessment of tunnels in glaciers and caves with respect to their origin and development and their

position in the glacier two fundamental systems can be distinguished, marginal and central.

The marginal system is formed at the contact of the glacier with the slope of the glacial valley, or between the glacier and the lateral moraine. It drains the melt water not only from the glacier, but also from the unglaciated mountain slopes. It also originates in the surroundings of nunataks. Channels and caves are developed partly in glacier ice and in the ice core of lateral moraines. Besides fluvioglacial material (subglacial) water transports also angular till which glides into the underground from lateral moraines and lateral mountain slopes. Tunnels have mostly vadose character. In places where they follow the glacier bedrock, numerous bars and waterfalls are formed and river beds cut into the bedrock. The central system drains the surface of the glacier tongue and part of snow patches below the frontier of permanent snow. The entrance from those parts is possible only through glacier shafts which pass into cascading channels ending at bedrock under the glacier. There, between the glacier and the ground moraine, broad but very low channels of phreatic character are formed. The outflows of subglacial waters from that system are mostly under pressure and sometimes form intermittent geysers below glacier heads. From the bedrock the water transports large amounts of rounded fluvioglacial material. In the central system also moulins (glacier shafts) and channels can be included, which do not reach the bedrock and have independent outflows of pure ablation water. The character of those channels is phreatic with typical elliptical cross-sections.

Section of the straight glacial gallery in the outflow cave of the river Isfjellelva Western Torell glacier

Black exsurgence - pressure outflow from the central system at the head of Werenskiold glacier

Besides those two fundamental systems channels in ice and caves in sandurs, marginal and lateral moraines were documented in proglacial areas. They are mostly relicts of channels of the above two systems which are nowadays separated from the drainage of the glacier. By thawing and falling of roofs of those channels extended lakes and valleys of the uvala type are formed in the sandur part from stagnant ice.

The programme of polar expeditions was concentrated on the research of the glacial karst at the glaciers Werenskiold, Torell and Hans in the surroundings of the Hornsund fjord.

Werenskiold Glacier is a type of a subpolar valley glacier whose snout ends on land and constitutes a closed drainage area in which it is possible to study all hydrological, hydrochemical and thermokarst regularities. The glacier surface is 28 km² and the whole basin has the area of 44 km². For the sake of comparison the exploration was extended to the glaciers Torell and Hans which are types of glaciers ending in the sea and which have considerably larger area. There only exploration of some regions and the given systems was carried out.

In Werenskiold glacier the expeditions of 1986 and 1988 succeeded in exploring and documenting parts of the marginal and the central systems, in outlining the course of the hydrographical subglacial network and verifying them by tracing experiments.

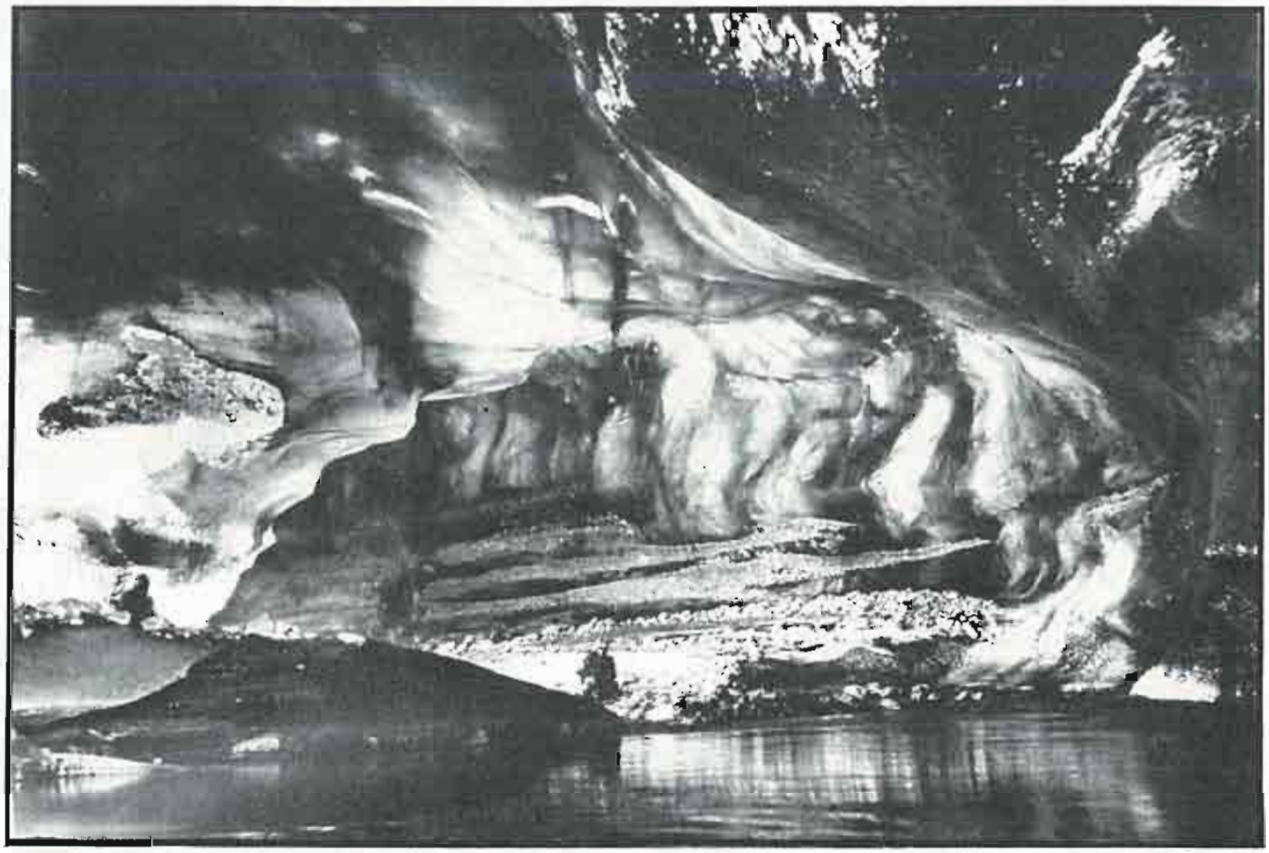
The cave Kvisla is situated in the northern part of the head of Werenskiold

glacier, near the lateral moraine. It is a marginal system of subglacial tunnels with a documented length of more than 600 m. The entrance into the system is through a glacial gate or a number of shafts following the course of the main galleries. The tunnels have a tunnellike character, their width being 6 to 15 m. Their height in some places is 18 m. The development to levels is observable there. Higher levels are flooded with meltwater only at the time of the spring thaw, when the natural drainage is prevented by icing and firn plugs at the orifice of the glacial gate formed during the winter months. The whole system is flown through by the glacial river Kvisla, reaching the peak discharge of 10 m^3. s^{-1}. Its waters transport fluvioglacial material from the subglacial part with angular till falling through the shafts into tunnels from the lateral moraine and the surrounding slopes. Further glacial till is washed out by water - thermoerosion from the frozen bedrock of the ice-cored lateral moraine. The main tunnel meanders alternately in the glacier and in the ice-cored lateral moraine. The ice walls of the tunnels are covered with facets, ice ribs and moulins (potholes). At the contact of the bottom with the bedrock cascades and waterfalls are formed. Tunnels in those places are cut into the bedrock and the glacier rests on the elevated lateral rock edges. The spaces formed under the ice-cored lateral moraine are cold, mineral material in the bottom and the walls is frozen. On the other hand, spaces and tunnels reaching below the glacier are warm with thawed sediments at their bottoms. By measuring the temperatures it was found that the atmosphere reached the value of + 0.8°C, sediment + 0.4°C. In that system changes were followed that occurred in the course of two years. Tunnels and spaces formed in the icecored lateral moraine did not exhibit conspicuous changes. Major spaces, however, formed in the body of the glacier were compressed due to the pressure of the overlying material and the ice plasticity and filled with glacier ice. Only the main tunnels were preserved. In places of the bedrocks conspicuous shifts of the glacier were found. The glacier transported in its contact area material pressed in the ground moraine.

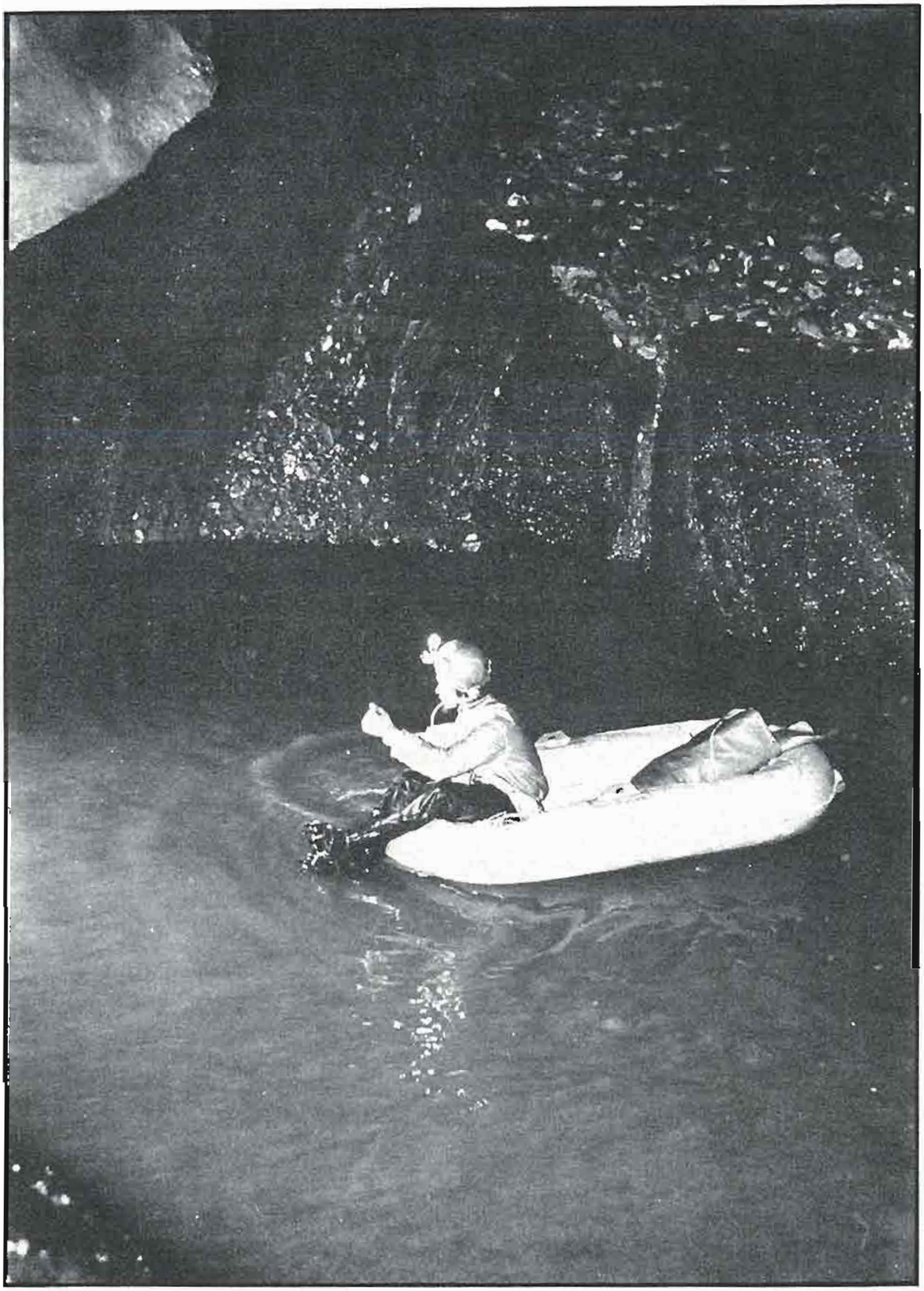
This is the hitherto best studied marginal system in subpolar glaciers.

The moulin called Lipertaven is situated 1 km from the head of Werenskiold glacier, close to the medial moraine. It drains the central part of the glacier through a network of supraglacial channels. It belongs to the central drainage system with shallow drain not reaching the glacier bedrock. The outflow was found and colorimetrically verefied at the distance of 1 km along the other side of the medial moraine. The discharge rate of water varied, according to hydrometrical measurements, from 750 to 1000 l. s^{-1}. A descent through an ice shaft in 1986 reached the depth of 71 m. The star-shaped orifice passes into a mighty extending vertical tube with ice ribs ending in a pothole with the diameter of 30 m. From it a horizontal ice tunnel starts which was explored and documented to the distance of 450 m. The direction of the horizontal part goes below the medial moraine and it is interesting to notice that in the walls of the tunnel no till could be followed. The character of the tunnel is phreatic, passing from a high crevasse gallery

into a tubular shape of as much as 3 m in diameter. The walls, the roof and the bottom consist of pure ice without mineral admixtures. Only at the beginning of the tunnel there was a well perceptible old shaft in the roof part, filled with firn under which coloured films of ferric oxide and manganese oxide had precipitated. In those places also crystals of gypsum were documented, grown in the films of the wall ice. At the end of the tunnel there is a number of deep pools which could not be overcome. The following descent into the system was carried out in 1988 with the objective of documenting all changes. The moulin proper was closed with a firn plug and the entrance into the system was possible only through the inlet channel 50 m higher along the glacier.



Meander in the outflow cave of the river Isfjellelva with terraces of fluvioglacial material and ice terraces



Crossing the lakes in the outflow cave of the river Isfjellelva - Western Torell glacier

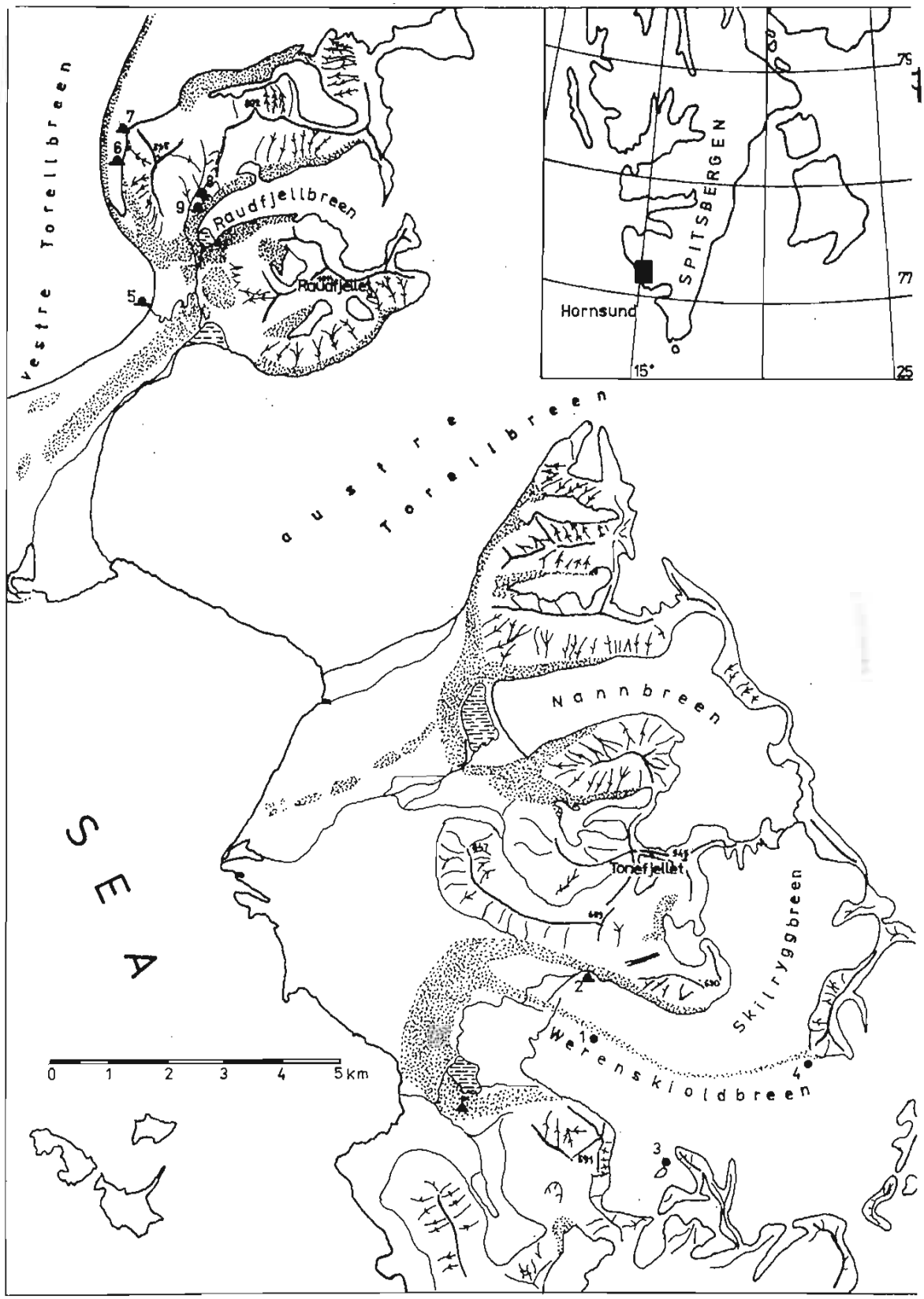
A number of cascades and pools began to form a new moulin. A requiring descent and sailing across the pools resulted in reaching the old horizon below the original shaft. The firn plug was clearly visible at the height of 20 m. The plug in the old shaft had sunk, completely barring the entrance into phreatic tunnels. Below the plug the water formed a siphon. The expedition did not manage to penetrate further. The documentation of that system made it possible to study the formation as well as the extinction of moulins in preserving the horizontal system. It would be very interesting and, from the point of view of documentation, necessary to carry out a descent in another two years. The individual cycles of development should be repeated, the moulins moving against the motion of the glacier.

The moulin below the mountain Eimfjellet belongs to the central drainage system of Werenskiold glacier. The moulin was chosen for exploration in 1988 on the basis of bioindicatory method which hinted that the depth reaches 140 m and the lower horizontal part is connected to the main subglacial channel. The descent could be carried out only after a complete cessation of ablation when the temperatures on the glacier reached already - 18°C. The orifice of the moulin had to be found by means of bioindication due to a mighty snow layer and the snow bridge dug through. The entrance shaft of oval shape, the dimensions of which were 10 x 5 m, reached the depth of 70 m. The walls were modelled by vertical ice edges. From the bottom of the shaft a meandering, steeply sloping channel with small cascades led to the depth of 80 m. It continued by a 10 m long horizontal section with an extended pool penetrating the inner glacial moraine. There followed another steeply sloping channel to the depth of 130 m. There the ground moraine was found. Thus it was possible to go through the whole thickness of the glacier down to the bedrock. Under the glacier the channel changed into a very wide and low bed filled with clastic material. Further penetration was not possible. Even though on the surface there had been minus temperatures for several weeks, the water in the glacier was still running. It came from innumerable small tunnels, filling subglacial lakes in cascades. The high relative humidity, the heat and our presence resulted in the formation of misty haze which brought about great trouble in making the photodocumentation. This system confirmed the presence of penetrable channels even below the depth of 100 m.

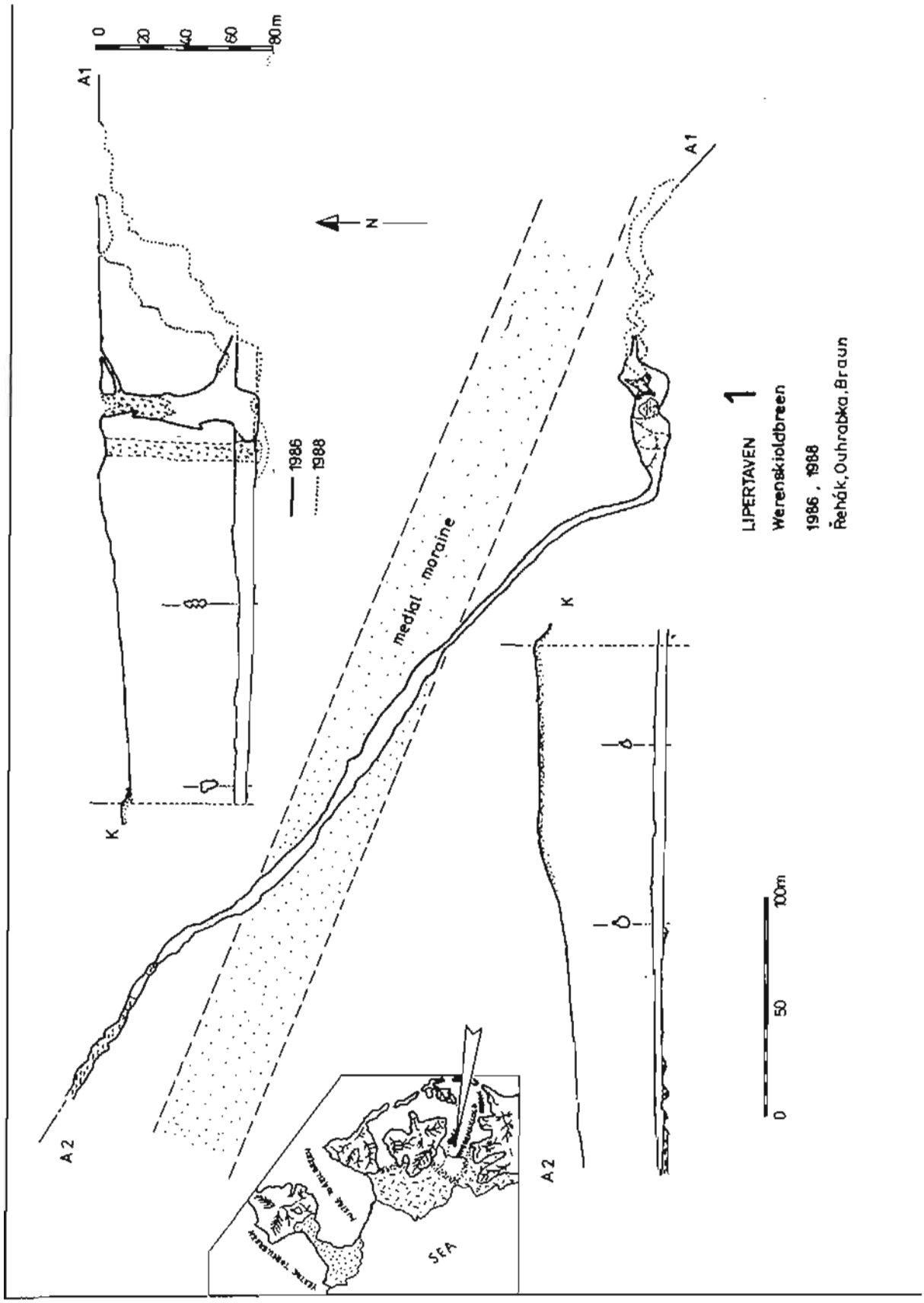
For comparison and for completing the results obtained on Werenskiold glacier descents were carried out as well as explorations of selected localities in Torell glacier. The greatest attention was paid to the glacial openning in the region of the medial moraine between western and eastern Torell. From the glacier opening springs the river Isfjellelva with maximum discharge rate during ablation of about 90 $m^3 . s^{-1}$. The penetration of the cave could be performed at the conclusion of the expedition under minimum water level. Even thus dinghies had to be used and waterproof suits for overcoming the stream and innumerable subglacial lakes. From the glacier opening there goes a meandering imposing gallery, 15 - 30 m wide and 15 - 18 m high. The walls of the gallery are richly modelled with facets, benches and glacial potholes. In the bottom the glacial river Isfjellelva forms cascades and lakes.

Fluvioglacial material fills not only the bottom of the river bed, but also constitutes lateral terraces.

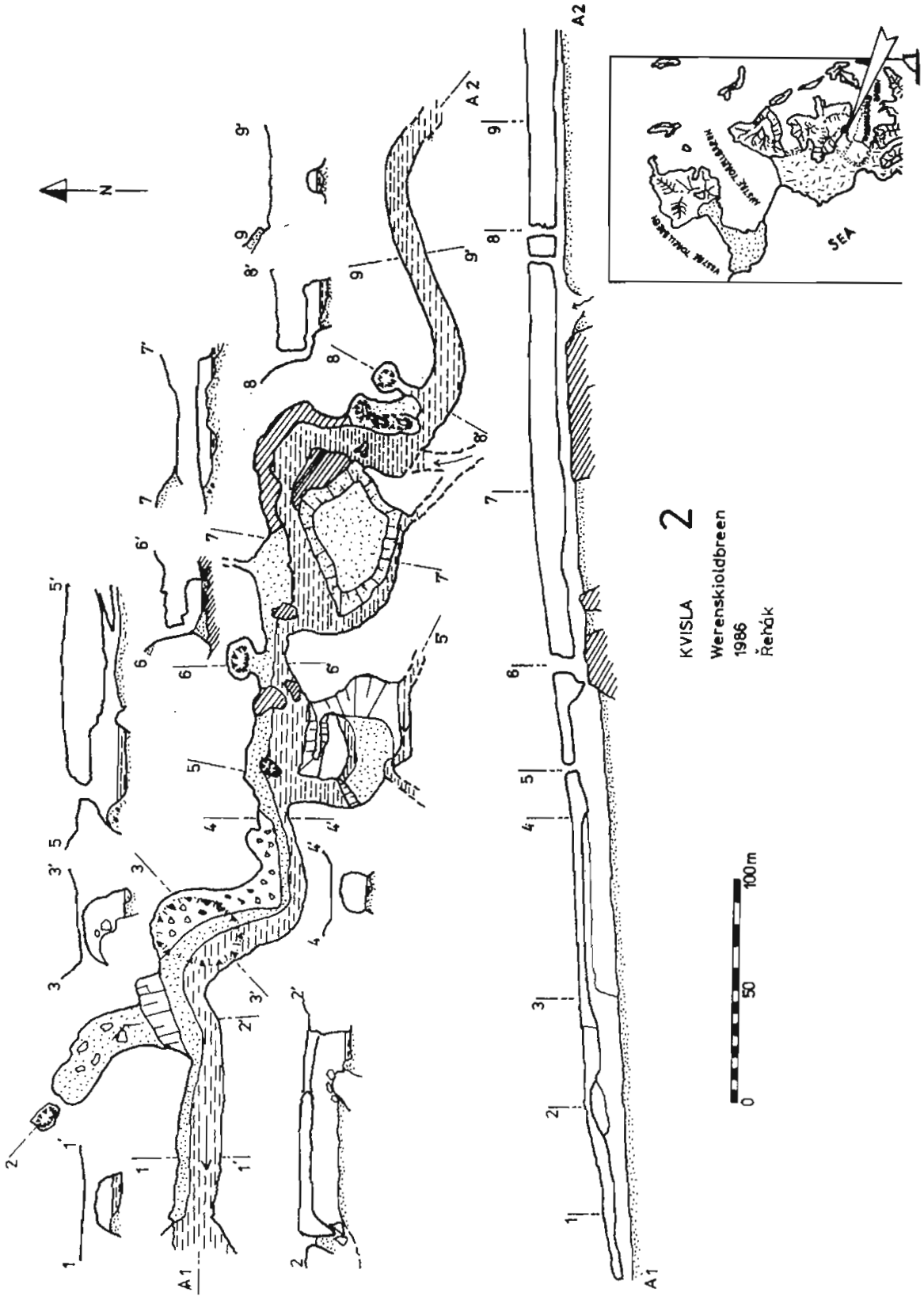
J. Řehák,
local organization 5 - 01
Czech Speleological Society



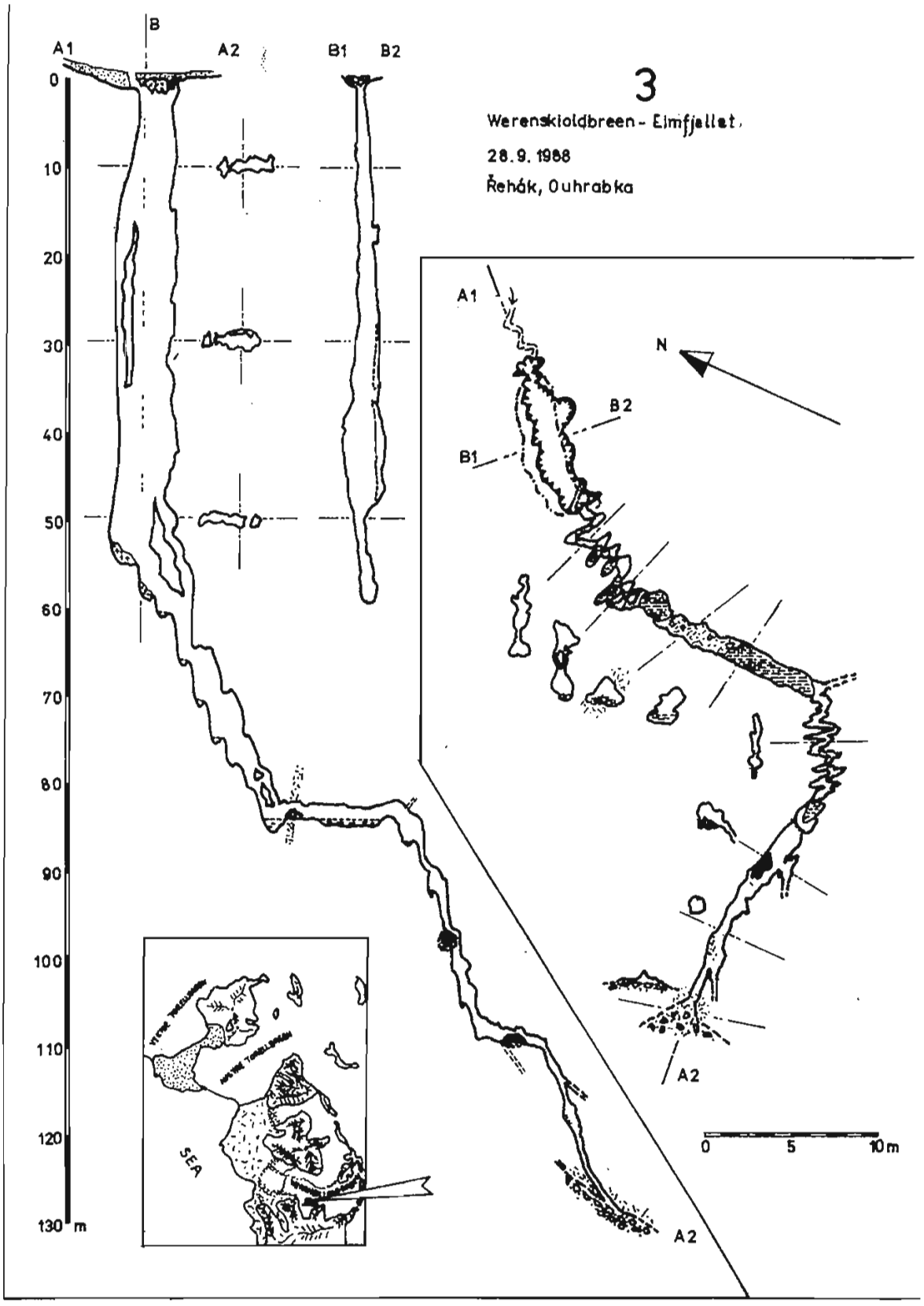
Map showing the position of moulins and caves in glaciers Werenskiold and Torell. Explanation: 1. moulin Lipertaven, 2. marginal (side) system of the cave Kvisla, 3. moulin at the foot of Mt. Eimjjellet, 4. moulin at the foot of the Mt. Glasjologerknausen, 5. ice gate and outlet cave of the river Isfjellelva, 6. and 7. ponor caves of the glacial river Isfjellelva, 8. and 9. glacial caves in the side moraine of the glacier Raudfjell.



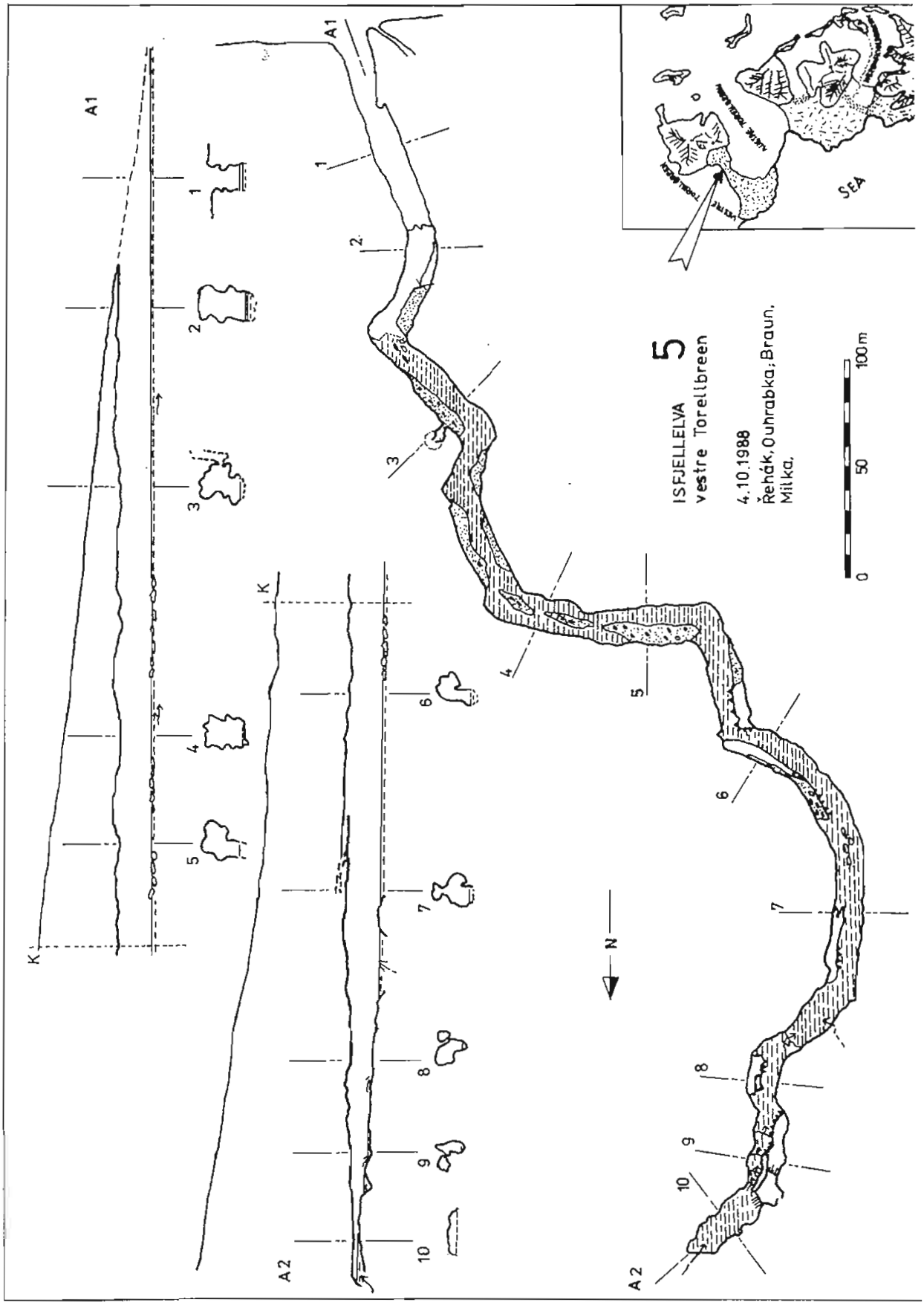
Moulin Lipertaven on the glacier Werenskiold, 80 meters deep with horizontal gallery 450 meters long. Mapped 1986 and 1988.



Marginal (side) system of the glacial cave Kvisla in the glacier Werenskiold.



Moulin at the foot of the Mt. Eimfjellet on the glacier Werenskiold about 135 m deep (up to the base of the glacier).



Large outlet cave of the glacial river Isfjellelva in the glacier Western Torell about 750 m long.

THE CONTRIBUTION OF KARSOLOGY AND SPELEOLOGY TO SOLVING PROBLEMS OF SOCIAL PRACTICE

The Czech Speleological Society (CSS) has developed versatile forms of activity by which it helps to solve problems of national economy and of other social practice. One of the examples of such help can be the results of the comprehensive karsological and speleological research, carried out by the members of the CSS in the interest of safeguarding the operation of a graphite mine at Bližná (district Český Krumlov) in south Bohemia against dangerous inrushes of ground karst waters.

In 1983, in advancing a gallery in the mine Bližná, cave spaces were opened. They were filled with water which rushed in the mine galleries, by transported sediments it flooded and filled their bottom, causing considerable material damage. On the request of the n. e. Rudné doly (Ore Mines) Příbram, the operator of the mine, these karst cavities were explored and mapped by the local organization "Speleos" of the CSS (Janoušek, Kadlec, Jäger 1985). In 1988 the authors of the present paper were entrusted - on the request of the scientific board of geology-geography of the Czechoslovak Academy of Sciences (CAS) by the management of the Geographical Institute, CAS in Brno to pass a comprehensive judgement of karsological conditions in broad surroundings of the graphite mine and to elaborate a suggestion at safeguarding maximum safety of further mine operation against inrushes of water.

The present paper contains a summary of fundamental information which followed from this research. The conclusions were subjected to a discussion and were utilized by n. e. Rudné doly Příbram for carrying out the respective measures.

The broad surroundings of the graphite mine at Bližná belongs geomorphologically to the southern part of the Vltavice furrow, elongated synclinal depression separating the Šumava Mts. from the Šumava foothills. The depression is at present flooded by the waters of the Lipno reservoir. The territory under study partly comprises the Boletická vrchovina hilly land, associated with the Českokrumlovská vrchovina highland, part of the Šumava foothills (Demek et al., 1987). From the point of view of karsological regionalization of Czechoslovakia the territory belongs to the so-called Šumava Karst, bound to dispersed small massifs of marbles in the southern and southwestern parts of the Bohemian Massif.

The broad surroundings of Bližná is constituted by rocks of the Český Krumlov band of Moldanubian rock group which is attributed Early Proterozoic and or Archaic age (Mísař et al. 1983). The chief rock is a complex of biotitic, differently migmatitized paragneisses containing numerous inclusions of graphitic and quartzitic geneisses, graphites, marbles dolomites, erlans and amphibolites. In the surroundings of Bližná these inclusions alternate throughout the thickness of the paragneiss complex

(Svoboda et al. 1964). Where they are sectioned by the old planated surface of the type etchplain, they have also morphological importance.

In the surroundings of Bližná the rocks form a complex structure of the type of asymmetric brachysyncline. The NE-SW trending shallow basin-like structural erosional depression, is bound to this structure. It lies between the villages of Černá v Pošumaví, Radslav and Dolní Vltavice. Morphologically it is a continuation of the Vltavice furrow now flooded by the Lipno reservoir up to the altitude of 725 m a. s. l. The unflooded part of the depression has a flat bottom developed on thick fossil weathered rocks of the paragneiss complex, in places covered with Quaternary alluvial and deluvial sediments. In the NW and SE the depression is confined by an asymmetrical horseshoe shaped crest representing the promontories of the Boletice hilly land. They are edges of an assumed brachysynclinical structure, morphologically strengthened with amphibolite, limestone and erlan mosors which protrude above the overall level of the crest. The crest reaches its highest point in the NW in horseshoe shaped closure (Vápenný vrch 813 m). The bottom of the depression is dissected by shallow widely open valleys of small consequent and subsequent streams. They are separated by plain ridges lying between them which are covered by cultivated fields and in the eastern part by continuous forests with extensive upland bogs.

For judging the karsological conditions it is important that the valleys follow or cross a relatively large band of marbles, passing in the axial part of the structural-erosional, but mostly concealed in weathered covers. They are big lenticular bodies accompanied the by graphite deposits and dolomites and steeply inclined towards NW. The metamorphies protruding along both sides of this band are weathered up to the depth of 30 - 40 m (in places even deeper). The upper part of this fossil eluvium (evidently of Lower Paleogene age) is disturbed by slope movements, wash and congelifluction to the depth of about 2 - 3 m.

Marbles are strongly karsted to unknown depths and karst cavities, with respect to the central position of the limestone band in the horseshoe shaped depression, represent the main collector of ground water of the whole region. The noncarbonate eluvium, on the other hand, is very little permeable.

Graphite in the surrounding of Bližná has been mined since 1828. Its mining was, however, several times interrupted in the past due to strong seepage and inrushes of water into the mine spaces. Athough it was known that it was water filling the karst cavities, the karstification of the limestone band, no attention was paid to the documentation of cavities or judgement of the karst hydrogeological connections. Only after water inrushes in 1983 the cavities were explored and mapped; they are situated at the level of 715 - 680 m above sea level between the 2nd and 3rd floors of the graphite mine, i. e. at the depth of 38 - 65 m below the terrain surface and 10 - 45 m below the level of the water surface of the Lipno reservoir (situated at the distance of only 1200 m from the mine objects) in the direction of W and SW.

The are relatively large cave spaces and several smaller cavities. They are formed by horizontal sections passing gradually or abruptly into vertical well

like spaces. The biggest cavity has the volume of 860 m^3. It is constituted by a broken horizontal space at the level of the 2nd floor of the mine galleries, about 20 m long and 3 - 5 m high. This section passes into a well-like abyss (4 - 7 m in diameter) in the direction of SW, falling 20 m towards the bottom of the drive adit of the 3rd floor of the graphite mine, but continuing towards even greater depths. The cave is filled with remnants of clayey and clay-sandy, finely layered sedimants with lamellae of amber mica. They are components of eluvial weathered rocks of the paragneiss complex flushed from the surface into karst cavities and sedimented in the water environment. The prevailing part of these sediments were flushed into the cavity in the water inrush into the mine spaces. The second cavity has the volume of only 225 m^3. In the upper part it is formed by a slightly sloping irregular gallery, on the average about 3 m high which passes slowly into an almost horizontal section, also continuing below the level of the bottom of the gallery of the 3rd floor. This space is caved in with block debris. About 1.5 m above the level of the bottom of the gallery of the 3rd floor a concentrated karst spring flows from the debris, which, since the disastrous water inrush in 1983 has had a practically constant discharge rate of 12.5 - 13.0 l. s^{-1}. The debris rests on the above clayey and clay-sandy layered sediments. The subhorizontal section is interrupted after 28 m by a debris caving in. The overall direction of this cavity is SSW. Near this cave there are two smaller ones which were not explored in detail due to the danger of caving in.

In a comprehensive karsological exploration of the broad surroundings of the graphite mine attention was also paid to the hydrogeological function of the documented spaces, i. e. to their possible dependence on the surface forms and their arrangement.

From many circumstances it follows that they are isolated sections of an extensive cave system which follows the direction of lenticular bodies of marbles. Since they are layers steeply inclined and from both sides surrounded by insoluble rocks of the paragneiss complex, the karst cavities can be classified as extensive forms of the interlayer karst. They are developed on cross-sections of steeply inclined layer fissures or schistosity plains with the plains of vertical joint systems. In places they have the character of contact cavities bounded by graphite or dolomite positions. These positions, irregularly situated inside marbles, are in places quite weathered into a plastic material similar to cottage cheese. The dependence of cave morphology on the structure is so close that some parts of the cave spaces reflect in detail lithological changes or tectonic deformation of the matrix. This dependence is also the reason of a great horizontal and vertical articulation of the cavities. Their roofs are often fallen off, but in places where they are intact it is evident that they were modelled by relatively quickly running water. In the bottoms of caves conspicuous river beds are formed.

Sedimentary fillings were transported to the cavities by water running into the caves from the surface. Their amount and diversity witness intense to mass transport. These sediments in irregular cavities form obstacles dividing the cave system into isolated sections. The debris also participate in the

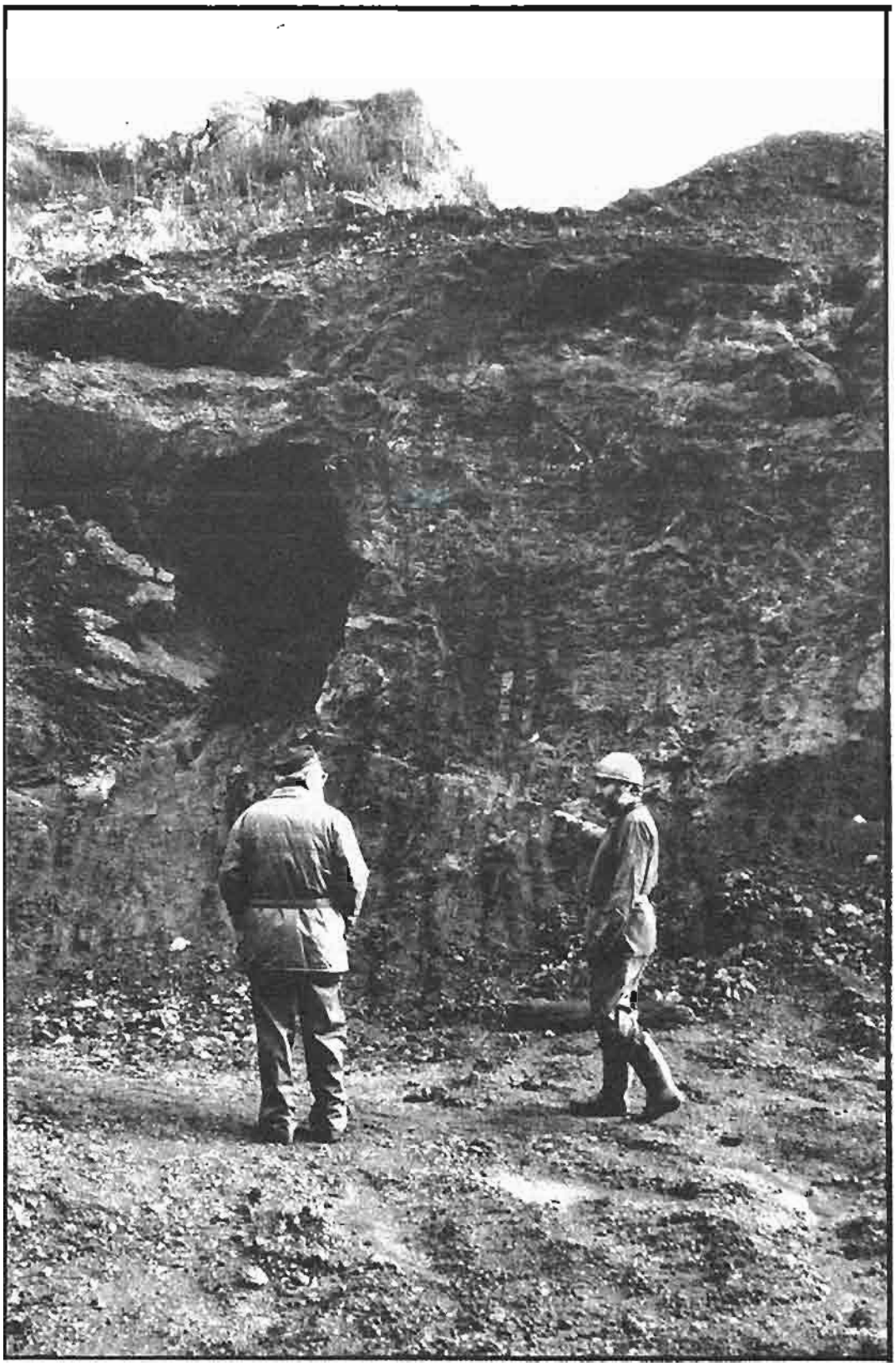
formation of obstacles. The obstacles are the main cause of the formation of large accumulations of ground water which can fill some sections in their whole volume.

For determining the regularities of the origin and development of these caves of importance is the finding that the cavities discovered in 1983 are situated in the places where the shallow valley of the brook springing in the surroundings of the village of Bližná crosses the limestone belt, whereas the cavities which caused inrushes of water in earlier periods follow the direction of the bed of one of the left tributaries of the main stream. The level of the horizontal and/or subhorizontal sections of cavities discovered in 1983 as well as those tapped earlier roughly agree with the level of the rock bottom of the valley of the Vltava river in the adjoining section of the Vltavice Furrow. From this circumstance it can be deduced that this cave level had been for a long time dependent on the erosional basis given by the system of the old Vltava River in the Vltavice Furrow, before it was deepened by the backwearing erosion due to the origin of the České Budějovice basin. The origin of this cave system can most probably be connected with the development of the planated surface in the Paleogene and with the period of its deformation and dislocation towards the end of the Oligocene and in the Miocene. This assumption leads to the conclusion that it is a cave system which had drained the structural-erosional depression in the surroundings of Bližná to the Vltava River valley.

Due to the steep inclination of the layers of the lenticular body of marbles the karsting can reach much greater depth. In other parts of the Český Krumlov belt of the varied zone of the Moldanubicum karsting of marbles was found by bore holes to depths of several hundred metres (Vašta 1984).

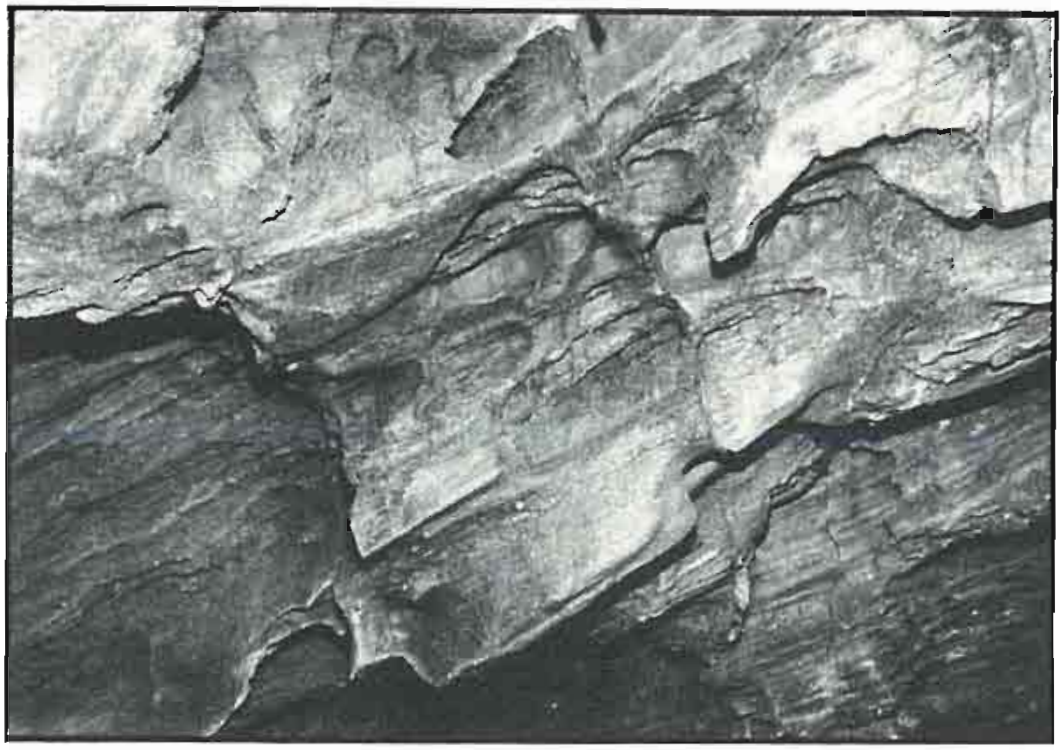
From the karst and hydrogeological point of view the caves discovered when mining for graphite near Bližná belong to a dynamically very active system of a shallow phreatic zone. The water moving in that zone and accumulating there at present is on the one hand the water seeping to the underground communications from the beds of surface streams, on the other hand water migrating into karst cavities from the fissure systems on the noncarbonate surroundings. Thick positions of cave sediments consisting of different fractions of weathered surface layers of paragneisses witness the fact that the prevailing part of the karst ground water consists of water flowing into the underground from concealed ponors in the beds of water streams draining the broader surroundings of Bližná. As far as those beds follow the direction of the carbonate belt, they give rise to series of ponors, if they cross them, ponor groups are formed.

From the chemism of ground karst water which flows concentrated from one of the karst cavities at the level of the 3rd floor of the graphite mine it can be judged that it is water that is conducted to the ponors also by the drainage lines of the ammelioration system of cultivated areas of the drainage basin as well as from upland bogs. It is medium hardness, of alkaline reaction, of the calcium-magnesium-hydrocarbonate type with increased content of nitrates (Vašta 1984). According to long-term observations of this submerged karst



Exposure of the graphite deposit with a fragment of an abandoned gallery of the Ist floor of the mine

spring (Sobotka, Radovský, Šarbach 1985) there are small fluctuations in the discharge rate of the spring reflecting with some delay substantial rainfall or the period of thawing of the snow cover. In no case is it the seepage of water from the Lipno reservoir, which has completely different mineralization.



Cave wings in the roof cavity discovered in 1983

The karst system in marbles in the surroundings of Bližná is very well developed, but has an irregular course both in the horizontal and in the vertical sense. With respect to the variable properties of the structure of the matrix its underground spaces are very irregularly distributed also into hitherto unknown depths. By current methods of trial holes or geophysical survey they are difficult to localize. The authors of the present paper have therefore recommended the management of the n. e. Rudné doly Příbram to drive the galleries outside the carbonate belt on its NW side and to secure sufficient distance from the karsted limestones by long horizontal boreholes. Besides, it is necessary to continue following the cavities of this interbedded karst by means of special geophysical methods, best by the method of low or high frequency electromagnetic location which would at the same time yield data about the position of graphite deposits. It is desirable to complete those methods by radioisotopic tracing of the direction of flow of the karst ground waters.

From the speleological point of view the karst cavities discovered in the graphite mine near Bližná belong among the largest cave spaces of the Šumava Karst.

Asst. Professor Dr. Vladimír Panoš CSc.
Radek Pučálka

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ABSTRACTS OF PAPERS PREPARED BY MEMBERS OF THE CZECH SPELEOLOGICAL SOCIETY FOR THE PRESENTATION ON THE 10TH INTERNATIONAL SPELEOLOGICAL CONGRESS, BUDAPEST 1989

LINEAR TECTONICS AS FACTOR OF KARSTIFICATION

Vladimír Lysenko

The analysis of tectonic predisposition of Czech karst features. Paper is based on valorization of previous datas, especially tectonic data and interpretation of space images and aerial photographs.

Morphostructure schematic map of Zlatý Kůň shows the morphotectonic block with denudation remnants of paleorelief limited of predominant linear structures (overthrust fault, faults and joints). The N-S lines are main directions of the karstification in this area (Koněprusy cave). These structures are connected with Tobolka fault and continue through the Bohemian Massif. The seismic intensity MSK-64 (5 - 6°) accompanies some of them.

AEROSOL SPELEOTHEMS - THEORY AND PRACTICE

Antonín Jančařík

Speleothems in which origin influence of aerosol is not negligible we call aerosol speleothems. Water aerosol has most importance from this point of view. This aerosol origin by condensation of water vapour or by shattering of water vapour or by shattering of water drops. In Koněprusy caves (Bohemian Karst) was studied specific form of speleothems. We suppose that this forms origin through influence of condensation water aerosol.

The origin of this speleothems was mathematicaly simulated. We suppose that this process has two phases - corosion of rock (or older speleothems) and origin of speleothems - both in thin Water layer on rock surface. Great influence has geometry of this layer.

Occurence of some of this aerosol speleothems (which was palynologicaly dated) help, as one of basis, simulate microclimatic conditions in Koněprusy caves during some periods of its development.

COMPUTER PROCESSING OF SPELEOLOGICAL AND GEOLOGICAL MAPS

Antonín Jančařík

Speleological mapping is one of the most important branches of systematic speleological research from its rise. New possibilities for processing of speleological and geological maps gives computers development from last years. Maps can be doing much more quickly, easily and precisely and is possible to do some new form of documentation.

Some of new software products are described in the paper. We gives

one's attention to microcomputers software for field use in the first part and some new form of speleological documentation (axanometric views on earth surface or caves, isolines interpretation atc.) and final processing of documents using minicomputers in the second part. Some of new forms of documentation can be use with advantage for the next research, other can help to visualise described objects.

FLUORIT CAVES IN THE DĚČÍNSKÝ SNĚŽNÍK /CZECHOSLOVAKIA/

Vladimír Lysenko

Within 1983 - 86 the members of ČSS ZO 1 - 05 "Geospeleos" registrated new caves in fluorit deposit between Děčínský Sněžník and Jílové. This region is formed of Upper Cretaceous sandstones. The caves are following the fluorit veins of the W-E directions. The caves has hight differance from 536 m a. s. l. to 598 m a. s. l. The spaces has been flooding with water below the hight 548 m a. s. l. Joint caverns predominate, but somewhere they was formed in conformity with layers.

The higgest cave is 150m long, the denivelation is 62 m. The volume is 3000 m3.

The fluorit mineralization making an irregular connected crust on walls and roofs. Three fundamental generations has been classified in the caves: columnar aggregates, concentric-radial aggregates and laminated fluorit. The caves are younger than silicification of sandstone but older than fluorit mineralization. The age of caves is probably Upper Miocen.

PALEOKARST: A KEY TO PALEOGEOGRAPHY AND STRATIGRAPHY OF CONTINENTAL PERIODS

Pavel Bosák

Karst features which developed partly or entirely during past geological periods have been known as paleokarst. In its forms and fills, it preserves a record of the nature of geological and geographical changes, which have only scarce evidence from other records or correlate sediments. It serves as a censerver of geologic past evidencing the evolution of hypergenic zone of the Earth crust. It serves as a key to bio- and lithostratigraphy of continental periods and as a guide to paleogeographic analyses and paleoecologic considerations.

THE EVOLUTION OF THE BOHEMIAN KARST

Pavel Bosák and Vladimír Lysenko

After Middle Devonian deposition in the Barrandian finished, the Bohemian Karst underwent by long-lasting continental evolution. It was interrupted only by sedimentation of Upper Carboniferous continental redbeds (Westphalian to ? Autunian) and by marine epicontinental deposition during Upper Cretaceous (? Albian to Middle-Upper Turonian). Therefore, three periods of karstification are distinguishable here: /1/ Middle Devonian to Westphalian, /2/ Autunian to ? Albian-Cenomanian, and /3/ post-Turonian. Direct evidence of pre-Carboniferous karstification has been missing, however some indirect indices have been detected in correlate deposits. An intensive karstification took place in the pre-Cenomanian period. There is evidence even of the development of the river network. The post-Turonian karstification period is the most important for the origin of karst phenomena. The karstification began partly even under the Upper Cretaceous cover of clastic deposits, which were eroded during Paleogene. The main phase of cave origin is dated to Oligocene-Miocene. A bulk of caves were fossilized during Upper Miocene to Pliocene. The Quaternary evolution resulted only in minor cosmetic retouches and in origin of certain features connected with the downcutt of rivers.

"NORTH PLATEAU" OF RIDGE MT. ANNE (TASMANIA)

David Havlíček and Radko Tásler

Expedition to Tasmania was organized by the Albeřice caving club of the Czech Speleological Society in the year 1987. The camp was located in the entrance chamber of the Anne-a-Kanada cave. Czech cavers reached the bottom of the cave and discovered easier route in the lower section.

The exploration was focused to the northernmost corner of the mountain karst of Mt. Anne. Eleven caves vere surveyed. The greatest discovery - Goggled Eyes cave - is 76 m deep and 575 m long.

The presence of sediments in some caves and the modelation of passages indicate the polycyclical developement. The cave origin was connected with period when the area had not mountain morphology. Horizontal passages developed in shallow phreatic zone and the active developement continued later in vadose zone. Vertical and subvertical caverns are comparatively young. Old passages are partly filled by sediments (silty clay, sand) which are partly transported into lower parts yet unknown.

NEW DISCOVERIES IN VĚČNÁ LABUŽ CAVE (JULIAN ALPS, YUGOSLAVIA)

Radko Tásler and David Havlíček

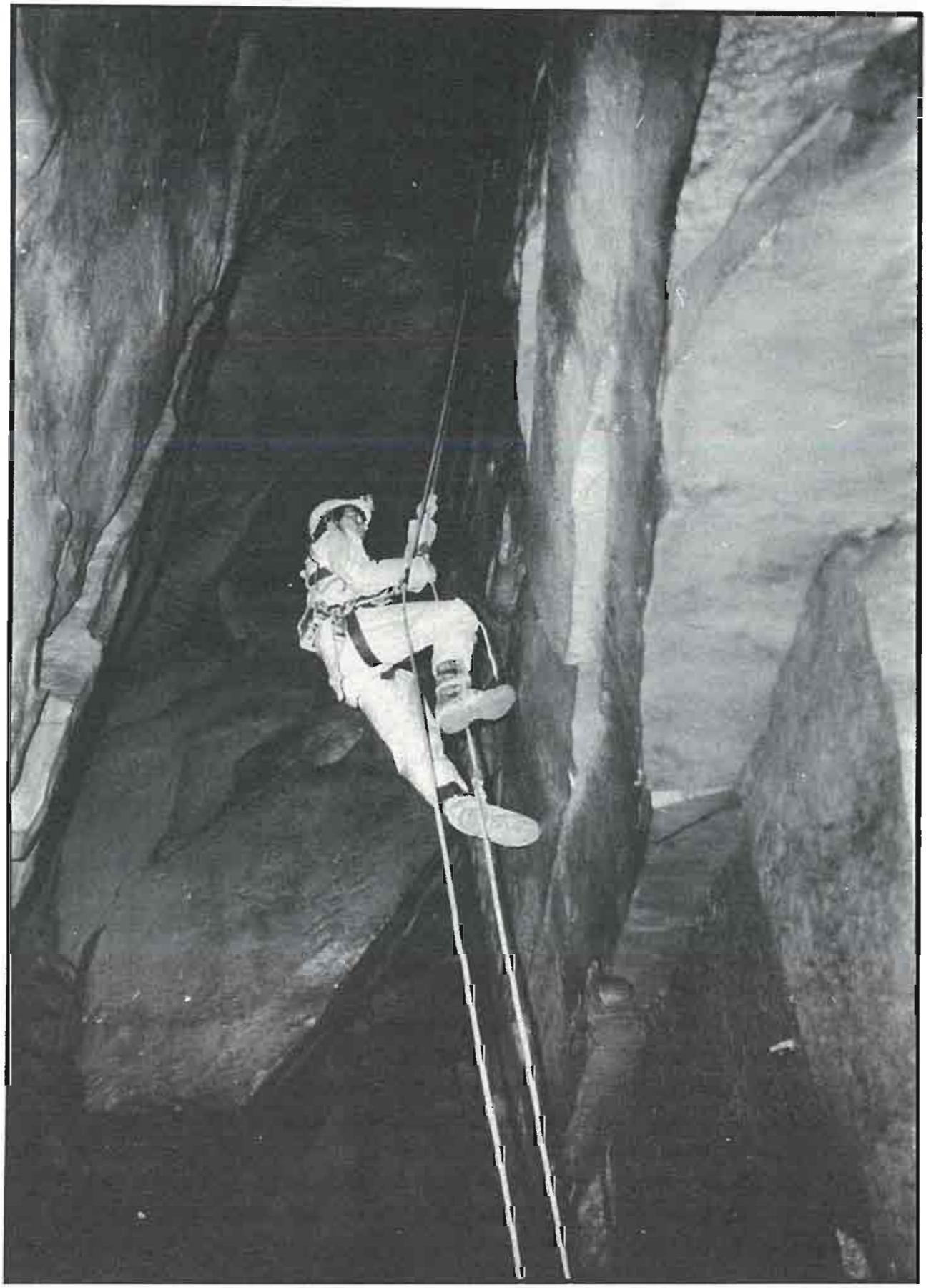
The poster shows the results of a speleological exploration of the plateau NW of Krn in the southern part of the Julian Alps, Yugoslavia, carried out by the Albeřice club of the Czech speleological society in the year 1988.

A detailed exploration was carried out of the area between Skutnik and Griva. Several shafts and photoles were discovered, the deepest one was "Zbrojnice" (Armoury) 108 m deep. The main effort was focussed to the cave "Věčná Labuž", which was prolonged from 265 up to 452 m in depth. There is a large canyon with underground water streem in this depth and the continuation is free.

FOURTH INTERNATIONAL SYMPOSIUM ON PSEUDOKARST, CZECHOSLOVAKIA 1990

Czech Speleological Society, Local Organisation 7 - 01 Orcus is organizing 4th International Symposium on Pseudokarst in Beskydy Mountains (Czechoslovakia) in Autumn 1990. Beskydy Mts. are important part of Flysh Carpathians situated in the Northern Moravian District. In Flysh sandstones are developed extensive pseudokarst caves and other features, which were studied and mapped in detail by Members of the Czech Speleological Society. The symposium will be organized in the centre of the Beskydy Mts. There will be 2 days of lectures and 2 days of field trips. No special equipment for the field trips will be required. All speleologist are heartily invited. Participants of earlier Pseudokarst symposiums will receive the ist circular. Other speleologists are asked to write to following adress:

Česká speleologická společnost - Czech Speleological Society
základní organizace - local organisation 7 - 01 Orcus
735 81 Bohumín
Československo - Czechoslovakia



"Kněhyňská" pseudokarst cave in the Beskydy mountain

"Ondrášovy díry" pseudokarst cave in the Beskydy mountain

Vydala Česká speleologická společnost, ústřední výbor v Praze, Valdštejnské náměstí 1 v roce 1989 jako příležitostnou publikaci k 10. mezinárodnímu speleologickému kongresu.

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