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SCHEELITE IN THE MALÉ KARPATY MTS. CRYSTALLINE AND ITS GENETIC RELATIONSHIP TO BASIC VOLCANISM

(Fig. 1—4)

Р е з ю м е: В общем исследовании шлифов из пезинско-пернецкого кристаллического массива Малых Карпат было определено значительное расширение шеллита. В областях состоящих из варишских гранитоидов модранского и братиславского массива находится относительно редко. Но обычным является на территории метабазитов и кристаллических сланцев нижнепалеозойского, согласно некоторых авторов позднеальгонкийского (?) возраста.

Самой выразительной концентрацией обычно связан с так называемыми продуктивными зонами, в которых появляются мощные толщи сингенетических кизовых руд связанных с субмаринным основным вулканизмом как и месторождения антимонита.

Уже А. М а у х е р и Р. Г о л л (1968) предположили возможность продолжения их «strata and time bound» Sb-Hg-W формации из Австрии до Малых Карпат.

Минералогические находки шеллита из Пернека и Пезинка были описаны в прошлом столетии (В. Ц е ф а р о в и ч 1859, 1873).

Но несмотря на обширные поисковые и исследовательские работы, могли быть только сейчас подтверждены.

Шеллит находится как на территории пезинско-пернецкого кристаллического массива так и в «Гармонской серии», что свидетельствует и о связанности обоих метаморфических комплексов, подчеркиваемую главным образом Б. Ц а м б е л о м.

A b s t r a c t: By a reconnaissance survey scheelite was found to be wide spread in heavy mineral concentrates from stream sediments of the Pezinok — Pernek crystalline, Malé Karpaty Mts.

It is rare or lacking in areas built by granitic rocks of the Bratislava and Modra Massifs. On the contrary it is common in segments of metabasic rocks and crystalline schists, Lower Paleozoic or according to some authors Algonkian (?) in age.

Highest scheelite concentrations are generally restricted to stream deposits draining the so-called producive zones, where mightly bodies of stratiform „Kies"-ores genetically related to the submarine volcanism of diabasic rocks as well as antimony ore mineralizations and deposits occur.

A. M a u c h e r and R. H ö l l (1968) have already pointed to the possibility of a continuation of their „strata and time bound" Sb—Hg—W Formation from Schlaining in Austria to the Malé Karpaty Mts. in Czechoslovakia.

Mineralogical occurrences of scheelite near Pezinok and Pernek were described already in the past century (V. Z e p h a r o v i c h 1859, 1873). In spite of extensive exploration works and investigations they could be confirmed only now.

Scheelite has been found not only in the Pezinok—Pernek crystalline area but also in the „Harmónia Formation" of paleontologically proved Lower Paleozoic age. This also indicates genetic relations of both complexes as stressed mainly by B. C a m b e l.

The Malé Karpaty are a core mountain-range of the West Carpathians. They are situated nearest to the Alpine mountain system.

Irrespective of the Mesozoic and Permian formation, the Malé Karpaty Mts. are

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built mostly by granitic rocks, crystalline schists and metabasic rocks (see the geological map fig. 1, compiled on the data by B. Cambel 1972 — partially modified).

The following two massifs are formed of the Variscan granitic rocks:

a) the Bratislava Massif — the larger one — extending from Bratislava to the northwestern surrounding of the town Pezinok, along 25 km and over a width to 8 km;

b) the Modra Massif in the northern surrounding of the town Modra. It is about 12 km long and 6—7 km wide.

After B. Cambel—J. Valach (1956), and B. Cambel (1967) in the Bratislava Massif two-mica quartz — granodiorite predominates over locally developed two-mica granites or adamelites. Leucocratic facies of granitic rocks are developed along the western margin of the Massif. Pegmatites are abundant, particularly along the eastern part of the intrusion.

In the Modra Massif, most frequent are biotitic granodiorites; less abundant are two-mica granitoides and autometamorphic facies. Pegmatites are markedly scarcer than in the Bratislava Massif, and are mostly restricted to the area of two-mica granites.

The crystalline schists are particularly frequent in the Pezinok — Pernek crystalline extending between the two granite massifs. However, in the area of the crystalline schists smaller spurs of granite rocks are found. Among these a body (approx. 1,5 × 2,5 km) near the Kolársky vrch (hill), to the northwest of the Cajla (Pezinok) antimony mines, is the largest.

Considerably less extensive are crystalline schists out of the Pezinok — Pernek crystalline area:

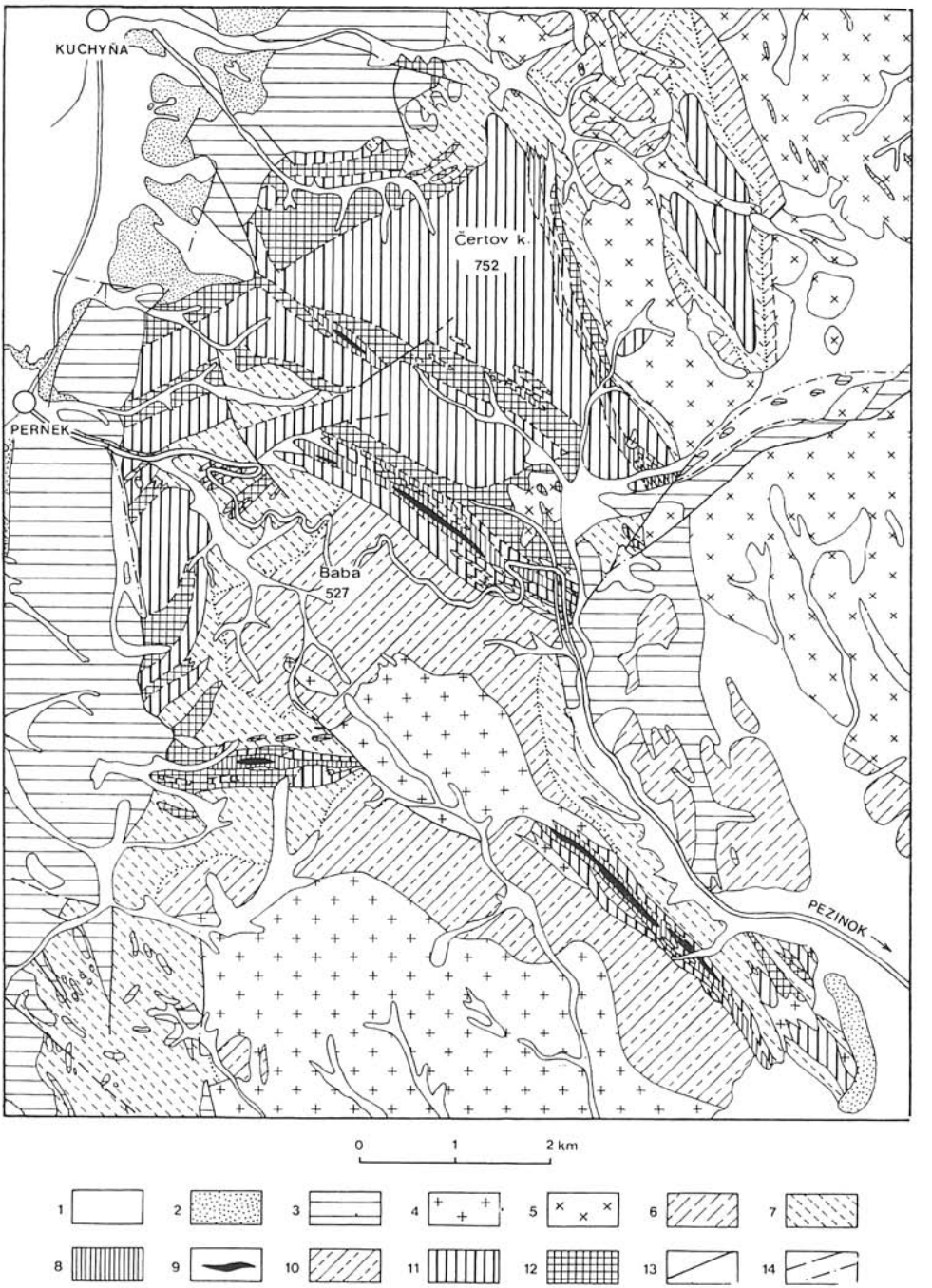
a) Along the western margin of the Bratislava Massif — an incontinuous fringe 1—2 km width is formed of the crystalline schists.

b) Crystalline schists occur also along the southeastern and northeastern margins of the Modra Massif — the so-called „Harmónia unit".

In the granitic rock massifs proper smaller blocks of crystalline schists and of metabasic rocks are found, too. The crystalline schists include (B. Cambel 1958, B. Žákovský 1962) metamorphosed para- and orthomaterial. The first comprises: two-mica and biotite paragneisses formed by periplutonic metamorphism near the granite intrusions, various phyllites (sericite-chloritic, quartzose — mostly containing biotite, graphite phyllites and schists).

Epimetamorphosed schists with variable content of actinolite are the most frequent intermediary member between para- and orthorocks. They originated from clayey — detrital sediments including pyroclastic material of basic effusive rocks. Frequently, they contain intercalations of graphitic shales, and are connected with sedimentary and volcanic rocks by gradual transitions.

Fig. 1. — Geological Map of the Pezinok — Pernek Crystalline (After B. Cambel in Geological Map of the Malé Karpaty Mts 1:50 000; Geol. Survey D. Štúr, 1972 — partially modified). 1. Quaternary; 2. Neogene; 3. Mesozoic; 4. Granitic rocks, Bratislava Massif (Variscan); 5. Granitic rocks, Modra Massif (Variscan); 6. Sericite-chlorite, and biotite phyllites; Silurian-Devonian; Harmonian-Formation; 7. Sericite-biotite-, biotite phyllites; 8. Actinolite schists; 9. Actinolite schists with syngenetic pyrite bodies; 10. Biotitic, micaschistose gneisses, paragneisses; 11. Amphibolites — fine-to medium grained; 12. Amphibolitic rocks with prevailing pyroclastic material 7—12 Lower Paleozoic to Yuonger Algonkian (?); 13. Faults; 14. Faults (supposed).


KUCHYŇA
Čertov k.
752
PERNEK
Baba
527
PEZINOK
0
1
2 km
1
2
3
4
5
6
7
8
9
10
11
12
13
14

The orthoschists of the Pezinok — Pernek crystalline formed by metamorphism of the volcanic rocks. B. C a m b e l (1968) regards the detrital sequence in the southern part of the Pezinok — Pernek crystalline area along the margins of the Bratislava Massif as the oldest element. The detrital sequence was metamorphosed into biotitic mica-schists to gneisses, paragneisses, or biotitic phyllites.

Sedimentation of the detrital sequence was followed by more intensive tectonic movements. They resulted in deepening the sedimentation area (formation of pellitic and organodetrital rocks), and — in its marginal parts — in effusions of basic, diabase lavas, in extrusions of pyroclastic material alternating with layers of sedimentary rocks.

Genetically related with this submarine, basic volcanism are also stratiform deposits of „Kies" ores of the so-called first productive zone (Pezinok — Kolársky vrch and Konské hlavy — Turecký vrch, in the area of the Kolársky vrch is the largest known accumulation of Sb- ores in the Malé Karpaty Mts. Map fig. 1. and Map fig. 2.

According to B. C a m b e l (1968) an age equivalent of this oldest volcanism are metabasites in the area of the hill Kuchynská Baba — Gajdoš (northeastern corner in fig. 1).

The eruption of metabasites was again followed by clayey — detrital sedimentation to which correspond biotitic phyllites, mica-schists and paragneisses north of the first productive zone (toward the middle of the crystalline area) (B. C a m b e l 1958).

Most metabasites are concentrated in the northwestern part of the crystalline area, north of the road connecting Pernek and Pezinok. B. C a m b e l regards them as products of a younger volcanic period, active predominantly in the central part of the Early Paleozoic synclinal basin.

The volcanism was here not a simple — one-act event. Distinguished are the so-called subjacent amphibolites (older part of the younger period) followed by formation of younger stratiform deposits which are the most intensive „Kies" mineralization in the Malé Karpaty; and the so-called hanging amphibolites which represent the final stage of the basic volcanism. The latter amphibolites form the thickest continuous bodies in a wider vicinity of the Čertov kopec (hill) and generally predominate in the northwestern part of the crystalline area.

The subjacent amphibolites crop out mostly in the form of elongated bodies, together with actinolitic schists, graphitic shales and with bodies of pyrite — pyrrhotite ores (i. e. the so-called younger productive zone of B. C a m b e l l. c.).

Distinguished are three (younger) productive zones:

a) the first zone, forming the southern confinement of the metabasite complex, comprises the deposits Kristína, Nádej, Augustín and Karol,

b) in the second zone (Rybníček — Čmelo — Kriżnica) extending over the middle

Fig. 2. — Distribution of scheelite in river-deposits of the Pezinok — Pernek area: 1. Panning concentrates without, or with sporadic sheelite only; 2. Panning concentrates with scheelite indications; 3. Panning concentrates with marked scheelite indications; 4. Panning concentrates with gold indications; 5. Panning concentrates with rich gold indications; 6. Panning concentrates rich in baryte; 7. Stratiform pyrite-pyrrhotite deposits; 8. Antimony deposits; 9. Antimony-ore occurences; 10. Deposis of the productive zones: I. Pezinok (Cajla) — Kolársky vrch: deposits: Ferdinand — Karolína, Pyrite and Antimony adit. Ia. Turecký vrch (hill) II. Deposits: Kristína, Nádej, Augustín IIa. Deposit: Karol III. Rybníček-Čmele; deposit of the Čertov kopec (hill) IIIa. Kriżnica; deposit Pernek (Sb- and pyrite-pyrrhotite) IV. Rybníček IVa. Kuchyňa; deposit of the Puklišová and Trojičná adit (Sb); pyrite deposit of the Ph-adit.


KUCHYŇA
Javorinka
Modransky p.
Sb
IV.a
Čertov kop.
752
III a
Sb
PERNEK
Kostolny p.
III. Sb
Vidiatova
Blatina
Sb
II.a
IV.
II.
Sedlačkov jar.
Sb
Rybnicky p.
Barvinsky p.
I.a
Sb
vodna nádrž
Limbach
Hrubý v.
564
I.
PEZINOK
0
1
2 km
1
2
3
4
5
6
7
8
Sb
9
Sb

of the metabasite komplex, are deposits of the Čertov kopec and Pernek (pyrite-pyrrhotite and antimony).

c) the northeastern margin of metabasites is confined by a productive zone including the Kuchyňa deposit of antimony (Puklišová and Trojičná adits), and syngenetic pyrrhotite-pyrite mineralization. The latter though, being extensive enough, does not form any remarkable deposit accumulation.

In contrast to B. Cambel's scheme presented, J. Čilík — P. Sobolič — R. Žákovský (1959) and R. Žákovský (1962) have a different opinion about superstition of individual complexes in the Pezinok — Pernek crystalline area.

In accordance with B. Cambel, the originally detrital sequence (biotitic phyllites, mica-schists gneisses) is regarded as the oldest complex too.

As a younger member of the crystalline they consider — the detrital — effusive sequence and distinguish in it the subjacent and hanging amphibolites (identic with those of the so-called younger volcanic period of B. Cambel), as well as the so-called middle amphibolites. However, in contrast to B. Cambel (l. c.), they comprise in the sequence also amphibolites from the most southern productive zones (deposits: Pezinok — Kolársky vrch — Turecký vrch) which have been considered products of an earlier volcanic period. According to such a scheme, all the productive zones with sulphidic mineralization are characterized by a more or less equal position.

Explosive nature and abundant pyroclastic material are characteristic of older products of volcanic activity, while the hanging amphibolites consist mostly of metamorphosed lava flows.

Besides effusive forms in the Pezinok — Pernek crystalline area, quoted are also intrusive forms: gabbros, gabbrodiorites a. s. o. (B. Cambel 1952, B. Cambel — G. Kupčo 1965). They are, however, not separately marked in geological maps.

Still the opinions about the age of the crystalline differ. The crystalline rocks are regarded as Proterozoic (M. Máška — V. Zoubek 1961, J. Kamenický 1967), or Paleozoic (B. Cambel 1962). This opinion is supported by the finds of Devonian crinoids (R. Horný — J. J. Chlupáč in Tectonic development of Czechoslovakia 1961) and of Devonian pollen (O. Čorná 1968) in the epimetamorphosed Harmónia Unit which — according to B. Cambel — is an equivalent or the upper part of crystalline rocks of the Pezinok — Pernek area.

Plant remains of Paleozoic age (Upper Devonian — Carboniferous) have been found in graphitic schists in deeper-metamorphosed crystalline rocks near the western margin of the Bratislava Massif (O. Čorná 1968).

In systematic isotopic investigations of the West-Carpathian ore formations, also mineralizations from the Malé Karpaty were included.

Our orientational investigations already disclosed tungsten in the form of scheelite to be a comparatively characteristic element of the metallogenesis and the necessity to pay certain attention to it not only from pure theoretical aspects.

It was just from the Malé Karpaty crystalline area, that scheelite was described in Slovakia for the first time: with pyrite in gneisses from Pezinok, and with pyrite, quartz and antimonite from Pernek (V. Zepharovich 1859, 1873).

These localities were for quite a long time the only known occurrences of tungsten minerals in our country. Since 1953 the author has described quite a number of paragenetic associations including scheelite, ferberite, hübnerite or wolframite, and called attention to the importance of tungsten for the West Carpathian metallogenesis in a synthetical article (J. Kantor 1965).

This was why we tried — already in the first stage — to get a survey about the

distribution of scheelite in the crystalline area of the Malé Karpaty, to distinguish complexes in which scheelite accumulated from eventual sterile sequences or rocks. Panning of stream-sediments provided the most favourable and quickest means of obtaining such information.

Scheelites in the Malé Karpaty are characterized with bluish luminescence in UV-light, indicating low molybdenum content. In this respect they are identic with scheelites in antimonite formations of other areas of the West Carpathians, and with scheelites in gold-scheelite veins of the crystalline areas. They are, however, different from scheelites genetically related to the Neogene volcanism, which are characterized by higher Mo-concentrations and by luminiscence in yellow colour-shade (J. Kantor 1965).

The X-ray difraction record on scheelite panned from stream gravels of the western slope of the Misársky ostrovec (hill) near Pernek, showed the following values for d (tab. 1).

Table 1

I		M — 522		II	
d	I.	d	I	d	I
4,64	S	4,76	7	4,62	7
3,029	VJ	3,15	10	3,04	10
2,744	W	2,825	5	2,79	5
2,558	W	2,608	8	2,59	5
2,255	W	2,311	7	2,26	5
				2,11	2
2,073	W	2,079	3	2,05	2
				2,02	2
1,957	W	1,989	5	1,971	5
1,887	S	1,925	9	1,899	9
1,817	W	1,858	7	1,830	5
				1,789	2
				1,752	2
				1,707	2
1,653	M	1,685	6	1,672	7
1,588	W	1,630	5	1,618	5
1,566	S	1,590	9	1,577	9
1,529	M	1,549	7	1,540	7
1,435	W	1,442	4	1,431	5
				1,410	2
				1,375	5
1,349	W	1,349	6	1,351	5
1,323	W	1,322	6	1,326	5
				1,302	2
1,229	S	1,250	8	1,241	10
		1,229	5	1,221	2
1,195	M	1,206	5	1,203	7
1,179	M	1,174	6	1,184	7
1,160	M			1,166	6
1,123	W			1,124	5
1,104	VW			1,106	2
1,078	S			1,078	9

I. — scheelite, Pernek, N of Misársky ostrovec. M — 522 — Michejev, tab. Nr. 522 — scheelite, Ural I. II. — De Assuncao, Garrido, scheelite, Traversella

The X-ray characteristic of scheelites from other occurrences in the West Carpathian Crystalline and in the Spišsko-gemerské rudohorie Mts. is presented in an article by the author (J. Kantor 1965).

The microphotograph fig. 3 shows scheelite grains separated from small creek alluvia on the western slope of the Misársky ostrovec. Here scheelite displays the form of angular fragments whose size and shape indicate a very short transport. In the map of the river system (fig. 2) the results of orientational analyses of panning concentrates from the Pezinok — Pernek crystalline are shown. The analyses were evaluated for scheelite. Although in several samples indications of gold and baryte were found, we did not treat them more thoroughly because of scarcity of time and also because of other purposes of our work. Partially they are included in the map.

With respect to scheelite content the heavy mineral concentrates were divided into three categories. A cross in the map marks sample with scarce or no scheelite. Empty circles mark distinct indications of scheelite, while full circles correspond to more abundant scheelite, whose grain size and shape indicate mostly also a short transport.

Panning tails without traces of scheelite are generally infrequent in the Pezinok — Pernek crystalline. Their occurrences are mostly restricted to segments composed of granitic rocks (Cf. maps fig. 1 and 3) in the Bratislava and in the Modra Massifs, with the exception of the Kolársky vrch interrupting the southernmost productive zone. In the heavy mineral concentrates of this area scheelite and rich indications of native gold are common. The latter was mined here till (the fifties) of the last century. On the origin of this scheelite we may suppose — till detailed study is carried out — come from disintegrated gold — scheelite veins. However, occurrences of scheelite without native gold in the aluvia of river from the central part of the massif indicate that this cannot be the only source. The scheelite may also be derived from dispersions in crystalline rocks or from sources remobilized in connection with the intrusion of hercynian granitic rocks. Granitic rocks of the Bratislava Massif were tested in an area out of that illustrated by the map Nr. 1, and they were found almost sterile in scheelite. This is in accordance with M. Mišík's (1955) investigations of accessoric minerals in eluvia of granitoids in the Bratislava and Modra Massifs. He did not find scheelite. This, however, does not mean that scheelite is completely missing. It occurs only sporadically, in small amounts (0—0.05 g/t), and is more frequent in the Bratislava Massif as showed the latest investigations by J. Veselský (1972).

Another area of scheelite present mostly in the form of slight indications or missing is that of the so-called hanging amphibolites. (In the map fig. 1 they are more abundant near the Čertov kopec, elevation point 752).

Except these cases, scheelite indications are common in deposits of rivers draining the area of crystalline schists and amphibolites. In the latter, scheelite indications are more conspicuous and abundant.

The maximum enrichment in scheelite show mostly rivers whose alluvia originate in the so-called productive zone (Cf. the map fig. 2) with pyrite-pyrrhotite and antimonite deposits. The accordance between the deposits known and the scheelite concentrations is usually good.

In some cases, however, in the source areas of rivers with important scheelite concentrations no antimonite or kiese deposits are known.

These areas should also be paid attention. They comprise: a. the right tributary of the brook Midlárová south of the antimonite deposit Kuchyňa (Puklišová — Trojičná adits); b. the right tributary of the brook Javorinka near Kuchyňa. B. Cambel (1959) mentioned larger adits tracing an unknown ore — mineralization: c. the

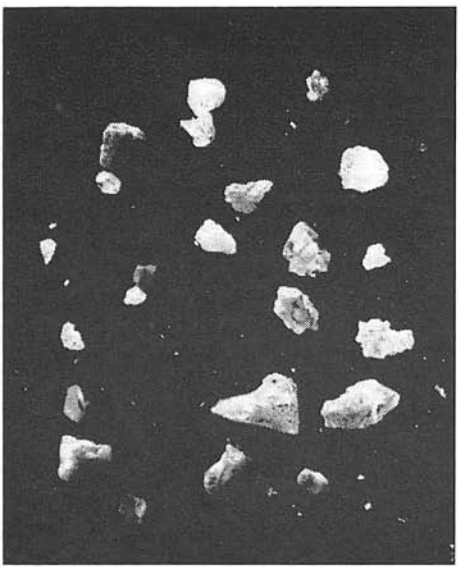


Fig. 3. — Scheelite from panning concentrates. Western slope of the Misársky ostrovec (hill), E. of Pernek. 15 ×.

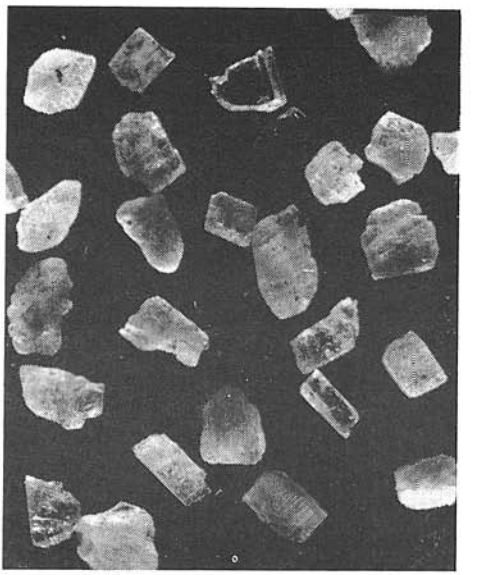


Fig. 4. — Baryte from panning concentrates. Tributary of Javorinka SE of the village Kuchyňa. 15 ×.

western slope of the Misársky ostrovec; d. the crystalline rocks along the eastern margin of the granitic intrusion of the Kolársky vrch where scheelite indications extend farther northward than antimonite and kies mineralizations known.

Heavy mineral concentrates from the western margin of the Pezinok — Pernek crystalline contain also baryte present over the area for the Turecký vrch through the Misársky ostrovec to the southern vicinity of Kuchyňa. Here in the tributary of the brook Javorinka found was quite abundant baryte. (Cf. the microphotograph fig. 4).

Following is its roentgenometric identification (tab. 2).

Till the present a baryte mineralization with galenite and sphalerite was described only from the southwestern part of the crystalline, from irregular veins below the Pezinská Baba (hill) (B. C a m b e l 1959). For a comparison we have analyzed sulphur from barytes of this mineralization (from the dump of the Gašpar adit) and from barytes in the tributary of Javorinka for it's isotopic composition.

Results:

a) baryte from the Gašpar adit:

$\delta\, S^{34} = + 20.0\ ‰$

b) baryte from the tributary of Javorinka:

$\delta\, S^{34} = + 20{,}3\ ‰$.

Their isotopic composition is identical, which indicates the same genesis, and possible thus far unknown occurrence of baryte — polymetallic mineralization southwest of Kuchyňa.

In panning concentrates of the Kolársky vrch area found were isolated flakes of molybdenite which has not been quoted from the Malé Karpaty so far.

Table 2

I		M — 464		ASTM — 3377	
d	I	d	I	d	I
4,26	W	3,974	1	4,35	20
3,79	W	3,819	2	3,89	25
3,59	VW	3,588	3	3,57	10
3,46	M	3,456	6	3,44	63
3,32	W	3,330	5	3,31	35
3,12	S	3,058	7	3,10	63
2,841	M	2,843	5	2,83	40
2,731	M	2,725	5	2,72	45
2,465	VW	2,470	1	2,47	15
2,315	W	2,322	6	2,31	10
2,203	W	2,202	5	2,20	15
2,106	VJ	2,106	10	2,10	100
2,052	VW	2,048	2	2,04	10
1,925	VW	1,922	1	1,92	5
1,849	W	1,847	4	1,85	15
1,749	W	1,745	4	1,74	8
1,676	W	1,669	4	1,67	15
1,591	W	1,625	1	1,63	8
		1,581	10	1,58	10
1,527	M	1,526	6	1,52	25
1,478	W	1,467	2	1,47	7
1,418	M	1,420	5	1,42	20

I. — baryte, Kuchyňa, 1,6 km N of Križnica, panning concentrate M — 464 — baryte, Klausthal, Michejev, tab. Nr. 464 ASTM — 3377 — baryte, tab. Nr. 3377

Our investigations concerning distribution of scheelites are just informative, and the can certainly be complemented and made more precise by detailed study.

Generally they show that:

1. Scheelite is scarcest in the area of granitic rocks. Here it is completely missing sometimes.

2. Scheelite is more frequent in the areas of the so-called hanging amphibolites; still indications are comparatively poor here.

3. The most important concentrations were in heavy mineral concentrates from rivers draining the so-called productive zone, i. e. complexes of predominantly actinolitic, graphitic schists, with syngenetic kies deposits and with antimony mineralization between subjacent and hanging amphibolites.

4. In the Malé Karpaty scheelite is evidently related to submarine diabase volcanism. This was also observed in Austria, for instance in the scheelite-magnesite deposit Tux (R. Höll — A. Maucher 1968) and in several scheelite-antimonite — cinnabar deposits (R. Höll — A. Maucher 1968 and R. Höll 1966 a o.).

5. More or less close spatial and genetic relationship among kies, antimony and wolfram mineralizations in the Malé Karpaty was also proved by our investigations. However the common occurrences of pyrite-pyrrhotite and antimonite ores in the same productive zones were known in the past, too. Recently, A. Maucher and R. Höll (1968a) presented interpretation according to which the Pezinok — Pernek Sb-deposit is regarded as a „strata and time bound" mineralization of th Sb-Hg-W

formation. The formation continues in Schlaining in Austria and is by A. Maucher and R. Höll (1968 a) supposed to be Lower Palaeozoic in age.

6. The presence of biogenic sulphur in antimony minerals of some deposits in the Malé Karpaty was proved on the basis of isotopic composition by the author in 1970 in a publication on the occasion of the 70-th birthday of Academician A. P. Vinogradov (B. Cambel — J. Kantor 1972). Based on numerous isotope analyses the effects of exogenous processes during the formation of the ores are treated elswhere. Interesting here is the presence of Sb-mineralization in graphitic schists, its rarer occurrence in actinolitic schists and almost total absence in metabasites, and first of all in granitic massifs.

7. Scheelite has been found also in the „Harmónia — Formation" between the villages Dubová and Kráľová north of Modra. The fact also proves evident relationship of this Formation to the rock complexes of the Pezinok — Pernek crystalline area. The find is the more interesting that in the Harmónia Formation, besides basic volcanism also carbonatic sedimentation was active. The effects of $CaCO_3$ upon the precicipation of scheelite are generally known.

Scheelite belongs among minerals characteristic of metallogenesis in the Malé Karpaty. Therefore, we cannot agree with a statement based upon several year's exploration of the deposits in the Pezinok — Pernek area, viz. that „scheelite mentioned by V. Zepharovich (1859, 1873) besides other later proved minerals could not be identified and its occurrence was unsure". On the contrary: in the Pezinok — Pernek crystalline it is difficult to find panning concentrates without at least traces of scheelite.

So far there is no complex information about the manner of occurrence of scheelite. Besides impregnations, mostly in the rocks of productive complexes it is also present in quartz veinlets, locally accompanied by sulphides.

For detailed revealing regularities of its occurrences it is necessary to test for scheelite the existing mining plants and numerous drillings by which the productive zones were explored. Attention should be also paid to other areas of the Malé Karpaty consisting of crystalline schists and amphibolites, for instance along the western margin of the Bratislava Massif, to area with carbonate sedimentation a. o., as well as to geochemistry of graphitic schists, with particular respect to the distribution of antimony, tungsten, quicksilver, a. o.

Translated by E. JASSINGEROVÁ.

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