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ACCESSORY MINERALS OF GRANITOID ROCKS OF BOJNÁ AND HLOHOVEC BLOCKS, THE POVAŽSKÝ INOVEC MTS.

(Figs. 7, Tabs. 2).

Abstract: Approximately 30 species of accessory minerals have been found in various types of granitoid rocks and pegmatites of Považský Inovec Mts. Special attention has been given to zircon and garnet, but as well to TR-minerals and sillimanite. On the basis of petrographical-mineralogical and geochemical study, two genetically contrasting groups of granitoid rocks could be distinguished:

1. granitoids of Bojná Block (association garnet-monazite);
2. granitoids of Hlohovec Block (association magnetite-allanite-titanite).

The Bojná Block granitoids differ in individual bodies from each other above all by the intensity of post-magmatic autometasomatic alterations. The Hlohovec Block of Považský Inovec Mts. appears to be a continuation of the Tribeč—Zobor Block of Tribeč Mts.

A pegmatite with rare-element mineralization (columbite, gahnite) associated with albitization zones has been found in the well-developed zonal pegmatites of Považský Inovec Mts.

Резюме: В различных типах гранитоидных пород и пегматитов г. Поважски Иновец было определено около 30 видов акцессорных минералов. Особое внимание уделялось циркону и гранату, но тоже минералам редких земель и силлиманиту. На основе петрографическо-минералогического и геохимического изучений можно выделить две, генетически друг от друга ярко отличающихся группы гранитоидных пород:

1. гранитоиды Бойнянского блока (ассоциация гранат-монацит)
2. гранитоиды Глоговского блока (ассоциация магнетит-аланиит-титанит).

Гранитоиды Бойнянского блока отличаются друг от друга в отдельных телах прежде всего интенсивностью послемагматических автометасоматических изменений. Глоговский блок г. Поважски Иновец кажется быть продолжением Трибечско-зоборского блока г. Трибеч.

В хорошо развитых зональных пегматитах г. Поважски Иновец был определен пегматит с минерализацией редких элементов (колумбит, ганит) связанной с зонами альбитизации.

Introduction

The geological structure of the Považský Inovec Mts. crystalline is relatively varied and has been studied with increased attention especially in the last years (Putiš, 1980, 1982, 1983; Korikovski — Putiš, 1986; Cambel — Korikovski, 1986).

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The Považský Inovec Mts., belonging to the core mountain ranges of Tatricum, have, besides nappe structure, an outstanding block structure with three different blocks, each one having its own type of crystalline as well as mantle units. According to M a h e ľ (1986), they are, from north to south: 1. Selec Block, 2. Bojná Block, 3. Hlohovec Block (Fig. 1).

Granitoid rocks, which are in the Selec Block limited to only a few unimportant occurences, are more significantly represented only in the Bojná

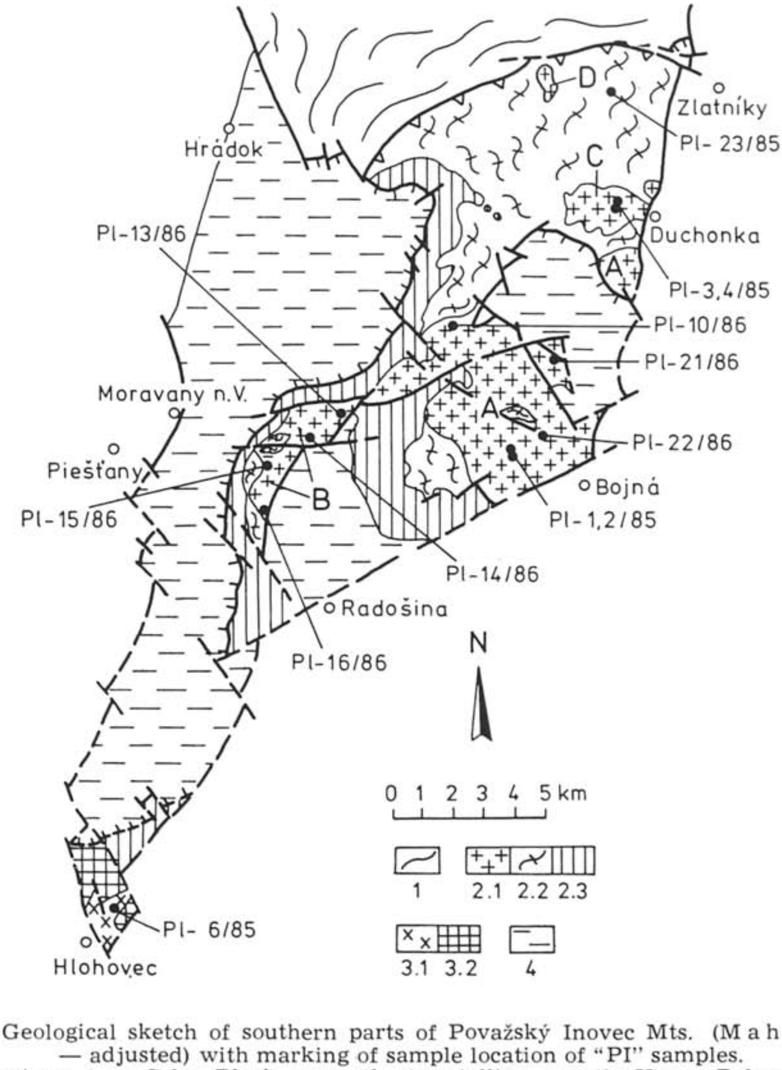

Fig. 1. Geological sketch of southern parts of Považský Inovec Mts. (M a h e ľ, 1986 — adjusted) with marking of sample location of "PI" samples.
Explanations: 1 — Selec Block generally (crystalline, mantle Upper Paleozoic, Mesozoic); 2 — Bojná Block: 2.1 — granitoid rocks, 2.2 — crystalline schists, 2.3 — mantle Mesozoic; 3 — Hlohovec Block: 3.1 — granitoid rocks, locally crystalline schists, 3.2 — mantle Mesozoic; 4 — allochthonous Mesozoic, Tertiary generally.

and Hlohovec Blocks; in the Bojná Block they form genetically related but mineralogically as well as petrographically partially different, isolated bodies. On the basis of older works (J. Kamenický, 1956; J. Kamenický in Buday et al, 1962; Putiš, 1983, and others) as well as our results it can be said that granitoid rocks of Hercynian age (Kantor, 1961) form the following bodies in the Bojná Block of Považský Inovec Mts.:

A — Bojná body — two-mica, less biotite (leuco)tonalites to leucogranodiorites grading into granites; coarse-grained pegmatoid varieties (PI-21/86) are represented locally as well. The contact with crystalline schists is sharp, clearly intrusive.

B — Moravany body — so far, two-mica granodiorites have been identified; their contact with crystalline schists is intrusive as well. Aplitoid-pegmatoid granites occur on the northern border of the body.

C — Duchonka body — leucocratic muscovite granites, only locally two--mica leucogranodiorites, frequently grading into coarse-grained aplite-pegmatoid varieties. Even though this is also an intrusive body, spatial relations of the leucocratic Duchonka granites with the surrounding paragneisses are apparently closer than in the case of the Bojná and Moravany bodies.

D — small occurences of granitoid rocks in a complex of migmatized paragneisses near the northern border of the Bojná Block. In several observed cases they are concordant, more or less lenticular, small bodies in the middle of crystalline schists; they could possibly be considered to be anatectic granitoids in situ (Fig. 1).

Hybride biotite leucogranodiorites-tonalites and rarely also biotite-amphibole diorites occur in the Hlohovec Block. Besides granitoid rocks, Ferenczi (1915) mentioned also the occurence of crystalline schists in the Hlohovec Block.

Methods of investigation

13 samples with a weight of approx. 12 kg have been collected from the Bojná and Hlohovec Blocks, and treated by the heavy-fraction method. The samples have been chemically analysed (we do not present the results of chemical analyses in this paper), petrographically and mineralogically evaluated. The scanning electrone microscope Tesla BS-300 was used for the study of morphology of the accessory minerals; semi-quantitative analyses of accessory minerals were carried out on the energy-dispersion system EDAX — PV-9100; quantitative chemical analyses were executed at 25W on the microprobe JEOL JXA-5A.

Accessory minerals in granitoid rocks

The complete accessory mineral assemblage is presented in Tab. 1. As magmatic accessory minerals can be classified, above all, zircon, apatite, allanite, Fe-Ti oxides, titanite; with late-magmatic to post-magmatic minerals we can class zircon and apatite of younger generation, further garnet, monazite, xenotime and sillimanite; sulfides of Fe, As, Pb, Zn, Sb, carbonates and U-minerals are considered to be of hydrothermal origin.

Zircon: One of the most informative accessory minerals is, without

Table 1

Total accessory mineral association and their contents in granitoid rocks of southern

	Bojná body				Moravany	
	PI-1/85	PI-2/85	PI-10/86	PI-21/86	PI-13/86	PI-14/86
zircon	240	200	110	74	200	270
apatite	4300	940	230	1200	1500	2600
allanite	<1	<1	—	—	—	—
monazite	20	15	4	40	15	90
xenotime	—	—	—	—	—	1
rutile	—	<1	—	<1	<1	—
ilmenite	—	<1	—	<1	<1	<1
magnetite	<1	—	<1	—	—	—
titanite	—	—	—	—	—	—
leucoxene	<1	15	<1	<1	<1	—
garnet	2200	910	170	44	180	490
sillimanite	30	<1	<1	<1	—	—
tourmaline	—	—	—	—	—	—
columbite	—	—	—	—	—	—
gahnite	—	—	—	—	—	—
Mn — spinelide	—	—	—	—	—	—
scheelite	—	<1	<1	<1	<1	<1
arsenopyrite	<1	<1	—	<1	—	—
pyrite	2	2	<1	<1	<1	<1
pyrrhotine	—	—	—	—	—	—
sphalerite	<1	<1	—	—	—	—
galena	5	<1	—	—	—	—
antimonite	<1	—	—	—	—	—
uraninite	—	<1	—	—	—	—
carbonate	<1	<1	—	—	—	—
epidote-zoisite	<1	619	<1	19	<1	<1
haematite	<1	—	<1	—	—	—
limonite-goethit	<1	<1	6	45	<1	<1
autunite (?)	—	—	—	—	—	—
Index No.	0.68	0.27	0.05	0.14	0.19	0.35

parts of Považský Inovec Mts. (in g/t).

body	Duchonka body	Leucoto-nalite	Pegmatites			Hlohovec body
PI-16/86	PI-4/85	PI-23/85	PI-3/85	PI-15/86	PI-22/86	PI-6/85
280	80	110	44	12	10	190
200	990	450	480	<1	330	1100
<1	<1	—	—	—	—	27
40	25	25	2	<1	2	6
5	—	—	<1	—	<1	—
—	<1	<1	—	—	<1	<1
<1	<1	6	<1	—	—	62
<1	6	15	<1	—	—	2300
—	—	—	—	—	—	7
<1	<1	<1	5	—	—	<1
100	330	120	12000	17000	67	—
—	10	—	<1	—	30	—
—	—	—	<1	—	—	—
—	—	—	—	50	—	—
—	—	—	—	140	—	—
—	—	—	—	<1	—	—
—	—	—	—	<1	—	<1
—	1	—	1	—	—	—
<1	2	<1	1	<1	2	2
—	—	7	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	<1
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	<1	<1	—	—	—
<1	7	43	10	--	<1	53
—	—	—	—	—	—	—
<1	2	<1	200	<1	200	18
—	—	—	1	—	—	—
0.06	0.15	0.08	1.27	1.76	0.06	0.38

Following correction coefficients (due to losses during separation) have been applied: apatite — 7.1, allanite — 5.3, monazite — 3.7, xenotime — 3.3, ilmenite — 3.1, magnetite — 1.9, titanite — 3.4, leucoxene — 5.0, garnet — 1.9, sillimanite — 10.0, columbite — 3.3, — gahnite — 2.0, arsenopyrite — 2.5, pyrite — 2.0, pyrrhotine — 3.3, galena — 5.0, epidote-zoisite — 4.8, limonite-goethite — 2.5, zircon was calculated from zirconium content in rock.

doubt, zircon. We directed our attention to its morphological characteristics. There are two genetic groups of zircon in the granitoid rocks of Považský Inovec Mts.: magmatic, and late magmatic to post-magmatic (pegmatite). Colourless to brownish-red, transparent types dominate in the first, older

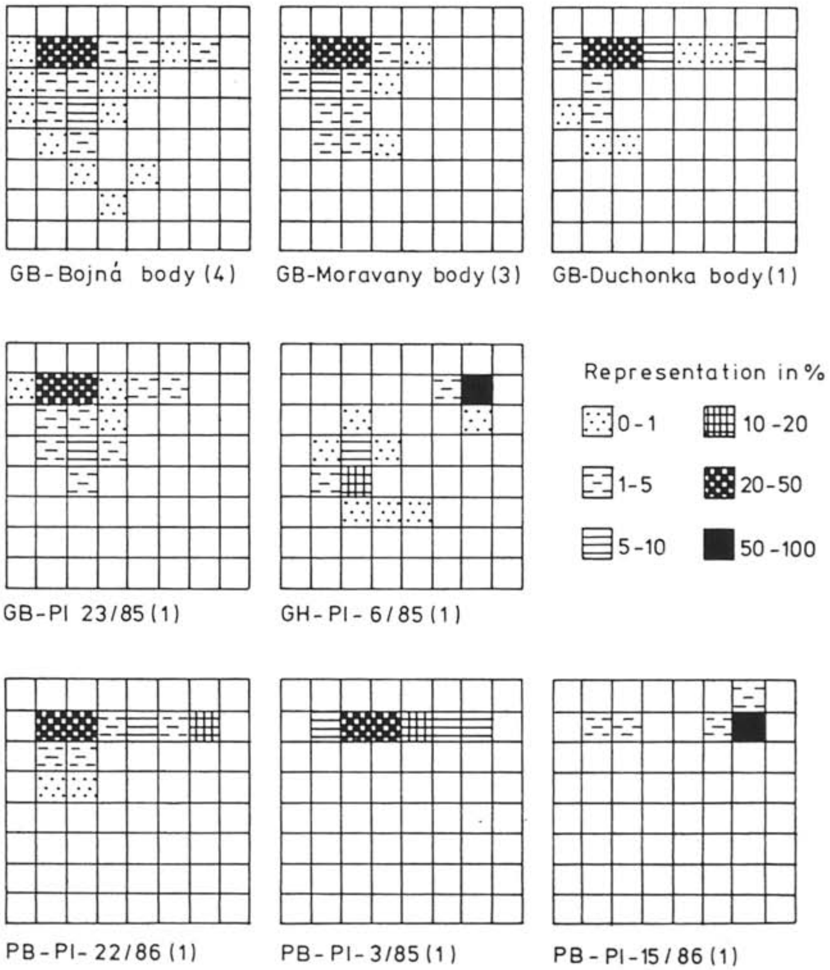

Fig. 2. Distribution of zircon types in the Považský Inovec Mts. granitoids (according to Pupin — Turco, 1972).

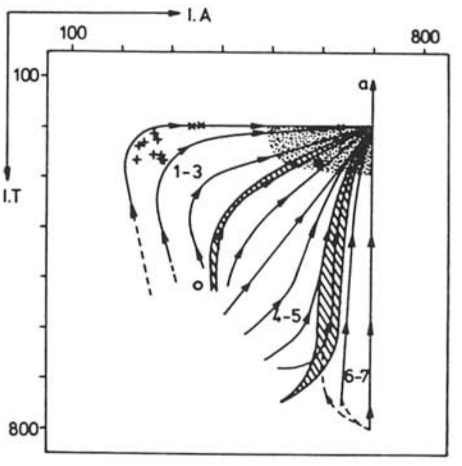

Fig. 3. Positions of $\bar{A}$, $\bar{T}$ indices for the Považský Inovec Mts. granitoids. Regions and evolution paths of different granitoid rock types (P u p i n, 1980, 1985).
Explanations: 1—3: aluminous anatectic granites; 4—5: hybride granites — calc-alkali and sub-alkali granite series; 6—7: granites of mantle origin — alkali and tholeiite granite series; hatched zones border fields between two principal regions; dotted area — main granite domain with cassiterite, topaz etc.; a — albitized granites in alkali series. Arrows mark the path of typological evolutionary trend (T.E.T.) of zircon populations. Positions of $\bar{A}$, $\bar{T}$ indices for Považský Inovec Mts. granitoids: + Bojná Block — granitoids; × Bojná Block — pegmatites; ○ Hlohovec Block — granitoids — total zircon population; ○ Hlohovec Block — granitoids — older zircon population (S).

group; from the viewpoint of typology (P u p i n — T u r c o, 1972) they are mostly L and S type zircons. The often observed colourless, long-prismatic individuals (elongation 5 — 10 : 1) can be found as inclusions in various minerals (in feldspars, micas, quartz, apatite, garnet, monazite as well as xenotime), which points to their long-term crystallization, from early-magmatic to late-magmatic stage. This is thus not necessarily a display of rapid magma solidification in apical parts of bodies, as it is usually considered to be the case with long-prismatic zircons (L i a k h o v i c h, 1979). Younger, metamict, variously coloured zircons belong to the second group. Typologically they belong especially to sub-types G_1 and L_3—L_5, and in some samples they can totally predominate (Hlohovec pegmatites). These zircon generations are connected with the conclusion of the magmatic process and frequently they are formed already in post-magmatic — autometasomatic processes (K, Na-metasomatism). We have evaluated the PI samples in the typological scale of P u p i n — T u r c o (1972); in all samples from the Bojná Block, subtypes L_1 and L_2 (Fig. 4a) are clearly predominant and the overall distribution points to their genetical relatedness. According to P u p i n's classification (1980, 1985), this is a case of zircons from aluminous anatectic granites (Fig. 3). The sample from the Hlohovec Block, on the contrary, gives a different distribution. Older-colourless-zircons are concentrated around the sub-type S_{12}; younger metamict zircon (G_1) – the most frequent type – lies separately (Fig. 4b). This is a case of two different zircon generations probably a proof of two-phase formation of the rock. The younger metamict zircons could perhaps be associated with aplite and pegmatite veins cross-cutting the Hlohovec granitoids and causing locally their K-metasomatism (formation of pink orthoclase etc.). The projection of older — magmatic — generation of the Hlohovec zircons points to higher-thermal conditions of their origin in the area of anatectic granites, but already near the field of

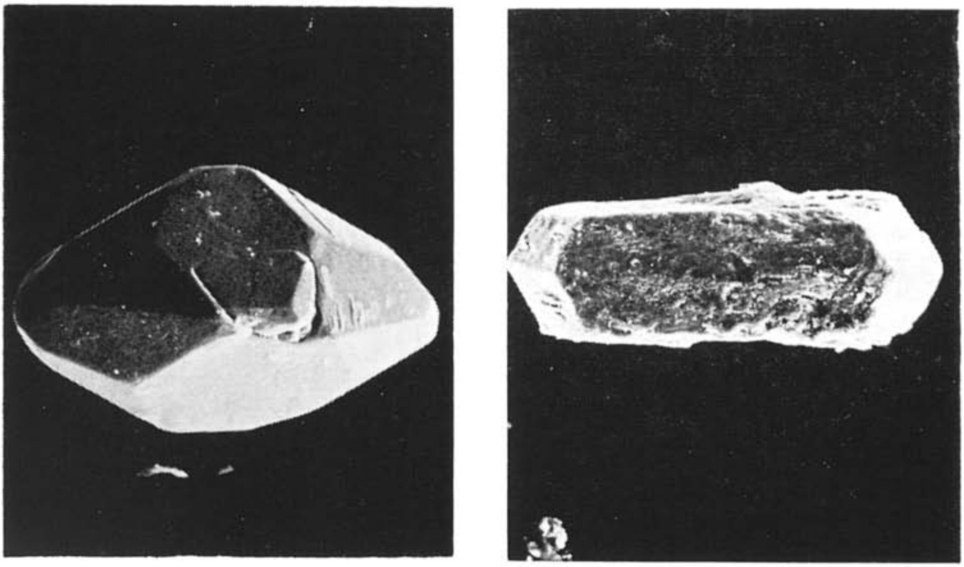

Fig. 4. Principal zircon types in the Považský Inovec Mts. granitoids.
Explanations: a — older, magmatic zircon generation: L_1, L_2 (PI-1/85); b — metamict late- to postmagmatic zircon type: G_1 (PI-6/85). SEM, magnif. 300—400 × (photo I. Holický).

hybride calc-alkali granites (Fig. 3). The general typological image of the sample from Hlohovec supports the observation of autometasomatic alterations in the rock.

Apatite: Apatites can be divided into two types: colourless, small, early-magmatic ones (type 1), forming inclusions in the most frequent — magmatic to late-magmatic apatite (2). Short-columnar, clouded or yellowish grains — probably post-magmatic — with increased Mn-contents (0.60—1.1 % MnO in the sample PI-2/85) can be sometimes found as well. The so-called apatites with pleochroic cores appeared in increased quantities only in the samples from the Hlohovec Block and from northern border of the Bojná Block (PI-23/85). In both cases the rocks are considered to be of hybride character.

TR-minerals: As far as TR-minerals are concerned, a significant predominance of monazite over allanite can be observed in the whole Bojná Block; in the Hlohovec Block, on the contrary, allanite predominates over monazite. The Inovec Mts. granitoids corroborate the long-known antagonism of both minerals, based on their different stability in certain PTX conditions. In the relatively more basic melts of the Hlohovec granitoid, light rare-earth elements were saturated in the stability area of allanite. A more advanced magmatic differentiation in the relatively more differentiated, more acid melts of the Bojná Block primarily decreased the contents of light rare-earth elements and monazite became stable in lower PT-conditions (Miller — Mittlefehldt, 1982; Petrík — Broska, 1985; Broska, 1986). We

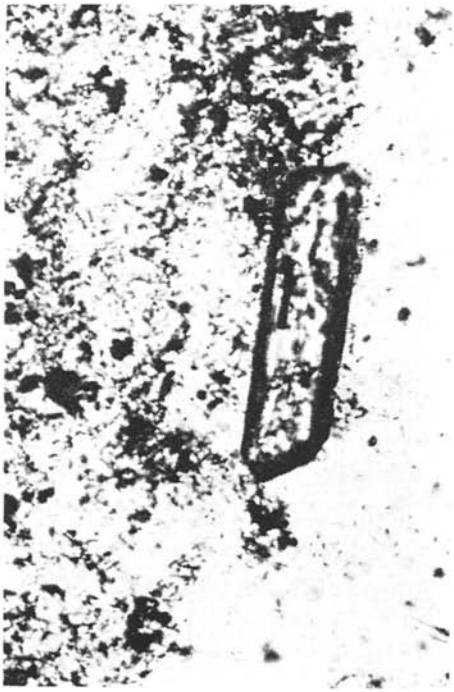

Fig. 5. Columnar monazite crystal enriched in Th, on contact of quartz (right) and sericitized plagioclase (left).
Explanations: Biotite leucogranodiorite-tonalite. Hlohovec — Stará Hora. // N, 25 ×.

Fig. 6. Aggregates of postmagmatic fibrolitic sillimanite with muscovite, replacing biotite (center) and plagioclase (upper left).
Explanations: Two-mica leucogranodiorite. Bojná—Hradná Valley. // N, 25 × (photo I. Petrík).

consider thus monazite to be genetically late-magmatic and allanite early- to mid-magmatic.

Monazite is developped in the Bojná Block in two generations. The older monazite type is honey-coloured to orange coloured; average size of its crystalls is 0.2 to 0.3 mm, with an elongation of 1.5 to 2 : 1. Sometimes it shows intensive secondary alterations, due to these it looses its transparency and gradually it changes into an ochre-yellow disintegrating matter, while preserving its form. Younger monazite is perfectly transparent, columnar (elongation 2 to 3 : 1), light-green to yellowish-green, with no traces of alterations. It occurs in small quantities almost in all granite samples from the Bojná Block, while its origin can be genetically connected with fluids which caused intensive secondary alterations of the older monazite type.

Morphologically partially different from the monazites of the Bojná Block is the monazite occuring besides allanite in the Hlohovec biotite leucogranodiorite to tonalite. (Fig. 5). It is often noticeably columnar (elongation 2 to 4 : 1), reddish in colour. This monazite has high Th contents (16.6 % ThO_2)

compensated by the entrance of Ca (1.14 % CaO) and Si (3.83 % SiO_2) into the structure of the mineral, with heterovalent isomorphy of the following type taking place:

$$Ce^{3+} + P^{5+} \rightleftarrows Th^{4+} + Ca^{2+}$$
$$\text{and } Ce^{3+} \rightleftarrows Th^{4+} + Si^{4+}$$

(G o d o v i k o v, 1983). We can consider this monazite to have increased contents of cheralite (Ca, Th) (PO_4) and huttonite Th(SiO_4) components. Increased Th contents in the Hlohovec monazite as well as in allanite (0.8—1.88 % ThO_2) can be most probably explained by a primarily Th-enriched melt. This is also the cause of increased radioactivity of the rock. We connect the monazites of the in two stages originated Hlohovec granitoids with a later post-magmatic event, when the zircons of G_1 type were formed as well, while, on the other hand, allanites can be attached to older zircon generations of S_{12} type.

Another representative of REE minerals outside monazite is in the Bojná Block the mineral xenotime. The presence of xenotime confirms the higher differentiation of the Bojná body granitoids.

G a r n e t. Garnet is an important typomorphic mineral in the granitoids of the Bojná Block. While here it occurs in all types of granitoid rocks, in Hlohovec Block it is missing completely (Tab. 1). The garnets belong to the almandine-spessartite type (Tab. 2) and as far as their chemistry is concerned they can be compared with similar garnets in leucoratic granitoids of Suchý Mts., less with those of Malá Magura Mts. (H o v o r k a — F e j d i, 1983). The in thin-sections observed relationships between garnets and both micas as well as the negative correlation muscovite + garnet versus biotite point rather to the formation of garnet and muscovite from older biotite in the end of the magmatic process, according to the scheme:

$$\text{biotite} + \text{Mn-rich melt} \longrightarrow \text{garnet} + \text{muscovite}$$

(M i l l e r — S t o d d a r d, 1981).

F e-T i o x i d e s: Magnetite displays the most marked regional differences in the general distribution of accessory minerals between the Bojná Block and the Hlohovec Block. While in the Bojná Block magnetite is represented always only in traces, the rocks of the Hlohovec Block are substantially enriched by this mineral which forms here partially martitized octahedrons, averagely 0.2 to 0.3 mm in size.

Ilmenite and rutile are also represented in the Bojná Block only in minor amounts. An exception is only the sample of vein leucotonalite PI-23/85, where ilmenite occurs together with a small quantity of magnetite. Higher contents of ilmenite can be found only in the Hlohovec granitoid, but in comparison with magnetite its quantities are here also only of minor significance. The contents of Fe-Ti oxides as well as of other rock-forming and accessory minerals justify the assumption of an affinity of the Hlohovec Block to magnetite series and of the Bojná Block to ilmenite series in the sense of I s h i h a r a' s (1977) classification of granitoid rocks.

S i l l i m a n i t e: An important role in the formation of the Považský

Table 2

Selected garnet analyses (electrone microprobe JEOL JXA-5A)

	Bojná body				Duchonka body			Pegmatite in Duchonka body		
	PI — 1/85	PI — 2/85			PI — 4/85			PI — 3/85		
	1st crystal core	3rd crystal core	3rd crystal rim	4th crystal rim	1st crystal core	1st crystal rim	5th crystal rim	1st crystal core	1st crystal between	1st crystal rim
SiO_2	36.16	34.84	34.44	35.74	35.38	36.07	34.91	34.62	35.30	35.32
Al_2O_3	15.58	20.00	19.88	18.98	20.52	19.76	20.91	20.65	20.25	19.82
$Fe_2O_3^*$	1.28	1.63	1.52	1.96	1.63	1.63	0.90	1.58	2.13	1.88
FeO	31.68	30.48	29.39	30.44	29.48	29.07	26.83	29.49	29.26	29.34
MnO	6.25	7.42	8.60	7.65	8.23	9.02	10.81	9.65	10.31	10.35
MgO	2.26	2.38	2.12	2.05	2.59	2.36	2.40	1.97	1.95	1.61
CaO	0.75	0.44	0.37	0.71	0.92	0.81	0.89	0.30	0.33	0.34
Σ	97.96	97.19	96.32	97.53	98.73	98.72	97.65	98.26	99.53	98.66
Si	3.008	2.921	2.918	2.999	2.910	2.977	2.898	2.878	2.904	2.938
Al^{IV}	0.000	0.079	0.082	0.001	0.090	0.023	0.102	0.122	0.096	0.062
Al^{VI}	1.920	1.897	1.903	1.876	1.899	1.899	1.944	1.901	1.868	1.882
Fe^{3+}	0.080	0.103	0.097	0.124	0.101	0.101	0.056	0.099	0.132	0.118
Fe^{2+}	2.204	2.137	2.082	2.136	2.028	2.007	1.863	2.050	2.013	2.041
Mn	0.440	0.527	0.617	0.543	0.573	0.631	0.760	0.679	0.718	0.729
Mg	0.280	0.297	0.268	0.257	0.317	0.290	0.297	0.244	0.239	0.199
Ca	0.067	0.039	0.034	0.064	0.081	0.071	0.079	0.026	0.029	0.030
almandine	73.7	71.2	69.5	71.2	67.6	66.9	62.2	68.4	67.1	68.0
spessartite	13.3	13.7	16.8	14.0	16.8	18.4	25.2	18.6	18.4	19.5
pyrope	9.3	9.9	8.9	8.6	10.6	9.6	9.9	8.1	7.9	6.6
andradite	2.2	1.3	1.1	2.1	2.7	2.4	2.6	0.9	1.0	1.0
calderite	1.5	3.9	3.7	4.1	2.3	2.7	0.1	4.0	5.6	4.9

* Fe_2O_3 contents have been calculated on the basis of ideal stoichimetry R_3^{2+} R_2^{3+} $(TO_4)_3$. Analyst Dr. D. J a n č u l a.

Inovec Mts. granitoid rocks is played by post-magmatic autometasomatic processes. These processes are connected with the origination of fibrolitic sillimanite (Fig. 6) which is formed together with large-scaly muscovite from feldspars and biotite as a result of high-temperature bleaching in acid environments (K o r i k o v s k i, 1963; K o r i k o v s k i — P u t i š, 1986; C a m b e l — K o r i k o v s k i, 1986; K o r i k o v s k i et al., 1987). At the same time, the forming of fibrolitic sillimanite was displayed more significantly only in the Bojná and Duchonka bodies, elsewhere was this process probably less intensive and only more or less new muscovite was formed. The effect of high-thermal aggressive acid fluids caused probably also the almost total bleaching of Fe-Ti oxides in the Bojná Block. On the other hand, high magnetite contents ($10^3 g . t^{-1}$) and the absence of sillimanite and muscovite in the Hlohovec Block point also to great differences in the post-magmatic evolution of both types of granitoid rocks.

S u l f i d e s — c a r b o n a t e s — U-m i n e r a l s: Hydrothermal processes connected with late-stage Hercynian retrograde autometamorphic alterations affected the granitoids of the both blocks only in the form of slight local occurences of epidote-zoisite and signs of polymetalic Cu-Pb-Zn-Sb mineralization together with carbonates (from the locality Hradná valley near Bojná). From U-minerals, uraninite (Hradná valley) and autunite (?) in metamict zircon (PI-3/85) occured in trace quantities.

Pegmatites in the Bojná Block

All 7 paragenetic zones determined in Tatricum and Veporicum of West Carpathians (D á v i d o v á, 1978) could be distinguished in the Bojná Block. Frequent are especially feldspar-quartz-mica pegmatites with large quantities of garnet and sporadically occuring sulfides (Fig. 7). In the Moravany body we have even found a pegmatite with rare-metal mineralization (columbite, gahnite) associated with younger albitization zones (especially sugar-like albite). The source of Mo, Ta, Ti Sn, Zn and other elements could possibly be in biotite, staurolite, ilmenite, rutile or other dark rock-forming minerals of the surrounding rocks (granodiorite, paragneisses) which yielded to the effects of fluids in retrograde and autometasomatic processes. Even though similar mineral assemblages have been lately sporadically reported from Tatricum (Malé Karpaty Mts. — G b e l s k ý — K r i š t í n, 1985; Nízke Tatry Mts. — H a t á r, 1979), the above mentioned ones are the highest columbite and gahnite contents in West Carpathian pegmatites.

Characterization of the Bojná Block and Hlohovec Block granitoids from the viewpoint of accessory minerals

Mineral assemblages and contents of individual accessory minerals have the following characteristic traits:

B o j n á B l o c k

— similar mineral assemblages of magmatic accessory minerals in all granitoid bodies of this block, pointing to their genetic relatedness,

— low index numbers in granitoid rocks (Tab. 1) are a proof of a relatively low content of accessory minerals,

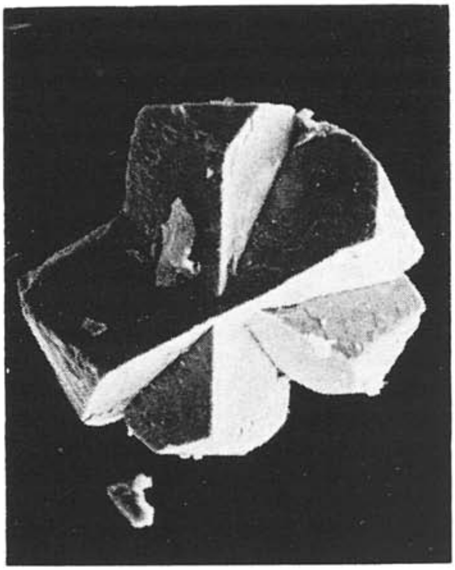

Fig. 7. Penetration triplet of arsenopyrite according to (101), from pegmatite near Duchonka.
Explanations: Sample PI-3/85, SEM, 300 × (photo I. Holický).

— high contents of low-thermal metamict zircons,
— in the distribution of REE minerals the relationship monazite≫allanite can be observed,
— in the majority of cases allanite is absent completely, on the other hand, almost 40 % of samples contain xenotime,
— almost total absence of Fe-Ti oxides and titanite,
— substantial contents of garnet,
— presence of secondary fibrolitic sillimanite,
— low contents of hydrothermal minerals.

The granitoids of the Bojná Block can be generally characterized by the association garnet-monazite.

Hlohovec Block

— two zircon types: colourless — higher-thermal, and metamict, lower-thermal; zircons are connected with two stages of formation,
— high contents of apatites with pleochroic cores,
— in the REE minerals, allanite dominates over monazite,
— high magnetite contents,
— absence of garnet and sillimanite,
— presence of Ti-minerals and titanite.

Generally, the Hlohovec Block granitoids can be characterized by the association magnetite-titanite-allanite.

Comparing the assemblages of Bojná Block and Hlohovec Block, we can see basic differences in the distribution of accessory minerals in both blocks. While the well-differentiated leucocratic bodies of the Bojná Block could be compared with similar associations e.g. in Suchý Mts., Veľká Fatra Mts. (except the Smrekovica type) and partially in the Bratislava massif of Malé Karpaty Mts., in Žiar Mts. and some types in Nízke Tatry Mts., the Hlohovec Block assemblage is similar to Tribeč Mts., Čierna hora Mts., to the Sihla type of Veporicum, partially to some types in Vysoké Tatry Mts., Nízke Tatry Mts. and Malá Fatra Mts.. In the case of Hlohovec Block, it is possible to consider it to be a part of the Tribeč—Zobor Block. Such an interpretation is supported besides by similar assemblages of accessory minerals and relative more basic character of the granitoids also by a remarkable similarity of both Mesozoic mantle units (Havrila — Vaškovský, 1983) as well as by the bore VZ-1 (Veľké Zálužie) and geophysical interpretation of pre-Neogene basement in the area of the Middle Ponitrie region (Fusán et al., 1971).

Conclusions

1. Granitoid rocks of the individual bodies in the Bojná Block belong to anatectic aluminous granites and to the association garnet-monazite; they incline to the ilmenite series of granitoids.

2. Granitoids of the Hlohovec Block belong to transitional hybride granites with the association allanite-titanite-magnetite; they incline to the magnetite series of granitoids.

3. Granitoid rocks of the Bojná Block experienced autometasomatic retrograde processes the intensity of which varied in individual bodies.

4. Favourable conditions for the origin of pegmatites were created in leucocratic granitoid rocks of Bojná Block; at the same time, a pegmatite type with rare-element mineralization associated with albitization zones was determined as well.

5. The Bojná Block and Hlohovec Block granitoids are not comagmatic; the Hlohovec granodiorites-tonalites appear to be rather a continuation of the Tribeč Mts. tonalites.

Translated by K. Janáková

LOCALIZATION OF SAMPLES

PI-1/85 Biotite leucocratic monzogranite. Bojná. Hradná Valley, road-cut of the new forest road near a creek, approx. 150 m S from the 3rd quarry in the Hradná Valley. 356°/720 m from the elev. point Kopec (438 m above sea level).

PI-2/85 Muscovite-biotite lencotonalite. Bojná. Hradná Valley, west wall of the 3rd quarry. 355°/850 m from the elev. point Kopec (438 m above sea level).

PI-3/85 Pegmatite, feldspar-quartz-mica zone. Prašice, settlement Duchonka. From debris on the slope N of the elev. point Soľnisko. 360°/100 m from the elev. point Soľnisko (498 m above sea level).

PI-4/85 Biotite-muscovite leucocratic syenogranite. Prašice, settlement Duchonka. From debris on the slope SE of the elev. point Soľnisko. 140°/200 m from the elev. point Soľnisko (498 m above sea level).

PI-6/85 Mylonitized biotite leucotonalite-leucogranodiorite. Hlohovec, Stará hora. Road-cut of the state road to Topoľčany, near a sharp curve opposite a cottage settlement, approx. 100 m under km 2.

PI-10/86 Muscovite-biotite leucogranodiorite. Nová Lehota. The valley of Bojnianka, outcrop near a blue-sign tourist path, above its merging into the main asphalt road in the Bojnianka Valley, opposite a bridge in front of the cottage settlement. 165°/1620 m from the elev. point Švibov (479 m above sea level).

PI-13/86 Muscovite-biotite granodiorite. Moravany nad Váhom. Valley Striebornica, rock outcrop near a forest path opposite an unnamed left affluent into the Čierny creek, W of the region Lovica. 237°/1880 m from the elev. point Kostolný Hill (569 m above sea level).

PI-14/86 Muscovite-biotite granodiorite. Moravany nad Váhom. The Valley of Striebornica, approx. 2 m long rock outcrop near a forest path in the valley of an unnamed creek flowing after 230 m northwards into Skaličný creek. 317°/1710 m from the elev. point Krahulčie Hills (566 m above seea level).

PI-15/86 Pegmatite, quartz-mica (muscovite) and albite zone. Moravany nad Váhom. Mine dump of a burried digging near a crossing of red-sign and green-sign forrest path. 43°/1050 m from the elev. p. Zlatý Hill (480 m).

PI-16/86 Muscovite-biotite granodiorite. Radošiná. Valley of Radošinka, approx. 30 m long continuous cut of a green-sign forrest path in the area of Malá Spúšť, inmediately under the connection with forrest asphalt road. 102°/1080 m from the elev. point Zlatý Hill (480 m above sea level).

PI-21/86 Coarse-grained pegmatitic muscovite leucocratic syenogranite. Závada, settlement Záhrada. Road-cut of a forrest asphalt road in the area Skalka NW of elev. point Zlatý Hill (480 m above sea level).

PI-22/86 Pegmatite, feldspar-quartz-mica zone on the contact with migmatitized biotite paragneisses. Bojná, Hradná Valley, middle part of the first quarry above the forrest road. 210°/1300 m from the elev. point Kopec (438 m above sea level).

PI-23/85 Muscovite-biotite leucotonalite. Zlatníky. The valley of Bystrý creek (named also Jelenia Valley), Dolné Brdeo, approx. 15 m long stone outcrop near the road above the creek. 30°/1100 m NE from the elev. point Ostrý Hill (669 m above sea level).

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