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SOME DATA TO THE GEOCHIMISTRY OF BASIC VOLCANISM IN THE WEST CARPATHIAN CRYSTALLINE, YOUNG PALEOZOIC AND MESOZOIC

(*Fig. 1—7*)

Abstract: Studying the given problem the authors investigated about 300 samples of basic rocks from the West Carpathian Gemeride region and about 170 samples of metamorphosed rocks from the crystalline. The samples underwent spectral quantitative analysis on following elements: Ga, Cr, V, Ni, Co, Cu, Zr, Sc, Y, Sr, Ba, Rb, Li, Pb and La. For spectral analysis in first order rock samples were chosen with existing silicate analysis or than the share of minerals was ascertained planimetrically and from mineral composition informing chemical composition of rock was recalculated. The groups of rocks were determined on basis of the geological position of the volcanites and according to geographical, stratigraphical and petrochemical criteria. The results of the analyses were treated statistically, numerically and graphically.

Our study refers to the investigation of basic and to a smaller degree also ultrabasic rocks and their metamorphic derivates in the Gemeride region. For the sake of comparison we also mention some results of geochemical study of amphibolic rocks in the Core mountains.

The views of the age and orogenesis of West Carpathians basic volcanism do not agree. According to some authors (e. g. J. Kamenický 1967) basic volcanism is being considered as initial mainly, having taken place in three periods, the Earlier Proterozoic (Jarabá Series), the Later Proterozoic (Kokava Series in the Kohút Zone of the Veporides and the Pezinok-Pernek Series in the Malé Karpaty Mts.) and the Earlier Paleozoic (Rakovec or Phyllite-Diabase Unit of the Gemerides and the Harmónia Series in the Malé Karpaty Mts.). It should be remarked that such a stratigraphical division is not based on concrete paleontological, geochronological and other evidence. Some authors therefore (B. Cambel 1961) consider such a division and so far other stratigraphical divisions too as unverified and rather are inclined to the opinion that basic volcanites are magmatites, originated in the West Carpathians mainly in various periods of the Earlier and Later Paleozoic.

When the presence of the Pre-Cambrian in the West Carpathians (the diaphthorized catacrystalline mainly) is also admitted, its extent seems to be overstimated in contrast to the Paleozoic now — particularly in the Core mountains region, as recent palynological investigation shows (O. Čorná 1965). Palynological investigation made on the basis of presence of Chitinozoa, spores and other plant and organic remnants in dark schists of the West Carpathian crystalline points to the Paleozoic age of the rocks. The same also results from the geochronological studies by J. Kantor (K/A method). With regard to the above

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mentioned also each magmatism cannot be ranged to one of the Stille's schemes of orogenesis and certain volcanism cannot always be determined whether it was initial phase or final and to which orogenic-magmatic cycle it belongs.

The manifestations of the basic magmatism in the West Carpathians in the earliest formations to the Mesozoic roughly comprise these fundamental types of rocks:

a) Effusive diabases, their tuffs and tuffites or more seldom subvolcanic diabases (in Paleozoic formations in the Gemerides).

b) Various types of amphibolites as products of progressive metamorphosis of rocks mentioned under a) (in metamorphosed series of the crystalline of the Core mountains particularly).

c) Subvolcanic smaller intrusive bodies and pipes of gabbrodiorites, monomineralic hornblendites or amphibolic diorites and diorites (in the whole region of the West Carpathian crystalline).

d) Intrusive bodies of larger extent, built of amphibolic gabbros, gabbroamphibolites, amphibolic diorites and amphibolites of various character (in the region of the Spišsko-gemerské rudohorie Mts. mainly).

e) Ultrabasic rocks as differentiates of rocks mentioned under a), b), c), d).

f) Melaphyric rocks of Carboniferous and Permotriassic beds in the subtatric nappes.

g) Ultrabasic rocks (serpentinites) of the Mesozoic and of the Triassic of the Gemerides mainly.

h) Other basic effusive and subvolcanic rocks of the Mesozoic, as e. g. gabbros, diabases, glaukophanites, augitites, limburgites and teschenites.

It should be remarked that primary basic magmatogenic rocks, diabases and their tuffs as also hypoabyssal forms were with regional or contact periplutonic metamorphosis altered in various areas in various way from epi- to catametamorphic derivates whereby chloritic schists, amphibolites, gabbroamphibolites, amphibolic gneisses and amphibolic migmatites arose from them. Some intrusive types of amphibolic rocks sometimes occur as relatively later in relation to the above mentioned chloritic schists and amphibolites, also when they can belong to the same magmatic-orogenic cycle.

In this paper we present a petrochemical and geochemical survey of basic magmatism in the Gemerides and data about basic magmatism of other regions are mentioned for comparison only.

Earlier Paleozoic of the Gemerides

In the Gemerides basic rocks are mostly extended in the Rakovec Unit. The Rakovec Unit is built of sedimentogenic and magmatogenic rocks. The sedimentary membres are represented by phyllites of various composition (sericitic, sericitic-chloritic, more or less quartzy or phyllites with greater or smaller content of graphitic component).

The R a k o v e c (Phyllite-Diabase) Unit of the Gemerides, considered as Devonian (or partly Lower Carboniferous) includes effusive rocks, tuffs and tuffites mainly represented in the northern part of the Gemerides in the strip from Rejdová to Malá Ida (L. K a m e n i c k ý, M. M a r k o v á 1955). The volcanism affected the character of the whole unit. The individual types of volcanic rocks are represented by diabases, diabase porphyrites, compact and flow diabases and amygdaloidal rocks. The tuffs are prevailingly fine grained and the tuffites usually are striped. Locally submarine exhalational-sedimentary hematitic quartzites originated (Lahn-Dill type).

Subvolcanic forms are represented by smaller bodies of gabbrodiorites and amphibolic gabbros. They usually comprise amphibole, saussuritized plagioclase, ilmenite, chlorite, epidote, apatite and calcite.

Larger intrusive bodies are known from the environs of Dobšiná and Košická Belá to Malá Ida.

The volcanites of the Rakovec Unit where altered by autometamorphosis and later also by regional epimetamorphosis (chloritization, epidotization, serpentinization, albitisation).

Basic volcanites of diabase character similar to that in the Rakovec Unit are also found in the C a m b r o s i l u r i a n of the Gemerides (in the Gelnica or Porphyroid Unit), less abundant here are in association with porphyroids, which build extensive complexes. As there is the underlying of the Rakovec Unit, it always is not clear, whether the basic magmatogenic rocks are not of Devonian age and only penetrate earlier formations. Sometimes it is not quite sure, what corresponds to Cambrosilurian and what to Devonian (to the Porphyroid or to the Phyllite-Diabase, i. e. Rakovec Unit). These facts make an acceprate stratigraphical ranging of magmatogenic basis rocks complicated.

Carboniferous

In the Gemerides the Carboniferous is quite abundantly represented, whereas in the Tatraveporides it forms small remnants only scattered in various Core mountains. Characteristic is its varied facies development. Among the Carboniferous rocks of the Gemerides clay shales, greywackes, sandstones, quartzites, conglomerates, reef and bedded carbonates, lydites and other rocks including intercalations of diabase tuffs, diabases and quartz porphyries are present. Intrusive rocks as serpentinites, gabbroamphibolites and gabbrodiorites also are present. Magmatic rocks only form a subordinate constituent in Carboniferous layers.

Permian

Occurrences of the Permian are known from all West Carpathian units. In the Central West Carpathians they mostly are sporadic, towards the Gemerides and in the Gemerides they are getting more extensive. Permian is of clearly continental origin except the occurrences west of Štítnik in the Gemerides. Regional metamorphism of the Permian was not intense (epimetamorphosis), however with strong local manifestations.

In the Gemeride region Permian is of verrucano development. There are polymict conglomerates, greywackes and arcoses with layers of variegated shales. A similar development also shows the Melaphyre Series, considered as Werfen in the past. The melaphyres mostly occur in the lower part of the Choč Unit. In the Permian of the Gemerides prevailingly quartz porphyries and only locally porphyrites occur.

Mesozoic

Mesozoic volcanism of the West Carpathians manifested as smaller effusive and subvolcanic bodies, scattered sporadically in formations from the outer Flysch Zone to the zone of lowlands in South Slovakia. This magmatism did not proceed at once but was repeating throughout the Mesozoic from the Lower Triassic, through the Middle Triassic, Upper Jurassic, Lower und Upper Cretaceous. Simultaneously the picture of its manifestation was changing. Ultrabasic and particularly basic intrusive or extrusive rocks (lherzolites, dunites, diabases, glaucophanites, melaphyre porphyrites, augitic porphyrites, augitites, limburgites, teschenites, their tuffs and tuffites) are present there. In the Gemerides of the Spišsko-gemerské rudohorie Mts. granitic magmatism also manifested. Smaller granite bodies of Upper Cretaceous age (according to K/A determination) occur here. They, however, are not present in the proper Mesozoic beds of the Spišsko-gemerské rudohorie Mts., only in their Earlier Paleozoic substratum.

Our study of the Gemeride basic rocks in the Spišsko-gemerské rudohorie Mts. is based on the following division of basic magmatites:

Cambrosilurian basic rocks (Porphyroid—Gelnica Unit)	—extrusive diabases and tuffs
Devonian to Lower Carboniferous basic rocks (Rakovec Unit)	extrusives diabases, tuffs and tuffites —smaller subvolcanic intrusives larger intrusive massifs
Carboniferous basic rocks	extrusive diabases, intrusive gabbrodiorites, ultrabasites, etc.
Permian basic rocks	—extrusive porphyrites
Mesozoic basic rocks	extrusive diabases —glaucophanites ultrabasic intrusives

Geochemical investigation was carried out with aid of spectrochemical quantitative analysis in the spectral laboratory of the Slovak Academy of Science. The analyses were carried out by T. Slezák on grid spectrograph PGS2 (with direct current 5 A — 9 A and generator ABR 3). The applicated methods were worked out and published by G. Kupčo (B. Cambel, G. Kupčo

1965). Quantitative data of the following elements are at disposal: Ga, Cr, V, Ni, Co, Cu, Zr, Sc, I, Sr, Ba, Rb, Li, Pb, La. The authors also intended to analyse besides samples taken originally and representing fundamental types of basic rocks mainly samples of various authors, silicate analysis of which had been already carried out in the past. Where it was possible, planimetric analyses of the samples were also carried out and where no silicate analysis was at disposal, conversions of the chemical composition from values of planimetric analysis were made.

The aim of the geochemical investigation of basic magmatites of the Spišsko-gemerské rudohorie Mts. was as follows:

a) to present survey of macro- and micro-chemism of magmatites in this region;

b) to ascertain the differences in the micro-elements content of individual types of rocks, divided into groups according to criteria of age, signs of texture and structure (intrusives, extrusives, tuffs), mineral composition (basicity or degree of differentiation);

c) to ascertain, whether the existing differences in chemical composition also confirm the views of the stratigraphical division of basic magmatites or whether the uniformity of chemical composition may confirm the uniformity of the volcanism in this region;

d) to ascertain the influence of metamorphosis on elements migration and the changes in micro- and macrochemism with regard to mineral alterations of the rocks;

e) to solve some problems of distribution laws of microelements in rocks and questions of geochemical position of microelements on the basis of their correlation with macroelements, which are considered as the isomorphous bearers of these elements.

In the presented paper a conclusion to all above mentioned points cannot be given and therefore we only mention results concerning the three first points on the basis of the discussion to the plates, which show average values of macroelements and microelements of individual groups arranged according to above mentioned criteria.

In tables 1, 2, 3 and 4 analyses of basic rocks are arranged in groups according to the standpoint of stratigraphy (Cambrosilurian to Mesozoic) and the geological position (extrusive and intrusive types). Within these main groups analytical data are divided into smaller groups according to the degree of magma differentiation (ultrabasic, medium-basic and leucocratic types) or according to the petrographic classification (glaucophanites, porphyrites, augitites, teschenites, etc.).

After analysing the results given in the tables 3 and 4 and in enclosed graphs we may state that the differences in the microelements contents in the first place depend on the basicity of the rock and only less distinct diferrences (in contents of certain elements only) can be observed in equally basic rocks of various stratigraphic or petrographic groups.

Table 1. Basic rocks of the Gemerides

Macroelements in Per Cents	Number of Anal.	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Other*	H_2O+	H_2O-	Sum.
A. Basic Cambrosilurian effusive rocks of the Gemerides (Gelnica or Porphyroid Unit).																
1. Basic effusive rocks from the environs of Mníšek	26	46,41	1,70	16,27	5,45	6,20	0,23	7,42	6,25	2,56	0,45	0,45	3,18	3,12	0,13	99,81
2. Basic effusive from other territory of the Gemerides	16	46,18	1,09	15,35	3,75	8,29	0,17	8,75	6,32	2,31	0,62	0,13	1,21	5,24	0,09	99,50
3. Detto-average of the group 1 and 2	42	46,32	1,46	15,92	4,81	7,00	0,21	7,93	6,28	2,47	0,52	0,33	2,42	3,93	0,12	100,32
4. Detto-mineralized rocks from the environs of Štirkenberg near Mníšek																
B. Basic Devonian effusive rocks of the Gemerides (Phyllite-Diabase or Rakovec Unit)																
5. Basic differentiates of effusive rocks	9	40,10	1,78	17,99	6,49	2,21	0,14	9,71	12,17	2,15	0,34	0,02	2,16	4,79		100,15
6. Medium-basic diabases	11	45,94	1,93	16,43	5,70	7,62	0,23	5,97	7,45	3,32	0,39	0,27	0,88	3,90	0,20	100,23
	28	46,37	2,48	15,58	4,60	2,28	0,13	10,25	0,43	3,05	0,43	0,04	1,50	4,35		99,99
	39	46,25	2,32	15,82	4,91	3,78	0,16	0,04	8,87	3,13	0,42	0,10	1,33	4,22	0,06	100,41
7. Leucocratic diabase differentiates	8	49,33	1,90	17,14	6,35	2,65	0,14	4,92	9,96	3,37	0,25	0,26	1,03	2,46	0,03	99,79
8. Extreme diabase differentiates	5	61,74	0,29	14,45	4,53	1,64	0,07	4,90	3,03	6,29	0,62	0,03	0,23	1,89	0,02	99,71
9. Diabase tuffs	4	43,96	1,14	14,72	6,01	4,34	0,12	10,97	10,28	2,22	0,13	0,04	1,24	4,36	0,16	99,69
10. Diabase tuffites	3	52,18	0,49	18,51	4,45	2,55	0,10	7,76	2,37	4,11	1,82	0,07	0,60	4,60	0,09	99,70
C. Basic Carboniferous effusive rocks of the Gemerides																
11. Medium-basic diabases	7	46,14	0,78	16,56	6,19	6,72	0,12	5,81	6,91	3,26	0,50	0,20	0,10	3,54	1,97	99,80
	5	43,33	0,91	14,47	6,06	3,56	0,13	12,47	0,94	2,23	0,43		1,63	4,75		99,91
	12	44,97	1,42	15,69	6,14	5,40	0,12	8,57	8,17	2,83	0,47	0,11	0,74	4,04	1,15	99,83
D. Permian porphyrites of the Gemerides																
12. Porphyrites	5	56,03	1,12	17,12	1,98	5,79	0,09	3,62	3,00	4,79	1,13	0,31		4,62	0,36	99,66
E. Mesozoic basic effusive rocks of the Gemerides																
13. Spilites and diabases	9	45,94	1,74	16,22	4,97	6,85	0,11	5,85	7,77	3,09	0,26	0,14	2,69	3,98	0,38	99,99
14. Glaucophanites	6	47,01	1,38	14,16	7,25	7,97	0,22	6,69	8,13	4,01	1,48	0,16		1,35	0,25	100,06

F. Mesozoic basic rocks of other West Carpathian regions															
15. Augitites															
16. Teschenites	7	29,88	2,62	8,82	5,77	5,07	0,18	8,88	18,64	1,29	0,58	0,64	10,31	4,79	2,58	100,05
B′. Devonian intrusive equivalents of diabases of the Gemerides															
a) Larger intrusives from the environs of L. Belá															
17. Ultrabasic differentiate	1	37,00	0,51	15,30	2,06	2,24	0,10	20,40	7,63	1,15	0,87		3,87	8,88		100,01
18. Gabbroamphibolites of normal basicity	10	47,18	1,33	14,67	5,22	6,04	0,10	8,84	11,11	2,40	0,60	0,04	0,16	2,23	0,01	100,02
19. Leucocratic gabbroamphibolite facies	2	65,46	1,02	13,93	1,32	2,58	0,04	3,00	3,23	6,39	0,68			1,21		99,86
b) Larger intrusives from the environs of Dobšina															
20. Basic differentiate of gabbroaphibolites	1	50,56	0,55	16,64	2,94	7,53	0,02	9,26	14,48	1,45	0,53	0,23	0,02	1,82		99,88
21. Gabbroamphibolites of normal basicity	11	44,41	0,93	14,70	3,06	7,88	0,11	7,01	9,22	2,70	0,91	0,26	0,43	2,33	0,10	100,10
22. Leucocratic gabbroamphibolite facies	7	62,63	0,47	14,68	3,05	2,34	0,03	4,05	5,41	3,34	1,37	0,04	0,55	1,82		99,78
c) Smaller intrusive bodies of gabbrodiorites															
23. Subvolcanic bodies of gabbrodiorites	20	47,57	1,43	15,93	3,04	7,64	0,20	6,80	9,14	3,19	0,36	0,09	2,03	2,41	0,10	99,93
	18	49,66	2,33	14,56	3,94	4,03	0,15	8,23	9,94	3,45	0,42	0,08	0,19	2,84	0,05	99,82
24.	38	48,56	1,86	15,28	3,47	5,93	0,17	7,47	9,52	3,32	0,38	0,09	1,16	2,65	0,05	99,87
25. Average of colums 24 and 18	48	48,27	1,75	15,15	3,83	5,95	0,15	7,76	9,85	3,13	0,43	0,07	0,95	2,56	0,04	100,09
26. Average of columns 19 and 18 and 21	59	48,70	1,59	15,07	3,69	6,31	0,15	7,62	9,74	0,05	0,52	0,11	0,84	2,49	0,05	99,93
27. Average of columns 19 and 22	9	63,26	0,60	14,52	2,67	2,39	0,03	4,04	4,93	4,01	1,21	0,03	0,43	1,69		99,78
C′. Basic Carboniferous intrusive rocks of the Gemerides															
28. Ultrabasites	2	37,14	0,18	0,13	12,11	1,44	0,04	35,86	1,36	0,05	0,01		0,67	10,93	0,11	100,02
29. Gabbros of normal basicity	4	46,17	0,39	16,23	3,41	8,10	0,12	7,76	10,42	2,58	0,18	0,18		2,51	0,88	99,93
	4	45,61	2,75	13,89	4,96	5,20	0,18	8,87	13,92	1,76	0,29			2,51		99,94
	8	45,89	2,07	15,06	4,18	6,65	0,15	8,31	12,17	2,17	0,24	0,09		2,51	0,44	99,93
E′. Smaller Mesozoic intrusives of the Gemerides															
30. Ultrabasites	2	39,96	0,01	3,89	4,00	3,08	0,07	34,82	0,93	0,27	0,34	0,02	0,36	11,90	0,54	100,02

* In most of analyses it concerns mainly SO_3 only at some it also concerns the subordinate contents of the further components.

Tables of average oxide values of macroelements of individual basic rock groups. In same group the upper value is the average analysis calculated from silicate analyse, the second value is the average of oxide values calculated from planimetric analyses and the third value is the average of the analyses used for the first and the second averages.

Table 2

Oxides of Macroelements in Per Cents	Number of an.	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Other*	H_2O+	H_2O-	Sum.
I. Average Values of Oxide Values in Groups of Medium-Basic and Intrusive Rocks of the Gemerides																
31. Cambrosilurian Medium — Basic Diabases	42	46,32	1,46	15,92	4,81	7,00	0,21	7,93	6,28	2,47	0,52	0,33	2,42	3,93	0,12	100,32
32. Devonian Medium — Basic Diabases	39	46,25	2,32	15,82	4,91	3,78	0,16	0,04	8,87	3,13	0,42	0,10	1,33	4,22	0,06	100,41
33. Devonian Medium — Basic Gabbrodiorites (24+18)	48	48,27	1,75	15,15	3,83	5,95	0,15	7,76	9,85	3,13	0,43	0,07	0,95	2,56	0,04	100,09
34. Detto — average of the groups 24+18+21	59	48,70	1,59	15,07	3,69	6,31	0,15	7,62	9,74	3,05	0,52	0,11	0,84	2,49	0,05	99,93
35. Average of Carboniferous Medium — Basic Diabases and gabbrodiorites (11+29)	20	45,34	1,68	15,44	5,36	5,90	0,14	8,48	9,77	2,57	0,38	0,11	0,44	3 43	0,86	99,86
36. Mesozoik Medium — Basic Diabases (13)	9	45,94	1,74	16,22	4,97	6,85	0,11	5,85	7,77	3,09	0,26	0,14	2,69	3,98	0,38	99,99
II. Average Values of Oxide Contents in Metamorphosed Basic of the West Carpathian Crystalline																
37. Primary intrusive metamorphites of the Malé Karpaty Mts. (gabbra)	7	47,12	1,02	20,75	1,74	6,56	0,09	6,20	11,43	3,74	0,50	0,13		0,71	0,05	99,76
38. Gabbroamphibolites of the Malé Karpaty Mts.	7	47,55	1,35	17,23	2,59	8,85	0,17	7,51	9,44	2,80	0,98	0,17		0,96	0,16	99,76
39. Primary effusive metamorphites of the Malé Karpaty Mts. (amphibolites)	7	47,25	1,28	17,95	2,66	7,94	0,14	6,97	9,43	3,54	0,74	0,14		1,60	0,28	99,90
40. Amphibolites of the Malé Karpaty Mts. with prevailing amphibole	10	47,93	1,13	17,06	2,50	7,13	0,19	8,50	10,37	3,12	0,75	0,20		1,03	0,13	100,04

41. Strongly melanocratic amphibolites of the Malé Karpaty Mts.	6	46,83	1,23	16,95	2,04	7,73	0,19	9,76	10,14	3,07	0,82	0,23		1,00	0,15	100,14
42. Metamorphites of basic rocks of the Harmónia Series of the Malé Karpaty Mts. (Devonian)	4	49,46	1,30	16,50	1,36	8,76	0,19	8,53	9,07	2,80	0,92	0,16		1,04	0,15	100,24
43. Amphibolites of the West Carpathian crystalline autside the Malé Karpaty Mts.																
44. Primary intrusive basic rocks of the West Carpathian crystalline																
45. Melanocratic to monomineralic amphibolite and gabbro facies and marginal facies of serpentinites (from minerals of the amphibole group)																
46. Serpentinites of the crystalline	6	38,94	0,13	4,12	3,01	6,45	0,15	31,78	2,19	0,44	0,18	0,10		12,13	0,16	99,78
47. Lamprophyres of the crystalline	2	45,91	1,78	14,90	3,51	7,33	0,17	5,74	9,15	1,81	2,67	0,36	2,36	4,37	0,14	100,20

* In most of analyses it concerns mainly CO_2 only at some it also concerns, the subordinate contents of the further components.
Explanations: see Table 1.

Table 3. Average Microelements Contents in Effusive and Intrusive Basic Rocks of the Gemerides

Microelements in Per Cents	Number of anal.	Ga	Cr	V	Ni	Co	Cu	Zr	Sc	Y	Sr	Ba	Rb	Li	Pb	La
A. Basic Cambrosilurian effusive rocks of the Gemerides (Gelnica or Porphyroid Unit)																
1. Basic effus. rocks from the environs of Mníšek	35	16	122	265	47	27	35	308	44	19	221	62	8		5	2
2. Detto from other territory of the Gemerides	16	13	78	199	74	36	33	150	46	22	84	45	21	37	65	8
3. Detto-average of the group 1 and 2	51	15	108	244	55	30	34	261	41	20	177	57	12	11	23	4
4. Detto-mineralized rocks from the environs of Štirkenberg near Mníšek	15	28	12	4		37	297	366	12	57		136	23		513	33
B. Basic Devonian effusive rocks of the Gemerides (Phyllite-Diabase or Rakovec Unit)																
5. Basic differentiates of effusive rocks	10	18	165	293	83	46	58	139	43	31	266	24	14	7	1	8
6. Medium-basic diabases	46	18	110	287	59	48	45	190	35	31	310	34	13		18	8
7. Leucocratic diabase differentiates	9	23	42	166	39	36	71	260	22	35	551	251	14			17
8. Extreme diabase differentiates	5	15	35	81	13	10	45	223	14	33	62	145	8			69
9. Diabase tuffs	5	15	358	307	82	51	81	168	36	31	304	14	18			36
10. Diabase tuffites	3	8	137	191	48	33	37	89	28	12	100	147	78			
C. Basic Carboniferous effusive rocks of the Gemerides																
11. Medium-basic diabases	13	15	148	232	56	34	27	148	43	30	275	112	42	28		4
D. Permian porphyrites of the Gemerides																
12. Porphyrites	3	23	17	68	3	7	64	250	32	19	247	350	20		6	
E. Mesozoic basic effusive rocks of the Gemerides																
13. Spilites and diabases	18	19	197	229	99	30	47	118	25	25	95	94	29	14	3	
14. Glaucophanites	5	18	174	189	87	30	27	138	11	19	185	37	35		9	

F. Mesozoic basic rocks of other West Carpathian regions																
15. Augitites	9	17	172	167	66	41	87	129	34	24	179	156	79		1	7
16. Teschenites	6	17	73	193	164	40	236	467	11	25	900	592	97		9	87
B'. Devonian intrusive equivalents of diabases of the Gemerides																
a) Larger intrusives from the environs of K. Belá																
17. Ultrabasic differentiate	1	20	370	270	150	71	40	91	48	32	12	46	6		3	
18. Gabbroamphibolites of normal basicity	10	17	133	359	88	53	61	121	42	40	249	37	4			
19. Leucocratic gabbroamphibolite facies	2	18	114	182	46	18	80	94	18	14	328	600	24			
b) Larger intrusives from the environs of Dobšina																
20. Basic differentiate of gabbroamphibolites	1	14	250	400	180	60	10	63	90	21	290	130	10		3	3
21. Gabbroamphibolites of normal basicity	14	15	157	300	69	44	62	223	49	29	222	168	26			
22. Leucocratic gabbroamphibolite facies	7	20	114	257	64	41	92	149	32	37	312	372	25		29	
c) Smaller intrusive bodies of gabbrodiorites																
23. Subvolcanic bodies of gabbrodiorites	20	15	137	215	51	25	55	161	45	20	157	36	5	23	2	1
24.	41	16	147	245	62	37	67	152	44	24	280	42	11	3	1	
25. Average of columns 24 and 18	51	16	144	268	68	41	66	146	44	28	275	41	6	9	4	1
26. Average of columns 24 and 18 and 21	65	16	147	275	68	41	66	164	45	28	264	67	10	7	3	2
27. Average of columns 19 and 22	9	20	89	208	53	22	90	137	25	28	316	304	25		23	
C'. Basic Carboniferous intrusive rocks of the Gemerides																
28. Ultrabasites	3	28	1000	15	1000	84	46	114	23	5			4	333		
29. Gabbros of normal basicity	11	16	148	349	72	41	87	149	44	27	269	75	9			
E'. Smaller Mesozoic intrusives of the Gemerides																
30. Ultrabasites	24	16	1000	34	1000	71	35	70	12	19		3	16		2	1

Tables of average values of microelements of individual basic rock groups. The average quantitative contents of the elements Li, Pb and La in the tables are calculated for small sensibility of the method from fewer analytical data then other elements. These data are therefore not fully applicable.

Table 4

Oxides of Microelements in Per Cents	Number of anal.	Ga	Cr	V	Ni	Co	Cu	Zr	Sc	Y	Sr	Ba	Rb	Li	Pb	La
I. Average Values of Microelements Contents in Groups of Medium-Basic Effusive and Intrusive Rocks of the Gemerides.																
31. Cambrosilurian Medium-Basic Diabases	51	15	108	244	55	30	34	261	41	20	177	57	12	11	23	4
32. Devonian Medium-Basic Diabases	46	18	110	287	59	48	45	190	35	31	310	34	13	7	1	8
33. Devonian Medium-Basic Gabbrodiorites (24+18)	51	16	144	268	68	41	66	146	44	28	275	41	6	9	4	1
34. Detto-average of the groups 24+18+21	65	16	147	275	68	41	66	164	45	28	264	67	10	7	3	2
35. Average of Carboniferous Medium-Basic Diabases and gabbrodiorites (11+29)	24	15	171	288	63	37	54	149	44	29	272	95	30	28	—	4
36. Mesozoik Medium-Basic Diabases (13)	18	19	197	229	99	30	47	118	25	25	96	94	29	14	3	0
II. Average Values of Microelements Contents in Groups of Metamorphosed Basic Rocks of the West Carpathian Crystalline.																
37. Primary intrusive metamorphites of the Malé Karpaty Mts. (gabbra)	13	5	198	251	83	40	44	72	32	25	243	133	2	2	st	st
38. Gabbroamphibolites of the Malé Karpaty Mts.	18	7	231	318	161	40	46	106	29	29	156	160	6	1	1	st
39. Primary effusive metamorphites of the Malé Karpaty Mts. (amphibolites)	15	7	282	291	114	44	45	108	34	29	235	136	5	2	1	st
40. Amphibolites of the Malé Karpaty Mts. with prevailing amphibole	26	8	363	314	212	47	41	160	33	31	220	135	9	—	2	st
41. Strongly melanocratic amphibolites of the Malé Karpaty Mts.	11	6	281	420	200	51	46	117	31	32	174	110	2	1	—	—
42. Metamorphites of basic rocks of the Harmónia Series of the Malé Karpaty Mts. (Devonian)	12	9	411	291	169	53	47	181	25	29	211	225	19	2	st	1

43. Amphibolites of the West Carpathian crystalline autside the Malé Karpaty Mts.	127	18	198	187	82	33	47	127	23	21	518	299	35	—	5	11
44. Primary intrusive basic rocks of the West Carpathian crystalline	19	18	291	159	69	31	46	67	31	18	222	242	60	—	—	6
45. Melanocratic to monomineralic amphibolite and gabbro facies and marginal facies of serpentinites (from minerals of the amphibole group)	13	17	485	116	335	38	39	69	29	15	157	179	23	—	—	53
46. Serpentinites of the crystalline	9	12	913	57	233	71	226	47	24	41	23	18	5	—	—	3
47. Lamprophyres of the crystalline	2	16	286	184	102	33	72	68	29	17	600	763	40	—	—	—

Explanations: see Table 3.

The content of microelements in the types of rocks can be studied and compared in figures 1, 2, 3 and 4, in which numbers on the horizontal axis are numbers of rock groups and identical with numbering of these groups in tables 1, 2, 3 and 4.

In figure 1 part „a" enables to compare the change of the average contents of elements in extrusive rocks, divided according to the standpoint of stratigraphy — and in part „c" — their change in intrusive rocks.

On the basis of average analytical values of basic Cambrosilurian rocks the presence of basic rocks various geochemically in certain elements can be proved. Group 1 e. g. (basic rocks from Smolník) shows high Sr content whereas group 2 (diabases from outher Cambrosilurian areas of the Gemerides) shows small Zr values and essentially not smaller Sr, Cr, V, Ba and higher Ni and Rb contents. This fact cannot be unambigueously explained. It possibly in connected with inaccurate stratigraphical ranging of analysed rocks or the contents of microelements in the Cambrosilurian were very dependent on regional factors. Such a difference is, however, not observed in the Devonian magmatism, which is more uniform in microelements contents and not even Upper Carboniferous basic magmatites differ from it.

Figure 2 shows a very good survey of average contents of elements in normal basic rocks (medium-basic rocks) of the Combrosilurian, Devonian, Carboniferous and the Mesozoic. This figure makes evident that the extreme members, e. i. basic rocks of the Cambrosilurian and Mesozoic show the greatest differences in microelements contents, whereas in Devonian and Carboniferous rocks the contents of elements move between these

Table 4

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46. Serpentinites of the crystalline	9	12	913	57	233	71	226	47	24	41	23	18	5	—	—	3
47. Lamprophyres of the crystalline	2	16	286	184	102	33	72	68	29	17	600	763	40	—	—	—

Explanations: see Table 3.

The content of microelements in the types of rocks can be studied and compared in figures 1, 2, 3 and 4, in which numbers on the horizontal axis are numbers of rock groups and identical with numbering of these groups in tables 1, 2, 3 and 4.

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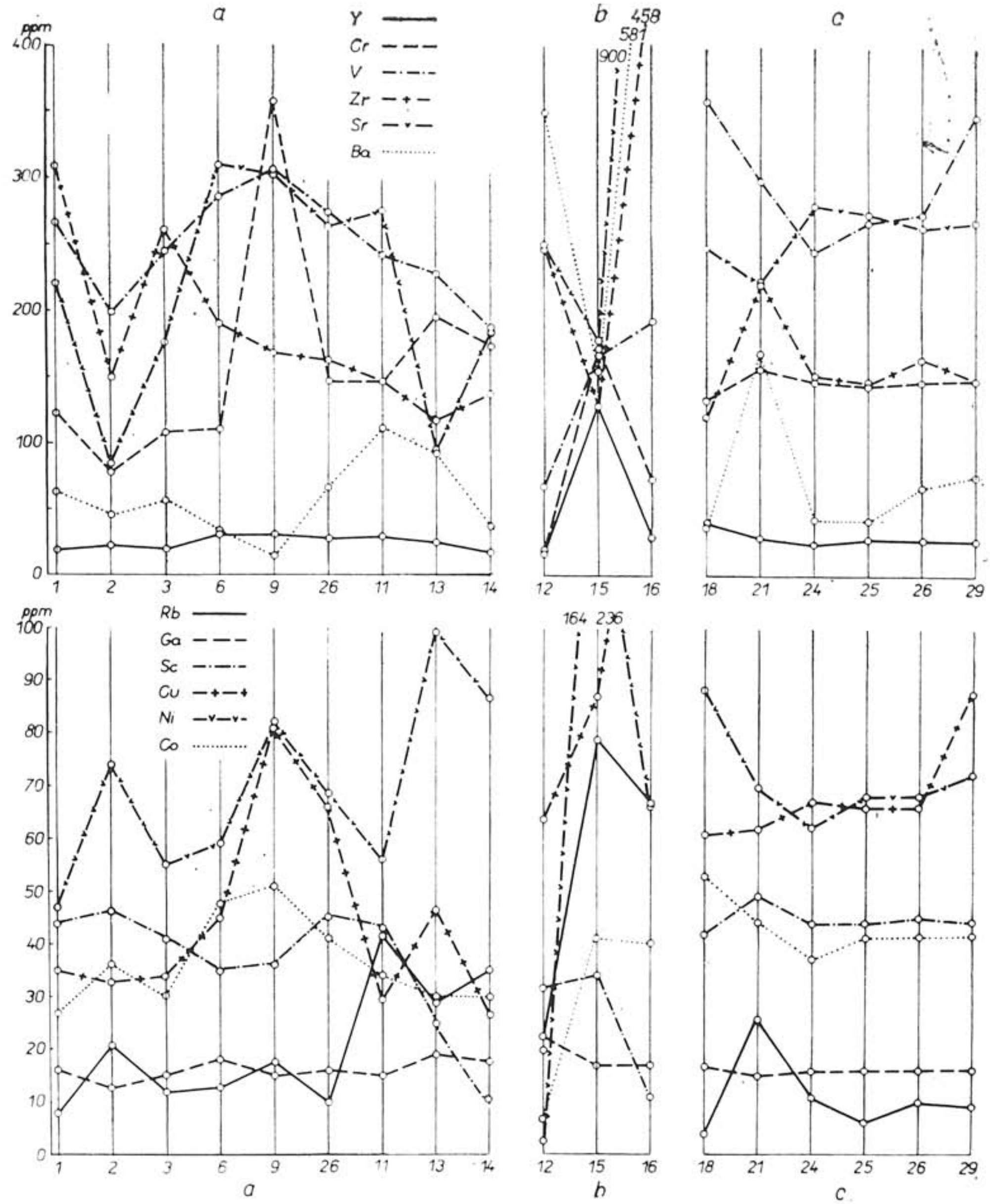

Figure 1. Graph of microelements average values of individual rock groups. a — groups of Gemeride Cambrosilurian diabases (1, 2, 3) Devonian diabases (6, 9), Devonian gabbrodiorites (26), Carboniferous diabases (11) and Mesozoic diabases (13), Mesozoic glaucophanites of the Gemerides (14); b — groups of Permian porphyrites of the Gemerides (12), Mesozoic augitites of the West Carpathians (15) and teschenites (16); c — groups of gabbroamphibolites from the surroundings of Košická Belá (18), gabbroamphibolites from the surroundings of Dobšiná (21), smaller gabbrodiorite bodies of the Gemerides (24) of average of 24 + 18 (25), of the average of groups 24 + 18 + 21 (26), of Carboniferous Gemeride intrusive rocks (29).

values. Cambrosilurian rocks have the highest and Mesozoic rocks the lowest Zr content, the contrary is in Cr, Ni and Rb content. Devonian and Carboniferous rocks have relatively high Sr, V, Cu, Sc values, compared to Cambrosilurian and Mesozoic rocks.

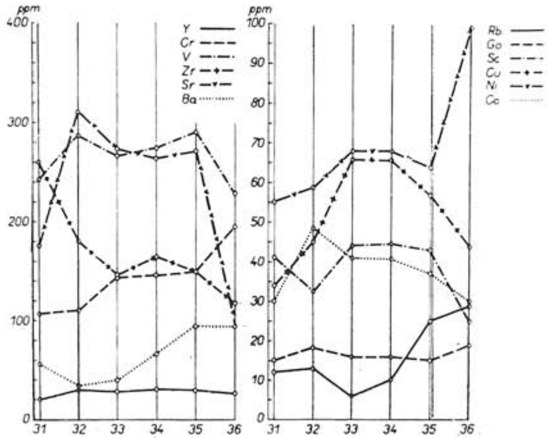

Fig. 2. Graph of average values of microelements from groups of medium basic diabases of the Cambrosilurian (31), Devonian (32), gabbrodiorites of the Devonian (33), group 33 + gabbroamphibolites from Dobšiná (34), Carboniferous basic rocks (35), basic rocks of the Gemeride Mesozoic (36).

These results show that magmatic rocks of the geological periods can be geochemically characterized with the aid of microelements contents, which fact is applicable in stratigraphic works.

Figure 3 compares microelements values of various groups of ultrabasic and more acid rocks of initial magmatism. The graph shows that in serpentinite groups (28, 30) besides high Ni and Cr contents minimum Sr contents bound to Ca are present. In ultrabasic differentiates of diabases and gabbrodiorites there are not serpentinites but monomineralic rocks, mainly hornblendites. In groups (20, 5, 17) high Sr contents are present therefore and these rocks have microelements contents close to diabases and not to serpentinites.

Figure 4 is interesting, where the changes of microelements contents in series of differentiation of the individual groups are catched. The figure clearly shows the dependence of the greatest changes of microelements contents on the basicity and acidity of rocks and also which elements mostly undergo such changes in their content. These dependences are separately expressed for intrusive rocks in figure 5 and table 5.

Studying the contents of elements in individual groups of rocks in table 3 and 4 we may call attention to the following matters of interest. In table 3 among Cambrosilurian basic rocks in column 3 the chemism of diabase rocks near the syngenetic pyrite mineralization is given. They are cut samples from the mineralized horizon in the adit on the Jalovičí vrch Mt. near Mníšek. Interesting is here the zero content of Ni and Sr, much lowered Cr contents and heightened Ba, Rb, Pb and La contents. This average analysis show, which elements in the mineralization process or during metamorphic recrystalisation of the rocks (under the presence of sulphides) are able to migrate (concentration or dispersion).

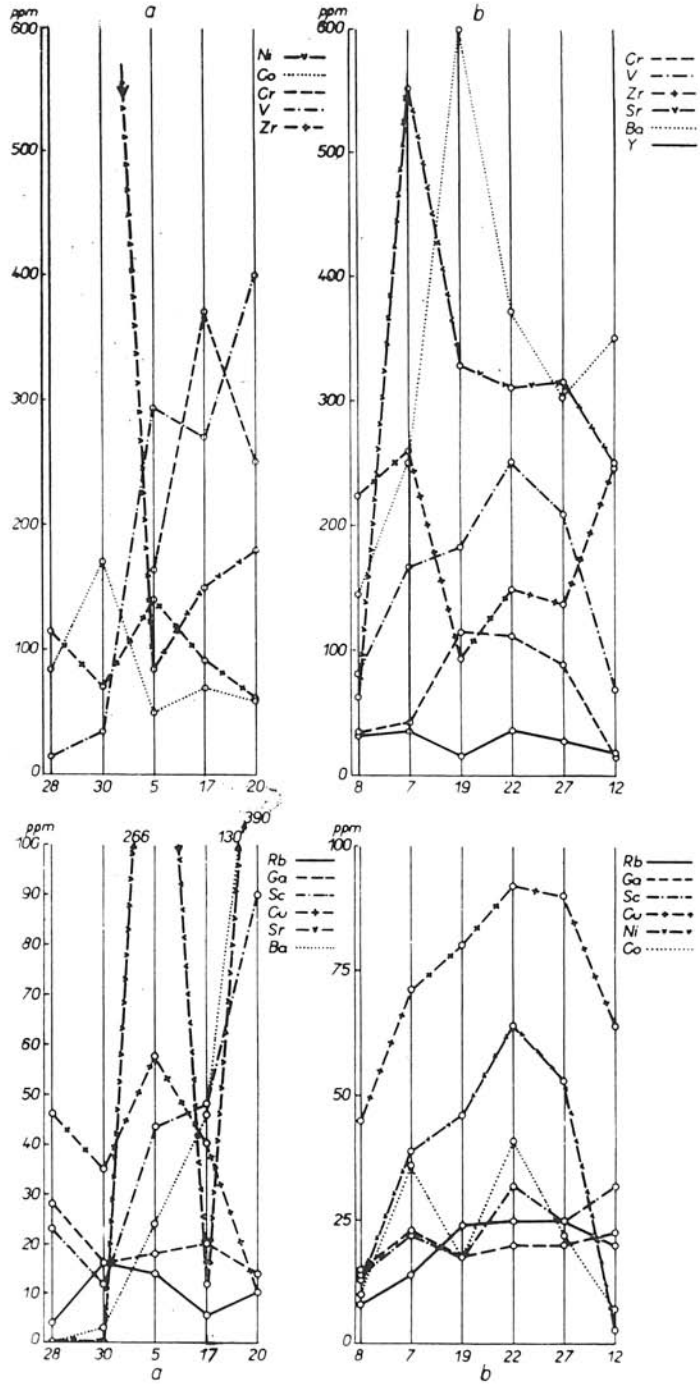

Fig. 3. Average values of microelements from groups of ultrabasic (a) and leukocratic (b) rocks of basic volcanism: a — Carboniferous serpentinites (28), Mesozoic serpentinites (30), extrusive extremely basic rocks of the Gemeride Devonian (5), ultrabasic rocks from amphibolic gabbro near Košická Belá (17), basic differentiate of amphibolic gabbro near Dobšiná (20); b — acid differentiates of Devonian basic magmatism of the Gemerides: leukocratic diabases (7), extremely acid differentiates of diabases (8), diorites from the surroundings of Košická Belá (19), diorites from the surroundings of Dobšiná (22), average of groups 19 and 22 (27) and Permian porphyrites of the Gemerides (12).

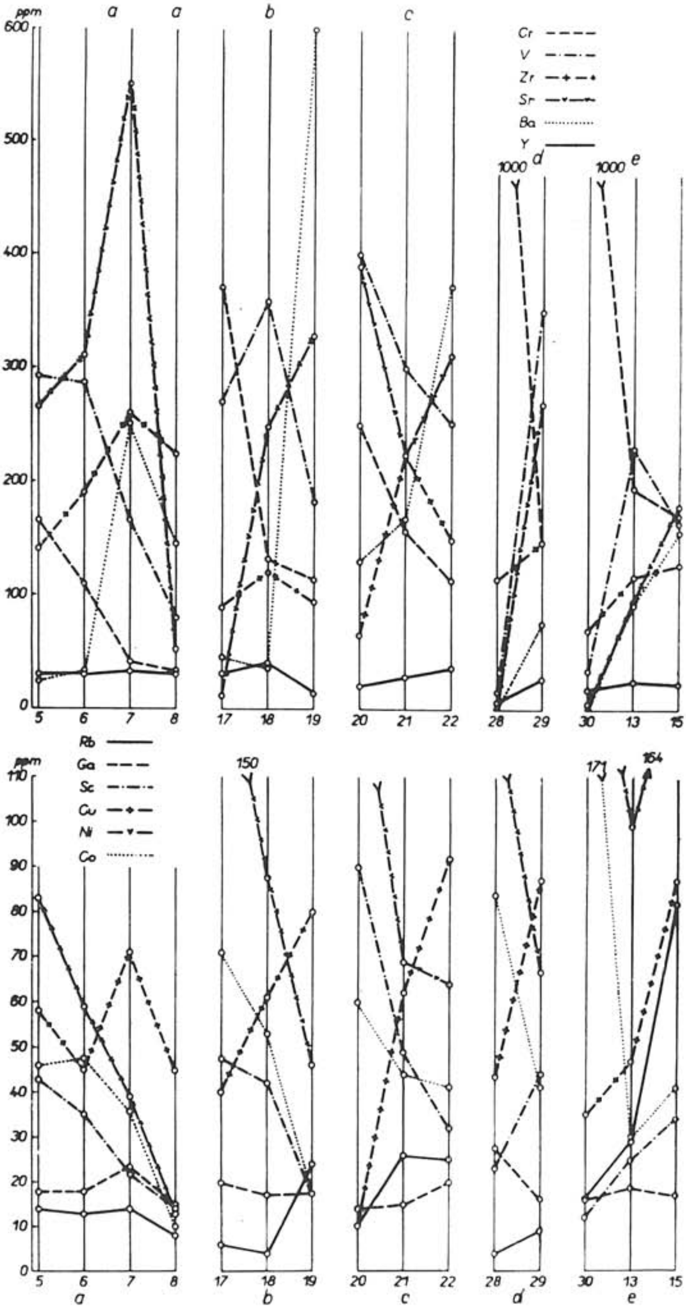

Fig. 4. Average values of microelements contents of individual groups of basic volcanism arranged from the left to the right according to increasing acidity of rocks: a — differentiates of Devonian diabases of the Gemerides (Rakovec) Serie; b — differentiates of amphibolic gabbro from a body near Košická Belá; c — differentiates of amphibolic gabbro from a body near Dobšiná : d — differentiates of Carboniferous basic rocks of the Gemerides; e — differentiates of Mesozoic basic rocks: serpentinites (30), diabases and spilites (13), augitites (15).

The table and also the graphs (1, 2) make evident that when there also are no essential differences in the microelements contents of all three normal (medium basic) rock types of the Paleozoic (Cambrosilurian, Devonian, Carboniferous) of the Spišsko-gemerské rudohorie Mts., however, the mostly marked geochemical is relatively abundant in these Cambrosilurian rocks. The heightened Zr content in basic rocks from Mníšek is characteristic of Cambrosilurian basic rocks and is then their specific geochemical feature. Zr therefore can be considered as indicator, which could be applicated for stratigraphical division. Cambrosilurian rocks in contrast to rocks of the Phyllite-Diabase Unit also show certain differences in the contents of other elements; they have lower amount of V, Sr. Other elements have very close contents. Geochemical accordance of microelements contents of smaller intrusives (column 13) with diabases of the Phyllite-Diabase Unit (column 6) is interesting, testifying that smaller intrusives genetically belong to Devonian volcanism. chemically differentation shows rock group 1 (Cambrosilurian of the Mníšek area), mainly in Zr content, which and geologically little differentiated, although it was taking place at various places of the Gemerides and for a longer period (table 5, fig. 5).

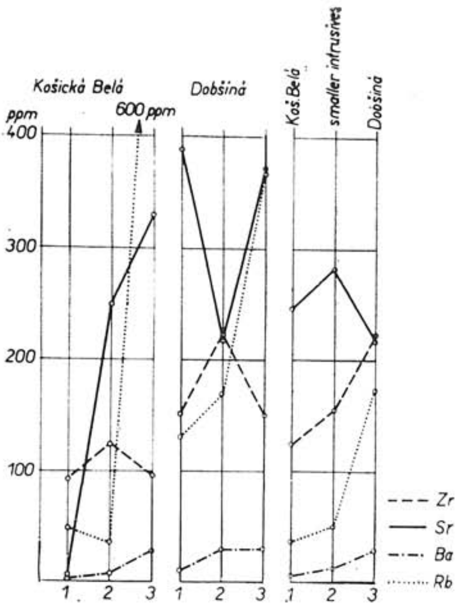

Fig. 5. Graphic illustration of elements contents values from table 5. Numbers 1, 2, 3 in the first two parts of the figure show degrees of differentiation: 1 — ultrabasic rocks, 2 — normal basic rocks, 3 — acid differentiates.

We consider as necessary separately to deal with the group of basic intrusives on the Spišsko-gemerské rudohorie Mts. region (part B of table 3).

The results of analyses of rocks of this group also are mentioned separately in table 5 and fig. 5. The tables and graphs show the greatest differences in the fundamental type of gabbrodiorites in contrast to other groups in basic rocks from Dobšiná, which not only have the most different average values of elements but also increased variability of contents of individual elements within the own group. This fact confirms the opinion of L. R o z l o ž n í k (1961) that the present diorites and gabbros of Dobšiná originated in consequence of the metamorphic effect of the Variscian magmatism on basic rocks of the Phyllite-Diabase Unit. The greatest differences in rocks from the Dobšiná area are mainly manifested in the increased content of Rb, Ba and Sr, which on the basis of the geo-

Table 5

		Košická Belá	Dobšiná	Smaller Intrusives
Zr	Ultrabasic rocks	91	149	
	Medium-basic rocks	121	223	152
	Leucocratic differentiates	94	149	
Sr	Ultrabasic rocks	12	390	
	Medium-basic rocks	249	222	280
	Leucocratic differentiates	328	372	
Ba	Ultrabasic rocks	46	130	
	Medium-basic rocks	37	168	42
	Leucocratic differentiates	600	372	
Br	Ultrabasic rocks	6	10	
	Medium-basic rocks	4	26	11
	Leucocratic differentiates	24	25	

Table of Zr, Sr and Rb values in individual types of basic intrusive rocks in the Gemerides, forming smaller subvolcanic intrusions or larger intrusive massifs Košická Belá, Dobšiná of Devonian to Lower Carboniferous age.

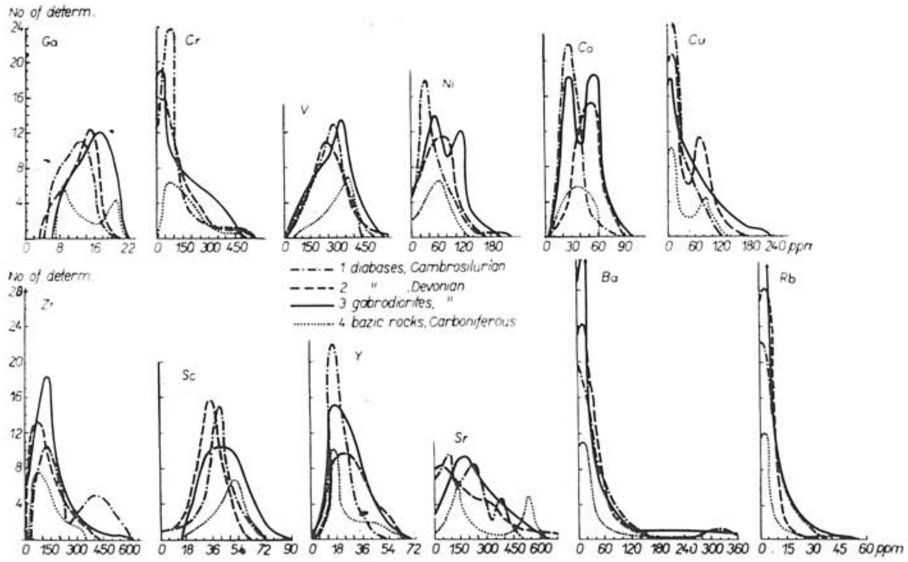

Fig. 6. Frequency histogram curves of contents of individual elements in essential medium basic rocks of Paleozoic basic volcanism in the Gemeride area. The curves were made by drawing contours of corresponding elements histograms of individual partial groups mentioned in graph.

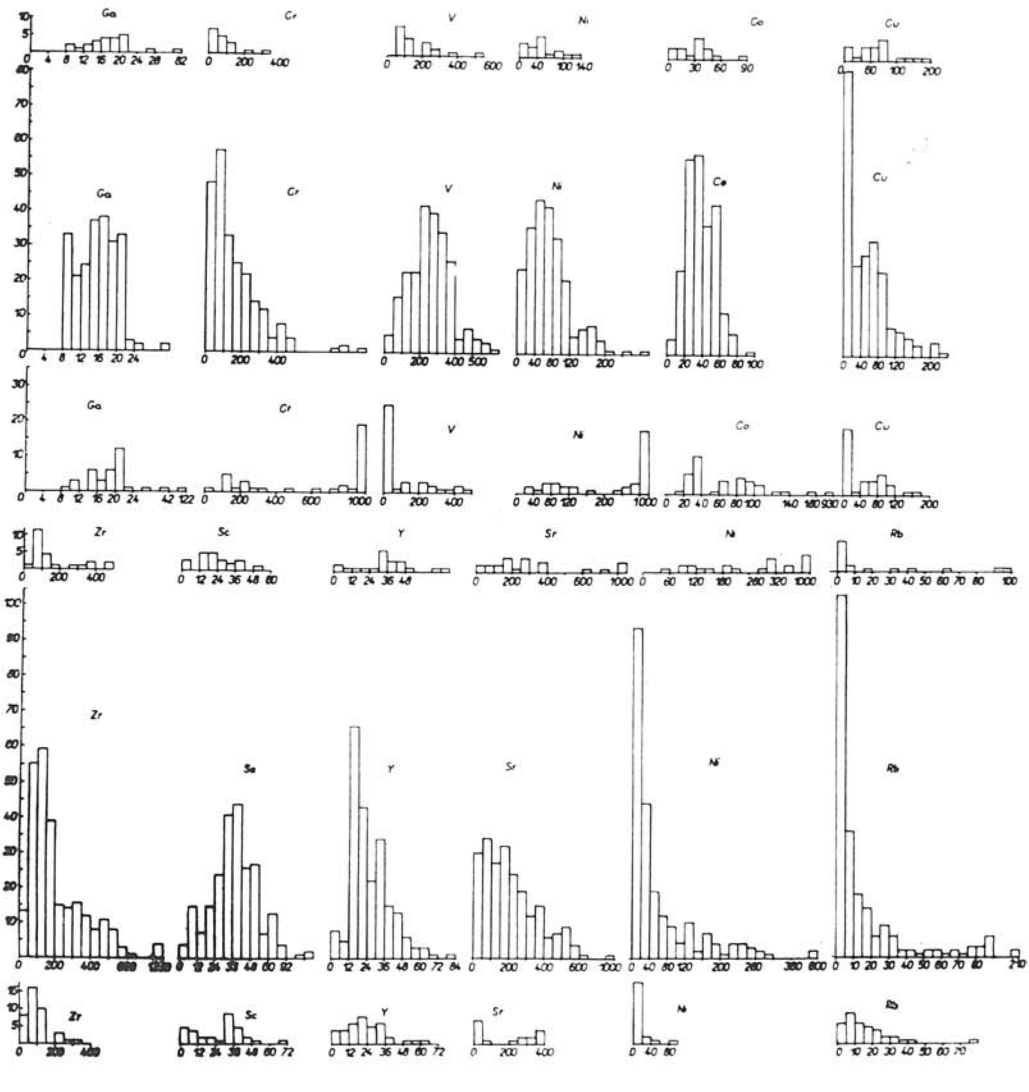

Fig. 7. Summary histograms of elements contents in differentiates of Paleozoic basic volcanism of the Gemerides. In the centre are histograms of essential rock types medium basic diabases and gabbrodiorites, above them histograms of ultrabasic differentiates or ultrabasites, below them histograms of acid differentiates.

chemical character of these elements can be considered as an evidence of subsequent metamorphic effect of granitoid magmatism on basic rocks of the Phyllite-Diabase Unit. For to see the differences of contents of these elements, the concentration of which mostly changes in three groups of the main intrusive rocks, we compiled a separate table (5) of Zr, Sr, Ba and Rb concentrations.

Average analyses in table 5 prove that a part from greater geochemicla difference in gabbrodiorites from Dobšiná the basic bodies near Košická Belá and smaller intrusives in the wide Spišsko-gemerské rudohorie Mts. region geochemically agree. With the aid of geochemistry the opinion then can be confirmed that magmatic intrusives in the Earlier Paleozoic and Lower Carboniferous of the Spišsko-gemerské rudohorie Mts. are magmatites belonging to uniform Devonian to Carboniferous magmatism of the Phyllite-Diabase (Rakovec) Unit.

The contents of microelements in Carboniferous and Mesozoic rocks (column 11. 29 and 35) and their comparison with contents in earlier basic magmatites can be seen best in figure 2. Carboniferous magmatic rocks essentially do not differ in microelements contents from Devonian rocks (Phyllite-Diabase Unit. column 32. 33. 34). They only have in contrast to them heightened amount of Ba and Rb and little lowered Co content. This fact perheps may indicate the consanguinity of the Carboniferous with the Devonian volcanism. There is a certain continuation of the Devonian-Lower Carboniferous volcanism also in the Upper Carboniferous. which could take place in the Gemeride region. where the Variscian granitoid magmatism only manifested sporadically with small intensity at the northern margin.

As it was mentioned about microelements contents in Mesozoic basic rocks (spilites and diabases). they showed greatest deviations mainly when we compared them to the earliest Cambrosilurian rocks. A very low Zr content is typical for them. Fig. 2 shows that Zr content in basic magmatism is lowering with the age of rocks. Mesozoic basic rocks have the lowest Sr. Sc and the highest Ba. Ni. Rb. Cr contents. These results in certain circumstances can be succesfully applicated in the solution of stratigraphical problems of the West Carpathians.

Groups of Mesozoic rocks as glaucophanites. augitites. teschenites must be geochemically treated separately as they are rocks very different and peculiar in space. age and origin. In contrast to spilites they mostly have high contents of Sr. Ba. Rb (compare the groups 13. 14. 15. 16 in table 3): it mainly is marked in teschenites (Zr 467 ppm. Sr 900 ppm. Ba 592 ppm). The glaucophanites of the Gemerides however essentially do not differ from spilites, a fact testifying that in the Gemeride region they genetically are close to Mesozoic spilites. They only differ in higher Sr and lower Ba content.

In this paper the authors also delt with the study of distribution laws of elements in basic rocks. Histograms of elements contents of individual rock groups were compiled. presented in tables. From the histograms frequency curves were compiled made by drawing contours of histograms of contents of individual elements from fundamental types of Paleozoic basic rocks. These curves were carried over into one base giving rise to figure 6. showing survey of general distribution of elements and their dispersion. In the next figure (7) all histograms of fundamental types of basic Gemeride Paleozoic rocks are summed up into one histogram. Above these histograms summary histograms of ultrabasic differentiates or ultrabasites and below them summary histograms of acid differentiates are given. The graph enables to follow the change of the concentration of

Table 6

I. Average Modal Composition of Basic Rock Groups in the Gemerides.

Min. Const. in Per Cent. / Rock Group.	Quartz	Plagioclase	Sericite	Epidote	Zoizite	Actinolite	Amphibole	Biotite	Chlorite	Serpentine	Olivine	Zirkon	Rutile	Titanite	Ilmenite	Hematite	Magnetite	Apatite	Calcite	Other Const.	Sum	Number of Analyses.
1.																						
2.	8,92	21,31		24,87		9,27			23,64					3,31				0,03	8,62		99,97	2
3.																						
4.																						
5.	1,23	22,42	30,42		0,10			1,81				5,31		1,97	1,23	5,49					99,98	8
6.	8,79	17,36	0,63	35,35		1,67	3,40		23,86					5,40	0,09	1,49	0,14	0,01	1,75		99,94	5
	3,45	27,64	1,76	23,04		5,61	0,11		26,97					5,23	0,80	0,60	0,86	0,16	3,47	0,37	99,73	28
	4,26	26,08	1,35	24,91		5,02	0,67	0,17	26,50					5,26	0,69	0,76	0,75	0,14	3,24		99,80	33
7.	4,32	34,93		32,54		3,00			16,05					3,11	1,72	1,27	0,39	0,40	1,78	0,43	100,03	6
8.	9,96	57,38	0,52	5,23		6,62			14,61					0,72	0,03	4,26	0,38		0,66		100,37	5
9.	3,92	15,98		35,26		7,68			27,26					3,09		3,12			3,63		99,94	3
10.	7,49	40,15	6,87	3,20					34,35				0,19	0,80	0,10	5,42				1,47	100,04	3
11.	2,47	20,94	1,79	25,23		5,54	9,51		25,62					1,94	0,09	2,95			3,54		99,89	7
12.																						
13.		34,00		4,36		0,36			10,56					9,35			2,24				100,11	1
14.																						
15.																						
16.																						
17.	1,41	9,37	9,70	7,20					62,15					1,25					8,7		99,79	1
18.	2,78	25,47	0,12	13,63	0,31	8,63	36,40		7,44					2,12	0,23	0,19	2,22	0,09	0,35		99,98	10
19.	15,63	57,5	0,31	1,76		5,14	13,39	0,17	3,97					0,91	1,35						100,13	2
20.		11,02			21,3		66,5		0,59									0,58			99,99	1
21.	7,10	34,54	0,39	3,9	4,01	5,18	38,11	0,5	2,15			0,03		0,65		0,14	1,98	0,24		1,07	99,99	10
22.	25,89	40,18	2,53	3,06		1,35	8,42	6,42	5,92					0,74	0,14	1,77		0,10	0,98	2,47	99,98	7
23.	0,35	28,05		22,26		7,15	22,91	2,29	10,61					1,11	3,25		0,25	0,05	0,02	0,55	99,85	7
24.	1,74	30,84		19,88		14,11	12,28	0,97	12,84					3,27	2,70	0,21	0,23	0,15	0,59	0,15	99,96	25
25.	2,04	29,30	0,04	18,09	0,09	12,55	19,17	0,69	11,33					2,92	1,97	0,20	0,79	0,14	0,52	0,11	99,94	35
26.	3,16	30,47	0,11	14,94	0,96	10,91	23,35	0,65	9,26					2,43	0,56	0,10	0,06	0,16	0,40	0,32	99,96	45
27.	23,26	44,03	2,03	2,77		2,19	9,52	5,03	5,50					0,78	0,37	1,42		0,08	0,77	1,93	100,05	9
28.		0,07		0,03					0,07	78,8						17,14				3,94	100,05	1
29.	1,10	11,95		30,54		15,65	27,05		7,61					6,07							99,97	4
30.																						

Average model composition of basic effusive and intrusive rock groups in the Gemerides. Numbers of rock group are the same as in the tables 1 and 3.

Table 7

Min. Const. in Per Cent.	Quartz	Plagioclase	Sericite	Epidote	Zoizite	Actinolite	Amphibole	Biotite	Chlorite	Serpentine	Olivine	Zirkon	Rutile	Titanite	Ilmenite	Hematite	Magnetite	Apatite	Calcite	Other Const.	Sum	Number of Analyses.
I. Average Modal Composition of Medium-Basic Effusive and Intrusive Rock Groups in the Gemerides																						
Rock Group																						
31.	8,92	21,31		24,87		9,27			23,64					3,31			0,03	0,03	8,62		99,97	2
32.	4,26	26,08	1,35	24,91		5,02	0,67	0,17	26,50					5,26	0,69	0,76	0,75	0,14	3,24		99,80	33
33.	2,04	29,30	0,04	18,09	0,09	12,55	19,17	0,69	11,33					2,92	1,97	0,20	0,79	0,14	0,52	0,11	99,94	35
34.	3,16	30,47	0,11	14,94	0,96	10,91	23,35	0,65	9,26					2,43	1,56	0,19	1,06	0,16	0,40	0,32	99,96	45
35.	2,15	17,67	1,14	27,17		9,22	15,88		19,07					3,43	0,06	1,88			2,25		99,93	11
36.		34,00		4,36		0,36			10,56					9,35			2,24				100,11	1
II. Average Modal Composition of Metamorphosed Basic Rock Groups of the West Carpathian Crystalline																						
37.		48,81		0,43			48,75										2,32			0,1	100,41	7
38.		34,52		3,16			56,59										5,24			0,27	99,50	7
39.		42,05		1,5			51,59										4,6				99,74	7
40.		28,61		4,50			62,51										4,24			1,1	00,96	10
41.		30,23		2,59			61,99										4,24			1,11	00,16	6
42.		34,65		1,19			57,82										5,88			0,44	99,98	4

Average modal composition of medium-basic effusive and intrusive rock groups in the Gemerides and average modal composition of metamorphosed basic rock groups of the West Carpathian crystallin. Numbers of rock groups are the same as in the Table 2 and 4.

elements in dependance on basicity in the whole group of Paleozoic basic volcanism and the detailed distribution of concentration of individual elements in the groups (table 6, 7).

Conclusion

The preliminary results of geochemical investigation of basic rocks of the Gemeride region can be summarized as follows:

The geochemical investigation enabled the geochemical characterization of individual rock groups of Paleozoic basic magmatism of the Gemerides according to basicity, stratigraphical and petrographical standpoints. The geochemical characterizations of individual groups are under certain conditions applicable in the solution of stratigraphical problems. The geochemical picture of representation of microelements in individual groups of rocks can be considered as characteristic of certain magmatism of a certain period.

On the basis of equal geochemical picture at least of a part of microelements conclusions on the consanguinity of magmatic rocks (their genetic relations) may be drawn.

The opinion is being confirmed that mainly Zr can be considered as indicatory element, which can characterize certain magmatism having taken place in certain period and space. In Gemeride basic rocks it is getting rarer with later basic volcanism.

Considerable differences in microelements contents in the first place manifest in dependence on basicity of the rock but in rocks of diabase character of equal degree of differentiotion also of various age differences in contents of the most elements are not essential.

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