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K-FELDSPARS OF THE GRANITOID ROCKS FROM THE STRÁŽOVSKÉ VRCHY CRYSTALLINE COMPLEX

(14 Figs., 3 Tabs., 2 Apps.)

Abstract: K-feldspars of granitoid rocks from the Strážovské vrchy Mts. (Suchý and Malá Magura massifs) have a perthitic character with average composition $Or_{90}Ab_{9.9}An_{0.1}$ in tonalites, $Or_{84}Ab_{15}An_{1}$ in granodiorites and $Or_{87}Ab_{12.5}An_{0.5}$ in granites. Structural states of K-feldspars determined by X-ray diffraction study (orthoclases in tonalites to maximum microclines in granites) reflect conditions of slow cooling of the both massifs. Temperatures ranging from 460 to 593 °C at presupposed pressures ranging from 400 to 500 MPa were determined by two-feldspar thermometers.

Резюме: Калиевые полевые шпаты гранитоидных пород Стражовских гор (массивы Сухи и Мала Магура) имеют пертитовый характер с средним составом $Or_{90}Ab_{9.9}An_{0.1}$ в тоналитах, $Or_{84}Ab_{15}An_{1}$ в гранодиоритах и $Or_{87}Ab_{12.5}An_{0.5}$ в гранитах. Структурные состояния калиевых полевых шпатов (ортоклазы в тоналитах — максимальные микроклины в гранитах) отражают условия медленного охлаждения обоих массивов. При помощи двуполевошпатовых термометров были определены температуры с 460 по 593 °C при предполагаемых давлениях с 400 по 500 МПа.

Introduction

Crystalline complex of the Strážovské vrchy Mts. (Suchý and Malá Magura massifs) represents southwestern continuation of external zone of the Western Carpathian core mountains. It is built of complex of various types of crystalline schists, granitoids and migmatites. According to Kahan (1979), the central ridge of the both massifs is formed by granitoid rocks, whereas complexes of paragneisses and migmatites prevail east- and westward (outward).

According to petrographic and geochemical features (which will be dealt with in the prepared paper), granitoids of the both massifs form differentiation series: tonalite → granodiorite → granite (Vilinovičová, 1988). All granitoid types are peraluminous (mol. $Al_2O_3/CaO + Na_2O + K_2O > 1$) what is manifested in modal composition by presence of muscovite, garnet and sillimanite, besides biotite. The most probable age of granitoid intrusion is 393 ± 6 m.y. (Kráľ et al., 1987).

K-feldspars from this region of the Western Carpathian crystalline complex have not been paid yet any attention. The only data are presented in the works of Ivanov (1957), Klinec (1958), Kahan (1979), 1985) and Putiš (1982) who mention presence of K-feldspars in petrographic description of rocks. K-feldspars are characterized in more detail by Ivanov (1957). He found 8 vol. %

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of orthoclase in more basic types of granitoids, 25—45 vol. % in leucocratic aplitic types. According to I v a n o v (l.c.), microcline is only accessory in biotite granodiorites, in aplitic granites it is macroscopically dark-grey. It is considered as the yougest among the main minerals.

Aim of the work was to obtain information on K-feldspars of granitoids from the both crystalline massifs, to observe differences between them in the series: tonalites-granodiorites-granites and to use them as indicators of processes and conditions of granitoid formation.

Methods of work

K-feldspars were microscopically studied in 49 samples of granitoids, but only 36 samples of them were separated from quartz-feldspar fraction (20 from Suchý, 16 from Malá Magura), Fig. 1, by gravimetric method in bromoform (M a c e k et al., 1980). X-ray diffraction records were carried out at Geological Institute of the CGR SAS by Philips PW 1150 apparatus under the following conditions: Cuk_{α}, radiation Ni-filter, 40 kV, 25 mA, diaphragms 1 °-0.2 ° -1 °, 10^3 impulses/sec., T = 2, shift of paper 600 mm/hour, goniometer rate 0.5 ° 2Θ/min. Measurements were made in direction from 52 ° to 20 ° 2Θ. Precision of measurement was checked by internal standard — silicon. X-ray diffraction patterns were evaluated by tables of B o r g — S m i t h (1969). Values of triclinicity Δ r, monoclinic ordering Δ z and Al contents in tetrahedral sites Al_{T_1O} Al_{T_1m}, Al_{T_2O}, Al_{T_2m} were obtained by A f o n i n a et al.'s (1978, 1979) method as mentioned by V i l i n o v i č o v á et al. (1986).

35 analyses of K-feldspars were obtained by electron microanalysis using JXA-5A JEOL apparatus and 25 analyses of coexisting plagioclases were obtained by the same method in order to use them in two-feldspar thermometry (Apps. I, II). Owing to perthitic character of K-feldspars, areas having size of 0.3 × 0.3 mm were analyzed in 22 cases from the above-mentioned 35 analyses (Fig. 2).

Data were processed by computer Siemens System 4004/151 in Laboratory of Information Science at Faculty of Mathematics and Physics of Comenius University in Bratislava. Parameters of unit cells of those K-feldspars which have not, according to diffraction patterns, "mixture" character, i.e. one polymorphic modification markedly prevails (in this case usually triclinic), were calculated by POWDER program. Crystallization temperatures of coexisting feldspars were calculated by means of TFELDT program compiled by G h i o r s o (1984) for two-feldspar thermometers.

Occurrence of K-feldspars in granitoid rocks

K-feldspars form great subhedral phenocrysts (up to 1 cm in size), sporadically twinned according to Carlsbad law, with plagioclase, muscovite and quartz enclosures (Fig. 3) in medium- to coarse-grained granites from the both massifs. They are usually perthitic with developed microcline cross-hatching (Fig. 4). Development of perthites is hair-like, spindle-shaped and wedge-shaped. The

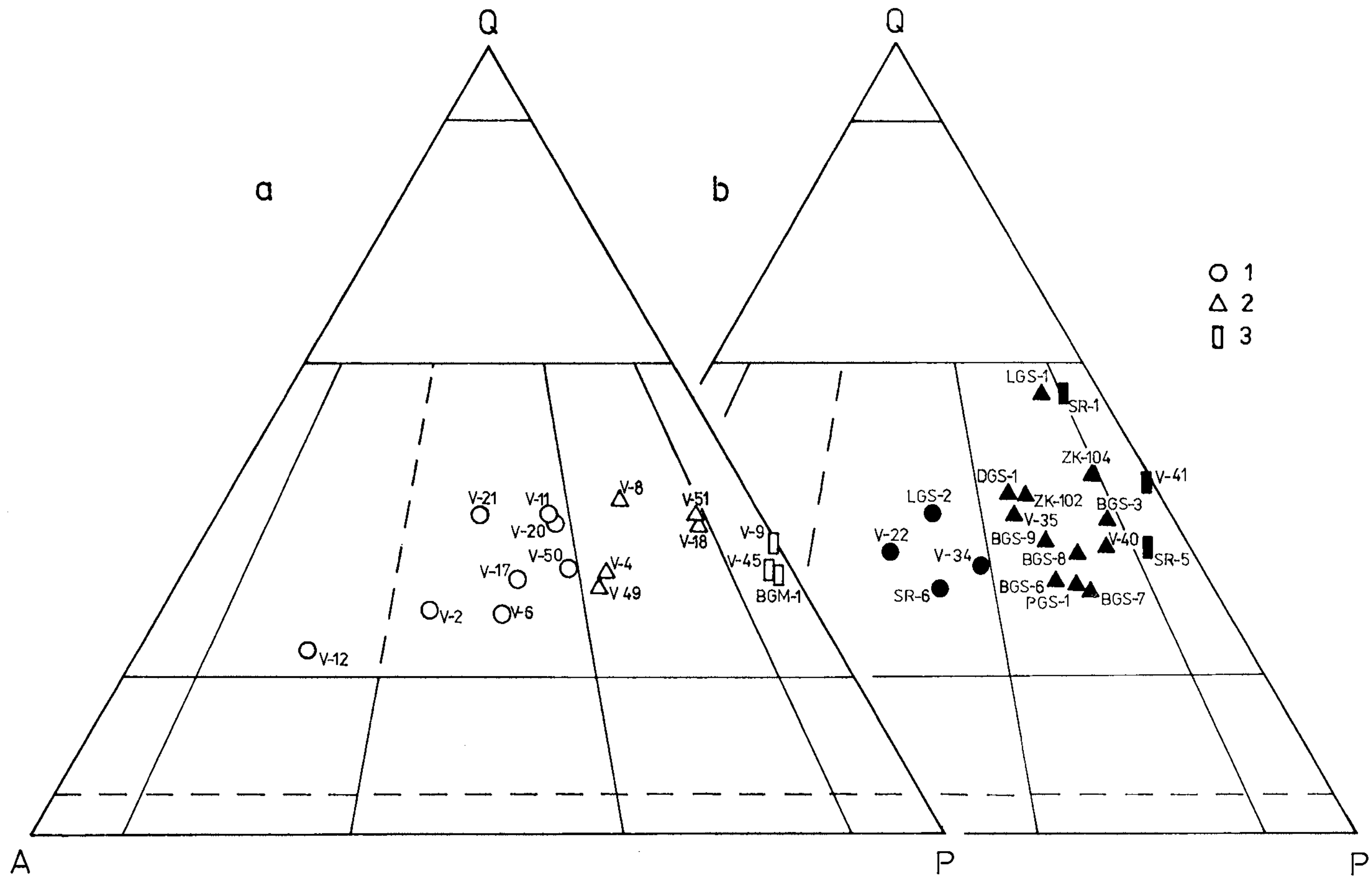

Fig. 1. Granites (1), granodiorites (2) and tonalites (3) from the Strážovské vrchy crystalline complex marked by QAP classification diagram of S t r e c k e i s e n (1976); a — Malá Magura, b — Suchý.
Note: sample SR-2 (coarse-grained, pegmatitic granite) has not planimetric analysis.

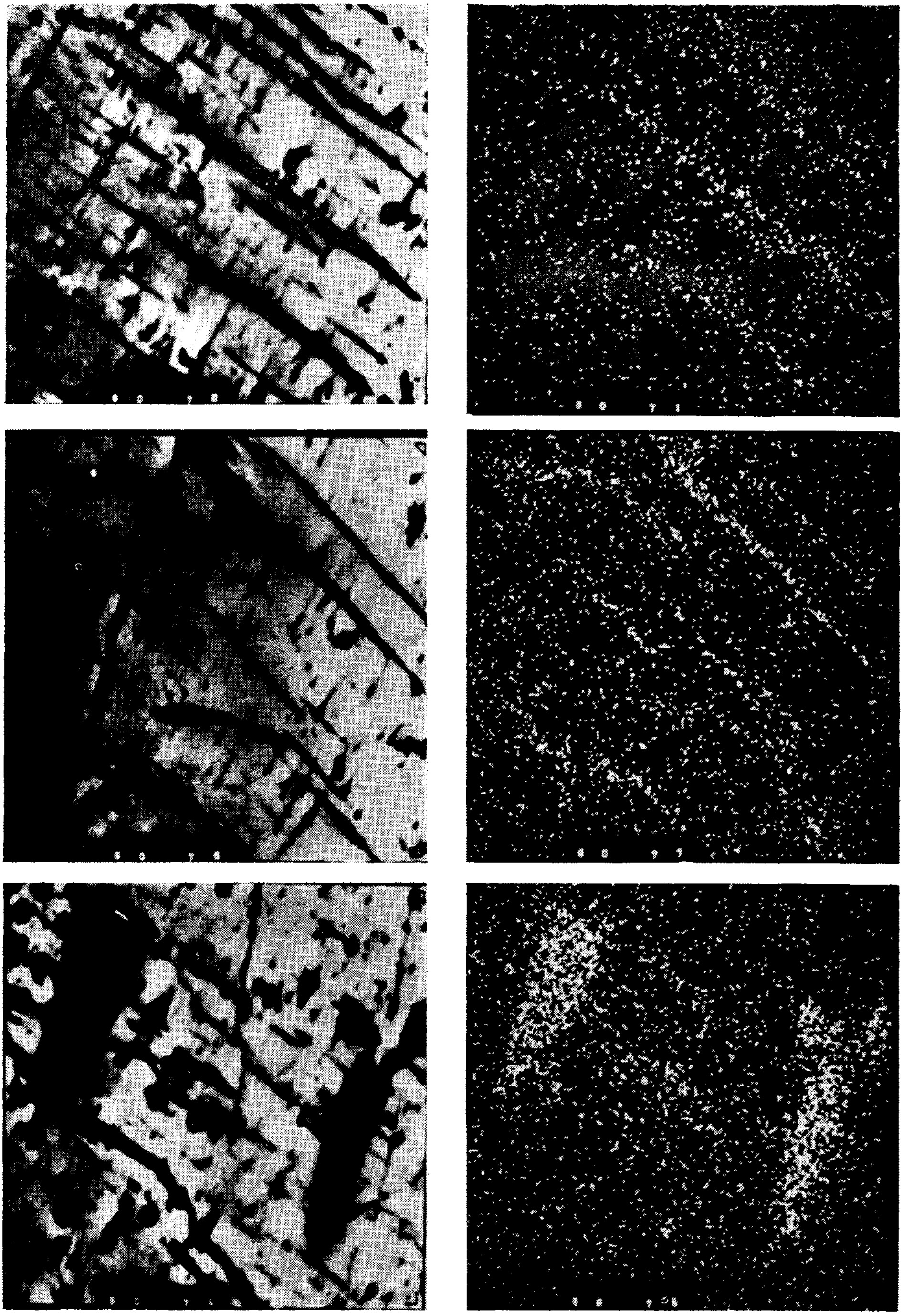

Fig. 2. Examples of analyzed areas (0.3 × 0.3 mm) of perthitic K-feldspars with Na distribution in leucogranodiorite V-18, Malá Magura. Photo: D. J a n č u l a.

Fig. 3. Poikilitic character of K-feldspar from leucomonzogranite V-6, Malá Magura. Magn. 13 ×, XN; all other photos made by L. O s v a l d.

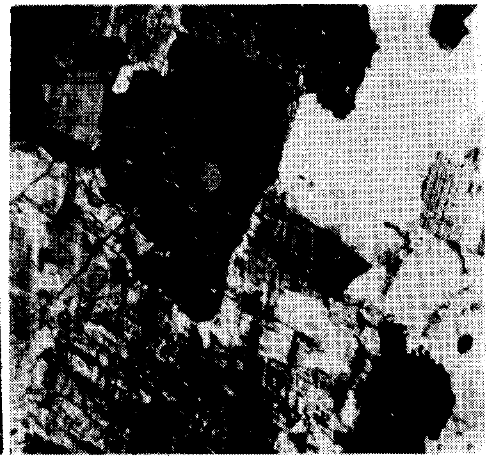

Fig. 4. Perthitic maximum microcline in section (001) with visible cross-hatching and section in a small angle to plane (100) with visible perthitization. Muscovite leucomonzogranite V-2, Malá Magura. Magn. 13 ×, XN.

Fig. 5. Poikilitic K-feldspar with non-oriented plagioclase, quartz and muscovite enclosures. Biotite granodiorite V-40, Suchý. Magn. 13 × XN.

Fig. 6. Interstitial K-feldspar enclosing plagioclases and quartz. Muscovite-biotite leucotonalite V-45, Malá Magura. Magn. 20 ×, XN.

latter seem to overlie hair-like or spindle-shaped perthites what probably means two phases of Ab-component unmixing. Interstitial K-feldspars are anhedral, without enclosures, having often very good cleavage.

Perthitic K-feldspars form poikilitic phenocrysts enclosing plagioclases, biotite, muscovite and quartz (Fig. 5) in fine- to medium-grained granodiorites,

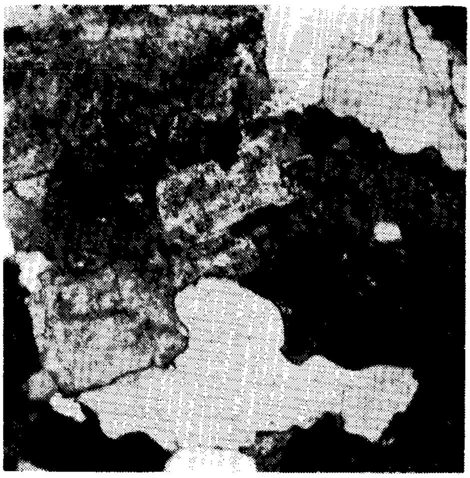

Fig. 7. Process of replacement of plagioclase by K-feldspar. Muscovite leucomonzogranite V-34, Suchý. Magn. 20 ×, XN.

Fig. 8. Replacement of plagioclase by K-feldspar in muscovite-biotite leucotonalite V-45, Malá Magura. Magn. 20 ×, XN.

whereby they may pass to irregular interstitial K-feldspars. These K-feldspars are anhedral, without enclosures as in granites. Poikilitic phenocrysts may, similarly as interstitial ones, show microcline cross-hatching.

K-feldspar is missing in the studied tonalites or its amount varies, according to modal analysis, from 0.2 to 5.3 vol. %. If it is present, it fills interstices (Fig. 6). It is sporadically perthitic or finely cross-hatched from the rims. Intensive replacement of plagioclases by K-feldspar from rim, in some cases from the centre of grain, is observed in all granitoid samples (Figs. 7, 8).

Composition and structural state of K-feldspars

Composition of coexisting plagioclases in sense of Or-Ab-An diagram is given in Fig. 9. Chemical composition of the studied K-feldspars is represented by bulk composition determined by areal analysis, whereas composition of K-phase has been established by focused analysis (App. I). Average values of these analyses are given in Tab. 1 from which it results that composition of K-phase is very pure mainly in K-feldspars from tonalites. Bulk composition of K-feldspars is given by amount and size of present perthites in feldspar grains. Concentration of perthitic phase depends also on rock type, as it results from Tab. 1. Character of these perthites is represented by compositions with corresponding Na distributions in Fig. 2.

Evaluation of X-ray diffraction patterns was complicated in many cases by diffusivity of characteristic reflexes of K-feldspars or by presence of reflexes of both monoclinic and triclinic symmetries what proves structural heterogeneity of K-feldspar. A f o n i n a et al.'s (1979) classification Δ r—Δ z diagram was used for evalution of structural state of K-feldspars. This proposed clas-

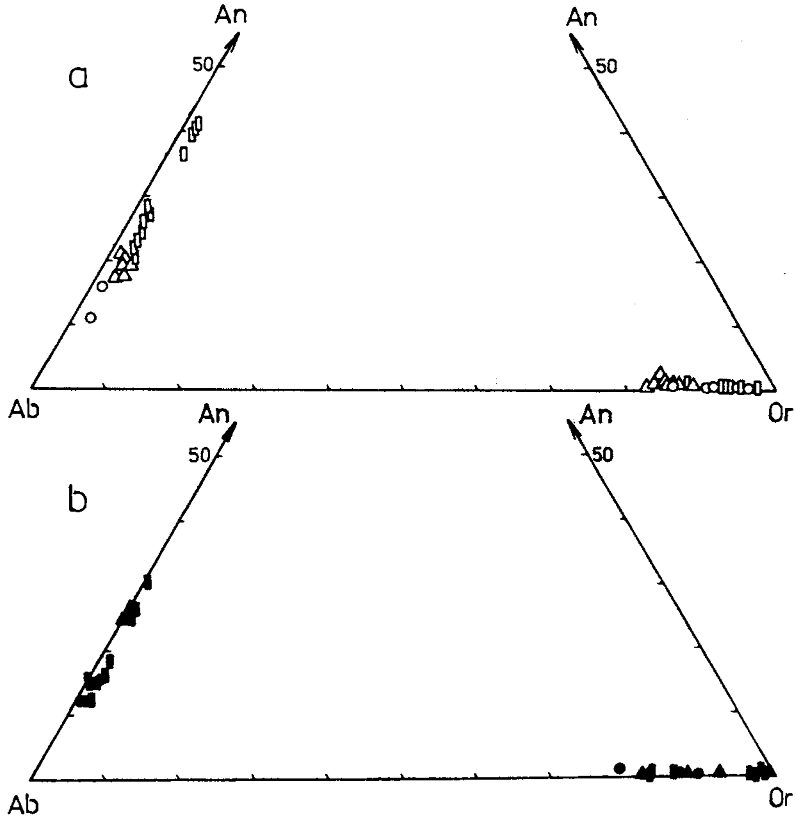

Fig. 9. Composition of the studied K-feldspars and plagioclases from granitoids of Malá Magura (a), Suchý (b). Legend as in Fig. 1.

sification enables, in qualitative terms, to determine exact names of polymorphic types of K-feldspars using X-ray diffraction method. According to this classification, K-feldspars of the studied granitoids from the Strážovské vrchy Mts. were divided into 4 groups. K-feldspars of granites from the both massifs have a structural state of intermediate and maximum microcline, K-feldspars of granodiorites have a structural state of orthoclase, intermediate and maximum microcline. K-feldspars of tonalites have not reached degree of maximum microcline ordering; orthoclase, high and intermediate microcline are present in them (Fig. 10). Displacement of one K-feldspar sample of tonalite from the Malá Magura massif to the field of maximum microcline is caused by presence of the both modifications (monoclinic M and triclinic T) in the sample represented approximately by 60 M : 40 T (in percent).

Structural state of K-feldspars according to W r i g h t (1968) is given in Fig. 11. Broken lines denote course of 2Θ $\overline{2}01$ enabling to establish anomalous character of K-feldspars. From difference of the established value 2Θ $\overline{2}01$ from diffraction pattern and of the value observed from the mentioned diagram

Table 1

Average bulk composition of K-feldspars of the studied granitoid types

	Granites n = 6 n = 2	Granodiorites n = 12 n = 2	Tonalites n = 9 n = 4
Bulk composition K-phase	$Or_{87}Ab_{12.5}An_{0.5}$ $Or_{95}Ab_5An_0$	$Or_{84}Ab_{15}An_1$ $Or_{96}Ab_4An_0$	$Or_{90}Ab_{9.9}An_{0.1}$ $Or_{98}Ab_2An_0$

Average composition of K-phase (determined by focused analysis) is presented in the table for comparison.

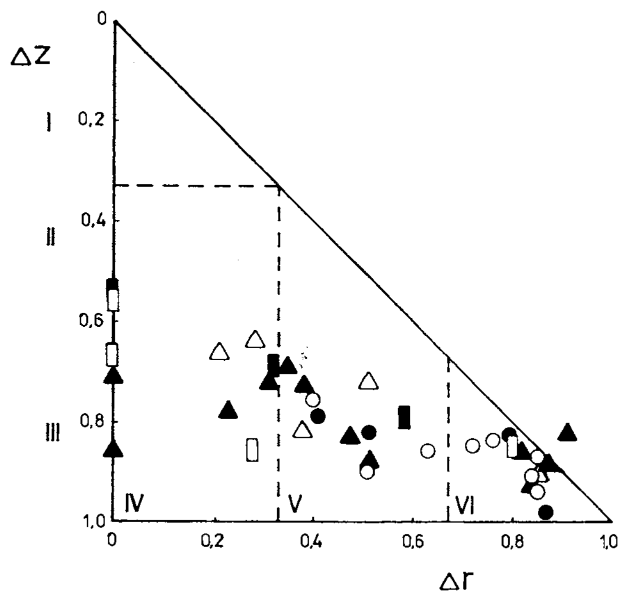

Fig. 10. Classification Δ z — Δ r diagram (Afonina et al., 1978) of structural state of K-feldspars of granitoids from the Strážovské vrchy Mts.
Legend as in Fig. 1.

(difference $2\theta\ \bar{2}01_e - 2\theta\ \bar{2}01_0 > 0.1^0$ = anomalous) it comes out that majority of K-feldspars of granitoids from Suchý massif is anomalous, in contrast to K-feldspars of granitoids from the Malá Magura massif.

Unit cell refined parameters of K-feldspars (Tab. 2 A, B) are represented together with error in b-c diagram (Stewart — Wright, 1974) in Fig. 12. From a small number it is evident that majority of samples was not suitable for refinement, because it did not supply precision requirements by their diffusive reflexes or by simultaneous presence of monoclinic and triclinic modifications in one sample. Position of K-feldspar samples in b-c diagram corresponds to their established structural state.

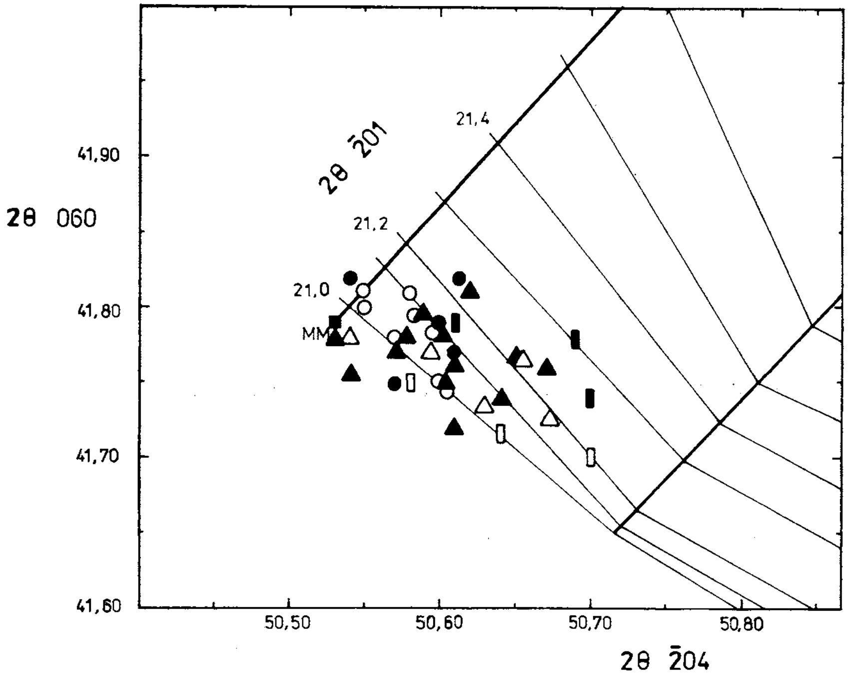

Fig. 11. Structural state of K-feldspars according to "three-peak" method ($\bar{2}04$-060-$\bar{2}01$) of Wright (1968). Thick lines denote the series of maximum microcline (MM) — low albite (outside the figure) and the orthoclase series.
Legend as in Fig. 1.

Table 2A

Unit cell parameters of some K-feldspars of granitoids from Suchý massif

Sample	a (nm)	b (nm)	c (nm)	α (°)	β (°)	γ (°)	V (Å^3)	Number of reflexes
V-35	0.8571(18)	1.2969(10)	0.7213(3)	90.71	115.94	87.78	720.52	15
BGS-3	0.8574(18)	1.2967 (7)	0.7199(2)	89.99	115.88	89.99	719.83	11
BGS-8	0.8592(17)	1.2965 (7)	0.7205(2)	89.99	115.96	89.99	721.45	10
SR-2	0.8573(13)	1.2954 (7)	0.7211(2)	90.51	115.95	88.05	719.75	11
SR-6	0,8606 (13)	1.2965 (6)	0.7210 (2)	90.49	115.80	88.18	723.95	14
ZK-104	0.8582(11)	1.2963 (4)	0.7218(1)	90.74	116.00	87.82	721.41	11

Note: Errors in the last decimal places are given in parentheses after the a, b, c parameters values.

Table 2B

Unit cell parameters of some K-feldspars of granitoids from Malá Magura massif

Sample	a (nm)	b (nm)	c (nm)	α (°)	β (°)	γ (°)	V (Å^3)	Number of reflexes
V-2	0.8586(16)	1.2970(5)	0.7219(2)	90.81	116.05	87.76	721.85	11
V-4	0.8553(18)	1.2945(7)	0.7194(3)	89.99	116.04	89.99	715.62	12
V-6	0.8571(18)	1.2959(9)	0.7216(3)	90.54	115.94	88.05	720.30	13
V-11	0.8584(9)	1.2965(4)	0.7212(2)	90.60	115.85	87.98	721.89	13
V-18	0.8581(20)	1.2975(10)	0.7222(4)	90.47	115.94	88.06	722.68	14

Note: Errors in the last decimal places are given in parantheses after the a, b, c parameters values.

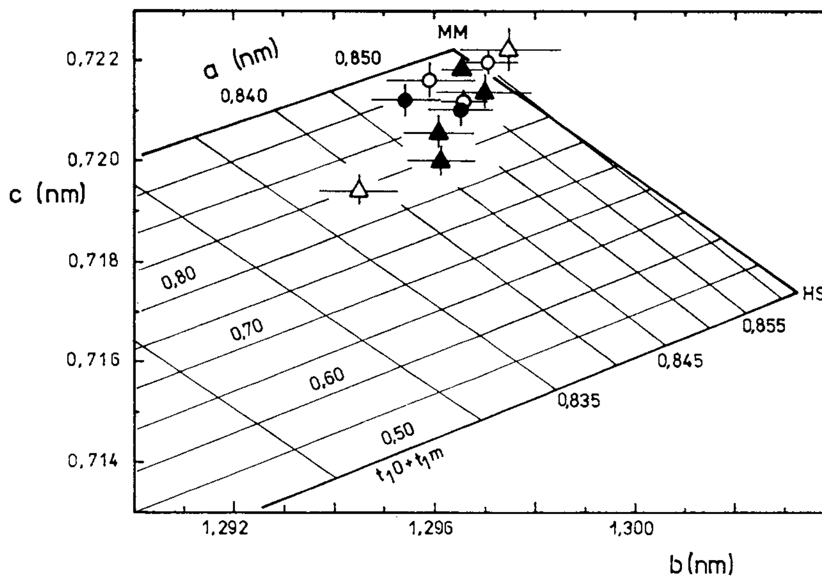

Fig. 12. Refined parameters of K-feldspar unit cells plotted together with an error in b-c diagram (S t e w a r t—W r i g h t, 1974). Majority of samples is close by their parameters to maximum microcline (MM). HS — high sanidine. Legend as in Fig. 1.

Al contents in tetrahedral sites (Tab. 3 A, B) give information on two-step process of ordering of the studied K-feldspars (Fig. 13). But it is not an ideal two-step process, since transformation of monoclinic symmetry to triclinic one took place earlier ($Al_{T_1O} = Al_{T_1m} = 0.38$—$0.40$) than $Al_{T_1O} = Al_{T_1m} = 0.50$.

Table 3A

Triclinicity, monoclinic ordering, Al contents in tetrahedral sites and structural state of K-feldspars of the studied granitoids from Suchý massif

Sample	Δ r	Δ z	T_1O	T_1m	$T_2O = T_2m$	Structural state
V-22	0.51	0.82	0.7100	0.2000	0.0450	intermediate microcline
V-34	0.87	0.98	0.9300	0.0600	0.0050	maximum microcline
V-35	0.87	0.88	0.9050	0.0350	0.0300	maximum microcline
V-40	0.31	0.72	0.5850	0.2750	0.0700	high microcline
V-41	0.58	0.79	0.7375	0.1575	0.5250	intermediate microcline
BGS-3	0	0.71	0.4275	0.4275	0.0725	low orthoclase
BGS-6	0.35	0.69	0.5975	0.2474	0.0775	intermediate microcline
BGS-7	0.38	0.73	0.6225	0.2425	0.0675	intermediate microcline
BGS-8	0.23	0.78	0.5600	0.3300	0.0550	high microcline
BGS-9	0	0.86	0.4650	0.4650	0.0350	low orthoclase
DGS-1	0.91	0.82	0.9100	0	0.0450	maximum microcline
LGS-1	0.47	0.83	0.6945	0,2205	0.0425	intermediate microcline
LGS-2	0.41	0.79	0.6525	0.2425	0.0525	intermediate microcline
PGS-1	0.82	0.86	0.8750	0.0550	0.3500	maximum microcline
SR-1	0.32	0.69	0.5825	0.2625	0.0775	high microcline
SR-2	0.88	0.89	0.9125	0.0325	0.0275	maximum microcline
SR-5	0	0.55	0.3875	0.3875	0.1125	intermediate orthoclase
SR-6	0.80	0.83	0.8575	0.0575	0.0425	maximum microcline
ZK-102	0.51	0.88	0.7250	0.2150	0.0300	intermediate microcline
ZK-104	0.84	0.93	0.9025	0.0625	0.0175	maximum microcline

Table 3B

Triclinicity, monoclinic ordering, Al contents in tetrahedral sites and structural state of K-feldspars of the studied granitoids from Malá Magura massif

Sample	Δ r	Δ z	T_1O	T_1m	$T_2O = T_2m$	Structural state
V-2	0.84	0.91	0.8975	0.0575	0.0225	maximum microcline
V-4	0.21	0.66	0.5200	0.3100	0.0850	high microcline
V-6	0.85	0.94	0.9100	0.0600	0.0150	maximum microcline
V-8	0.28	0.64	0.5500	0.2700	0.0900	high microcline
V-9	0	0.67	0.4175	0.4175	0.0825	intermediate orthoclase
V-11	0.85	0.87	0.8925	0.0425	0.0325	maximum microcline
V-12	0.40	0.76	0.6375	0.2425	0.0600	intermediate microcline
V-17	0.76	0.84	0.8400	0.0800	0.0400	maximum microcline
V-18	0.85	0.91	0.9025	0.0525	0.0225	maximum microcline
V-20	0.72	0.85	0.8225	0.1025	0.0375	maximum microcline

Continuation of Tab. 3B

V-21	0.51	0.90	0.7293	0.2193	0.0257	intermediate microcline
V-45T	0.80	0.85	0.8625	0.0625	0.0375	maximum microcline
V-45M	0.28	0.85	0.6025	0.3225	0.0375	high microcline
V-49	0.38	0.82	0.6450	0.2650	0.0450	intermediate microcline
V-50	0.63	0.86	0.7800	0.1500	0.0350	intermediate microcline
V-51	0.51	0.72	0.6850	0.1750	0.0750	intermediate microcline
BGM-1	0	0.56	0.3900	0.3900	0.1100	intermediate orthoclase

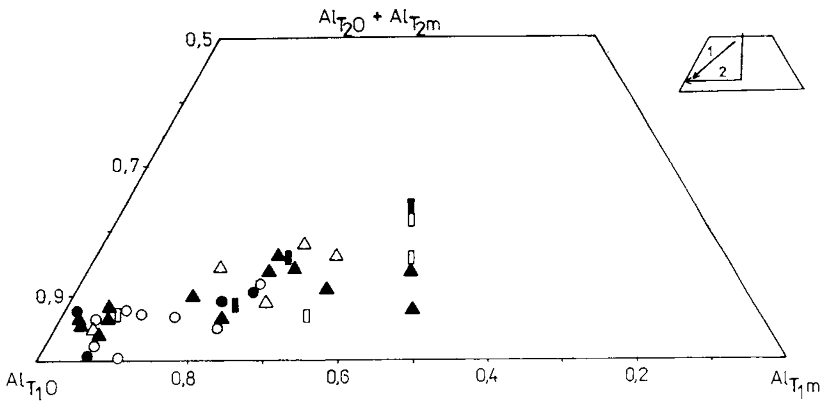

Fig. 13. Al contents in tetrahedral positions of the studied K-feldspar in Stewart — Wright's (1974) diagram. One-step (1) and two-step (2) process of ordering of alkali feldspars is schematically represented in reduced diagram. Legend as in Fig. 1.

Thermometry

Two-feldspar thermometers based on distribution of Ab-component between coexisting K-feldspar and plagioclase are widely applied to geothermometry for granitoid and metamorphic rocks (Stormer — Whitney, 1977; Whitney — Stormer, 1976; Bohlen et al., 1980). Temperatures ranging from 460 to 550 °C at presupposed pressure p = 500 MPa were determined by two-feldspar Stormer's Jr. (1975) thermometer for the studied set of granitoids from the Strážovské vrchy Mts. In addition to this two-feldspar thermometer, Ghiorso's (1984) thermometer sensitive to K content in plagioclase and Ca content in K-feldspar was applied too. Temperatures varying from 460 to 593 °C at pressures varying from 400 to 500 MPa were attained by TFELDT program (Fig. 14). Analyses of areas representing bulk composition of K-feldspar were used for thermometers.

Discussion and conclusion

Ascertained knowledge of structural state of K-feldspars of granitoids from the Strážovské vrchy Mts. permit to presuppose that presence of orthoclases

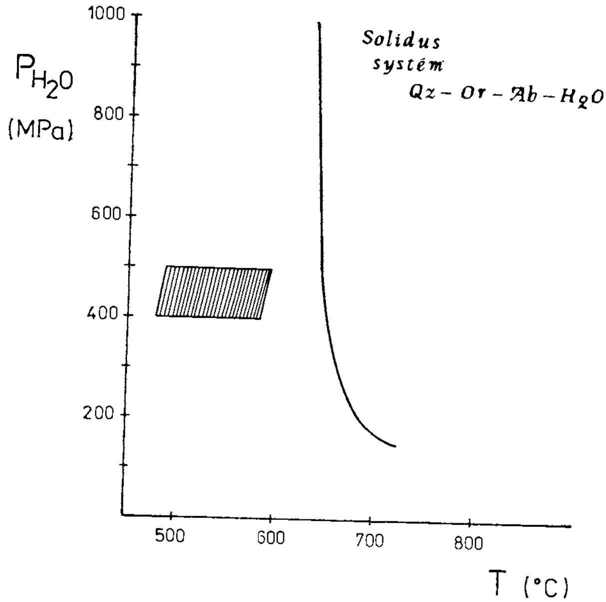

Fig. 14. Area of subsolidus temperatures of coexistence of K-feldspar — plagioclase pair from granitoid rocks of the Strážovské vrchy Mts. Calculated according to G h i o r s o's (1984) two-feldspar thermometer. Solidus curve of Qz-Or-Ab-An-H_2O system is according to J o h a n n e s (1984).

in tonalites (granodiorites) supports the fact that process of ordering started with disordered orthoclase and finished with maximum microcline in granites. During this process an important role was probably played by cooling rate and H_2O content which caused that ordering process stopped in various parts of the bodies at certain stages. These various stages of ordering are reflected in X-ray diffraction patterns of K-feldspars by diffusive reflexes or present reflexes of monoclinic and triclinic symmetry. In case of diffusive 131 reflex, it is probably only partial triclinization of monoclinic feldspar. Presence of the both modifications in individual K-feldspar grains is quite frequent (M a c K e n-z i e, 1954; W r i g h t, 1964; C r o s b y, 1971) and it refers to structural heterogeneity of feldspar composed of submicroscopic blocks of monoclinic and triclinic symmetry (E g g l e t o n — B u s e c k, 1980; M e l n i k o v — S h u n k o, 1988). In such cases, triclinic modification was described by the above authors as intermediate microcline usually with variable structural state; monoclinic modification — as orthoclase. Refined parameters of these intermediate microclines give, with small exceptions, sum $T_10 + T_1m > 0.80$. Lack of intermediate microclines with $T_10 + T_1m < 0.80$ and presence of monoclinic and triclinic symmetry in individual K-feldspar grains are in accordance with discontinuous character of transformation (C h e r r y — T r e m b a t h, 1979). Orthoclases present in the studied granitoids are marked by high ordering ($2T_1 = 0.7750$—0.9300) which is close to the ordering of high and intermediate microclines ($2T_1 = 0.8200$—0.9400). Such high ordering may prove also slow cooling of the both massifs. Therefore, it may be stated that there are not striking differences between the studied K-feldspars of individual granitoid types from the both crystalline massifs. Particular difference was found only in anomalous character of K-feldspars (K-feldspars of granitoids from Suchý massif are more anomalous) which is caused by strain of their structure raised by their perthitic character (Stewart — Wright, 1974).

Temperatures obtained by Ghiorso's (1984) two-feldspar thermometer give information on subsolidus temperatures in spite of the fact that the ternary model taking into account K effects in plagioclase and Ca in K-feldspar is concerned. Bohlen — Lindsley (1987) state that this model is not quite correct, because it presupposes much more limited ternary solution than that which is observed in some rocks and experiments. Therefore, it will be more proper to use revised ternary model introduced by Fuhrman — Lindsley (1988). Its great advantage is that it enables to calculate three temperatures (for each component) providing thus a sensitive test of feldspar pair equilibrium.

It is sure that calculated temperatures ranging from 460 to 593 °C for feldspar pairs of granitoids from the both massifs cannot represent crystallization temperatures. They correspond to the temperatures at which certain exchange of components between feldspars took place finally. This fact is supported by processes of replacement of plagioclases by K-feldspar in all studied granitoid types from the both massifs. The mentioned temperatures prove also the fact that the studied feldspars are not in equilibrium. Their high ordering and perthitic character are manifestations of plutonic environment where structure and composition of feldspars changed even after solidifying of the rock.

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Appendix I

Chemical composition of K-feldspars of granitoids from the Strážovské vrchy Mts.

	V-21 granite		V-50 granite			V-1 granodiorite				
	1*	2*	3	4	5	6	7	8	9	10
SiO_2	65.11	65.12	64.27	64.64	64.24	64.62	64.52	64.41	64.62	64.50
Al_2O_3	18.17	18.17	19.12	19.12	19.03	19.09	18.97	18.75	19.02	19.01
FeO	—	—	0.06	0.02	0.05	0.04	0.10	0.07	0.09	0.10
CaO	—	—	0.06	0.13	0.07	0.10	0.16	0.20	0.19	0.19
Na_2O	0.48	0.65	1.12	1.59	1.00	1.69	1.72	1.31	1.89	1.74
K_2O	16.22	16.02	15.81	15.23	15.99	15.50	15.24	16.02	14.81	15.27
Total	99.98	99.96	100.44	100.73	100.38	101.04	100.71	100.76	100.62	100.81
Si	3.008	3.007	2.961	2.964	2.964	2.960	2.963	2.936	2.964	2.960
Al	0.989	0.989	1.038	1.033	1.035	1.031	1.027	1.061	1.028	1.028
Fe	0	0	0.002	0.001	0.002	0.001	0.004	0.003	0.003	0.004
Ca	0	0	0.003	0.006	0.003	0.005	0.008	0.010	0.009	0.009
Na	0.043	0.058	0.100	0.141	0.089	0.150	0.153	0.116	0.168	0.155
K	0.956	0.945	0.929	0.891	0.941	0.906	0.893	0.932	0.866	0.894
Or	95.7	94.2	90.0	85.8	91.1	85.4	84.7	88.1	83.0	84.5
Ab	4.3	5.8	9.7	13.6	8.6	14.1	14.5	11.0	16.1	14.7
An	0	0	0.3	0.6	0.3	0.5	0.8	0.9	0.9	0.9

1st continuation of App. I

	V-18 granodiorite					V-5 tonalite		V-9 tonalite	
	11	12	13	14	15	16*	17*	18*	19*
SiO_2	64.51	64.70	64.70	64.60	64.44	63.48	63.22	65.08	64.53
Al_2O_3	19.10	18.81	19.10	18.92	18.93	18.67	18.69	18.46	18.54
FeO	—	—	—	—	—	—	—	0.02	0.02
CaO	0.06	0.16	0.08	0.13	0.57	—	—	0.04	0.03
Na_2O	1.88	1.85	1.66	2.06	1.76	0.28	0.52	0.89	0.89
K_2O	14.75	15.45	14.84	14.79	15.33	14.87	14.90	16.38	16.81
BaO	—	—	—	—	—	2.66	2.58	—	—
Total	100.30	100.97	100.38	100.50	101.03	99.96	99.91	100.87	100.82
Si	2.963	2.967	2.969	2.966	2.929	2.992	2.984	2.989	2.976
Al	1.036	1.016	1.033	1.024	1.062	1.037	1.040	0.999	1.008
Fe	0	0	0	0	0	0	0	0.001	0.001
Ca	0.003	0.008	0.004	0.006	0.028	0	0	0.002	0.002
Na	0.168	0.164	0.148	0.183	0.155	0.026	0.048	0.079	0.079
K	0.866	0.904	0.869	0.866	0.889	0.894	0.897	0.960	0.989
Or	83.5	84.0	85.1	82.1	82.9	97.2	94.9	92.2	92.4
Ab	16.2	15.2	14.5	17.3	14.5	2.8	5.1	7.6	7.4
An	0.3	0.7	0.4	0.6	2.6	0	0	0.2	0.2

2nd continuation of App. 1

	V-13 tonalite		V-22 granite			V-35 granodiorite		V-40 granodiorite	
	20	21	22	23	24	25	26	27*	28*
SiO_2	64.48	64.44	64.38	64.34	64.85	63.12	63.21	63.68	63.78
Al_2O_3	18.92	18.68	19.26	18.90	18.95	19.18	19.21	18.77	18.63
FeO	0.01	—	0.02	0.01	0.01	—	—	—	—
CaO	0.06	0.05	0.02	0.04	0.27	—	—	—	—
Na_2O	1.49	0.72	1.42	1.22	2.51	2.12	1.43	0.83	0.09
K_2O	15.19	16.02	15.23	16.02	13.93	14.58	15.15	14.98	16.25
BaO	—	—	—	—	—	—	—	1.54	1.16
Total	100.15	99.87	100.33	100.53	100.52	99.00	99.00	99.80	99.91
Si	2.971	2.982	2.961	2.966	2.968	2.914	2.920	2.981	2.984
Al	1.028	1.019	1.044	1.027	1.022	1.098	1.100	1.036	1.027
Fe	0	0	0.001	0	0	0	0	0	0
Ca	0.003	0.002	0.001	0.002	0.013	0	0	0	0
Na	0.133	0.065	0.127	0.109	0.223	0.190	0.128	0.075	0.008
K	0.893	0.946	0.894	0.942	0.813	0.859	0.893	0.894	0.970
Or	86.8	93.4	87.5	89.5	77.5	81.9	87.5	92.3	99.18
Ab	12.9	6.4	12.4	10.4	21.3	18.1	12.5	7.7	0.82
An	0.3	0.2	0.1	0.2	1.2	0	0	0	0

3rd continuation of App. I

	V-41 tonalite			SR-5 tonalite			
	29	30	31	32*	33*	34*	35*
SiO_2	63.68	65.04	64.19	63.58	63.82	63.85	63.61
Al_2O_3	19.13	18.47	19.55	18.66	18.58	18.66	18.64
FeO	0.01	0.03	0.01	—	—	—	—
CaO	0.05	0.05	0.16	—	—	—	—
Na_2O	1.94	1.51	1.99	0.08	0.17	0.40	0.13
K_2O	14.55	14.84	14.59	16.15	16.13	15.89	16.24
BaO	—	—	—	1.53	1.30	1.20	1.38
Total	99.36	99.94	100.49	100.00	100.00	100.00	100.00
Si	2.955	2.995	2.945	2.982	2.986	2.983	2.981
Al	1.046	1.002	1.057	1.031	1.025	1.027	1.030
Fe	0.001	0.001	0	0	0	0	0
Ca	0.003	0.003	0.008	0	0	0	0
Na	0.174	0.135	0.177	0.007	0.015	0.036	0.011
K	0.861	0.872	0.854	0.966	0.963	0.947	0.971
Or	82.9	86.3	82.2	99.28	98.47	96.34	98.87
Ab	16.8	13.3	17.0	0.72	1.53	3.66	1.13
An	0.3	0.3	0.8	0	0	0	0

Note: Structural formulae calculated on the basis of 8 oxygens; *focused analysis.

Appendix II

Chemical composition of plagioclases of granitoids from the Strážovské vrchy Mts.

	V-50		V-1				V-18		V-5	
	1	2	3	4	5	6	7	8	9	10
SiO_2	63.27	64.94	62.56	62.29	62.45	62.76	63.35	62.94	62.27	63.00
Al_2O_3	22.84	21.60	23.73	23.68	23.41	23.47	22.91	22.66	25.76	25.29
FeO	0.07	0.05	0.09	0	0	0.03	0.02	0.03	0	0
CaO	3.52	2.42	4.37	4.30	4.59	4.30	3.60	3.94	6.56	5.94
Na_2O	9.91	10.63	9.75	9.09	9.33	9.56	9.13	8.70	5.16	5.54
K_2O	0.28	0.44	0.47	0.35	0.28	0.60	0.42	0.59	0.25	0.26
Total	99.90	100.09	100.97	99.71	100.06	100.72	99.43	98.86	100.00	100.03
Si	2.803	2.866	2.756	2.767	2.769	2.769	2.813	2.813	2.733	2.760
Al	1.193	1.124	1.232	1.240	1.223	1.221	1.199	1.194	1.333	1.306
Fe	0.003	0.002	0.003	0	0	0.001	0.001	0.001	0	0
Ca	0.167	0.114	0.206	0.205	0.218	0.203	0.171	0.189	0.308	0.279
Na	0.852	0.908	0.833	0.783	0.802	0.818	0.786	0.754	0.439	0.471
K	0.016	0.025	0.026	0.020	0.016	0.034	0.024	0.033	0.014	0.015
Or	1.5	2.4	2.4	2.0	1.5	3.2	2.4	3.4	1.8	2.0
Ab	82.3	86.7	78.2	77.7	77.4	77.5	80.1	77.3	57.7	61.6
An	16.1	10.9	19.3	20.3	21.0	19.2	17.4	17.5	40.5	36.5

1st continuation of App. II

	V-13		V-22			V-35		V-40	
	11	12	13	14	15	16	17	18	19
SiO_2	61.29	62.38	61.94	64.72	64.21	64.20	64.60	61.60	62.10
Al_2O_3	24.34	23.47	22.28	21.99	22.15	22.53	22.21	24.17	23.94
FeO	0.04	0.02	0.03	0	0.04	0	0	0	0
CaO	4.94	4.53	3.36	2.51	2.60	3.11	3.15	5.60	5.22
Na_2O	8.97	9.01	9.67	9.83	10.34	9.99	9.97	8.58	8.73
K_2O	0.49	0.54	0.33	0.32	0.19	0.17	0.07	0.05	0.01
Total	100.07	99.95	97.61	99.37	99.53	100.00	100.00	100.00	100.00
Si	2.725	2.782	2.834	2.866	2.846	2.832	2.847	2.734	2.751
Al	1.275	1.204	1.164	1.146	1.155	1.171	1.153	1.264	1.250
Fe	0.001	0.001	0.001	0	0.001	0	0	0	0
Ca	0.235	0.220	0.160	0.119	0.123	0.147	0.149	0.266	0.248
Na	0.773	0.790	0.831	0.844	0.887	0.854	0.852	0.738	0.750
K	0.028	0.031	0.019	0.018	0.011	0.010	0.004	0.003	0.001
Or	2.7	3.0	1.9	1.8	1.1	1.0	0.4	0.3	0.1
Ab	74.6	75.9	82.3	86.0	86.9	84.5	84.8	73.3	75.1
An	22.7	21.1	15.8	12.1	12.0	14.5	14.8	26.4	24.8

2nd continuation of App. II

	V-41			SR-5		
	20	21	22	23	24	25
SiO_2	64.00	64.36	64.10	61.78	60.88	60.58
Al_2O_3	22.30	22.14	22.24	24.05	24.71	24.89
FeO	0.04	0.05	0.04	0	0	0
CaO	3.36	2.85	4.03	5.44	6.19	6.42
Na_2O	10.06	10.78	9.74	8.62	8.13	8.05
K_2O	0.36	0.35	0.28	0.11	0.09	0.06
Total	100.12	100.53	100.42	100.00	100.00	100.00
Si	2.828	2.835	2.826	2.741	2.706	2.695
Al	1.161	1.149	1.155	1.257	1.294	1.305
Fe	0.002	0.002	0.001	0	0	0
Ca	0.159	0.135	0.190	0.259	0.295	0.306
Na	0.862	0.921	0.832	0.741	0.701	0.690
K	0.020	0.020	0.016	0.006	0.005	0.003
Or	1.9	1.9	1.5	0.6	0.5	0.3
Ab	82.8	85.6	80.1	73.7	70.0	69.1
An	15.3	12.5	18.3	25.7	25.9	30.6

The given chemical analyses of feldspars (Apps. I, II) will be completed in the prepared paper on granitoid rocks from the Strážovské vrchy Mts. by localization, silicate analyses and trace elements analyses of rocks.
Note: Structural formulae calculated on the basis of 8 oxygens; analyses with the sum of 100.00 were carried out by energy-dispersive method (EDAX).