

Petrology

On Genetic Identity of Rkvia and Beretisa Granitoid Intrusives (Dzirula massif)

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(Presented by Academy Member D. Shengelia)

ABSTRACT. In the canyon of the river Dumala, near the village Beretisa granitoids are outcropped by a narrow zone. These rocks were first outlined and studied by the authors. On the basis of geological, mineralogical, petrochemical and geochemical studies we can assume that Beretisa's granitoids and Upper Hercynian generation Rkvia granitoid intrusive located in its western part within 12 km, are absolutely identical and distinguished in Rkvia-Beretisa intrusive complex. © 2007 Bull. Georg. Natl. Acad. Sci.

Key words: granitoid, intrusive, outcrops.

Dzirula massif is one of the best studied pre-Alpine units in the Caucasus from the petrological point of view, which has been intensively explored during the last decade [1-4]. However, some controversial issues about its geological structure still exist, including the problem of the genetic identity of Rkvia granitoids and granitoids outcropped in the river Dumala and in its tributaries.

As there is much information on the Rkvia intrusive [4-6], we propose only a short review. The intrusive crosses Upper Proterozoic gneissic quartz diorites and at the same time is overlaid by Upper Paleozoic quartz porphyries, Liassic sediments and Upper Cretaceous and Lower Neogene limestones. The crystallization age of Rkvia intrusive is $352 \pm \text{mln. years}$ (Rb-Sr method), as for the time of its inversion, it is $303 \pm 2 \text{ mln. years}$ ($^{40}\text{Ar}-^{39}\text{Ar}$ method) [4]. The intrusive is obviously of a crust origin, generated as a result of anataxis of Sialic rocks. The geometry of the intrusive shows that injection of magmatic melt was caused by meridional compression subsidence.

After the 12th km of the eastern extension of the Rkvia intrusive, near the village of Beretisa Upper Cretaceous limestones are underlain by granitoids. They are outcropped within canyons of the river Dumala and its left tributary Akhashmula, being represented by narrow zones (strips), with a total area of up to 4 km². This

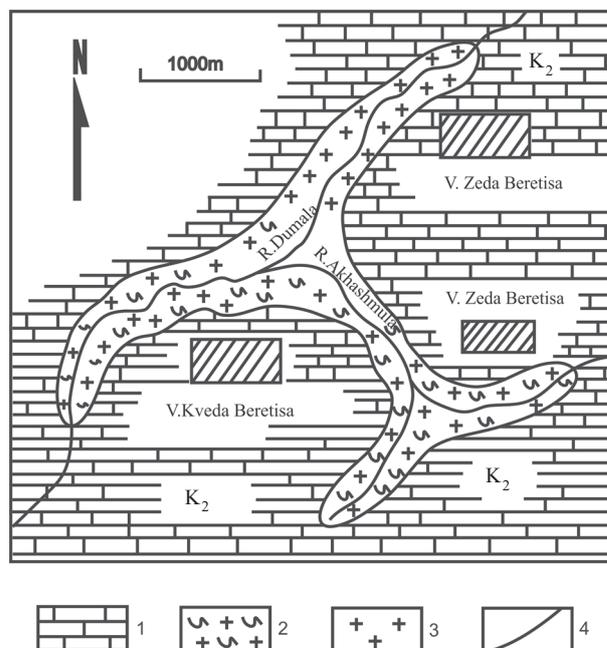


Fig. 1. Sketch of the Beretisa intrusive outcrop. 1. Upper Cretaceous limestone, 2. Late Hercynian microcline granites and pegmatites, 3. Early Hercynian microcline porphyry granites, 4. Geological borders.

Table 1.

Chemical analyses of granitoids of the Beretisa intrusive (mas.%).

Samp.№	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MnO	CaO	MgO	K ₂ O	Na ₂ O	P ₂ O ₅
1-05	72.36	0.19	14.42	2.02	0.41	0.05	0.98	0.32	4.36	3.32	0.02
2-05	73.52	0.15	14.45	2.08	0.50	0.07	0.93	0.37	3.58	3.39	0.01
3-05	75.13	0.18	12.18	1.85	0.30	0.03	1.23	0.46	3.63	3.05	0.02
5-05	71.78	0.19	14.69	2.15	0.57	0.04	0.39	0.37	4.72	3.05	0.06
6-05	73.16	0.15	13.05	1.89	0.40	0.03	0.98	0.28	4.38	3.94	0.02
7-05	74.51	0.01	13.92	0.45	0.08	0.01	0.03	0.10	6.05	3.01	0.06
8-05	76.33	0.03	12.90	0.64	0.20	0.01	0.05	0.14	5.02	3.29	0.04
9-05	77.03	0.18	12.18	1.46	0.40	0.03	0.09	0.38	2.23	3.94	0.04
10-05	72.46	0.24	14.07	2.50	0.22	0.05	1.15	0.20	3.65	3.94	0.03

Samples: 1-05, 2-05, 3-05, 5-05, 6-05, 10-05 –porphyritic granites; samples 7-05, 8-05, 9-05 –pegmatites.

outcrop was for the first time outlined (Fig. 1) and studied by the authors [7].

The investigations carried out showed that by its textural-structural characteristics, petrologic and mineralogical composition, petrochemically, geochemically and according to distribution of the rock types, the outcrop of Beretisa granitoids is absolutely identical with the Rkvia intrusive. It is obviously a fragment of the granitoid intrusive, hence we call it Beretisa intrusive.

The unaltered granitoids of the Rkvia and Beretisa intrusives are of milky-whitish color. As for the altered varieties, K-Na feldspars acquire a pinkish hue, owing to which the whole rock has the same coloring.

The central part of the west edge of the intrusive (cross-section of the river Buja) is built up with porphyritic granites. On both peripheries they are replaced by granitic pegmatites and aplites. In the cross-section of the river Dumala, where only a fragment of the intrusive is outcropped, porphyritic granitoids are substituted by granitic pegmatites and aplites, as in the Buja cross-section.

Both outcrops are alike according to their structural-textural peculiarities. In particular, most of the granitoids are of porphyritic structural generation; where the main mass is represented by medium-grained rocks of massive texture. In both cross-sections porphyritic minerals of the main mass are idiomorphic crystals of K-Na feldspars (3-5 cm). The rock building minerals of the main mass are silicic (acid) plagioclase, K-Na feldspar, quartz and biotite. Secondary minerals are muscovite, sericite, chlorite, epidote

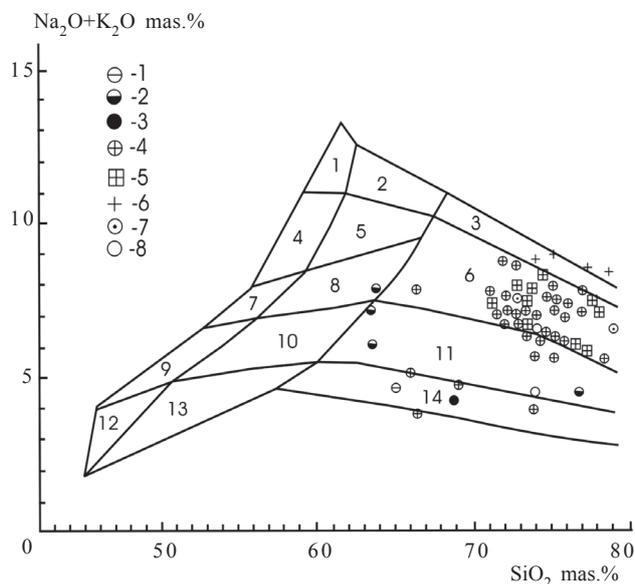


Fig. 2. Rocks of the Rkvia-Beretisa intrusive complex on (Na₂O+K₂O)-SiO₂ discrimination diagram of granitoids (Middlemost, 1985).

Fields: 1. alkali systems; 2. alkali quartz-syenites; 3. alkali granites; 4. syenites; 5. quartz-syenites; 6. granites; 7. monzonites; 8. quartz-monzonites; 9. monzodiorites; 10. quartz-monzodiorites; 11. grano-diorites; 12. gabbros; 13. quartz-diorites.

Symbols: 1. granite-gneisses; 2. migmatites; 3. tonalites; 4. porphyritic granites of Rkvia intrusive; 5. porphyritic granites of Beretisa intrusive; 6. even-grained granites of Rkvia intrusive; 7. aplites; 8. pegmatites.

and caolinite. Accessory minerals are zircon, apatite, sphene, monacite and ilmenite. According to chemical composition, petrochemical parameters and peculiarities of rare elements distribution, both intrusives are almost the same. In the $(\text{Na}_2\text{O}+\text{K}_2\text{O})\text{-SiO}_2$ discrimination diagram the figured points of the rocks of Rkvia and Beretisa intrusive are distributed in the same field of normal granites (Fig. 2).

According to the peculiarities of distribution of rare elements, both intrusives are identical. For example, they have higher concentration of Ni, Co, Cr, Hf, Ta, Sn, Th

and U in comparison with the Clarke concentration. As to Cu, Mo, Pb, Rb, Li, Sr, Y, Nd, Ga and V contents, they are within normal [7].

Thus the Rkvia and Beretisa intrusives are geologically, petrologically, mineralogically, petrochemically and geochemically absolutely identical. From the viewpoint of their distribution in space, they may be considered as different manifestations of the whole protolithic and tectono-magmatic activity. This gives ground to identify the Rkvia-Beretisa intrusive complex as a separate unit.

პეტროლოგია

რკვიისა და ბერეთისას გრანიტოიდული ინტრუზიების გენეტიური იდენტურობის შესახებ (ძირულის კრისტალური მასივი)

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