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RODINGITE-LIKE PARAGENESIS IN SERPENTINITES FROM JORDANÓW (LOWER SILESIA, POLAND)

BY

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The occurrences of basic and ultrabasic rocks in Lower Silesia are mainly confined to the central Sudetes, to the margin of the Sowie Góry crystalline massif. As regards their abundance, the most important are serpentinites which occur primarily along the northern margin of the Sowie Góry gneisses near Sobótka. Their isolated occurrences have also been noted further south of Sobótka, in the vicinity of Zabkowice Slaskie. In the area of Sobótka the serpentinites are accompanied by such basic and ultrabasic rocks as dunite, peridotite, websterite, pyroxenite and intensely saussuritized gabbro. The ultrabasic rocks appear as more or less altered intercalations and lenses in serpentinites. The serpentinites in question are considered to be the products of alteration of the above-mentioned ultrabasic rocks.

The serpentinites are crosscut in several places by thin veinlets of aplitic rock (Weisstein) which are best exposed in a serpentinite quarry near Jordanów. They are accompanied by abundant calcium silicates, which will be discussed in a further passage of this paper.

The principal constituents of the serpentinites from Jordanów are antigorite and chrysotile, accompanied by subordinate lizardite. Chlorite, tremolite and actinolite, dolomite, iron oxides and chromite appear as admixtures. The aplitic veins are made up mainly of quartz and albite.

Adjacent to the aplitic veins in Jordanów are irregular zones of leucocratic rocks, extending up to several dozen metres. The rocks in question consist almost entirely of iron-poor silicates and are also accompanied by nephrite.

The silicates of the leucocratic zone of alteration in Jordanów are represented by diopside, zoisite, clinozoisite, grossular, chromium hydrogrossular, vesuvianite, prehnite, pumpellyite, desmine, tremolite, actinolite, talc, vermiculite, clinochlore, saponite, hyalite, and others (Heflik 1967, Heflik and Zabiński 1965, 1969). Calcium silicates are positively the most abundant. Some of them form larger concentrations

in the nature of rocks, e.g. grossular-vesuvianitic, quartz-zoisitic, diopside-tremolite-clinozoisitic, actinolitic rock. In places, particulartly in zones of intense nephritization of serpentinites, tremolite has also been found to form veins. Some of these minerals, however, have only been encountered in insignificant amounts. The calcium content in the leucocratic rocks in question is very high, exceeding in places, e.g. in grossular-vesuvianitic rock, 30 wt.-% of CaO. A feature deserving note is that grossular itself is an exceptionally pure variety of a composition slightly deviating from the stoichiometric (Heflik and Zabiński 1965).

From the mode of occurrence of the minerals of the leucocratic zone it appears that at least some of them own their origin to metasomatic processes. An illustrative case is the replacement of grossular by vesuvianite, well visible in thin sections.

A peculiar rock reported from the leucocratic zone in Jordanów is nephrite. It occurs in the form of irregular lenses, usually adjoining the diopside-tremolite rock. Macroscopically, it is dark-green in colour. It is made up of minerals of the tremolite-actinolite series, with the prevalance of tremolite. It is one of the few nephrite occurrences in Europe, and the first discovered. The nephrite from Jordanów is also the finest and most typical, as regards its mineralogical and petrographic nature, specimen reported from Europe, similar to classical nephrite varieties from Siberian deposits. CaO content in the nephrite from Jordanów amounts to 13 wt.%, at a relatively low percentage of iron (almost exclusively Fe^{2+}).

From the above data it appears that the leucocratic rocks from Jordanów show marked enrichment in calcium. Both this fact and the paragenetic assemblage of silicate minerals present in the leucocratic rocks permit one to regard them as rocks approximating in the mineralogical-petrographical nature to rodingites. Particularly similar to the latter are those parts of the leucocratic zone in which rocks rich in grossular, vesuvianite and diopside are quantitatively predominant. In places, rocks made up almost entirely of grossular have been encountered.

The mineral paragenesis of the leucocratic zone of alteration from Jordanów is not the only one of this type in the area of Sobótka. A nearly identical paragenesis, yet developed on a considerably smaller scale, has been found within altered serpentinites at Nasławice (about 1.5 km north of Jordanów), where it is accompanied by small amounts of nephrite and a great many noble varieties of serpentinites (developed as ornamental stones) enriched in minerals of the tremolite-actinolite group. Their presence testifies to the local metasomatic enrichment in calcium. Several of the discussed minerals have also been found in the altered gabbro of Sobótka. They are, e.g., minerals of the epidote group, clinozoisite, vesuvianite, tremolite, actinolite, as well as albite and quartz, i.e. minerals uncommon in gabbro rocks. It is feasible that residual post-gabbroic solutions high in calcium were involved in their origin. A part of calcium could have been released from the primary gabbro minerals (monoclinic pyroxenes and basic plagioclases) during the rock alteration.

Studies of the leucocratic zones enriched in calcium, occurring in the serpentinites near Jordanów, led the present authors to believe that also typical rodingites might be present in the Lower Silesian serpentinite massifs. This presumption was confirmed by Majerowicz (1979), who reported rodingite-like rocks from the Gogołow-Jordanów serpentinite massif.

In the light of investigations carried out to-date, the genesis of rodingites is still controversial. At most localities they occur in serpentinites, in the vicinity of gabbro intrusions and leucocratic rocks always enriched in calcium. The same geological situation is in Jordanów, from which it can be inferred that rodingites are here the products of hydrothermal metasomatism associated with gabbro intrusions. The evidence suggesting both the action of post-gabbroic products on the ultrabasic rocks occurring in the area of Sobótka and Jordanów and a gradual drop in their crystallization temperature is provided by some minerals, e.g. diopside and zoisite, characteristic of the initial stage of crystallization in the process of leucocratization of the rocks in question, or zeolites and opal, typical of the final stage of this process. Numerous cracks and fissures that formed in the ultrabasic rocks during respective stages of intrusion were largely responsible for the zonal and local action of post-gabbroic products. The gradual change in concentration of individual components in the solutions of different ionic potentials led to metasomatic activity which resulted, e.g. in metasomatic replacement of grossular by vesuvianite. The mineralogical composition of the country host rocks played a significant part in the genesis of the products of metasomatism. The high CaO content in the leucocratic rocks of the alteration zone of Jordanów can be accounted for by the supply of calcium from beyond the basic rock massif of Sobótka, the remobilization of CaO during the serpentinization of ultrabasic rocks, or else by the abundance of calcium in the final products of differentiation of gabbroic magma. The latter explanation seems to be the most plausible, the more so as a similar hypothesis was already advanced by Gaweł (1957). Basing on P. Niggli's differentiation diagram, this author deduced a genetic relation between some hydrated calcium silicates (mainly zoisite) occurring in the area in question and the final products of activity of the gabbroic magma of Sobótka.

REFERENCES

GAWEŁ, A. (1957). Nephrite from Jordanów in Lower Silesia (in Polish). *Przeglad Geologiczny*, 7.

HEFLIK, W. (1967). Mineralogical and petrographic investigation of the leucocratic altered zone of Jordanów (Lower Silesia) (in Polish). *Prace Mineralogiczne* 10.

HEFLIK, W. and W. ZABIŃSKI (1965). Grossular from Jordanów near Sobótka (Lower Silesia). *Bull. Acad. Pol. Sci. Sér. Sci. Géol. Géogr.*, 13.

HEFLIK, W. and W. ZABIŃSKI (1969). A chromian hydrogrossular from Jordanów, Lower Silesia, Poland. *Miner. Mag.* 37, 286, 241-243.

MAJEROWICZ, A. (1979). Occurrence of rodingites in serpentinitic massif Gogołow-Jordanów (in Polish). *Przeglad Geologiczny*, 1.