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Minerály coronaditové skupiny z Třebíče - Boroviny a Řípova (Morava, Česká republika)

Minerals of the coronadite group from Třebíč - Borovina and Řípov (Moravia, Czech Republic)

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Abstract

Localities Třebíč - Borovina (GPS N 49° 12.400‘ E 015° 51.280‘) and nearby Řípov (N 49° 12.700‘ E 015° 50.850‘) are known since 19th century. They represent variegated residual rocks originated during Tertiary? weathering of marbles, dolomite marbles, calcic and magnesian skarns, quartzites and hornblendites intersected by aplites and granitic pegmatites. These rocks enveloped by the biotite gneisses and migmatites close to the contact with the Třebíč Pluton belong to the Moldanubian Zone of the Bohemian Massif. In the past, there was a short-time production of Fe-ore from the weathering zone at Třebíč - Borovina, as well as production of mineral raw-material for brickworks. Since the localities are inaccessible for a long time, we investigated 11 mineral samples of manganese oxidic minerals deposited in the museum collections (Museum Vysočina Třebíč, National Museum in Prague - Natural History Museum, Museum of the South-eastern Moravia in Zlín): 10 from Borovina and 1 from Řípov, labeled as pyrolusite, *psilomelane*, and *wad*. They usually form botryoidal black aggregates up to 20 cm in size. Powder X-ray diffraction proved the presence of the coronadite group minerals, accompanied by birnessite (one sample), kaolinite, quartz, gypsum, and minerals of the spinel and chlorite groups. Unit-cell parameters of the coronadite group minerals range as follows: a = 9.750 - 9.939 Å, b = 2.851 - 2.869 Å, c = 9.840 - 10.024 Å, and β = 88.66 - 90.77° (for the monoclinic space group 2/m). Scanning electron microscopy showed the botryoidal texture, where at least part of the zoning visible in back-scattered electrons is in fact the result of density of the mineral aggregate, alternating from massive to fibrous, sometimes with the atol microstructure. Empirical average mineral formulae, based on WDS analyses, are: hollandite from Borovina $(Ba^{2+}_{0.40}Ca^{2+}_{0.16}Mg^{2+}_{0.13}Cu^{2+}_{0.03}Zn^{2+}_{0.02}Pb^{2+}_{0.01}K^{+}_{0.18}Na^{+}_{0.04})_{\Sigma 0.98}[(Mn^{4+}_{5.90}Si^{4+}_{0.06}P^{5+}_{0.04})_{\Sigma 6.00}(Mn_{1.77}Fe_{0.20}Al_{0.11})^{3+}_{\Sigma 2.07}]_{\Sigma 8.07}O_{16}$, cryptomelane from Borovina $(K^{+}_{0.51}Na^{+}_{0.04}Ba^{2+}_{0.20}Ca^{2+}_{0.09}Zn^{2+}_{0.05}Cu^{2+}_{0.03}Mg^{2+}_{0.02}Pb^{2+}_{0.02}Co^{2+}_{0.01})_{\Sigma 0.97}[(Mn^{4+}_{6.91}Si^{4+}_{0.03}P^{5+}_{0.06})_{\Sigma 7.00}(Mn_{0.72}Fe_{0.07}Al_{0.06})^{3+}_{\Sigma 0.85}]_{\Sigma 7.85}O_{16}$, and cryptomelane from Řípov $(K^{+}_{0.66}Na^{+}_{0.03}Ba^{2+}_{0.14}Ca^{2+}_{0.04}Zn^{2+}_{0.03}Cu^{2+}_{0.01})_{\Sigma 0.92}[(Mn^{4+}_{6.88}Si^{4+}_{0.03}P^{5+}_{0.09})_{\Sigma 7.00}(Mn_{0.77}Al_{0.11}Fe_{0.04})^{3+}_{\Sigma 0.93}]_{\Sigma 7.93}O_{16}$. Most significant are substitutions $Al^{3+} \rightarrow Mn^{3+}_{-1}$ and $Fe^{3+} \rightarrow Al^{3+}_{-1}$ at the M^{3+} site, also $Mg^{2+} \rightarrow Ba^{2+}_{-1}$ and $Ca^{2+} \rightarrow Ba^{2+}_{-1}$ at the A^{2+} site in hollandite. Accessory minerals - baddeleyite and probable xenotime-(Y), present in the hollandite and cryptomelane aggregates, were identified only by EDS analyses.

Key words: *Mn oxides, cryptomelane, hollandite, magnesian skarn, Moldanubian Zone, Czech Republic*

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