Ultrabasic Rocks of the Staré Město Crystalline Complex - their Structural Position and Petrology

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The results based on the new geological mapping of the Staré Město Crystalline Unit, on relevant geophysical data and on a detailed petrological study of spinel-bearing ultrabasic rocks and of their derivatives support in many aspects the ideas of the multi-stage collisions of the microcontinents. The tectonic individualisation of rigid ultrabasic bodies, their fast uplifting and dismembering under gradually decreasing pressure and temperature show the main features of their history. Before the first (Cadomian?) squeezing through the complex of prevailingly volcano-sedimentary origin the ultrabasic bodies experienced metamorphism in granulite and eclogite facies conditions together with other lithologies which are preserved as numerous kinematically reworked relics. New geological maps show that ultrabasic bodies of the Staré Město Crystalline Complex separate quite sharply the older gneiss unit from the younger metavolcanic rocks of different origin: the first one being represented by a banded amphibolite - metakeratofyre unit, the other one - probably older - by retrogressive garnet amphibolites, derived from eclogites (e.g. in the Nýznerov Unit).

The ultrabasic rocks went through a multi-stage and complex set of metamorphic events, including the metasomatic ones. The process of serpentinisation, which may be traced in the transition between lherzolites and metagabbros started the rodingitisation of the alpine type, beginning on an ocean floor in the interaction with sea water. Some data show that this process has been repeating several times until young Variscan tectonics and intrusion of the marginal Variscan granites took place. The Variscan processes led to retrogressive changes of the ultrabasic rocks, reactions in rodingites resulting finally in rodingitic pegmatites containing amazonite and some specific minerals.

The ultrabasic rocks, rodingites, amphibolites and metakeratophyres of the Staré Město Crystalline Complex show anomalously high to very high magnetic susceptibilities. In serpentinised ultrabasic rocks, abundant new magnetite was produced during the process of olivine serpentinisation. Consequently, the magnetic susceptibility of these rocks is controlled by the intensity of serpentinisation and by the amount of pyroxene. Magnetite has undergone a low temperature oxidisation. In rodingites, the susceptibility show a correlation with the FeO content and with the amount of dark minerals; the carrier of susceptibility being oxidised magnetite. In amphibolites and metakeratophyres, the magnetite forms schlieren present only in certain layers, and its presence is rather controlled by the original substrate than by the metamorphic conditions.

Geophysical maps, having been compared with the new petrogenetic data, enable to trace the continuation of the deep pre-Variscan suture with ultrabasics rimming unequally the Orlice-Kladsko Dome on both sides.

Contrasting PT Evolution of Eclogite and Metapelites in the Northern Termination of the Svratka Dome (Moravian Domain of the Bohemian Massif)

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Metabasites containing relics of eclogite-facies assemblage were found in garnetiferous mica schists situated between the northern termination of the Svratka dome and the Letovice metaophiolites. Minimum pressure conditions of 9 kbars at temperatures of 530 - 550°C were followed by an amphibolite facies stage marked by a significant temperature increase up to 680°C. This meta-eclogite boudin is juxtaposed to metapelite containing Fe-rich chloritoid and Fe-rich staurolite preserved as inclusions in garnet porphyroblasts that indicate early PT conditions of 570°C at pressures of 6 - 7 kbars. The matrix assemblage shows a pressure and temperature increase up to 640 - 680°C at pressures of 6.5 - 9 kbars. PT paths of both metapelite and retrograde eclogite converge at peak temperature conditions. Their PT evolution is not consistent with that observed in typical Moldanubian eclogites and is explained by contrasting burial and exhumational tectonics of both types of lithologies during "A-type subduction" of the Brunovistulian foreland below the Moldanubian domain.