# Eclogites and Ultramafic Rocks from Polná, Strážek Moldanubicum, Moravia, Czech Republic

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This work was undertaken on the base of the contract between GEAM Dolní Rožínka (N° 14/95 PGP) and CGS Praha (N° 5559) in years 1995-6. The petrology and mineral chemistry of a suite of *retrograded eclogites, pyroxene hornblendites, peridotites* and *granulite* from prospecting bore-holes, drilled during the 80-thies by the former prospecting organisation Uranový průzkum Liberec, závod Dolní Rožínka, have been investigated. The bore-holes (Pl-70, 75, 77, 80, 81, 94, 136, 197) are situated in a small area 0.5-1 km NNW of Polná between the Jamenský potok valley and the road from Polná to Věžnice. Geologically, the area belongs to the Strážek Moldanubicum (Varied Group). The rocks studied are intercalated with amphibolite-grade metamorphites, mainly gneisses and migmatites along with minor amphibolites, marbles, skarns and quartzites as layers of variable thickness (metres to tens of metres). Many small intrusions of granitoids and pegmatites occur. The boreholes are situated onto the Přibyslav Mylonite Zone, which strongly modifies the geological pattern.

All *eclogitic rocks* studied (5 samples) are strongly retrogressed. Primary eclogitic minerals, omphacite (24 and 31 mol.% of jadeite), pargasite, albite-rich plagioclase and rutile are preserved along with quartz as inclusions in garnet porphyroblasts. Groundmass minerals are represented by variable portions of the Na-poor clinopyroxene-plagioclase symplectite, diablastic amphibole-plagioclase aggregate, porphyroblastic amphibole, plagioclase, and minor quartz. Ilmenite, titanite, rutile, apatite, K-feldspar, and clinozoisite are accessory. Garnet margins are rimmed by radiating kelyphite of amphibole and plagioclase. Based on mineral composition, two distinct types of eclogites were recognised. Molar compositions of garnets of "A" type (4 samples) range between 42-50 % Alm, 19-31 % Pyr, 16-30 % Grs, and 0.X-3.3 Sps. Mg-richer eclogite of "B" type (1 sample) is poorer in plagioclase, richer in mafic minerals than the "A" type, and also chemical composition of garnet is different (Alm 36-41.5, Pyr 37-44, Grs 18-21.5, Sps 0.8-1.6, all in mol.%). Zoning profiles are flat or prograde with increasing Mg and decreasing Fe from core towards margin. One sample displayed a slightly complicated zonal pattern with initially increasing Ca and decreasing Mg and Fe, but finally Mg grows at the expense of Ca and Fe.

*Olivine-free ultramafic rocks* (pyroxene hornblendites) form a fine-to medium-grained uniform mosaic of subhedral brown amphibole (mostly magnesiohornblende to edenite, Si=6.2-7.2, $X_{Mg}$=0.75-0.8, $(Na+K)_A$=0.22-0.76), prevailing over light-green anhedral clinopyroxene ($X_{Mg}$=0.8-0.9, Jd=0.6-12 mol.%). Accessory minerals are rutile, titanite, spinel, Mg-ilmenite, apatite, pyrite and rare plagioclase. Four samples studied are garnet-free or contain garnet as a rare accessory, one sample is garnetiferous. The latter forms about 2 cm thick, sharply bound layer of medium-grained garnetiferous pyroxene hornblendite (with about 10 vol.% of garnet) in fine-grained garnet-free pyroxene hornblendite. Molar composition of garnet shows the following variation: 37-44 % Pyr, 36-40 % Alm, 15-17 % Grs, 3-6.5 % Sps, and 0.5-1.4 % Uva. Slightly retrograde zoning (decreasing Mg, Mn increasing towards rim) was observed. Bottle green spinel corresponding to pleonast - picotite ($X_{Mg}$=0.49-0.53) occurs as fine symplectites replacing garnet.

*Olivine-bearing ultramafic rocks* display complicated mineral assemblages resulting from various stages of retrogression. Five samples studied represent hornblende-rich, olivine-bearing pyroxenites to lherzolites sometimes with spinel and/or with garnet, one sample is banded harzburgite. The structure of unaltered rock was equigranular, fine- to medium-grained. Primary assemblage includes olivine ($X_{Mg}$=0.8), Na-poor clinopyroxene ($X_{Mg}$=0.8-0-0.9), orthopyroxene (Fe-enstatite to enstatite), garnet (Pyr 48-52, Alm 30-34, Grs 13, Sps 1.1-2.2, Uva 1.9-2.7, mol.%) , spinel (Cr-pleonast) and accessory Mg-ilmenite , pyrrhotite and Ni-pyrrhotite. Gradual destabilisation under lower pressure conditions connected with increasing fluid activity leads initially to the replacement of garnet by Fe-Mg spinel and of pyroxene by common hornblende or tremolite, anthophyllite, and talc, succeeded by Mg-chlorite, serpentine minerals, secondary magnetite and "bastite".

One sample of *garnet granulite* forming a small body within a suite with gneisses and retrograded eclogites was studied. The rock is composed of quartz, plagioclase (7-21 An) K-feldspar, Alm-rich garnet (Pyr 34-40, Grs 11-15, mol.%), Ti-rich phlogopite and kyanite. Graphite, rutile, monazite, zircon are accessory. Garnet includes rutile, phengite (Si=3.3) and calcite.

The suite of the rocks studied represents heterogeneous assemblage resulting from the complex geological development. *Two main metamorphic stages* were recognised: *1. older HT/HP (eclogite facies)* and *2. younger HT/MP (high amphibolite facies).* Geothermobarometric studies indicate equilibration at 780-890 °C and 16-19 Kb for the primary eclogite and granulite assemblages, corresponding to depths of 55-65 km. At this level the rocks were imbricated with the mantle ultrabasics. The uplift was associated to the formation of various secondary mineral assemblages. A penetrative MP overprint transformed eclogites into the garnet amphibolites. The mineral assemblages of interlayered metasediments and retrogressed eclogites indicate pressures of 5-8 Kb and temperatures of 680-740 °C corresponding to the high amphibolite facies metamorphism (sillimanite zone).