

## **Ophiolite from Osielec-Magura Nappe, Outer Carpathians, Poland – a new approach to the problem**

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In the early fifties of 20-th century, in Osielec village located in Beskid Makowski Mts. between towns of Sucha Beskidzka and Jordanów, a block of igneous rock has been discovered in the Magura Nappe. It was studied and described by Wieser (1952) as ophiolite, and in petrologic approach classified as gabbro. New outcrops with large blocks of the discussed igneous rock (Cieszkowski et al. 2010, 2016) were found in Osielec, so detail studies of sedimentary rocks containing gabbro blocks, their tectonic position, their petrological characteristics, as well as studies of gabbro's absolute age have been done.

The Magura Nappe in Osielec (Cieszkowski et al. 2016) consists mainly of the late Cretaceous-Palaeogene deposits represented by the Rača Subunit. There in the lithostratigraphic log of the Osielczyk Thrust-Sheet occur Łabowa Shale Fm. (red beds - Early and Middle Eocene), Pasierbiec Sandstone Fm. (Middle Eocene) and Beloveža Fm. (Middle and Late Eocene). The Pasierbiec Sandstone Fm. consists of thick-bedded sandstones and with occasional intercalations of thick-bedded Łącko Marls, as well as packages of thin-bedded Beloveža-like flysch and red shales. There was also identified olistostrome which is developed as chaotically defragmented sandstone layers with crumpled shales in between and debrites that consists of sandy-gravel matrix with number shaly clasts and pebbles, boulders and blocks of different exotic rocks e.g. granitoids, gabbro, micaceous schists, quartz, limestones, marls, and glauconitic sandstones. Within others there occur large blocks of gabbro, 0,5 m up to 3,5 m in dimension.

Studied gabbro, is a medium grained rock, dark green or green black in colour, showing massive texture. The rock is partly strongly dynamically altered and shows irregular pale green or pale yellow green zones (up to 5 cm thick). These zones consist of neogenic minerals, macroscopically visible, as chlorite, epidote and calcite. Microscopic study of thin section indicates that in dynamically deformed parts of metabasite cataclastic and mylonitic structures are formed. The phenomena of crushing mineral crystals, reduction of their size and abnormal optical properties of rock-forming minerals are observed. In undeformed parts of the rock studied some relics of primary poikiloblastic

structure occur. Plagioclases and amphiboles are the main minerals of the rock studied. Plagioclases are represented by subhedral albite which is characterized by multiple twinning of albite law and undulatory extinction. Central parts of albite crystals are filled by small grains of neogenic minerals: epidote and zoisite. In deformed parts of the rock studied, albite crystals are crushed and strongly altered into aggregates of flakes a white mica. Amphiboles are represented by olive hornblende, showing strong pleochroism from yellow green to olive green in colour. Hornblende tends to form elongated crystals and is altered in various degree. This mineral is partially replaced by aggregates of secondary minerals: epidote, sphene, chlorite and opaque minerals. Accessory minerals, are represented by: apatite, ilmenite and zircon. In some blocks Gabbro rock cut calcite veinlets containing pyrite and chalcopyrite.

The zircon grain have been separate from the rock and tested at the age of absolute. Cathodoluminescence analysis of internal zircon structure revealed a single population with simple one stage growth. We conducted preliminary laser ablation ICPMS U-Pb dating on 10 randomly selected crystals which define mean  $^{206}\text{Pb}$ - $^{238}\text{U}$  age of 601±10 Ma. This age is interpreted as reflecting zircon crystallization during gabbro formation. It means that these igneous rocks formed in Early Proterozoic since the Cadomian Orogeny. These results stop the hopes, according to Wieser's suggestions, discussed gabbro rocks emerged in the Alpine orogenic cycle, and could be remnants of supposed oceanic floor of the Magura Basin.

The source area of the exotic rocks with gabbro fragments, basing of the paleocurrent directions and distribution of lithofacies, were situated towards the north (estimated as southern part of the Silesian Ridge, or more probably of the Grybów Ridge *sensu* Cieszkowski 1992), south from the Bielsko-Biała Dome. It could represented an eastern prolongation of the Brno Massif composed besides of granites and granodiorites also of gabbros (Picha et al. 2006). That was probably also source of chromian spinel found locally within sediments of NE part of the Magura Nappe (Winkler & Ślącza, 1992).

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