

The Dalradian Supergroup of the Scottish Highlands is a largely metasedimentary succession of Neoproterozoic to Early Cambrian age, metamorphosed during the Caledonian Orogeny. The rocks were deposited on the Laurentian margin during and following the break-up of Rodinia. This rift setting is evidenced, in the upper half of the succession, by the presence of several volcanic sequences. A significant development of these volcanic rocks occurs in the NE Grampian Highlands. There, the Blackwater Formation, within the Argyll Group of the Huntly area, is dominated by basic and ultrabasic metavolcanic rocks, with intercalated metasedimentary rocks. The rocks were metamorphosed in the amphibolite facies, with the Mg contents of their dominant amphiboles apparently reflecting those of the whole-rock protoliths. The protoliths ranged from ultrabasic picritic types (MgO up to 35 wt%) through high-magnesia basalts to basaltic andesites and andesites. The magmas feeding the volcanism were of tholeiitic affinity, broadly similar to metavolcanic rocks elsewhere in the Dalradian. Higher-Nb and lower-Nb groups can be distinguished. The inferred parental magmas were basalts with MgO c. 10 wt%. The ultrabasic rocks formed by accumulation of olivine and minor Cr-spinel within the parental basalts. Some more evolved rocks show evidence of minor (5–10 wt%) accumulation of Fe–Ti oxides. Primary magmas of the Blackwater metavolcanic rocks were generated from a mantle source, or sources, relatively enriched compared to the MORB source. It is speculated that all the Dalradian metavolcanic rocks represent varying degrees of mixing of magmas from this source and a depleted, MORB-like, mantle source.