

## **Monchiquite dykes on Machias Seal Island, New Brunswick, Canada**

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A narrow set of thin (<1 m) black fine-grained mafic dykes cross granodiorite on the eastern side of Machias Seal Island (MSI), in the northern Gulf of Maine about 19 km southwest of Grand Manan, New Brunswick. The dykes are near-vertical and trend 15 to 25°E, with about 700 m between exposures. The dyke rock is notably dark and dense, and thin sections reveal abundant small (<0.2 mm) phenocrysts of brown amphibole, augite, and larger euhedral olivine in a matrix of sparse alkali feldspar and analcite (?). The olivine has been completely replaced by chlorite, but other minerals are relatively fresh. Accessory minerals include abundant needle-shaped apatite, magnetite, and cubic pyrite. Another small dyke on the western side of the island is less mafic and consists of fine- to medium-grained plagioclase and clinopyroxene, which is highly altered to saussurite and chlorite, respectively.

Chemical analyses and mineralogy indicate that the eastern dyke is a near-ultramafic monchiquite and similar to some lamprophyric dikes of the New England-Quebec igneous province, the nearest known of which is about 110 km to the SW near Blue Hill in coastal Maine. The freshness of the mineralogy of the MSI mafic dyke (except for olivine) is also typical of the New England-Quebec dykes, which have ages around 110 to 125 Ma (Early Cretaceous). Another NE-trending mafic dyke is visible (but not visited) at North Rock, a small island or ledge exposed a few km north of Machias Seal Island. The other mafic dyke on MSI is likely much older, based on its extensive alteration. The monchiquite dykes may also be analogous with the Triassic lamprophyre dyke at Malpeque Bay on Prince Edward Island, which contains ultramafic or mantle xenoliths. No such xenoliths were observed in the dykes of Machias Seal Island.