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**Field relationships, petrology, and age  
of granitic and syenitic plutons in the  
Antigonish Highlands, Nova Scotia**

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The Antigonish Highlands of Nova Scotia have characteristic features of Avalonia, including Neoproterozoic arc-related volcanic and plutonic rocks and Cambrian-Silurian cover sequences. Also present in the southern part of the highlands are scattered plutons previously inferred to be of Devonian-Carboniferous age. Although contacts are not exposed, these plutons were interpreted to have intruded Neoproterozoic and Silurian volcanic and sedimentary rocks. This project focuses on the field relationships, petrology, age, and tectonic implications of these plutons.

One of the plutons, Hunters Lake, consists of tonalite and minor granodiorite, and is likely to be closely related to quartz diorite of the Neoproterozoic (based on previously determined K-Ar ages) Eden Lake Complex. Such an interpretation is consistent with the lack of contact metamorphism in the surrounding fossiliferous Silurian rocks. Preliminary geochemical analyses show these rocks to be calc-alkaline and formed in a subduction zone setting. The other plutons consist of varying proportions of granitic and syenitic rocks. The granitic rocks include distinctive alkali-feldspar granite and syenogranite with quartz eyes and interstitial granophyric texture indicative of shallow emplacement. Although predominantly subalkalic, samples from three of the plutons (Barneys River, McGraths, and Leadbetter) have chemical characteristics of within-plate granitoid rocks, whereas a fourth pluton, Gunn Lake, has a volcanic-arc granite composition. These plutons overall show fractionated compositions, including high Si ( $\text{SiO}_2 > 71\%$ ), K, Ba, Rb, and Th, and depletion in elements such as P, Ca, and Mg. The predominantly syenitic rocks in the Brora Lake area contain aegirine and in some samples riebeckite, indicative of peralkaline composition. An additional pluton (Haggarts Lake), previously mapped as Neoproterozoic diorite, is also of syenitic composition and related to the Brora Lake pluton. Geochemistry confirms that these plutons are peralkaline and have high concentrations of K, Na, P, Ti, and Fe with an intermediate range in silica content (54–64%  $\text{SiO}_2$ ). Tectonic discrimination diagrams indicate a within-plate setting for these plutons.

An alkali-feldspar granite sample from the Gunn Lake Pluton yielded a preliminary U-Pb (zircon) upper intercept age of about 605 Ma, consistent with the concordant U-Pb (zircon) age of  $610 \pm 3$  Ma reported previously for the petrographically

similar Cape Porcupine Granite at the Strait of Canso. These ages suggest that at least some (and probably all) of the plutons in the southern Antigonish Highlands previously inferred to be Devonian-Carboniferous are of Neoproterozoic age, indicating that such plutons are much more abundant than previously recognized. The recognition of widespread Neoproterozoic peralkaline granite and syenite in the southern highlands is especially significant, as similar rocks also occur in the northern Antigonish Highlands but are not known in Avalonia elsewhere in Maritime Canada.