

# Provenance Studies of Cambrian Sedimentary Rocks in Avalonia, Southern New Brunswick and Cape Breton Island, Nova Scotia, Canada<sup>1</sup>

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Cambrian sedimentary rocks typical of Avalonia occur in the Caledonia terrane of southern New Brunswick and the Mira terrane of Cape Breton Island, Nova Scotia. The lowermost unit in the Saint John area, the Ratcliffe Brook Formation, is the age-equivalent of the Chapel Island Formation in the type area of eastern Newfoundland and likely extends into the Ediacaran Period of the Late Neoproterozoic. The Ratcliffe Brook Formation differs from similar lithologies in the underlying Seeley Beach Formation of the Coldbrook Group (equivalent to the Rencontre Formation of eastern Newfoundland) in containing abundant detrital muscovite and less abundant pyroclastic material. New  $^{40}\text{Ar}/^{39}\text{Ar}$  data for detrital muscovite from the Ratcliffe Brook Formation has a maximum age of ca. 620 Ma, and a minimum age of 550 Ma. The overlying Glen Falls Formation consists of grey to white quartz arenite, equivalent to the Random Formation of eastern Newfoundland, and is overlain by the Hanford Brook Formation, age of which is constrained to late Early Cambrian by fossils and a previously published U-Pb (zircon) age of ca. 511 Ma from an ash horizon. Overlying units extend through the Middle and Late Cambrian and into the Early Ordovician. Laser ablation MC-ICPMS analysis of 100 detrital zircons from the Glen Falls Formation yield a nearly unimodal age population with a peak at ~540 Ma. Subordinate age clusters occur between 600-665 Ma and 1850-2100 Ma, with spot ages also at 750, 1540, 2900, and 3100 Ma. The dominant population age is similar to the previously published U-Pb zircon age of 531 Ma from ash in the upper part of the underlying Ratcliffe Brook Formation. Nd isotopic data indicate that the provenance changed during deposition from more juvenile sources (positive to moderately negative  $\epsilon\text{Ndt}$  values in the Seeley Beach, Ratcliffe Brook, and Glen Falls formations) to more evolved sources ( $\epsilon\text{Ndt}$  values as low as -8.5 from the Late Cambrian part of the sequence). Work is in progress to obtain detrital muscovite and zircon ages from equivalent units in the Mira terrane of Cape Breton Island, and in lithologically similar units in adjacent Ganderian terranes. Although the age and  $\epsilon\text{Ndt}$  data have broad similarities to those from units of the same age in the Meguma terrane, they differ in detail, and a linkage between the two terranes at that time is unlikely.

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