Precambrian rocks of the Avalon Terrane in the Cobequid Highlands, Nova Scotia

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The Cobequid Highlands expose two sequences of Precambrian strata. The older of the two, approximately 800 to 1000 Ma, forms the granitic basement to this part of the Avalon Terrane. It consists of two metamorphic complexes separated by the dextral slip Rockland Brook Fault. The Mt. Thom Complex is exposed north and east of the fault and consists of para- and ortho-gneisses which have been deformed and metamorphosed three times. A whole rock Rb/Sr isochron yielded an age of 934±82 Ma from a granitoid gneiss. The other unit, the Bass River Complex, is located south of the Rockland Brook Fault. Detailed mapping has shown that the complex comprises an amphibolite, granitoid gneiss, and ortho- and para-gneiss unit (Great Village River Gneiss), a quartzitic unit (Gamble Brook Schist), and a dominantly mafic volcanic unit (Folly River Schist). The Great Village River Gneiss is interpreted to be "basement" to the other two, based on a more complex structural, metamorphic, and intrusive history. The quartzitic rocks and volcanic rocks were deposited on the older gneiss, intruded by granite stocks and then the entire complex was deformed by two deformations, with garnet grade of regional metamorphism accompanying the first of these deformations. Garnet-biotite gneisses crop out south of the Cobequid Fault in the Clarke Head Fault Zone 15 km southeast of Parsboro. This occurrence of probable Precambrian rock is interpreted as the southern edge of the Avalon Terrane adjacent to the Minas Geofracture.

The younger Precambrian sequence is dominated by mafic volcanic rocks in two formations: Warwick Mountain Formation in the east and Jeffers Formation in the west. The age of the units is considered to be approximately 600 to 700 Ma. An upper age limit for the Jeffers Formation north of Parsboro is given by the age of the Jeffers Brook Pluton (diorite) which yielded an average of K/Ar mineral dates on biotite and hornblends and a Rb/Sr biotite mineral isochron of approximately 600 Ma. The pluton truncates the recumbent F_1 and upright F_2 deformation events. In the east the Warwick Mountain Formation has the same structural history and probably the same age.

South of the Rockland Brook Fault the McCallum Settlement Pluton (granite) yielded a whole rock Rb/Sr age of 575±22 Ma and intruded the mafic volcanic rocks of the Bass River Complex. West of this pluton is the Debert River Pluton (granite) which has yielded a whole rock Rb/Sr isochron of 596±70Ma. This pluton intruded the mafic volcanic rocks of the Bass River Complex, the Frog Lake Pluton (diorite), and a relatively undeformed sedimentary rock succession that had previously been assigned to the Early Carboniferous Nuttby Formation. The two dated plutons are undeformed and the sedimentary succession is probably Late Precambrian.

The older Precambrian rocks of the Bass River Complex are correlatives of the Greenhead Group in Saint John, N.B. and the George River Group in Cape Breton.