

Tectonic significance of the St. Croix Terrane, southwestern New Brunswick

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The St. Croix Terrane in southwestern New Brunswick and adjacent Maine is underlain by the Ordovician Cookson Group. From the base upward, the Cookson Group comprises black pelites of the Calais Formation, wackes of the Woodland Formation, and quartz arenites of the Kendall Mountain Formation. The Digdeguash Formation, previously assigned to the Silurian, is considered to be equivalent to the Woodland Formation on the basis of lithological similarities. The Calais and Kendall Mountain formations, respectively, contain Tremadocian and Caradocian graptolites. Deformed plutons presumably of Early Silurian age (U-Pb dating is in progress), and massive Late Silurian to Early Devonian and Late Devonian plutons intrude the stratigraphic sequence.

The variation in attitude of bedding in the St. Croix Terrane area can be attributed to at least three, approximately co-axial generations of folding. The first and second folds are generally tight and are associated with penetrative, axial planar cleavages, whereas the third folds are open folds or kinks without an

associated penetrative cleavage. Multiple episodes of high-grade metamorphism appear to coincide with the emplacement of various intrusions during distinct stages of structural development.

The compressive structural features within the St. Croix Terrane resulted from continental collision between the Avalon Terrane and North America. This collisional event must have begun after deposition of the continental rise deposits of the Cookson Group, i.e., after the Caradocian (mid-Ordovician). Debris-flow deposition along the St. Croix-Avalon boundary, recorded in the Late Silurian Oak Bay Formation, presumably reflects tectonic uplift at high crustal levels during continental convergence. Low-pressure metamorphism and generation of syn- to post-tectonic, bimodal magmatism in the St. Croix Terrane suggests a relatively slow rate of lithospheric thickening involving both crust and upper mantle. Such a model is consistent with the extended age range (greater than 50 Ma) of plutonism in the region.