Middle to Late Carboniferous movement on the Fredericton Fault, central New Brunswick, Canada

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The Fredericton Fault transects New Brunswick from SW to NE, running below the Pennsylvanian cover of the New Brunswick Platform in the Fredericton area, NE of which its expression is geophysical. Major strike-slip movement is pre-Carboniferous (and probably pre-Devonian), but smaller scale movement controlled small depositional basins during the Visean and late Tournaisian up to the late Visean eruptive episode represented by the Royal Road and Hardwood Ridge basalts and the Cumberland Hill rhyolite/trachyte. The fault trace between Smithfield and Durham Bridge to the SW and NE of Fredericton reveals a complex history of movement affecting Carboniferous strata from Visean to late Pennsylvanian in age. A single fault is not evident and deformation is spread across a broader 'fault zone' in the Carboniferous cover rocks, and Silurian basement. The oldest Carboniferous unit is a redbrown conglomerate/breccia of unknown age, overlain by the upward-fining conglomerate-siltstone/mudstone Shin Formation of late Visean age. The volcanic rocks that top the Shin sequence are only dated in the Cumberland Hill area, and appear to be time-equivalent of the Windsor Group in the Moncton subbasin (ca. 334 Ma: Asbian-Brigantian). Deformation episodes are evidently pre-Shin Formation, and post-Shin Formation/pre-Pennsylvanian.

The mid-Pennsylvanian Minto Formation (Bolsovian) drapes much of the New Brunswick Platform, showing only minor offset along faults that expose the Shin Formation and volcanic rocks as inliers NW of Minto and along the Nashwaak valley. Southwest of Fredericton there is evidence for pre-Bolsovian Pennsylvanian rocks below the Minto Formation – possible Boss Point Formation equivalents (Langsettian) preserved along the line of the Fredericton Fault. The relationship of these rocks with the Minto Formation may be an angular unconformity. This is evidence for movement during early Pennsylvanian time (Duckmantian). Again, displacement occurs over a broad 'fault zone' rather than along a single 'Fredericton Fault'.

Deformation affecting Visean and older rocks and predating the Pennsylvanian formations is consistent with right-lateral strike-slip movement, similar to that noted on the major faults to the southeast. The Pennsylvanian history is more complex. No good kinematic indicators are seen in the pre-Minto Formation units, though this deformation is contemporary with the right-lateral strike-slip history observed on Cape Maringouin. All this history appears to be a reactivation of the Fredericton Fault as a broader movement zone. Post-Minto Formation movement shows no overall trend but seems to be a far-field effect related to the Alleghenian front seen south of Saint John along the coast.

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