
**Structure and petrology of the Partridge Island block and
the tectonic evolution of the Saint John area,
New Brunswick**

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The Partridge Island block is a component of the tectonic terrane collage of the northern Appalachians in the Saint John area, New Brunswick. It comprises crystalline rocks (variously deformed granitic and intermediate rocks) that crop out mainly on Partridge Island, and the adjacent areas

of the mainland around Red Head and Tiners Point. The block impinges on adjacent Carboniferous rocks (Balls Lake Formation) and the problematic Taylors Island–Lorneville assemblage of basaltic lavas and red sandstone-siltstone-mudstone. Detailed petrographic and structural studies have addressed both the primary nature of the rocks of the Partridge Island block, and its relationship to the adjacent Taylors Island–Lorneville assemblage. Geochronological studies have permitted a calibration of this history of intrusion and deformation.

A suite of granitic to dioritic intrusions make up most of the Partridge Island block; they are commonly highly deformed, and include mylonite, blastomylonite, and protomylonite. Around Tiners Point they contain xenolithic enclaves of quartz arenite and siltstone, which may represent the host. One distinctive pluton in this suite, an aegirine-bearing alkali granite of A-type affinity, has yielded a U-Pb zircon age of 346.4 ± 0.7 Ma, whereas muscovite in a mylonitized pluton yielded a $^{40}\text{Ar}/^{39}\text{Ar}$ age of 332 ± 3 Ma. These ages are interpreted as intrusion and uplift/cooling ages, respectively.

Contact relations between the Partridge Island block and adjacent units is commonly faulted, and most of these faults are the vertical strike-slip faults that cross the Saint John area from west-southwest to east-northeast. However, in the Red Head area the crystalline rocks occupy a thrust sheet above red conglomerate-sandstone-mudstone of the mid-Carboniferous Balls Lake Formation. Within the thrust sheet, an unconformable relationship is preserved between the mylonitic Partridge Island igneous rocks and the basalt-red sedimentary Taylors Island–Lorneville assemblage.

The Taylors Island–Lorneville assemblage, variously termed the “Mispec Group”, “Taylors Island Formation” and “Lorneville Group”, has defied direct dating and has been assigned ages ranging from late Precambrian to Carboniferous. However, the unconformable relationship with mylonitic rocks of the Partridge Island block constrains its age to being younger than the uplift age of ca. 332 Ma. In the Tiners Point area, basalts of the Taylors Island–Lorneville assemblage are highly deformed and apparently interfinger with mylonitic granitoid rocks, including the aegirine-bearing alkali granite of the Partridge Island block.

The Partridge Island block consists of an early Carboniferous plutonic complex intruded into sedimentary rocks of unknown (older) age. Deformation to mylonite along with uplift followed within 20 Ma; the basalt and red to grey sedimentary rocks of the Taylors Island–Lorneville assemblage were deposited on this basement and were partially deformed along with it. Subsequently, late Carboniferous (Alleghenian) deformation emplaced these rocks as thrust slices above the Pennsylvanian formations east of Saint John, or elsewhere in strike-slip juxtaposition against late Precambrian and Cambrian rocks of the Avalonian Caledonia terrane.