

## NEW BRUNSWICK MINES DIVISION DEPARTMENT OF NATURAL RESOURCES

## ATLANTIC DEVELOPMENT BOARD

## DESCRIPTIVE NOTES

The map-area covers a northeast-trending belt of rocks that range in age from Precambrian (?) to Triassic. A major northeast strike fault traverses the area over a distance of 50 miles and divides the region into two parallel zones of contrasting age and tectonic development. The Precambrian and Carboniferous rocks to the southeast have been subjected to Precambrian (?) deformation and granitic intrusion, and several periods of Carboniferous folding and faulting. "Skarn-type" mineralization is associated with granite-limestone contacts in this general area and several Pb, Zn, Ag and Mo deposits are known to occur west of Saint John. A complex, steeply folded assemblage of Cambro-Ordovician, Silurian and Devonian sedimentary and volcanic strata in the northwestern part of the area has been mainly affected by Acadian folding, emplacement of minor gabbro-diabase bodies and major Devonian granitic masses including the Charlotte batholith. Quartz-calcite veins with Cu, Pb, Zn mineralization are spatially related to this northeasterly-trending structural zone (Potter, 1967). Tungsten and molybdenum occurrences are associated with the Devonian granitic rocks.

The Green Head Group was defined to include carbonate rocks, argillites, and quartzites in the Saint John area (Hayes and Howell, 1937), and has been assigned an Archean age by Alcock (1938). A thick, complexly folded sequence of limestone, dolomite, argillite and quartzite forms a broad southwesterly-plunging synclinorium west of Saint John, and isolated patches of Green Head-type quartzite and carbonate rocks form a discontinuous belt that extends 20 miles to the southwest of Saint John. Volcanic flows, tuffs and breccias of unit (2) extend southwestward from Kingston Peninsula in a 50-mile linear belt that includes strata formerly known as the "Kingston Series". The precise age of these rocks is uncertain, but they are tentatively correlated with the Coldbrook Group near Saint John. Here, volcanic strata of this type have been interpreted to unconformably overlie Green Head sediments. Alcock (1938), Weeks (1957) and MacKenzie (1964) regarded the Coldbrook as Proterozoic in age although the exact nature of the contact between the Coldbrook and fossiliferous Lower Cambrian strata remains obscure. Fairbairn et al (1966) obtained a 495 m.y. (Lower Ordovician) <sup>1</sup>48 m.y. Rb/Sr isochron from Coldbrook volcanics underlying fossiliferous Cambrian, but this unusually low date may reflect variable decrease in <sup>87</sup>Sr/<sup>87</sup>Rb daughter-parent ratio resulting from post-Cambrian orogenic disturbances. resulting from post-Cambrian orogenic disturbances.

Highly fossiliferous Cambrian sediments (4b) are exposed near Saint John and northeast of the mouth of the Nerepis River. They occur as isolated, infolded or down faulted remnants of former wide-spread sandstone, conglomerate and black shale deposits. All three stages of the Cambrian system are represented by strata exposed at several localities, but no single complete section has been found. In the extreme northeast part of the map-area, argillite, slate, quartzite and minor volcanic rocks of unit 4(a) are assigned to the Dark Argillite Division of the Ordovician Charlotte Group (MacKenzie, 1964). The nature of the Cambrian-Ordovician and Silurian-Ordovician boundaries is very uncertain and rocks of unit 4(a) are distinguishable from similar Cambrian and Silurian beds only by a higher degree of metamorphism and the absence of fossils.

A varied assemblage of steeply dipping, northeast-trending Silurian rocks between Lake Utopia and Loch Alva, has been subdivided into predominantly sedimentary units (5a), predominantly mafic volcanic units (5b), and felsic volcanic units (5d) on the basis of recent work by Hay (1968). The volcanic rocks include massive andesite, basalt and rhyolite flows, bedded tuff, and amygdaloidal flows. The metasedimentary rocks include green and grey slate, calcareous phyllite, conglomerate, siltstone, sandstone and quartzite. These metavolcanic and metasedimentary units in the western part of the map-area may be similar to the Upper Silurian Long Reach (5c) and Jones Creek (5a) Formations northeast of Nerepis River. The older, Long Reach Formation consists of basalt flows, tuffs, breccia, and interbedded fossiliferous slate, argillite and minor shaly limestone. The Jones Creek Formation conformably overlies the Long Reach and consists of highly fossiliferous shale, slate and argillite (Smith, 1966).

A narrow wedge of conglomerate, sandstone and shale (unit 6) lies on the northwest side of the Beaver Harbour fault in the southwestern corner of the map-area. These rocks are correlated with the terrestrial deposits of the Devonian Perry Formation, but may actually be younger in age (Helmstaedt, 1966).

In the western part of the map-area, a three-mile wide belt of migmatitic granite and associated gneisses and schists (7) lies to the northwest of the Beaver Harbour-Long Reach fault. The granitic rocks of unit 7 contain inclusions of older volcanic rocks and display intrusive contact relations with Silurian rocks to the northwest (Hay, 1968). Although an age equivalence has not been established, this meta-igneous assemblage is grouped with a second belt of similar lithology that crosses the lower part of the Nerepis River. Rocks to the north and northeast of Loch Alva consist of gneissic granite, meta-diorite and intrusive quartz porphyry as well as metamorphosed conglomerate, volcanic flows, tuff and breccia (MacKenzie, 1964).

The Lower Mississippian Kennebecasis Formation (10) rests unconformably on pre-Carboniferous rocks and comprises terrestrial red conglomerate, sandstone, and shale. Conglomerates contain clasts of varied lithology derived from underlying older rocks. The Mispeck Group has been subdivided into two conformable units by Alcock (1938). The older Balls Lake Formation (11b) consists of purplish red to grey and brown conglomerate, arkose and shale with minor tuffaceous beds; and the younger West Beach Formation (11a) consists of rhyolitic to basaltic flows and tuffs with minor intercalated shale. Mispeck rocks are locally highly deformed in contrast to rocks elsewhere of equivalent age. Less deformed shales and sandstones of the Pennsylvanian Lancaster Formation contain well-preserved plant fossils and apparently rest unconformably on Mispeck rocks in the area between Saint John and Maces Bay.

The Lepreau Formation is well exposed along the east side of Maces Bay, and comprises tilted and faulted grey to red sharpstone conglomerate and sandstone. Since the Lepreau conglomerates contain boulders of grey Lancaster sandstone, a post-Pennsylvanian, probable Triassic age is presumed (Alcock, 1959).

Extensive granite, granodiorite and diorite masses (3) intrude Precambrian Green Head and Coldbrook rocks in the Saint John area. Upper age limits have not been established for these intrusive rocks and some may be much younger than their assigned late Precambrian age. Middle Devonian granitic batholiths and stocks (9) intrude Lower Palaeozoic volcanic-sedimentary strata on the northwest side of the Beaver Harbour-Long Reach fault. The Charlotte batholith dominates the northwestern part of the maparea and is composed mainly of granite, quartz monzonite and granodiorite. A northeast-striking apophysis of the main batholith contains syenitic and granophyric facies associated with granite and adamellite. Biotite from the Charlotte batholith has yielded a 380 m.y. K/Ar date (Tupper and Hart, 1961). Ordovician, Silurian, as well as all older sedimentary and volcanic rocks are extensively intruded by gabbro-diabase sills and stocks (8). Extensive granite, granodiorite and diorite masses (3) intrude Precambrian Green Head and

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