
**Robert's Arm volcanic belt, central Newfoundland:
Late Ordovician–Early Silurian underthrusting and
regional metamorphism of a peri-Gondwanan
Darriwilian–Caradocian arc complex
beneath Laurentia**

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The oldest and youngest Iapetan arc complexes in the Newfoundland Appalachians occur in the Exploits Subzone on the peri-Gondwanan side of the oceanic Dunnage Zone. The highly metamorphosed peri-Gondwanan strata presently included in the Robert's Arm volcanic belt comprise mafic-dominant Darriwilian and felsic-dominant Caradocian sequences of island arc and back arc rocks. Situated within the structurally lower and most tectonized part of the Robert's Arm thrust stack, such metavolcanic and metasedimentary rocks contain considerably more felsic volcanic strata, and are younger than, similar arc-rift and extensional arc deposits

in the western Wild Bight Group. They are host to an even younger suite of pre-tectonic calc-alkaline gabbros than those observed crosscutting the Wild Bight Arc and the negligibly strained, chlorite grade, oceanic tholeiites and alkali basalts of the Exploits back-arc basin.

Amphibolite facies belts of schist and gneiss were regionally metamorphosed and intruded by foliated granites in the Early Silurian and, in part, in the Middle-Late Ordovician. Structurally, they lie directly below greenschist facies Early Ordovician volcanic rocks in the easternmost part of the peri-Laurentian Notre Dame Subzone. Syntectonic sheets of pyroxenite, gabbro and diorite were preferentially emplaced into highly anisotropic quartz-veined tracts of mafic schist and turbidite lying closest to the Red Indian Line. They were a heat source for the regional high T – low P metamorphism that accompanied the late phases of underthrusting of the composite Laurentian margin by one of the westernmost arc complexes in the peri-Gondwanan Dunnage Zone.

Northwest-trending domes and basins refold earlier nappes and control the regional disposition of thrust sheets within most parts of the Robert's Arm belt. These structures formed prior to the opening of the Botwood Basin and the Springdale Caldera. However, certain northeast-trending cross folds and associated northwest-dipping reverse faults in the basement rocks of the Roberts Arm belt may have been reactivated during closure of these Silurian depocentres. Very rapid uplift of metamorphic tectonites, particularly those in the olistostrome-bearing peri-Gondwanan segment, occurred in the late Llandovery before the post-tectonic emplacement of the epizonal Hodges Hill and Topsails batholiths.

It is herein proposed that a tectonic complex of late Middle Ordovician mineralized bimodal volcanic strata and arc-related metasedimentary migmatites, together with early Late Ordovician quartz-phyric felsic schist, andalusite-garnet semipelite, cordierite-lineated pelitic schist and amphibolitized metatuff - alkali basalt, is locally preserved on the peri-Gondwanan side of the Red Indian Line suture in the central Dunnage Zone.