

# Acadian Metamorphism with an Alleghanian Overprint: White Rock Formation, Yarmouth Area, Southwestern Nova Scotia<sup>1</sup>

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Acadian orogenesis in southwestern Nova Scotia resulted in metamorphism of Cambrian-Silurian units and the development of upright, NE-trending folds (F1) with axial-planar cleavage (S1). The White Rock Formation (WRF), comprising Silurian metasedimentary and metavolcanic rocks, crops out in a regional-scale syncline. The WRF is underlain by the slaty Halifax Formation (HF) and older turbiditic Goldenville Formation (GF), which together comprise the Cambrian-Ordovician Meguma Group.

Peak metamorphic porphyroblasts of staurolite, andalusite, garnet, plagioclase, chloritoid and biotite are largely post-kinematic with respect to the axial-planar slaty/phyllitic foliation (S1). Their distribution reveals substantial strike-normal differences in grade. Chlorite- and biotite-zone assemblages in the GF and central part of the WRF contrast markedly with staurolite ± andalusite-bearing assemblages developed in the lower WRF and HF. Mineral assemblages and thermobarometric data from amphibolite facies pelites and interlayered metabasites suggest moderate temperatures (550-600°C) and low to moderate pressures (4-6 kb) during peak metamorphism.

Elsewhere in the Meguma terrane, muscovite defining the regional slaty cleavage (S1) has yielded ca. 390 Ma <sup>40</sup>Ar/<sup>39</sup>Ar ages. This cleavage and the M1 regional metamorphic assemblages are locally overprinted in the contact aureoles of ca. 375 Ma granitic plutons. Peak metamorphism is therefore inferred to be of Acadian age, although Acadian ages have been difficult to obtain from the WRF owing to the effects of later deformation and metamorphism.

Peak metamorphic assemblages (M1) and associated structures (D1) are strongly overprinted within broad (5 km), strike-parallel D2 shear zones that encompass the lower parts of the WRF and subjacent HF. The shear zones coincide with areas of highest Acadian metamorphic grade, suggesting that the present distribution of M1 isograds is controlled by these D2 structures. Synkinematic (D2) neoblastic chloritoid and albite growth accompanied pervasive matrix recrystallisation, boudinage, and retrogression of peak metamorphic porphyroblasts. Ubiquitous ca. 325 Ma <sup>40</sup>Ar/<sup>39</sup>Ar muscovite ages suggest that D2 deformation and metamorphism represent the effects of the Alleghanian orogeny in SW Nova Scotia.

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