

Bromley, Matthew (1997). "The Bedrock Geology of the Bates College Shortridge Property". Standard Theses.

The Casco Bay Group lithographic package in exposure at the Bates College Shortridge Property, Phippsburg, Maine has experienced multiple stages of deformation, metamorphism, and plutonism associated with the Acadian Orogeny. Previous studies of the local and regional geology have provided a partial picture of the geological and tectonic history of the area. The lack of control on the terrane the Casco Bay Group is associated with, the Merrimack Harpswell Terrane, has hindered the rendering of the full geologic and tectonic history of the area. This study, from data accumulated at the Bates College Shortridge Property, attempts to correlate the lithographies and structures to previous studies in the area in order to fill in some of the holes left by previous work. Two rock lithologies were discovered at the site. One was a schist/quartzite interbedded series of metasedimentary units classified as part of the Cape Elizabeth Formation member of the Casco Bay Group. The second package was a granite series that could be correlative with the New Hampshire Plutonic Series. Evidence for four sequences of deformation and metamorphism and one intrusional event were found on the site. Regional deformation occurred first which produced regional-scale isoclinal upright horizontal folding in the metasedimentary units accompanied by late, synkinematic igneous intrusion of granite. This granite member is represented a sills parallel to the schist/quartzite layers and is distributed throughout the property in a north-south fashion with the granite unit being totally dominant in the eastern portion of the site. This regional folding event caused an average orientation of the metasedimentary layers to  $170^{\circ}, 55^{\circ}$  west. The final episode of the early deformation during this period caused a foliation forming deformation apparent in the intrusion. The average strike and dip of these foliations was  $184^{\circ}, 72^{\circ}$  west. Following these two events was a more local event producing a second series of vertical symmetric folds. Average strike and dip orientations of the axial plane was  $63^{\circ}, 83^{\circ}$  south; average trend and plunge of the hinge line was  $71^{\circ}, 80^{\circ}$  south. Finally, a deformation event associated with the Norumbega Fault Zone caused the final sequence of folding. Associated with this series are chevron folds and recumbent folds with planes  $78^{\circ}, 82^{\circ}$  south for the hinge lines. All deformations and intrusions are associated with the Acadian Orogeny except the last series. The final deformation even could be Alleghanian. Each deformation produced regional metamorphism leaving traces of a polymetamorphic history. Final metamorphic grades are at sillimanite-andalusite level. Geochronology research of the area produced associations with the Acadian Orogeny. In general more work on the regional and local scale needs to continue in order to formulate a complete geologic and tectonic picture of the history of the area.