

## Arc rivals of the Taconian orogeny in western New England

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Tectonic models of western New England usually invoke a collision between the Laurentian margin and the Bronson Hill Arc (BHA) to account for the Taconian orogeny. However, in central Massachusetts and southern New Hampshire arc-related rocks in the BHA are 454 to 442 Ma (Tucker and Robinson, 1990) and, therefore, younger than much of the Taconian deformation and metamorphism in western New England which began before 470 Ma. U/Pb and single-grain evaporation zircon ages combined with geochemical analyses reveal the presence of a magmatic arc, the Shelburne Falls Arc (SFA), that formed west of the BHA and the Connecticut Valley-Gaspé Synclinorium (CVGS) at 485 to 475 Ma. The SFA is extensively preserved in the Barnard Volcanics in Vermont and in the Collinsville and Hawley formations in Massachusetts. La/Ce versus Zr/Hf diagrams indicate distinct sources for the BHA and SFA, further suggesting that they are two separate arcs.

Zircon dating and geochemistry also provide evidence for Late Ordovician to Late Silurian volcanic and plutonic rocks that formed in a rift environment. These younger rocks are superimposed on the SFA and BHA and occupy part of the region between the arcs, including the Standing Pond Volcanics in Vermont. We interpret the SFA to have formed above an east-dipping subduction zone by Early Ordovician and suggest that collision between Laurentia and the SFA began at approximately 475 to 470 Ma resulting in the Taconian orogeny. Thus, in our model, the Taconian orogeny was not caused by collision of the BHA with Laurentia. Instead, the BHA most likely formed above a west-dipping subduction zone that developed along the eastern edge of the newly accreted terrane near the end of the Taconian orogeny. By approximately 440 Ma back-arc rifting began west of the BHA producing the CVGS and volcanic and plutonic rocks that span much of the Silurian.