

**Dunnage-Gander relations in the Appalachian-Caledonian orogen:  
evidence for an early Ordovician arc-continent collision**

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Conceptually, rocks of the Dunnage Zone are vestiges of Iapetus; those of the Gander Zone are the eastern passive margin of Iapetus. In Newfoundland, New Brunswick, and southeast Ireland, Dunnage (Exploits Subzone)-Gander boundaries are marked by remnants of Lower Ordovician ophiolite complexes, which structurally overlie melanges that contain Gander Zone rocks. A sedimentary linkage indicates Dunnage-Gander juxtapositioning by Llandeilo. Rare preserved stratigraphic relationships suggest that Middle Ordovician volcanic and sedimentary rocks form an overstep sequence between the Lower Ordovician oceanic Dunnage Zone and the passive margin Gander Zone. Early Ordovician amalgamation (Penobscottian Orogeny) is explained by north-west subduction of the Gander Zone beneath a Cambrian-Early Ordovician arc-back arc system. Faunal provinciality, provenance, paleomagnetic, and isotope tracer data, as well

as a spatial association with exposed rocks of the Avalon Zone, suggest that this arc-continent collision took place along an Avalon margin. Collision was followed by a reversal in subduction polarity. New southeast-directed subduction caused back-arc spreading (Exploits Basin) behind the reactivated Penobscot arc. The Penobscot arc then collided with the Taconic arc at the Laurentian margin in the Middle-Late Ordovician. Arc-arc collision caused another subduction polarity reversal, this time leading to the closure of the Middle Ordovician Exploits marginal basin by repeated north-west subduction of the Gander Zone and overlying Middle Ordovician overstep sequence. This event was followed by a Late Ordovician-Early Silurian collision between composite Laurentia and composite Avalonia. The vestiges of Iapetus (Dunnage) represent the remnants of a complex Pacific-type rather than a kinder and gentler Atlantic-type ocean.