Palaeobiogeography and faunal dynamics in the lower to middle Ordovician of western Newfoundland of the Iapetus Ocean region

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Differentiation of Ordovician faunal groups into provinces in the North Atlantic Region is not strictly comparable with palaeogeographical models and does not relate clearly to criteria for recognizing continental margins and separation across the Iapetus Ocean.

Recently published and unpublished stratigraphic and palaeoecological evidence from Laurentia is reviewed. The approach of faunal dynamics, that is, changes of faunas in time and space is used. The cyclic interchange between faunal associations between platform and slope environments is evaluated during early and middle Ordovician time. The study is based on trilobites and conodonts from western Newfoundland and compared with evidence from Scotland, Norway, Greenland and Spitsbergen.

The distribution of faunal associations along the edge of the craton suggests a pattern of concentric perhaps depth-related facies belts. Cyclic appearance of deeper water marginal faunas onto the platform characterized Tremadoc and early Arenig time, but interrupted by an extinction event at the Tremadoc/Arenig Series boundary. The lower Boat Harbour faunal associations were replaced by the upper Boat Harbour/Catoche faunal associations. Platform uplift in middle to late Arenig forced faunas to migrate to other areas such as Greenland and Spitsbergen. Foundering of the platform in late Arenig and early Llanvirn allowed the Table Head fauna not only to migrate across the platform, but also the Iapetus Ocean, and the taxa appeared in Baltica. However, some taxa associations that were earlier adapted to cool, normal marine waters were able to cross the Iapetus Ocean at the time of its presumed maximum extent.

The palaebiographical migration-immigration pattern is governed by relative sea level changes and tectonics. The model gives an understanding of the faunal dynamics within the North Atlantic Region and helps to constrain the definition of continental margins using faunal evidence.