

## ORIGIN OF THE LATE ORDOVICIAN *LEPIDOCYCLUS* BRACHIOPOD FAUNA IN NORTH AMERICA AND ITS BIOGEOGRAPHIC SIGNIFICANCE

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Three rhynchonellid brachiopod genera, *Hiscobeccus*, *Lepidocyclus*, and *Hypsiptycha*, are the most diagnostic elements of the *Lepidocyclus* fauna of North America in Late Ordovician time. These are characterized by relatively large, strongly biconvex to globular shells with coarse imbricating growth lamellae and, internally, with septiform cardinal processes in brachial valves. Among the three genera, *Hiscobeccus* appears the earliest, now known from rocks of late Trentonian-Edenian age in the Canadian Rocky Mountains and Mackenzie Mountains. Morphologically, *Hiscobeccus* is distinguished from the other two genera by its open delthyrium in the pedicle valve. Early forms of *Hiscobeccus* show close morphological similarity to *Rhynchotrema* in their non-globular biconvex shells covered by strong growth lamellae only in the anterior portions. It has been suggested that *Hiscobeccus* evolved from the *Rhynchotrema wisconsinense* stock through increase in shell size, globosity, and strength of growth lamellae. Earliest species of *Rhynchotrema* has been documented convincingly from rocks of early Trentonian age, and the derivation of *Hiscobeccus* most likely took place during the mid-Trentonian. *Lepidocyclus* and *Hypsiptycha* evolved from either *Rhynchotrema* or *Hiscobeccus* by developing a pair of deltidial plates covering the delthyrium.

*Rhynchotrema* and other rhynchonellids that evolved before mid-Trentonian time are common to the North American (Laurentian) and the Siberia-Kazakhstan paleocontinents. In contrast, *Hiscobeccus*, *Lepidocyclus*, and *Hypsiptycha* that evolved after the mid-Trentonian are virtually restricted to Laurentia. Therefore, *Rhynchotrema* marked the last successful intercontinental migration of rhynchonellids during their Llandeilian-Caradocian cosmopolitanism. The pronounced provincialism of the North American *Lepidocyclus* fauna may have been caused by a number of factors. Facies control is not likely the explanation because these rhynchonellids occur in nearly all the inland and marginal platform seas of Laurentia and commonly are found together in the same types of rocks. Plate tectonics and sea-level changes are considered major causes. The Ordovician rhynchonellids lived in shallow marine (intertidal-subtidal) environments and were incapable of crossing vast, deep oceanic barriers because of their sedentary mode of life and short-lived motile larval stages. The widening of the ocean between North America and Siberia, coupled with high sea-level stand, may have created a sufficiently wide oceanic barrier to interrupt faunal mixing between the two paleocontinents by late Trentonian time. Moreover, the rise in sea level would have resulted in the disappearance of island faunas, which could have served as stepping stones for intercontinental migration of shallow-water benthic faunas during low sea-level stand.