

## FUNCTIONAL SIGNIFICANCE OF VARIATIONS IN THE CENTRAL FOLD OF SHELLS OF LATE ORDOVICIAN THROUGH DEVONIAN BICONVEX BRACHIOPOD GENERA

ALEXANDER, Richard R., Dept. of Geological and Marine Sciences, Rider College, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648-3099.

Flume experiments with models of Mid-Paleozoic atrypids, orthids, rhynchonellids, and spiriferids indicate that the central fold functions efficiently to separate lateral-margin incurrents from the anterior-medial margin excurrent in five of nine possible life orientations of the shell relative to the current direction and substrate. Anterior-medial incurrents and lateral excurrents are effectively separated in four of the nine orientations used with models of spiriferids and atrypids, but non-pediculate brachiopods drawing in water anterior-medially could not take advantage of reversing tidal currents to feed. The risk of refiltration of medial excurrent water is reduced with increasing relief of the central fold above the commissural plane. Downcurrent turbulence increases with increasing relief of the central fold. Eddies with a large radius of curvature are generated by large chevron-shaped central folds at low current velocities (5 cm/sec) and boomerang against the downcurrent lateral margin of models. Flume experiments on models also reveal that a well-developed sinus accelerated erosion of the supporting sediment around the weight-bearing posterior of the valves. Shells with high relief in the sinus destabilized comparatively quickly from valves-erect orientations when subjected to moderate current velocities (25 cm/sec).

Morphospace (ternary) diagrams of sinus shape for Late Ordovician (Caradocian) through Devonian (Famennian) genera show the realized field among the potential morphotypic extremes, namely, 1) rectimarginate (no fold), 2) isoclinal, chevron-shaped, and 3) M-shaped anterior commissural outlines. Morphospace plots through successive stages suggest centripetal selection for taxa with moderately developed folds in the atrypids and spiriferids, with occasional evolution of "outlier" genera with chevron-shaped central folds. Orthids display progressive loss of rectimarginate genera through the Devonian. Weak directional selection is suggested by the successive stage-level plots of the rhynchonellid genera which expanded toward the extremes of chevron- and M-shaped central folds in potential morphospace during the Devonian.