ABSTRACT OF THE THESIS

A Morphometric Approach to Competition in Ordovician Brachiopods

by
Carrie L. Tyler
Master of Science in Geological Sciences
San Diego State University, 2007

Ecologists and Paleontologists commonly use diversity counts to analyze how processes (e.g. competition during invasion) influence community structure. Based on generic level diversity, it is hypothesized that if no incumbents are lost, and invaders succeed, then the pre-invasion community was not saturated and competition was not a driving force in structuring the community (e.g. Patzkowsky and Holland 2003, 2007); however, this method does not take into account 1) morphological shifts by incumbents to avoid competition (character displacement), or 2) losses at lower taxonomic levels (species loss). Comparing morphology of incumbents pre- and post-invasion can illustrate the change or loss of a morphotype, whether this is character displacement or species loss. Therefore, morphology may be a better measure of ecological patterns through time than diversity counts, as it can illustrate niche space occupation and reflect taxonomic loss.

To test this, we explore competition in the fossil record during the Richmondian invasion (Ordovician) in the Illinois Basin, using brachiopod morphologies (Strophomenid, Rhynchonellid and Orthidine brachiopods) as a proxy for niche space occupation (Hermoyian *et al* 2002). The effects of competition were examined by analyzing the external shape of three pairs of potentially competing brachiopod genera; each pair consisted of one incumbent and one invader. Using Baseline Shape co-ordinates (Bookstein 1991), we see a morphological shift in the incumbents away from the invaders in each pair, reflecting either competition-induced character displacement, or species loss. Either interpretation means that the community was saturated prior to invasion, in contrast to previous conclusions drawn from diversity based analyses. Thus, morphological analyses present a useful analytical tool to examine community saturation, competition and invasion.