Did the Late Ordovician mass extinction event trigger the earliest evolution of 'strophodontoid' brachiopods?

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Abstract

As most majority of strophomenides during Silurian to Devonian, the 'strophodontoid' are typified with hinge line denticles, which is closely related to the origination of the clade. The evolution of hinge line denticles correlated with the disappearance of dental plates and teeth. In this study, the specimens of *Eostropheodonta parvicostellata* collected from the Kuanyinqiao Bed (Hirnantian, latest Ordovician) of Hetaoba Section, Meitan, Guizhou province, South China, displays clear population differentiation, capturing the process of the disappearance of dental plates and development of denticles from those anchored on the dental plates to form preliminary denticular plates. Three phenotypes of *E. parvicostellata* are recognized in the single fossiliferous bed, which may herald the progress of a speciation event. Among them, the Phenotype C could be assigned to a species of a younger genus, *Palaeoleptostrophia* but with more ancestral characters. Data on the distribution of species of *Eostropheodonta* in South China, may record a process of speciation. NMDS based on five key characters of the genera of the Family Leptostrophiidae shows the much larger morphospace of Silurian genera than that for Devonian taxa. For phylogenetic analysis of the Family Leptostrophiidae, 42 characters for 23 genera (coded based on type species) are coded. The result supports that of the NMDS and mostly tracks their geological history. The fossil population differentiation of *E. parvicostellata* discovered between the two phases of the LOME, may suggest the possible origination of 'strophodontoids' during the interregnum, and may link microevolution to macroevolution driving an adaptive radiation of the group. Cold environment during the glaciation of LOME might have triggered the origination of 'strophodontoids'.

Keywords: Microevolution, speciation, Late Ordovician mass extinction, morphospace, Leptostrophiidae

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