

## BIOFACIES STRUCTURE OF CAMBRIAN TRILOBITE EXTINCTIONS.

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In the Late Cambrian of North America, trilobite extinction events occurred at an average interval of about 5 million years. Consequently, there is an unparalleled opportunity for comparative studies of the dynamics of diversity change. Here, we present a comparison of biofacies patterns associated with the extinctions at the close of the Late Cambrian Marjuman, Steptoean and Sunwaptan stages (= Marjumiid, Pterocephaliid and Ptychaspid "biomeres") in Laurentian North America, based both on new collections and data compiled from the literature. All three events involve a profound reduction in both within-habitat (alpha) and between-habitat (beta) diversity. During and immediately after the extinctions, biofacies structure collapsed, producing an ecologically homogenous shelf with a small number of widely-distributed biofacies dominated by a few eurytopic trilobite taxa. The extinctions intervals are characterized by rapid biofacies replacements and step-wise reduction in alpha diversity. These biofacies replacements reflect both extinctions of dominant genera together with extensive immigration of taxa from shelf margin and, especially, off-shelf sites. Low levels of alpha and beta diversity persist for some time following the extinction interval. Such a lag is predicted by logistic models of diversification and is therefore not surprising. It could, however, be amplified by reduced speciation rates following the shift towards biofacies dominated by wide-ranging eurytopes.

Previous analyses of Phanerozoic extinction patterns based on genera or higher taxa have viewed the Cambrian "biomeres" as minor events. However, the extent of ecological disruption of shelf habitats at each of the three Late Cambrian extinctions indicates that their severity has been underestimated. The nature of the factors responsible for the extinctions remains poorly understood, although, in outer shelf facies, all three events are close to major sequence boundaries.