

Evolution and extinction patterns in Late Ordovician-Early Silurian graptolites as revealed by the study of uncompressed specimens from Arctic Canada

M.J. Melchin

Department of Geology, St. Francis Xavier University, Antigonish, Nova Scotia B2G 1C0, Canada

The Late Ordovician to Early Silurian was a time of mass extinction and subsequent radiation of the planktonic graptolite faunas. Recent improvements in our understanding of graptolite morphology and phylogeny from the study of uncompressed specimens has resulted in a better appreciation of the magnitude and suddenness of these events. The Ashgill extinction event resulted in the termination of three of the four extant families and all but one genus and it culminated at the end of the *pacificus* Zone. Only *Normalograptus* survived the extinction and gave rise to the subsequent radiation.

The initial stages of the radiation were manifested mostly at the species level. Species of one proximal development pattern completely dominated the post-extinction *extraordinarius* Zone with the number of species in this group jumping

from four or five in the latest *pacificus* Zone to over twenty in the *extraordinarius* Zone. The subsequent zone, however, witnesses the development of several new genera as well as new proximal development patterns. All of the major stocks of Silurian and Devonian graptoloids, with the exception of the retiolitids and the cyrtograptids, had become established within two graptolite zones after the extinction, a time period of probably less than 1 million years.

Evidence from sections in Arctic Canada and elsewhere suggests that the main extinction event coincides with a time of sea-level fall as well as changes in ocean chemistry, oxygenation, circulation patterns, and possibly temperature brought about by the Ashgill glaciation centred on North Africa.