

GRAPTOLITE RECOVERY AFTER THE MID-WENLOCK LUNDGRENI EVENT:
LINKS TO NUTRIENT AVAILABILITY AND PALEOCEANOGRAPHY

BERRY, William B.N., Department of Geology & Geophysics,
University of California, Berkeley, CA. 94720, U.S.A.

A near-extinction of graptolites, the Lundgreni Event, took place in the mid-Wenlock (mid-Silurian). The extinction is unique in that most graptolites that had a significant amount of periderm became extinct but graptolites with mesh-like rhabdosomes and little periderm survived. Major extinctions did not occur among marine benthic faunas of the time, even those living on outer parts of shelves. Locally, community turnover did take place among certain outer shelf benthic faunas. Graptolites that became extinct include cyrtograptids, monograptids of the prionon-flemingii group, most monoclimacids, and Testograptus. Survivors were mostly small gothograptids and slender Pristiograptus dubius group forms. Recovery took place in four steps: 1. a nassa-dubius interval in which small P. dubius forms and nassa type gothograptids comprise nearly all the taxa present; 2. a praedeubeli interval in which several new plectograptines (graptolites with mesh-like rhabdosomes) appear as well as apparent founders of new lineages derived from the P. dubius group; 3. a deubeli-lundgreni interval in which plectograptines are numerous and taxa derived from the P. dubius group are common locally; and 4. a major radiation in which Bohemilograptus, Colonograptus, Crinitograptus, Neodiversograptus and Saetograptus appear. This major radiation typifies the base of the Ludlow. Jeppsson and associates analysed Wenlock paleoceanography and identified a Mulde Event coeval with the Lundgreni Event extinctions. That event involved a change in source of oceanic deep water. A Mulde Episode, a time of widespread ocean density stratification and little upwelling of nutrients into surface waters persisted from the Lundgreni Event until the base of the Ludlow. Low nutrient availability in most graptolite habitats appears to have persisted during the interval of the first three steps in recovery. Plectograptines had large areas of surface tissue relative to zooidal volume. Small P. dubius forms had relatively large surface areas of tissues exposed as a result of open thecal apertures and small zooids. If these graptolites had intracellular algal symbionts that contributed dissolved nutrients to the zooid, as do such symbionts in certain modern zooplankton, then survivors of the Lundgreni Event had a mechanism for obtaining nourishment that other graptolites lacked. Only when enhanced nutrients in ocean surface water were again available to generate significant near-surface productivity did graptolites radiate markedly. That development followed from paleoceanographic change in the Ludlow.