

## Phyletic evolution of the latest Ludlow spinose monograptids

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The spinose latest Ludlow (Ludfordian) graptolite *Monograptus* (*Uncinagraptus*) *spineus* is not related to the lobate-spinose monograptids of the late Wenlock. It developed independently as a result of phyletic evolution from hooded *M. (U.) acer*, *M. (U.) protospineus* sp. n. being a transient link. Cumulative effects of gradual and directional changes within this lineage resulted probably in feeding specializations that enabled separation of niches. Previously described *M. (U.) acer* and *M. (U.) aculeatus* are defined as chronosubspecies, the latter representing a more advanced stage of evolution. A biostratigraphic subdivision of late Ludfordian in graptolite facies is suggested.

**Key words:** graptolites, monograptids, phyletic evolution, hypermorphosis, Ludlow, Late Silurian.

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