

## Evaluating the Frasnian-Famennian mass extinction: Comparing brachiopod faunas

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*Acta Palaeontologica Polonica* 43 (2), 1998: 137-154

The Frasnian-Famennian (F-F) mass extinctions saw the global loss of all genera belonging to the tropically confined order Atrypida (and Pentamerida): though Famennian forms have been reported in the literature, none can be confirmed. Losses were more severe during the Givetian (including the extinction of the suborder Davidsoniina, and the reduction of the suborder Lissatrypidina to a single genus), but origination rates in the remaining suborder surviving into the Frasnian kept the group alive, though much reduced in biodiversity from the late Early and Middle Devonian. In the terminal phases of the late *Palmatolepis* rhenana and *P. linguiformis* zones at the end of the Frasnian, during which the last few Atrypidae declined, no new genera originated, and thus the Atrypida were extirpated. There is no evidence for an abrupt termination of all lineages at the F-F boundary, nor that the Atrypida were abundant at this time, since all groups were in decline and impoverished. Atrypida were well established in dysaerobic, muddy substrate, reef lagoon and off-reef deeper water settings in the late Givetian and Frasnian, alongside a range of brachiopod orders which sailed through the F-F boundary: tropical shelf anoxia or hypoxia seems implausible as a cause for atrypid extinction. Glacial-interglacial climate cycles recorded in South America for the Late Devonian, and their synchronous global cooling effect in low latitudes, as well as loss of the reef habitat and shelf area reduction, remain as the most likely combined scenarios for the mass extinction events.

**Key words:** Brachiopoda, Atrypida, diversity, mass extinction, Kellwasser Crisis, Frasnian, Famennian, Devonian.

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