

Westmorland Geological Society

UV-B radiation was the terrestrial killer at the Devonian-Carboniferous boundary

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Zoom Meeting

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Some 359 million years ago there was a terrestrial mass extinction at the boundary between the Devonian and Carboniferous Periods. Major extinctions include all the armoured fish and important groups of land plants. In East Greenland there are a number of localities where we can find the terrestrial extinction layer. These were in the arid centre of the Old Red Sandstone Continent some 1000 km from the sea. The boundary is found in a large deep wide lake that represents a highly active monsoon system showing the climate was globally warm. This follows on from a short intense episode of glaciation. It is from these lake deposits that we can isolate the tough outer wall layers of pollen and spores that normally protect the cellular DNA from UV radiation. In the middle of the lake bed there are malformed pollen and spores that demonstrate that the extinction was coincident with elevated UV-B radiation and a reduced protective ozone layer. Mercury analyses show there is no evidence for continental scale volcanic eruptions as were responsible for the end Permian, end Triassic and Late Devonian mass extinctions. A possible cause of ozone loss is increased transport of naturally produced ozone destroying chemicals into the atmosphere. An important conclusion is that ozone loss during rapid warming is inherent in the Earth System and that we should be alert for the same process occurring in our rapidly warming world. Others have suggested and now restated other causes include a cosmic ray blast from an exploding star, i.e. a supernova.

John Marshall graduated from the University of Cambridge before completing a PhD on *Devonian Palynology from the Shetland Islands* in the Department of Botany, Bristol University. He spent three years as a Demonstrator in the Department of Geology, University of Newcastle upon Tyne. Following two years working in industry for Gearhart Geodata he returned to an academic position in the University of Southampton where he has been ever since, ultimately rising to the rank of Professor. John has worked extensively on Devonian rocks and plant spores from Scotland, East Greenland, Svalbard, Russia, Bolivia, Spain, the Falkland Islands and China. Currently he is working on the Frasnian–Famennian and End Devonian mass extinction events, the spread of the first forests and the age and environments of Tournaisian tetrapods. He is past Chair of the Devonian Subcommittee.

