

2 Late Ordovician mass extinction

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The Ordovician period was an era of extensive diversification and expansion of numerous marine clades. Although organisms also present in the Cambrian were numerous in the Ordovician, a variety of new types including cephalopods, corals (including rugose and tabulate forms), bryozoans, crinoids, graptolites, gastropods, and bivalves flourished. Ordovician communities typically displayed a higher ecological complexity than Cambrian communities due to the greater diversity of organisms. However, as in the Cambrian, life in the Ordovician continued to be restricted to the seas. The Ordovician extinction occurred at the end of the Ordovician period, about 440-450 million years ago. This extinction, cited as the second most devastating extinction to marine communities in earth history, caused the disappearance of one third of all brachiopod and bryozoan families, as well as numerous groups of conodonts, trilobites, and graptolites. Much of the reef-building fauna was also decimated. In total, more than one hundred families of marine invertebrates perished in this extinction. The Ordovician mass extinction has been theorized by paleontologists to be the result of a single event; the glaciation of the continent Gondwana at the end of the period. Glacial deposits discovered by geologists in the Saharan Desert provide evidence for this glaciation event. This glaciation event also caused a lowering of sea level worldwide as large amounts of water became tied up in ice sheets. A combination of this lowering of sea-level, reducing ecospace on continental shelves, in conjunction with the cooling caused by the glaciation itself are likely driving agents for the Ordovician mass extinction (Dr. Ken Hooper Virtual Paleontology Museum, Ottawa-Carleton Geoscience Center and Department of Earth Sciences, Carleton University, Ontario, Canada).

Another information can be obtained from Wikipedia, the free encyclopedia, which considered the Ordovician-Silurian extinction event as the second largest of the five major extinction events in Earth's history in terms of percentage of genera that went extinct. The Wikipedia assigned this event to either glaciation, as it is believed by many

scientists, or to the gamma ray burst originating from an exploding star within 6,000 light years of Earth (within a nearby arm of the Milky Way Galaxy). A ten-second burst would have stripped the Earth's atmosphere of half of its ozone almost immediately, causing surface-dwelling organisms, including those responsible for planetary photosynthesis, to be exposed to high levels of ultraviolet radiation. This would have killed many species and caused a drop in temperatures. While plausible, there is no unambiguous evidence that such a nearby gamma ray burst has ever actually occurred.

The Peripatus website clued on the net that mass extinctions of tropical marine faunas occurred at the end of the Ordovician when 100 or more families became extinct, including more than half of the bryozoan and brachiopod species. This website cited the following possible causes for this event:

- climatic cooling
- major glaciation
- sea level drop
- Iapetus Ocean (proto-Atlantic) closed, eliminating habitats
- Cambro-Ord platform collapsed
- Taconic Orogeny

On the other hand, the University of Southern California, Department of Earth Sciences, considered the mass extinction of organisms at the end of the Ordovician as probably the greatest mass extinction ever recorded in the Earth history with over 100 families going extinct. The Department of Earth Sciences noted the following:

1. One idea was that it was the breakup and movement of the large super continent into many fragments. However, modern biology teaches us that this would not likely lead to extinctions, rather it would provide additional niche space for groups to expand into.
2. The more likely cause is that the Earth cooled, particularly the oceans where most of the organisms lived during the Ordovician (Remember there were not land plants and no evidence of land organisms yet). All the extinctions occurred in the oceans.

Paul Recer, in the Associated Press (2004), confirmed that the Late Ordovician mass extinction event was the second-largest extinction in the Earth's history, the killing of two-thirds of all species, may have been caused by ultraviolet radiation from the Sun after gamma rays destroyed the Earth's ozone layer. This supports the gamma ray burst hypothesis.

Prothero (1998) avowed that warm adapted taxa seem to be the chief victims, suggesting that a global cooling event might have been responsible. Wilde and Berry (1984) introduced the possibility of that the cooling and glaciation regression may brought the biologically toxic waters to the surface leading to severe conditions on the sensitive shallow marine benthic community. Orth (1989) declared that no clear evidence of a single extraterrestrial iridium anomaly has yet been documented for the Ordovician.

This short essay clarifies that the causes of the Late Ordovician mass extinction event are still debated, and no scientific team could give stronger evidences than the other team.

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