

The flash recovery of ammonoids after the most massive extinction of all time

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After the End-Permian extinction 252.6 million years ago, ammonoids diversified and recovered 10 to 30 times faster than previous estimates.

This discovery results from Franco-Swiss collaboration involving the laboratories at CNRS, France, and the Universities of Zurich and Lausanne, Switzerland. These results raise questions about paleontologists' understanding of the dynamics of evolution of species and the functioning of the biosphere after a mass extinction. The study appeared in the 28 August issue of *Science*.

The history of life on Earth has been punctuated by a number of mass extinctions, brief periods of extreme loss of biodiversity. These extinctions are followed by phases during which surviving species recover and diversify. The End-Permian extinction, 252.6 million years ago, the most massive extinction ever recorded, resulted in the loss of 90% of existing species. Until now, studies had shown that the biosphere took between 10 and 30 million years to recover the levels of biodiversity seen before the extinction.

A Franco-Swiss team of paleontologists has shown that ammonoids needed only one million years after the End-Permian extinction to diversify to the same levels as before. The cephalopods, which were abundant during the Permian, narrowly missed being eradicated during the extinction: only two or three species survived and a single species seems to have been the basis for the extraordinary diversification of the group after the extinction. It took researchers seven years to gather new

fossils and analyze databases in order to determine the rate of diversification of the ammonoids. In all, 860 genera from 77 regions around the world were recorded at 25 successive time intervals from the Late Carboniferous to the Late Triassic, a period of over 100 million years.

The discovery of this explosive growth over a million years takes a heated debate in a new direction. Indeed, it suggests that earlier estimates for the End-Permian extinction were based on truncated data and imprecise or incorrect dating. Furthermore, the duration for estimated recovery after other lesser extinctions all vary between 5 and 15 million years. The result obtained here suggests that these estimates should probably be revised downwards. The [biosphere](#) is most likely headed towards a sixth mass extinction, and this discovery reminds us that the recovery of existing species after an extinction is a very long process, taking several tens of thousands of human generations at the very least.

More information: Good Genes and Good Luck: Ammonoid Diversity and the End-Permian [Mass Extinction](#). Brayard A., Escarguel G., Bucher H., Monnet C., Brühwiler T., Goudemand N., Galfetti T. and Guex J. *Science*, 28 August 2009.

Provided by CNRS

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