

**Table 1 | The 'Big Five' mass extinction events**

Event	Proposed causes
The Ordovician event <sup>64-66</sup> ended ~443 Myr ago; within 3.3 to 1.9 Myr 57% of genera were lost, an estimated 86% of species.	Onset of alternating glacial and interglacial episodes; repeated marine transgressions and regressions. Uplift and weathering of the Appalachians affecting atmospheric and ocean chemistry. Sequestration of CO <sub>2</sub> .
The Devonian event <sup>64,67-70</sup> ended ~359 Myr ago; within 29 to 2 Myr 35% of genera were lost, an estimated 75% of species.	Global cooling (followed by global warming), possibly tied to the diversification of land plants, with associated weathering, paedogenesis, and the drawdown of global CO <sub>2</sub> . Evidence for widespread deep-water anoxia and the spread of anoxic waters by transgressions. Timing and importance of bolide impacts still debated.
The Permian event <sup>64,71-73</sup> ended ~251 Myr ago; within 2.8 Myr to 160 Kyr 56% of genera were lost, an estimated 96% of species.	Siberian volcanism. Global warming. Spread of deep marine anoxic waters. Elevated H <sub>2</sub> S and CO <sub>2</sub> concentrations in both marine and terrestrial realms. Ocean acidification. Evidence for a bolide impact still debated.
The Triassic event <sup>74,75</sup> ended ~200 Myr ago; within 8.3 Myr to 600 Kyr 47% of genera were lost, an estimated 80% of species.	Activity in the Central Atlantic Magmatic Province (CAMP) thought to have elevated atmospheric CO <sub>2</sub> levels, which increased global temperatures and led to a calcification crisis in the world oceans.
The Cretaceous event <sup>58-60,76-79</sup> ended ~65 Myr ago; within 2.5 Myr to less than a year 40% of genera were lost, an estimated 76% of species.	A bolide impact in the Yucatán is thought to have led to a global cataclysm and caused rapid cooling. Preceding the impact, biota may have been declining owing to a variety of causes: Deccan volcanism contemporaneous with global warming; tectonic uplift altering biogeography and accelerating erosion, potentially contributing to ocean eutrophication and anoxic episodes. CO <sub>2</sub> spike just before extinction, drop during extinction.

Myr, million years. Kyr, thousand years.

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**This paper discusses the definition of mass extinctions and mass depletions, and the relative role of origination versus extinction rates in causing the diversity reductions that characterize the Big Five.**
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