

## The Great Extinctions

Author: Penney, David

Source: Acta Palaeontologica Polonica, 58(3) : 560

Published By: Institute of Paleobiology, Polish Academy of Sciences

URL: <https://doi.org/10.4202/app.2013.1001>

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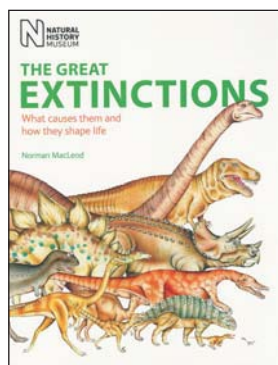
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## The Great Extinctions



**Norman MacLeod 2013. *The Great Extinctions: What Causes Them and How They Shape Life*. 208 pp. The Natural History Museum, London. Softcover. ISBN: 978-0-565-09278-8. Price: £14.99.**

Extinction is a topic of interest to all palaeontologists regardless of their sub-discipline and also to biologists, botanists, zoologists and the broader general public. Striking a balance that will appeal to such a diverse readership is not an easy thing to do, but in my opinion it has been achieved very well in this book.

The author has researched extinctions for the greater part of his academic career, but has tried to refrain from promoting his own points of view at the expense of those of others. Indeed, he seems to have struck a very good balance with regard to currently accepted versus more controversial ideas regarding the major mass extinction events. The first five chapters are introductory with the following headings: What is extinction?; Evolution, fossils and extinction; Patterns in extinction data; Kinds of extinction; and Causes of extinction. These occupy approximately one quarter of the book, but are by no means wasted space as they set the scene very well for what is to follow.

The following eight chapters cover the major extinctions: Precambrian and Cambrian; End-Ordovician; Late Devonian; Late Permian; Late Triassic; End-Cretaceous; Paleogene; and Neogene and Quaternary. For each, following a brief introduction, headed sections discuss the following topics: Setting; Extinctions; Timing; and Cause(s). To make the work more broadly accessible, it is not overburdened with reference citations, though some have been included where it was deemed important to do so.

A chapter on modern and future extinctions brings us out of the realms of palaeontology and into the present. In addition to urging caution in accepting rather outlandish claims for rates of modern extinctions, with many such claims based on non-existent data, the author also suggests how we might go about more accurately quantifying future extinction rates, in light of the general paucity of data

(and finance) available. He also discusses the difficulties of comparing data based on known extinctions in the Recent fauna with the considerably lower resolution data afforded by the fossil record.

Finally, there is a summary and conclusions chapter where we are reminded that without extinction evolution would grind to a halt. In a post modern synthesis, the take home message seems to be that the “Big Five” extinction events occurred over extended periods and were history-driven (rather than process-driven) anomalies, representing time intervals during which unusually intense background extinction intervals occurred together coincidentally. Such processes would have included the likes of tectonics, climate and sea-level change, marine anoxia, changes in ocean and atmosphere circulation patterns, and large igneous province (LIP) volcanism. This is referred to as the multiple interacting causes (MIC) scenario of mass extinction, with unique ahistoric processes (e.g., bolide impacts) also accounting for some proportion of the extinctions observed during the so-called mass extinction intervals. A summary table of proximate and ultimate causes for the major Phanerozoic extinction events is provided. The book ends with a glossary of terms, an index, the references cited and a list of acknowledgements.

The production quality is good and the layout is pleasing to the eye. A small number of typographical errors (mainly extra spaces in the running text) and inconsistencies have slipped through the proofing stage, but overall the copy-editing is very good. The photographs are clear and the palaeohabitat reconstructions are nice. However, in my opinion, this book stands out with regard to the other figures and graphs which condense large and often complicated data sets in an easy-to-interpret manner. Overall, I believe the book strikes an excellent balance and will be accessible to the educated layperson, while also being suitable as undergraduate reading material, and also as a general reference work for the more advanced academic. This book is excellent value for money and I highly recommend it to all the aforementioned readership categories, or indeed anybody with an interest in extinction.

David Penney [david.penney@manchester.ac.uk], Faculty of Life Sciences, University of Manchester, Oxford Road, Manchester M13 9PL, UK.