

Book Review

By Ed Starkey

Every now and then I stumble onto a book about which I become so enthusiastic that my friends suspect that I own stock in the publishing company. **Extinction: Bad Genes or Bad Luck?** by David M. Raup (W.W. Norton, 1991) is such a book.

Although, for many of us, a book on paleontology may not seem to be a likely choice for recreational reading, this book is fun to read. Raup makes a potentially dull subject exciting, partially at least with irreverence. Stephen Jay Gould writes in the Introduction that if Raup "has any motto, it can only be; Think the unthinkable (and then make a mathematical model to show how it might work); take an outrageous idea with a limited sphere of validity and see if it might not be extendable to explain everything".

Raup's emphasis throughout the book is on extinction. His main question is "whether the billions of species that died in the geologic past died because they were less fit (bad genes) or merely because they were in the wrong place at the wrong time (bad luck)." He concludes that extinction is a combination of bad genes and bad luck. Some species die out because they cannot compete or cope in their normal habitat, but "most species die out because they are unlucky. They die because they are subjected to biological or physical stresses not anticipated in their prior evolution and because time is not available for Darwinian natural selection to help them adapt."

Raup explores the likelihood that meteorite impact has been the primary cause of species extinctions detected in fossil records, ie. the source of "bad luck" and unanticipated biological or physical stress. Both sides of the issue are discussed, but after reading the book it is hard for me to dismiss meteor impact as a likely cause of extinctions. He really got my attention with the suggestion that the risk of a "civilization destroying" impact during a human lifetime might be 1:4,000.

Raup further suggests that extinction through bad luck does not challenge Darwin's natural selection. He believes that natural selection remains the best explanation for sophisticated adaptations such as eyes and wings, and that we would not be here without natural selection. His view is that extinction by bad luck only adds another element to the evolutionary process, operat-

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ing at the level of species, families, and classes instead of at the level of breeding populations of individual species.

Because I have recently spent considerable time thinking about threatened and endangered species, Raup's perspectives on recent and ongoing extinctions were especially interesting. He suggests that "human activities provide the first strike necessary to reduce species' ranges so that extinction from other causes is likely. Thus, current concerns about endangered species are justified because the human species is producing first strikes regularly – first strikes that nature supplies only at intervals of millions of years."

As Malcolm W. Brown of the **New York Times Book Review** wrote, this book is "An eminently entertaining and informative read." I especially recommend the book to those interested in conservation biology and biodiversity issues. Raup challenges us to consider time-frames greater than those measured in human lifetimes, and to keep an open mind about causes of extinction.

Raup is the Sewell Avery Distinguished Service Professor and a statistical paleontologist at the University of Chicago. Other books by him include The Nemesis Affair, also published by Norton.

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