

Book Reviews

Meteorites: Flux with Time and Impact Effects

M. M. Grady, R. Hutchison, G. J. H. McCall and D. A. Rothery (Eds)

Geological Society, London, Special Publications 140, 1998

Reviewed by John O'Byrne

On 18 July 1997 Gene Shoemaker, the well-known planetary geologist from Lowell Observatory, was killed in a car accident while pursuing his search for impact craters in outback Australia. In February of that year he had been the keynote speaker at the Fermor Meeting of the Geological Society which discussed meteorite flux and impact effects. His unfinished paper is the first contribution in this collection of papers arising from the meeting and the volume is devoted to his memory.

The idea that impacts of small asteroids or comets may be related to mass extinctions of terrestrial flora and fauna gained popularity with the work of Alvarez and his colleagues in 1980. They cited evidence in rock strata for a large impact 65 million years ago, coinciding with the major Cretaceous–Tertiary (K–T) mass extinction. That impact has now been identified with the Chicxulub crater, a feature ~180 km across in the rocks below Mexico's Yucatan peninsula. The evidence for this impact is clear, but the environmental consequences are subject to debate and the fossil record is ambiguous. The non-avian dinosaurs and pterosaurs certainly died out at this time, at least in the western interior of North America where the evidence is good. However, they were perhaps the only major terrestrial vertebrate group to become extinct around that time. The idea that other mass extinctions are related to impact events, or even that a periodicity in mass extinctions is related to the Earth's motion through the galactic plane, is much more slender.

This book addresses these questions by presenting the somewhat conflicting evidence of astronomers, geologists and palaeontologists relating to mass extinctions. The broad ideas presented in the various papers are well summarised in an introductory paper by the editors at the beginning of the book. The detail is to be found in the remaining 17 review papers, which are divided into four sections:

- the flux of extraterrestrial material determined by astronomical and statistical techniques
- the meteorite flux determined by studying small meteorites on the ground, primarily in Antarctica and the Nullarbor

- the study of terrestrial craters, including Chicxulub, and the evidence at impact sites, and
- the palaeontological evidence relating to mass extinctions.

As an interested outsider to this field I found it fascinating to have Napier, an astronomer and a chief proponent of a link between periodic impacts and extinctions and geological disturbances, make his case alongside palaeontologists such as MacLeod and Hallam who see no such link. The interested reader can move from these review papers to original publications using the extensive references provided by all the authors.

The study of meteorites on the ground today provides evidence for short term variability in impact rates of small objects, while the conclusions of the astronomers emphasise the need for programs to better estimate the numbers of potential large impactors. However, the larger uncertainties lie in the energy and mass of these objects and, most importantly, the environmental effects of an impact.

The arguments in this book make it clear that the importance of impacts in the evolution of life on Earth remains the subject of intense debate. This book is a well produced survey of the field as of early 1997, with extensive references and the welcome, but somewhat unusual feature in such a compendium, of an index at the back. The relevance of astronomical research to our understanding of the Solar System is obvious. I would recommend it to any library and anyone wishing to understand the debate over mass extinctions.

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On Mars

Patrick Moore

Cassell, London, 1998, 222 pp., ISBN 0-304-35069-9

Reviewed by Simon Johnston

Patrick Moore is a well known populariser of Astronomy and has written many books as well as hosting the BBC Series 'The Sky at Night' for more than 40 years. Most English speakers with a passing interest in astronomy will be familiar with his style of writing and his idiosyncrasies. His latest book, 'On Mars', is an excellently written book taking a tour through four centuries of observations of the red planet from the first primitive telescopes to the Space Age and the electronic Sojourner Rover. I have only a few