

Book reviews

ALBRITTON, C. C. Jr.: *Catastrophic Episodes in Earth History*. — 221 pp.; London (Chapman and Hall) 1989.

This little book is the second volume in the series *Topics in the Earth Sciences*, which is edited by T. H. Van Andel and P. J. Smith and intended as a means of providing geoscientists with easily accessible, nontechnical and nonpartisan but competent overviews of hot topics in various fields of broadly defined Earth sciences. The underlying rationale is that the flood of new publications makes it virtually impossible for any single person to keep track and critically evaluate the evidence and arguments appearing in the ever-growing spectrum of academic journals.

Albritton made in the 1930's a major contribution to the interpretation of cryptoexplosion structures as traces after extraterrestrial impacts. He also is a well known historian of geology. And his experiences in these two research areas nicely complement each other, helping him to produce a review of the modern catastrophic interpretations placed in a well developed historical context. Given recent developments in this field, it should come as no surprise that Albritton's focus is on mass extinctions and their environmental causation. His book is consequently of interest to the paleontologist who will find here brief, often telegraphic-style summaries of the majority of recent hypotheses, supplemented by a large and updated bibliography (almost 400 references, but beware typographic errors!). Brevity does not always come to the advantage, though. In some instances, these summaries are so short that they almost turn the arguments to a caricature. On the other hand, however, the conceptual framework of the current debate on catastrophic episodes becomes consequently more distinct.

The methodological fundamentals of geology certainly include Lyell's methodological uniformitarianism and Occam's Razor, which jointly demand that the causes for past geological phenomena be primarily sought among ongoing processes. It is only after the commonly observed processes prove insufficient to account for the phenomena that we can turn to less common processes, and finally even to rare events. Since the time several meteorite impacts have been identified by their structural, mineralogic, and geochemic fingerprints and a quite substantial frequency of such events has been noted, Earth's collision with extraterrestrial objects must

also be included on the list of processes that geoscientists seriously consider. And since the amounts of energy liberated by collision with a large bolide are enormous and can account for a wide variety of major environmental changes, extraterrestrial impacts provide an extremely attractive alternative to more mundane explanations for many geological and paleontological phenomena.

The trouble is that this alternative often appears overly facile. The catastrophists, who accept it, too easily invoke plausibility arguments instead of searching for mechanisms that could translate the postulated causes into the observed phenomena. Their opponents, in turn, too easily focus on criticisms alone or turn to ad hoc hypotheses. It seems to us that the only way out of the present dilemma is (i) to seek conservative causes that might potentially explain the empirical observations and to test them for sufficiency, and (ii) to critically analyze in quantitative terms the environmental effects of collisions with impactors of a given structure and energy, hitting in a given site. It is partly the fault of the book to make a false impression that nothing has been made thus far along these lines.

Albritton attempts to take no particular stance in the debate. He clearly slips, however, to the catastrophist camp. This is quite evident in the way he treats cryptoexplosion structures. A large proportion of these are in fact subject to a major controversy, as illustrated by their rival name, cryptovolcanic structures. For example, Albritton considers the famous Vredefort dome in South Africa as an impact crater, while the majority opinion appears now to be that it unquestionably represents deep explosive volcanism. Similarly, the absence of a clear definition what is meant by the terms 'catastrophic episodes' and 'mass extinctions' seems to suggest that everybody knows what they designate, whereas the very existence of phenomena that could be validly described in such terms is hotly contested by many geoscientists.

In summary, the book offers a guide to the fascinating problem of dramatic geological phenomena and their environmental causation, which has become so fashionable all over the world. It also hints at the methodological problem of choosing between rival explanations. But it should be read with much care.

Krzysztof Małkowski and Antoni Hoffman
Institute of Paleobiology
Polish Academy of Sciences
Al. Zwirki i Wigury 93
Pl-02-089 Warszawa, Poland