

CATASTROPHIC EPISODES IN EARTH HISTORY. By Claude C. Albritton, Jr.
(1989) Chapman and Hall, 220 p. Paperback \$ 12.95.

Knowledge about the Earth and processes operating on it is growing so rapidly that it has become next to impossible to keep pace with the increasing tempo of research. We should, therefore, feel grateful to persons who take the trouble of distilling the growing knowledge in certain specialised fields and make it available to the non-specialist reader in an easily assimilable form. This is what the books in the present series aim to do. They are intended 'to break a path for us to new or little known territories of the Earth Sciences without doubting our intelligence, insulting our erudition or demanding excessive effort'.

The earlier sections of this eminently readable book takes us rapidly through the developing ideas about Earth as formulated by stalwarts like Burnet, Steno, Hooke, Warner, Hutton, Lyell and Smith.

Lyell was the champion of 'uniformitarianism', the theory that 'the laws of nature are permanent and immutable' and that there is no need to arbitrarily assume the existence of catastrophes. Was he right in selecting the period in which we live as the standard for reconstructing the history of all earlier epochs? Obviously there is room for differences of opinion. Sedgwick pointed to the discontinuities in the record of ancient life to be the result of sudden and revolutionary events separated by long periods of quiescence.

Evolution of our idea on impact and explosion craters is traced next and a brief description of the more important impact craters presented. Controversies regarding the origin of the craters is discussed. Urey's theory of mass extinction as a result of profound climatic changes which followed such impact is examined. Five episodes of above normal extinction (Late Ordovician, Late Devonian, Late Permian, Late Triassic and Terminal Cretaceous) are outlined. We also get to know of Fischer's hypothesis of Supercycles which postulates global climatic changes in response to long-term changes in sea level and in the amounts of carbon dioxide and water vapour—the result of greenhouse and ice house effect.

The catastrophist scenario for mass extinction is then summarized. We are told of the element iridium being chosen for study because it is 10,000 times more abundant in stony meteorites than in crustal materials. Iridium content in the boundary clay marking Cretaceous-Tertiary transition has been found to be very high, pointing to an extra terrestrial source in the form of an asteroid. Other evidences include presence of mineral grains showing evidence of excessive shock lending support to the impact theory. To what extent the Deccan Syncline owes its origin to multiple bolide impact is a debatable question. The book does not, however, raise this issue.

A separate chapter is devoted to the extinction of Dinosaurs which made their appearance in the latter half of Triassic and soon occupied diverse habitats. The cause of their sudden extinction has remained a puzzle for which satisfactory answers have yet to be found. Did they die out suddenly at the end of Cretaceous or peter out slowly? We are informed that extinction is the normal way of life and that more than 99.9 per cent of all the species that existed on Earth are now extinct!

The criticism of the catastrophic hypothesis to account for mass extinctions are then outlined. The idea that iridium anomaly at the C/T boundary is related to

extra-terrestrial impact has not merited universal acceptance. It is pointed out that volcanic flows with their source of magma at great depth could also give rise to iridium anomaly. The extra-terrestrial origin of microspherules is also similarly questioned. They have been reported from different horizons unconnected with mass extinction. Volcanism and the attendant shock metamorphism, changes in global temperatures causing glaciation, changes in sea level and changes in plant life are adduced as alternative causes for mass extinction. This section summarizing various view points makes interesting reading.

In spite of all that has been stated to the contrary, uniformitarianism still holds sway. The age of the Earth is so vast that remarkable changes can be effected even though the processes are gradual. Voyage into space which commenced 30 years ago, has added a new dimension to our knowledge. It has become obvious that the Earth has been hit by flying objects. The impact of foreign bodies, therefore, is a fundamental process in planetary evolution. Brief periods of rapid changes appear to have alternated with protracted period of gradual changes. The life of the soldier which consists of long periods of boredom alternating with short periods of terror is an apt analogy.

Catastrophists are not as black as they are made to appear. Uniformitarianism likewise is not a panacea and cannot be swallowed wholesale without qualification. A compromise between the two schools of thought appears a possibility. The book under review makes fascinating reading. It is recommended as a remarkably good and readable summary of a vast amount of recent research on catastrophism and its role in mass extinction.

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INTERPRETATION OF FILTERED GRAVITY MAPS. By F. Steiner and L. Zilali-Sebess (344 pages), Published by Akademiai Kiado, Budapest, 1988.

This book presents a summary of authors' own work, in Hungarian, spread over a period of twenty years in putting the known coefficient sets of the once-popular grid systems in an 'octant matrix' format and in elaborating their 'weight function'. This book avoids all the current and more popular methods for similar purposes. It does not refer to any mathematical transforms and excludes all information suggested by its title, viz., methods to find the nature of the anomalous bodies from the filtered maps.

The book is divided into seven chapters, grouped into three parts and is supported by eight appendices. Part I with two chapters classifies the classical methods of regional residual separation, continuation and derivative calculations into 'mathematical' and 'task-oriented' filtering schemes and puts their numerical coefficients in an octant form. Parts II and III, with two and three chapters respectively, are fully devoted to introduce, develop and overplay on what they call the 'W function'. The appendices include tabulation of several filters they developed for different combinations of smoothing, depth and expected task.

The title of the chapters are as deceptive as the title of the book. Chapter II on 'practical realization of map transformations' contains elementary methods of computer contouring, interpolation, reduction to a common datum and enhance-