

identification of primary magmas, while many geologists may feel that Stearns's statement "It is believed from the above data that the alkalic suite of rocks are derived by crystal settling, gas transfer, and filter pressing, from the parent tholeiitic magma in compartments within the upper crust" is misleading if not wrong. (The data referred to are the proportion of alkali rocks in Hawaiian volcanoes.)

Many may enjoy reading about the real nature of the jewellery which passes for Pele's hair, but nevertheless this book is for the dabbler in geology rather than the specialist.

A. M. MARSHALL

HOW IT ALL WORKS

Physics and Chemistry of the Earth

Vol. 7. Edited by L. H. Ahrens, Frank Press, S. K. Runcorn and H. C. Urey. Pp. v+337. (London and New York: Pergamon Press, 1966.) 105s. net.

FOR various reasons studies of the physics and chemistry of the Earth are proceeding at a faster rate now than ever before, and there seems to be no prospect of a slackening of the effort being put into attempts to understand conditions within the Earth. This is the seventh volume in a substantial series which has commanded the respect of all geo-scientists for its wide ranging authority, and the four editors have been among the most prominent in maintaining the momentum in the Earth sciences. One therefore looks forward to every new volume as not only an up-to-date authoritative summary but as prophetic of where future developments should occur.

This volume differs from its predecessors in containing only three contributions, each of them of substantial size and, particularly with regard to the first and last, in conception almost of book dimensions.

The first contribution on orogenic fold-belts and a hypothesis of Earth evolution by R. Dearnley is geopoetry at its most expansive. Dr. Dearnley rightly points out the limitations that ignorance of the Pre-Cambrian imposes on anyone interested in the development of the Earth, and attempts to rectify this by an impressive, if exhausting, catalogue of folding from the "Superior regime" (3,500-1,950 million years ago) through the Hudsonian to the Grenville regime (1,075 million years to the present). He collects a vast amount of data on this subject but loses plausibility as soon as he slips into the geopoetic, which he is prepared to do at a moment's notice. Wordsworth's "It is not now as it hath been of yore" would seem an appropriate line, for Dr. Dearnley casts admiring glances at core expansion, polar wandering, changes in G and variations in Coriolis force controlled convection current patterns. The edifice is inevitably shaky and invites destruction by a medium-sized push, but the paper is not by any means pointless, as it should trigger argument. It is unfortunate that it was finished before the appearance of the Royal Society Symposium on Continental Drift, which one must feel would have helped considerably in its construction.

Professor Markus B ath of Uppsala has for many years been deeply concerned with the thorny problems of earthquake energy and magnitude, and it is therefore appropriate that he should contribute an article on that subject. It has never been a very fashionable topic among seismologists, lacking the immediate interest of body-wave and surface wave time analysis, and those who have pursued the problem have, as Professor B ath points out, gone about it in very diverse ways. His account errs on the side of all-inclusiveness and, although the essay is the shortest in the book, it is by no means an easy read. One feels that a more personal approach in which the author did not feel the need to cover all the ground comprehensively might have paid off. That the subject is by no means sewn up is shown by B ath's wry

comment that one recent estimate is "probably forty times too low". In this subject we are barely getting below the order of magnitude level.

I viewed with some foreboding the last, very substantial essay by Haskin, Frey, Schmitt and Smith on meteoritic, solar and terrestrial rare earth distributions, as my knowledge of the subject was trivial. Such is the verve and vitality of the authors and so great is their ability to convey a huge number of facts rapidly and digestibly, however, that I emerged, if not infinitely wiser, certainly aware of the importance of the subject and with the knowledge that here is an excellent mine of information. The authors really attempt to cover too much of the enormous literature in 150 pages, and this article, above all, might well have been expanded into a book. They convey the healthy impression of a sceptical community who do not believe that all the work has been done already. But not a paper to attempt to read if slightly jaded!

The whole book is handsomely produced, and although it is heavy reading it is strongly recommended to all who are struggling to keep up with the vastly expanding field of the Earth sciences.

D. DAVIES

BASIC SEDIMENTOLOGY

Developments in Sedimentology, Vol. 9B

Carbonate Rocks: Physical and Chemical Aspects. Edited by George V. Chilingar, Harold J. Bissell and Rhodes W. Fairbridge. Pp. 413. (Amsterdam, London and New York: Elsevier Publishing Company, 1967.) 150s.

THIS symposium, with its companion volume, sets out to be a comprehensive treatise on carbonate rocks. With the exception of the discussion of the physical chemistry of formation of carbonates by W. H. Taft, contributions are reviews rather than the result of original research.

Nearly a third of the volume is devoted to a paper on elemental composition of carbonate skeletons, minerals and sediments by K. H. Wolf, G. V. Chilingar and F. W. Beales. This, together with W. H. Taft's paper and those on stable isotope distribution in carbonates by E. T. Degens and chemistry of dolomite formation by K. J. Hsu, summarizes the organic and inorganic factors known to control carbonate composition, and shows how some components can be used in environmental reconstruction.

The discussion of techniques of examining and analysing carbonate skeletons, minerals, and rocks, by K. H. Wolf, A. J. Easton and S. Warne, provides a convenient and comprehensive synopsis not available elsewhere, although many of the methods are already well known.

The origin of petroleum in carbonate rocks, considered by J. W. Hunt, and properties and uses of carbonates, by F. R. Siegel, are also valuable. Siegel's lists of selected physical constants are an unusual addition to a geological work of this kind, and perhaps overdue.

The most disappointing contribution is that on the influence of pressure and temperature on limestones by B. L. Mamet and M. d'Albissin. More experimental work has been done than the authors present, particularly on compaction of recent sediments and the textural effects of deformation.

The book lists 1,051 references (some duplicated) and gives, with the authors' contributions, a pr cis of a large and important volume of literature, including many Russian works. Graphs and tables, while contributing to the high cost, provide convenient summaries of data.

This work fulfils three useful functions. First, it can inform the new worker what has been done, how, and where remaining problems lie. Second, it provides for specialists a reference book for fields other than their own. Third, it may also be of value to more advanced university students.

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