

coverage of the problems encountered with specific minerals and natural glasses. The variable, temperature-dependent sensitivity of different minerals to track-recording and track-fading, which has exciting possibilities for establishing the thermal history of some rocks and rock masses, is given only cursory treatment. Chapters 5 and 6 are on the use of tracks in elucidating the nature of both ancient and modern energetic particles in space and, therefore, will be of relevance to those interested in meteorite and lunar research or in the subject of nucleosynthesis.

The last four chapters (7 to 10) comprise the third part, discussing nuclear science and technology. Of interest to the mineralogist will be the sections dealing with element mapping in samples, and the use in uranium exploration.

This, in my view, is an important book that deals with a subject of considerable significance to mineralogy and the other Earth sciences. It is well written, excellently produced, and with its wide coverage but usually rigorous approach should be the standard work on the subject for many years. The full reference lists, covering nearly all the published work up to 1974, will be invaluable. If one is to look for faults in the presentation, the index is more scant than it appears at first sight, and the book lacks a list of abbreviations and symbols used in the text, but these are minor grumbles. The book should form an essential part of any Earth science library and will be at the elbows of the practitioners of the method.

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Le Bas (M. J.). *Carbonatite-nephelinite Volcanism*. New York and London (John Wiley & Sons), 1977. xii + 347 pp., 48 figs., 21 pls., 47 geol. sketch-maps. Price £22.00.

At the outset, the potential purchaser of this book should be aware that, despite its rather general title, approximately 240 out of the 290 pages of text deal directly with the carbonatite-nephelinite Neogene magmatic province around Homa Bay, western Kenya. This is in keeping with the author's stated intention 'to study in detail the structural and petrological relations of a suite of well-developed examples within a limited area and to deduce the principles involved'.

The Homa Bay province (possibly linked with the East Uganda carbonatite-nephelinite province to the north) is one of extreme interest since, in the degree of dissection of some of the volcanic structures, it is intermediate between Napak and the modern carbonatite volcano Oldoinyo Lengai. On the other hand, some of these later volcanoes have erupted almost precisely in the same area as older,

well-eroded ijolite centres; thus, within a very small area, differing levels of carbonatite-nephelinite volcanoes and their sub-volcanic complexes are exposed, allowing *inter alia* detailed studies of their various types of fenitization. In all, six ijolite intrusions (Uyi-Angalo, Usaki, North and South Ruri, Sagurume, southern Rangwa, and Homa Mountain) and eight carbonatite-nephelinite volcanoes (Kiyako-Nyamgurka, Rangwa, North and South Ruri, Okuge, Wasaki, Sokolo, and Homa Mountain) are described, the duplication in the listings emphasizing the multiple stages of activity at these centres. There is a wealth of data, particularly on field relationships and modal analyses, that is only really appreciated after reading for the second or third time. Finally, the last two chapters—on magmatic and metasomatic processes and the petrogenesis of the carbonatite-nephelinite association—pull together the many observations and raise the debate from the localized to a more general level, as did Garson in his Chilwa Island memoir. Important points made are: the dominance of an olivine-free ijolitic/melanephelinite parental magma of upper-mantle origin, and the absence of any connection of this magma with the coeval alkali basalt magmatism in the Gregory Rift Valley to the east; the absence of any tectonic connection between the Homa Bay province and the formation of the Kavirondo Rift Valley; the contrasting metasomatism associated with ijolites and carbonatites (together with the recognition that most carbonatites probably had a high original content of alkalis); and well-developed carbonatite intrusion sequences that can be seen only partially developed in other provinces. Appendix 1 is a useful compilation of radiometric dates on rocks within the province.

What of the shortcomings? The approach is of detailed field relationships and petrography but, presumably due to cost and/or absence of space, there are disappointingly few data on the mineralogy (only four tables). There are, in Appendix 2, some 200 analyses of rocks from the province but, again, not much is done with them, though they do provide a useful block of data. Two further points that the reviewer noted (possibly due to his own preoccupation with such features) are: (1) could not some of the 'sedimentary' pyroclastic units at some centres be due to base-surge deposition?; and (2) on the evidence presented, the kimberlitic affinities of the Lake Simbi explosion crater are open to question.

The book is well printed, line diagrams are clear, and the plates well reproduced. Bearing in mind that the book is the result of a prolonged project by seven research workers from Bedford College and Leicester University, the author is to be congratulated.

lated on an excellent consistency of presentation in such a formidable task of compilation. Finally, should you buy it? For the carbonatite *afficionado* the book is a must, but for other individuals the rather limited subject combined with the high price will inevitably be a deterrent and they will probably be forced to rely on the copies that ought to be purchased by all geological libraries.

J. B. DAWSON

Coleman (R. G.). *Ophiolites: Ancient Oceanic Lithosphere?* (Minerals and Rocks, vol. 12). Berlin, Heidelberg, and New York (Springer-Verlag), 1977. x+229 pp., 72 figs. Price DM. 68.00 (\$30.00).

Robert Coleman in the preface to this book states its purpose as being '... to provide a starting point for anyone interested in the background and state of knowledge concerning ophiolites (ancient oceanic lithosphere)'. The parentheses are Dr. Coleman's and emphasize his views, stated elsewhere in the preface, that '... ophiolites represent fragments of old oceanic crust...'. This is a reasonable attitude for if ophiolites are not fragments of oceanic lithosphere (albeit less than 0.001% of that formed during the Phanerozoic and seemingly mainly formed beneath minor, marginal seas) it is exceptionally difficult to think what they are.

The text is divided into eight parts. Two short introductory sections on 'What is an ophiolite?' and 'Plate tectonics and ophiolites' are followed by lengthy descriptive sections on igneous (72 pp.) and metamorphic petrology (21 pp.), before ore deposits, geological character, and emplacement tectonics are briefly discussed. Part 8 consists of a description of four classic ophiolites: the Bay of Islands, Newfoundland; the Troodos massif, Cyprus; the Semail ophiolite, Oman; and Eastern Papua, New Guinea.

Much of this book is devoted to igneous and metamorphic petrology. This, as becomes a survey geologist, is set out in orderly fashion and, after a brief introduction, each unit, starting at the bottom with 'peridotite with tectonic fabric' and going upwards to 'extrusives', is described. Each section is in turn subdivided into—introduction, structure, mineralogy and petrology, and chemistry. Metamorphic petrology and ore deposits receive similar systematic treatment. Only in the first two parts when discussing 'What is an ophiolite?' and 'Ophiolites in the plate tectonic framework' and in Parts 6 and 7 on 'Geologic Character' and 'Emplacement Tectonics' does the author allow his imagination any liberty.

The book is well presented. The literary style is clear and the diagrams acceptable although most are direct copies of those that appeared in the origi-

nal papers. Referencing is odd. Original sources are only rarely quoted, more recent works of synthesis being usually preferred. Furthermore, certain favoured references are repeatedly quoted whereas others, often of greater significance in the development of the ophiolite saga, are omitted or receive only brief mention. My major comment, however, is about the data the author has seen fit to include and more significantly what he has omitted. For instance, I found the detailed treatment of major element abundances, with its numerous tables of analysis and variation diagrams, unrealistic, for most experts in this field now agree that these data are petrologically unreliable. Conversely, the treatment of stable isotope and trace element information is shallow, dated, and in places naïve. The presentation of four case studies at the end of the volume has necessitated considerable repetition and so far as Troodos is concerned the description given varies in several major respects from the currently preferred model of those working on the complex. At his self-imposed cut-off date (December, 1975), the author was one of the few who had had the opportunity to study the Oman ophiolite. Timing is undoubtedly to blame that in this case recently acquired data could markedly modify the ideas Dr. Coleman presents. On the descriptions of the New Guinea and Newfoundland ophiolites I cannot comment. The other sections are much more generalized and subjects such as 'Ophiolites and plate tectonics' and 'Emplacement mechanisms' have been the subject of several works of synthesis. Here we have a synthesis of syntheses in which the author's own beliefs and predilections show clearly through.

To those involved with ophiolite research this text has been long and eagerly awaited, but, on arrival, it falls somewhat short of expectations. It is good, but it could have been so much better. Yet, the author is the doyen of north American ophiolite geologists and uniquely well equipped to prepare this text. It fails to totally satisfy, probably because one view and one style of treatment dominates in an area where there are multitudes of approaches, opinions, and beliefs. Also, many statements are polemic and other passages contain little that either advances knowledge or promotes debate. The wisdom of asking any one person, however expert or eminent, to prepare an advanced text of this nature is questionable. Nevertheless, there is no doubt that this book will be a useful addition to any geological library and a valuable reference source for those engaged in ophiolite research for although the information it contains has mostly appeared elsewhere, this is the first time a synthesis of this detail has been prepared and bound into one volume.

I. G. GASS