

Aubert (H.) and Pinta (M.). *Trace Elements in Soils* (Developments in Soil Science, 7). Amsterdam and New York (Elsevier Scientific Publishing Co.), 1977. x + 395 pp. Price Dfl. 145.00 (\$49.50).

This translation clearly fulfils the authors' aim of providing researchers in English-speaking countries with rapid and convenient access to extensive information on total and extractable trace elements in soils, compiled from world-wide sources by l'Office de la Recherche Scientifique et Technique Outre-Mer, and mainly for the thirteen elements—boron, chromium, cobalt, copper, iodine, lead, manganese, molybdenum, nickel, selenium, titanium, vanadium, and zinc. It differs from the original 1971 French edition by the inclusion of over 300 bibliographic references for the period 1968–75 and by the introduction of the 7th Approximation (U.S.D.A.) Soil Classification System into the Synoptic Tables as an additional means of identifying the types of soil studied. The newer references, however, have only been listed without critical comment in the general text, forming the first section of the book, and have not been summarized in the very useful Synoptic Tables that occupy the remaining two-thirds. The book is intended for pedologists and agronomists, but the price may well deter many of them from placing it on their shelves.

J. C. BURRIDGE

Hurlbut (C. S., Jr.) and Klein (C.). *Manual of Mineralogy (after James D. Dana)*, 19th edn. New York and London (John Wiley & Sons), 1977. xii + 532 pp., 506 figs. Price £14.00.

This new edition is an excellently produced volume, the clarity of typography and illustrations producing an immediately favourable impression.

The chapter on crystallography is amplified by an account of point group symmetry, fifty-seven pages are devoted to crystal chemistry and crystal structure, and a short paragraph on crystal structure and chemistry is added to each of the 200 descriptions of minerals. This last feature is supported by many new, and mostly very good, diagrams of structures. All these additions give a welcome aspect of modernity. The new chapter (33 pp.) on phase equilibria and petrography is too brief to be of much use.

The treatment of optics remains traditional. Reflected light is neglected. The descriptions of minerals provide few graphs of variation in optical properties of rock-forming minerals: the feldspar group rates one determinative graph—r.i. and S.G. of plagioclase. The determinative tables suffer from the same defect, all species being grouped by gross

physical properties only. This limits the usefulness of the book to students and for them it is not today's best buy.

M. H. BATTEY

Fleischer (R. L.), Price (P. B.), and Walker (R. M.). *Nuclear Tracks in Solids: Principles and Applications*. Berkeley and London (Univ. California Press), 1975. xxii + 605 pp., 205 figs., 1 pl. Price £22.00.

It is not yet twenty years since E. C. H. Silk and R. S. Barnes first reported on the occurrence in mica of fission fragment tracks, but in that period there has been a remarkable growth in the number of studies and published papers on the formation and analysis of particle tracks in solids—over 1300 papers had been published by mid 1973. Many of these relate to the Earth sciences where applications of the technique include geochronology; determination of cosmic ray nuclei; identification of extinct radio-isotopes in meteorites; mapping of fissionable nuclide distributions, as well as lithium and boron, on a microscopic scale; and in uranium exploration.

One of the strengths of the particle-track method is its relative cheapness—for many applications little more is needed than a good microscope and a painstaking research worker. The state of development and the scope of particle-track studies is such that it is a very appropriate time for the publication of this book, especially when the authors are probably the most authoritative in the field.

The first part (Chapters 1 to 3) deals with the formation and etching of tracks and the methods of nuclear particle identification. The experimental techniques are given in some detail so that a beginner will be able to use the book as his laboratory manual. For example, a relatively complete list of optimum etching conditions for different minerals, glasses, and plastics is given, together with much previously unpublished information. This detail ensures that the experienced researcher also will find it a useful manual: a recent visit to a research institute in Paris, where particle tracks have been a subject of study for many years, showed a well-thumbed copy on the laboratory bench.

The second part (Chapters 4 to 6) covers the applications in the Earth and Space sciences and starts with a fairly detailed exposition of fission-track dating. The method can cover a wide time range and is particularly useful in the span from about  $10^4$  to  $10^6$  years where carbon-14 or K-Ar dating methods are awkward to apply. The section on procedures deals with sample selection and preparation and with track counting, but some geochronologists would wish to have seen more

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.

PAUL HENDERSON

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.