BOOK REVIEWS

Embrey, P. G. and Symes, R. F. *Minerals of Cornwall and Devon.* London (British Museum [Natural History]) and Tucson, Arizona (Mineralogical Record), 1987. vi + 154 pp., 36 figs., 114 colour photos., 8 maps. Price: Hardback £19.95, paperback £9.95.

The first half of this well-illustrated book deals with the geology, mines and mining in this classic area, with numerous maps, black-and-white photographs of mining operations in the last century and details of the development of special skills and techniques to deal with the difficulties of mining such refractory material. These innovations were later carried throughout the world by pioneering Cornishmen. There is also a fascinating section on collectors and mineral dealers—including a facsimile of part of a letter from Philip Rashleigh to John Hawkins in which Rashleigh writes 'The expense of procuring specimens has increased to such extravagance that if my collection was not considerable at present, I should not have begun now'—'now' being 1802! The authors point out that most dealers had a wholly different main source of livelihood, often of a kind likely to bring them into contact both with possible customers and with the main source of specimens, the miner and his family. Richard Talling of Lostwithiel is described as, beyond question, the greatest Cornish dealer of all time, flourishing in the years 1844–83 when mining activity was at its peak in Cornwall.

In the second part of the book the minerals themselves are presented, with brief descriptions of each with an account of the paragenesis and locality and some 80 truly magnificent colour photographs. Most of the specimens are selected from the collections of the British Museum (Natural History), now augmented and enriched by the incorporation of the collections of the Geological Museum.

There was undoubtedly a need for such an illustrated account of both mining and minerals in the southwest of England. The maps of the localities of the various old mines long-closed are invaluable. The authors kindle the imagination with details of old and rich tin mines and collectors and dealers of bygone days. Devon unfortunately gets condensed into three pages, but references to its mines and minerals are included in the 1100 entries given, together with annotations and selective bibliography.

This is a marvellous book at an extremely reasonable price, which all mineralogists, amateur or professional, throughout the world will want to have on their own shelves.

R. A. HOWIE

Nixon, P. H. (Editor) *Mantle Xenoliths.* Chichester and New York (John Wiley & Sons), 1987. xviii + 844 pp. Price £99.00.

The subject matter of this excellent book is much wider than the title indicates. It is a monumental work encompassing mineralogical, chemical, experimental, geophysical, tectonic, age and isotopic studies of upper mantle and lower crustal products. Twenty years ago, mantle heterogeneity was looked on as a possibility that had only just begun to be investigated, and only a handful of papers per year were published on mantle rocks. It is significant that the editor (and contributing author) of *Mantle xenoliths* was even then committed to the study of nodules in kimberlite, so he has brought over twenty-five years experience to the production of the present over-view by seventy-eight authors.

The book is in two parts. The first is largely factual and lists the occurrences of mantle xenoliths, paying particular attention to their structural setting in a plate tectonic framework. The amount of information given on each suite of rocks is dependent on availability, coverage of South America being less than that for Mexico. Detailed information, whether chemical, petrological or geographical, is invariably well tabulated, but the editor appears to have insisted, successfully, that this must be reinforced by its incorporation in simple and lucid figures and graphs. One surprising omission, however, is the absence of information on the xenoliths of the Eifel. Although the rocks are mentioned by several authors, they are allocated only one third of page 98. The author(s) of each chapter provide often unique local knowledge, rendering this part of the book an important source of information for students of alkaline rocks, carbonatites and kimberlites, the hosts of the mantle nodules.

In the second half of the volume the chapters are largely interpretative, but new data and summaries of published data are provided. Topics range from

isotopic studies of xenoliths from localities covering one million square kilometres to the compositional heterogeneity within a single nodule 18 cm in diameter. Herein lies the difference between our present state of knowledge and that of 1967. We now know that the mantle is heterogeneous on centimetre, kilometre, and thousand kilometre scales. With its apt and well produced colour plates, lucid figures and wealth of information, this book is value for money and an excellent review of the state of the art.

ROBERT HUTCHISON

Menzies, M. A. and Hawkesworth, C. J., eds. *Mantle Metasomatism.* London and New York (Academic Press), 1987. xx+472 pp. Price £46.00.

There is a growing appreciation amongst geoscientists that much of the upper mantle may have been metasomatised, but there is less consensus as to what that involves. This book provides a timely review of recent research in mantle metasomatism, and resolves some previous confusion in the terminology.

The book contains 11 chapters written by 22 authors which have been well organised into three Parts, with titles which are largely self explanatory. Part 1 (Theoretical and Experimental Foundation; 2 chapters) provides the necessary background for the expected behaviour of metasomatising fluids and melts, with important new data for solute capacities. Part 2 (Metasomatism and Enrichment in Lithospheric Peridotites; 6 chapters) examines the xenoliths themselves, combining mineral chemistry, whole-rock and isotope chemistry with petrographic studies. This Part is particularly well illustrated, with abundant photomicrographs (including 4 full page colour) and line drawings. Huge variations in incompatible element (especially *REE*) levels and isotopic histories occur on a mineral grain scale, with obvious implications for mantle heterogeneity. Part 3 (Enrichment Processes and Basaltic Volcanism; 3 chapters) uses the inverse approach of characterising mantle metasomatic processes by deduction from the trace element and isotope geochemistries of oceanic and continental volcanic magmas.

The book is fully referenced at the end of each chapter, and has a comprehensive 7 page index. It is well written and contains numerous annotated diagrams and data tables that should encourage reading by any active researcher with an interest in the upper mantle, including final year undergraduates. It is valuable both as a first-source text and for secondary references on mantle metasomatism that should be available to every geoscientist.

A. P. JONES

Morris, E. M. and Pasteris, J. D., eds. *Mantle Metasomatism and Alkaline Magmatism.* Colorado (Geological Society of America; Special Publication **215**), 1987. x+383 pp. Price $45.00 (postpaid).

The volume opens with an excellent review of intrinsic oxygen fugacity data (IOF). Ulmer *et al.* consider the problems inherent in such determinations but conclude that redox heterogeneity *does* exist in the mantle. The redox state may have much to do with a complex pre-history that involves polybaric crystallisation of alkaline (Wilshire, Nielson and Noller) and kimberlitic (Eggler *et al.*) magmas producing dykes (enrichment process) and altered wall-rock (metasomatic process) that contain distinguishable sulphides (Dromgoole and Pasteris). The origin of such metasomatic melts is apparently caused when melts intersect the two cusps on the peridotite–H_2O–CO_2 solidus (Meen). The ensuing reactions apparently produces mantle similar to the Leucite Hills (USA) volcanics, the Westland (New Zealand) lamprophyres (Barreiro and Cooper) and the Nunivak–St. Paul's rocks. Roden 'ages' the Nunivak and St. Paul's peridotites in an elegant demonstration that only recently metasomatised mantle can produce Na-rich alkaline magmas whilst old metasomatised mantle is a more likely source for K-rich magmas. The picture is further complicated (Shervais *et al.*) by the need for hybridisation of melts to produce certain kimberlitic magmas. Diamond occurrences (Bergman *et al.*, Janse and Sheahan, Mansker *et al.*, Waldman *et al.*) are not all kimberlitic, being related to either sedimentary conglomerates of ophiolitic? derivation or kimberlites that may be olivine lamproites. Off the stable cratons, subduction-related continental volcanic rocks evolve to rhyolites whilst extensional volcanics remain essentially undifferentiated (Price *et al.*) Closer examination reveals *early* differentiated volcanics on rift margins and *later* undifferentiated volcanics on rift valley floors (Kempton *et al.*) due to priming of conduits for mantle-derived melts (Barker *et al.*). Involvement of depleted mantle and crust is invoked where one has syenites, carbonatites and other alkaline rocks (Hill and Barnes, Morris, Tilton *et al.*, Zartman and Howard). Comparative data from alkaline volcanics erupted on the continents and in the oceans (Nelson and Nelson) reveal that crustal thickness produces different derivatives. Oceanic alkaline volcanic rocks