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