

wide acceptance in many areas of science. However, it is clear that sample introduction or presentation is still a limiting factor for some sample types.

The quality of the figures is variable and style varies from one contribution to another — as does font and layout. Despite its vivid hardback cover, this book contains contributions of rather mixed quality and content. Unfortunately, the editors' wish to "allow authors the opportunity to preserve their ideas and observations intact" has led to a lack of uniformity and consistency in the expression of units of measurement and unexplained abbreviations. Poor proof reading, reflected in numerous errors throughout, spoils what would otherwise be an interesting and informative collection of papers.

K. E. JARVIS

Augustithis, S. S., *et al.*, Eds. *High-Grade Metamorphics*. Athens (Theophrastus Publications S. A.), 1992. Price US\$ 60.00. x + 504 pp.

This compilation volume purports to present papers addressing modern and key issues in high-grade metamorphism as well as 'innovative' interpretations for the origin of granulites and mineral assemblages in both well- and little-known high-grade terrains. Although useful as a source of basic data and information on regions for which little is currently available in accessible journals, much of the information presented in the various papers is piecemeal and only a few of them present coherent reviews of the geology of their described areas. For example, several papers present rock geochemical data where mineral chemical and structural information would be much more useful. The utility of this volume is limited too by the propensity of some authors to indulge in large scale, unsubstantiated or even wild speculations about processes, tectonic settings, and petrogenesis on the basis of poor, limited or at best only vaguely indicative data.

The book includes 19 papers arranged in five somewhat artificial sections, namely fluid, granulites, charnockites, 'sillimanites-metamorphics' (i.e. metapelites), and regional considerations. The 'fluids' section includes three papers which look at rather different aspects of the subject. Shlygin considers the physical aspects of fluid movement in 'locked' circulating systems in the crust, invoking fracture propagation but leaving the lengthscales vague. Gupta compiles evidence for CHOSCl fluids, summarises experimental data on H₂O-CO₂ fluids, and gives brief examples of the roles of fluids in solubility, kinetics, anatexis and reactions in a paper that is broad but hardly a critique. Srikantappa *et al.*

present an orthodox application of fluid inclusion microthermometry to a granulite suite, making the usual assumptions about peak entrapment of high density inclusions.

The 'granulites' section contains five papers describing aspects of terrains in the former Soviet Union (Anabar and Ukrainian shields) and India (Eastern Ghats and Gujarat). There is useful documentation and description of mineral assemblages in some of these, but the emphasis on geochemical characterization of rock types in others is not well-founded in the absence of proper descriptions of the rock relations and deformational histories. Rosen (Anabar) and Rao & Rao (Eastern Ghats) speculate that the granulites in their regions were derived from island arc magmas and marginal platform sediments on the basis of rather general geochemistry but do not establish timing or evolutionary relationships which could aid in understanding the development of the terrains.

Charnockites are considered explicitly in three papers. Nambiar *et al.* apply relatively recent geothermobarometry and geochemical tools to igneous charnockites from northern Kerala, whereas Rao and Kumar adopt a traditional descriptive petrographic approach complemented by some basic mineral and rock chemical data in a report on Eastern Ghats charnockites. Prasad *et al.* propose charnockite formation through anatexis of pyroxene granulite precursors and use major, trace element and REE geochemistry to support their model.

The 'Sillimanites-metamorphics' section is very varied in content and quality. Papers on metasediments from Hubei, China (Lu and Jiang) and Karnataka (Devaraju *et al.*) are interesting and useful in providing good petrographic or mineral chemical data and providing some insight into the metamorphic conditions and grade variations in these areas. Collins and Davis describe a high-grade terrain in Colorado where they consider hydrothermal alteration and Ca-leaching of gabbro-diorite to have produced regional cordierite gneisses. The large-scale mass transfer involved in this process, however, is nothing compared with the massive influx of silica (from the mantle, of all places) that these authors propose in their speculative and unconstrained concept of 'global hydrothermal circulation' generating expansion and extension of the continental crust. Cela *et al.* describe enclaves in dacites from Spain and try to connect their metamorphism and the volcanism to one decompressional *P-T* path, a requirement which detracts from an otherwise stimulating and interesting paper. These authors also extend a poorly argued model of frictional heating, based on their xenoliths, to low-pressure high-temperature regional granulite terrains without any assessment of the energy budgets involved.

Three of the four papers grouped under 'Regional Considerations' are broad reviews of the large-scale features and units within geologically complex and diverse high-grade areas which definitely deserve more coverage in the western literature: the Pamirs and Tien Shan (Budanov *et al.*), Baikal and areas west (Sizykh) and Kazakhstan (Shlygin *et al.*). Although some of the maps and diagrams are cryptic and the age data not reliable, these articles may provide some useful background for future work. A paper by Budanov and Volkova on bimetasomatism in magnesian skarns in the SW Pamirs, in contrast, is a highly focused and purely petrological contribution of considerable worth but not particularly relevant to the regional considerations theme.

Despite the apparent organisation, the book has no real definitive or unifying approach binding the diverse papers together. It is not a text which will be referred to for state of the art or up to date evaluations of the principal issues facing those of us working on high grade terrains, such as the roles of fluids and melts, tectonic settings, implications of $P-T$ paths, reliability of $P-T$ estimates, constraints imposed by mineral assemblages and grids, and temporal and spatial scales of high grade events. The main use of this book will be as an avenue into some of the literature relevant to the terrains considered and perhaps a data source for geochemical compilations, but it is not a book which I can recommend either to specialists or petrologists in general.

S. L. HARLEY

Brocardo, O. *Minerals and Gemstones of the World*. Newton Abbot, Devon (David and Charles), 1994. Price £10.99 (paperback) [ISBN 0 7153 0197 7]. 215 pp., 156 colour photographs.

This handy identification guide (translated from Italian) comprises an excellent text in the first 43 pages, followed by 156 pages with colour plates of mineral specimens, together with a pictographic table below each using easily identified symbols to allow rapid selection from a mass of detailed information on the characteristics and properties which can be used to classify and identify the mineral. The order of presentation of the minerals is by their overall colour.

The colour photographs are generally excellent, but the specimens to be shown were all selected from the Turin Museum of which the author is Director; there is thus a tendency to select rather rare species, e.g. buergerite, creedite and greenockite. Admittedly we are told that these are rare or extremely rare, but with only some four percent of known mineral species on display the inclusion of such rare species

must be questioned. Also, we are shown some unusually coloured varieties, e.g. violet-pink cobaltian calcite [though, no doubt by a slip, the formula is given beneath the plate as CaCO_3]; similarly we have a rather bilious yellow quartz, labelled prase. Another problem users may find is with the colour descriptions in the pictograms: it turns out that the colour indicated there is that of the mineral powder rather than the hand-specimen appearance — thus we have a representative picture of kyanite, we are told the name is for the blue colour, but the pictogram indicates merely white or pale. Under epidote, piemontite is mis-spelt and the selected sample of epidote is yellow-brown rather than the typical pistachio green.

Despite these reservations (colour giving a collector such an important clue), I would happily recommend this useful little book to a beginner.

R. A. HOWIE

Veasey, T. J., Wilson, R. J. and Squires, D. M. *The Physical Separation and Recovery of Metals from Wastes*, (Gordon and Breach), 1993. vi + 201 pp. Price £45.00.

This book, arranged in five chapters, is a review of the physical processes involved in the recycling and reprocessing of secondary metals. Resource conservation, in the form of reclamation and recycling, has increased in the past two decades and is expected to continue increasing. The technologies involved are complex and have developed considerably in response to the increase in recycling. Hence, this review of the latest technologies available for secondary metal processing deals with an important topic in engineering.

The first chapter introduces the relevant terminology and considers the economic, political/social and technological practicalities of metal and material recycling. It highlights the environmental and energy cost benefits to be gained from secondary metal processing. The second chapter, 'Unit operations in secondary metals processing', describes the methods available for the comminution of waste and physical separation of metal fragments from the bulk in detail. For each separation technique described (size, density, magnetism and electrical conductivity) the suitability of various types of machinery to different waste sources is assessed. The third chapter reviews the different processes employed to recover scrap metal from large objects such as automobiles whilst the fourth describes the processing of metal wastes from smaller sources e.g. television sets. The final chapter is an interesting description of the recent attempts to separate out municipal solid waste into its major components.