

McBirney has taken the trouble to put these particular lectures down on paper for a wider audience.

C. J. HAWKESWORTH

Shelley, D. *Igneous and Metamorphic Rocks Under The Microscope. Classification, Textures, Microstructures and Mineral Preferred Orientations*. London (Chapman and Hall), 1992. xv + 445 pp. Price £24.95.

This book is about those parts of hard-rock petrology that use the optical microscope as the analytical tool. Features visible only with the scanning or transmission electron microscopes are not included, and chemical petrology is not considered. The author intends that students use the book initially as a basic guide to petrography and then as a route into the research literature, once their interest in textures and rock fabrics has been kindled.

Part One deals with rock nomenclature and the mineralogical and textural characteristics of individual rock types. The IUGS scheme is used as a framework for the igneous rocks, and a similar hierarchical scheme is adopted for metamorphic rocks. Part Two opens with a discussion of the principles of crystallisation and recrystallisation and is followed by treatments of the nature and origin of twinning, zoning, intergrowths, and volcanic, plutonic and metamorphic textures. Part Three discusses the mechanisms by which preferred crystal orientations develop in metamorphic rocks, principally, but also in igneous ones. It includes instruction in how to use the Universal Stage in such studies and how to interpret data patterns in stereograms. The book closes with an extensive combined index and glossary.

Coverage of textures and rock types is comprehensive and amply illustrated with carefully chosen, high quality, black-and-white photomicrographs. The layout is attractive and the writing style flows smoothly.

In my opinion Parts One and Two are out of sequence. It is eccentric that each rock type in Part One has a statement about the textures present and yet the vocabulary of textures is dealt with in Part Two, or has to be accessed via the glossary. Students may well get frustrated by this arrangement. (They are also likely to be frustrated by the absence of glossary entries defining the terms *texture*, *structure*, and *fabric*!)

The 200 pages of Part Two are the meat of the book. The information on textures is comprehensive and commendably up-to-date, for example Bruce Marsh's introduction of crystal size distri-

bution curves is included, as is Bob Hunter's work on cumulate maturation, both of late 1980's vintage. The majority of references are from the last decade which helps to convey that micropetrography is alive and evolving, though it obscures the fact that many features were recognised up to 150 years ago. Students need to be aware of this, so that some, at least, will investigate old descriptions and interpretations. A short section on the history of micropetrography would have helped to make this point. Only 3 pages are allotted in the chapter *Crystals and crystallization* to nucleation, diffusion and crystal growth. Concepts such as interface attachment kinetics, layer spreading versus continuous growth, spiral versus surface nucleation growth, surface free energy, and compositional convection ought to have been included here. Their absence is a missed opportunity to engage students in these important current ideas about crystal growth in geological systems.

Therefore, while my students will find this book in their library, I am in two minds about urging them to purchase a personal copy.

C. H. DONALDSON

Brown, P. E. and Chappell, B. W. (eds.) *The Second Hutton Symposium on the Origin of Granites and Related Rocks*. Edinburgh (Royal Society of Edinburgh), 1992, 507 pp. Price £55.00.

This volume, which also constitutes volume 83 parts 1 and 2 of the *Transactions of the Royal Society of Edinburgh: Earth Sciences*, contains the proceedings of the Hutton symposium held at Canberra in September 1991. It comprises 43 papers (M.A. 93M/3443-3485) and 70 abstracts, with a worldwide authorship representing a fair cross-section of the most active researchers on granites and related rocks. Naturally there is a strong emphasis on geochemical studies, but a few structural papers are also included.

Many of the authors describe particular granite complexes, and interpret their compositional variation in terms of more or less plausible genetic models. The I- and S-classification continues to be popular, particularly among the Australian authors, and the first paper in the volume is a review by Chappell and White of the I- and S-concept as applied to its type area, the Lachlan fold belt. As well as occasional references to A- and M-type granites, a new alphabetic category, C-type, is introduced by Kilpatrick and Ellis to describe those magmas produced by dry melting at very high temperatures which give rise to igneous charnockites. Lower crystal orthopyroxene-

bearing granites are also described in a paper by Shimura, Komatsu and Iiyama, who give the results of some high pressure melting and crystallisation experiments on these rocks. Other experimental phase equilibrium studies in a range of metaluminous to peraluminous compositions are reported in papers by Green and by Holtz, Johannes and Pichavant.

Several of the contributions are concerned with the relationship between magmas and restites. For example Ellis and Obata discuss the segregation of melt from migmatites on the basis of petrographic observations and phase equilibria, while Burnham presents geochemical arguments to support the restite unmixing hypothesis, i.e. the idea that granites represent mixtures of melt and restite. A paper by Zeck gives further details of the Hoyazo dacite, a volcanic rock with apparently restitic inclusions.

Stable and radiogenic isotope studies are described by many of the authors, but particularly interesting are several papers on the use of the SHRIMP ion microprobe at the Australian National University for U-Pb geochronology of zircons. The photomicrographs and isotopic data which accompany these papers reveal the complex history of zircon growth in granites, and the great potential of this technique for uncovering the history of their magmatic source regions. Another relatively new area of research is the study of oxidant state of granitic magmas, and the paper by Blevin and Chappell considers how oxidation state among other factors can influence the metallogenic character of granites.

Altogether this is a most valuable collection of papers on recent granite research, and it is pleasing to see that unlike many symposium volumes the contributions are packed with detailed and often new information. The volume is very well produced and illustrated, although it is a pity that it has been priced beyond the reach of most researchers. Granite specialists will be indebted to Bruce Chappell for the organisation of the Second Hutton Symposium. The next meeting in the series will be held at the University of Maryland in 1995.

A. HALL

Floyd, P. A., Exley, C. S. and Styles, M. T. *Igneous rocks of South-West England*. London (Chapman and Hall), 1993. xii + 256 pp. Price £65.00

This volume is one of the Geological Conservation Review series, initiated by the Nature Conservancy Council in 1977, which will eventually document all the geologically important

sites (SSSIs) in Great Britain. Like the other volumes in the series, it highlights the special interest of each site, describes its geology, reviews research on the site, and sums up its importance in simple terms for the non-specialist.

The first two chapters introduce the geology of the region, mentioning the structure and stratigraphy, reviewing the igneous activity and summarising the most important isotopic ages. The four main chapters describe localities illustrating the four principal igneous rock associations of the region: the Lizard ophiolite complex (10 sites); the pre-orogenic (spilitic) lavas, tuffs and intrusions (19 sites); the Cornubian granite batholith (19 sites); and the post-orogenic Exeter Volcanic Series of shoshonitic character (5 sites). Some of the localities are among the best of their kind in the British Isles, e.g. the coastal section through the roof of the Tregonning granite; and others are of international significance, e.g. the tourmaline and topaz-rich rocks associated with the St. Austell granite.

The authors have done an excellent job of describing the sites and explaining their significance. They provide an up-to-date bibliography for the specialist reader and a glossary for the non-specialist. The volume is beautifully produced and very well illustrated, although some of the photographs are rather poorly reproduced. This review will be of lasting value, and many geologists who know the region will want to own a copy; unfortunately it is priced beyond the reach of nearly all its potential readers.

A. HALL

Emeleus, C. H. and Gyopari, M. C. *British Tertiary Igneous Province*. London (Chapman and Hall), 1992. xii + 259 pp. Price £65.00 hardback.

This A4-sized book contains 95 figures (including photographs) and 12 Tables and is published in association with the joint Nature Conservation Committee as part of the *Geological Conservation Review Series*. The production is handsome with good art-quality paper so that photographs produce well, and is printed in a clear double column that reads easily. I found very few typographical errors indeed and the volume is both well written and well edited.

An introductory statement at the beginning of the volume states that the Geological Conservation Review was initiated by the Nature Conservancy Council to publish accounts of the rich geological heritage of the UK, particularly regarding the key earth science sites, which either are, or are being considered for notification as,