a flimsy paper band inside the back cover. Otherwise the volume is well-produced, in a soft linen cloth cover of (large) pocket dimensions.

This is a real guidebook, in that it not only covers the geology with great thoroughness but also gives tips on travel and accommodation, cultural monuments, history, geography, climate, and much else. It is indispensable for anyone visiting these delectable islands with geological ends in view.

E. A. VINCENT

Sutherland, D. S., Ed. *Igneous Rocks of the British Isles*. Chichester and New York (John Wiley and Sons). xvi + 645 pp., 176 figs., 37 photos., 80 geol. sketch-maps, 1982. Price £55·00.

This book gathers together a systematic modern account of the major occurrences of igneous rocks in Britain and Ireland. Its thirty-four chapters on rocks ranging from those of the Precambrian to the Tertiary have been written by thirty-seven authors. There are also a substantial and well-illustrated 65-page appendix on the petrography of British igneous rocks, twenty-four tables of selected chemical analyses, and an up-to-date compilation of geochronological data.

The work is arranged in seven parts in chronological order, each with an introductory chapter which aims to place the igneous activity within the wider context of tectonics and plate movements. Much attention has been given to the provision of a useful bibliography: some 1900 references are placed together at the end of the book but are divided into seven sections corresponding with the part of the volume in which they are quoted, together with an indication of with which chapter or appendix the reference is linked.

The Precambrian igneous rocks of the Lewisian complex are of necessity given rather brief treatment, later deformation and metamorphism having obscured or destroyed their original relationship with other rocks. The scattered outcrops of Precambrian in England, Wales, and Ireland include a variety of igneous rocks, as do those of the Channel Islands. The Lower Palaeozoic volcanic rocks are well covered with individual chapters on volcanism in the Dalradian, Ordovician volcanism in Scotland, Lower Palaeozoic volcanism in Wales and the Welsh Borderland, Ordovician volcanicity in the English Lake District, and Lower Palaeozoic volcanism in Ireland.

In the introductory chapter to the Caledonian intrusive rocks, B. C. King points out that the mode of emplacement of the common transgressive granites is still far from explained: there are only local indications of displacement of adjacent structures and there is often evidence that the plutons enlarge with depth—stoping only becomes possible after some space has been provided by a mechanism that remains obscure. In this part there are chapters on the basic plutons, the Caledonian granites and diorites of England and Wales, and the alkaline intrusions of northwestern Scotland, but in many ways the most interesting and innovative chapter is that on the granites and diorites of Scotland (by R. J. Pankhurst and D. S. Sutherland, with contributions by G. C. Brown and W. S. Pitcher). The now classic grouping suggested by Read into 'Older Granites' and Migmatites is followed, but the 'Newer Granites' are placed in three groups, according to their time of emplacement; this and Sr isotopic ratios lead to the suggestion that there are affinities between the Older and Group I Newer Granites, which may be S-type granites, and between Group II and Group III Newer Granites, which conform more to the I-type of Chappell and White.

Devonian and Carboniferous volcanism constitutes Part 4 of the book, with consideration not only of the widespread volcanism of Scotland and SW England but also of the Late Carboniferous intrusions (Whin, Lugar and Midland Valley sills and associated dykes). The possible derivation of tholeiitic magmas by $\sim 40\%$ partial melting of lherzolite mantle is proposed by P. A. Floyd, who also suggests that alkali-basalt parent magmas only require 15–20% melting of the same source. The chapters on the various aspects of the Hercynian granites (their geological setting, petrology, late-stage alteration and petrogenesis) are virtually all by C. S. Exley and M. Stone. Particular attention is paid to the interpretation of textures and order of crystallization and to the chemical variations shown by the exposed granite cupolas before considering the origin of the granites. The structural and tectonic environment of the Permian and Mesozoic igneous rocks is discussed by Sir Peter Kent. In the Jurassic there was a basaltic volcanic centre in the North Sea and the widespread fullers' earth of southern England is essentially a vitric tuff; the clayey partings known in the Chalk can be interpreted as ashfalls.

As the Director of the Institute of Geological Sciences reminds us in his introduction to Part 7 dealing with the British Tertiary Province, generations of British petrologists have learned the fundamentals of their subject by early introduction to this young, well exposed, and dramatically complex assemblage of igneous rocks. And in their turn these rocks have probably provided more information per unit volume than any other such districts of the world. Here we have chapters on the eruptive volcanism, the central complexes, the

major basic intrusions, acid intrusions, composite intrusions, the Scottish dyke swarms, and geochemistry and magma genesis. Of these the longest and in many ways the most thorough review is that by C. H. Emeleus on the central complexes of Skye, Rhum, Mull, Ardnamurchan, Arran, St. Kilda, the Mourne Mountains, Slieve Gullion, Carlingford, Lundy, Rockall, and the Blackstones Bank, each of which is described in some detail. There does not appear to be any consistent pattern of change in the nature and composition of magmas available during the development of these complexes; basaltic magmas appear to have been available throughout the history of all the centres with, in some centres, abundant later granitic magmas. The composite intrusions are considered by B. C. King to result from the injection of successive pulses of increasingly acid material, reflecting a history of hybridization, including magma mixing that took place during uprise from depth. The petrogenesis of the basic magmas is discussed by R. N. Thompson who also reviews briefly the isotope geochemistry of the granites.

The largest chapter of the book is the appendix on the petrography of the rocks contributed mainly by P. A. Sabine and D. S. Sutherland, in which after a brief discussion on nomenclature, detailed and illustrated descriptions are given of British igneous rocks arranged in the seven sections used in the main parts of the work. The other appendices give chemical analyses of some 294 selected rocks (together with references) and geochronological tables summarizing all significant age data available for British igneous rocks.

This is a long-awaited and welcome addition to petrological literature. The authors have drawn upon the heritage of classic accounts of British petrology and at the same time have attempted a modern assessment in terms of crustal plate movements, geochemistry, and magma genesis. All the sections are clearly written and well illustrated with diagrams and numerous geological sketch-maps, and many of the chapters are inspiring in the informative overview they provide. Nevertheless despite the length and size of the book, even the Tertiary province is only able to claim 132 pp. (+16 pp. petrography) which when broken down into the introduction and seven separate chapters is able to deal only relatively briefly with e.g. Mull or Ardnamurchan. This is not intended as a criticism—merely an illustration of the size of the task. Devotees of British igneous petrology will continue to need to scan the current literature, but this book marks an important milestone in the documentation of our knowledge in this field. It is clearly a must for all geological libraries throughout the world and hopefully will also find its way on to the shelves of many individual petrologists; even if its purchase necessitates a second mortgage it is well worth it.

R. A. HOWIE

Sinkankas, J. *Emerald and Other Beryls*. Radnor, Pennsylvania (Chilton Book Co.), 1981. xvi + 665 pp., 170 figs., 10 colour pls., 43 geol. sketch-maps. Price $37.50.

This well-illustrated book covers virtually every aspect of beryl and its gem varieties. It is arranged in three parts, with Part I covering the history and lore in antiquity and medieval in time, the 'occult' properties attributed to emerald and beryl, their therapeutic uses, and important gems in collections. Part II deals very thoroughly with the chemical and physical properties of beryl, including its crystal structure and the problem of accommodating large alkali ions, the chemical variations (involving the presence of transition elements, alkalis, and water), the optical and physical properties with particular emphasis on colour and colour changes, morphology and etch figures, inclusions, the production of synthetic beryls and emeralds both hydrothermally and by the flux-fusion process, the cutting and polishing of gem varieties, and finally the mode of occurrence of beryl.

The reader may already be left with a surfeit of information on beryl, but in Part III devoted to a detailed description of worldwide localities for both ore and gem beryl we are given exhaustive accounts country by country, complete with sketch-maps, photographs, and production figures. The greatest detail has been furnished for countries for which locality information is difficult to obtain or in which deposits of major importance occur. A list of references follows each country, and sometimes references are given for individual states or provinces. Chapter 14, which comprises the entire Part III, thus amounts to 250 pages and constitutes a real mine of information. Whether it be the Nuristan pegmatite region of northeastern Afghanistan, the Habachtal emerald deposit of Austria, the numerous Brazilian beryl localities (20 pp.), the Colombian emerald mines (27 pp.), common beryl in pegmatites and veins associated with the Rosses granite in Donegal, or the beryl pegmatites of the Urals (20 pp.), the USA (50 pp.) or Zimbabwe (6 pp.), they are all fully described and accredited. Finally the numerous historical, varietal, and territorial names for beryl are given in an appendix.

One can find chapter and verse for such quotations as 'Cut with six facets shines the beryl bright, else a pale dullness clouds its native light' or what