

important localities for each species is listed and discussed), but rather to provide assistance with the identification of the gem minerals.

After an introductory chapter outlining the discovery of gem deposits, those such as diamonds, sapphires, zircons and olivine which are typically associated with basic volcanic rocks are described. Small diamonds have been found in alluvial deposits, most being discovered by accident during treatment of wash dirt for gold and tin recovery; no commercial deposits have been found and the primary source of the diamonds remains unknown. Sapphires are of widespread occurrence as waterworn crystals in present-day streams and older gravels; blue is the dominant colour, but purple, yellow and brown varieties are found. Pale rubies also occur but are rarer and smaller than sapphires. Rounded grains of reddish brown to near colourless zircon are also found in stream gravels at numerous localities. The primary sources of the sapphires and zircons are thought to be basalts and volcanisedimentary rocks. Olivines and anorthoclase occur in xenoliths and megacrysts in lava flows of the Newer Voicanics in the W of the state; scoria cones have yielded olivine fashioned to give peridot  $\leq 8$  mm in size.

In the areas of granitic rocks and pegmatites, tourmaline is common but mainly as schorl; elbaite is extremely rare. Topaz has been found *in situ* in granites at only a few localities, but waterworn colourless to blue fragments are widespread in alluvial deposits. In Victoria, the garnet species almandine, spessartine, pyrope, grossular and andradite have been found, mainly in stream gravels, but few have been large or transparent enough to facet. Quartz is the most common gem mineral, with the varieties rock crystal, amethyst, smoky quartz and citrine all recorded; agate, chalcedony, jasper and common opal also occur.

The book is extremely well illustrated, both by numerous sketch maps showing most of the localities mentioned in the text and by an abundance of excellent colour photographs of rough and faceted stones for each of the principal localities. It ends with a list of some 180 references, a localities index and a glossary, together with tabulated mineral data for Victorian occurrences, and clearly fulfils the author's intentions of providing a book to assist with the identification of many of the gem minerals through the use of colour photographs.

R. A. HOWIE

Emeleus, C. H. *Geology of Rum and Adjacent Islands*. London (British Geological Survey), Memoir for 1:50,000 Geological sheet 60 (Scotland) 1997. xii + 170 pp. Price £35.00. ISBN 0 11 8845179.

Compared to Skye, Mull and Arran, the Small Isles are the least visited and hence least well known parts of the Scottish Tertiary Igneous Province. Remoteness, a limited ferry service, inability to take a vehicle, and lack of choice of accommodation have all conspired to make the islands of Muck, Eigg, Rum, Canna and Sanday the Cinderella region of the province. Yet as a group, the islands have a geological record that equals the more accessible regions of the province in range of geological interest. For example, Rum has a world renowned major layered ultrabasic intrusion where refluxing of a Tertiary intrusion was first demonstrated and the detailed record on Rum of ring fault tectonics and associated intrusive and extrusive magmatism is unmatched in the Province. Mesozoic and Torridonian sediments are also exposed on Rum, along with Lewisian gneisses and a fascinating record of Quaternary events. All this is packed into an island just 12 km in diameter. Fine sections of flat-lying basalt lavas and dykes dominate the other islands, rivalling those of Skye and Mull, and neither of these islands can match Eigg for its impressive 3 km-long Sgurr pitchstone ridge which represents a basal ash flow and one or more overlying lavas that flowed along a valley cut into the Tertiary land surface.

It is 90 years since the Survey published the first memoir on the Small Isles geology by Alfred Harker. Much new information has been obtained in that time and new insights and interpretations have been put forward. Most of this re-investigation follows the transfer of Rum to State ownership in 1957 and its designation as a National Nature Reserve, events which opened the island to natural history research of all kinds. The need for a new geological memoir had become pressing and the ideal person to write it was Henry Emeleus of the University of Durham; no other geologist has greater local knowledge or experience of working in the area (his first paper on Small Isles geology was written in 1957) and none has such a comprehensive knowledge of the Tertiary Igneous Province, essential for setting Small Isles geology in a regional context. In the task Emeleus has been ably supported by several specialist contributors on particular aspects.

The memoir is completely rewritten and reconstructed. While it is satisfyingly and appropriately rooted in field observation, there is plenty of traditional and high-tech laboratory information on textures, rock modes, whole-rock chemical information, trace-element comparison diagrams for lavas and dykes, oxygen, strontium and neodymium isotopic data, and radiometric age determinations. The text is written in an engaging, enthusiastic style, largely free of jargon and hence accessible not only to professional geologists, but also to the general geological public and, hopefully, even to tourists to the islands.

Successive chapters ascend the stratigraphic column (Lewisian Complex, Torridonian Group, Mesozoic Rocks, Tertiary) and are followed by chapters on structure, geophysical investigations and age-determinations, Pleistocene and Recent, and economic geology (essentially the thick olivine and chromite sands in Harris Bay which are potentially exploitable). The Tertiary geology is divided into 5 chapters: Introduction and Rum Central Complex - Stage 1; Minor intrusions; Rum Central Complex - Stage 2; Layered Suite; Lavas and associated sedimentary rocks; Magma genesis and tectonic setting. Appendices tabulate the features of beds in type sections of three Mesozoic formations on Eigg and Muck, and present whole-rock geochemical data for selected lavas and intrusives, along with rock and mineral oxygen isotope data for igneous and sedimentary rocks on Rum. Igneous petrologists will inevitably wish there was more detail on geochemistry, and discussion of inter-magma relations and origin of the magmas, however further information is available in the literature and to include more here would have been to unbalance the Memoir's content.

Much of the research work that has been done remapping and re-investigating Rum, and to a lesser extent the other Small Isles, has been carried out by numerous PhD and MSc research students, and also by undergraduate students doing Honours mapping projects. While some of this work remains unpublished, much of it is known to Emeleus and has been incorporated by him in the Memoir and the accompanying map sheet. Emeleus's willingness to include the data of workers of different levels of experience and his ability to present alternative views evenhandedly are striking features of the Memoir.

Harker would envy the abundance of full colour diagrams and maps in the new Memoir which have been prepared to a very high standard

and are skilfully deployed to elaborate the geology. Numerous plates (mostly in colour) illustrate landscapes, outcrops and thin section features. All the illustrations have reproduced superbly and greatly enhance the utility of the Memoir. A superior, kaolinised paper has been used and the cover is printed with a mouth-watering view from Askival across the layered rocks of Hallival, with the Torridonian of northern Rum, the Sound of Sleat, and the mountains of southern Skye as a backdrop – one of the finest scenes in British geology (when it isn't raining)!

The original Small Isles Memoir represented Harker's second Hebridean *tour de force*, following by 4 years his memoir on the Tertiary rocks of Skye. Three generations of British petrologists have honoured the author by informal reference to the work as "Harker's Small Isles Memoir". I have no doubt that its successor will be similarly honoured as "Emeleus's Small Isles Memoir". It stands as a fitting tribute to the late Malcolm Brown, former Survey Director, former colleague of Emeleus at Durham and before that one of his PhD mentors, and the man whom Professor Lawrence Wager chose to spearhead modern investigation of Rum in the late 1940's.

I don't normally praise publications for their price but this ought to cost more than £35; the perennial excuse of pressure on library budget preventing purchase of a copy can't be invoked here.

C. H. DONALDSON

Mitchell, R. H. *Kimberlites, Orangeites, Lamproites, Melilitites, and Minettes; A Petrographic Atlas*. Thunder Bay (Almaz Press Inc., 1427 Ridgeway St., Thunder Bay Ontario, Canada P7E 5J7), 1998 243 pp., 400 colour plates, price US\$100. ISBN 0-88663-026-6.

This book consists mainly of 400 very high quality colour photomicrographs of thin sections of some alkaline rocks viewed under the microscope, about 50 of them being back scattered electron images with false colouring. The majority are of standard thin sections photographed in plane polarized light or between crossed polars. The plates in the book are 100 mm × 150 mm in size and the magnifications at which most of the plates are reproduced are ×60 or ×152. The electron microscope images are of higher magnification and a few of the optical photomicrographs were taken at lower magnifications in order to show a larger field of view.