tion diagrams are described and there follows a table occupying three pages in which minerals are listed according to whether they are isotropic, uniaxial positive and negative and biaxial positive and negative. Relief is indicated by the following symbols −M, −L, L, M, H, VH and E. The ranges of refractive indices covered by these symbols have been defined on a previous page e.g. M represents 1.60–1.70.

Most of the space in these tables is occupied by columns indicating the possible colours exhibited by the mineral but nowhere is it stated that these colours may be either in thin section or in hand specimen, e.g. cordierite is described as colourless, yellow, green, blue or purple-lilac—these colours must refer to hand specimens, while arfvedsonite has almost the same list of colours and here they are likely to refer to colours as seen in thin section: kyanite is described as colourless or grey so this must be in thin section.

Part II is entitled Mineral Groups and here the commonest rock-forming mineral groups are dealt with in a very condensed and largely tabular form. Some of the data in these tables are more useful than others; for example the relationship between birefringence and composition in the plagioclase feldspar series cannot be of much diagnostic value especially as it varies with structural state as well as composition. There is an observation that sanidine may show anomalous interference colours but this is no more frequent in sanidine than in anorthoclases or high-temperature plagioclases. Many of the references in this section are to secondary or tertiary sources but this is becoming increasingly common nowadays.

Among the useful features of this booklet are the photomicrographs of minerals in thin section many of which the student may recognize immediately; others are less convincing.

One might form the impression that the booklet is designed for students who have no intention of studying geology for more than one year, so that buying this book will save the expense of more detailed text-books. This is not the author's intention since he writes in the introduction 'The student is strongly advised, however, to study a standard and authoritative text, not only for additional data but to verify initial mineral recognition.' The aim is to speed up mineral recognition so that the student has time to 'study the textural relations that are important clues to the problem of rock genesis'. The author has greater faith than the reviewer in the information which can be obtained from textures in our present state of knowledge: the aim is however one to be encouraged.

W. S. MacKenzie

Brunton, C. H. C., Besterman, T. P., and Cooper, J. A., eds. *Guidelines for the curation of geological material.* Geological Society Miscellaneous Paper 17, 1985. 192 pp., 40 figs. Price: with binder, £19.50; without binder, £17.00.

These *Guidelines* are a series of contributions by curators of geological material. The subject matter covered is divided into five sections; Acquisition (12 pp.), Documentation (66 pp.), Preservation (36 pp.), Occupational Hazards (8 pp.), and Uses of Collections (21 pp.). The book is produced in a loose-leaf form, the intention evidently being to revise individual sections from time to time.

Although much of the subject matter spans the whole range of geological material, considerable attention is given to the specific requirements of those handling and documenting mineralogical and petrological specimens. In the Occupational Hazards section there is a useful contribution on the regulations for the safe storage and handling of radioactive specimens, one of the areas in which clarification is most frequently sought from mineralogical curators.

The book makes a useful contribution to the documentation, handling and uses of geological collections, although, surprisingly, there is no coverage of one topic currently of widespread interest—the computer-based storage and retrieval of specimen data. Nevertheless the book should be of considerable interest to those concerned with the preservation of geological material, whether from an exhibition standpoint, or from a concern that research material should be preserved for the benefit of future workers.

A. M. Clark

Roonwal, G. S. *The Indian Ocean: Exploitable Mineral and Petroleum Resources.* Berlin, Heidelberg and New York (Springer-Verlag), 1986. xvi + 198 pp., 63 figs. Price DM 128.00.

The appearance of this small volume of just under two hundred pages coincides with an upsurge of interest in the geology of the Indian Ocean. The British research vessel *Charles Darwin* has been operating there since August 1986 and in May 1987 the Ocean Drilling Program vessel *Joides Resolution* began an 18 month programme of scientific ocean drilling.

After introductory chapters covering mineral resources, the origin and development of the Indian Ocean and marine exploration techniques, the bulk of the book is divided into chapters on each of the major types of marine deposit which can be considered as mineral resources: placer deposits, phosphorite, ferromanganese nodules and encrustations,

metalliferous sediments and hydrothermal ores, petroleum and natural gas, and unconsolidated sedimentary deposits. The final chapter discusses mining and the environment and the book concludes with a comprehensive list of references.

As one would expect from Dr Roonwal's own speciality, by far the largest chapter in the book is that devoted to ferromanganese nodules and crusts. After reviewing the worldwide literature on their occurrence, structure, chemical composition, mineralogy and growth rates, a substantial section is devoted to Indian Ocean nodules. Numerous tables and figures summarise the metal content of nodules recovered from each of the main basins. Nodules in the Central Indian Basin are shown to be of 'ore grade' in their concentrations of Cu, Ni and Mn. But readers expecting to find here some of the results of the extensive nodule surveys funded by the Indian Government Department of Ocean Development will be disappointed. All the data analysed and discussed are from the Scripps Institution of Oceanography Data Bank.

In his preface the author states that the book 'aims to be a handy reference work for mineral economists, planners and policy makers'. Admirable though it may be in concept, I regret that I cannot recommend it. The book is marred by too many errors. Some are relatively minor errors of spelling which a publisher with the reputation of Springer-Verlag should have been able to eliminate. Others are more substantial and raise nagging doubts in the reader's mind. For example, this sentence occurs on page 46: 'Seismic methods provide information on the Earth's electric characteristics, earthquake processes and layering.' But perhaps the most serious error of all is the excessively optimistic view the author expresses about the potential for exploitation of deep ocean minerals. In the long run converying such views to the planners and policy makers can only harm the progress of marine science and technology.

T. J. G. FRANCIS