

and mineral prospecting companies in New Zealand since Williams went to press, and the scientific community will be only too aware how the results of such work are commonly lost to science. Dr. D. Kear, the editor of the present volume and a former Director of the New Zealand Geological Survey and Director General of the New Zealand Department of Scientific and Industrial Research, has successfully solicited papers by company geologists recording activities in a wide variety of mineral prospects. Previous work and geological backgrounds are briefly reviewed together with prospecting methods, results, and actual or potential processing methods where applicable. Included are papers on various gold and gold-silver prospects, sulphur and halloysite deposits, titanomagnetite and ilmenite iron sands, scheelite, copper, nickel, and molybdenum mineralization, bismuth sulphosalts, and platinum group minerals. These papers are complemented by some more general reviews by DSIR scientists on the geological setting of mineralization in New Zealand, the Hauraki goldfield, placer gold mining, and non-metallic minerals, including a particularly interesting account of the submarine phosphorite deposits of the Chatham Rise.

Work in the period under review led to the reopening of a major gold-silver (electrum-acanthite) mine in the Hauraki epithermal goldfield, which is associated with Miocene volcanism. This is the Martha Hill pit at Waihi, and another large mine is planned for the Golden Cross prospect in the same field. Both alluvial and underground reef mining for gold and scheelite have taken place intermittently near Macraes in the province of Otago since 1862. Here gold- and scheelite-bearing quartz lodes are hosted in a shear zone in schist, and following investigations summarized in the volume a new large open-cut mine at Round Hill went into production in November, 1990. One important enterprise, the mining for export of the Waipipi iron sands, has ceased during the 1974-87 period, and in this case an epitaph is provided in the form of an account of the production history, mining and concentration processes, slurry-loading onto ore carriers, and land rehabilitation.

Perhaps more important than the accounts of the successful enterprises, are those documenting less well known activities, knowledge of which could so easily have been lost for most readers. The quality of the papers is inevitably uneven, specialists may sometimes wince at statements that are made, and proof-reading leaves something to be desired ('schistocity' appears so frequently in one paper that it can hardly be

ascribed to a mere typographic error). Nevertheless, workers who do not usually do so have recorded data of interest and have sometimes included further references to otherwise inaccessible reports. Dr. Kear himself has provided an extended bibliography. Past production figures are summarized in many cases, and some fascinating snippets are revealed, for example official gold production in New Zealand in 1986 was 1265 kg with a value of \$27.2 million, whereas one Auckland bullion exchange company alone is said to have handled around 2500 kg of West Coast placer gold in about the same year.

While not intended for professional mineralogists as such, the volume should prove a valuable source book for future workers involved in mineral exploration in New Zealand, and Dr. Kear is to be congratulated on bringing it together [M.A. 90M/3998-4034].

DOUGLAS S. COOMBS

Railton, C. T. and Watters, W. A. *Minerals of New Zealand*. Lower Hutt, New Zealand (N.Z. Geological Survey Bulletin 104), 1990. 89 pp., 38 photos., 3 maps. Price \$NZ 60.00 (\$US 60.00), including overseas airmail postage.

This publication is a welcome supplement to the widely used N.Z. Geological Survey Bulletin 32 (1927) by P. G. Morgan: *Minerals and Mineral Substances of New Zealand*. The main part is an alphabetical listing of minerals recorded in published form up to 1990 from New Zealand and its outlying islands. For each mineral the chemical formula, locality details, geological setting, availability of analytical data (with references), and associated minerals are listed. There is a bibliography of some 500 items, photographs of 38 representative minerals including photomicrographs in colour and SEM photographs. Appendices include an explanation of chemical formulae, a list of chemical elements and symbols, minerals arranged according to metallic elements they contain and Maori names for minerals.

The bulletin is intended for the professional geologist and mineralogist, but will also be of much interest to collectors and lapidarists.

R. A. HOWIE

Rothwell, R. G. *Minerals and Mineraloids in Marine Sediments: an optical identification guide*. Elsevier Science Publishers, 1989, 279 pp., 148 figs. Price £47.00.

The subtitle of the book accurately describes its purpose: it is an aid to the rapid identification of

minerals found in unconsolidated and semi-consolidated sediments recovered from marine, particularly, but by no means exclusively, bathyal deposits. It is especially relevant for samples prepared by the smear-slide method as samples undergo their initial examination upon the recovery of cored material from the ocean floor, and it reflects the experience of workers involved in the Deep Sea Drilling Project and its successor, the Ocean Drilling Programme. The smear-slide method is quick and, with practice, offers a quantitative tool sufficient to name the sediment type. The appearance of the material on the slide differs from that when conventional methods of preparation are used and the book is very much related to the smear method. Provided certain rules are followed and the investigator is reasonably competent a 'permanent' name can be ascribed to the sample. The author describes the method and the system of nomenclature to be used: then, with many illustrations, the appearance, properties and usual occurrence of the mineral species are described. Over 40 minerals and mineraloids are described—only ikaite ($\text{CaCO}_3 \cdot 6\text{H}_2\text{O}$) is missing. [M.A. 86M/2239.] There is a section on extra-terrestrial material in marine sediments, an appendix illustrating the main microfossil groups, useful identification flow charts, a glossary of descriptive terms and an excellent list of references concerned with deep-sea minerals.

This book can be recommended as a welcome addition to texts on mineral identification and particularly so for those in the field of recent marine sediments.

A. J. SMITH

Alloway, J. D. (Ed.). *Heavy Metals in Soils*. Glasgow (Blackie), 1990. xiv + 339 pp. Price £59.00.

The term 'heavy metals' has been adopted as a group name for the metals and metalloids which are associated with pollution and toxicity but includes elements such as Co, Cu, Mn, Se and Zn, which are essential for living organisms at low concentrations. Studies of heavy metals in ecosystems around the world have identified many areas near industrial complexes, major road systems, metalliferous mines and waste disposal sites which contain anomalously high concentrations of these elements. With the current pressure on land for development the characterisation of such contaminated land and the introduction of clean up technologies has assumed major importance. The soil is at the interface between the atmosphere and the rocks which form the earth's crust,

and as such it is most vulnerable to heavy metal pollution.

This book seeks to bring together the information available on heavy metals in soils to provide a data base for research scientists and environmental technologists involved in heavy metal pollution, its characterisation and remediation. The book is divided into two parts. Section 1 contains chapters providing an introduction to the relevant soil processes affecting the chemical behaviour of heavy metals in soils, the sources from which the metals originate and a review of the methods used for their analysis. Section 2 constitutes the main part of the book and contains chapters dealing with 17 individual elements in detail.

Like any book of this type which attempts to cover a wide field with numerous contributors, the individual chapters vary in their usefulness to the student and research scientist. The chapter on methods of analysis for example is too brief to be of much use and could profitably have been omitted. However, the chapters in Section 2 provide an excellent source of reference on individual elements and contain a host of up-to-date references. One irritating feature is that the titles of referenced papers are not included, reducing the number of pages but also reducing the value of the listings. However, overall Brian Alloway has edited a useful volume which can be recommended to all workers interested in the subject of heavy metal pollution and particularly those involved in the increasingly important subject of contaminated land.

J. D. MATHER

Mottana, A. *Fondamenti di Mineralogia Geologica*. Bologna (Zanichelli), 1988. xii + 553 pp. Price L 52,000.

This text, dealing with the principles of geological mineralogy, opens, after a brief introductory chapter, with considerations on the distribution of elements in the Earth's crust, before turning to the structure of atoms and the principles of structural crystallography, where symmetry elements, the Bravais lattice, point groups, and space groups and their nomenclature are introduced. Defects in crystals, coordination numbers, Pauling's rules and possible systematic classifications of crystal structures are discussed in detail. These sections, the following chapter on the various silicate structure types, and indeed the whole book, benefit greatly from the provision of numerous two-colour figures, e.g. with atoms and bonds shown in orange-brown, light brown, black, grey, or white, making the details of crystal