minerals found in unconsolidated and semiconsolidated 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 undergoe 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 decribed—only ikaite ($CaCO_3 \cdot 6H_2O$) 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

structures instantly more readily visualized. Later chapters deal with variations in structure as a function of temperature and pressure, solid-solution series, crystal morphology, stereographic and other projections, and twinning.

The crystallography sections are interdigitated with an important chapter on the methods of calculating the chemical formula of a mineral and expressing its composition in terms of end-member molecules; graphical methods of plotting composition in two-, three-, four- or multicomponent systems are also discussed.

Full consideration is given to the physical characters of minerals and the methods used to determine their various physical properties, including density, cleavage, hardness and electrical properties. Optical properties of minerals and mineralogy under the microscope are each dealt with in separate chapters. The theory and practice of X-rays are considered in detail and other determinative methods described include infrared spectroscopy, thermal analysis, XRF, electron microscopy and (briefly) SEM and the microprobe. Mineral equilibria and the experimental techniques used in the investigation of synthetic systems are each discussed before the final chapter on geothermobarometry.

Although the text is in Italian, it is clear and readily understandable (even by this reviewer who has no knowledge of the language) aided of course by over 400 two-colour diagrams. This is a book which all teachers of mineralogy should have available on their own or library shelves. The price is right.

R. A. Howie

Ryan, M. P. (Ed.). *Magma Transport and Storage.* Chichester and New York (J. Wiley and Sons), 1990, 420 pp. Price £125.00.

This book is divided into two parts—Part I, Heat and mass transport in magmatic systems; Part II, Transport structure, mechanics and dynamics of magmatic systems.

Part I. Compaction models and fluid mechanics are formulated at the outset (Fowler) and a model for melt transport applied to the Earth. Fluid mechanical models are used by Olsen in a study of plume evolution. Melt movement as diapirs or by porous flows (Whitehead and Helfrich) is considered along with evidence for solitons (solitary waves) and the importance of the dihedral angle (Riley and Kohlstedt). Studies of fracture-controlled dike transport (Bruce and Hoppert) deal with solidification and melting along dikes and the role of laminar and turbulent flow (Turcotte) A numerical treatment of explsoive eruptions (Wohletz and Valentine) is followed by an evaluation of the thermal gradients within pyroclastic units (Ryan, Banks, Hoblitt, and Blevins).

Part II deals more with magma transport. Hydrofracturing and porous flow at ridges (Nicolas) is evaluated using theoretical and field observations. Geophysical, structural and petrologic data from Iceland (Ryan) are next combined to produce a two-dimensional model of the magma system beneath Iceland, to a depth >300 km. Next the subcaldera magma storage system of Krafla, Iceland (Ewart, Voight, and Bjornsson) is defined as a 'hot, largely non-elastic rock mass that encompasses numerous magma chambers connected by "pressure valve" conduits'. Sato and Sacks explore the seismic structure of intra-plate and subduction zone magmatism by a comparison of laboratory-based studies of partial melts and seismic observations in the Earth. Seismic tomography (Iyer, Evans, Davison, Stauber, and Achauer) is shown to be a useful tool when evaluating the behaviour of magmas in the Long Valley–Mono Craters region and the Newberry volcano in the Cascades. Finally details of magma ascent, storage and eruption are provided for Mt. St. Helens (Endo, Dzurisin, and Swanson), Sakurajima (Ishihara) and Mt. Etna (Murray, Hughes, Guest and Duncan).

This is an extremely useful text which contains an acceptable balance of theoretical experimental and field based contributions. It covers a plethora of topics; solitons to segregated peridotites, dihedral angles to dyke emplacement, plumes to plumbing systems. It should be on the shelf of every library and active researcher and teacher of volcanology [M.A. 91M-2072/2089].

M. A. Menzies

Troll, G. *Mineralvorkommen im östl. Bayerischen Wald.* Sonderband nr 31 of Aufschluss, 1991. 152 pp., illustrated in black-and-white and in colour.

The Bayerischer Wald is largely taken up by a national park whose geology forms the subject of the first paper in this multi-author survey. Some of the most interesting minerals are found in the pegmatite region and other major mineralizations are found in the Bodenmais area and in the graphite-producing locations of Kropfmühl and Passau. Each paper has its own extensive bibliography but there is no subject or general index. Subscribers to foreign journals are not always aware that monographic series are often produced and it is always worth finding out whether