

procedure. Thus, I could find no reference to recent developments in nickel sulphide fire assay involving low mass (e.g. 1 g) buttons, nor to the innovations in the determination of Os relevant to recent interest in the Os/Re geochronometer.

There are ten chapters in this book. Following the introduction (Chapter 1, 8 pp), the principles of instrumental methods are reviewed in Chapter 2 (40 pp.). The techniques considered include AAS (flame and electrothermal atomisers) ICP-AES, ICP-MS and NAA, though not XRF despite the use of XRF methods later in the book. The style is a little uneven since the AAS (flame and electrothermal atomisers), ICP-AES, ICP-MS and NAA, though not XRF despite the use of XRF methods later in the book. The style is a little uneven since the AAS section includes details of instrumental features relevant when considering a purchase from manufacturers, whilst the ICP-MS section outlines the theory (of quadrupole mass spectrometry) in some mathematical detail, neither topics being covered in this detail when considering other techniques. Chapter 3 (12 pp.) reviews some physical and chemical properties of the precious metals. Chapter 4 (33 pp.), is entitled 'Reference Materials' and although this subject is considered with some perception, more coverage is given to blanks, the preparation of standard solutions and safety. The latter section includes X-ray spectrometry hazards (despite the absence of this technique from Chapter 2!). Although SI units are defined, it is disappointing to see the working discussion in the old radiation units of the curie, rad and rem.

In Chapter 5 (13 pp.) sampling and sample preparation are reviewed in respect to the following samples: geological; mineral; ore; concentrate; metals and alloys; metal scrap; catalysts; organics; botanical and water. Chapter 6 is devoted to fire assay (46 pp). Much of this chapter is devoted to the classical lead method. Alternative fire assay collectors, including the ubiquitous nickel sulphide procedure, merit 11 lines at the beginning of the chapter since although these techniques are claimed to be particularly useful for the determination of Os, Ir and Ru, in general there is little advantage in these approaches for the other precious metals—a statement with which some analytical colleagues may not agree. However, the nickel sulphide technique *is* then taken up again later in the chapter since the technique has found 'widespread application'. Much of the lead fire assay details given in this chapter reproduce procedures used by the USGS that were first published by Haffty and co-workers in 1977.

Chapter 7 (23 pp.) covers the analysis of ores, minerals and concentrates, summarising six procedures published previously in the literature. Chapter 8 (46 pp) covers rocks, water and biogeochemical materials. Following a brief introduction to each section, details are given of individual methods (about 15 in all) published previously in the literature, many of which are reproduced by permission of the original publisher. Chapter 9 (19 pp.) is devoted to biological materials describing about seven previously published methods. Industrial samples are covered in Chapter 10 (32 pp.) following the same format.

As is apparent from the above commentary, there are a number of inconsistencies in this book. Perhaps the most disappointing aspect is that the contents appear to this reviewer to lack an in-depth critical evaluation of the procedures presented in this work. Thus, some sections of the book appear, at a superficial level at least, to comprise a series of procedures presented as re-edited versions of the original paper. In one sense, this is useful in giving an overview of the analytical methodologies currently available. However, any reader new to the subject would benefit considerably by expansion of the commentary that generally introduces each of these procedures. In summary, this book presents a useful overview of techniques for the determination of the precious metals biased towards established methods.

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Hashimoto, M. (Ed.). *The Geology of Japan*. Tokyo (Terra Scientific Publishing Co.) and Dordrecht and Boston (Kluwer Academic Publishers), 1991. x + 249 pp., 52 maps. Price £67.00 (Dfl. 195.00, \$125.00).

English language readers are generally starved of authoritative texts on the geology of the Japanese islands. Yoshida's *Outline of the Geology of Japan* (1977) was very much an outline; Minato, Gorai and Hunahashi's *The Geological Development of the Japanese Islands* (1965) was a weightier volume but pre-plate tectonics in its approach. Your reviewer was, however, somewhat disappointed by Hashimoto's 'new' (1991) work for essentially it is a translation of a 1980 Japanese-language publication. Though it claims to have been 'considerably abridged and rewritten to make it suitable for non-Japanese readers' this reviewer found very few references dated later than 1979 and no indication as to whether those references are written in the Japanese or the English language.

The coverage of the geology of Japan is, however, complete and the contributors will be well known to geologists who knew the Japanese geology fraternity of ten years ago. Sadly the affiliations of those authors are not given in the volume, thus making personal contact, with those writers who are still extant, difficult.

The key parts of this 249 page book after a brief introduction are Chapter 2—The pre-Neogene sedimentary and metamorphic rocks; Chapter 3—Ultramafic rocks and gabbros; Chapter 4—Granites and rhyolites; Chapter 5—Late Cenozoic strata; Chapter 6—Quaternary sediments of lowland plains and terraced uplands; Chapter 7—Cenozoic volcanic activities and their products; Chapter 8—Submarine topography and geology around the Japanese islands; Chapter 9—Ore deposits in relation to igneous activity and Chapter 10—Geotectonic history of the Japanese islands. The coverage, notwithstanding its somewhat dated nature, is excellent with each chapter having a long bibliography, though there are surprisingly few references to 'foreign' publications even when they might have been quite appropriate. See, for example, the chapter on ore deposits where one would have expected such references.

Some knowledge of Japanese geography is required to get maximum advantage from the book—it is not always easy to locate the places to which references are made in the text into the broader context. This can detract from the value of the locality sketch maps. Members of the Mineralogical Society will find the Chapter on Ores concise to the point of being disappointingly short—twelve pages can hardly be expected to do that subject justice. The plate tectonic story of Japan is only summarily described and much more has been published in and abroad about Japan's plate tectonic history since 1980.

Overall, the translation is excellent and very readable, spelling errors are rare and sometimes

amusing (Morasse appears several times instead of Molasse). There are many line diagrams and these are generally clear: the exception are the maps in the Introduction which are so reduced as to be indecipherable.

There is no doubt that, in spite of the caveats I have made, this book does fill a need and in spite of its high price, it is probably essential reading for anyone wishing to learn about the geology of Japan and it would make a useful compendium for anybody wishing to visit that fascinating country.

A. J. SMITH

Decker, R. W. and Decker, B. B. *Mountains of Fire: The Nature of Volcanoes*. Cambridge and New York (Cambridge University Press), 1991. x + 198 pp., 95 figs., 16 colour plates. Price £30.00 hardback, £10.95 paperback.

This well illustrated book is written in a popular but authoritative style (the senior author being formerly Scientist-in-Charge of the U.S.G.S. Hawaiian Volcano Observatory). Each chapter opens with an eyewitness account of a major volcanic eruption or a related phenomenon—the latter including hydrothermal ore deposits as exemplified by a 40-foot high vugh lined with gold crystals in the Cresson mine, Cripple Creek, Colorado, and the giant clams and anemones associated with a 'black smoker' 2500 m deep at the Galapagos Ridge axis. In addition to numerous drawings and black-and-white photographs there are 27 colour photographs showing a spectacular range of volcanic activity, including the eruption on Io, one of the moons of Jupiter.

This fascinating book should appeal to all earth scientists and is very reasonably priced.

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