

morphic terrains, and are associated with enrichments in a characteristic suite of elements (Nb, Ta, Li, B). Alluvial and colluvial concentrations from these primary deposits are also present. Most of the tin occurrences are, however, small in size, and currently it is only the deposits in the Bastar province which are economic.

Although much exploration for tin has been undertaken over the last few decades, the exploration and development programmes have been hampered by both the remoteness of the locations, and the secrecy surrounding any resulting geological data. This book attempts to summarise the occurrences of tin mineralization in India by bringing together and presenting much of this information. It describes many of the tin occurrences in some detail: exact locations, geological setting, nature of mineralization, and history of exploration and development are all presented. The methods used during the tin exploration programmes are outlined (including some discussion on biogeochemical surveys for tin).

This is an interesting and useful summary of the occurrence of tin in India, and the collection of information into one compact text is welcomed. It is packed with data and figures, and includes a good, general introduction to tin and its deposits. It will be of particular use to anyone needing an introduction to the tin mining and exploration industry in India. It will also be useful reading for anyone interested in the mineral deposits of India, tin deposits in general, or the occurrence of mineral deposits in high-grade metamorphic rocks.

D. H. M. ALDERTON

Scott, V. D., Love, G and Reed, S. J. B. *Quantitative Electron-Probe Microanalysis* (second edition). London and New York (Ellis Horwood) 1995. xiv + 311 pp., Price £31.50 (paperback) ISBN 0 13 104050 2.

This book comprises 15 chapters covering the theoretical, instrumental and some practical aspects of electron microprobe analysis. Chapter titles are as follows: (1) 'An historical perspective', (2) 'Physical basis of quantitative analysis', (3) 'Wavelength dispersive spectrometry', (4) 'Energy dispersive spectrometry', (5) 'Processing energy dispersive spectra', (6) 'Experimental determination of X-ray intensities', (7) 'Atomic number correction', (8) 'X-ray absorption correction', (9) 'Fluorescence corrections', (10) 'Evaluation of correction procedures', (11) 'Correction procedures in practice' (12) 'The Monte Carlo method', (13) 'Analysis of thin coatings', (14) 'Analysis of thin films' and (15) 'Analysis of particles'. The original edition of this book was published about a decade ago and this second edition has been substantially revised to take into account

recent advances. The particular revisions include details of the  $\phi(\rho z)$  correction procedures as well as updating the evaluation of correction methods. Details are also included of multi-layer devices for long wavelength WDS germanium energy dispersive detectors and applications in the analysis of thin films, coatings and particles (which are now afforded separate chapters).

The book gives an excellent overview of theoretical and instrumental aspects of electron microprobe analysis. A substantial part of the book is devoted to mathematical correction procedures, reflecting, no doubt, a particular area of interest to the authors. However, other instrumental aspects are adequately covered. What the authors have not attempted to do is review applications of the technique, or to demonstrate the important scientific contribution that the electron microprobe has and continues to make. Nor is any attempt made to review the capabilities of the electron microprobe in relation to other modern microprobe techniques.

This said, however, the book is excellent in its role as a 'nuts and bolts' text; it is well laid out and contains numerous line drawings which make a valued contribution in illustrating the text. The bit I enjoyed most? — browsing through the historical perspectives section which gives details and illustrations of pioneer electron microprobe instruments — 'lest we forget'. The bit I most appreciated having to hand? — the sections on the various correction procedures — 'good for the soul' and one day I'll get round to reading these chapters in detail. The bit I disliked most? — within the scope set by the authors, none, although it would have been nice to appreciate the advances that can be attributed to the electron microprobe in the various branches of science and technology.

Overall — an excellent book and, in paperback format, very good value for money. P. J. PORTS

Hodge, P. *Meteorite Craters and Impact Structures of the Earth*. Cambridge (Cambridge University Press), 1994. Price hardback £25.00. ISBN 0 521 360927. 124 pp.

As the title implies, this book is a compilation of descriptions of meteorite craters and impact structures on the Earth. Each description is accompanied by basic geographical, age and size information, a sketch-map of the surrounding area, and a summary of the geological setting. References to more detailed work on each crater are given, where appropriate. Many entries are illustrated with aerial photographs. Where the author has visited the site, he has provided a description of access details, and suggested itineraries for the best exploration of the feature.

The impact structures are arranged alphabetically by continent, which immediately raises problems, such as the location of the Europe–Asia boundary (which results in Russian and Ukrainian meteorite craters being considered in separate chapters). The organization of the text also precludes obtaining readily all the craters in a particular country or state. Although the book is fairly comprehensive and extensively illustrated, there are several surprising omissions, e.g. no mention is made of the Tunguska impact phenomenon. The meteorites which produced the structures are hardly mentioned at all: for instance, in the description of the Barringer Crater, the fact that the cause of this feature is better known as the Canyon Diablo meteorite is completely overlooked. The text gives the impression that preservation of fragments of the impactors is rare, which is not the case — we have many meteorites in our collections which are associated with known impact craters.

The writing style is perhaps a little too casual: "blobs of rock" is not a generally recognized technical term. There are also several careless typographical errors, which should have been noticed, including one in the frontispiece of the book. The text sits awkwardly between a popular 'coffee-table' offering and a specialist monograph. If the former were the market, then a more general description of associated features, such as tektites, should have been included in the introduction. Colour photographs would also have been essential. The sketch-maps and locality descriptions will be valuable for visitors to crater sites, but since any such visits are likely to be geographically-based, rather than alphabetically, the organization of the book is not helpful. The book lacks figures or tables which collate the data together, such as global, age or size distributions of craters. Specialists in meteorite craters will still turn to Grieve's invaluable review paper on the subject (*Meteoritics*, 1991, **26**, 175–194), rather than this book, which has itself drawn heavily on Grieve's work.

Notwithstanding these criticisms, the book is informative and easy to read. It is well-illustrated, and would be a valuable addition to any library, as it provides a general introduction to the study of impact craters, and helpful (if slightly dated) references to more specialist works.

M. M. GRADY

Heide, F. and Wlotzka, F. *Meteorites. Messengers from Space*. (Springer-Verlag), 1994. Price paperback DM 38.00. ISBN 3 540 58105 7. 231 pp.

This book is the English translation of the third edition of a German text which first appeared in 1934. As such, it contains valuable historical

references and photographs, the latter of which are unavailable elsewhere. The book is organized into three main sections: Fall Phenomena, Meteorites, and The origin and formation of meteorites, with a short introduction and a final list of appendices.

The first section, on fall phenomena, is a comprehensive and detailed description of the effects of a meteorite landing on Earth. Starting with observations of the light and sounds which often accompany a meteorite fall, the authors then go on to describe impact-related phenomena, including a report of the consequences of the fall of small meteorites, effects which are often overlooked, given the far-reaching destruction caused by hypervelocity impacts. This section also includes an historical overview of the first recorded observations of meteorite falls, and the gradual awareness that meteorites were natural phenomena. The historical aspects of the text are an important record of the development of the field of meteoritics as a recognized physical science.

Section 2 (The meteorites) is an account of the classification and properties of the different meteorite groups, and includes a discussion of cosmic dust and its connection to asteroids and comets. The section focuses on mineralogy and petrology, but also has a short additional section on geochemistry. One of the shortcomings of the text is that the more recent discoveries in meteoritics, such as the extensive research undertaken on presolar grains, is only considered in a very abbreviated fashion. Any future edition of the book would do well to incorporate more detailed discussion of the importance of isotope studies on meteorites (including the enormous database of information used for oxygen isotope classification of meteorites).

Section 3 concerns the origin and formation of meteorites, and details the different age-dating techniques for the samples. It is not until this section that we learn of the great age of meteorites, and their relation to the formation of the solar system. In this respect, the organisation of the text is perhaps a little awkward.

Overall, the book is a clearly-written and fairly comprehensive, description of meteorites and meteoritics. Translation from the original German is excellent — there is none of the stiltedness of flow so often characteristic of translated text. The book is well-illustrated throughout, with numerous black and white photographs and diagrams. Although the text has been revised and extensively up-dated since its first publication, the historical basis of the book is still clear from its organisation, and its concentration on classical descriptive science, rather than the more recent instrument-based geochemical studies. This is no bad thing, and the book provides a valuable, clear and well-written introduction to the study of