in this class of deposit. Paper 10—The Platinum Group Element Deposits: Classification and Genesis by A. J. McDonald reviews the geological and geochemical characteristics of deposits that host this group of elements. A threefold classification is given: 1. Orthomagmatic; 2. Alluvial; 3. Hydrothermal. An excellent well ordered review of the types and modes of emplacement of the most important deposit types—the orthomagmatic deposits, is presented. Paper 11—Magmatic Segregation Deposits of Chromite by J. M. Duke reviews the important features of chromite deposits with succinct summaries of the Bushveld, Great Dyke, Stillwater, Kemi, Selukwe and Bird River Sill deposits. The models for magmatic segregation of stratiform chromite are summarized but there is a lack of discussion on structural controls on chromite body formation.

Papers 12 and 13 are excellent companion articles by J. Lydon on Volcanogenic Massive Sulphide Deposits—Part 1: A Descriptive Model, and Part 2: Genetic Models. These are comprehensive summaries that describe the geological and geochemical characteristics of VMS deposite (Part 1) and erect genetic models involving fluid compositions, deposition systems and alteration characteristics (Part 2). Ore Deposits Models contains a useful index at the back of the volume. On the whole the book is well produced and well illustrated. Some papers could be improved with more photographs of ore types and of ore textures.

Despite the shortcomings of this volume in that some of the papers are somewhat dated, being written in the early eighties, and also because of a lack of descriptions of world class deposits such as Olympic Dam, this volume contains a wealth of information, extremely useful reference lists, together with succinct summaries and descriptions of many of the major ore deposit types. The book will be of great value both to the economic geologist and to the non-expert alike and will be particularly invaluable to students. Undoubtedly it will be a best seller and represents extremely good value.

K. R. McCLAY

Zachrisson, E., Ed. *Proceedings of the Seventh Quadrennial IAGOD Symposium*. Stuttgart (E. Schweizerbart'sche Verlagsbuchhandlung), 1988. x + 694 pp. Price DM 238.00 ($140·00).

This publication contains 71 of the many papers presented at the 7th IAGOD (International Association of Ore Genesis) symposium held in Luleå (Sweden) in August 1986. The topics covered are wide-ranging and there are sections on the tectonics of ore deposits (9 papers), fluid inclusions (7 papers), paragenesis (7 papers), fluorite and baryte deposits (7 papers), skarns (7 papers), tin and tungsten deposits (6 papers), volcanic-hosted massive sulphide deposits (8 papers), and mineralization associated with granitoids (9 papers). In addition there are five introductory review papers: 'Ores in volcanoes' (Sillitoe), 'Precambrian metallogeny of Finland, Norway and Sweden' (Frietsch), 'Volcanogenic mineralization styles in the Early Proterozoic of Fennoscandia' (Rickard), 'Latest Proterozoic and Phanerozoic metallogeny in Fennoscandia' (Vokes), and 'A model for the genesis of sediment-hosted exhalative (SEDEX) ore deposits' (Russell). [Abstracts of all papers are given in M.A. 90M/0265–0335.]

There are several interesting and thought-provoking papers in this volume and the range of subjects covered ensures that most geologists concerned with mineral deposits will find something of relevance here. The presence of numerous review and compilation papers makes it a particularly valuable literature source for a wide range of mineral deposit types. The overall standard of presentation is high, and the editor must be congratulated on the production of this book.

D. H. M. ALDERTON

King, H. F. *The Rocks Speak*. Parkville, Victoria, Australia (Australasian Institute of Mining and Metallurgy), 1989. xii + 308 pp.

This book is an autobiographical collection of essays concerning the development of ore geology from an Australian perspective. Dr King's professional experience of sixty years has covered the entire modern period of thought on ore genesis and his work traces changes of ideas and subsequent approach to mineral exploration from local to global scale.

He uses the example of Broken Hill to show how until the 1950s this deposit was thought to have resulted from selective replacement of sedimentary horizons by 'ascending' hydrothermal fluids. Even after presentation of substantial evidence of the stratiform nature of the deposit by Ramdohr in 1951, showing that the high-temperature nature of the ore mineralogy was acquired during metamorphism, and field scale evidence by King, the hydrothermal view was retained by Australian geologists because of mineral replacement textures seen on thin-section scale. Stanton's work in 1972 finally demonstrated that the

Broken Hill district represented an inverted metallogenic sequence and that metamorphic mineral assemblages reflect original rock composition rather than a precise indication of *P–T* conditions.

Mt. Isa was not really considered to be a stratiform deposit until 1962, equivalent unmetamorphosed mineralization not being demonstrated until 1978 to 1983—that of McArthur River, described as having been deposited in a shallow lagoonal environment. The Cobar field is shown to be a camp where regional changes in Cu–Pb–Zn contents reflect a metallogenic sequence of original sedimentary origin, but present orebodies are mainly transgressive due to remobilization of the metals during metamorphism.

King draws comparisons of the Broken Hill district with widely separated regions of North America: Calumet, P.Q.; Balmat-Edwards, N.Y.; Franklin Furnace, N.J.; Sterling, N.J., and states that in order to dismiss a sedimentary origin for such deposits we must ignore much obvious data. Continuing the theme of a sedimentary or volcanogenic origin for many deposits he gives examples of Precambrian gold mineralization in Western Australia—many past and present producers are conformable lodes or stratiform reefs. Gold in the Kalgoorlie field has obviously been remobilized during shearing, but a preference for certain horizons still suggests that the metal may have had a local source.

Expanding the sedimentary theme, the author notes the presence of algal remains in many mineralized areas: the Belgian Congo; Bulman, McArthur River, Northern Territory; Weekaroo, South Australia; Rum Jungle and Mary Kathleen uranium; and the Pernatty Lagoon area of South Australia. He stresses the early experimental work of Baas Becking in demonstrating that organisms are capable of forming 'ore' minerals and emphasizes that it is necessary to consider the total environment in which mineralization may be found.

In considering mineralization throughout geological time he notes that concentrations of elements are typical of certain ages: Proterozoic—dolomite/BIF deposition; Palaeozoic—Pb/Zn/Cu/pyritic deposits, where pyrite:base metal is often 1000:1; Palaeozoic—phosphate, gold/quartz mineralization; Mesozoic—coal deposition. He compares the Palaeozoic bedded phosphate of Queensland with that of the U.S.A. and the uranium of the Northern Territory with Saskatchewan; the Bonaparte Gulf, Northern Territory with the Mississippi Valley; Hamersley iron with counterparts in South Africa and N. America and hints at a correlation of the central Australian ultrabasics with those of the Bushveld and Duluth.

The author emphasizes that we do not as yet understand the reason for such appearances of huge amounts of certain elements at discreet times, such as the Hamersley iron, magnesium in dolomite, and later in the Proterozoic: sulphur as at Mt. Isa and in the Palaeozoic deposits; phosphate; gold and the Malayan and Tasmanian tin provinces. In making large-scale correlation he notes the controversial work of Tim O'Driscoll in defining major lineaments which may be the result of long-lived deep crustal fracture patterns and which have major mineralized areas at their locus. He stresses the need that in order to understand it we must study mineralization from all scales and take 'a holistic view'. He observes: '... the trend today is heavily toward high-technology data. At the risk of appearing old-fashioned, this—as ore geology—is an unfortunate trend. The need is for understanding and through this, insight, not for pages and pages of instrumentally-acquired "data"', noting in the case of Broken Hill (p. 260) that: "Some geological concepts lack a sense of scale. Replacement processes, plausible on the scale of mineral boundaries as seen under a microscope, become absurd when extrapolated to field scale'. The central theme of the book is that there is *no substitute* for good field observation and mapping.

This book was of great interest to me, being one who had been engaged in mineral exploration in Australia during the 1960s, often working without any sound metallogenic model for mineralization. It is highly recommended to all exploration and mining geologists and will benefit students of ore geology and encourage them to think on *all* scales.

T. LIVERTON

Berkman, D. A. *Field Geologists' Manual*. Parkville, Victoria (Australasian Institute of Mining and Metallurgy: Monograph Series No. 9, Third Edition), 1989. 382 pp. Price $A 58.50.

This reference manual is written especially for the needs of geologists and geophysicists in Australia, New Zealand and New Guinea. It contains a wealth of basic reference data—the requirements for Australian Stock Exchange reports and the A.I.M.M.E. code of ethics; basic mineralogical and petrological tables plus criteria for environmental impact reports. Also included are compositional requirements for ore parcels; classification of Australian coals and a checklist