

given. The authors pose several direct questions with each problem, such as the likely source of geochemical anomalies, factors which have influenced anomaly development and recommendations for further work in the area. In the next 100 pages of the book, each of the problems receives clear and extended answers to the questions, and a full discussion of the nature of the problem, why it arises, what precautions should be routinely taken to deal with it, and so on.

For the most part the problems are not esoteric or bizarre, but are examples of the slight but ultimately predictable departures from idealized or simplified models of geochemical dispersion patterns. They are the problems that the practitioner of exploration geochemistry is bound to face in the real world.

The book is organised into groups of problems in the categories of reconnaissance, follow-up, detailed and integrated surveys. Relevant maps, diagrams and tables of data are plentiful. Useful references to pertinent papers in the scientific literature accompany each of the problems. The book also sports an excellent index, an asset that some might have omitted in a book of this type, but which would be sorely missed.

Some prior knowledge of exploration geochemistry is required in order to enjoy and appreciate the value of this book, so it is not for the beginner. It is, however, essential to all those who truly need to have a working knowledge of exploration geochemistry, and it is versatile in its applications. College and university lecturers may opt to use it as a means of formulating instructive exercises and as a source of case histories. Students will undoubtedly find it an excellent self-teaching aid. Exploration professionals will find it illuminating and a useful work of reference.

Handsomely presented throughout and bound in hard cover, 'Practical Problems in Exploration Geochemistry' deserves wide readership in its specialist field.

M. HALE

Hall, A. *Igneous Petrology*. London (Longman), 1987. viii + 573 pp., 366 figs. Price £17.95 (soft cover).

This undergraduate textbook is divided into fifteen chapters. The first seven treat the occurrence, petrological phase equilibria, trace-element distribution, isotopic composition and evolution of igneous rocks and magmas. Of the remainder, six chapters cover the field and tectonic occurrences, chemistry and petrogenesis of magmas that erupt at the present day, and the final two concern anortho-

sites and Alpine peridotites. Much of the material appears in a textbook for the first time.

Major element, microscopic and hand-specimen petrography are not covered, so a second book will be required for these topics. To my mind, even brief remarks on the mineralogical and textural characteristics of the rocks would have been beneficial in making the petrogenetic discussions more tangible, and in demonstrating that these are useful sources of petrogenetic information.

Nonetheless, the author skilfully balances information on field relations, tectonic relations, phase relations, chemistry and isotopes to produce rounded and thoroughly modern discussions of magma genesis, that should prove compelling to keen students. It is a welcome feature that Hall indicates the importance of field relations by the inclusion of numerous simple, but effective maps. It is also welcome to find an appropriate proportion of British field examples in this text. The reference list is extensive (c. 1400 entries) and, though up-to-date and covering predominantly the last 25 years, does not ignore the older literature in which the foundations of modern study were established.

While a reviewer can almost always find that a book lacks some marginal topic (e.g. this one barely mentions extra-terrestrial igneous rocks), it seems to me a serious omission that the new ideas emerging in physical petrology, and particularly in fluid processes in magma chambers, are not dealt with. Perhaps the author feels these matters are still too controversial for undergraduates, but this is to exclude them from the most exciting, topical and rapidly developing aspects of igneous petrology in the 1980s. The next edition must remedy this shortcoming.

Amongst the many textbooks on igneous petrology published in the last decade, the distinction of this one is its price. Congratulations to the author for choosing a publisher who appreciates that undergraduates have limited funds, and accordingly has produced a modestly priced paperback book. I expect buoyant sales and no little competition for Cox, Bell and Pankhurst's *The Interpretation of the Igneous Rocks*.

C. H. DONALDSON

Salkield, L. U. *A Technical History of the Rio Tinto Mines: some notes on exploitation from pre-Phoenician times to the 1950s*. London (Institute of Mining and Metallurgy) 1987, x + 114 pp., 4 maps. Price £15.99.

Many of the important technical developments associated with mining and metallurgy in Europe and the Spanish Colonial domains have originated