The reviewer has no hesitation in recommending this book to anyone who is interested in its highly specialized subject.

B. W. ANDERSON

Atherton (M. P.) and Tarney (J.), Editors. *Origin of Granite Batholiths: Geochemical Evidence.* Orpington, Kent (Shiva Publ. Ltd., 9 Clareville Road, Orpington, Kent BR5 1RU), 1979. viii + 148 pp., 57 figs. Price £4·50 ($9.00), + 50p ($1.00) per copy for postage outside the UK.

This book is comprised of eleven papers which deal mainly with geochemical data pertinent to the origin of granite (s.l.) batholiths and chemically evolved volcanics erupted at destructive plate margins. The papers were originally presented at a one-day meeting of the Geochemical Group of the Mineralogical Society held at Liverpool in May 1979, and it is much to the credit of the editors and the publishers (Shiva Publishing Ltd.) that the book was published (in paperback form) before the end of 1979. This must be a record!

The eleven papers include reviews of published and unpublished data; however, much of the new data is presented in diagrammatic form only and the authors indicate that it will be published elsewhere. The references for all eleven papers are collected together at the end of the column, a feature which has presumably assisted in rapid publication.

The first paper in the book by Pitcher briefly discusses the over-all volcanic association of batholiths in different tectonic environments. Three of the subsequent papers are concerned with chemical aspects of Andean batholiths and volcanics. Atherton, Court, Sanderson, and Taylor review the trace element geochemistry of the Peruvian coastal batholith and Thorpe and Francis discuss the petrogenetic relationships of Andean intrusive and volcanic associations, and in particular address the possibility of crustal contamination during their development. Tarney and Saunders describe the trace element geochemistry of some Andean plutons in Antarctica and draw comparisons with Proterozoic and Archaean crustal rocks in E. Greenland and Scotland.

Three papers focus on the Caledonian granites of Britain and Ireland. Stephens and Halliday deal with the major element and Sr isotope variations in the Galloway pluton and consider the role of crustal contamination in its petrogenesis. Pankhurst reviews Sr and Pb isotope results and other trace element abundance data for the Foyers and Strontian intrusions and discusses possible models for their petrogenesis. The emplacement of the Caledonian Ardara pluton is dealt with by Holder.

The remaining papers include a topical and general review of Sr and Nd isotope data of volcanics formed of destructive plate margins by Hawkesworth and an account of I- and S-type granites (as defined by Chappel and White) occurring in the tin belt plate margin environment of SE Asia. Brown considers the possible changes in batholith emplacement through time in relationship to proposed models of continental growth. Lastly preliminary sulphur isotope data are presented for well-defined I- and S-type granites by Coleman.

The book is by no means a complete discussion of geochemical evidence for the origin of granite batholiths, but then it was presumably never intended to be so. However, it is a timely review of some of the progress that is being made by geochemists in understanding the petrogenesis of granite batholiths. Its value is much enhanced by the speedy publication and it is likely to be a valuable reference book for undergraduates, graduates and researchers alike. At a price of £4·50, many will consider it worthwhile purchasing the book.

R. K. O'NIONS

Levinson (A. A.). *Introduction to Exploration Geochemistry*: second edition (with chapters by R. B. McCammon and B. Hitchon). Wilmette, Illinois (Appl. Publishing Ltd.), 1980. xxiv + 924 pp., 267 figs., 1 coloured pl. Price $35.00 (Student price $22.00).

Readership spans experienced exploration geochemists as well as the students, geologists, scientists in allied fields, and prospectors towards whose requirements the author directed his attention. The production of a second edition is fully justified by the rapid advances that have been made since the writing of the first, and the author has taken the opportunity of incorporating improvements suggested in reviews of the earlier book.

The format adopted for the new work is unorthodox; the first edition has been retained unaltered save for the insertion of a list of corrections, and the new material added in the form of an addendum of some 310 pages entitled 'The 1980 Supplement'. It is understood that this will be available separately. Chapter titles in the addendum are identical with those in the first edition while chapter numbers, figures, and tables are distinguished with an added A. Page numbers of the corresponding entry in the first edition are given alongside both second and third order headings, facilitating reference back to the earlier material. If additional discussion is unjustified, the heading is followed by 'No additional comment'; similarly,

when new topics are introduced, the fact is noted. Inspection of the contents list reveals that although most chapters have increased in length by around fourteen pages, three have enjoyed considerably greater expansion. They are: The Secondary Environment (56 pp.); Primary Distribution (32 pp.); and Analytical Methods (26 pp.). There is a new appendix listing geochemical characteristics of selected elements modelled on one originally presented by Hawkes and Webb in 1962. Basic information on average abundancies in different rock types, soils, and surface waters; on geochemical associations; on element mobilities in primary and secondary environments; and on geochemical barriers are given for more than thirty, mostly trace, elements.

A major new source of material available to the author is the translated text of *Beus and Grigorian* (1977) in which Soviet ideas and experiences as applied to the primary environment are emphasized. Basic concepts behind the techniques used in the USSR for recognizing and interpreting primary halos and the primary distribution of elements, largely based on the idea of hydrothermal zoning, are incorporated in Chapter 2A, while application of these concepts to mineral exploration is discussed in Chapter 7A. This Chapter includes a new topic of eleven pages on lithogeochemistry in the Soviet Union containing some interesting practical details. An impression of the flavour of the Russian influence can be gained from consideration of the re-definition of geochemical provinces from 'relatively large, well-defined areas of the Earth's crust that have a distinctive chemical composition' to the more rigorous 'large-scale crustal units characterized by common features of geological and geochemical evolution expressed in the chemical composition of the constituent geological complexes (formations), as well as in the endogenic and exogenic metalliferous and non-metalliferous concentrations of the chemical elements'.

Notwithstanding an increased emphasis on the primary environment, the secondary environment continues to be of most importance to exploration geochemists and this is reflected in the large amount of new material presented under this heading. In addition to expansion of first edition sections, there are new topics on arid environments and mobility of uranium and its daughter nuclides in the secondary environment. The author has done his best with the first of these in the face of a paucity of published work, and in respect of the second, has produced an admirably succinct account of a subject with a voluminous literature.

As indicated previously, analytical methods receive a good deal of attention. In the introduction and section on general principles, progress in high-productivity, multi-element analysis, and the importance of error control are discussed in some detail. Almost all the individual analytical methods described in the first edition are brought up-to-date, atomic absorption spectrophotometry, for instance, with a useful account of the development and application of the heated graphite furnace. Several new topics are introduced including neutron activation analysis, charged particle track analysis, and plasma emission spectrometry. (On a point of nomenclature, it might be better to reserve the word 'spectrograph' for an instrument in which a spectrum is recorded on a photographic plate and to employ 'spectrometer' where measurement by some form of electronic measuring device is used). This chapter constitutes a well-balanced account of the current analytical scene with no significant omissions.

The 1980 Addendum will be welcomed by all who use the first edition of this book. Prospective purchasers who do not own a copy of the latter would do well to obtain the second edition, combining the first edition and the Addendum. It is well-bound but not unwieldy—for all its nine hundred plus pages, and is a mine of information presented in a clear and interesting style. Illustrations and tables are abundant and clear. It is highly recommended to everyone with an interest in exploration geochemistry.

Beus A. A. and Grigorian S. V. (1977). *Geochemical Exploration Methods for Mineral Deposits.*

P. J. MOORE

MacKenzie (W. S.) and Guilford (C.). *Atlas of rock-forming minerals in thin section.* London (Longman), 1980. vi+98 pp., 228 colour photographs. Price £6·95.

Here is the excellent pedagogical innovation of a set of annotated superb high quality colour photographs of thin sections of minerals as seen under a petrological microscope in plane polarized light and under crossed polars. It is intended to illustrate and supplement *An introduction to the Rock-forming Minerals* by W. A. Deer, R. A. Howie, and J. Zussman. The photographs are so good that they really will help the average student and the volume undoubtedly fulfils its primary purpose as a laboratory manual. Most illustrations of minerals in thin sections, whether in journals or books, are so atrocious that no one who did not already know the appearance of a mineral could rely on the picture to identify the same mineral in another thin section. These photographs are excellent.

However, the book has the mark of a first edition and a number of improvements can easily be