factors. Although the care required to recognize the existence and effects of precursors and isotopic memories has been highlighted, the question of whether stable isotopes really tell us what we think they do has not been clearly posed. In the preface, the authors rightly point out that it is almost impossible to cover the current diversity of clay mineral isotope geochemistry in one book. Their aims were to familiarize the readers with various isotopic approaches, the dynamics of the evolution of clay minerals, to demonstrate the current state of the art in isotope geochemistry, and also to stimulate further progress in the research of isotopes in clay minerals. These aims are certainly accomplished. Some concluding final remarks on as yet unsolved fundamental problems of isotope geochemistry, and on the future outlook of new, expanded, or refined applications would have been a nice rounding off.

K. ZIEGLER

Mahadevan, T. M. *Deep Continental Structure of India: A Review*, Geological Society of India, Memoir 28, 1994. 569pp. Price US$ 60.

Many clues to the overall understanding of continental areas are locked up in the lower crustal layers, which, with the ever increasing sophistication of geophysical techniques and instrumentation these layers, are now becoming accessible. This twelve chapter Memoir summarises the geophysical evidence for the nature of the deep crust under India. It appears an impressive summary of a vast amount of data and of conflicting ideas and, to many outside India, will be a welcome reference book.

In outline, the first three chapters serve as an introduction and define the geographical limits of the Indian continental crust, and also examine different terminology in the context of modern concepts of crustal structure. Basic criteria are introduced for describing deep crustal structure and the position of various discontinuities. Techniques of data acquisition have changed radically and the increasing use of satellite data in relation to ground acquisition is discussed. There are sections on magnetic, gravity, resistivity and seismic data acquisition, including deep seismic sounding techniques, and heat flow measurements. The data are put into context with respect to the exposed sections through the crust as India has large areas of high-grade metamorphic rocks, effectively middle to lower crust, exposed for examination. One section discusses the capabilities of instrumentation, some of it designed and built in India. Chapter three concludes the introduction and describes the geological framework of the geophysical defined regions and there are several summary maps of the different types of data which can be used to find sources for details of smaller areas. Various models for the structure of the crust are discussed and comparisons with other shields made.

The details are presented in the next seven chapters. Chapter four describes the detailed data obtained from Peninsular India and covers both the Archaean cratons and Proterozoic mobile belts. A detailed review of the geology is followed by the geophysical data discussed in detail for smaller areas within the main regional framework. The chapter ends with inferences and summary. Once the Precambrian crystalline basement is described, Chapters five and six deal with the Proterozoic platformal sedimentation and the Gondwana cratonic sedimentary basins. There are sections on each occurrence and again it is easy to seek out the source references and available data. The Mesozoic–Tertiary volcanic provinces are described in Chapter seven. The younger sedimentary basins in Chapter eight and the Himalaya in Chapter nine. The continental margins of India are described in a separate chapter, ten. The final two chapters, eleven and twelve, deal with the interpretation of the data and a summary of the different scenarios that the data allow. Finally, the concluding two chapters give a framework for future research and discuss where this might lead.

This volume is reasonably produced, but some of the diagrams have lost their clarity because of reduction, which could have been avoided. The Memoir is specifically designed as a review text and provides a summary of an integrated case study by many different methods of a complete continental area. It may thus have a value in teaching, though I would expect it to be found in a University Library catering for research and applied studies. Probably only specialists would have a personal copy. As a non-specialist, I found it relatively easy to follow and gives a good introduction to those wanting to know more about the deep structure of the crust.

C.R.L. FRIEND

Golley, P. and Williams, R. *Cornish Mineral Reference Manual.* Truro (Endsleigh Book Co., 50 Daniell Rd., Truro, TR1 2DA), 1995. viii + 71 pp. Price £9.20 (+ 80p postage). ISBN 0 951 9419 92.

This work represents an up-to-date list of the minerals known to be found in Cornwall, together with their chemical formulae and literature reference for the first documented occurrence of each species in the county. Entries are listed in bold type where their occurrence in Cornwall is beyond doubt; entries not in bold type are either of questionable occurrence or require further study. A total of 424 species are

recorded, of which 36 were first described from Cornwall and 136 whose first British recorded occurrence was in Cornwall.

The earliest described localities are listed for each species, but many of the present-day exposures get scant treatment; thus scapolite-wernerite is listed as occurring with axinite and zoisite in Tater Du greenstones, but there is no mention of this locality under either axinite or zoisite. Old and discredited names are listed, yet there is no entry for gilbertite. The touchstone for credibility is rightly the third edition of *Hey's Mineral Index*, but one is perplexed to find potassium magnesio-arfvedsonite [*Mineral. Mag.*, 1982, 257–66] as 'no record found of acceptance as a species, no reference in Hey 3'. Have the authors not heard of the I.M.A. nomenclature of the amphiboles [*Mineral. Mag.*, 1978, 533–63], where magnesio-artvedsonite is defined and the prefix potassium is specified for an amphibole with $K \geqslant 0.50$ in the standard formula? Potassium magnesio-arfvedsonite is certainly not a new species, but a new variety, as the author claimed.

The typography and layout are generally clear, but in some instances entries run into one another, e.g.chloropal onto chlorargyrite, diallogite onto diadochite, titanomagnetite onto titanite. Despite all these points, which could be easily remedied in a future edition, this book will be very useful as a quick reference to give known Cornish occurrences and formulae.

R. A. HOWIE

Hawthorne, F. C. and Martin, R. F., Eds. *Microbeam Techniques in the Earth Sciences*. Thematic Issue of the *Canadian Mineralogist*, Volume 33, 1995, 201–508. Price $50 CND (for purchasers outside Canada).

This thematic issue of the *Canadian Mineralogist* mainly contains papers presented at a Special Session of a GAC-MAC Annual Meeting in Waterloo, Ontario, Canada, and includes a total of 23 papers designed to familiarize the Earth Science community with the range of microbeam techniques currently available and the kind of work that can be done with them. Roughly half the special issue comprises papers that review the technical, analytical and general applications of selected microbeam techniques, covering electron-probe microanalysis of minerals for the light elements (Raudsepp, British Columbia), SIMS (MacRae, Western Ontario), accelerator mass spectrometry (Wilson, Rucklidge and Kilius, Toronto), Auger-electron spectroscopy (Nesbitt and Pratt, Western Ontario), micro-analytical techniques in stable isotope geochemistry (Kyser, Saskatoon), two papers on micro-PIXE / mineralogy and geochemistry (Campbell, Teesdale and Halden, Guelph/Manitoba), laser ablation ICP-MS (Fryer, Jackson and Longerich, Memorial), and microbeam X-ray diffraction (Wicks *et al.*, Royal Ontario Museum, Toronto). The second half of the volume covers more specific applications of microbeam techniques including EPMA of alkaline silicate glasses, SEM electron channelling, SIMS (three papers), comparison of methods for boron, micro-Raman spectroscopy (two papers), laser ablation ICP-MS (four papers), synchrotron XRF/ LA-ICP-MS and finally, micro-XAFS.

The majority of the contributors are Canadians working in Canadian Universities, so in a sense this collection of papers represents the state of health of microbeam work in Canada today (it is alive, kicking and in pretty good shape!). In terms of microbeam techniques, it's difficult to think what has been left out. Certainly all the main stream microbeam techniques are more than adequately covered. Furthermore, probably because of clear editorial direction, care has been taken by contributors to explain the fundamentals of the respective techniques and papers are, in general, very well illustrated using line diagrams, spectral output and half-tone photographs (where appropriate).

And finally, having just been involved in editing a book of similar coverage, I can't help but remark on how near the coincidence between title, publication date and scope of the present volume, with the Mineralogical Society's just published 'Micro*probe* techniques in the Earth Sciences'. To distinguish them, the micro*beam* book has more of a research flavour to it, as might be expected of papers submitted to a primary journal and furthermore includes techniques such as accelerator mass spectrometry that do not normally offer direct spatially resolved data. The micro*probe* book, comprising invited contributions, has a more unified approach that should attract the novice as well as the more experienced reader. And although this view is not entirely unbiased, both books well deserve to lie side by side in the laboratories of all users of microprobe instrumentation.

P. J. POTTS