related to the Hercynian collision, but the rock masses which collided are dominantly of Upper Proterozoic to Lower Palaeozoic protolith ages.

The last chapter contains a plate tectonics-oriented synopsis of the Palaeozoic by the editors, mostly for the Hercynian stages of the central European crust. The results of many authors, including the editors, are summarized in a mobilistic model for the region which will be a valid source for many years to come. The authors and the editors did a good piece of work. Let us hope that the following period in deciphering crustal features in Europe will be free of the divisions which have burdened earth scientists in the region, in this century.

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Australian times

Young, G.C. and Laurie, J.R. (editors) 1996. *An Australian Phanerozoic Timescale*. Oxford University Press, Melbourne. 279 pp., plus separate folio of 12 stratigraphic charts. ISBN 0-19-553951-6. Price: £110.

This volume compiled by the Australian Geological Survey Organisation (AGSO) presents a new global perspective on the Phanerozoic timescale, correlating extensive Australian and overseas research on biostratigraphy, geochronology and magnetostratigraphy. The book is thus an exceptional contribution to the development and refinement of the Phanerozoic time-scale. As the title suggests, the primary focus of the book is on Australian data. Despite this, rescaling of the geological timescale is presented in a global context, thus ensuring that it will be an essential framework for stratigraphers worldwide.

The book is divided into two sections, with the first providing an overview of each of the Phanerozoic geologic periods, together with summaries of the methods of biochronology, isotope geochronology and magnetostratigraphy. A chapter is also devoted to numerical calibration of the major Phanerozoic boundaries. A set of detailed explanatory notes for the set of biostratigraphic charts of each Phanerozoic period comprises section 2. The separately boxed folio of charts, integrates data on magnetic reversals, sea-level curves, and isotopic data used for age control, and the relationship of Australian biochronological zonation schemes to standard global time-scales presented wherever possible. Formation details are also presented for Australian sedimentary basins for some periods (e.g. for the Permian).

As a petrologist, much of the detail presented in the second part of the text is well beyond the bounds of my field, but nevertheless provides the up to the moment information on the timescale required by most geologists. If your field of interest is stratigraphy, palaeontology or palaeogeography, these explanatory notes provide the necessary detail for your field. From the point of view of an Australian stratigraphic context, this volume is a mandatory requirement.

The first section of the text is of more appeal to the non-stratigrapher/palaeontologist, and will be a valuable teaching aid for both undergraduate and postgraduate courses, with its overview of each of the Phanerozoic geological periods, and discussion of the methods of biochronology, isotope geochronology and magnetostratigraphy and numerical calibration of the major Phanerozoic boundaries. However, some shortcomings are apparent in this section of the book (which, given the scope, is hardly surprising). For example, it is disappointing that while there are 30 pages on magnetostratigraphy, there are only six pages on biochronology, and only four pages on isotopic geochronology. This seems a shame, given the recent advances in geochronological methods, particularly at the research School of Earth Sciences at the Australian National University and AGSO—especially in U–Pb zircon dating. The chapter on numerical calibration is also surprisingly succinct, but does cover the necessary aspects, with relevance of the geochronological data explained in section 2.

Despite this criticism, the collation of such a massive amount of data as presented in this volume represents an enormous amount of work—a project unlikely to be undertaken by anyone other than an organisation such as AGSO. The data are comprehensive and are presented in a standardized, easily followed format. The 79-page bibliography is a testament to the extensive literature review undertaken, and also provides the researcher with further data sources. Overall presentation quality is high, definitions are well explained, indexing is thorough, and the book is presented in an easily followed, logical format. The quality of printing, binding and editing is splendid, and the folio charts are presented in a high quality format. Perhaps one criticism here would be the complete lack of colour diagrams in either the book or the charts; however this is probably a warranted cost-saving measure in an otherwise high quality product.

In summary, this book makes accessible a vast amount of information which is presented in a high quality book and chart format. The editors, their many contributors, the publishers, and the Australian Geological Survey Organisation, should be congratulated on an excellent publication.

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Granites a third time

Brown, M., Candela, P.A., Peck, D.L., Stephens, W.E., Walker, R.J. and Zen, E-an. (editors) 1996. *Third Hutton Symposium. The Origin of Granites and Related Rocks. Transactions of the Royal Society of Edinburgh: Earth Sciences*, **87**. Parts 1 and 2. Royal Society of Edinburgh, U.K. 359 pp. Price £47.00.

This volume of 33 papers represents the proceedings of a symposium held at the University of Maryland at College Park, Baltimore in August 1995. The Hutton Symposium Series has grown out of a meeting organised jointly by the Royal Societies of Edinburgh and London in 1987 to mark the bicentenary of the work of James Hutton. This, the third in the series of Hutton Symposia, published by the Royal Society of Edinburgh is the latest statement from the 'granite community' on the health of their discipline.

It was the final chapter of this volume that caught my attention first, for it seemed that *Clarke's* survey of the 'Status of Granite Science' was a good place to begin this specialist volume. I was hoping for some answers to rather general questions about the achievements and future directions of 'Granite Science'. In response to my enquiry about the current status of granite research I found a carefully honed summary of the 'granite paradigm', although I felt that the discussion on the future of granite research lacked focus. My disappointment was short-lived, however, for this volume contains a number of major review papers which point the way forward for granite geology with great insight.

If a dominant theme can be identified in this collection of papers it is the physics and chemistry of granite melts, with a particular focus on the processes operating in the source regions of granitoid magmas. Three other themes are also significant. These are the mechanisms of granite segregation and ascent, the association between granites and mineral deposits and the relationship between granites and crustal evolution.

Constraining the Source of Granite Magmas

The extent to which granites 'image' their source regions has been the subject of continuing debate amongst granite petrologists over the past two decades. The debate centres on the granite 'source rock model' in which it is argued that granite magmas are probes of the deep crust. Critical to this viewpoint is the extent to which granites are modified during their extraction from the source and ascent to the surface. This subject is debated by *Chappell* and *Collins* for granites from the famous Lachlan Fold Belt in south-eastern Australia. These granites are thought to be divisible into two major groups (the well known S and I-type granites) on the basis of their chemistry. Chappell argues that the observed trace element variations are not modified by fractional crystallisation and that the observed rock chemistry can be related to the unseen source region. In contrast Collins argues that whilst an apparent division between types of source region is evident in the major element chemistry, isotopic studies suggest a continuum of compositions. He presents new Nd and Sr isotopic evidence to show that the Lachlan Fold belt granites derived from three source regions. Similarly, *Krogstad and Walker* show that the Proterozoic Harney Peak Granite in South Dakota, was derived from multiple sources, comprising mixtures