BOOK REVIEWS

ARRATIA, G., WILSON, M.V. H. & CLOUTIER, R. (eds) 2004. *Recent Advances in the Origin and Early Radiation of Vertebrates*. 703 pp. München: Dr Friedrich Pfeil Verlag. Price Euros 240.00 (hard covers). ISBN 3 89937 052 X.
doi:10.1017/S0016756805211706

Although his book, with its more than 700 pages, brings together a number of papers on a named theme, it is more a volume honouring the retirement of Hans-Peter Schultze and his scientific contributions on early vertebrates ranging from conodonts to early tetrapods. It developed from a symposium by the same name held at the 62nd Annual Meeting of the Society of Vertebrate Paleontology held in Norman, Oklahama, on October 9, 2002.

The book comprises 33 papers written by a total of 58 authors, and is divided into two formal sections: Part 1, 'Recent Advances in Early Vertebrates' and Part 2, 'Recent Advances in Fishes'. The second part excludes completely any work on tetrapods, but otherwise they both deal with all major groups of early vertebrates, such as placoderms, chondrichthyans, acanthodians, actinopterygians and sarcopterygian fishes. As the book implies from its title, it intends to present a window on the recent advances and approaches in research on early vertebrate evolution. In recent years, research on early vertebrates has developed substantially thanks to innovative work in, for example, developmental biology, molecular phylogeny and cladistics, and by the finding of new exciting and important fossil material.

So, does this book succeed in its ambition besides honouring Hans-Peter Schultze? I must say that to some degree it does, since it quite accurately shows where the majority of effort actually is placed for the moment. Despite the recent interest in integrating developmental biology and molecular phylogeny, few are actually involved in this work and the majority of current research on early vertebrates deals with taxonomical and morphological description and phylogenetic analyses. Although this reality is reflected, there is a deficit in the volume on papers covering the more innovative advances.

Nevertheless, the large number of titles and wide range of various groups and aspects covered in this book are the strengths of this volume. I can say with certainty that at least some ingredients will satisfy many potential readers with various tastes and interests within early vertebrate evolution. This strength of the volume may, however, be seen as a weakness as it lacks a coherent synthesis with a particular focus, but I do not think we can compare it with other multi-authored symposium volumes where a particular synthesis has been the main agenda from the beginning. The book's strength as a diverse record on early vertebrate research makes it, however, difficult for a single reviewer to assess the quality of the individual papers. There is also no room in this review to discuss each one of them, but it is important to flag an obvious observation that the quality of the various papers and their contents are as disparate as the groups the book covers.

I would like to acknowledge the editors for the work they have put into compiling this massive volume, but I am disappointed in the often poor technical editing – there are quite a few spelling mistakes and factual errors. This is surprising, particularly since many of the errors are in areas where the editors are well informed. One would expect from the ridiculously high price that the book should have fewer of these irritating errors.

Recent Advances in the Origin and Early Radiation of Vertebrates, with its widely variable quality of content, is rich in new information and it does highlight where the areas of main interest remain. It is an appropriate contribution and many of the chapters will, through various reasons, provoke intense debate among vertebrate palaeontologists and evolutionary biologists.

Henning Blom

DE BOER, J. Z. & SANDERS, D. T. 2004. *Earthquakes in Human History. The Far-Reaching Effects of Seismic Disruptions*. xvii+278 pp. Princeton, Oxford: Princeton University Press. Price £15.95 (hard covers). ISBN 0 691 05070 8.
doi:10.1017/S0016756805221702

This book, subtitled 'The far-reaching effects of seismic disruptions', is a collaboration between a Professor of Earth Science at Wesleyan University (de Boer) and a science writer (Sanders). It arises from a lecture course by de Boer that attempts to convince liberal-arts undergraduates that "the sciences are not 'bloodless' – that, in the earth sciences in particular, something akin to the 'breath of living man' can be seen in phenomena such as volcanic eruptions [the topic of a previous collaborative book from these authors] and earthquakes". The way they do this is by discussing how particular historical earthquakes have affected people, societies and cultures.

The examples they consider will be familiar to most seismologists, and to many geologists. Two are non-specific, dealing with earthquakes in the Holy Land and in England, both of which benefit from long, documented histories that allow a perspective over a considerable period. Others are the earthquakes in Sparta (464 BC), Lisbon (1755), New Madrid (1811–12), San Francisco (1906), Tokyo (1923), Yungay (1970) and Managua (1972), a roll-call of famous disasters with which every seismology student should be familiar.

The book is well written, in a clear crisp style, without unnecessary jargon. The geological aspects are admirably well informed and accurate and, indeed, I learned several interesting details with which I was unfamiliar. Occasional bits of journalese slip in (I have never met an earth scientist who refers to earthquakes as 'tremblors'), but not enough to be irritating. The impact of these earthquakes on history and society is, of course, debatable; that is the nature of this rather less tangible side of the authors' endeavour. But the analysis presented here is sensible, rational and balanced, and has no particular agenda. They argue that we should all think more about the interaction between the natural behaviour of our planet and way we live, and that this issue is likely urban areas. In this they are, in my view, entirely correct.

This is an admirable book. It is easily the most scholarly and well-informed discussion of the broader historical contexts of these earthquakes that I have read, and the geological accounts of what happened are well explained and not unnecessarily dumbed down. I would recommend it to all earth scientists who possess a broad natural curiosity; they are certain to learn something from it, and attain a perspective on some famous natural disasters that will complement the detached scientific analysis which is the bread-and-butter of most of us.

James Jackson

COSGROVE, J. W. & ENGELDER, T. (eds) 2004. *The Initiation, Propagation, and Arrest of Joints and Other Fractures*. Geological Society Special Publication no. 231. vi+330 pp. London, Bath: Geological Society of London. Price £85.00, US $153.00; GSL members' price £42.50, US $77.00; AAPG/SEPM/GSA/RAS/EFG/PESGB members' price £51.00, US $92.00 (hard covers). ISBN 1 86239 165 3.
doi:10.1017/S0016756805231709

The latest Special Publication from the Geological Society has a format and provenance typical for the series: a thematic collection of papers deriving from a scientific meeting. However the meeting concerned was unusual: a field workshop held in August 2001 in Somerset, England to recognize posthumously the contribution of Paul Hancock to structural geology and to the field of brittle deformation in particular. The papers are said to have derived from questions raised in the field, rather than before the meeting, a stimulus that may partly explain the longer than usual delay between conference and publication.

The twenty-one papers on fractures are organized into seven sections, giving a flavour of the scope of volume: initiation, propagation, arrest, geometric analyses, tectonic history, statistical approaches and post-propagation. Intertwined through these sections are several other themes: the contrast between joints and veins, the controls on joint spacing, the reason for concentrated fracture 'swarms' and joint fractography as a guide to origin. Approaches vary from computer simulation to field studies. Naturally there are case studies from the Jurassic of north Somerset, but others include the Beer Sheva syncline, Israel and a volcanic terrain in Java.

This is a useful collection, of interest to geologists concerned with brittle deformation and its economic implications. However, the volume would have been improved by an introductory review of fracture formation, highlighting current debates and research directions. Such a review might have made the volume more accessible to the average geologist for whom joints are an ever present but ever puzzling phenomenon.

Nigel Woodcock

DAL SASSO, C. 2005. *Dinosaurs of Italy.* xv+213 pp. Bloomington, Indianapolis: Indiana University Press. Price US $35.00 (hard covers). ISBN 0 253 34514 6.
doi:10.1017/S0016756805241705

Indiana University Press is generating a regular series of books on plaeontological topics (many of which are dino-centric). This is another in the series and although dinosaurs do indeed feature they are not the sole subject of the book; it also covers topics such as marine reptiles, flying reptiles and the Gubbio site (famous for its contribution of iridium-enriched clays to the debate over the K–T extinctions).

The book is intended by the author to outline some of the palaeontological heritage of Italy (thereby yanking attention away from its rich human history). Beyond this, it appears also to be intended to provide some ammunition that can be aimed at the political powers that be, in order to encourage funding to help support the preparation, scientific study and conservation of these more ancient aspects of Italy's natural heritage.

The book provides a brief layman's guide to dinosaurs and their relationships. This is then followed by an outline of dinosaur trackway discoveries in Italy, and then more extensive description of one of the most famous dinosaur discoveries of recent years: the tiny, and beautifully preserved, *Scipionyx*. This exceptionally well-preserved, carnivorous (theropod) dinosaur not only exhibits a beautifully articulated skeleton, but also distinct traces of tissues (not only remnants of claws, but soft tissues of the abdominal region). There is consideration not only of details of the anatomy of this animal (osteology and soft-tissue structures) as well as more speculative description of the circumstances of burial and even a potted history of how this dinosaur came to be (its taphonomic history). A further chapter deals, rather tantalisingly, with a new discovery of a complete and articulated hadrosaur (duck-billed dinosaur) from a quarry near Trieste. The skeleton was extracted in 1999 and has been painstakingly prepared to reveal a wonderfully complete example of an apparently adult, yet 'miniature' (4 metres long – we are talking 'dinosaur' here!), dinosuar. This has yet to be fully described so the details are, to myself as an ornithopod dinosaur specialist, genuinely tantalising. There is also a very brief section on a very fragmentary, large carnivorous dinosaur.

Up to this point we have been dealing with dinosaurs either broadly or narrowly, and have reached the approximate halfway point in the book. The remaining pages deal with an array of non-dinosaurian fossils from Italy (marine reptiles, flying reptiles) and the iridium-enriched clays at the K–T boundary that were first identified in Gubbio.

The book is generally well presented, and it may be that production-cost-related corners have been cut because there is an occasional reference to colour in some of the legends to photographs (which are all monochrome). The information is generally accessible to a wide audience and I am sure would be considered interesting to the non-specialists at whom it has been aimed by the author. However, this is not an academic textbook and, along with some other contributions in this series produced by Indiana University Press, sits (for me) rather uncomfortably across the interface between the technical and popular. At intervals it adopts a somewhat technical 'air', and at others a decidedly populist one. The use of the word 'dinosaur' in the title is misleading, and as such is a clearly commerical ploy on the part of the publishers. I am relatively pleased to add this book to my bookshelf simply because of the meagre information it contains (in the space of about 10 pages) about the new Italian hadrosaur but, apart from that, it is largely intellectually redundant and I would not really have considered spending hard earned cash upon it.

This must, in truth, be simply intended by the publishers as fodder for the burgeoning population of 'dinosaurophiles' around the globe. Cristiano Dal Sasso will be delighted to have got this published in English (as well as his native

Italian) because it forms part of his campaign to pressurize the Italian government into actively supporting research into his nation's fossil heritage. All I can say is that I wish him much luck.

David Norman

BAMBER, J. L. & PAYNE, A. J. (eds) 2004. *Mass Balance of the Cryosphere. Observations and Modelling of Contemporary and Future Changes*. xvii + 644 pp. Cambridge, New York, Melbourne: Cambridge University Press. Price £85.00, US £130.00 (hard covers). ISBN 0 521 80895 2.
doi:10.1017/S0016756805251701

The effect of global warming on the cryosphere has become an issue of increased scientific and public interest in the last two decades. Thus this volume on the mass balance of the cryosphere edited by Bamber & Pyne is timely. The editors state that the goal of the book is 'to provide, in a single volume, a comprehensive and up to date and timely review of our state of knowledge about the present-day mass balance of the cryosphere from observations and how it might change over the next millennium based on the latest modelling studies'. Although the term 'cryosphere' refers to all the frozen water and soil on the Earth's surface, the book only focuses on sea ice and land ice (glaciers, ice caps and ice sheets). This is acknowledged by the editors in the introduction and is appropriate given that land- and sea ice form the largest component of ice on the planet today and interact sensitively with climate and sea level.

The book is designed as a reference test which reviews the theory and practice of measuring and modelling the mass balance of land ice and sea ice. It comprises a series of chapters written by international experts on sea ice, ice sheets, and glaciers and ice caps. Following an introductory chapter by the editors, the book is divided into five parts. Parts 1 and 2 are methodological in focus and cover the principles of the methods used to observe and model mass balance. Part 1 deals with observational techniques, including both remote sensing and in-situ measurements, while Part 2 focuses on modelling. The following three parts of the book provide overviews of the current state of knowledge of present day and predicted future mass balance of the cryosphere. Part 3 covers the mass balance of sea ice and is divided into chapters on modelling and observation. Part 4 focuses on ice sheet mass balance in Greenland and Antarctica and for each ice sheet there are again chapters on modelling and observation. And finally Part 5 focuses on the mass balance of glaciers and ice caps and includes chapters on Arctic ice caps and glaciers, the interaction between glacier mass balance and climate and sea level change, and glacier monitoring.

The book provides an excellent and detailed reference for scientists interested in the current and likely future mass balance of land- and sea ice. The chapters are well written, each chapter is accompanied by its own bibliography and figures are generally reproduced to a high standard, although it is a pity that greater use of colour figures was not made. Many of the authors are physicists by training and the book reflects this; several of the modelling chapters are necessarily highly quantitative in focus. The book is likely to be less useful to those interested in reconstructing changes in mass balance or ice sheet/sea ice history from the geological record as its focus is firmly on the present day and the future. At £85 the book is certainly not cheap, but for those interested in the current state of play of land- and sea ice mass balance it is an important work and I can recommend it as a useful addition to their bookshelves.

Colm Ó Cofaigh

STOW, D. A. V. 2005. *Sedimentary Rocks in the Field. A Colour Guide*. 320 pp. London: Manson Publishing. Price £39.95 (hard covers), £19.95 (paperback). ISBN 1 874545 68 5; 1 874545 69 3 (pb).
doi:10.1017/S0016756805261708

For any geologist interested in sedimentary rocks, this is a special book indeed. There are already compact guides to the field study of such rocks. There are other books of field photographs. However, there is no other sedimentological guide that combines such high-quality photos with such informative captions and text. This book is likely to become the valued field companion of many students and researchers who are keeping alive the intellectually challenging and economically vital skill of interpreting ancient sediments.

The organization of the book is simple but effective. Eleven central chapters on rock types – from conglomerates to volcaniclastics – are preceded by ones on field technique and the principal characteristics of sedimentary rock. The concluding chapter is on the main depositional environments, and there are appendices of the timescale, grain size and sorting charts and the like. Throughout these chapters the main components are the 450 or more colour field photographs, each with helpful caption and locality information. These photos, making up about half the book, will provide as much entertainment for the experienced geologist as they do education value for the student. For those wanting more formal instruction, each chapter has some concise text, many informative tables and some clear line drawings. The quality of this material makes the book a reliable introduction to practical sedimentology, quite apart from its value in the field.

Dorrik Stow's preface ends with the plea that this book should be taken in the field and used. The paperback edition is robustly constructed with this in mind, and the cost represents excellent vale for what should be many years of service. The author deserves the reward of seeing his book selling well worldwide. After all he will get little reward from the accountants of UK academic output, who, in a topsy-turvy world, rate influential books like this lower than a mediocre scientific paper. Our thanks should go to the author for wasting his time on such a stimulating and attractive book.

Nigel Woodcock

MATHEZ, E. A. & WEBSTER, J. D. 2004. *The Earth Machine. The Science of a Dynamic Planet*. xvi+335 pp. New York: Columbia University Press. Price US $39.95, £27.00 (hard covers). ISBN 0 231 12578 X.
doi:10.1017/S0016756805271704

The Earth Machine has an unusual pedigree: it was written by members of the team that assembled the Hall of Planet Earth (HOPE) at the American Museum of Natural History. So it draws on the structure of the exhibition and on the enormous amount of work involved in obtaining material for the displays. Centred on rocks as the primary source of information, the collection spans the globe. One exhibit in particular caught my attention: the museum staff made a latex mould of the Devonian unconformity at Siccar Point, but as exposed in cliffs and not at Hutton's famous occurrence on the foreshore. Sadly, the one they chose could have been from anywhere.

Like the exhibition, the book is divided according to four fundamental questions that might occur to any lay person curious about their home world. How has Earth evolved? Why are there ocean basins, continents and mountains? What causes Earth's climate and climate change? Why is Earth habitable? Providing answers inevitably draws out the familiar fundamentals of the geosciences, and also a good deal of the history of geological ideas and the evolving technical context that made them possible. *The Earth Machine* is an extension of the exhibition and seems most suited to those who have been inspired by the Hall of Planet Earth. Judging by some of the exhibits figured, HOPE must be awesome. So it should be, for the team combed the planet for the most appropriate materials, many specimens being enormous, at equally enormous cost.

Pitched at an accessible level for lay readers, the book does cover the ground and the past comprehensively, the themes drawing on field photographs taken during the collecting trips. I particularly liked the personalized accounts of how geoscientific breakthroughs were made, from superposition to the development of mass spectrometers. Also included are up-to-date simulations of processes at scales from the planetary to the local, to enliven empirical observation. Where some insight into investigative technologies is needed to understand the outcomes of research, Mathez & Webster summarise them well. They largely achieve their aim of passing on clearly the fundamental principles and issues in Earth science, with a couple of glaring omissions. They give no account of climate change before the Neogene cooling, and supercontinents that played such a huge role in Earth history do not figure, except for Wegener's Pangaea. As regards the text, the book is fine, but illustration is disappointing.

Museum exhibits are, if nothing else, visually stimulating. Bar the colour field photographs, the book is not, and that is a great surprise. Designing a major exhibition demands the flair of expert visualizers, and most displays from the modern era are awesome. It is the graphic design element that sadly lets down the reader, particularly in the line drawings and maps that are monotonously monotone, lacking even cues for depth perception that are the hallmark of computer aided design. That is not only odd as regards the book's origin, but because each page has been printed using a four-colour (CMYK) process, so the potential was there once a contract had been signed. Photographs of 3-D museum models *never* convey their quality or their content, simply because they are not designed to be viewed on a 2-D page along with all the shadows and highlights that plague indoor photography. Compared with magnificent, if somewhat dated, books of the visual quality of *Earth Story*, this one simply cannot compete in firing up the imagination of readers who have not been around the museum itself.

Steve Drury

HUTCHISON, R. 2004. *Meteorites. A Petrologic, Chemical and Isotopic Synthesis.* Cambridge Planetary Science Series. xiii + 506 pp. Cambridge, New York, Melbourne: Cambridge University Press. Price £80.00, US $135.00 (hard covers). ISBN 0 521 47010 2. doi:10.1017/S0016756805281700

While I own several hundred books specifically on meteorites, there are only a few that I keep on my desk within arm's length. Bob Dodd's *Meteorites: A Petrologic–Chemical Synthesis* has always been one of these. Meteorite names are an alphabet soup and even meteorite researchers occasionally need help remembering what distinguishes a CO from an R chondrite or a winonaite from an acapulcoite. Dodd's book was a superb reference for this purpose, but lacked details of many new groups of meteorites discovered since its 1981 publication. It was with much anticipation that I learned that Robert Hutchison, the retired curator of meteorites at the Natural History Museum in London, was undertaking revision of this important work. *Meteorites: A Petrologic, Chemical and Isotopic Synthesis* is a welcome addition to what is, admittedly, a crowded field of recent additions to books on meteorites.

The strength of this book is its descriptions of meteorites. Chapters 4, 5, 8, 9 and 10 provide 2–3 page descriptions of the important members, textures, mineralogy (high- and low-temperature components for chondrites), and thermal histories of each of the major meteorite groups and several important ungrouped meteorites. The chapters on chondrites are particularly welcome, given that no other recent text presents the features of chondrites in a succinct, systematic manner. The uninitiated may find the text overly dense with nomenclature, although the book provides an ample glossary. Each chapter provides a selected bibliography of the most important summary papers for the interested reader.

Chapters 1, 2, 3 and 6 provide complementary information on meteorites in general, an overview of chondrites, their components, and the timing of their formation, respectively. These chapters serve as useful context for interpreting the similarities and differences between the individual groups. Chapter 11 addresses petrogenetic associations both within the differentiated meteorites and between chondrites and achondrites. It is unfortunate that this chapter does not include advances in our understanding of meteorites from spacecraft exploration of asteroids, the Moon and Mars.

The two most controversial chapters are on the origin of chondrules (Chapter 7) and the Solar System (Chapter 12). While Hutchison presents multiple viewpoints on such issues as the origin of chondrules (planetary *v*. nebular), the heating mechanism for chondrules (X-wind *v*. transient, localized events) and the origin of Jupiter (co-accretion *v*. capture), he states upfront that his 'own predilections will be apparent to the discerning reader'. While this might be true for the informed reader, a new graduate student would find it very difficult to know where Hutchison is taking the road less travelled.

My major complaint about the book is the quality, size and placement of the figures. Many of the photographs lack the contrast or resolution expected of a high-quality text. Further, they are typically reproduced at a size of around 4 by 6 cm – too small to make out important details. Line drawings are of better quality, but are often placed a page or two away from the relevant text.

Despite its shortcomings in presentation and production, Hutchison's book will serve as an invaluable reference for anyone wanting to understand the diversity of meteorites. It is probably too dense in terminology to serve as an introductory text to the subject and its ideas depart from the mainstream enough that it should not serve as the only text.

T. McCoy