BOOK REVIEWS

FAGAN, B. (ed.) 2009. *The Complete Ice Age. How Climate Change Shaped the World*. 240 pp. London: Thames & Hudson. Price £24.95 (paperback). ISBN 9780 500 051610.
doi:10.1017/S0016756809990884

With around 200 colour illustrations, *The Complete Ice Age* is aimed at a fairly popular market but also a scientifically literate readership. The 'Ice Age' in question is, of course, the Late Cenozoic phase of climate change with warm and cold stages, commonly known as 'The Ice Age'. Brian Fagan and his coauthors cover a wide range of 'Ice Age' related topics from the history of discovery, the initiation and development of the climate cycle to the astronomical parameters and causes of ice ages in the first half of the book. The second half is devoted to the impact of these climate changes on human evolution and animal life over the last two million years, followed by a brief section on the Holocene and another on future developments. Inevitably in a book of this kind, much of the emphasis is on the northern hemisphere.

The contributors are all academics working in relevant fields: John Hoffecker is at the University of Colorado's Institute of Arctic and Alpine Research, Mark Maslin is Professor of Geography at University College London, Hannah O'Regan researches Quaternary mammals at Liverpool John Moores University and Brian Fagan is Emeritus Professor of Anthropology at the University of California, Santa Barbara.

The Complete Ice Age is a complementary volume to the same publishers' *The Complete World of Human Evolution* by Chris Stringer and Peter Andrews; indeed it reuses quite a lot of the graphics and illustrations from that book. Nevertheless, *The Complete Ice Age* is a visually pleasing and interesting introduction to the subject for the non-specialist and a useful text at the first-year student level. It has a good index and an up-to-date list of 'Further Reading', although the references are primarily to other books and so the student will have to go another step to get at the primary sources.

Douglas Palmer

BENTON, M. J. & HARPER, D. A. T. 2009. *Introduction to Paleobiology and the Fossil Record*. xii + 592 pp. Chichester: John Wiley & Sons Ltd. Price £34.50 (paperback). ISBN 978 1 4051 4157 4.
doi:10.1017/S0016756809990859

In the days before the syllabus became crammed to bursting, and topics had become finely-divided fields of specialism that needed to be fiercely protected at all costs, teaching could be a much broader, almost poetic, adventure across broad areas of intellectual interest. Great and wonderfully charismatic university teachers could enchant their audiences with tales about intangibles: the structure of the Earth, the origin of life, the history of life on Earth; they may not have had the answers to such topics, but the insights provided by a *broad scientific approach* to such subjects could act like a crucible in the minds of their students: '. . .it strikes *me* that all our knowledge about the structure of the Earth is very much like what an old hen c^{d} know of the hundred-acre field in a corner of which she is scratching!' These are the reported comments of the student Charles Darwin to one of Adam Sedgwick's wildly speculative lectures on geology and time (letter of J. M. Rodwell, 1882).

The history of life on Earth is the focus of this re-branded edition (formerly known as *Basic Palaeontology*) that is intended as a primer for first- and second-year undergraduates reading either geology or biology. I feel, in many ways, that it should be required reading for all with inquiring minds (not just scientists) because it touches on so many issues, whose epicentre is 'change', that are of relevance to the Earth and the lives that we lead today. Surely it must be the case that without a proper appreciation of the depth of the history of our Earth and the constant, and occasionally dramatic, changes to the fabric of life on Earth we, as a species, will continue to fail to grasp our place, and more importantly our responsibility, with respect to life and the continuation of this planet as a viable ecosystem. Dramatic words and sentiments – perhaps; a clarion call for palaeobiology in any curriculum – undoubtedly.

This, now massive, yet fairly modestly priced, textbook has matured compared to its predecessors and offers an interesting, accessible and concise entry-point for inquisitive and aspiring students, into the branch of natural sciences called palaeontology. Now divided into 20 chapters, and supported by a resource-filled website, the book brings with it an intellectual maturity from the very outset.

The first chapter considers 'Paleontology as a science' and takes as its metaphorical call-to-arms that hoary old quotation from the cantankerous intellectual giant, Rutherford: 'All science is either physics or stamp collecting'. How many times have we (non-physicists) had to endure that put-down by – I am forced to say it – the often profoundly narrow-minded and ignorant, since Sir Ernest came up with that witty rejoinder, I wonder? Intellectualizing the philosophical basis and logical processes that are fundamental to palaeontology leads also to a short series of notes on the history of the development of this branch of science since the glimmerings of understanding provided by the early Greeks (Herodotus) through the miasmic 'dark ages' until the enlightenment of the 17th century, through to the present day, provides a useful backdrop to what palaeontology is striving toward today.

Chapters 2–7 explore the 'how to?' methods and approaches that underpin palaeontological investigation: the importance of geology to a basic understanding of time and space into which fossils fit; the nature, quality and biases within the fossil record; insights into interpreting ecology and environmental reconstruction; understanding and investigating the process of evolution as well as diversity changes in the historical past; and interpreting function from the shape of fossils.

Chapters 8–19 cover the 'nitty-gritty' concerning the major groups of organisms that are preserved as fossils and how they are represented and interpreted within the fossil record. This is the classical core of the science that constitutes the majority of the practical and demonstration work that needs to be absorbed (to varying degrees) by the student palaeontologist. While there is a boredom quotient that inevitably kicks in at this point – some groups *are* simply more interesting than others! – there is no getting away from the fact that this is solid material and made more interesting by the use of explanatory textboxes and good quality illustrations, both photographs of the original material

as well as excellent reconstructions and interpretative schemes.

Chapter 20 draws together much of the preceding information into a consideration of patterns of diversity change within the fossil record throughout the Phanerozoic. Each chapter opens with a list of key points that are to be covered, and ends with a list of review questions to ensure in proper pedagogic fashion that you have been paying attention.

As a textbook I think this is an excellent introduction to palaeontology in general. It is well structured, accessibly written and pleasantly informative (boring where inevitable – not all learning can be fun and uplifting – but importantly it is not excessively so and the authors are commended for their lightness of touch). I would recommend this as a standard reference text to all my students without hesitation.

David Norman

MENDUM, J. R., BARBER, A. J., BUTLER, R. W. H., FLINN, D., GOODENOUGH, K. M., KRABBENDAM, M., PARK, R. G. & STEWART, A. D. 2009. *Lewisian, Torridonian and Moine Rocks of Scotland*. Geological Convervation Review Series no. 34. xviii + 721 pp. Peterborough: JNCC; distributed in the UK by NHBS Ltd. Price £62.50 (hard covers). ISBN 978 1 86107 483 6.
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The book forms part of the Joint Nature Conservation Committee's Geological Conservation Review (GCR) series, which aims to record the 'current state of knowledge of key earth science sites in Great Britain and [to provide] a firm basis upon which site conservation can be founded in years to come'. This volume describes a number of geological sites in the Northern Highlands that have either been notified as Sites of Special Scientific Interest (SSSI), or have been proposed as SSSIs. These sites include localities along the Moine Thrust Belt in addition to exposures of Lewisian, Moine and Torridonian rocks on the Scottish mainland and surrounding islands (e.g. Outer Hebrides, Shetland). Following a succinct introduction that summarizes the historical importance of geological research in the Northern Highlands and introduces the tectonic setting, the book is divided into chapters encompassing each of the major geological units. Each chapter comprises an introduction followed by detailed, self-contained descriptions of individual conservation localities, all written by acknowledged experts on the area.

The overall impression is of a scholarly tome that readily enables readers with an Earth Science background to appreciate the geological significance of individual localities within the wider regional and historical context. In this respect, I think the *Lewisian, Torridonian and Moine Rocks of Scotland* fulfils its remit of providing a (very comprehensive) public record of the features of interest in sites that have been notified or are being considered for notification as SSSIs. It also fills a useful niche between detailed field guides and more general textbooks, such as *The Geology of Scotland* or *The Geological History of Britain and Ireland*. As such, this GCR volume would be very useful in designing geological field classes/excursions to classic areas of the Northern Highlands, or for undergraduate students about to embark upon their independent mapping projects in one of these areas. The GCR series also sets out to be a resource for those with a vested interest in the GCR sites – landowners, tenants, planning authorities and 'those concerned with the practicalities of site conservation'. However, I think a bulky (and, for the individual, expensive) hard copy volume is unlikely to be the best way to reach some of these target groups. A freely available web-based report might have been more appropriate in this case. Nevertheless, this criticism in no way detracts from the content of the book. I would recommend its purchase by university libraries, and by the relevant local authority lending libraries in the Northern Highlands of Scotland.

Jonathan Imber

References

TREWIN, N. H. (ed.) 2003. *The Geology of Scotland*, 4th ed. London: Geological Society of London.

WOODCOCK, N. H. & STRACHAN, R. A. (eds) 2000. *The Geological History of Britain and Ireland*. Oxord: Blackwell Science.