Regolith has always been difficult to define and study, and this textbook of regolith science does little to alleviate either problem. Several definitions of regolith are cited along the general lines of unconsolidated soil and sediment at the surface. Then the authors include unweathered Cenozoic basalt flows, thick sedimentary sequences and Permian tillites, and one begins to wonder where to draw the line between sedimentary sequences, soils, palaeosols and regolith. Interpretations of geological or environmental history are most effective in the few cases where these lines can be drawn by detailed study, leaving the term regolith as a terra incognita of unstudied surficial deposits. Regolith thus becomes one of those intriguing mysteries that challenge our ingenuity. The nature of regolith does eventually emerge from the numerous examples of thin (a few tens of metres), Cenozoic, deeply weathered sediments, palaeosols, landforms, and major geological unconformities. Such complex and overlapping processes make it clear why the study of regolith has languished as a field of geological study until application of the modern armament of analytical techniques. This emerges as the strength of this volume, which particularly emphasizes the arsenal of chemical and petrographic approaches now applied to the study of regolith. Parts of the text read like mineralogical and geochemical manuals, and I am happy to have this reference material on my shelf, but it will be heavy going for students and casual readers.

Another strength of the volume in my opinion is its unabashed Australian emphasis. There are many books on Quaternary geology, soils, palaeosols and sedimentology that draw most of their examples from glaciated landscapes of North America and Europe. It is refreshing to rediscover the deeply weathered cratonic landscapes of Australia, and the subtlety of their interpretation. It is a landscape I know and love well, but I was pleased to learn more. Did you know, for example, that lateritic pisoliths form by Liesegang banding inward from the rim, rather than accretion from the centre outward? There are even some duricrusts rich in magnetite (magnecrete) and manganese (manganocretae).

Duricrusts such as laterites, bauxites, silcretes, and calcretes figure prominently throughout text, and then in a short chapter with concise definitions, descriptions and considerations of hypotheses of their genesis. These rocks all remain controversial. I agree with the authors that silcretes are unlikely to be produced by overlying basalt flows, and laterites are not uniquely related to peneplains. However, I disagree with the author’s insistence that laterites have no stratigraphic significance and that they form in cool as well as warm climates. High palaeolatitude laterites of Japan, Germany, Oregon and southern Australia tend to be best developed at certain times, such as terminal Palaeocene (55 Ma) and middle Miocene (16 Ma), when there is evidence of transient global spread of warm climate to high palaeolatitudes.

Some terminological lapses of scholarship are annoying. The term pedolith was first defined by Erhardt in 1965 for redeposited laterite, and the pedolith has become widely used as a synonym for soil sediment. In this book, however, pedolith is used as a synonym for soil solum, and contrasted with underlying saprolith and saprock. The new term saprock is distinguished from saprolith, on the basis of its rock-like physical strength. Use of the term zone instead of horizon for soils can also be confusing in studies involving palaontology, which has its own views on zones. The authors’ pronouncement that all prior Australian regolith maps are inaccurate because theory laden struck me as unnecessarily uncharitable.

With its fresh approach and abundant new examples *Regolith Geology and Geomorphology* is a welcome new addition to what the authors identify as an emerging frontier, now yielding to 21st century analytical instruments and computers. There is much to be gained from more detailed and sophisticated studies of regolith. Not only do they contain important ores and reveal buried and weathered ores, but regolith includes important records of global change. If you are into soils, weathering or low temperature geochemistry and mineralogy, you will want to see this book in a library near you. Before adopting for a course or casual reading, however, you may wish to look also at Cliff Ollier and Colin Pain’s *Regolith, Soils and Landforms* (Wiley, 1996), which covers much of the same ground in a more straightforward, introductory manner. *Regolith Geology and Geomorphology* in contrast is not for the faint of heart. It is a professional reference that should be of value to many on the front lines of consulting and research.

Gregory J. Retallack
related diagenesis. All three chapters are well-written and well-organized reviews of their subject and illustrated with good quality petrographic images.

Chapters 5 and 6 examine the problems of formation damage and core analysis. Both chapters are highly practical, well illustrated and provide the reader with an excellent introduction to their respective subjects from US Cambrian and Ordovician reservoirs. Although Chapter 6 is a single page it has a message that is central to all scientific investigation, whether applied or not: when acquiring data one should know what questions are being asked and why. Further, that interpretation of data is often strongly influenced by the analytical procedure. In short and in the context of diagenetic studies, one cannot simply buy an ‘off the shelf’ product and expect it to answer every problem related to mineralogy and diagenesis. Problems need to be carefully constrained and appropriate investigative programmes designed.

Applied geoscientists, in particular petroleum geologists, should obtain a copy of this text. The short course that the book is based upon must be an excellent training for the average petroleum geologist. The author has succeeded in providing a logical approach to why and how data should be acquired, then applied to practical problems. The case studies are generic, easily read and are fine examples of transferable technology. This book is in no way an exhaustive review of diagenetic damage and core analysis of deep-water systems but is well referenced and should lead readers to sources of more detailed information. Some readers may find some of the technical terminology obscure, particularly in chapters 4 and 5. Not all maps and line drawings are particularly good quality but these are more than compensated for by fine photomicrographs.

Although US$63 is hardly a bargain for a 143-page paperback this is a valuable addition to the applied geoscience literature. Sharon Stonecipher deserves our thanks.

Andrew Hurst


The interest of the petroleum industry in deep-water depositional environments continues to grow. Once regarded as unproductive and of only academic interest, turbidite systems are now the subject of intense research activity. Where are the porous sands in such systems? How are the sand-bodies arranged, spatially and through time? Do sands interconnect sufficiently to provide viable reservoirs? Answers are harder to find than for shallow-water systems. The relevant active processes are difficult or impossible to observe. Modern turbidite systems are naturally in deep water, and cannot be studied at outcrop. Ancient systems are, as often as not, preserved in strongly deformed mountain belts.

The majority of industry research on turbidite systems has understandably concentrated on sand-rich systems: a sedimentological interest in mudstones of any sort has always been regarded as perverse and masochistic! However, fine-grained turbidite systems have been recognized as containing large enough amounts of sand to be economically useful. Hence the new volume edited by Arnold Bouma and Charles Stone. Conceived at the AAPG/SEPM Annual Convention in 1997 and, like many edited volumes, some time in gestation, the book aspires to be a comprehensive text on fine-grained turbidite systems. It may not fully achieve this aim, but it does offer a valuable compilation of techniques, principles and case studies.

Twenty-eight chapters are loosely organized into six groups: General (7 chapters), Seismic (5), Stratigraphy (4), Reservoir characterisation (2), Sedimentology (8) and Logging (2). However this organization is only referred to in the initial overview to the book. It is not featured in the Table of Contents, nor as section markers in the body of the book, nor in a topic table on the end-sheets. This evident lack of confidence by the editors in their chapter groupings means that the cover-to-cover reader may find the organization to be more or less random. Given that nearly two-thirds of the chapters are case studies of specific modern and ancient systems, a more conventional arrangement by geographical area would have been a safer option. So, there would be sections on the Karoo Basin of South Africa (8 chapters), the Jackfork Group of Arkansas (4), the Brushy Canyon Formation of west Texas (3) and the Gulf of Mexico (2). There is one chapter on each of the Gulf of Guinea, offshore Canary Islands, and the Mount Messenger Formation, New Zealand. There are six overview or techniques chapters and two on theoretical modelling. There is a CD-ROM bound with the book, giving digital versions of the papers and some supplementary images.

The loose organization of the book should not detract from the value of many of the individual contributions. I liked the modelling of Lincoln Pratson and others on stacking patterns of turbidites and debrisites, and of Jeff Peall and colleagues on submarine fan channels. I particularly enjoyed the papers on two Permian turbidite systems, the Tanqua Karoo and the Brushy Canyon. These excellent field-based descriptions emphasize the enduring value of outcrop analysis of deep-water systems. Workers on turbidite systems will want at least to refer to this volume, even if they do not buy a personal copy. Presumably they will have double the normal chance of borrowing the book from their academic library: being published as both an AAPG and an SEPM serial presumably means that many libraries will be subscribing to two copies?

Nigel Woodcock


This book is the latest title in the excellent Geological Conservation Review Series which aims to provide information about sites being considered for notification as sites of special scientific interest (SSSIs) and provides an invaluable resource for both the professional and amateur geologist. The book retains a consistently clear style without an excessive use of jargon and a well designed glossary as an appendix. Clear maps accompany all the sites described, and information on access is provided where appropriate. The literature review associated with the site descriptions is comprehensive and up to date. My only major complaint with
The introductory chapter provides a clear summary of the rather complicated suite of tectonic terranes that define the basement to England and Wales, and discusses the absolute dating of the basement rocks. Subsequent chapters describe the geology of the Precambrian of Charnwood Forest, Nuneaton, the Malvern Hills, Shropshire, Wales and Anglesey. All chapters integrate information from outcrops, cores, petrography, geochemistry, palaeontology and structural geology where appropriate. Sedimentary, igneous and metamorphic rocks are treated in equal detail and each subsection provides a concise summary of the importance and relevance of the suite of rocks considered.

The chapter on Precambrian palaeontological sites was a little disappointing. The Precambrian rocks of Charnwood Forest contain one of the most important Ediacaran Faunas in the world, which is let down by the quality of the photography. Likewise, the section on the faunas of the Longmynd in Shropshire only figures a rather poor example of a soft-bodied jellyfish-like form and is not dealt with further.

These criticisms aside, it is an excellent well-written book, which provides an invaluable resource for both the professional and amateur geologist. The authors state that it is not intended for use as a field guide but – if the appropriate permissions are sought – it would serve that purpose very well as it provides a comprehensive and easily accessible summary of the basement rocks of England and Wales. The outcrops discussed would also make ideal day fieldtrips when supported by this book, allowing interested geologists to make the most of these small but important windows into the Precambrian history of England and Wales. I would therefore thoroughly recommend this book to anyone with an interest in British stratigraphy, but also encourage a higher quality of reproduction of photographs in subsequent issues of this series.

D. McIlroy


The first edition, which I reviewed about eight years ago, was noteworthy as a remarkably comprehensive overview of sedimentary basins, and this new edition is even better. It is an excellent, up-to-date reference book for any geologist needing an overview of the formation and fill of sedimentary basins. Most impressive is the sheer volume of material that the author has summarized on such a wide range of topics: the over-used term *tour de force* really is applicable in this case.

The first part of the book is a descriptive summary of depositional environments, and a basic knowledge of sedimentology and facies analysis is assumed. The order in which different facies are considered is perhaps a little unusual: fan-deltas are considered under continental deposits rather than with deltas, marine volcanioclastic deposits similarly are out of place, and there is a catch-all chapter on ‘Special Depositional Environments’ to cover evaporites, red beds, phosphates and so on which did not fit into the main scheme. Some readers might prefer a more specialist text such as Reading's *Sedimentary Environments* for a more thorough review of sedimentary facies. Similarly, the later section on ‘Basin Evolution’ covers in 100 pages the same ground as Busby & Ingersoll's book *Tectonics of Sedimentary Basins*, and is inevitably not so detailed. However, with such a comprehensive and up-to-date reference list (some 2000 works cited in total), Einsele’s book is a very good substitute for both of these other texts. One of the best features of the first edition was the quantitative approach to various aspects of sedimentary basin analysis, particularly subsidence, denudation, sedimentation rates and the relationship between sediment supply, subsidence and basin fill. These aspects have been expanded and updated in this new edition with some very informative summary tables of data on rates of denudation and sedimentation. There is also a quantitative approach to diagenetic process, compaction, pore water flow and thermal histories in one of the later chapters of the book.

The book is characterized by a large number of original, composite diagrams which provide visual summaries of the text. Most are clear illustrations of conceptual models, but a few suffer from an excess of detail and complexity which makes them more difficult to understand. They are drafted in a slightly idiosyncratic and old-fashioned style, but are none the less effective for that.

Overall, this second edition is an improvement on what was already a very good text. It is also a relief to see that the production quality has been considerably improved. There are a few minor weaknesses, such as the limited coverage of lithospheric behaviour; and an unusual approach to the discussion of sequence stratigraphy, but these can be readily excused in the context of the broad scope of the book. It is not a ‘light’ read, but the addition of summaries to reinforce essential points at the ends of sections and chapters helps. It is suitable text for advanced undergraduate courses, postgraduate programmes and many geologists working in industry or academia will find this a valuable addition to their bookshelves.

Gary Nichols


The great rift system of Africa, stretching over 4200 km from the Afar to Mozambique, is in the process of splitting the immense African plate into two smaller plates, the Somalia and Nubian plates. This rift system is undoubtedly the world’s best natural laboratory in which to study incipient continental break-up and the formation of a new plate boundary. The history of this emerging plate boundary is preserved in the rock record of a series of well-known rift valleys and lakes. This stratigraphic story can be traced back at least 40 million years and in some places precursor rifting is as old as Cretaceous and even Permo-Triassic (~200–300 million years).

Much has been learned about the geologic environments of these magnificent valleys and their associated volcanism, but less so about their tectonic evolution. This is because most of the structural fabric is covered by young sediments and volcanics. Consequently there are many competing models that have been proposed to account for the rifting

This weighty pocket-book provides a general survey of the dinosaurs (and pterosaurs) collected from the Wealden Group (Lower Cretaceous) of the Isle of Wight. This island, because of the combination of poorly consolidated Mesozoic ‘continental’ sediments and high levels of erosion, is by far and away the richest and most productive area for dinosaur fossils in the British Isles and, for this reason alone, merits its own guidebook. However this is clearly also a very timely production in the sense that it appears during the year of the opening of the new ‘Dinosaur Isle’ visitor centre (which will formally replace the older Museum of Isle of Wight Geology that for many years shared its cramped living space with the local town library).

The book has been compiled by a number of workers who have been, for many years, involved directly with the geology and palaeontology of this part of the world. In general the book offers a useful and frequently well-illustrated guide to dinosaur and pterosaur fossils. It opens with chapters outlining, in succession, the geology of the dinosaur-bearing beds of the island, the importance of the dinosaurs discovered to date, and some information on the environmental conditions that led to the preservation of fossils in this particular area. These informative chapters are then followed by the ‘meat’ of the book (over 250 pages) on the various dinosaur groups found on the island, then a short section on trace fossils and rare remains of flying reptiles (pterosaurs). The book concludes with a section on bone identification, a ‘dinosaur trail’ and various appendices (glossary, references, index, catalogue of fossils).

All in all this gives the impression of being a pretty heavy-duty and comprehensive volume. I do, however, have one or two observations to make. Given that this review will not be read by many of the buyers of this book I think I am perhaps aiming these comments more at the Palaeontological Association, and fieldcourse leaders, rather than the editors/authors of this volume. I am a little concerned about what I feel is an obvious tension in the book: is this a textbook, a popular book or a genuine fieldguide?

What I referred to above as the ‘meat’ comprises a series of chapters focused on distinct groups of dinosaurs; each one commences with lengthily (and to my mind largely over-indulgent) phylogenetic, classificatory, historical and anatomical preambles. I also find it hard to justify spending 13 pages describing one entire group of dinosaurs (Marginocephalia) based on a single, small fragment of the skull roof, when the entire group of flying reptiles (Pterosauria) only merits 12 pages.

The book is clearly straining too hard to encompass everything. There are no obvious stegosaurs remains from the Isle of Wight and yet there is a section on stegosaurs; this latter includes the assignment of an Iguanodon pubic bone (illustrated (Text-fig. 7.2) in medial view – this is significant for the incorrect interpretation). Clearly the book wants to be an encyclopaedia. In this instance I would prefer to be told that stegosaurs might eventually be discovered on the Isle of Wight (as an incentive), and then be offered some simple, clear, illustrations of the basic anatomy of a stegosaur that indicate to the reader/student/enthusiast-fossil hunter what are the key diagnostic features to look for (as might be expected of a helpful fieldguide).

In a book of this size a few errors are to be expected. In addition to the error above, the teeth illustrated in Text-fig.
5.5 b–c, do not belong to Hypsilophodon; the supposed Hylaeosaurus osteoderm (Text-fig. 7.11) is an eroded pollex ungual (thumbspike) of Iguanodon. A few typos also slipped through the editorial net, and the text itself has an unnecessarily pedantic air in places – occasionally incorrectly and amusingly so (such as when indicating that the US spelling of ‘paleontology’ in a quotation from an American (p. 64) is incorrect!).

Despite the tenor of these more detailed comments, the book is informative and does provide an extensive series of useful photographs and line drawings that should assist with identification. My real quibble (and quibble it is) concerns the more general format of this book with regard to its utility in the field if it is being marketed as a fieldguide. For example, it is a tough question, but: How would you use the book to identify a piece of bone you had just found on the foreshore? A: With considerable difficulty.

David Norman


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If you are looking for a college textbook upon which to base an introductory course in Earth Sciences, you could do worse than use this book, or the 3rd edition (September 2001) which will be available before this review is published. It covers not just basic geology but also has two chapters on the oceans, four on the atmosphere, and two more on the Solar System and beyond. The book is clearly written and it is well illustrated in colour throughout. It comes with a Macintosh- and Windows-compatible CD-ROM containing extra illustrations (with a free licence to install and use on an unlimited number of computers on a single campus), chapter summaries and self-assessment activities. There is also a website at http://www.prenhall.com/lutgens/ that extends and elaborates some of this material, and to which the student (and reviewer!) can submit answers for assessment. This is well worth a look at, and has separate sub-sites for the 2nd and 3rd editions.

Naturally there are some quibbles. The colour block diagrams are generally of excellent quality, but lack any indication of scale. This means that (for example) the beginner may not appreciate the difference in scale between a diagram for folded strata and one showing a whole subduction zone. Furthermore, although the distinction between crust and lithosphere is usually carefully and correctly made, it is lacking on Figure 5.9 on which tectonic plates appear to consist of the crust alone. The volcano sections in the book and the CD-ROM both present cinder cones as one of three main types of volcano, treating them as equal in status with shield volcanoes and composite cones (stratovolcanoes). This is a foolish oversimplification, because cinder cones are just one example of a whole range of monogenetic volcanic features (such as tuff rings, tuff cones and maars), and because it overlooks the importance of large silicic calderas in terms of volume of erupted product and impact on the climate (the term ‘ignimbrite’ is not even in the index).

I dare say specialists in other fields could find aspects to pick on too. However, overall it is an attractive and competitively-priced book package, that is up there with the leaders in its field.

David A. Rothery