Compendia of the diverse range of topics which make up the Earth Sciences can be very useful starting points for student reference and essay-type research. However, they need to be as up-to-date as possible and have some helpful references for further reading. These days, the task of producing such encyclopedic volumes covering a good range of topics in appropriate depth for undergraduates requires many authors. The additional benefit of multi-authorship is that, theoretically at least, it should be possible to produce the work within a year or two so that it is not beginning to get out of date by the time it is published. The downside is that it can be very difficult to achieve any common approach. And, like a wartime convoy of ships, the mission is not complete until the laggards are abandoned. The Oxford Companion to the Earth is an impressive single volume with over 800 entries, totalling 1174 pages written by 260 academic authors (is the profession still as male-dominated as the list of authors suggests, less than 5% women?) on everything in the Earth Sciences from acid rain through isostasy and isotope geochemistry to zoogeomorphology. There are also some 600 black-and-white illustrations ranging from diagrams and maps with a good general standard of graphics to a selection of photos (mostly small but at least the pixels are not readily visible as they are in so many textbook illustrations these days).

One of the initial and most difficult tasks for any editor attempting an encyclopedic approach is the development of the head word list which inevitably has to have some limit. Here, there are some 800 for the whole of Earth Science. Some decisions are relatively simple, such as determining that all periods of geological time should have their own entries, within which other important subdivisions can be mentioned but individual ages do not get their own entries. More difficult decisions concern what topics to include in subjects such as mineralogy and palaeontology. Which rock, mineral or fossil groups should have separate entries? The palaeontology, with more than 30 entries for animal fossil groups including bryozoans, has an overly animal bias. I have nothing against bryozoans but fossil plants have no prominent. Parts 3 to 5 comprise the bulk of the book with more than 30 entries for animal fossil groups and 100 for mineral or fossil groups should have separate entries? The palaeontology, with more than 30 entries for animal fossil groups including bryozoans, an overly animal bias. I have nothing against bryozoans but fossil plants have no separate entries apart from one on stromatolites. There has to be selection but surely this amounts to prejudice.

The strength of this volume is the wide diversity of topics covered, the inclusion of important and appropriate topics from atmospheric sciences to wine and geology. Even ‘Music and the Earth Sciences’ gets a look in, although it is a slightly staid entry. Unfortunately, Masiakasaurus knopfleri arrived on the rock scene too late to get an honourable mention. It was only this January that Scott Sampson and colleagues named their new Madagascan dinosaur with the funny teeth after the famous singer/songwriter Mark Knopfler, whose music apparently inspired the expedition. But surely the Beatles and ‘Lucy’ deserve a mention for their role in the discovery of the famous little australopithecine. And surely the interesting point about Mendelssohn’s overture ‘The Hebrides (Fingal’s Cave)’ is not that it inspired geologists but that it was the part that the majestic landscapes and rocks of the Highlands and Islands played in the romantic movement, especially amongst European composers of the time, as well as the painters and writers. But I am quibbling; I do not know of any other such Earth Science compendium which includes such an entry.

The production of the volume had the bad luck to be delayed by the untimely and very sad death of the Editor-in-Chief, Paul Hancock. But it is a tribute to his memory that the project was pushed through to conclusion. References to other works generally do not extend beyond 1997. There is no doubt that every library should have a copy on the shelves and for the price it is a bargain. And, I now know what zoogeomorphology is.

Douglas Palmer
and facies interpretation is more variable but generally adequate. Future editions might consider a more widespread use of seismic illustration. The style is, perhaps necessarily, complicative rather than critical or discursive and there are some areas where one might wish the authors to be less hesitant about airing their own opinions. An example might be the relative roles of compression and diapirism in the formation of shale-cored ridges and to what extent wrench propagation through thick deltaic piles is plausible, for which problems the margins of the Baram Delta offer critical evidence. Rather unfortunately, in view of its historical significance, the now abandoned Miri field in Sarawak is given a deliberately detailed description which includes a structural model that dates from 1941 and was disproven by seismic and drilling in the early 1970s.

PETRONAS was founded in 1974 and is custodian of a huge geoscience database, not only of strategic importance to the nation but also of major global scientific value. The book marks an important stage toward increased involvement of its staff in the publicly available analysis of this data and is thus warmly to be welcomed. At the promotional price of $100 it is splendid value for money and an essential purchase for libraries with petroleum geology interest.

David James


This compilation of articles takes its name from an original review by Michael Novacek Mammal phylogeny: shaking the tree, which itself was published by Nature almost a decade ago (1992). In fact looking through the list of reviews re-published here, what jumps out at the reader is that the vast majority of papers hail from the first half of the decade (only 3 of the total of 19 were published in the second half of the decade). While this does not make it an antique, it is nevertheless creaking a little given the pace of research in evolutionary biology and systematics – the primary subjects of this volume. To compensate for this Gee offers a short ‘Introduction’ and further sets of prefatory comments to each of the five sections: ‘Shaping the tree’, ‘Geoffroy’s legacy’, ‘The global context’, ‘Shaking the tree’ and ‘The history of primates’, into which this book has been divided. This allows the authors/Gee to outline more recent publications or developments.

As Gee disarmingly points out, there are inevitable gaps in the coverage and scope of topics included in this volume because the reviews were not originally commissioned with a view to the production of this book. The reviews are also claimed to have been written by authors who were positively encouraged to be provocative (as opposed to … boring?) and this, he claims, lends to the volume an unfinished, ‘makeshift’ air that is intended to provide the reader with a feeling of what it is like to be involved at the cutting edge of science. Though not specifically stated, it seems clear that this set of articles is intended to be provocative reading for undergraduates in the equivalent of their third or fourth years in the British university system. The intention may well be to give them a feel for the difficulties and unresolved issues that scientists are/were grappling with in this large and complex field.

This is not the time or place to discuss the various articles assembled in this volume; many indeed have served admirably in the past. More pertinent now is the question: does the volume serve a useful purpose? On that question I am decidedly ambivalent. I found that Gee’s introduction ranged from useful on the one hand, to slightly silly on the other. The prefatory comments to the five sections were far more focused and, I am led to believe, reflect the updates to the original articles provided to Gee by the individual authors; these he acknowledges in a short ‘afterword’ to the book. Here I think lies the fault (as far as I alone see it): the book would have been far more powerful as a stimulator of minds if the original authors had been given the opportunity to provide short updates to their original articles. This would have far more effectively shown progress/change in perspective over time and the way in which science has moved in these fields.

Individually many of these articles are, or have been, used by academics for structuring undergraduate reading assignments, tutorials or essay/dissertation work. Whether the rehashing of these, with update commentaries by Gee, is valuable I am less sure – I think I would rather have my students research the more recent developments for themselves. While this may well attract purchases by academic readers who work outside the field, but are interested in updating themselves, I doubt that the undergraduates will flock to buy this book and most copies will reside on university library shelves.

David Norman


There has probably been a geological input to the human arms race ever since one of our extinct hominid relatives first raised a cobble in anger over 2.5 million years ago. Apart from such Stone Age precursors, it is obvious that geology must have played a vital military role in terrain analysis and material supplies ever since there was a need for military campaigns and fortification. I have often wondered why there was not a book about the role of geology in warfare and presumed it was mainly because the British military do not do geology or, if they did, left it to the engineers and anyway it was probably the sort of thing the Germans or Americans do better – pure prejudice of course. I am very glad to find out from Geology and Warfare just how wrong I was.

My puzzlement was all the more because I was also aware that historically the military connection with the early ‘Ordnance’ and ‘Geological’ surveys was very strong. A number of the people who helped found geology as a science and a profession in early nineteenth century Britain, such as Colby, Portlock, Greenough and Murchison, had military careers. Many nineteenth century geological reports from out of the way places, often parts of the then British Empire, were made by military personnel or quasi-military surveyors. But of more contemporary geological involvement with the military I got the impression it was fairly minimal; certainly it was never mentioned in any of the geological teaching I had.
Nevertheless, one read in the literature of the seemingly unlikely military connections of geologists such as the ostra-
cod specialist T. R. E. Jones, a lecturer at Sandhurst, or the
famous sedimentologist Brigadier Bagald, brother of the
novelist Enid Bagnold, who apparently studied the physics
of blown sand whilst in the North African desert. Why was he
not recruited as a military geologist, or perhaps he was and it was just my ignorance of the matter? And did not
Dudley Stamp study the stratigraphy of late Silurian and early Devonian rocks in Belgium during the First World War?

Then there were the more contemporary anecdotes of the
likes of the late Derek Ager recounts his experiences of
losing tanks bogged down on Norfolk beaches, or the late
Alan Charig learning Russian at HM’s expense whilst doing
national service. Always there was the typical British under-
cutting of authority and turning of such experiences into a
‘bit of a laugh’ but did they in any way reflect reality?

The 15 chapters of *Geology and Warfare* range from
Trevor Halsall’s fascinating accounts of the role of geology
in the sitting and construction of castles, such as the 11th
century Norman castle of Windsor, to the geology of the ter-
rains of a selection of battles from Bannockburn onwards.
The reader is taken through the role of geologists in the
American Civil War and the two World Wars to the geologi-

cal aspects of future conflict – the wars of resources, such as
water, fertile land, hydrocarbons and minerals.

Inevitably there is a considerable emphasis on the
European theatre and the two World Wars. It turns out that
some of my prejudices are not totally unfounded: ‘in contrast
to the relatively small numbers of military geologists deployed by the Allies, German armed forces made use of
far larger numbers of military geologists *per se*; about 250 in
the First World War, 400 in the Second World War. They
constituted the largest number of geologists ever to be
organised and informative. The succeeding chapter on the
margin of the Iapetus Ocean from the Archaean through to
the Silurian initiates the systematic part of the book. The
various terranes of northern Britain are well described, with
appropriate diagrams. There is a good balance of coverage
of the literature on often-contentious issues.

The following section traces Eastern Avalon from the
Precambrian to its collision with Laurentia. The first chapter
provides an admirably clear account of the Neoproterozoic
to Cambrian history of the area. I enjoyed the Lower
Palaeozoic chapters, which are arranged after the author’s
sequence stratigraphical approach, though this is not explicit-
ly stated. However, the chapters are well constructed and
well illustrated, but lack discussion of the relationship
between faunas and facies and the contrast between the dark
graptolitic facies and the paler shelly facies.

The Devonian chapter has an excellent account of Old
Red Sandstone sedimentation, but I was disappointed by the
coverage of the marine Devonian. There is an excellent
chapter on the Carboniferous that is well balanced, illus-
rated well and readily digestible, but the section on the
Dinantian of the Culm is rather short. The Silesian section
is full and is well served by the diagrams. I liked too the chapter
on the Variscan orogeny that describes clearly this protracted
orogenic phase.

I found the Permian and Triassic sections disappointing.
Unlike much of the rest of the book, there are no sedimen-
tary logs, merely a generalized diagram of successions which
is partly out of date. For the Triassic there is no indication of
the thicknesses of any of the formations and no look at the
depositional history of, for example, the Cheshire Basin.
Although halite is mentioned, would not the fact that the
thicknesses of any of the formations and no look at the
depositional history of, for example, the Cheshire Basin.

The Penarth Group is largely left to the chapter on the
Late Triassic and Jurassic. Why the old term White Lias
appears in the text is hard to understand, particularly when
in a diagram it appears as the Langport Member of the
Lias Group. The chapter’s latest timescale does not agree with that of the introduction. There is much general
information on topics such as sea-water chemistry, cata-

crophic events and climate, resulting in an imbalance
between general information and discussion of the British
rocks. The successions figure mainly in sedimentary logs of
which a major omission is the Middle Jurassic of southern
Britain. The discussion of the Oxford Clay is devoid of any
mention of thickness – important, as most of it (the
Callovian part) is lacking from any logs. The sedimentologi-
cally interesting Corallian Group is not mentioned in the
text and occupies barely 2 cm of two sedimentary logs. The
Portland Group gets a text mention although the fact that
‘parts of it are still used as a monumental stone’ belies its
importance as the most-used dimension stone in Britain for
over three centuries.

The Cretaceous is covered in two chapters that convey a
real feel for the rocks, but the first dealing with Early
Cretaceous rifting does not follow on well from the preced-
ing Jurassic chapter; the remainder of the chapter is well
organized and informative. The succeeding chapter on the

Reference


It is clear from the outset of this volume that this is a
process-oriented book and ten authors augment the editors’
major contributions. Absence of references from the text
makes reading easy; there are references and a 'Further
Chalk summarizes well new work on Chalk. However, its palaeogeographical map for the Campanian is extraordinarily conservative in showing much of western Britain as land, despite modern apatite fission track analyses that show that most of those areas have lost some 2 km of cover since the end-Cretaceous, that probably included late Chalk.

The succeeding chapter uses the now informal term ‘Tertiary’ as opposed to Palaeogene and Neogene; it deals well with the Palaeogene, though with inconsistent spelling of ‘Palaeocene’. There is good coverage of the onshore areas from southern Britain to the Hebridean igneous province and offshore coverage of the North Sea and areas to the northwest of Britain and Ireland, but no discussion of uplift and erosion in the Irish Sea. The Neogene is dismissed in less than 80 words and its significant offshore development ignored in the text.

The Quaternary chapter lacks specialist input. While Milankovitch cycles may track the long-term record of glaciation, events on millennial frequencies are now the leading paradigm. Thus, those of the last glaciation should be correlated with the Greenland ice core and Atlantic marine core records. It is surprising that Heinrich events and their effects are not mentioned. Cover of British and Irish stratigraphy is also selective and omits the important river terrace successions of southern England that link stratigraphy with geomorphology and archaeology.

It is a great pity that there is evidence of the book having been brought together quickly. There are few significant factual errors, but some careless slips that checking would have revealed. Some authors clearly did not proofread their sections very well, whilst a few diagrams have incorrect or incomplete keys and text references to diagrams are occasionally wrong. The use of a multi-authored team has led to a few inconsistencies, but more importantly has allowed important facts to escape mention. And what are we to make of the editors who in their introductory chapter quote Lyell’s uniformitarian principle as ‘the past is the key to the present’?

The book has not been served too well by its publishers. I disliked the small single-columned fragments of text below diagrams where it is crowded and easily initially overlooked by the reader. The occurrence of word-breaks over columns and pages should also have been avoided and some diagrams obviously constructed to appear on facing pages have each ended up split over the pages.

This book is to be warmly welcomed as it fills a significant gap in student texts. I would suggest that an Errata slip should be included at the earliest opportunity to correct some of the mistakes that have slipped through. Once these have been ironed out this book will surely set the standard for some time into the future.

John C. W. Cope


The Lecture Notes in Earth Sciences Series is intended to disseminate ‘timely’ information widely and rapidly in informal fashion. The series is printed by photo-offset in softback format but to very high quality. The success of this approach can be argued to be largely inversely proportional to the degree of need of a manuscript for conventional peer review. This monograph is a decidedly individual view of selected aspects of the petroleum geology of Algeria south of the Atlas front. It results from extensive petrographic and geochemical research carried out by SONOTRACH between 1975 and 1992, apparently largely by the author or under his supervision. There are no acknowledgements, either for technical support or proof reading, and no indication of a SONOTRACH imprimatur. Only a handful of the references post-date 1993.

Content is divided between ten chapters which start with a short summary of methods of investigation and end with short summaries of conclusions and of analytical methods and equipment. Chapter 2 on regional structure, lithofacies and palaeogeography with comments on non-structural traps is now dated and better accounts exist elsewhere, for example in The Petroleum Geology of North Africa. Geological Society of London Special Publication no. 132, 1998. Chapter 5 on the geochemical features of hydrocarbon generation, migration and accumulation and Chapter 6 on burial history and kinetic modelling of hydrocarbon generation are less dated in that they contain useful local insight and hard data but one suspects that their conclusions will come as no surprise to current explorationists. The remaining chapters deal with the destruction and creation of sandstone reservoir porosity, the use of carbon isotope ratios in carbonates as evidence of hydrocarbon destruction and leakage, and the use of clay mineral species in shales as geothermometers. All three chapters are based on very large and detailed datasets and are still of considerable potential interest to explorationists.

Porosity loss is thought to occur both by conventional pressure solution and by a process of solid-state grain agglomeration over long time periods that reduces the surface energy of the system; the latter hypothesis is developed with I. I. Plyusnina using SEM data and thought relevant to the common situation where extensive quartz cementation is present in poorly compacted sands. The temporal relationship of the two processes needs to be made clearer as grain shape changes during the latter must presumably affect the quantitative petrographic estimation of net quartz import or export for which extensive datasets are given. Secondary porosity development (alarmingly called decompaction!) is thought to result from carbonate solution by carbonic acid formed by decarboxylation during early stage hydrocarbon generation. Use of carbon isotopes is clearly a pet topic for the author but one is left wondering to what extent their use is uniquely diagnostic. The clay mineralogy geothermometer is, quite inexcusably, derived from uncorrected bottom-hole temperatures.

The monograph clearly results from much work and thought, and it is sad that much of any predictive value has been wasted by delayed publication and lack of incisive review. It is worth a look by specialists in diagenesis but will not compete strongly for scarce library funds.

David James

New York, London, Paris, Tokyo, Hong Kong: Springer-Verlag. Price DM 149.00, Ös 1088.0, SFr 129.00, £51.50, US $85.00 (paperback). ISBN 3 540 66369 X.