it and how to interpret (but not over-interpret) the results. However, those using statistical procedures more intensively might want something a bit meatier and, in that market, Davis' book is still the best bet.

Dave Waltham
Royal Holloway
University of London

Reference

DAVIS, J. C. 2002. *Statistics and Data Analysis in Geology*, 3rd edition. Wiley. 656 pp.

FLETCHER, C. 2010. *Physical Geology: The Science of Earth*. xxv + 679 pp. Wiley. Price £39.99, €48.00, US$131.95 (PB) US$84.95 (binder ready); US$79.50 (e-book). ISBN 978 0 47122 037 4.
doi:10.1017/S0016756811000379

Fletcher's textbook (on what is essentially North American geology, or geology plus physical geography/geomorphology in Europe and especially the UK and Ireland) is 679 pages long, very well organized, well illustrated and comprehensive in its coverage.

On the opening page of the Preface, Fletcher asks the reader: 'Why publish another Physical Geology text?', a question I asked myself on beginning this review. To test the three reasons Fletcher gives, I compared his work to four of the standard (North American) books in this class. Fletcher states that his book is organized around two-page sections (for ease of reading), which it is. This is innovative and a positive step. Critics may say that some geological concepts cannot be reduced so dramatically, yet Fletcher does this effectively, which will keep the student's attention. Students do have short attention spans in these days of moving images and instantaneous web access, making reading daunting, so Fletcher is to be applauded. None of the competitors deploy this method. Fletcher also uses Bloom's Taxonomy to develop extensive, critical and comprehensive exercises for each chapter. The competitor texts do all use 'revision questions', many of which are rather an afterthought to the chapters. In Fletcher's book, they are a key element. Finally, Fletcher discusses relevant and controversial issues such as peak oil and natural hazards. Many of the competitor texts do consider such things, but not as comprehensively. Fletcher considers 'global warming', as opposed to climate change, possibly a mistake in my personal view.

Neither Fletcher nor his competitors from the US market cater well for non-North American or even non-US geology students. In this regard, Fletcher has closed his market even further than his rivals, with a chapter on US geology. This is no criticism — US students need to know about their geological heritage, as do my students here in Belfast, so we teach them this, but not many of them want to learn about, see any relevance for, nor have much interest in the geology of another country. His book will be popular in the US I am sure. However, this mix of global and also country-specific outlook is reflected in the content of the book (and its competitors), being about geology and physical geography, making for a mixed bag of information, some of which is relevant to A level and geology/geography undergraduates in many countries outside of the US, some of which isn't.

In short, the factual content of Fletcher's well-written, well-illustrated book is about the same as the other comparator texts on the market. What makes it different is the layout and the exercises, for which Fletcher is commended.

Alistair Ruffell
Queen's University, Belfast

ARCHIBALD, J. D. 2011. *Extinction and Radiation: How the Fall of Dinosaurs Led to the Rise of Mammals*. xii + 108 pp. Johns Hopkins University Press. Price £39.00, US$65.00 (HB). ISBN 978 0 8018 98905 1.
doi:10.1017/S0016756811000690

The extinction of the dinosaurs is an iconic event in Earth history that attracts continued attention from scientists and the public. Just when everyone thought that the case was closed and a giant meteorite implicated, as expressed in a 'manifesto' statement last year in *Science* (Schulte *et al.* 2010), signed by 41 distinguished authors, it turns out that everything is not so clear, as explained by Archibald et al. (2010), signed by an equally distinguished list of 29 authors. David Archibald's book reflects this somewhat cautious stance. He has lived through the brouhaha about the KT impact, and has been a constant commentator over the past thirty years, drawing evidence from his own field of vertebrate palaeontology, and especially from the small mammals that lived during the last days of the dinosaurs. In a previous book (Archibald, 1996), the vertebrate palaeontological case was put, and here it is brought up to date.

This is a slim volume of six chapters, which review, respectively, what is known of the last 10 million years of the dinosaurs, the Cretaceous mammals, the origin of modern mammalian groups, the records of different groups through the KT boundary, possible causes of diversity decline in latest Cretaceous time, and finally the current position on dinosaurian extinction and especially the radiation of the mammals.

Archibald's case rests strongly on his oft-argued case that dinosaurs, and other vertebrate groups such as turtles and mammals, were declining in abundance and diversity through the last 5 m of sediments of the Hell Creek Formation, representing the last 100,000 years of the Cretaceous. Whether this is a global pattern or not is widely debated. His other forte has been the Late Cretaceous mammals, and especially those that are close to modern mammalian clades. Archibald outlines the debates between palaeontologists studying sometimes incomplete remains and experts on modern mammals. He has witnessed, and been instrumental in, major revisions in methods; palaeontologists are now much more critical about assigning fossils to modern clades.

As noted at the start, opinion is divided on whether the KT impact was the sole cause of mass extinction, or a contributor. The evidence for the impact is clear, and the story of how the evidence was assembled is a fascinating story of science in action. But, as Archibald says, nobody addresses the question of just how the physical crisis caused the exact patterns of extinction that we see in the rocks. Most physical killing models arising from impact would be so devastating that all life should have succumbed, and yet it did not. Further, the Deccan traps were erupting through this interval, and geologists cannot ignore them while at the same time arguing that other basalt traps caused mass extinction at the end of the Permian and at the end of the Triassic (through global warming, acid rain, and ocean stagnation).

This is a learned essay, written clearly and attractively for students and the public, but supported by substantial