

and critical look at the record of Ediacaran trace fossils, which have long been accepted as the definitive evidence for early triploblastic metazoans. Somewhat disturbingly, most of these structures turn out not to be trace fossils at all, though there is a residue of *bona fide* traces that squeaks the record of macroscopic motility back into the terminal Ediacaran.

Not very much is said in this volume about why animals might be more generally important, but Erwin (Chapter 6) provides an enormously useful primer of the developmental biology that goes in to building one, and two alternative models for what the last common ancestor of bilaterians might have looked like – only one of which is likely to express itself in the fossil record. The potential for much deeper, palaeontologically invisible, roots is also taken up by Hedges *et al.* (Chapter 7) who doggedly defend the results of their earlier molecular clock analyses. In explaining the pervasive absence of billion-year-old animal fossils Hedges *et al.* are happy to fall back on ‘permissive environments’, invoking insufficient oxygen as a barrier to large size, biomineralization and cuticularization. No attempt is made to explain the profound stasis of the acritarch record through this interval, however – compelling *positive* evidence for the absence of even small, non-preserved eumetazoans (Peterson & Butterfield, 2005).

Chapters 8 and 9 return to the geological record, with a view to gaining a finer temporal resolution of Neoproterozoic stratigraphy and events. Halvorsen presents a refreshingly frank account of what is known and not known from chemostratigraphic correlation, primarily $\delta^{13}\text{C}$, while Corsetti & Lorentz focus on the radiometric age constraints and global correlation within the mid-Neoproterozoic Cryogenian. In both instances both the data and the interpretations are in an obvious state of flux, though the case for recognizing two globally synchronous Cryogenian glaciations is looking decidedly shaky.

So is the volume successful? In principal, absolutely. This is very much the kind of multidisciplinary approach that is necessary to appreciate when and how biology revolutionized the surficial Earth system, yielding our modern, uniformitarian world. In practice it is not so clear. The range of topics covered is far from exhaustive and, as intimated above, falls somewhat short of reflecting the full range of recent opinion. Inevitably, the volume will also suffer from its own success, with most of the constituent fields advancing much more rapidly than can be tracked in a one-off, hardcover book. Its real value, then, lies in synthesis, and the focus it brings to one of the most fascinating intervals in Earth history. I look forward to the next edition.

N. J. Butterfield

References

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This book contains seventeen papers arising from a Petroleum Group conference in November 2004, a somewhat lengthy gestation but ultimately worth while. The content is subdivided into four sections.

The first, outcrop studies, comprises papers on economically critical fold-related fracturing in the Asmari reservoirs of the Zagros Mountains, transient fracture permeability and diagenetic resealing in the Dent Fault (UK) and factors affecting the potentially very variable transmissibility of relay ramps in sandstones based on data from Utah. Notable in the value of outcrop studies is the detail and insights now available from satellite imagery.

The second, geophysics, includes a discussion on fracture compliance (unfortunately without saying what it is!), a useful reminder of the value of VSP data in bridging the seismic/well-scale gap, and some laboratory data with potential to improve the use of acoustic emission in the engineering geology of fractured rock. The value of the latter, if any, to production monitoring of fluid depletion is unclear.

The third, numerical and analogue modelling studies, deals with estimating the complicating effects of concurrent diagenetic stiffening of matrix blocks during fracture, the correlation of variable geometry fracture networks with well test response, the use of elastic dislocation theory in the prediction of lower-order fracture orientation and an experimental study of fracture localization by dip-domain boundaries in buckle folds. All are topics requiring familiarity by those at the geology/reservoir engineering interface.

The fourth, reservoir case studies, is the longest and arguably the best part of the book, giving not only hard data but valuable insight into the commonly recursive processes of evaluation. Two cases deal with chalk fields of the North Sea where fractures govern economics in reservoirs with high matrix porosity and low matrix permeability. Other papers include the pre-development fracture modelling in the gigantic West Shetland Clair Field, studies in both clastic and carbonate reservoirs from Oman and an account of fracture distribution in folded thrust sheets from western Canada. All stress the multidisciplinary requirements for evaluation success; indeed there is no single-author article in the whole book.

Although a ‘slim’ volume, the book is fair value for money and especially at discounted price may attract personal purchases from those engaged in the management of fractured reservoirs. Libraries should certainly endeavour to stock it. Particularly commendable is that the majority of the papers are informative and well-written and all are concise. Less so is the absence of an overview article giving introduction and literature guide to many aspects not covered in the conference such as artificial fracturing for well stimulation, karst fracture reservoirs with negligible matrix porosity in palaeogeomorphic traps, cleat fractures controlling coalbed methane economics, dense polygonal faulting as a determinant on production potential and shear wave polarization for evaluation of fracture orientation. An annotated global listing of major fractured reservoir plays would also have helped to augment the value of the book to those seeking the general introduction that might be implied by the title.

David James