



Book Review

Sedimentary Structures (Fourth Edition), By John Collinson and Nigel Mounteney. Published by Dunedin Academic Press, £35.00. 340 pp. Also available as an e-book.

Sedimentary structures were one of the features that drew this reviewer to the study of Sedimentology. They are, perhaps, the most eloquent among the many details observed in rocks, speaking to us about their conditions of deposition and the environment in which this occurred. If that seems a touch anthropomorphic, well, they talk to me!

This is an impressive volume, well presented on good quality paper, and a credit to the publishers. It resembled a 'Coffee-Table book', but this is not a criticism, the use of this term is fully justified by countless high quality colour images and prolific line illustrations of the features discussed. Pick it up, these catch the eye, and encourage further investigation. The photographs leave no doubt about the identity of the structures and the diagrams explain, with some help from the text, how and why they form. Good illustrations are not a trivial issue, so often students asked to illustrate features appear to see something quite different!

There is a brief introduction to each chapter, and each includes sections on study techniques, recommended field and laboratory experience, and references. There are two novel features. The authors commonly describe simple experiments that would allow the reader to observe the effects discussed for themselves. Unusually, the references that follow chapters are limited to the names and dates of the work, but each has a brief critique of what the article cited offers to the topic addressed. Traditional bibliographic references for all chapters appear at the end of the volume.

There are ten chapters, varying in length according to the material they contain.

An Introduction to the study of sedimentary structures (5 pp) discusses the origins, principles, and aims of the science of sedimentology and reading is recommended. The discussion follows the various philosophical views, and principles, that have shaped sedimentology in particular, Actualism, the Uniformitarianism promoted by Lyell, and the Catastrophism espoused by Cuvier, and we see how these shaped the ways in which we look at sedimentary rocks. From the outset, the authors adopt a personal approach, addressing the reader directly and encouraging methodical observation and analysis.

The core of the book is represented by six chapters, on Bedding (14 pp), the Basic properties of fluids, flows and sediment (24 pp), Erosional structures (relating principally to turbidite deposits, 21 pp), Depositional structures in muds, mudstones and shales (6 pp), Depositional structures of sands and sandstones (71pp), and Depositional structures in gravels, conglomerates and breccias (26 pp). These describe the characteristics of flow, and how sediments move, and

generate structures ranging from ripples to large scale cross bedding. These stretch across a range of environments, from subaerial fluvial and aeolian deposits, to shallow storm deposits, bars, channels and deltas, and deep-water turbidite fans. Although the account includes the mathematical expressions for Reynolds and Froude numbers, wave velocity, and Stokes Law, that underlie behaviour, the reader is able to gain a good understanding of the processes involved without these details. The descriptions are clear and the illustrations and diagrams excellent. The book is worth buying for this section alone. The chapter on Depositional structures of chemical and biological origin (20pp) is disappointing. The account of evaporites is good, again with good illustrations, but sections relating to carbonate rocks are poor, containing errors and omissions and lack the structure of the rest of the book. There is no detailed description of stylolites. The following chapter reverts to the more typical high standards of the work with a description of structures due to deformation and disturbance (67 pp). These relate principally to sands and finer-grained sediments, reflecting physical, chemical and biological processes. Features range from structures resulting from liquefaction to large-scale slumps, diapirs and gravity collapse. There is a relatively brief section on nodules but a comprehensive description of biogenic sedimentary structures.

The final chapter considers Assemblages of structures and their environmental interpretation (21 pp). It explains how structures may be used to establish the nature of processes and their spatial and temporal relationships, using palaeoflows and wave movements to characterize palaeoenvironments.

Six Appendices provide advice on how to collect, display, analyse and interpret directional data, and sample and preserve unconsolidated sediments; together with methods for the study of present-day environments; techniques for the study of trace fossils; and techniques for sedimentary logging, with illustrations of graphic keys to common lithologies and structures.

There is an extensive bibliography (12.5 pp) and a helpful Index (19 pp).

So, for whom is the book intended? In the author's view, it is primarily for Earth scientists, but non-specialists from other subject areas are expected to benefit also, where an understanding of sedimentary structures and environments is of value. It provides a well-organized account of how features form and what they mean at scales ranging from sand grains to sedimentary basins. Although written in an understandable manner, the level of detail goes beyond that which might be expected in a book aimed at undergraduates, or even early postgraduates. However, in my view, this should not deter readers from other backgrounds. It guides even the novice to a deeper understanding of the significance of the features described and, given the costs of many books today, it

represents exceptional value. Anyone with a general interest in clastic sediments will find it a useful addition to a personal library.

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