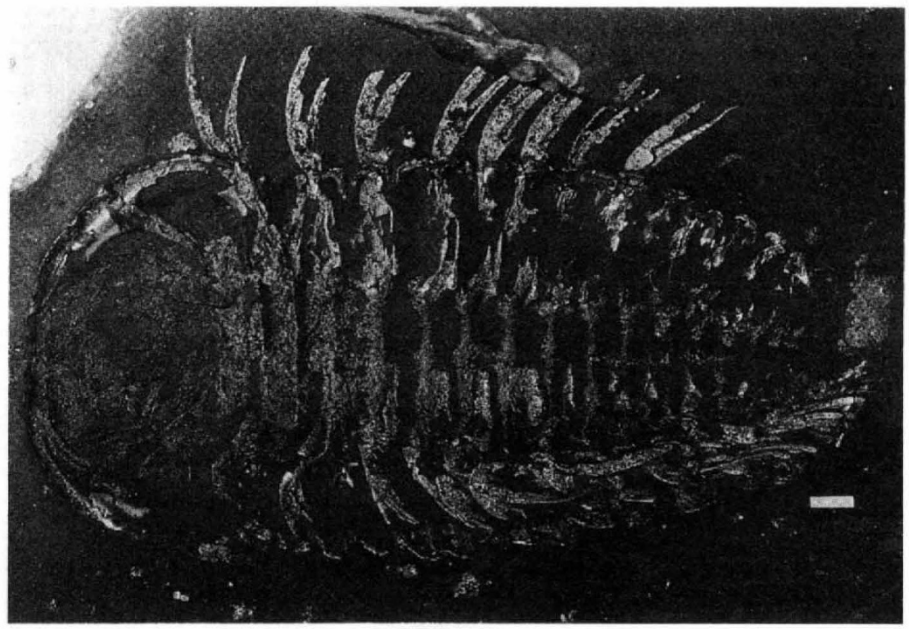
Unlocking the past

Douglas Palmer

Taphonomy: Releasing the Data Locked in the Fossil Record. Edited by Peter A. Allison and Derek E. G. Briggs. *Plenum: 1991. Pp. 560. $95, £67.06.*



Ageing gracefully — exceptional preservation of a trilobite's appendages by pyrite (*Triarthrus eatoni*, Upper Ordovician, New York State, USA). Photo by Dr J. E. Almond from H. B. Whittington's *Trilobites* (Boydell, in the press). Scale bar, 1 mm.

THE classical descriptive terms of palaeontology — 'petrified fossils', 'the vestiges of past life' — all suggest loss of substance and with it information. It is all too easy to take a negative view of the great stone sarcophagus that is the fossil record. But just how representative is this record of the great variety and relative abundance of past life? And why and how are some organisms preferentially preserved? The study of burial processes, or 'taphonomy', addresses these and the related problems of how the postmortem remains of organisms are recruited to the sedimentary record.

Because of the enormous diversity of literature for multidisciplinary subjects such as taphonomy, well-written and organized reviews play an important part in helping all concerned keep in touch with the latest developments. This new volume gives a detailed and positive view of the nature of the fossil record and its potential for enriching our understanding of evolution. The editors have brought together an excellent and timely survey of taphonomy today. It builds on the earlier volumes in the series (on skeletal growth, animal–sediment relations and biotic interactions) and complements other recent works such as Joseph Carter's encyclopaedic *Skeletal Biomineralization* (Van Nostrand Reinhold, 1990) and Steven Donovan's *The Processes of Fossilization* (Belhaven, 1991).

Of particular value are the introductory discussions on organic biomolecules and nonmineralized tissues. The study of biomolecules in the fossil record is opening up new vistas. My only regret is that the chapter on this subject is not longer. Also welcome are the analyses of the role of the main mineral groups in the fossilization process. Iron sulphides, phosphates, diverse carbonates and silica minerals are all given substantial review chapters.

Most of the authors conclude by emphasizing some current problems and unanswered questions. Why is there a great fluctuation through time in the volume of silica locked in sedimentary rocks and particular fossil groups? Which came first, the change in available marine silica or the blooms and radiations of silica-fixing organisms? Why do ancient sediments and fossils display a much greater range of pyrite formation than modern sediments with their incipient fossil shells? As Donald Caulfield and Robert Raiswell say, "early diagenetic processes are unable to explain many features of the fossil pyritization". This stimulating volume should be available to all students of palaeontology. It will be their future work that will help release some of the vast supply of unexplored data still locked away in the fossil record. □

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Of compasses and currents

N. David Mermin

Icons and Symmetries. By Simon L. Altmann. *Oxford University Press: 1992. Pp. 104. £14.95, $29.95.*

WRITING accurately and non-technically about technical matters is a challenging art. In these lectures on symmetry, Simon Altmann has produced three fascinating specimens of the genre. Originally given to the Faculty of Science of the Catholic University of Leuven, the lectures, in their written form, are now also addressed to young people not yet at university (in the United Kingdom) or who are in general liberal-arts college science courses (in the United States).

Altmann begins by retelling the famous tale of Ørsted, the compass and the current. Symmetry appears to dictate that the needle cannot be deflected from the north by a north-flowing current, so any electromagnetic effect should clearly be sought with the wire perpendicular to the needle, yet none is found. Appearances can be deceiving. This particular deception delayed for some time one of the great unifying discoveries of science. Altmann presents the episode as an instance of confusing the properties of an icon (in this case an arrow on a page) and the object it is intended to represent (in this case a directed line segment or vector). This well-nigh universal use of arrows overlooks the fact that there are two very different ways a cylindrical rod can be used to point. One way puts a special mark on the end of the rod. But one end can also be distinguished from the other by spinning the rod about its axis. The two ways correspond to polar and axial vectors, which behave oppositely under reflection in a plane. Ørsted's discovery was delayed by the failure to realize that the icon of the arrow captures only one of the two types of vectors.

The story is told with considerable charm and many attractive and informative figures. We are given advice, some good, some bad, from luminaries ranging from St Thomas Aquinas to Pierre Currie on the relation one should expect between the symmetries of causes and their effects. I could happily build a week or two of a liberal-arts physics course around the text of Altmann's first lecture.

But the second or third lectures might tax even the well-educated sixth-former.