



Review: Bizarre and Extinct

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Reviewed work(s):

The Early Evolution of Metazoa and the Significance of Problematic Taxa by A. M. Simonetta ; S. C. Morris

Source: *BioScience*, Vol. 42, No. 11, Stability and Change in the Tropics (Dec., 1992), p. 877

Published by: American Institute of Biological Sciences

Stable URL: <http://www.jstor.org/stable/1312091>

Accessed: 26/11/2008 22:49

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BIZARRE AND EXTINCT

The Early Evolution of Metazoa and the Significance of Problematic Taxa.

A. M. Simonetta and S. C. Morris, eds. Cambridge University Press, New York, 1991. 296 pp., illus. \$69.95 (ISBN 0-521-40242-5 cloth).

Many species, both fossil and extant, seemingly resist our attempts to unravel their relationships. This problem arises primarily for two reasons. Either the known specimens are so fragmentary or they are so structurally distinct (apomorphic in systematists' parlance) that they lack a sufficient number of characters with which to link them to well-characterized groups. Systematists have long been interested in taxa of problematic relationships: they represent puzzles to be solved and at the same time they broaden our descriptive catalog of life's diversity. Some problematic fossil taxa—whose very names conjure up the bizarre: *Hallucigenia*, *Tullimonstrum*—represent morphologies so distinct they have inevitably led paleontologists to wonder about where they came from, how they made their living (functionally and ecologically), and why they eventually died out. Indeed, these morphologies are often so strange that even experts have found it difficult sometimes to distinguish top from bottom or front from back.

This book constitutes the proceedings of a symposium on problematic taxa held at the University of Camerino, Italy, in 1989. The 24 chapters cover the early evolution of the Metazoa, Cambrian faunas, and, primarily, discussions about a broad range of problematic taxa. Much of the book is descriptive, and if one is not particularly interested in this or that group of arthropods, molluscs, or echinoderms, the discussion may well come across as arcane taxonomy. Nevertheless, if you are curious about the early history of life, then the text and illustrations provide a broad outline of its morphological and taxonomic diversity and serve as an introduction to the difficulties paleontologists have in studying life forms over half a billion years old.

Paleontologists have paid close attention to fossil Lagerstätten—highly

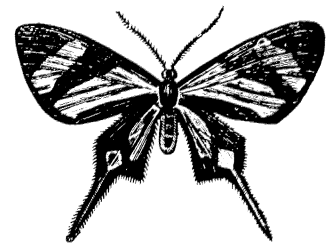
fossiliferous rock units carrying special information about the history of life—and some of the most appealing chapters of the book summarize the diversity of these assemblages. C. Junyuan and B. Erdtmann, for example, describe one of the oldest Phanerozoic assemblages from the Lower Cambrian of China. This biota included a rich array of taxa, from algae, sponges, and various wormlike creatures to numerous brachiopods and arthropods. Likewise, R. A. Robison summarizes the diversity of four Middle Cambrian Lagerstätten from Utah and illustrates many of these taxa with wonderful photographs. These assemblages contain approximately 50 genera, compared with more than 100 in the famous Burgess shale, but Robison attributes this reduction not to a basic difference in community organization but to preservational and collecting biases. These Lagerstätten demonstrate the widespread occurrence of diverse biotas very early in the Phanerozoic.

The central issue for the study of problematic taxa is that we still have an incomplete picture of Metazoan phylogeny. In principle, it does not matter whether the taxon in question is represented by a Cambrian fossil fragment or by a complete specimen of a recent mammal or bird. They remain of problematic affinities unless we can relate their characters to those diagnosing monophyletic groups within the systematic hierarchy. Consequently, it is perplexing that this book is so bereft of phylogenetic thinking and empirical discussions of relationships. Virtually the sole exception is a chapter by F. R. Schram, who builds a metazoan phylogenetic tree using 77 morphological characters and then attempts to interpolate several problematic fossils into that scheme. As Schram notes, a phylogenetic hypothesis merely reflects the available data, and the process of generating the tree directs attention to the information conveyed by multiple characters and identifies for the investigator the diagnostic characters that allocate problematic taxa to a specific position within the tree of life.

Given the large number of molecular and morphological studies on metazoan interrelationships that have been published in the last decade, an opportunity was lost to integrate these

findings with the study of problematic taxa. As paleontologist R. A. Fortey of The Natural History Museum (London) has pointed out in a number of articles, we will not understand the significance of these strange creatures or be able to describe the temporal, morphological, and ecological patterns of the explosive metazoan radiation in the Cambrian until we redirect our attention to the phylogenetic questions. The major weakness of this book is the lack of such a perspective. Still, it can serve as a useful source of information for those teachers and researchers interested in the early history of life.

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PROVIDING FOR THE FUTURE

The Evolution of Parental Care. T. H. Clutton-Brock. Princeton University Press, Princeton, NJ, 1991. 352 pp., illus. \$49.50 (ISBN 0-691-08730-X cloth), \$19.95 (ISBN 0-691-02516-9 paper).

We are witnessing an extraordinary renewal of interest in the study of evolution that cuts across disciplinary boundaries. It is not confined to traditional areas of evolutionary biology but has generated new areas of inquiry, such as the evolution of development and molecular evolution. T. H. Clutton-Brock's book is a timely and welcome addition, and its topic, the evolution of parental care, comfortably occupies an otherwise vacant intellectual niche.

Sexual selection, reproduction, and the differential survival of offspring are key factors in evolution. Together, they comprise much of what is included in the study of animals' breed-