

for supposing that the Crab Nebula originated with the brilliant "guest star" observed by the Chinese and Japanese in A.D. 1054; if, as Williams suggests, the nebula could equally well have originated in the first half of the 12th century, one of the most satisfying tales in the history of science will have to be rewritten.

A good festschrift should, above all, give pleasure. This one will be read with delight, the more so as its contributors display their learning with a grace and lightness of touch that their mentor will surely appreciate.

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## A Fossil Group

**The Ammonoidea.** The Evolution, Classification, Mode of Life and Geological Usefulness of a Major Fossil Group. Proceedings of a symposium, York, England, Aug. 1979. M. R. HOUSE and J. R. SENIOR, Eds. Published for the Systematics Association by Academic Press, New York, 1981. xvi, 594 pp., illus. \$86.50. Systematics Association Special Volume No. 18.

Ammonoid cephalopods hold pride of place in late Paleozoic and Mesozoic biostratigraphies, and their chambered shells provide some of the most instructive material for evolutionary studies to be found among the shelled invertebrates. As a consequence, research on ammonoids is vigorous and the literature is immense and widely scattered. Insight into the entire group comes largely from summaries like those in part L of the *Treatise on Invertebrate Paleontology* (R. C. Moore, Ed., Geological Society of America and University of Kansas Press, 1957) or "Molluski-Golovonogie I" of the *Osnovy Paleontologii* (V. E. Ruzhencev, Ed., Izdatel'stvo Akademii Nauk SSSR, 1962). *The Ammonoidea* supplements and updates those volumes by summarizing principal research accomplishments of the last 20 years.

*The Ammonoidea* is divided almost equally into three parts. The first six papers deal with classification and evolutionary development; the second six with organization and mode of life; and the final eight with biostratigraphy and distribution. The individual chapters are keynote addresses given at a 1979 Systematics Association symposium on ammonoidea. They vary in style, philosophy, and coverage, but all are authoritative.

In chapters on origin, classification, and evolution, authors of Devonian, Carboniferous, and Triassic contributions treat the Ammonoidea as a subclass, whereas Permian, Jurassic, and Cretaceous workers regard the group as an order. Major ammonoid taxa (orders or suborders) are largely the same as in part L of the *Treatise*, but concepts of several are changed through addition, subdivision, or rearrangement. For example, House regards bactritids as primitive ammonoids and includes them as a suborder of the Anarcestida, noting that this moves the question of ammonoid origins back a step, probably to straight orthocerid nautiloids with ventral siphuncles. Authors dealing with Jurassic and Cretaceous ammonoids introduce welcome changes through abandonment of the concept of iterative "replenishment" of the Ammonitina by successive homeomorphic waves from the conservative Phylloceratina and Lytoceratina. Origin of Carboniferous ammonoids from cheiloceratacean Prionoceratidae, the only group to survive the Devonian, seems well established, as is origin of most Triassic ammonoids from the Xenodiscidae. Tozer notes that the Phylloceratida provide the only clear link between ammonoids of the Triassic and those of the Jurassic. Donovan, Callomon, and Howarth, however, reject the idea that all Jurassic ammonoids developed from the Phylloceratina, but they cannot identify lines of descent by which early Jurassic forms developed from Triassic predecessors.

In the section on organization and mode of life, Birkelund concludes from her consideration of shell structure and siphuncular morphology that economy of mass was a primary factor governing shell construction and that differences in siphuncular construction reflect ecologic differences. Wiedmann and Kullmann emphasize the importance of sutural ontogeny, show that sutural phylogeny is related, and conclude that the law of recapitulation applies. Callomon shows that evidence of dimorphism is widespread in Jurassic ammonoids but has not yet been systematically assembled for Cretaceous ones. Lehmann reviews interpretations of aptychi and anaptychi and discusses jaw apparatuses, radulae, crop contents, and ink sacs. Chamberlain summarizes studies of the relationship between hydromechanical design and adaptive locomotor strategies; and Klinger speculates on buoyancy control and ecology in certain heteromorphs. Some of these studies are obviously more advanced than others, but all the features considered have obvious sys-

tematic and evolutionary significance.

Because ammonoid biostratigraphy and distribution have been so thoroughly studied, the final section of the book adds little conceptual novelty. However, Ziegler's comments about potential infirmities in Jurassic ammonite biostratigraphy, coupled with earlier comments by Donovan, Callomon, and Howarth on the difficulty of identifying notoriously homeomorphic Jurassic ammonites, should caution those who cite Jurassic ammonite biostratigraphy as the ideal.

The book is well made, has few typographic errors, and is a fitting tribute to the late Bernhard Kummel, to whom it is dedicated. The contents suggest that the revised version of part L of the *Treatise*, in preparation by the same authors, will be a substantial improvement over the first edition.

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## Marine Ecology: Status Report

**Analysis of Marine Ecosystems.** A. R. LONGHURST, Ed. Academic Press, New York, 1981. xxii, 742 pp., illus. \$125.

The study of ecosystems as such, rather than simply of component species, is still in a formative stage in which investigators are exploring in many directions with no generally agreed-upon approach. Longhurst has taken up the challenge of assembling and editing a thick volume on the state of the science that encompasses many of the active lines of research on marine ecosystems today. A section of the book is devoted to particular geographical types of ecosystems: high and low latitudes, upwellings, continental shelves, and coral reefs. A second section is devoted to functional aspects of marine ecosystems, such as autotrophy, grazing and predation, and variability in space and time. A final section deals with simulation and experimental studies, in other words with models of all kinds.

Although the book is written by 30 authors, writing more or less independently, a number of themes run through it, giving us insight into what the collective authorship views as important. The integration of physical and chemical oceanography with the study of the biological aspects of ecosystems is impressive. Ecologists clearly recognize that they must understand and reckon with the physicochemical regime. Within that