



**The Biology of *Latimeria chalumnae* and Evolution of Coelacanth.
Developments in Environmental Biology of Fishes, Volume 12.**

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the core of an upper division course for science majors. Though environmental physics is much less emphasized than in K. H. Mann and J. R. N. Lazier's *Dynamics of Marine Ecosystems: Biological-Physical Interactions in the Oceans* (Blackwell Scientific, Boston, 1991), such a course could (indeed, should) attract a few physicists and chemists, as well as biologists.

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PACIFIC SALMON LIFE HISTORIES.

Edited by C. Groot and L. Margolis. Published in cooperation with the Government of Canada, Department of Fisheries and Oceans by UBC Press, Vancouver. \$65.00. xv + 564 p. + 6 pl.; ill.; geographical and subject indexes. ISBN: 0-7748-0359-2. 1991.

The recent prominence of the Pacific salmon caused by their appearance on the Endangered Species Lists makes this well-edited volume most timely and useful. The editors assembled a group of scientists well qualified for the task of summarizing the enormous literature that has accumulated over the more than 100 years that these fishes have provided recreation, sustenance, and economic wealth and have intrigued biologists with their fascinating way of life. There are six chapters, one on each of the five species that occur in both North America and Asia and one on the two exclusively Asian species. The most abundant (pink, chum and sockeye) receive the largest coverage, but the other species (chinook, coho, masu, and amago) are thoroughly evaluated.

The organization of each chapter reflects careful planning and coordination on the part of the editors. Though not identical in format, each chapter includes a similarly ordered sequence of topics that follows the fish from "gravel to gravel"—from spawning, to emergence from the gravel, freshwater residence, seaward migration, ocean migration, and the final return to fresh water, to spawn in the home stream. This still poorly understood homing process, particularly in the ocean, is just one of the fascinations of their biology. Approximately 1600 references are listed, though there is some duplication owing to each chapter having its own list (a highly desirable feature in my view). Of particular value is the extensive listing of works in Russian and Japanese.

My only criticism is one common to efforts of this kind: The book clearly spent a long time in production. The latest substantive literature is mostly dated 1986 or 1987. As a consequence, some important recent findings are not included. Nonetheless, this excellent document will provide valu-

able guidance for years to come for those who seek to understand the life histories of the Pacific salmon. In the words of Burgner, author of the chapter on sockeye salmon, "Although the bibliography on *O. nerka* is impressive, the sockeye salmon still retains many secrets of its life history. . . . Certainly, the sockeye remains a mysterious and fascinating species that will challenge the curiosity and ingenuity of biologists far into the future" (p. 100).

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THE BIOLOGY OF *LATIMERIA CHALUMNAE* AND EVOLUTION OF COELACANTHS. *Developments in Environmental Biology of Fishes, Volume 12.*

Edited by John A. Musick, Michael N. Bruton, and Eugene K. Balon; Series Editor: Eugene K. Balon. Kluwer Academic Publishers, Dordrecht and Boston (Massachusetts). \$199.00. 446 p.; ill.; species and subject index. ISBN: 0-7923-1224-4. [Reprinted from *Environmental Biology of Fishes*, 32 (1-4), 1991.] 1991.

In December 1938 a sensational discovery was made and in the following year it was reported in *Nature* by J. L. B. Smith of South Africa. Majorie Latimer found the first living coelacanth and Smith named it after her, *Latimeria chalumnae*. This species is the last of its kind, which was believed to have gone extinct more than 66 million years ago. Its oldest actinistian cousins date from the Devonian (about 380 million years ago). The second specimen was caught in 1952, and about four more per year have been captured since then. The coelacanth is an exceedingly rare species that has earned its position, largely thanks to the laudable efforts of the editors of this volume and some of its contributors, of most protected status in the Convention on International Trade in Endangered Species (CITES) lists. Based on a total of 172 specimens, more than 800 publications (more than 30 in *Nature*), as well as many books and theses, have been written.

The coelacanth is certainly one of the most publicized and published species that cannot be kept alive in a laboratory. Much of the attention stems from its celebrated status as a "living fossil" and "missing link" that connects our fishy ancestors to land vertebrates—most introductory zoology textbooks prominently feature a coelacanth at the base of the tree of vertebrate life on land.

This is the fourth major conference proceedings dealing exclusively with the biology of this species; it contains 25 contributions plus a Prelude and an Introduction. This volume is largely based on the symposium "Biology and evolution of coelacanths" that was organized by John Musick and held in

1989 at the 69th Annual Meeting of the American Society of Ichthyologists and Herpetologists in San Francisco. This collection of papers celebrates the 50th anniversary of the discovery of *Latimeria chalumnae*.

Progress in the understanding of this species' biology continues to be made—many of the initial studies dealt with morphology, but later ones with molecules, biochemistry, physiology, and conservation biology. Modern techniques (computed tomography and magnetic resonance imaging) allow sophisticated morphological analyses (Schultze and Cloutier). It is disconcerting to learn that levels of DDT in the ecosphere are high enough to allow their detection in coelacanths caught in 100 to 200 m depths of the Comoro Islands, far off Africa (Hale et al.). Most surprisingly, *Latimeria chalumnae* was found to be a live-bearer with eggs the size of oranges (color photograph) (see the chapters by Wourms et al. and Balon).

Since the last major symposium volume of 1979, the idea that coelacanths are closely related to cartilaginous fishes was soundly put to rest. At the time this volume was edited (September 1990), no consensus had been reached as to whether the coelacanth or lungfish was the closest living relative of land vertebrates. Stock et al. show that phylogenetic analyses based on the large ribosomal subunit gene do not allow one to distinguish between these two alternative hypotheses. This debate, based on molecular data, continued with several papers that appeared since the second half of 1990. My partial perception of this debate is that the lungfish is the more favored candidate for being the closest living relative of tetrapods. That does not diminish the importance of the coelacanth. This volume contains several excellent papers that analyse fossil actinistians. Cladistic reconstructions of their evolutionary relationships and application of innovative analyses to study the tempo and mode of morphological evolution leading up to the coelacanth are most informative (chapters by Cloutier and Forey).

This book is going to be the main reference for the discriminating "international fraternity of coelacanth fanatics" (Balon) and other more pedestrian scientists for many years to come. The volume is well edited and touches upon all major areas of research relating to the coelacanth—the editors deserve much credit for putting this work together with so much care. It is an idiosyncratic book, and the personal touch of the editors shows, with more than 20 pages taken up by drawings and photographs of stamps and other coelacanth memorabilia that often lack any immediate connection to the coelacanth; they make one curious to turn the page to look for the next quirky picture. Most un-

fortunately, its price (\$199 for the hardcover edition) will naturally select for a readership too small for this excellent collection of papers.

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DASYCLADALES: AN ILLUSTRATED MONOGRAPH OF A FASCINATING ALGAL ORDER.

By Sigrid Berger and Matthias J. Kaefer; Foreword by Ralph A. Lewin. Georg Thieme Verlag, Stuttgart; distributed by Oxford University Press, New York. \$195.00. viii + 247 p.; ill.; taxonomic and subject indexes. ISBN: 0-19-520953-2 (from Oxford University Press, New York). 1992.

The Dasycladales is a relatively small group of extant coenocytic green algae that have an extensive fossil record extending back to the Cambrian. Today they inhabit shallow tropical and subtropical shores of oceans. In this most comprehensive treatment ever attempted of this important group of algae, there is a wealth of information for both biologists and paleontologists.

Fossil members are handled exceptionally well, including a clear and concise discussion of the basic structural organization of the thallus, together with details about calcification. Also included is a detailed systematic section that treats both living and fossil members, and a table that defines the geographic distribution of the living species. Each of the eleven extant genera is described and illustrated in magnificent detail. There are numerous, brilliantly colored plates throughout that add to the visual excitement of this monograph. Many are used to illustrate stages in the reproduction of these unique organisms. I feel confident that many of the illustrations depict structures that have never been seen by most students of the algae. The colored plates are augmented by splendid scanning and transmission electron micrographs, and simple but effective line drawings that greatly aid in understanding the complex thallus structure and morphology of the dasyclads.

What is most impressive about this monograph is its completeness. There is simply nothing that has been left out about these organisms, including the description and illustration of various techniques used by cell biologists and detailed information about culture protocols. I can only echo the comments by Ralph Lewin in the Foreword, in which he describes this scholarly work as "a labor of enthusiastic love" (p. vi). While the price might be prohibitive for some individual researchers, the scope and quality of this volume make it an absolutely necessary addition to every university and research library. For the student of phycology and marine biology this book is indispensable, and a