Biologists have complained that lichenology is esoteric and that getting into research on lichens is hard. *The Lichens* not only opens the door upon these organisms as research subjects but also points to the most promising directions for future work. For the general reader, this book gives the best available view of the life of the lichen, evolution's *chef d'oeuvre* of symbiosis.

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Quantitative Marine Biology

Biological Oceanographic Processes. TIMOTHY R. PARSONS and MASAYUKI TAKAHASHI. Pergamon, New York, 1973. x, 186 pp., illus. $12.

The classic textbook in oceanography, *The Oceans* by Sverdrup, Johnston, and Fleming (Prentice Hall), was published in 1942, before the postwar explosion of oceanographic research. Since then it has become more and more difficult to comprehend the subject within one book or even to describe one part of the subject in the manner of Sverdrup *et al.* Thus it is necessary for any author to adopt a point of view from which to look at his part of the seas, and the value of any treatment depends on this choice. Parsons and Takahashi consider that the study of pelagic marine organisms now has the kind of quantitative rigor usually associated with the more fundamental or experimental aspects of biology. Gone are the descriptions of oddities to be found in the deep sea. Instead we have a discussion of regularities in biochemical composition and the rates of transformation of energy. Thus this book can be considered not only as a detailed review of certain special aspects of biological oceanography but also as an attempt to show the coming of age of this subject.

The first two chapters deal with the "statics" of plankton. Because of the stance taken, the variety of species of phytoplankton and zooplankton are dealt with perfunctorily, fuller treatment being replaced in part by a description of methods of measuring particle size (an enterprise in which Parsons has played a leading role) and a discussion of the importance of such measurements. The chapter on chemical composition provides a comprehensive review of the literature.

The main part of the book is concerned with the dynamics of plankton growth. The modeling of ecosystems is now in vogue, but such models depend for their realism on the adequacy and accuracy of estimates of rates of change of the components. This book provides a valuable source of information on these building blocks for pelagic ecosystems, the functional relation of phytoplankton growth to nutrients and light, the dependence of zooplankton feeding on particle concentrations, the relative importance of microbial heterotrophic processes, and so on.

The last parts of the book deal with possible applications to questions of estuarine water quality, and fish stock recruitment, as a function of variable food supply. By implication the authors indicate that the potential usefulness of the results lies in the consideration of the details of practical problems.

The book admirably fulfills the aim of providing a source of quantitative expressions of near-surface pelagic phenomena. In parts, particularly the earlier chapters, the compression of information makes for difficult reading, but this will be a valuable reference work for students, engineers, and others requiring information in this field. This is the stated aim of the authors, but beyond this, and especially in the later chapters, the book, by the accumulation of detail, gives an opportunity to evaluate the present status of the subject as a scientific discipline.

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Karyotypes

Cytotaxonomy and Vertebrate Evolution. A. B. CHIARELLI and E. CAPANNA, Eds. Academic Press, New York, 1973. xvi, 784 pp., illus. $41.

This is a book of exceedingly uneven quality. It is clear, from the concluding chapter by Capanna, that the editors had hoped at the outset to be able to read some kind of taxonomic sense into the many accurately documented vertebrate karyotypes which have been published since the late 1950's. It was about this time that several simple but most fruitful technical innovations were introduced to vertebrate karyology, notably the use of spindle-arresting agents and hypotonic treatment before fixation.

In the event, the editors' hopes have manifestly not been realized, so much so that Capanna amusingly refers to the demonstration in 1970 that two closely related species of deer have diploid numbers of 46 and 6 (or 7 in the male) respectively as the "Muntjac Scandal"!

Miller and Bakken's early chapter "Ultrastructure of genetic activity in vertebrate chromosomes" is out of context in a book such as this. Romanini's survey of DNA C-values suffers from abominable translation into English, so poor as to be obscure in many places. Mancino's chapter on lampbrush chromosomes is scarcely more than a list of references. White has provided a balanced review of chromosomal rearrangements. Koulischer has written on chromosome "evolution" in cell cultures, again a subject that is not really relevant to this book.

Chapters by Colombera on karyotypes of lower chordates, by Potter and Robinson on karyotypes of cyclostomes, and by Morescalchi on karyotypes of amphibians are of some limited interest, but information on the fish is restricted to a checklist of chromosome numbers assembled by the editors. Gorman has written a scholarly and valuable chapter on the karyotypes of reptiles, as also have Ray-Chaudhuri on birds, Sharman on monotremes and marsupials, and Matthey on eutherian mammals. Vorontsov has surveyed sex-determining mechanisms in the chordates in rather mundane fashion (he fails to mention the clear-cut evidence for female heterogamety in *Pleurodeles* and *Ambystoma* obtained by Gallien and by Humphrey respectively by breeding from sex-reversed animals, and Lacroix's confirmatory comparison of the lampbrush chromosomes of normal and sex-reversed *Pleurodeles*). Ohno has written a provocative chapter in which he compares sex-determining genes with regulatory genes in the sense of Jacob and Monod.

There is no mention in this book of recent advances in the fine-scale analysis of karyotypes by Giemsa-banding and fluorescence techniques, nor of in situ hybridization revealing the distribution of highly reiterated base sequences in the chromosomes of several vertebrates, including man.

Considered all round, this book is an ill-conceived hotchpotch, and it certainly does not do justice to its title.

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