Plant-Parasite Interactions

Cell Wall Biochemistry Related to Specificity in Host-Plant Pathogen Interactions. Proceedings of a symposium, Tromsø, Norway, Aug. 1976. S. SOLHEIM and J. RAA, Eds. Universitetsforlaget, Oslo, 1977 (U.S. distributor, Columbia University Press, New York). 488 pp., illus. Paper, $34. Scandinavian University Books.

Despite numerous editorial and technical errors, this book contains useful information about the new and developing study of cell-surface components that play a role in recognitional specificity in plant-parasite and plant-symbiont systems. The best defined of this work is on the apparent role of plant lectins in the recognition of certain *Rhizobium* strains by various species of the plant family Leguminosae. It has long been known that each of these species establishes a symbiotic relation with one but not other *Rhizobium* species. Several papers in the book are in agreement that the mechanism for this lies in the presence on the roots of the various plants of unique glycoprotein lectins that specifically recognize certain surface polysaccharides or glycoproteins of the bacteria and thus lead to their binding to the root surface. Although it is less well defined, the same mechanism appears to operate in plants such as tobacco for specific recognition and ultimate rejection of incompatible *Pseudomonas* species. The specific pathogen metabolites in this case are called disease defense elicitors, and papers in the book evaluate their likely role in triggering disease defense reactions in plants and also in animals. In plants, at least some of the elicitors operate by activating normally repressed biosynthetic pathways for the production of phytoalexins, low-molecular-weight chemicals that are antibiotic to pathogens.

The book includes papers on plant glycoprotein chemistry and cell recognition mechanisms in yeast, subjects that will occupy researchers studying plant-parasite interactions for several years. Several papers are concerned with plant cell-wall degrading enzymes produced by plant pathogens, discussing such aspects of the subject as the sequential production of enzymes, the release of plant enzymes by pathogen-macerating enzymes, and the regulation of enzyme production. These enzymes, however, are not likely to be related to specificity mechanisms.

It is clear that a lot of work will be expended in the future on the dissection of the cell walls and plasma membranes of plants and their pathogenic and symbiotic bacteria and fungi in order to identify molecules that play a role in specificity. This work should be particularly exciting since, in contrast to the general situation with animals, specificity in plant-parasite systems is frequently governed by a single defined gene in each partner. Although the plant chemical work is yet archaic by the standards for the study of animal receptor systems, the book portends greater things for plant work, and accordingly it will be interesting reading for anyone concerned with the mechanisms underlying specific cell recognition.

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Marine Ecosystems

The Ecology of the Seas. D. H. CUSHING and J. J. WALSH. Saunders, Philadelphia, 1976. x, 468 pp., illus. $19.

This book, according to the editors, "was written for scientists who are starting to work from ships by others who have spent their working lives at sea." It is not a textbook in the usual sense; rather, it is a collection of 15 reviews by 14 "oceanographers" (five each from the United States and the United Kingdom, two from Canada, one from Australia, and one from the U.N. Food and Agriculture Organization in Rome), and it is the sort of a book that has bits and pieces that would be assigned to graduate students embarking on research projects.

The reviews cover a wide range of topics and are aggregated into six groups: The Sea and the Organisms That Live in It; The Structure of Life in the Sea; Functions in the Marine Ecosystem; Yield from the Sea; Evolutionary Consequences; and Theory. While there is logic to the first three groupings, the last three appear contrived. To help tie the reviews together there are an introductory chapter by the senior editor and a brief introduction to each of the groups. While these attempts at cohesion are helpful, they also have a contrived flavor. But these are matters of form.

In matters of substance the book conveys both the comprehensions and the frustrations of marine ecology. To the editors, "marine ecology is a diverse subject composed of many facts, many concepts and few testable theories" and is emerging "from the precopernican mists." While this is both modest and melodramatic, there is little doubt that the past three decades have brought marine ecology to a much more respectable level of scientific activity, and the diverse chapters of the book clearly attest to this sophistication. The presentations of modern concepts of nutrient cycles, herbivore production, and food chains in the sea (to choose only three examples) are both profound and elegant. Moreover, almost all the chapters close by identifying problems that should be tackled next.

There is, of course, an abundance of factual material. Much of it has long since been expounded in a form suitable for nonspecialists, but here it appears in its scientific trappings, rigorously documented. The substantive reasons for the limits to marine fish production (100 million tons by present technologies, more perhaps by future technologies) are readily deduced from the chapters. If the book has a major theme, it is that production from the sea is a consequence of complex ecological processes, which, to be understood, must be tackled in a multidisciplinary way. The junior editor remarks in his chapter that "the initial development of models of oceanographic phenomena . . . tended to be along disciplinary lines, with the amount of theoretical work an inverse function of the number of variables measured." The way to go in the future is thus clearly indicated.

In preparing the various introductions that are supposed to hold the reviews together, the editors have shown some characteristic saltiness. With an arbitrariness that borders on being outrageous they, for example, dispose of population genetics by characterizing it as "an extensive study important to the understanding of evolutionary events but [that] can rarely be used in ecology." In the introduction to the section headed Evolutionary Consequences there is the statement, "Some thought was also given to a discussion of species diversity, equitability, stability and information theory, but these red herrings were discarded in favor of perhaps more fruitful subjects." There are many other similarly provocative statements, which should be taken with more grains of the same salt with which they were written.

In brief, this is a splendid collection of outstanding papers on the most challenging and sophisticated contemporary research in marine ecology. It should have a major influence on the direction of research in the next decade. Most important, it should remind fisheries biologists where their fish come from and biological oceanographers that there is a large market for the end product of marine ecosystems. It should not be thought of as a comprehensive text on the ecology