

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 recognition 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

of the seas. (To give only two of many possible examples of omissions, the word "pollution" occurs only once, and there is no mention whatever of mariculture.)

The book concludes with a list of references and four indexes (author, subject, plants and animals, and geographic). There are very few typographical errors, and the editing appears to have been careful.

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Viral Diseases

Slow Virus Infections of the Central Nervous System. Investigational Approaches to Etiology and Pathogenesis of These Diseases. Proceedings of a workshop, Würzburg, Germany, Mar. 1975. VOLKER TER MEULEN and MICHAEL KATZ, Eds. Springer-Verlag, New York, 1977. xii, 258 pp., illus. \$27.50.

Slow viral diseases continue to attract the attention of investigators whose primary concern is either with understanding etiologically obscure diseases of man or with defining unusual host-virus relationships. Over the past five years or so symposiums of variable composition and intent have served as gathering places for the growing number of persons who share these concerns. One such meeting was the workshop that provided the chapters and commentary that make up this slim book. The workshop brought together not only persons actively working on slow viral diseases but also biomedical scientists who were not so engaged. The latter participants were to offer appraisals of current work and to point to possible new directions for future study. And so they did.

The book is divided into four parts. It deals in turn with diseases caused by unconventional viruses (such as scrapie and kuru), diseases caused by conventional viruses (such as progressive multifocal leukoencephalopathy and subacute sclerosing panencephalitis), and multiple sclerosis and concludes with brief critiques of present research approaches.

The book has a somewhat misleading title; it is not a source of detailed information on slow viral diseases of the central nervous system, and much of the information presented in it has been presented elsewhere. In fact, several recent books bearing similar titles offer more complete information than this one does. But the book is not intended to provide detailed information. Rather, it presents

a general account of the diseases that mainly serves as a prelude for what obviously was the real concern of the workshop—the possible viral cause of multiple sclerosis.

Although multiple sclerosis cannot now be defined as a viral disease, it is thought to be a good candidate. Indeed, on the evidence summarized in this book the hypothesis that it is caused by a slow virus appears to be the best new lead for etiologic studies of the disease. The general feeling expressed in the book is one of guarded optimism. If multiple sclerosis is caused by a virus or viruses, demonstrating this causal relation may not be as straightforward as was the case with kuru and Creutzfeldt-Jakob disease. Meanwhile, the viral hypothesis will serve as a rallying point for renewed interest in multiple sclerosis, and, as Cedric Mims states in the concluding chapter, will "generate a great ground swell of research effort and active interest on the part of young people." Such interest should contribute greatly to our understanding of multiple sclerosis, whatever its cause may be.

Much of the real value of the book lies in the commentary of the diverse participants—virologists, geneticists, immunologists, epidemiologists, pathologists, and neurologists—which appears at the ends of chapters and in well-written summaries of question-and-answer sessions. Although such discussions touch on the need for a clearer definition of slow virus infection, the issue was left unresolved.

This attractive, well-prepared account of the workshop in Würzburg contains much information to ponder.

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Books Received

Analysis and Design of Sequential Digital Systems. L. F. Lind and J. C. C. Nelson. Halsted (Wiley), New York, 1977. viii, 146 pp., illus. \$17.

Annual Review of Plant Physiology. Vol. 28. Winslow R. Briggs, Paul B. Green, and Russell L. Jones, Eds. Annual Reviews, Palo Alto, Calif., 1977. x, 616 pp., illus. \$17.

Aspects of Topology. Charles O. Christenson and William L. Voxman. Dekker, New York, 1977. xiv, 518 pp., illus. \$19.75. Monographs and Textbooks in Pure and Applied Mathematics, 39.

B and T Cells in Immune Recognition. F. Loo and G. E. Roelants, Eds. Wiley-Interscience, New York, 1977. xviii, 504 pp., illus. \$41.

Basic Problems in Cross-Cultural Psychology. Papers from a congress, Tilburg, Netherlands, July 1976. Ype H. Poortinga, Ed. Published for the International Association for

Cross-Cultural Psychology by Swets and Zeitlinger, Amsterdam, 1977. viii, 380 pp., illus. Paper, \$18.

The Behavior of Communicating. An Ethological Approach. W. John Smith. Harvard University Press, Cambridge, Mass., 1977. xii, 546 pp., illus. \$20.

Biogeochemistry of a Forested Ecosystem. Gene E. Likens, F. Herbert Bormann, Robert S. Pierce, John S. Eaton, and Noye M. Johnson. Springer-Verlag, New York, 1977. xii, 148 pp., illus. Paper, \$9.80.

Biology of Nematodes. Neil A. Croll and Bernard E. Matthews. Halsted (Wiley), New York, 1977. viii, 202 pp., illus. \$13.75. Tertiary Level Biology.

Bringing Up Children Overseas. A Guide for Families. Sidney Werkman. Basic, New York, 1977. x, 222 pp. \$9.95.

Cane Sugar Handbook. A Manual for Cane Sugar Manufacturers and Their Chemists. George P. Meade and James C. P. Chen. Wiley-Interscience, New York, ed. 10, 1977. xx, 948 pp., illus. \$48.95.

The Cellular Basis of the Immune Response. An Approach to Immunobiology. Edward S. Golub. Sinauer, Sunderland, Mass., 1977. x, 278 pp., illus. Paper, \$8.95.

Chiropractic Health Care. A Conservative Approach to Health Restoration, Maintenance, and Disease Resistance. R. C. Schaffer, Ed. Foundation for Chiropractic Education and Research, Des Moines, Iowa, ed. 2, 1977. viii, 118 pp., illus. Cloth, \$5; paper, \$3.50.

Chronology of Alpine Glacier Stillstands, East-Central Lemhi Range, Idaho. Kenneth M. Knoll. Idaho State University Museum of Natural History, Pocatello, 1977. xiv, 230 pp., illus. Paper, \$8.75.

Cognitive Theory. Vol. 2. Papers from a conference, Bloomington, Ind., Apr. 1975. N. John Castellan, Jr., David B. Pisoni, and George R. Potts, Eds. Erlbaum, Hillsdale, N.J., 1977 (distributor, Halsted [Wiley], New York). x, 342 pp., illus. \$19.95.

Cold Spring Harbor Symposia on Quantitative Biology. Vol. 41, Origins of lymphocyte Diversity. Papers from a symposium, Cold Spring Harbor, N.Y. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1977. Two parts. xxiv + pp. 1-416, illus. + index; and xiv + pp. 417-902, illus. + index. \$60.

Compilation, Critical Evaluation and Distribution of Stellar Data. Proceedings of a colloquium, Strasbourg, France, Aug. 1976. J. Jaschek and G. A. Wilkins, Eds. Reidel, Boston, 1977. xiv, 320 pp., illus. \$36.

Correspondence Principle and Growth of Science. Władysław Krajewski. Reidel, Boston, 1977. xiv, 138 pp. \$19.50. Episteme, vol. 4.

Costs, Risks, and Benefits of Surgery. John P. Bunker, Benjamin A. Barnes, and Frederick Mosteller, Eds. Oxford University Press, New York, 1977. xxvi, 402 pp., illus. \$22.50.

Developmental Psychology. Robert M. Liebert, Rita Wicks Poulos, and Gloria Strauss Marmor. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1977. xviii, 572 pp., illus. \$14.95.

Drug Fate and Metabolism. Methods and Techniques. Vol. 1. Edward R. Garrett and Jean L. Hirtz, Eds. Dekker, New York, 1977. xviii, 314 pp., illus. \$35.

Ecological Succession. Frank B. Golley, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1977 (distributor, Halsted [Wiley], New York). xiv, 376 pp., illus. \$25.

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