the biology of selenium, but these are loaded with information and are well documented. They encompass nutrition, assimilation, metabolism, toxicity, human biology, and therapeutic applications. The chapters are readable and could well serve as a short course in the biology of selenium as well as a convenient guide to the original papers and to older reviews.

Since the chapters in the volume were written, selenium has been identified as an integral part of the enzyme glutathione peroxidase (J. T. Rotruck, A. L. Pope, H. E. Ganther, A. B. Swanson, D. G. Hafeman, W. G. Hoekstra, *Science* **179**, 588 [1973]). This finding has already given research on selenium a new direction, as well as new intensity. Present and future researchers will need to know as much basic chemistry of organoselenium compounds as possible, and that is what this volume is all about.

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Saline Ecosystems

Ecology of Halophytes. Papers from a symposium, Minneapolis, Minn., Aug. 1972. ROBERT J. REIMOLD and WILLIAM H. QUEEN, Eds. Academic Press, New York, 1974. xiv, 606 pp., illus. $19.50.

Most of the potentially arable soil remaining unfarmed in the world is saline to some degree, and water available for its irrigation is also saline. Consequently it has become increasingly important that the ecology and physiology of plants able to tolerate soils containing extraneous salts be better understood and that procedures for better utilization of saline waters for irrigation be devised. Moreover, the difficulties encountered in the utilization of coastal salt marshes have been of sufficient magnitude that many of these areas have not been significantly altered and constitute some of the few remaining pristine ecosystems, inviting the attention of many ecologists. Thus it is timely that the proceedings of this symposium be published.

The book is not offered as a compendium of research from all the diverse fields encompassed by the title, but is rather a collection of papers presented by authors concerned with various aspects of halophyte ecosystems. Many of the papers are comprehensive reviews, and some are reports of current research, but there is little attempt to evaluate current knowledge, generalize, or formulate new concepts. There are, however, numerous instances where need for intensive research is pointed out. The emphasis is mostly on the halophytes of the United States, with only one of the authors being from outside of the country.

This book will be a good introduction to newcomers in halophyte research and a good review for scientists already in the field. There are over 2000 references, and much of the information on halophytes in the United States is brought together for the first time. The topics considered are diverse, and although most of the important disciplines are represented the representation is uneven. Eighty percent of the book is about coastal marshes and mangroves, with only 20 percent dedicated to desert halophytes, perhaps because most of the authors are from the eastern seaboard or gulf coast states.

The book is divided into four parts as follows:

1) A brief introductory overview by V. J. Chapman summarizing ecological literature on halophytes over the past ten years.

2) Halophytes of the United States: Distribution, Ecology, Anatomy and Physiology. The chapters on distribution are primarily extensive reviews of the literature with only brief consideration of community relationships or factors influencing distribution. An exception is the chapter on mangroves (Gerald E. Walsh), which is an excellent and comprehensive ecological survey comparing the mangroves of the world. The two chapters on the physiology of halophytes are also excellent reviews, including some evaluation of available information.

3) Habitat Associations of Halophytes. This portion of the book consists of several brief research reports followed by reviews on the roles of animals in salt marsh ecosystems. These reviews add considerably to the book, broadening the ecological scope to include both vertebrates and invertebrates and their role in the ecosystem.

4) Applied Research Related to Halophytes. What man has done and might do to salt marsh vegetation is considered in chapters on the effects of herbicides, fertilizer, and reclamation of disturbed areas. P. J. Mudie, in an excellent summary, reviews the extent of halophyte habitats, discusses their potential economic value, and proposes several important avenues of research. The final chapter, by E. P. Odum, emphasizes the unique energy relationships of coastal marshes, wherein halophytes expend considerable energy to survive under salt stress but take advantage of tidal irrigation to balance the energy demand.

This book is a valuable reference. Typographical errors, misspelling of simple words and author's names, and the omission of references from bibliographies are too abundant and will be detractive to many readers. An introduction or epilogue summarizing the major problems and principles would have added considerably to the book.

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Cytogenetics

Somatic Cell Hybridization. Proceedings of a conference, Winter Park, Fla., Mar. 1973. RICHARD L. DAVIDSON and FELIX F. DE LA CRUZ, Eds. Raven, New York, 1974. xviii, 296 pp., illus. $19.75.

Of the 33 contributions to this volume 27 are short papers of the sort given at large meetings, two (by Krooth and Ephrussi) are brief commentaries, and four are reviews of moderate length. The reviews deal with the uses of somatic cell hybrids in human gene mapping (Ruddle); in studies of virus-cell interactions, immune functions, and antigenic determinants (Koprowski and Knowles); in studies of the expression of differentiated functions (Davidson); and in the analysis of gene expression and nuclear function in binucleated heterokaryons (Ringertz).

Taken together, the reviews and the experimental papers present practically every type of experiment that has been attempted with somatic cell hybrids. Such experiments fall into two categories: those performed directly on heterokaryons within the first few hours after fusion has occurred, and those performed on the synkaryon hybrids which grow out as clones following the rare event of nuclear fusion. The former type of experiment, which requires direct cytochemical observation, can produce dramatic and unequivocal results —as exemplified by the beautiful experiments on nuclear-cytoplasmic interactions reviewed in this volume by Ringertz. The latter type, in which clones can be grown to any size for genetic and biochemical experimentation, suffers from considerable uncertainties concerning, among other things, the

exact state of the chromosomes that remain after many cell generations. Thus, as we have discussed elsewhere (F. M. Davis and E. A. Adelberg, *Bacteriol. Rev.* **73**, 197 [1973]), experiments on the expression of tissue-specific genes in hybrids have not as yet thrown much light on the mechanisms of differentiation. On the other hand, the ability to make clonal hybrids has opened up the highly successful field of gene mapping—exemplified in this volume by Ruddle's review.

The title of this book is misleading. With the exception of one short paper, there is nothing in the book about hybridization. Rather, it is about the applications of hybrids to the solutions of certain problems. Unfortunately, the number of problems that have been so illuminated is small. Readers of this book will learn a little about the control of the cell cycle and about nuclear inactivation in chick erythrocytes. They will discover that fusion hybrids are useful for revealing the presence of latent viruses and for turning on genes that are normally not expressed (such as the gene for complement C4 in HeLa cells). They will certainly discover the utility of hybrids for gene mapping, particularly in the human genome. Mostly, however, they will find a wealth of data that pertain only to the artifactual systems that fusion hybrids represent and seem to me to have little significance for the normal cell phenomena they were designed to investigate.

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Organic Substances

The Total Synthesis of Natural Products. JOHN APSIMON, Ed. Wiley-Interscience, New York, 1973. Vol. 1, xii, 604 pp., illus. $24.95. Vol. 2, xii, 754 pp., illus. $22.50.

These two volumes (a third is in the offing) through flow charts and text present accounts of total syntheses of natural products that have been devised by chemists mainly during the past 40 years. The classes of natural products that have been selected for inclusion are the more important ones, as the voluminous literature citations that follow each review indicate. Volume 1 deals with syntheses of carbohydrates, prostaglandins, pyrrole pigments, nucleic acids, antibiotics, and oxygen ring compounds. Volume 2 features a more structurally homogeneous format and covers monoterpenes, sesquiterpenes, triterpenes, and aromatic steroids. Volume 3 will include diterpenes and alkaloids. A review of nonaromatic steroid synthesis might also be appropriate for the sake of completeness, although the 1970 review by Akhrem and Titov covers the topic thoroughly.

For the most part the series has been carefully edited. The formulas, an all-important part of synthesis reviews of this sort, have been clearly and carefully drawn. The authors have thoroughly covered the literature, and some have even included unpublished work in their reviews. The flow charts would be considerably more useful if reagents and yields were indicated for the majority of synthetic steps. Some authors show reagents and some note yields, but in no case are both consistently presented. In view of the recent and welcome proliferation of synthetic methodology, the efficiency of a given transformation needs to be considered in an evaluation of the synthesis. Thus reported yields must assume increasing importance in reviews of this type.

When complete this series should constitute the most up-to-date and comprehensive source book on natural product synthesis. It will be of great utility to those practicing or studying the art of synthesis, master and tyro alike. For most topics the flow charts alone can give the reader ideas regarding possible solutions for synthetic problems the reader may be confronted with in his own research. Therein lies much of the value of a series of this nature.

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Books Received

Adult Articular Cartilage. M. A. R. Freeman, Ed. Grune and Stratton, New York, 1974. xiv, 342 pp., illus. $26.

The Alkaline Rocks. H. Sørensen, Ed. Wiley-Interscience, New York, 1974. xii, 622 pp., illus. $49.95.

Alternative Technology and the Politics of Technical Change. David Dickson. Fontana/Collins, London, 1974. 224 pp. Paper, 50p. Technosphere Series.

Analysis of Metallurgical Failures. V. J. Colangelo and F. A. Heiser. Wiley-Interscience, New York, 1974. vi, 362 pp., illus. $19.95. Wiley Series on the Science and Technology of Materials.

Biology, History and Natural Philosophy. Proceedings of a symposium, Denver, Colo., Nov. 1967. Allen D. Brech and Wolfgang Yourgrau, Eds. Plenum, New York, 1974. xiv, 356 pp., illus. Paper, $6.95. Reprint of the 1972 edition.

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Chemistry. Leonard W. Fine. Appleton-Century-Crofts (Prentice-Hall), New York, 1973. xviii, 910 pp., illus. $13.95.

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The Food and People Dilemma. Georg Borgstrom. Duxbury Press, North Scituate, Mass., 1973. xiv, 140 pp., illus. Paper, $3.95. The Man-Environment System in the Late Twentieth Century.

Genetic and Metabolic Eye Disease. Morton F. Goldberg, Ed. Little, Brown, Boston, 1974. xviii, 654 pp., illus. $48.50.