The book is highly recommended to all who are involved in the study of steroidal hormones.

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Plant Bodies

Structure and Function of Chloroplasts. MARTIN GIBBS, Ed. Springer-Verlag, New York, 1972. xvi, 286 pp., illus. $22.60.

The nine articles in this book present fairly comprehensive reviews of current areas of research on chloroplast structure and function. The topics covered are the ultrastructure of plastids, light-induced chloroplast contraction and movement, plastid inheritance and mutations, nucleic acids and information processing in chloroplasts, lipids of chloroplasts, biochemistry of photophosphorylation, carbohydrate metabolism by chloroplasts, and biosynthesis by chloroplasts. In addition there is an introductory article by Robert Hill which is easily one of the best historical overviews of the field of chloroplast structure and function ever published in such a brief and well-written form. Each article is accompanied by an impressive bibliography.

Since each author apparently was charged to be as comprehensive as possible, the articles are a gold mine of tabulated material. This is the sort of book one uses when one wants to know, for instance, the nature of all lipids found in chloroplasts, or the DNA content in grams of the chloroplasts of a particular organism. Indeed, one of the best articles is one, by Woodcock and Bogorad, in which is tabulated for easy reference nearly all the information available on the nucleic acids of chloroplasts as well as ideas about their probable function. Comparison between chloroplast DNA's and those of mitochondria, bacteria, viruses, and higher plant nuclei is presented in well-referenced tables.

Another compendious article is by Goodwin on biosynthesis by chloroplasts. Here, in the encyclopedic style we have come to stand in awe of from this author, is presented a magnificent review of the synthetic prowess of chloroplasts. He presents not merely a description of biosynthetic abilities but a discussion of their control and regulation.

Most of the articles are illustrated, and the reproduction of electron photomicrographs is of high quality.

Photosynthetic functions of chloroplasts are reviewed in an article on photophosphorylation by Avron and one on carbohydrate metabolism by Gibbs. The book does not present a review of what might be termed the "photophysics" of photosynthesis, although electron flow is covered in the article on photophosphorylation. Action spectra for various light reactions in plastids, fluorescence in vivo, delayed fluorescence, and light-capturing pigment systems are among topics not reviewed separately.

There is a good subject index at the back of the text. This volume will be of use to students and researchers in plant physiology, biochemistry, and cellular physiology. It is a marvelous source of information for the teacher seeking a comprehensive review of chloroplasts and would be an excellent beginning reference for the graduate student or researcher who is contemplating work in the field of chloroplast structure and function.

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Cytogenetics

Cytoplasmic Genes and Organelles. RUTH SAGER. Academic Press, New York, 1972. xiv, 406 pp. + plates. $12.50.

My own decision to study cytoplasmic inheritance was made largely because of a review paper written a dozen years ago by Ruth Sager describing her work on cytoplasmic genes in *Chlamydomonas*. It was clear then that she had uncovered some fascinating genetic phenomena although the significance of these phenomena was obscure.

A wealth of information published in the years since has shown that the chloroplasts and mitochondria of eukaryotic cells contain DNA distinct from the nuclear DNA and that these organelles possess unique protein-synthesizing systems as well. Recent work has established that chloroplast and mitochondrial DNA's have limited coding capacities when compared to the DNA of the eukaryote nucleus. It has also been established that the ribosomal RNA's and some, if not all, of the transfer RNA's present in these organelles are gene products of their respective DNA's, but as yet not a single protein has been identified as a product of chloroplast or mitochondrial DNA. It seems likely that if we are to determine what proteins are coded by organelle DNA, it will be necessary to use the classical genetic approach of establishing the primary defects present in mutants residing in these DNA's. Through the study of selected cytoplasmic genetic systems which are probably localized in organelle DNA, it may be possible to ascertain not only what proteins are coded by organelle DNA but also how the genes resident in chloroplasts and mitochondria segregate and recombine.

Sager has been in the thick of the research described, and, although much of the work has been summarized in review articles and symposia, nowhere has it all been brought together recently under the critical eye of a principal investigator in the field. The great virtue of Sager's book is that it does just this and at the same time puts the recent findings in perspective with respect to an extensive older literature dating its beginnings almost to the time of the rediscovery of Mendel's principles.

After a review of what is now known about organelle DNA the book is divided into two sections. The first, Genetic Analysis of Cytoplasmic Systems, deals principally with Sager's own research on the inheritance, segregation, and recombination of cytoplasmic, possibly chloroplast, genes in *Chlamydomonas* and the extensive literature on these same topics with respect to mitochondrial genes in yeast. Cytoplasmic genes affecting mitochondria in *Neurospora* and cytoplasmic genes affecting chloroplasts in higher plants are also considered. Even the less well defined cytoplasmic genetic systems known in fungi and higher plants are also discussed especially with respect to whether they may be related to organelles or not.

The second part of the book, Cytoplasmic Genes and Organelle Biogenesis, reviews in two extensive chapters what we know about the structure of chloroplasts and mitochondria; their protein-synthesizing systems; and what the functions of these protein-synthesizing systems may be.

The only important flaw in the book has to do with the author's discussion of her own work on *Chlamydomonas*. One of the difficulties in writing a book such as this is the great temptation to include one's own unpublished data. Sager has succumbed to this temptation and has presented experiments on the physi-

cal localization of cytoplasmic genes in *Chlamydomonas* as well as recombinational mapping experiments with these genes which have not been published in sufficient detail elsewhere. Many of the generalizations she makes about the *Chlamydomonas* system are open to alternative interpretations and cannot be taken for granted until the data themselves can be analyzed in detailed research papers.

With this exception the book is excellent. It is well illustrated and contains copious references to work both new and old. It also contains a useful appendix describing some of the physical methods used to characterize organelle DNA and a detailed glossary of the terminology used by the present-day "organelle geneticist."

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Phytochemistry

Plant Lipid Biochemistry. The Biochemistry of Fatty Acids and Acyl Lipids with Particular Reference to Higher Plants and Algae. C. HITCHCOCK and B. W. NICHOLS. Academic Press, New York, 1971. xiv, 388 pp., illus. $19. Experimental Botany.

This is the first book on plant lipid biochemistry in the English language. (An earlier book by Mazliak has not been translated from French.) The emphasis in this new volume is on metabolism, and so the book is complementary to that of Hilditch and Williams, *The Chemical Constitution of the Natural Fats.* It has been the intention of the authors to present a book that will permit a reader, by selective reading, to become familiar with research accomplished in a specific area. This purpose is well served since the book has a massive bibliography. However, the work is much more than a compendium of references: each chapter is readable and clear.

The advantage of having cooperating authors, rather than independent contributors, is apparent. Topics from chapter to chapter are well cross-referenced, there is little repetition, and most topics are discussed. (Terpenoids and steroids are not considered.) There is some unevenness in the treatment of topics; for example, the three chapters dealing with fatty acids, their biosynthesis, and their degradation cover almost 150 pages, whereas the corresponding three chapters for glycerolipids cover just over 40. At some points useful comparisons are made between the metabolic pathways in plants and those in bacteria and animals, but again these comparisons are more thorough for fatty acids than for glycerolipids.

The chapters on fatty acids are detailed and documented, reflecting the expertise of the authors. The brief chapters on glycerolipids give thorough literature citations; however, the stereochemical numbering system for these lipids could have been used appropriately, and there is an error in the description of bacterial phospholipid synthesis, where it is stated that phosphatidyl ethanolamine is synthesized by way of cytidine diphosphate ethanolamine. Specialists will undoubtedly find arguable points and even small errors, but taken as a whole the book successfully accomplishes its objective.

At several points in the book subjects for future research are noted, and the last chapter gives a survey of methods applicable to the study of lipids in plants. Thus the book is of value to both the practicing and the potential researcher in this field. At the same time it should be a useful supplement to the resources of the plant biochemist or physiologist who wishes to have a ready summary and bibliography of recent work in plant lipid biochemistry.

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Books Received

The Acceleration of History. Gerard Piel. Knopf, New York, 1972. x, 370 pp. $8.95.

Adrenal Steroids and Disease. Cuthbert L. Cope. Lippincott, Philadelphia, ed. 2, 1972. xii, 884 pp., illus. $32.

The Biological Bases of Behaviour. Neil Chalmers, Roberta Crawley and Steven P. R. Rose, and Judy Hicklin, Eds. Published for the Open University Press by Harper and Row, New York, 1972. 318 pp., illus. Paper, $6.95.

Biological Science. William T. Keeton. Illustrated by Paula Di Santo Bensadoun. Norton, New York, ed. 2, 1972. xvi, 888 pp. $11.75.

Cytochromes. Current Research I. Papers by Yoshiyuki Ichikawa, Toshio Yamano, Richard Di Augustine, James Fouts, *et al.* MSS Information Corp., New York, 1972. 244 pp., illus. $15.

The Desert World. David F. Costello. Crowell, New York, 1972. viii, 264 pp., illus. $7.95.

Design of On-Line Computer Systems. Edward Yourdon. Prentice-Hall, Englewood Cliffs, N.J., 1972. xvi, 608 pp., illus. $16.

The Electronic Structure of Atoms and Molecules. A Survey of Rigorous Quantum Mechanical Results. Henry F. Schaefer III. Addison-Wesley, Reading, Mass., 1972. x, 438 pp., illus. $7.95.

The Evolution of Primate Behavior. Alison Jolly. Macmillan, New York, 1972. xiv, 398 pp., illus. Paper, $4.25. Macmillan Series in Physical Anthropology.

Feeding the World of the Future. Hal Hellman. Evans, New York, 1972 (distributed by Lippincott, Philadelphia). 224 pp., illus. $4.95.

Fiber Optics. M. P. Lisitsa, L. I. Berezhinskii, and M. Ya. Valakh. Translated from the Russian edition (Kiev, 1968). Israel Program for Scientific Translations, New York). viii, 272 pp., illus. $20.

Government Regulation of the Computer Industry. Bruce Gilchrist and Milton R. Wessel. American Federation of Information Processing Societies Press, Montvale, N.J., 1972. x, 248 pp. $12.50.

Handbook of Neurochemistry. Vol. 7, Pathological Chemistry of the Nervous System. Abel Lajtha, Ed. Plenum, New York, 1972. xxiv, 676 pp., illus. $35.

Heat Transfer. F. J. Bayley, J. M. Owen, and A. B. Turner. Barnes and Noble, New York, 1972. xvi, 438 pp., illus. $16.50. Applications of Mathematics Series.

Inhibition and Learning. A conference, Sussex, England, Apr. 1971. R. A. Boakes and M. S. Halliday, Eds. Academic Press, New York, 1972. xvi, 568 pp., illus. $22.50.

Insulin Action. Proceedings of a symposium, Toronto, Oct. 1971. Irving B. Fritz, Ed. Academic Press, New York, 1972. xx, 610 pp., illus. $17.50.

Kirk-Othmer Encyclopedia of Chemical Technology. Index to volumes 1–22 and Supplement. Herman F. Mark, John J. McKetta, Jr., Donald F. Othmer, and Anthony Standen, Eds. Interscience (Wiley), New York, ed. 2, 1972. lvi, 418 pp. $50; by subscription, $40.

Man into Superman. The Startling Potential of Human Evolution—and How to be Part of It. R. C. W. Ettinger. St. Martin, New York, 1972. viii, 312 pp. $8.95.

Methods of Modern Mathematical Physics. 1: Functional Analysis. Michael Reed and Barry Simon. Academic Press, New York, 1972. xviii, 326 pp., illus. $12.50.

Molecular Reactions and Photochemistry. Charles H. DePuy and Orville Y. Chapman. Prentice-Hall, Englewood Cliffs, N.J., 1972. x, 150 pp., illus. Cloth, $10.95; paper, $5.95. Prentice-Hall Foundations of Modern Organic Chemistry Series.

Molecular Studies on Halogenated Deoxynucleosides. Papers by C. C. Huang, John Coleman, Annette Coleman, Elizabeth Hartline, Robert Lasher, Robert Cahn, *et al.* MSS Information Corp., New York, 1972. 256 pp., illus. $15.

The Moscow Puzzles. 359 Mathematical Recreations. Boris A. Kordemsky. Martin Gardner, Ed. Scribner, New York, 1972. x, 310 pp., illus. $10.

The New Guide to the Planets. Patrick