

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

D. R. IDLER

Marine Sciences Research Laboratory,  
Memorial University of Newfoundland,  
St. John's

## 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.

HARVARD LYMAN

Division of Biological Sciences,  
State University of New York,  
Stony Brook

## 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-