Cellular Organelles

Chloroplasts. J. KENNETH HOOBER. Plenum, New York, 1984. xii, 280 pp, illus. $42.50; paper, $19.95. Cellular Organelles.

The realization that the "semi-autonomous" organelles of eukaryotic cells, mitochondria and chloroplasts, possess unique, almost bizarre molecular regulatory systems and that they play more than an energy-generating role has led to a blossoming of research on the physiology, genetics, and development of organelles. Conferences are devoted to organelles; societies are formed to plumb their intricacies. Inevitably the outpouring of literature has led some intrepid souls to attempt to summarize and review the field. Chloroplasts have been superbly treated in the encyclopedic work of Kirk and Tilney-Bassett, *The Plastids*, which, although several years old, remains the major monograph on these organelles. Mitochondria are treated in a group of books, mostly conference proceedings and an excellent book by Tedeschi. Now textbooks are beginning to appear.

A series by Plenum, Cellular Organelles, began auspiciously with Tzagoloff's *Mitochondria* and now is equally well served by Hoober's *Chloroplasts*. Inevitably this book will be compared to Halliwell's *Chloroplast Metabolism* and Prebble's *Mitochondria, Chloroplasts and Bacterial Membranes*. Hoober's book is more detailed and more comprehensive than the other two. It is first and foremost a textbook designed to introduce the advanced student familiar with cell biology, biochemistry, and genetics to this unique, energy-generating organelle, but it has some of the characteristics of a monograph in that Hoober places emphasis on aspects of chloroplast biology that appeal to him. For instance, a large amount of the experimental detail discussed in the book is drawn from work on *Chlamydomonas*, an organism dear to the author's heart. Fortunately the bulk of the work is balanced enough that a student can get a sense of the diversity of chloroplasts.

Chloroplast research presents an interesting problem. Those studying mitochondria can figuratively (some results suggest literally) work "in the dark," but chloroplast investigators must appreciate the many ways other than photosynthesis in which light mediates and modulates reactions within the cell. Almost every aspect of chloroplast development is light-sensitive in a variety of higher plants and some algae. Transcription, translation, and post-translational events involved in chloroplast synthesis as well as the interplay between nuclear and chloroplast genome are regulated to some extent by light. Often the investigator must attempt to determine the link between the light-absorbing molecule and the ultimate molecular event. This problem is, unfortunately, rarely addressed in textbooks. Hoober does attempt to give insight into the matter and his sections on photoregulation, although brief, at least bring up the subject.

The book's nine chapters contain a brief historical survey, a solid description of photosynthesis, discussions of biochemical and genetic aspects of structure, function, and development, and finally a discussion of the evolutionary aspects of chloroplast development. The photographs and micrographs are very good, the figures and tables clear and straightforward. The text is detailed enough that a working scientist interested in chloroplasts would find the book valuable as an introduction; advanced undergraduates and beginning graduate students will find it a gold mine.

HARVARD LYMAN
Division of Biological Sciences, State University of New York, Stony Brook 11794

Extracellular Matrix

Extracellular Matrix Biochemistry. KARL A. PIEZ and A. H. REDDI, Eds. Elsevier, New York, 1984. xx, 473 pp., illus. $60.

The Role of Extracellular Matrix in Development. ROBERT L. TRELSTAD, Ed. Liss, New York, 1984. xviii, 643 pp., illus. $76. From a symposium, Irvine, Calif., June 1983.

The papers in these two volumes discuss much of the current research on extracellular matrix. One of the volumes is a general treatise and the other is the proceedings of a symposium. The Piez and Reddi volume primarily attempts to paint a large picture, minimizing details and allowing for individuality in the styles of the contributing authors. It is clearly written, well illustrated, and up to date. The book contains 11 chapters, six of them dealing with aspects of collagen biology, chemistry, and pathology.

The book begins with a chapter by Piez in which the molecular structure of collagen is defined, some of its properties are described, and some related proteins are noted. A large part of the chapter is devoted to an analysis of the ways in which collagen molecules can polymerize, including contemporary models of three-dimensional structure. A chapter by Miller is a compendium of the detailed structures of the most well-characterized collagens; the chapter contains an analysis of the homology of these structures and some speculations concerning their evolutionary implications.

Chapters by Kivirikko and Myllylä on the biosynthesis of the collagens and by Woolley on mammalian collagenases delineate unknown territory particularly well and present balanced views of the literature. The illustrations and tables in Woolley's chapter are skillfully woven into the text and prove extremely helpful in highlighting many of the author's points.

A chapter by Timpl on the immunology of the collagens contains a general discussion of protein antigenicity followed by a more detailed discussion of collagen as an immunogen. The author draws heavily upon his own research contributions and those of his collaborators. The illustrations are particularly helpful.

A lucid discussion of elastin by Gosline and Rosenbloom is especially successful in its treatment of mechanochemistry. The chapter integrates the chemical and physical aspects of the subject well.

A chapter by Hakomori *et al.* on fibronectin and related extracellular glycoproteins is a refreshing treatment of a subject that has received enormous attention in recent years. Broad biological concepts are presented in a wealth of well-illustrated detail, with an even-handed view of the literature. The tables alone will serve as an important source of information for students.

A discussion of the structure and metabolism of proteoglycans by Heinegård and Paulsson clarifies a subject that is rather complex because of the extreme variability of proteoglycan structure. The range of such variability was noted by early workers in the field, but its exquisite detail is only now being unveiled. This subject is central to the chapter. Though the illustrations are vital for comprehension of the text, they often contain an excess of detail, which is distracting. One certainly develops an appreciation of the major questions that abound in this field; it will be fascinating to read a similar chapter several years from now.

Bones and teeth are analyzed by Veis on the basis of both a reworking of earlier data and an integration of recent studies. The chapter contains well-se-

lected illustrations and tables and provides a fresh look at a complex biological problem.

The relationships of extracellular matrix to development is the theme of a chapter by Reddi that briefly recapitulates the history of the subject and its model systems. Some of this material is more thoroughly covered in earlier chapters, and the remainder is more of an informational survey than an incisive analysis.

The book ends with a discussion of genetic and acquired disorders of collagen deposition by Krane. The study of genetic disorders is progressing rapidly, and the chapter does not cover some recent insights. Nevertheless, Krane's commentary and analysis should serve as important guides for investigators.

In summary, the Piez and Reddi book is an important addition to the literature on extracellular matrix. It can be recommended to neophytes and to experts.

The contributions to the volume edited by Trelstad consist mainly of brief reviews, many of them old hat, all written by major figures. There is overlap with the Piez and Reddi volume in the treatment of collagen, fibronectin, and proteoglycans. The most exciting parts of this volume are those devoted primarily to new information; of note are a chapter describing anchorins and a chapter on the analysis of basal laminae by the use of monoclonal antibodies.

Anchorins are defined by von der Mark and associates as a class of membrane proteins involved in cell-matrix interactions. One of these proteins, found on rat myoblasts, seems analogous to that described as a laminin receptor on other cells. Interestingly, the myoblast protein, when solubilized in detergent, showed low affinity and limited specificity for laminin, but these properties were significantly improved upon insertion of the receptor into liposomes. Similar results were found by this group when a collagen-binding protein was isolated from chondrocytes. Both receptor proteins, which differ in size, were purified to homogeneity and antisera were then raised against them. Immunolocalization studies showed that the receptors were present on cell surfaces. Such definitive studies usher in a new era for the investigation of cell-matrix interactions.

Linsenmayer, Fitch, and Mayne have used monoclonal antibodies to map type IV collagen domains, to examine the immunoreactivity of type IV collagen in situ and during development, and to describe basal lamina heterogeneity revealed by monoclonal antibodies directed against both type IV collagen and lens capsule. A crisp, incisive interpretation of the data, clearly noting their limitations, is provided by the authors. A major point of the interpretation is that some basal lamina show immunologic constancy whereas others manifest great diversity and the difference must reflect differences in matrix composition or assembly.

One predominant theme in the book is that there are many types of interactions between cells and matrix and that virtually all of the known matrix molecules participate in such relationships, especially during development. Furthermore, the studies describing regeneration of the neuromuscular junction predict that biologically active components of the matrix, of unknown nature, are vital in such regeneration.

Though this compendium will be of value to some developmental biologists as a reference, I do not believe it is an important addition to most bookshelves.

MARVIN L. TANZER
Department of Biochemistry,
University of Connecticut
Health Center, Farmington 06032

Mistletoes

The Biology of Mistletoes. MALCOLM CALDER and PETER BERNHARDT, Eds. Academic Press, Orlando, Fla., 1983. xiv, 348 pp., illus. $49.

Ideas concerning the systematics of those groups of plants that in Anglo-Saxon countries are referred to as mistletoes have changed considerably in the last couple of decades. No longer is the term equated with a single family, Loranthaceae; instead (depending on who is being consulted), there are two to four families involved, with perhaps a couple of genera from Santalaceae thrown in. Such changing and diverging attitudes are a reflection of a great deal of recent scientific attention paid to these unusual plants. Thus Calder and Bernhardt's *The Biology of Mistletoes* is timely in drawing the attention of the botanical world to past and current work in at least the two largest families, Loranthaceae s.s. and Viscaceae. It is unfortunate, however, that virtually no reference is made to Misodendraceae; similarly, the other purely American family, Eremolepidaceae, receives no attention except for a brief discussion of its systematic status.

The 17 chapters present a great variety of topics, including biogeography, embryology, fruit and floral biology, and various aspects of physiology. The contributions are a little uneven in the sense that some represent very recent work whereas others could have been (or were) written 20 years ago with essentially the same content and conclusions. In the first category are the various Australian contributions, among which Barlow's integration of mistletoe systematics with plate tectonics especially merits attention. In the second category are the two chapters on embryology, which are very much of the *déjà vu* type; among other things, the tiresome subject of the "*Psittacanthus*" *cuneifolius* endosperm, the existence of which has led to doubts concerning the lack of endosperm as a generic character, is once again raised, notwithstanding published evidence showing the species to be quite unrelated to *Psittacanthus*. In fact, there are such failings in several chapters: factual and interpretative errors that could have been largely eliminated by more stringent editing.

A great deal of attention is paid to issues involving species from Australia, an emphasis that, I think, is justified because of active work there in the last decade and that will counter the opposite bias of older literature.

The book should be successful in stimulating further interest in these unusual plants. The authors and editors must feel frustrated by the lax advertising; the only announcement I have seen arrived some months after the book's appearance.

JOB KUIJT
Department of Biology,
University of Lethbridge,
Lethbridge, Alberta T1K 3M4, Canada

Books Received

Advances in Petroleum Geochemistry. Vol. 1. Jim Brooks and Dietrich Welte, Eds. Academic Press, Orlando, Fla., 1984. x, 344 pp., illus. $49.50.

AIDS. A Basic Guide for Clinicians. Peter Ebbesen, Robert J. Biggar, and Mads Melby, Eds. Munksgaard, Copenhagen, 1984. 313 pp., illus. $40.

Analysis of Foods and Beverages. Modern Techniques. George Charalambous, Ed. Academic Press, Orlando, Fla., 1984. xviii, 654 pp., illus. $82.

The Analysis of Time Series. An Introduction. C. Chatfield. 3rd ed. Chapman and Hall, London, 1984 (U.S. distributor, Methuen, New York). xiv, 286 pp. Paper, $17.95.

Annual Review of Astronomy and Astrophysics. Vol. 22. Geoffrey Burbidge, David Layzer, and John G. Phillips, Eds. Annual Reviews, Palo Alto, Calif., 1984. x, 635 pp., illus. $44.

Annual Review of Phytopathology. Vol. 22. Raymond G. Grogan, George A. Zentmyer, and Ellis B. Cowling, Eds. Annual Reviews, Palo Alto, Calif., 1984. xii, 487 pp., illus. $27.

Applications of Picosecond Spectroscopy to Chemistry. Kenneth B. Eisenthal, Ed. Reidel, Boston, 1984 (distributor, Kluwer Boston, Hingham, Mass.). xii, 363 pp., illus. $59. NATO ASI Series C, vol. 127. From a workshop, Acquafredda di Maratea, Italy, June 1983.

Asian Marine Biology 1. The Marine Biological Association of Hong Kong. Hong Kong University Press, Hong Kong, 1984. xvi, 175 pp., illus. Paper, $20.

Aspects Psychosociaux de la Dépression en Sortir?