II. Biosynthesis of Chloroplast Components: Chloroplasts (16) Lipids and Proteins (23)
III. Development of Photochemical Activity, Growth of the Photosynthetic Unit and the Structure–Function Relationship (24)
IV. Chloroplast Genetics and Information Processing (27)
V. Control of Chloroplast Development (15)

Sections I and III are not logically separated, and their contents show the interdependence of studies on mature and developing material.

Although three disciplines are represented – the studies of photosynthetic mechanism, genetics and plant physiology – there is an even gradation between them in the papers presented. The 'structural' papers are concerned with the three or perhaps four protein chlorophyll complexes (see, e.g., Boardman and Anderson) and their assembly into the particles visible in electron microscopy (e.g., Miller; Steinback et al.) and the biosynthesis of their component chlorophyll and protein is attacked both by biochemical and applied-genetics methods. Section IV provides a timely continuation to such previous conference proceedings as, Genetics and Biogenesis of Chloroplasts and Mitochondria (1976) edited by Th. Bücher et al. (Elsevier/North-Holland, Amsterdam). The biochemical approach leads to section V in which explanations are sought on the basis of the physiological control of biosynthesis by red light (via phytochrome?), blue light (via protochlorophyllide and flavins?) and hormones (cytokinins and abscissic acid).

The relationship of cytoplasm/nucleus and the chloroplast, (e.g., Ellis and Barraclough; Feierabend) and the active and passive roles of the organelle's envelope (e.g., Douce and Joyard; Leong and Schweiger) are stressed by several workers.

The editors are to be congratulated for their organisation and prompt publication of the material. The publishers have produced an attractive volume, unavoidably in typescript, with excellent clarity in the photographic plates. There is an author index, but no list of participants and their addresses.

This is a valuable collection for workers in a wide field of biochemistry, plant science and organelle-genetics. The series, Developments in Plant Biology, includes one other title, Plant Mitochondria (1978) edited by G. Ducet and C. Lance.

R. P. F. Gregory

Plant Mitochondria

Developments in Plant Biology: Volume 1

Edited by G. Ducet and C. Lance
Elsevier/North-Holland Biomedical Press; Amsterdam, New York, 1978
xxiv + 454 pages. $60.00, Dfl 135.00

In an excellent introductory chapter one of the editors (C. Lance) outlines the 'nearly thirty years of experimental plant mitochondriology'. He considers that the birth occurred upon the publication of Millerd, Bonner, Axelrod and Bandurski's paper in 1951, showing that the oxidative enzymes of plant cytoplasmic particles are associated with mitochondria. Since then over 2000 papers have been published on isolated plant mitochondria. In fact the title of this symposium would have been more accurate as 'The Bioenergetics of Higher Plant Mitochondria' since this is where the main emphasis is centred. Lance shows that over the last decade there has been a decreasing emphasis on higher plant mitochondria (now representing about half of the published papers) towards studies on mitochondria from yeasts and fungi. The isolation techniques for obtaining good mitochondria from these latter organisms was only developed in the mid-sixties – a field the reviewer was involved in while working with *Neurospora*.

This well-produced and rapidly-published symposium volume (within 5 months of the meeting) gives

a very good view of the current research around the world on the enzymology and bioenergetics of plant mitochondria and the characteristics of cyanide-insensitive respiration in mitochondria from plants, yeasts and fungi. It does not cover any aspects of DNA/RNA/protein synthesis/biogenesis in mitochondria. The section on physiological aspects is interesting since it shows the wide range of organisms and tissues and cells where mitochondrial activity play a crucial role, e.g., photorespiration in leaves, fruit and tuber storage, maize mutants susceptible to *Helminthosporium* attack, seed germination, suspension cultures of plant cells, root tissues.

The overall impression is a broad experimental approach to basic and applied research in the field of plant (not only higher) mitochondria. Now that techniques are available for isolating intact, functional mitochondria from a wide variety of plants and tissues (e.g., leaf mitochondria can now be obtained free of chloroplast contamination) and that plant mitochondriacs have a host of experimental devices available to them (and not only to animal mitochondriacs) we can look forward to them solving the biochemical and physiological properties of plant mitochondria soon!

D. O. Hall

Organelle Heredity

by Nicholas W. Gillham
Raven Press; New York, 1978
602 pages. $64.35

Recent years have seen a great increase in our understanding of the mechanism of biogenesis of mitochondria and chloroplasts; in particular the discovery of mitochondrial and chloroplastal DNA has resulted in the development of a new technology with its own language, esoteric terms and mysterious practices – the technology of organelle genetics. Gillham's book is a most timely addition to the literature on the subject because it brings together in one volume (albeit a rather bulky one) the theory and practice of research on mitochondrial genetics in yeast, *Neurospora* and *Paramecium* and of chloroplast inheritance in *Chlamydomonas, Euglena* and higher plants (e.g., *Nicotiana*). Thus the major cell types that have been used for the study of organelle genetics are considered in full detail.

In addition to the accounts of the genetics of these systems, the book includes a useful introductory section on the structure and function of chloroplasts and mitochondria and of their replicative systems. At the end of the book there is an equally useful section on the biogenesis of chloroplasts and mitochondria. The text is richly illustrated with high quality diagrams and electron micrographs and there is an extensive bibliography at the end of each chapter. The author states that the book '. . . is designed for advanced undergraduates, graduate students, and the general biologist and geneticist interested in the biogenesis of chloroplasts and mitochondria' and the text is perfectly suited to this aim (perhaps with the proviso that the 'advanced' undergraduate would have to be 'hyper-advanced' to cope with some of the detail).

As one turns the pages of 'Organelle Heredity' it is difficult to escape a feeling of awe at the pace and depth of discovery that is now taking place. It is clear that new sorts of problems are being tackled – problems of supramolecular organization, of migration of membrane components from their site of biosynthesis to their final resting places, of complex interactions between genetic systems and of control processes that are more sophisticated than the relatively 'simple' systems involved in the biosynthesis of individual enzymes. Gillham's book guides us in a most erudite manner through these exciting developments and should be a useful source book for several years to come.

D. B. Roodyn