of animals, or whether the germ line contains a relatively small number of genes coding for variable regions (V) of Ig and somatic mutational events (during ontogeny, or the life of the animal) account for the observed Ig diversity. This has been the centre of much controversy, and since no final proof is available, there is opportunity for continued debate.

This nicely produced volume contains an excellent collection of articles by 12 contributors. I found it very pleasant and amusing reading; it provides an opportunity for newcomers and immunological research workers, interested in this field without active participation, to catch up on the viewpoints of several investigators. The articles are short and cover many different experimental and theoretical approaches, with hardly any overlap, and also provide a most useful list of references. The discussions include, for example: analysis of sequence data and inherited idiotypes; clonal variants of plasma cells, (where no variation in the variable region has been detected so far); high frequency changes in plaque morphology of committed cells after division (but no convincing evidence that plaque morphology must reflect structural changes in antibody molecules); the learning of self and non-self discrimination; DNA–RNA hybridisation data; the terminal deoxynucleotidyl transferase (found so far only in T-cells) as a possible generator of diversity; antibody characterisation in isogenic tadpoles. Some articles are very scholarly, others represent an imaginative interpretation of selected observations.

Several contributors still favour a germ line theory without somatic variability. On the other hand, the best DNA–RNA hybridisation data would indicate a small number of V-region genes for K- and λ-chains of mouse and not a sufficient number to account for the known diversity of these light chains.

B. A. Askonas

Genetics and Biogenesis of Chloroplasts and Mitochondria

Edited by Th. Bücher, W. Neupert, W. Sebald and S. Werner
North-Holland; Amsterdam, 1976
xiii + 895 pages. $ 71.50, Dfl 175.000

This massive volume is essentially 892 pages of short communications. These were given at the conference on mitochondria and chloroplasts held in August, 1976, at Munich. The book will certainly be of value to those laboratories actively engaged in the field, since it summarises the current state of the field but it is likely to be of little interest to the general reader. There are 125 individual communications so that each communication is necessarily brief and often intelligible only to the specialist. The areas covered are

(1) Role of chloroplasts and nuclear genes in production of chloroplast proteins.
(2) Control of formation and assembly of chloroplast constituents.
(3) Mitochondrial ATPase complex.
(4) Mitochondrial respiratory complexes.
(5) Chloroplast DNA.
(6) Mitochondrial DNA.
(7) Transcription and translation apparatus of chloroplasts.
(8) Transcription and translation apparatus of mitochondria.
(9) Mitochondrial biogenesis.

The coverage of this book is so extensive and specialised that only a few general remarks need to be made on the trends of research in the field. It is clear that over the last few years considerable emphasis has been placed on genetic analysis of yeast mitochondria. This has been greatly aided by the ready availability of restriction endonucleases. These enzymes have been used also to prepare extensive physical maps of both chloroplast and mitochondrial DNA. There is obviously close integration of nuclear

and cytoplasmic DNA synthesis but the mechanism of control is still mysterious. It was postulated some considerable time back that both chloroplasts and mitochondria were closely related to the prokaryotes. Several contributions to this symposium go towards confirming this view. It remains something of a mystery, however, why it should be necessary for eukaryotes to maintain a small number of genes in these cytoplasmic organelles. The debt which the nucleus pays towards the maintenance of this DNA is very considerable indeed, and something of the order of at least 100 nuclear genes are required to support protein synthesis in chloroplasts or mitochondria. There must be considerable biological advantage in the maintenance of cytoplasmic genes for this debt to the worth while and much remains to be learned about the symbiotic relationship between cytoplasmic and nuclear genes.

Considerable progress has been made in the characterisation of the various types of transfer RNA found in chloroplasts and mitochondria. It is now clear that many of the unique types of tRNA found in cytoplasmic organelles are coded by cytoplasmic DNA. It is clear also, however, that some types of tRNA found in mitochondria of tetrahymena are nuclear in origin and that RNA must therefore be capable of penetrating from cytoplasm into mitochondria. It may be that mitochondria will yet provide one of the most profitable approaches to understanding of control mechanisms in eukaryotes.

T. S. Work

Biochemical Toxicology of Environmental Agents

by A. De Bruin
Elsevier; Amsterdam, 1977
x + 1544 pages. $ 130.75, Dfl 320

Not too long ago toxicology was considered a branch of forensic medicine. The publication of this book shows the changes that have occurred with the increasing complexity of knowledge in the biochemical field. The rapid increase in information has been due to the development of new analytical techniques for chemicals and their metabolites, and also to the development of molecular biology. Thus, it is becoming possible to provide exact information about the metabolism of foreign chemicals in vivo and also to identify the sites on macromolecules or membranes to which they become attached. A slower process is the synthesis of this information with the detail of biological responses to produce concepts of mechanisms of toxicity. This book illustrates how much easier it is for scientists to produce information than it is to provide a convincing theory how a substance brings about a particular clinical condition (or even at a lower level of biological complexity a change in a function of an organ).

My first reaction to receipt of this book was one of astonishment and admiration; that any one man could assemble a book of such a size and yet be so up-to-date. It would seem almost churlish to criticise it at all, taking into account the magnitude of the task. The book covers most chemicals to which man might be exposed either at work or in the general environment. There is no doubt that it will provide a valuable source book in the field. According to the Preface some 13 000 references are cited.

The arrangement of the book varies. Sometimes the emphasis is on the chemical or class of chemical, sometimes on a particular biological response produced by chemicals and sometimes on an aspect of biochemistry. This makes it difficult to find a way around the book. It would have been useful to include in the Contents page the main subtitles of the Chapters. These are informative and many are not in the index.

It is obvious that biochemical toxicology embraces