

## Book Reviews

### Primary and Secondary Metabolism of Plants and Plant Cell Cultures III

J. Schripsema and R. Verpoorte (eds). Kluwer Academic Publishers Group, Dordrecht. 1995. ix+274 pp. Hardback, Dfl. 220.00; US\$154.00; UK£90.00. ISBN 0-7923-3363-2.

Plant tissue culture may be used for various purposes. At present, major commercial applications comprise propagation ('micropropagation'), various biotechnological breeding techniques (in particular, genetic engineering and induction of haploids) and freeing plants of diseases ('meristem culture'). A fourth application is the production of chemicals by cell and organ cultures. This application was very promising some 10 to 15 years ago, but many stumbling blocks occurred and commercial application is still very limited. The major problem is the very low productivity of the cultures. The book under review contains the proceedings from the third workshop on 'Primary and Secondary Metabolism of Plants and Plant Cell Cultures'. It is a reprint of two special issues of the journal *Plant Cell Tissue and Organ Culture*. Previous workshops were in 1984 and 1988. The third workshop shows well how focus has shifted to solve the problems. Now many studies deal with genes and molecular biology in addition to culture techniques and biochemistry. The book does not contain reviews, but the 32 contributions give a good overview of the present state in the field.

G.J. DE KLERK

### Molecular Processes of Photosynthesis (Advances in Molecular and Cell Biology, Volume 10)

J. Barber and E. Edward Bittar (eds). Jai Press, London. 1995. ix+437 pp. Hardback, UK£62.50. ISBN 1-55938-710-6.

*Molecular Processes of Photosynthesis* is an excellent new edition in the well-known series *Advances in Molecular and Cell Biology*. Guest editor Jim Barber has done first-rate work in compiling this updated volume from first-rate review papers, written by front-line researchers in the various specialisms. There is already a vast scale of literature on photosynthesis, but progress is rapid and many new insights were generated in the last few years, especially by the spectacular advances made by molecular genetic approaches within this field. Therefore, this new book is a welcome and justified expansion of photosynthesis literature. A particularly positive aspect is the focus on physiological and ecological significance of the discussed molecular processes and

structures, and their dynamic properties. This book will be of interest not only for the specialists, but also for experimental plant researchers with a broad interest in physiology, molecular genetics and environmental studies.

Professor Barber has carefully selected the topics from the many new and important developments in photosynthesis research. In the first chapter Bertil Andersson and Jim Barber set the scene for the rest of the book with an excellent review on the 'Composition, Organization, and Dynamics of Thylakoid Membranes'. Special attention is given to the adaptive strategies inherent in thylakoid protein and membrane organization. Many previously puzzling features of lateral protein segregation now seem to be brought into place. The second chapter by Philip Thornber, Richard Cogdell and colleagues focuses on the Antenna Pigment-Protein Complexes of Higher Plants and Purple Bacteria, a field in which tremendous progress has been made over recent years. In line with this review, the next chapter by Alexander Glazer deals with the 'Adaptive Variations in Phycobilisome Structure', the special light-harvesting machinery of cyanobacteria (blue-green algae) and red algae. Photosystem II of chloroplasts is highly sensitive to light-induced damage by toxic forms of oxygen that are formed as a result of its water-splitting activity and which represents a stress condition with large physiological and ecological consequences. Fred Chow covers this subject in a chapter on 'Photoprotection and Photoinhibitory Damage'. Eiji Takashi and Colin Wraight give an overview of the 'Molecular Genetic Manipulation and Characterization of Mutant Photosynthetic Reaction Centers from Purple Nonsulfur Bacteria', a research area which was enormously stimulated by the resolution of the RC protein three-dimensional structure by Michel, Deisenhofer and Huber (Nobel Prize 1988). New and exciting information on the 'Protein-Translocating NAD(P)H Transhydrogenase and NADH Dehydrogenase in Photosynthetic Membranes' is reviewed by Baz Jackson and Alastair McEwan, important (and often ignored) systems that may control removal of xenobiotics and free radicals and regulate the protonmotive force and the overflow of reducing equivalents. Steven Gutteridge and Tomas Lundqvist give a fine update of the 'Structural Elements Involved in the Assembly and Mechanism of Action of Rubisco'. Bob Buchanan gives a state-of-the-art review on 'The Ferredoxin-Thioredoxin System: Update of its Role in the Regulation of Oxygenic Photosynthesis'. Anthony Gatenby and coworkers review the hot topic of the molecular chaperones in their paper 'Identification, Cellular Organization,

and Participation of Chaperonins in Protein Folding'. Finally, Barry Bruce and Kenneth Keegstra deal with the targeting of proteins in their review on 'Translocation of Proteins across Chloroplast Membranes'.

RUUD KRAAYENHOF

### Essential Genetics

Daniel L. Hartl. Jones and Bartlett Publishers, Inc., Sudbury, Ma. 1995. xxi+458 pp. Paperback, UK£17.95. ISBN 0-86720-883-X.

Genetics remains a fascinating and rapidly advancing field of biology and medicine; no wonder that new textbooks appear regularly for undergraduate students. The teacher has a great deal of choice and hopes that revised editions will follow. Going through Hartl's book, I think it is worth recommending to students and research workers specializing in genetics. I feel that it has been written by an instructor who has met with difficulties in teaching this complex field. The text is presented simply and clearly and is balanced well by the figures, tables and examples of organisms. Some features make the book, as the author writes, 'user friendly'. Each chapter begins with about four keywords and some sentences emphasizing the themes and ends with a helpful list of statements, key terms (also defined in a glossary), suggested reading (in particular textbooks and *Scientific American* articles), with problems with a guide to solving (and with answers). The themes are well-distributed in a logical order over 14 chapters and defined by subtitles and messages. The book has few pages (458) and so is lighter than many other genetic textbooks.

The first chapter begins with an overview of genetics. It focuses on the integration of Mendelian,

molecular and evolutionary genetics and DNA as the genetic substance. The following four chapters deal with transmission genetics: Mendel's laws, the chromosomal basis of heredity, gene linkage and chromosome mapping and chromosome number variation and structure. The figures illustrating crossing-over are extremely clear, because chromosomes are drawn instead of solid rods. Chapters 6–12 cover the genetics of bacteria and viruses, gene expression, genetic engineering and genome analysis, regulation of gene activity, genetic control of development and mutation. Although most of the fundamental facts of molecular genetics have been obtained with prokaryotes, examples of higher organisms are taken into account where possible. The use of recombinant DNA technology is illustrated with mice (injection of stem cells), plants (*Agrobacterium*) and human (gene therapy). The chapter on developmental genetics of animals and plants (*Arabidopsis*) provides the reader with well-documented basic information about this rapidly evolving subject (three Nobel Prize-winners last year). The remainder of the book concentrates on population genetics and evolution and the genetics of complex multifactorial traits, avoiding complex statistics.

A few mistakes have crept into the presentation, such as typing errors, misprints (Table 6.1) or artwork (Fig. 3.2, nucleolus not attached to chromosome). Compressing the text has led to omissions (centrioles, cytoplasmic inheritance). However, these mistakes are of minor importance and can be corrected easily in a new edition. I enjoyed reading this book and botanists must surely be attracted by the cover page, which shows the influence of transposable elements on a flowering morning glory (*Ipomoea*).

L.P. PIJNACKER