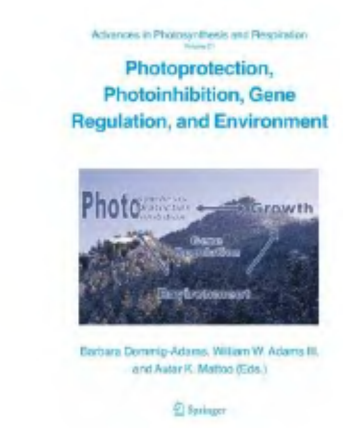

Photoprotection, Photoinhibition, Gene Regulation and Environment. B. Demmig-Adams, W. W. Adams III and A. K. Mattoo (eds). Series on Advances in Photosynthesis and Respiration (Series editor: Govindjee). Springer, Dordrecht, 2006. vol. 21. 380 pp. Price: 180 Euros.

Over the years our research work has moved from photomorphogenesis to the area of stress biology and this was one reason that, when approached by the editors of this book, I was initially reluctant to review it. Once I had it in hand and started reading the chapters, I found that there was much overlap with my current interests. The reading expanded my own concepts and taught me how one could look at plant biology from an overall perspective, with reference to plant adaptation mechanisms acting in normal vs stress environments. In fact, the front cover of the book says it all. From the title, the picture and the names of the editors and the series editor, one gets an idea of what can be expected within the hard covers of the book. The three editors (B. Demmig-Adams, W. W. Adams and A. K. Mattoo) have contributed chapters in one of the books that I and Govindjee edited, along with G. S. Singhal, G. Renger and K.-D. Irrgang (*Concepts in Photobiology*, 1999, Narosa) and hence I knew their work and strengths. I have also worked in the laboratory of one of the editors (A.K.M.). The reading of this book also took me back to some of the work I was associated with on the D1 protein and plastid signalling (R. G. Herrmann's laboratory at Munich, Germany). I therefore started reading each chapter to broaden my interests and understanding. However, I must confess that it is difficult for me to comment on all the chapters and therefore I present here a general overview of the book as a whole.

The complete table of content is available at: http://www.life.uiuc.edu/govindjee/References/Volume%2021%20By%20Chapter.htm, whereas other information is available at: http://www.life.uiuc.edu/govindjee/newbook/Vol%2021.html.

The book has 21 chapters. In the first chapter, H. Y. Yamamoto presents personal experiences about his work and achievements in the study of the xanthophyll cycle. This is wonderful reading that describes how the concepts and the field developed as new technologies were used.

Among the other chapters, seven cover various aspects of photoinhibition, six are on photoprotection, and others are in the area of signal mechanisms and gene expression. Included in the third category are three chapters on antioxidants and reactive oxygen species (ROS) signalling, two chapters on redox regulation and gene expression, and one chapter each on plastid signalling and photosynthetic gene expression.

The chapter on photoinhibition by B. Osmond and B. Förster presents a 'holistic view of photoinhibition from the molecule to the biosphere'. In this chapter, though different hypotheses are described, studies with mutants in Chlamydomonas show an important role of the D1 protein. Among other topics, biogenesis and the role of the chloroplast-encoded D1 protein have been studied in the laboratory of M. Edelman (Rehovot, Israel) and A. K. Mattoo (USDA, Beltsville, USA) who summarize their exciting research of the past 25 years on this protein in chapter 3. During my sabbatical at USDA, the discovery of the 32 kDa protein band was made, which was later found by Elich *et al.* to be a phosphorylated form of the D1 protein. In a chapter by Demmig-Adams *et al.*, the mechanism of thermal dissipation under favourable and unfavourable environmental conditions is explained. The role of the PsbS protein is addressed as well as a relationship between thermal dissipation by zeaxanthin and antheraxanthin and phosphorylation of the D1 protein, especially with reference to the evergreens 'which seem to have greater propensity for photoinhibition than plants with shorter-lived leaves'. In the following chapter, Adams *et al.* describe the consequences of photoinhibition and the mechanisms of photoprotection. The role of the xanthophyll cycle and zeaxanthin-dependent energy dissipation is clearly described in the process of photoprotection. How photoinhibition and photoprotection mechanisms operate under abiotic stresses like drought and salinity, and under iron and nitrogen deficiency, is covered in a chapter by Morales *et al.*

From an ecological perspective, the interesting question of whether photoinhibition mechanisms are the same in the terrestrial and aquatic environment, is addressed by D. P. Häder, using UV light as a causative agent for photoinhibition. It seems that although the broad mechanism may be similar in most organisms, microalgae have developed several strategies for protection against excessive light stress, like production of carotenoids, mycosporine-like amino acids and other chemicals that have not yet been fully identified. Two other chapters that deal in detail with photoprotection mechanisms, especially at the molecular level, are by H. S. Jung and K. K. Niyogi, and S. Jansson. The latter chapter deals with various systems such as algae, liverworts, mosses, ferns and conifers, and brings out the role of light harvesting complexes and also of 'quenching proteins'. Details of reaction centre quenching versus antenna quenching, on the other hand, are discussed by Huner *et al.* They describe reaction centre quenching in different systems, from algae to higher plants, and mechanisms of quenching, again bringing the role of the D1 protein into focus. Jung and Niyogi, besides discussing the production of early light-induced proteins and heat shock proteins (HSPs) under high light stress, also address the role of antioxidants like carotenoids, ascorbate and tocopherols in photoprotection. The role of antioxidants is discussed in further detail by Foyer *et al.* This chapter and also that by Mullineaux *et al.* illustrate the importance of the generation of ROS and antioxidant signalling in relation to inducing antioxidant defence system in chloroplasts. The involvement of lipoxygenases and role of antioxidants in controlling lipoxygenase-mediated apoptosis is discussed by M. Maccarrone.

Another chapter on photoinhibition and photosystem II (PSII) damage and repair is by K. Yokthongwattana and A. Melis. They again emphasize the role of zeaxanthin, Hsp-70 and, in addition, a new component – a chloroplast-targetted sulphate permease. The other chapter on PS II repair, by Nishiyama *et al.*, addresses

similar processes under light, oxidative, salt and low temperature stress. The role of redox signalling and peroxiredoxins is discussed by Dietz *et al*. Though many chapters discuss the role of PSII, the editors have not overlooked the role of PSI. The importance of cyclic electron flow around PSI and the water–water cycle, and their respective roles in stress responses, are discussed in a chapter by T. Endo and K. Asada. (For complete information on PSII and PSI, I recommend that the readers consult volume 22, edited by T. Wydrzynski and K. Satoh, and 24, edited by J. Golbeck respectively: http://www.life.uiuc.edu/govindjee/newbook/Vol%2022.html and http://www.life.uiuc.edu/govindjee/newbook/Vol%2024.html.)

The mechanisms of gene expression are discussed in a few chapters in great detail. As mentioned above, one of these is by Mullineaux *et al*. The other one by S. Baginsky and G. Link, gives an overall picture of the regulation of chloroplast gene expression in response to changes in the redox status of the cell and illustrates regulation at both the transcriptional and the post-transcriptional level. The chapter by R. M. Larkin, in addition, emphasizes the concept of plastid-to-nucleus signalling. This concept was initially developed in the laboratory of Hans Mohr. This was followed up by others, including Ralf Oelmüller. The last chapter by C. and S. Reinbothe covers the regulation of photosynthetic gene expression during development and senescence.

A brief introduction to the various chapters in the book, as illustrated above, should give the reader a clear impression that the task of integrating various themes of photoinhibition, photoprotection and gene expression has been well achieved by the editors and the Series editor. This book has volumes of information. The chapters have built-in concepts based on data and contain well-illustrated explanatory diagrams. The contents of each chapter can be grasped effortlessly and are easy to understand. I recommend this book to everyone working in the area of photosynthesis, stress biology, molecular biology of organelles and plant molecular biology. Further, I recommend it to all biology libraries of universities and research institutions, especially when bioenergy and global issues are at our doorsteps.

SUDHIR KUMAR SOPORY

Plant Biology: Plant Molecular Biology,
International Centre for Genetic
Engineering and Biotechnology,
Aruna Asaf Ali Marg,
New Delhi 110 067, India
e-mail: sopory@icgeb.res.in

MEETINGS/SYMPOSIA/SEMINARS

Biopesticide Conference (BIOCICON – 2007)

Date: 28–30 November 2007
Place: Palayamkottai

Concerns over the environment and human health impacts of chemical pesticides have led to considerable interest in the development of an alternative control method. Members of microorganisms, plants and natural enemies have been utilized as biopesticides. Furthermore, biopesticides have been used to protect agricultural crops in different parts of the world. The conference will include the following sessions: (i) Plant products in pest management; (ii) Microbial control of crop pests; (iii) Natural enemies in biological control; (iv) Integrated pest management (IPM); (v) GM crops and nanotechnology in pest management; (vi) Risk management for genetically engineered crops.

Contact: Dr K. Sahayaraj
Organising Secretary, BIOCICON – 2007
Department of Advanced Zoology and Biotechnology
St. Xavier's College (Autonomous)
Palayamkottai 627 002
Tel: +0462-2560744 (O); +0462-2542303 (R)
Fax: +0462-2561765
E-mail: ttn_ksraj@sancharnet.in

11th International Conference on Wetlands Systems for Water Pollution Control (ICWST – 2008)

Date: 1–7 November 2008
Place: Ujjain, India

Topics include: **Process dynamics:** Hydrology, biochemistry, kinetics, vegetation, substrate, microbiology, biotechnology, biodiversity benefits; **Design criteria:** Hydraulics, sizing criteria, vegetation management, modelling and optimization, environmental factors; **Treatment performance of wetlands in water pollution control:** Case studies: Municipal, industrial, agricultural, landfill, mine drainage effluents; sludge dewatering; **Economics:** Investment costs, operation and maintenance costs, ancillary benefits, ecological services *vis-à-vis* conventional technologies, carbon trading; **Landscaping:** Waterscaping and aquatecture, roof gardens, flood plain construction, biodrainage, wildlife in wetlands.

Contact: Prof. Suresh Billore
Organising Secretary, ICWST – 2008
Institute of Environment Management
and Plant Sciences
Vikram Unviersity
Ujjain 456 010, India
Tel: +91-734-2511226
Cell: +919425380484
E-mail: suresh_billore@yahoo.co.in
Website: www.wetland2008.org