

BOOK REVIEWS

Photomorphogenesis in Plants and Bacteria. Function and Signal Transduction Mechanisms. 3rd edn. Eberhard Schafer and Ferenc Nagy (eds). Springer, Dordrecht, The Netherlands. 2006. 662 pp. Price: £125.00.

The book under review edited by Eberhard Schafer and Ferenc Nagy, two experts in the field of plant photomorphogenesis, has 29 chapters appropriately grouped in five parts. Although the title of the book refers to photomorphogenesis both in plants and bacteria, most of the chapters focus on plants. The chapters are contributed by internationally reputed scientists from Europe, Japan, South America and USA. The editors have dedicated the book to Hans Mohr with whom this reviewer had an opportunity to work at the University of Freiburg, Germany. The book rightly honours a person, who is one of the top plant photobiologists of the world.

Plants have evolved extensive sensory mechanisms that make them capable of sensing the light signal that they receive in terms of its intensity, quality, duration and direction. They have developed adaptational mechanisms for specific light conditions, controlling several complex events associated with their growth. Perception of light signal by different photoreceptors is the first and most important event of the light sensory mechanism. The chapters of the book deal with both biochemical and biophysical characterization as well as the function of major photoreceptors such as phytochrome, cryptochrome and phototropins. The book focuses on the biology of photoreceptors, signalling systems associated with them and the recent techniques used in the study of these fascinating receptors.

Part 1 of the book consists of four chapters contributed by both the editors with a historical presentation of photomorphogenesis research, emphasizing the development of our knowledge in the area of structure and physiology of the phytochrome. The authors describe phytochrome induction responses, use of classical action spectra and *in vivo* spectroscopic measurements of physiological responses of the photoreceptor in the first two chapters. The next two chapters cover the structure, cellular location, physiology, distribution and evolution of the phytochrome; there is also a brief description of the different molecular biology tools used in the study of the

receptors and mechanism of signal transduction, specifically identification of signal transduction pathways through the analysis of photomorphogenic mutants.

Part 2 contains five chapters covering the complete story of the phytochrome. The contributors of the chapters are well-known experts in the field of this well-studied photoreceptor. The first two chapters deal with the general structure of the phytochrome, its biochemical and biophysical characteristics, biosynthesis and holoassembly, and its distribution and evolution both in plants and bacteria. The next three chapters discuss the phytochrome gene structure, sequence analysis and expression, and its distribution and evolution in seed plants. Stability of the phytochrome in light/dark conditions, the intracellular localization of different phytochromes are also summarized.

Blue light and UV receptors are covered in six chapters in Part 3. The first three chapters deal with the early history of classical physiological responses of the receptors such as phototropism, stomatal opening, leaf expansion and chloroplast movement. These chapters also describe the discovery, structure, distribution and mode of action of cryptochromes and phototropins with emphasis on the molecular structure and mechanism of action of both types of receptors in the background of recent knowledge in the field. The role of cryptochromes in the wide spectrum of organisms like bacteria, algae, mosses, higher plants, *Drosophila* and mammals has been critically summarized, with special reference to its role in the regulation of circadian rhythms in *Drosophila* and mammals. The remaining three chapters primarily summarize recent developments in the mechanism of perception of light by blue light/UV receptors and various signal transduction pathways operating in the blue-light mediated photomorphogenesis.

The focus of Part 4 shifts to the molecular mechanism of photosignal transduction pathways, biochemical analysis of signal transduction components, dissecting and identifying the pathways through mutational analysis, crosstalk in the signalling network, and interaction between different photoreceptors. The photobiologist Peter Quail, reviews the contributions made by the pioneers in the field of intracellular signalling systems and also critically summarizes all the chapters of the book, with a focus on photosignal transduction.

Part 5 of the book does not specify any theme; however it includes interesting review chapters like the role of phytochrome in shade condition, and photoreceptors in ferns and mosses and their function with specific reference to spore germination and chloroplast movement. This concluding part also includes chapters on circadian regulation of photomorphogenic events, role of chlorophyll precursors as the communicating system in plastid–nucleus signalling, and molecular mechanism of photoperiodic responses with an up-to-date knowledge in these areas of research. The chapter on commercial application of photomorphogenesis research is unique because the authors draw our attention to the application of photomorphogenesis research in biotechnology, specifically in the area of light-based plant biological engineering. The last article by the photobiologist H. Smith summarizes the progress made so far in the area of photomorphogenesis research. The advancement made in this area, according to Smith, is the result of the use of precise light sources, analysis of action spectra, gene cloning, reverse genetics, intracellular imaging and microarray analysis.

The book provides basic knowledge in photomorphogenesis and is therefore suitable as a textbook for graduate-level studies in plant development, physiology, biochemistry and molecular biology. At the same time, some chapters provide update information in the field with novel ideas and technical know-how for post-graduate students and researchers in photobiology.

BASANTI BISWAL

*School of Life Sciences,
Sambalpur University,
Jyotivihar 768 019, India
e-mail: basanti_b@hotmail.com*

Annual Review of Entomology, 2007. M. R. Berenbaum, R. T. Cardé and G. E. Robinson (eds). Annual Reviews, 4139, El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. 2007. Vol. 52, 529 pp. Price: \$197.00.

Perhaps it is the sign of the times. I did an exercise of trying to classify the various review articles in the *Annual Review of Entomology* from 2000 onwards, and found that as I approached 2007, it was becoming increasingly harder to place