Preface

Living organisms are subject to fluctuating environmental conditions. While most animals are able to move away from unfavourable conditions, plants are sessile and so must cope with whatever comes their way. As part of their coping strategy, plants have evolved an exquisite array of mechanisms to sense environmental signals coupled with an extraordinary degree of developmental plasticity that enables them to modulate their growth and development in response to external cues.

Of all the environmental cues that challenge the developing plant, light can probably be considered to be the most important. In addition to its key role in plant metabolism, and hence almost all life on Earth, where it drives the process of photosynthesis, light energy also acts to regulate plant growth and development. Light quantity, quality, direction and diurnal and seasonal duration regulate processes from germination, through seedling establishment to the architecture of the mature plant and the transition to reproductive development. These developmental responses of plants to light constitute photomorphogenesis.

Regulatory light signals are detected by an array of specialised, information-transducing photoreceptors, including the red/far-red light-absorbing phytochromes, the blue/ultraviolet-A light-absorbing cryptochromes and phototropins and one or more, as yet unidentified, ultraviolet-B-absorbing photoreceptor molecules. Light-mediated signal transduction in plants starts with the perception of light by these specialised photoreceptors leading to altered expression of up to several thousand genes, thus enabling the plant to respond at the physiological level. In recent years, the application of genetic, biochemical and molecular studies, particularly in the model *Arabidopsis thaliana*, has led not only to the identification and characterisation of the photoreceptors and their genes, but also many of the components that act downstream of photoreceptor activation. It is evident that the photoreceptors operate through interactions with one another and with other signalling systems thus forming complex response networks.

This volume is designed to provide the reader with state-of-the-art accounts of our current knowledge of the major classes of higher plant regulatory photoreceptors and the signal transduction networks that comprise plant developmental photobiology. Consideration is also given to the ways in which knowledge of plant photoreceptors and their signalling networks can be exploited, for instance to improve the quality and productivity of commercially grown plants. The book is aimed at advanced students and new researchers requiring up-to-date accounts of the major themes in higher plant photomorphogenesis research.

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