

Preface

During recent years the science of plant surfaces, and the cuticle in particular, has advanced at a fast pace, encompassing new fields of study along the way. Considerable progress has been made possible by the application of new concepts and techniques for investigating the biosynthesis, composition, structure and functional complexity of the plant cuticle.

We now have an increased understanding of the microscopic and sub-microscopic fine structure of the cuticular membrane as a whole, as well as of the cutin matrix and the associated wax deposits. By employing mutants and applying molecular biological techniques and advanced analytical tools, a much clearer image can now be drawn of the composition of cuticular waxes and the biosynthetic pathways leading to them. Intriguing variations can be found in the cuticular chemistry, morphology and function between and within plant species. Studies assessing the impact of UV radiation on plant life have emphasised the role of the cuticle and the underlying epidermis as optical filters for solar radiation. The field concerned with the diffusive transport of lipophilic organic non-electrolytes across the plant cuticle has reached a state of maturity, which makes it possible to quantitatively analyse and predict permeabilities based on physico-chemical predictors and to manipulate them *in vivo*. Recently, a new paradigm has been proposed for the diffusion of polar compounds and water across the cuticle. Within the context of plant ecophysiology, cuticular transpiration can now be considered in the perspective of whole-leaf water relations. New and unexpected roles have been assigned to the cuticle in plant development and in pollen-stigma interactions. Finally, much progress has been made in understanding the cuticle as a specific and extraordinary substrate for the interactions of the plant with microorganisms, fungi and insects.

Since the early 1970s, three books on the plant cuticle have been published. Only the first addressed all aspects of the subject; the other two were multi-author volumes arising from scientific meetings. Considering the progress made in this field, a book which deals comprehensively with plant surface characteristics and functions is overdue. The title, *Biology of the Plant Cuticle*, is intended to express the multidisciplinary and integrative approach to the subject. As functions are interconnected and rely heavily on the (bio)chemistry and properties of the cuticle, it is hoped that bringing together thus far disparate views of the subject will substantially advance the field of plant surface science. The book is also intended to provide a comprehensive overview and critical discussion of the current state of knowledge, paying close attention to the applied aspects of the field wherever appropriate.

Biology of the Plant Cuticle is aimed at a broad audience, ranging from biologists working on the molecular and whole-organism level to industrial agrochemists.

It is hoped that it will be of interest to phytochemists, plant (eco)physiologists, ecologists and environmental scientists, as well as to scientists and practitioners from the agricultural and horticultural sciences. In comparison with its predecessors, this book extensively considers the biological interactions occurring on plant surfaces and, therefore, is hoped to be of special appeal to scientists who, in the past, did not consider the plant surface *a priori* as a subject of prime importance. Thus, this volume is furthermore directed at phytopathologists, environmental microbiologists, entomologists and chemical ecologists.

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