

# METHODS IN MOLECULAR BIOLOGY™

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# **Chloroplast Research in Arabidopsis**

**Methods and Protocols, Volume I**

Edited by

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## Preface

Chloroplasts are green plastids found in land plants, algae, and some protists. They are the unique site for the reactions of photosynthesis in such cells, and thus chloroplasts are responsible for much of the world's primary productivity. As photosynthesis is the only significant mechanism of energy-input into living cells, these organelles are essential for the survival of plants and animals alike. Consequently, agriculture is wholly dependent upon the photosynthesis that takes place in chloroplasts. Moreover, many other important cellular activities occur uniquely inside chloroplasts or in other non-photosynthetic types of plastid. These activities include the production of starch, amino acids, fatty acids, lipids, terpenoids, purine and pyrimidine bases, and colourful pigments in fruits, flowers, and leaves, as well as key aspects of nitrogen and sulphur metabolism. Many products of these biosynthetic processes are vital components of mammalian diets or offer opportunities for industrial exploitation. Advances in our understanding of plastid biogenesis will facilitate the manipulation and exploitation of these processes and aid improvements in the quantity or quality of the various products.

Over the years, chloroplast biology has been studied in a variety of different organisms, based on technical considerations. Such work has undoubtedly led to major advances in the field, but has had the significant disadvantage that findings made using different experimental systems or species are not always directly cross-comparable. The relatively recent adoption of *Arabidopsis thaliana* as the model organism of choice for plant science research, across the globe, has led to its emergence as a pre-eminent system for research on chloroplasts and other types of plastid. The availability of genomic sequence resources and extensive germplasm collections for *Arabidopsis*, as well as its amenability to molecular genetic analysis, have all contributed to this change. This book (together with its partner, Volume II) aims to bring together in a single location some of the most important, modern techniques and approaches for chloroplast research, with the unifying theme of *Arabidopsis* as the model system. Within the confines of this remit, we have produced a book that is relatively broad in its scope, and which many *Arabidopsis* researchers and biotechnologists with a general interest in chloroplasts, plastids, or related processes might use as an aid to their work. In essence, it is a book for *Arabidopsis* integrative biologists with a general focus on chloroplast and plastid research. In spite of the central position afforded to *Arabidopsis*, many of the presented methods can be applied to other experimental organisms with minimal modification.

*Leicester, UK*

*R. Paul Jarvis*



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