
Preface

Plant cells differ enormously in size and shape and cell volumes can vary 10,000-fold within a species, increasing in size from meristems to differentiated cells. Plant cells can be cylindrical, tubular, spherical, stellate, etc., and this complex cell shapes are produced by tight regulation of growth and need to be maintained by structural reinforcement after the cessation of growth. Plant cell expansion occurs through the controlled growth of the cell wall, which results from the interplay between turgor pressure and cell wall elasticity and extensibility. The understanding of growth at the cellular level is vital because final plant shape is dictated by two factors: cell number and cell size. The improvement of existing methods and the development of new ones to follow and study how single plant cells change over the time is one exciting area of research within plant biology.

By presenting this new volume of *Plant Cell Expansion*, I wanted to cover selected aspects of plant cell growth in different single-cell types such as root hairs and pollen tubes as well as at tissues-organ level like hypocotyls and whole roots. This volume is focused on methods to study in detail several complex aspects of cell expansion such as secretion and endocytosis, reactive oxygen species (ROS) production, and Ca^{2+} imaging as well as quantification of growth in real time. In addition, two chapters described methods for the structural and mechanical as well as the biochemical characterization of growing plant cell walls. On top, there are chapters only dedicated to the green algae *Penium margaritaceum* as a new model for single-cell growth and cell wall formation. Finally, several methods currently used in plant molecular and cell biology are described for identification of new genes related to cell growth and expansion.

As in previous books of the series, all the authors in each single chapter of this book have tried to present a collection of step-by-step protocols, described at a level of detail enough to be followed by experienced researchers and beginners. I wish this book would become an important reference book for plant scientists working on any aspect of molecular and cell biology that relates to cell growth and expansion. Finally, I would like to thank all the contributing colleagues whose knowledge, expertise, and effort have been vital for attaining the highest scientific level of this book.

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Methods and Protocols

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