The Plant Cell Wall
Annual Plant Reviews

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The Plant Cell Wall

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Preface

Plant cell wall research has advanced dramatically on numerous fronts in the last few years, in parallel with many related technical innovations. Analytical tools associated with molecular biology, biochemistry, spectroscopy and microscopy, immunology, genomics and proteomics, have all been brought to bear on elucidating plant cell wall structure and function, providing a degree of resolution that has never been possible before. Furthermore, as an appreciation develops of the critical role of cell walls in a broad range of plant developmental events, so does the strength and diversity of cell wall-related scientific research.

This book, written at professional and reference level, provides the growing number of scientists interested in plant cell walls with an overview of some of the key research areas, and provides a conceptual bridge between the wealth of biochemistry-oriented cell wall literature that has accumulated over the last fifty years, and the technology-driven approaches that have emerged more recently. The timing is especially appropriate, given the recent completion of the first plant genome sequencing projects and our entry into the ‘post-genomic’ era. Such breakthroughs have given an exciting glimpse into the substantial size and diversity of the families of genes encoding cell wall-related proteins and, as with most areas of biological complexity, the greater the apparent resolution, the greater the number of questions that are subsequently raised. A common approach of the chapters is therefore to provide suggestions and predictions about where each of the fields of wall research is heading and which milestones are likely to be reached.

Due to size limitations, it has not been possible to cover all the areas of cell wall research, and there are several topics that are not addressed here, such as the role of the wall in plant-pathogen interactions and the significance of apoplastic signaling and metabolism. However, this volume illustrates many of the molecular mechanisms underlying wall structure and function.

The first chapter provides an overview of primary cell wall polysaccharide composition and structure – a long-established field but one that remains extraordinarily challenging and open to debate. Developing clearer visions of secondary walls and wall structural proteins, covered in Chapters 4 and 5, respectively, are also formidable goals, and Chapters 2 and 3 describe analytical approaches that promise to help address these challenges. The dynamic multifunctional nature of plant walls, including mechanisms of information exchange with the protoplast, and the exquisite regulation of wall synthesis, restructuring and disassembly, are discussed in subsequent chapters. The volume concludes with a summary of some