

Preface

Terrestrial plants are unable to relocate when faced with biological, physical, or chemical stress and have, therefore, developed efficient signaling mechanisms to respond to and ensure survival under adverse circumstances. The auxotrophic lifestyle obviously allows plants to fuel more primary active ATP-dependent transporters (= pumps) than animals. Moreover, unlike bacteria that rely entirely on their cell walls, higher plants needed more secondary transport systems to control cell homeostasis and osmotic pressure. Finally, plant-specific organelles and vacuoles provide storage pools for ions and catabolites that are filled by cotransporters. This correlates with an increased and more divergent number of transporter genes, mainly pumps and secondary active transporters, in higher plants compared with genomes from bacteria or animals.

Although plant sensing and responding mechanisms might be considered as simple and even slow compared with nervous systems in animals, the basic mechanisms of signal transduction and sensing are very similar. At the same time, work in the recent years has identified novel, plant-specific signaling molecules and mechanisms. This volume focuses on the role of transporters and pumps in regulation of movement, long-range transport, and compartmentalization of water, solutes, nutrients, and classical signaling molecules. Function, regulation, and membrane-transporter interaction of prominent transporters and pumps and their individual roles in plant signaling controlling plant physiology and development are discussed.

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