



# Plant Plasma Membrane

**Christopher J. Staiger, Frantisek  
Baluska, D. Volkmann, P. Barlow**



## **Plant Plasma Membrane:**

**The Plant Plasma Membrane** Christer Larsson, Ian M. Møller, 2012-12-06 The plasma membrane forms the living barrier between the cell and its surroundings. For this reason it has a wide range of important functions related to the regulation of the composition of the cell interior and to communication with the cell exterior. The plasma membrane has therefore attracted a lot of research interest. Until the early 1970s it was only possible to study the plasma membrane in situ, its structure e.g. by electron microscopy and its function e.g. by uptake of radioactively labeled compounds into the intact cell or tissue. The first isolation of plant protoplasts by enzymatic digestion of the cell wall in the early 1970s was an important step forward in that it provided direct access to the outer surface of the plasma membrane. More importantly, T. K. Hodges and R. J. Leonard in 1972 published the description of a method by which a fraction enriched in plasma membranes could be isolated from plant tissues using sucrose gradient centrifugation. As a result, the 1970s saw a leap forward in our understanding of the structure and function of the plasma membrane. In 1981, S. Widell and C. Larsson published the first of a series of papers in which plasma membrane vesicles of high yield and purity were isolated from a wide range of plant tissues using aqueous polymer two phase partitioning.

**The Plant Plasma Membrane** Angus S. Murphy, Wendy Peer, Burkhard Schulz, 2010-11-11 In plant cells the plasma membrane is a highly elaborated structure that functions as the point of exchange with adjoining cells, cell walls and the external environment. Transactions at the plasma membrane include uptake of water and essential mineral nutrients, gas exchange, movement of metabolites, transport and perception of signaling molecules and initial responses to external biota. Selective transporters control the rates and direction of small molecule movement across the membrane barrier and manipulate the turgor that maintains plant form and drives plant cell expansion. The plasma membrane provides an environment in which molecular and macromolecular interactions are enhanced by the clustering of proteins in oligomeric complexes for more efficient retention of biosynthetic intermediates and by the anchoring of protein complexes to promote regulatory interactions. The coupling of signal perception at the membrane surface with intracellular second messengers also involves transduction across the plasma membrane. Finally, the generation and ordering of the external cell walls involves processes mediated at the plant cell surface by the plasma membrane. This volume is divided into three sections. The first section describes the basic mechanisms that regulate all plasma membrane functions. The second describes plasma membrane transport activity. The final section of the book describes signaling interactions at the plasma membrane. These topics are given a unique treatment in this volume as the discussions are restricted to the plasma membrane itself as much as possible. A more complete knowledge of the plasma membrane's structure and function is essential to current efforts to increase the sustainability of agricultural production of food, fiber and fuel crops.

**The Plant Plasma Membrane** Angus S. Murphy, Wendy Peer, Burkhard Schulz, 2010-10-02 In plant cells the plasma membrane is a highly elaborated structure that functions as the point of exchange with adjoining cells, cell walls and the external environment.

Transactions at the plasma membrane include uptake of water and essential mineral nutrients gas exchange movement of metabolites transport and perception of signaling molecules and initial responses to external biota Selective transporters control the rates and direction of small molecule movement across the membrane barrier and manipulate the turgor that maintains plant form and drives plant cell expansion The plasma membrane provides an environment in which molecular and macromolecular interactions are enhanced by the clustering of proteins in oligimeric complexes for more efficient retention of biosynthetic intermediates and by the anchoring of protein complexes to promote regulatory interactions The coupling of signal perception at the membrane surface with intracellular second messengers also involves transduction across the plasma membrane Finally the generation and ordering of the external cell walls involves processes mediated at the plant cell surface by the plasma membrane This volume is divided into three sections The first section describes the basic mechanisms that regulate all plasma membrane functions The second describes plasma membrane transport activity The final section of the book describes signaling interactions at the plasma membrane These topics are given a unique treatment in this volume as the discussions are restricted to the plasma membrane itself as much as possible A more complete knowledge of the plasma membrane s structure and function is essential to current efforts to increase the sustainability of agricultural production of food fiber and fuel crops

**The Plant Plasma Membrane** Angus S. Murphy, Wendy Peer, Burkhard Schulz, 2011-07-23 In plant cells the plasma membrane is a highly elaborated structure that functions as the point of exchange with adjoining cells cell walls and the external environment Transactions at the plasma membrane include uptake of water and essential mineral nutrients gas exchange movement of metabolites transport and perception of signaling molecules and initial responses to external biota Selective transporters control the rates and direction of small molecule movement across the membrane barrier and manipulate the turgor that maintains plant form and drives plant cell expansion The plasma membrane provides an environment in which molecular and macromolecular interactions are enhanced by the clustering of proteins in oligimeric complexes for more efficient retention of biosynthetic intermediates and by the anchoring of protein complexes to promote regulatory interactions The coupling of signal perception at the membrane surface with intracellular second messengers also involves transduction across the plasma membrane Finally the generation and ordering of the external cell walls involves processes mediated at the plant cell surface by the plasma membrane This volume is divided into three sections The first section describes the basic mechanisms that regulate all plasma membrane functions The second describes plasma membrane transport activity The final section of the book describes signaling interactions at the plasma membrane These topics are given a unique treatment in this volume as the discussions are restricted to the plasma membrane itself as much as possible A more complete knowledge of the plasma membrane s structure and function is essential to current efforts to increase the sustainability of agricultural production of food fiber and fuel crops PLASMA MEMBRANE ATPASE OF PLANTS & FUNGI Ramón Serrano, 1985-12-06 *Plant Cell Biology* Randy O. Wayne, 2018-11-13

Plant Cell Biology Second Edition From Astronomy to Zoology connects the fundamentals of plant anatomy plant physiology plant growth and development plant taxonomy plant biochemistry plant molecular biology and plant cell biology It covers all aspects of plant cell biology without emphasizing any one plant organelle molecule or technique Although most examples are biased towards plants basic similarities between all living eukaryotic cells animal and plant are recognized and used to best illustrate cell processes This is a must have reference for scientists with a background in plant anatomy plant physiology plant growth and development plant taxonomy and more Includes chapter on using mutants and genetic approaches to plant cell biology research and a chapter on omic technologies Explains the physiological underpinnings of biological processes to bring original insights relating to plants Includes examples throughout from physics chemistry geology and biology to bring understanding on plant cell development growth chemistry and diseases Provides the essential tools for students to be able to evaluate and assess the mechanisms involved in cell growth chromosome motion membrane trafficking and energy exchange

Oxidoreduction at the Plasma Membranerelation to Growth and Transport Frederick L. Crane,D. James Morre,Hans E. Low,1991-04-15 The concept of general oxidoreductase function at the plasma level is new Oxidoreduction at the Plasma Membrane Relation to Growth and Transport provides the first truly comprehensive coverage of the oxidoreduction reactions in plasma membranes and the role that can now be attributed to these enzymes in controlling growth and other cell functions in plants and animals The book describes the nature and orientation of oxidoreductases in plasma membranes the stimulation of cell growth by oxidants reacting with transplasma membrane electron transport changes in enzymes in tumor cells and the basis of the growth effects and oxidoreductase stimulation of membrane transport in relation to known second messenger functions such as cellular pH changes calcium transport protein phosphorylation and oxidation levels of pyridine nucleotides The book then examines the significance of these enzymes in cell culture tumor growth nerve transmission ion transport and membrane potential The book also presents a new approach to understanding the action of antitumor drugs and herbicides Biochemists biologists oncologists cancer researchers physiologists and endocrinologists will find this an indispensable reference source as they conduct studies in this exciting new area **Plant**

**cell endomembrane dynamics and specialization** Emily R Larson,Lorena Norambuena,Cecilia Rodriguez-Furlan,2023-11-09 **Plasma Membrane Redox Systems and their role in Biological Stress and Disease**

Han Asard,Alajos Bérczi,Roland J. Caubergs,2013-06-29 Oxidation reduction i e redox processes at the plasma membrane of any cell have been attracting more and more attention both in basic and in applied research since the first workshop dealing with the plasma membrane oxidoreductases was organized in Cordoba Spain in 1988 This evolution is evident considering the numerous cell functions performed by plasma membrane redox systems not only in healthy cells but also in cells that escaped from the normal metabolic control e g cancer cells and cells under attack by pathogens Plasma membrane redox processes have now been demonstrated to play an essential role in growth control and defense mechanisms of these cells The

great importance of the plasma membrane redox systems originates in the fact that they are located in the membrane which is essentially the site of communication between the living cell and its environment We may say that the plasma membrane can be considered as the sensory part of the cell No chemical substance can enter the cell interior without interaction with the plasma membrane

**The Plant Cell** N. E. Tolbert, 2013-09-24 The Biochemistry of Plants A Comprehensive Treatise Volume I The Plant Cell serves as an introduction to the various parts of the cell and to the basic biochemistry carried out in the different subcellular components The book discusses the parts of a cell and the biochemical processes such as respiration involving the mitochondria microbodies or cytosol or photosynthesis in the chloroplasts The text also describes the use of plant cell cultures in biochemistry the primary cell walls of flowering plants and the morphology purification chemical and enzymatic composition and functions of the plasma membrane and the cytosol The biochemistry of the developmental and genetic processes involved the development of function and the biochemistry and metabolism of the mature organelle are also considered The book further tackles the biochemistry of the plant mitochondria peroxisomes glyoxysomes endoplasmic reticulum ribosomes golgi apparatus plant nucleus protein bodies plant vacuoles and cyanobacteria blue green algae Biochemists chemists biologists botanists plant pathologists and students taking related courses will find the book useful

**Handbook of Plant Science, 2 Volume Set** Keith Roberts, 2007-12-10 Plant Science like the biological sciences in general has undergone seismic shifts in the last thirty or so years Of course science is always changing and metamorphosing but these shifts have meant that modern plant science has moved away from its previous more agricultural and botanical context to become a core biological discipline in its own right However the sheer amount of information that is accumulating about plant science and the difficulty of grasping it all understanding it and evaluating it intelligently has never been harder for the new generation of plant scientists or for that matter established scientists And that is precisely why this Handbook of Plant Science has been put together Discover modern molecular plant sciences as they link traditional disciplines Derived from the acclaimed Encyclopedia of Life Sciences Thorough reference of up to the minute reliable self contained peer reviewed articles cross referenced throughout Contains 255 articles and 48 full colour pages written by top scientists in each field The Handbook of Plant Science is an authoritative source of up to date practical information for all teachers students and researchers working in the field of plant science botany plant biotechnology agriculture and horticulture

*Actin: A Dynamic Framework for Multiple Plant Cell Functions* Christopher J. Staiger, Frantisek Baluska, D. Volkmann, P. Barlow, 2013-04-17 Actin is an extremely abundant protein that comprises a dynamic polymeric network present in all eukaryotic cells known as the actin cytoskeleton The structure and function of the actin cytoskeleton which is modulated by a plethora of actin binding proteins performs a diverse range of cellular roles Well documented functions for actin include providing the molecular tracks for cytoplasmic streaming and organelle movements formation of tethers that guide the cell plate to the division site during cytokinesis creation of honeycomb like arrays that enmesh and immobilize plastids in unique

subcellular patterns supporting the vesicle traffic and cytoplasmic organization essential for the directional secretory mechanism that underpins tip growth of certain cells and coordinating the elaborate cytoplasmic responses to extra and intracellular signals The previous two decades have witnessed an immense accumulation of data relating to the cellular biochemical and molecular aspects of all these fundamental cellular processes This prompted the editors to put together a diverse collection of topics contributed by established international experts related to the plant actin cytoskeleton Because the actin cytoskeleton impinges on a multitude of processes critical for plant growth and development as well as for responses to the environment the book will be invaluable to any researcher from the advanced undergraduate to the senior investigator who is interested in these areas of plant cell biology

*Plant Cell Walls* Peter Albersheim, Alan Darvill, Keith Roberts, Ron Sederoff, Andrew Staehelin, 2010-04-15 Plant cell walls are complex dynamic cellular structures essential for plant growth development physiology and adaptation *Plant Cell Walls* provides an in depth and diverse view of the microanatomy biosynthesis and molecular physiology of these cellular structures both in the life of the plant and in their use for bioproducts and biofuels *Plant Cell Walls* is a textbook for upper level undergraduates and graduate students as well as a professional level reference book Over 400 drawings micrographs and photographs provide visual insight into the latest research as well as the uses of plant cell walls in everyday life and their applications in biotechnology Illustrated panels concisely review research methods and tools a list of key terms is given at the end of each chapter and extensive references organized by concept headings provide readers with guidance for entry into plant cell wall literature Cell wall material is of considerable importance to the biofuel food timber and pulp and paper industries as well as being a major focus of research in plant growth and sustainability that are of central interest in present day agriculture and biotechnology The production and use of plants for biofuel and bioproducts in a time of need for responsible global carbon use requires a deep understanding of the fundamental biology of plants and their cell walls Such an understanding will lead to improved plant processes and materials and help provide a sustainable resource for meeting the future bioenergy and bioproduct needs of humankind

*Plant Cell Wall Analysis* Hans F. Linskens, John F. Jackson, 2012-12-06 Modern Methods of Plant Analysis When the handbook *Modern Methods of Plant Analysis* was first introduced in 1954 the considerations were 1 the dependence of scientific progress in biology on the improvement of existing and the introduction of new methods 2 the difficulty in finding many new analytical methods in specialized journals which are normally not accessible to experimental plant biologists 3 the fact that in the methods sections of papers the description of methods is frequently so compact or even sometimes to incomplete that it is difficult to reproduce experiments These considerations still stand today The series was highly successful seven volumes appearing between 1956 and 1964 Since there is still today a demand for the old series the publisher has decided to resume publication of *Modern Methods of Plant Analysis* It is hoped that the New Series will be just as acceptable to those working in plant sciences and related fields as the early volumes undoubtedly were It is difficult to

single out the major reasons for the success of any publication but we believe that the methods published in the first series were up to date at the time and presented in a way that made description as applied to plant material complete in itself with little need to consult other publications Contribution authors have attempted to follow these guidelines in this New Series of volumes Editorial The earlier series of Modern Methods of Plant Analysis was initiated by Michel V *Plant Cell Biology* William V Dashek, 2010-03-09 While there are a few plant cell biology books that are currently available these are expensive methods oriented monographs The present volume is a textbook for upper undergraduate and beginning graduate students This textbook stresses concepts and is inquiry oriented To this end there is extensive use of original research literature As we live in an era of literature explosion one must be selective These judgements will naturally vary with each investigator Input was sought from colleagues in deciding the literature to include In addition to provision of select research literature this volume presents citations and summaries of certain laboratory methods In this connection the textbook stresses quantitative data to enhance the student s analytical abilities Thus the volume contains computer spread sheets and references to statistical packages e g Harvard Graphics and Statistica *Methods in Plant Cell Biology, Part B*, 1995-10-10 Methods in Plant Cell Biology provides in two volumes a comprehensive collection of analytical methods essential for researchers and students in the plant sciences Individual chapters written by experts in the field provide an introductory overview followed by a step by step technical description of the methods This is accompanied by examples of typical results illustrations troubleshooting of potential pitfalls sources of chemicals and equipment and complete reference lists Protocols are written to be easily comprehended by beginning research students but these extensive volumes will also be a valuable addition to the libraries of expert researchers Key Features Written by experts many of whom have developed the individual methods described Contains most if not all the methods needed for modern research in plant cell biology Up to date and comprehensive Full references Allows quick access to relevant journal articles and to the sources of chemicals required for the procedures Selective concentration on higher plant methods allows for particular emphasis on those problems specific to plants **Methods in Plant Cell Biology, Part A**, 1995-10-10 Methods in Plant Cell Biology provides in two volumes a comprehensive collection of analytical methods essential for researchers and students in the plant sciences Individual chapters written by experts in the field provide an introductory overview followed by a step by step technical description of the methods Key Features Written by experts many of whom have developed the individual methods described Contains most if not all the methods needed for modern research in plant cell biology Up to date and comprehensive Full references Allows quick access to relevant journal articles and to the sources of chemicals required for the procedures Selective concentration on higher plant methods allows for particular emphasis on those problems specific to plants **Methods in Plant Cell Biology** David W. Galbraith, Hans J. Bohnert, Don P. Bourque, 1995 Methods in Plant Cell Biology provides in two volumes a comprehensive collection of analytical methods essential for researchers and students in the plant sciences Individual



chapters written by experts in the field provide an introductory overview followed by a step by step technical description of the methods

**Key Features** Written by experts many of whom have developed the individual methods described Contains most if not all the methods needed for modern research in plant cell biology Up to date and comprehensive Full references Allows quick access to relevant journal articles and to the sources of chemicals required for the procedures Selective concentration on higher plant methods allows for particular emphasis on those problems specific to plants

*Purification and Electrophoretic Analysis of the Plant Plasma Membrane ATPase* Sean Ross Gallagher, 1985 Introduction to Plant Cell Development Jeremy Burgess, 1985-05-16

This textbook is about plant cells and the way in which their behaviour is regulated to suit the function which they fulfil in the plant The purpose of the book is to emphasise the structural and spatial events which occur during the development of specialised plant cells It is designed to fill the gap between descriptive anatomy books on the one hand and purely physiological books on the other Its novelty is in its emphasis on the interaction between the structure of a plant cell and the way in which it performs its role in the plant It is written in two parts of four chapters each The first part concentrates on cells as individuals and presents a detailed account of their structure in various situations together with descriptions of how such structures are achieved and function The second part places these descriptions in the context of tissues organs and whole plants

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