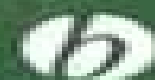


MEMBRANE TRANSPORT IN PLANTS

Annual Plant Reviews, Volume 15



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Michael R. Blatt



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Membrane Transport In Plants Annual Plant Reviews Volume Fifteen

**Jens Tilsner,Emmanuelle
Bayer,Sébastien MONGRAND,Lesley
Torrance**

Membrane Transport In Plants Annual Plant Reviews Volume Fifteen:

Membrane Transport in Plants Annual Plant Reviews, Volume Fifteen Michael R. Blatt, 2004-11-29 Research in membrane transport has advanced rapidly in recent years following the availability of new biophysical techniques the integration of structural and molecular approaches and developments in molecular genomics With an expanding population agricultural production is pushed increasingly into marginal areas promoting interest in the genetic engineering of crop species to cope with these conditions Membrane Transport in Plants provides an overview of our current understanding of plant membrane transport in the light of recent developments The volume is directed at researchers and professionals in plant cell biology biochemistry and physiology Annual Plant Reviews, Control of Primary Metabolism in Plants William Plaxton, Michael T. McManus, 2008-04-15 The ability to control the rates of metabolic processes in response to changes in the internal or external environment is an indispensable attribute of living cells that must have arisen with life's origin This adaptability is necessary for conserving the stability of the intracellular environment which is in turn essential for maintaining an efficient functional state The advent of genomics proteomics and metabolomics has revolutionised the study of plant development and is now having a significant impact on the study of plant metabolism and its control In the last few years significant advances have been made with the elucidation of enzyme gene families and the identification of new proteinaceous and allosteric regulators The first part of this volume is devoted to generic aspects of metabolic control with chapters on the key control points in pathways Part Two considers the control of specific pathways with detailed descriptions including structures and discussions of the regulation of these pathways particularly in terms of the enzymology The book is directed at researchers and professionals in plant biochemistry physiology molecular biology and cell biology Annual Plant Reviews, The Gibberellins Peter Hedden, Stephen G. Thomas, 2016-05-02 First discovered as fungal metabolites the gibberellins were recognised as plant hormones over 50 years ago They regulate reproductive development in all vascular plants while their role in flowering plants has broadened to include also the regulation of growth and other developmental processes This timely book covers the substantial and impressive recent advances in our understanding of the gibberellins and their roles in plant development including the biosynthesis inactivation transport perception and signal transduction of these important hormones An introductory chapter traces the history of gibberellin research describing the many discoveries that form the basis for the recent progress The exciting emerging evidence for the interaction of gibberellin signalling with that of the other hormones is critically evaluated The occurrence of gibberellins in fungal bacterial and lower plant species is also discussed with emphasis on evolution Manipulation of gibberellin metabolism and signal transduction through chemical or genetic intervention has been an important aspect of crop husbandry for many years The reader is presented with important information on the advances in applying gibberellin research in agriculture and horticulture Annual Plant Reviews Volume 49 The Gibberellins is an important resource for plant geneticists and biochemists as well as agricultural and

horticultural research workers advanced students of plant science and university lecturers in related disciplines It is an essential addition to the shelves of university and research institute libraries and agricultural and horticultural institutions teaching and researching plant science

Annual Plant Reviews, Nitrogen Metabolism in Plants in the Post-genomic Era Christine Foyer, Hanma Zhang, 2011-06-09 The field of plant nitrogen metabolism continues to be a compelling focus for basic research activities because there is a strong demand for immediate solutions particularly in key areas such as improving plant nitrogen use efficiency which are crucial to future agricultural sustainability and the future economic success of agriculture The 13 reviews which comprise this excellent and carefully edited new volume bring together the expertise and enthusiasm of an international team of leading researchers Topics covered include nitrogen sensing and signalling uptake and membrane systems nitric oxide primary nitrogen assimilation and C N balance and interactions and regulation of root and plant architecture Together these reviews provide an insight into how plants sense uptake and assimilate nitrogen into the organic compounds required for growth co ordinate nitrogen and carbon metabolism and regulate growth and development according to nitrogen availability The transcription factors that act to integrate environmental nutrient nitrogen signals to co ordinate primary and secondary metabolism are discussed together with new concepts of cross talk transport and signalling and how such molecular networks influence nitrogen and carbon cycling processes in the environment

Annual Plant Reviews Volume 42 Nitrogen Metabolism in Plants in the Post genomic Era is an essential purchase for advanced students researchers and professionals in plant sciences biochemistry physiology molecular biology genetics and agricultural sciences working in the academic and industrial sectors Libraries in all universities and research establishments where these subjects are studied and taught will need copies of this excellent volume on their shelves

Annual Plant Reviews, Phosphorus Metabolism in Plants William Plaxton, Hans Lambers, 2015-03-25 The development of phosphorus P efficient crop varieties is urgently needed to reduce agriculture s current over reliance on expensive environmentally destructive non renewable and inefficient P containing fertilizers The sustainable management of P in agriculture necessitates an exploitation of P adaptive traits that will enhance the P acquisition and P use efficiency of crop plants Action in this area is crucial to ensure sufficient food production for the world s ever expanding population and the overall economic success of agriculture in the 21st century This informative and up to date volume presents pivotal research directions that will facilitate the development of effective strategies for bioengineering P efficient crop species The 14 chapters reflect the expertise of an international team of leading authorities in the field who review information from current literature develop novel hypotheses and outline key areas for future research By evaluating aspects of vascular plant and green algal P uptake and metabolism this book provides insights as to how plants sense acquire recycle scavenge and use P particularly under the naturally occurring condition of soluble inorganic phosphate deficiency that characterises the vast majority of unfertilised soils worldwide The reader is provided with a full appreciation of the diverse information

concerning plant P starvation responses as well as the crucial role that plant microbe interactions play in plant P acquisition

Annual Plant Reviews Volume 48 Phosphorus Metabolism in Plants is an important resource for plant geneticists biochemists and physiologists as well as horticultural and environmental research workers advanced students of plant science and university lecturers in related disciplines It is an essential addition to the shelves of university and research institute libraries and agricultural and ecological institutions teaching and researching plant science

Annual Plant Reviews, Senescence Processes in Plants Susheng Gan, 2008-04-15 The scientific and economic significance of plant senescence means that much effort has been made to understand the processes involved and to devise means of manipulating them agriculturally During the past few years there has been considerable progress in this regard especially in the molecular genetic and genomic aspects Senescence has a tremendous impact on agriculture For example leaf senescence limits crop yield and biomass production and contributes substantially to postharvest loss in vegetable and ornamental crops during transportation storage and on shelves In addition proteins antioxidants and other nutritional compounds are degraded during senescence Senescing tissues also become more susceptible to pathogen infection and some of the pathogens may produce toxins rendering food unsafe Mitotic senescence may also determine sizes of leaves fruits and whole plants This volume summarizes recent progresses in the physiology biochemistry cell biology molecular biology genomics proteomics and biotechnology of plant senescence Beginning with a chapter on senescence related terminology and our current knowledge of mitotic senescence in plants a less well studied area the book focuses on post mitotic senescence and includes chapters addressing the senescence of leaves flowers and fruits Later chapters examine the development of various new biotechnologies for manipulating the senescence processes of fruit and leaves some of which are approaching commercialization The book is directed at researchers and professionals in plant molecular genetics physiology and biochemistry

Annual Plant Reviews, Intercellular Communication in Plants Andrew J. Fleming, 2009-02-12 **Annual Plant Reviews Volume 16 Intercellular communication in plants** plays a vital role in the co ordination of processes leading to the formation of a functional organism The signalling systems must function at a local level to co ordinate events of cellular differentiation over long distances to co ordinate developmental and physiological responses in different parts of the plant and they must even operate between separate individuals for example to control fertilization as part of the evolutionary strategy of a particular species To cope with the diverse requirements for intercellular signalling plants have evolved a spectrum of molecular mechanisms and significant progress has been made over the last few years in our understanding of these processes This volume provides an overview of our current understanding of intercellular communication in plants with an emphasis on those research areas showing significant recent progress and promise It is directed at researchers and professionals in plant biochemistry physiology cell biology and molecular biology

Annual Plant Reviews, Regulation of Transcription in Plants Klaus D. Grasser, 2008-04-15 Regulation of transcription represents a major controlling step in plant gene expression as it determines

the tissue specific and developmental stage specific activity of many genes Changes in gene expression have been shown to underlie the responses to environmental cues and stresses the response against pathogens the regulation of metabolic pathways and the regulation of photosynthesis for example Regulation by transcription factors is an integral part of a highly complex network In recent years research on the regulation of transcription has made impressive progress This volume provides a broad overview of the regulation of transcription in plants introducing the key elements the way in which it works in practice and the potential within plant biotechnology It is directed at researchers and professionals in plant molecular biology biochemistry and biotechnology

Transporters and Pumps in Plant Signaling Markus Geisler, Kees

Venema, 2010-10-17 Due to their sessile lifestyle plants need to efficiently adapt to changing environmental conditions during their life cycle Nutrient acquisition from the soil has to be able to adapt to considerable fluctuations in concentrations to ensure adequate distribution between tissues cells and organelles The storage and retrieval of nutrients metabolites or toxic substances in vacuoles plays an important part in cellular homeostasis in plants The long range transport and maintenance of turgor is critically dependent on the availability of water and rate of evaporation while at the same time photosynthetic products have to be transported to all plant parts As a result plants contain a large number of ATP dependent pumps and secondary transporters that in order to adapt to the changing environment need to be regulated by a complex network of sensing and signaling mechanisms Plants share many basic elements of signal transduction with animals but also contain plant specific signaling molecules and mechanisms In this volume the role of transporters and pumps in the regulation of movement long range transport and compartmentalization of water solutes nutrients and classical signaling molecules is highlighted and the function regulation and membrane transporter interaction and their roles in plant signaling controlling plant physiology and development are discussed

Pollen Tip Growth Gerhard Obermeyer, José Feijó, 2017-06-13

This book focuses on the biophysical aspects of tip growth How do physical parameters like pressure water potential electrical fields or ion currents contribute to and influence this specialized and highly dynamic form of cell growth It provides an updated and balanced overview of the current state of knowledge and future research perspectives regarding how pollen tubes growth is driven and regulated by molecular interactions underlying the cellular processes The individual chapters address topics ranging from molecular biophysical concepts to comprehensive omic studies and computational modeling of the tip growth process In addition a chapter on root hair cells is included to provide an alternative view on the underlying molecular principles of tip growth in general Each chapter provides a summary of cutting edge techniques results and experimental data a statement hypothesis or conclusion on the importance of the aspect described for tip growth particularly pollen tip growth and addresses open gaps in our understanding and potential approaches to remedying them The book offers experimental and theoretical solutions to help established researchers and newcomers to the field alike solve the many mysterious behaviors of pollen tube tips

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. **Quantitative Understanding of Biosystems** Thomas M. Nordlund, Peter M. Hoffmann, 2019-04-16. Praise for the prior edition: The author has done a magnificent job; this book is highly recommended for introducing biophysics to the motivated and curious undergraduate student. Contemporary Physics: a terrific text will enable students to understand the significance of biological parameters through quantitative examples, a modern way of learning biophysics. American Journal of Physics: A superb pedagogical textbook. Full color illustrations aid students in their understanding. Midwest Book Review: This new edition provides a complete update to the most accessible yet thorough introduction to the physical and quantitative aspects of biological systems and processes involving macromolecules, subcellular structures and whole cells. It includes two brand new chapters covering experimental techniques especially atomic force microscopy complementing the updated coverage of mathematical and computational tools. The authors have also incorporated additions to the multimedia component of video clips and animations as well as interactive diagrams and graphs. Thomas Nordlund is professor emeritus in the Department of Physics at The University of Alabama at Birmingham. He is an elected fellow of the American Physical Society and has been studying biomolecular dynamics for over thirty years. Peter M Hoffmann is a professor in the Department of Physics and Astronomy at Wayne State University in Detroit, Michigan where he founded the biomedical physics program. He has been involved in soft matter and biophysics research for twenty five years and earned his PhD in materials science and engineering from Johns Hopkins University. **Plant Trichomes** J. A.

Callow, David L. Hallahan, J. C. Gray, 2000-03-22. This volume is a collection of review articles by leading scientists involved in various aspects of work involving plant hairs or trichomes. The scope of the volume is broad, representing the fact that there is interest in these structures for researchers in diverse fields including plant anatomy, taxonomy, cell and molecular biology, biochemistry and ecology. **Intercellular Communication in Plants** Andrew J. Fleming, 2005. Intercellular

Communication in Plants provides an overview of intercellular signaling systems capitalizing on the results of contemporary

molecular biology Many biological phenomena are controlled by intercellular signaling systems initiated by messenger molecules For example intercellular communication channels are thought to be associated with a plant's growth and dormancy development an important adaptive strategy for the survival and regrowth of temperate perennials This volume is directed at researchers and professionals in plant biochemistry physiology cell biology and molecular biology in both the academic and industrial sectors

Handbook of Plant and Crop Physiology Mohammad Pessarakli, 2021-07-12 Continuous discoveries in plant and crop physiology have resulted in an abundance of new information since the publication of the third edition of the Handbook of Plant and Crop Physiology Following its predecessors the fourth edition of this well regarded handbook offers a unique comprehensive and complete collection of topics in the field of plant and crop physiology Divided into eleven sections for easy access of information this edition contains more than 90 percent new material substantial revisions and two new sections The handbook covers the physiology of plant and crop growth and development cellular and molecular aspects plant genetics and production processes The book presents findings on plant and crop growth in response to climatic changes and considers the potential for plants and crops adaptation exploring the biotechnological aspects of plant and crop improvement This content is used to plan implement and evaluate strategies for increasing plant growth and crop yield Readers benefit from numerous tables figures case studies and illustrations as well as thousands of index words all of which increase the accessibility of the information contained in this important handbook New to the Edition Contains 37 new chapters and 13 extensively revised and expanded chapters from the third edition of this book Includes new or modified sections on soil plant water nutrients microorganisms physiological relations and on plant growth regulators both promoters and inhibitors Additional new and modified chapters cover the physiological responses of lower plants and vascular plants and crops to metal based nanoparticles and agrichemicals and the growth responses of plants and crops to climate change and environmental stresses With contributions from 95 scientists from 20 countries this book provides a comprehensive resource for research and for university courses covering plant and crop physiological responses under normal and stressful conditions ranging from cellular aspects to whole plants

The Model Legume *Medicago truncatula*, 2 Volume Set Frans J. de Bruijn, 2020-01-29 Fully covers the biology biochemistry genetics and genomics of *Medicago truncatula* Model plant species are valuable not only because they lead to discoveries in basic biology but also because they provide resources that facilitate translational biology to improve crops of economic importance Plant scientists are drawn to models because of their ease of manipulation simple genome organization rapid life cycles and the availability of multiple genetic and genomic tools This reference provides comprehensive coverage of the Model Legume *Medicago truncatula* It features review chapters as well as research chapters describing experiments carried out by the authors with clear materials and methods Most of the chapters utilize advanced molecular techniques and biochemical analyses to approach a variety of aspects of the Model The Model Legume *Medicago truncatula* starts with an examination of *M. truncatula* plant development biosynthesis of natural

products stress and *M. truncatula* and the *M. truncatula* *Sinorhizobium meliloti* symbiosis Symbiosis of *Medicago truncatula* with arbuscular mycorrhiza comes next followed by chapters on the common symbiotic signaling pathway CSSP or SYM and infection events in the *Rhizobium* legume symbiosis Other sections look at hormones and the rhizobial and mycorrhizal symbioses autoregulation of nodule numbers AON in *M. truncatula* *Medicago truncatula* databases and computer programs and more Contains reviews original research chapters and methods Covers most aspects of the *M. truncatula* Model System including basic biology biochemistry genetics and genomics of this system Offers molecular techniques and advanced biochemical analyses for approaching a variety of aspects of the Model Legume *Medicago truncatula* Includes introductions by the editor to each section presenting the summary of selected chapters in the section Features an extensive index to facilitate the search for key terms The Model Legume *Medicago truncatula* is an excellent book for researchers and upper level graduate students in microbial ecology environmental microbiology plant genetics and biochemistry It will also benefit legume biologists plant molecular biologists agrobiologists plant breeders bioinformaticians and evolutionary biologists

Progress in Botany Vol. 85 Ulrich Lüttge, Francisco M. Cánovas, María Carmen Risueño Almeida, Christoph Leuschner, Hans Pretzsch, 2024-12-10 With one volume each year this series keeps scientists and advanced students informed of the latest developments and results in all areas of the plant sciences This latest volume includes reviews on plant physiology biochemistry genetics and genomics forests and ecosystems

Fluid Mechanics Pijush K. Kundu, Ira M. Cohen, David R Dowling, 2015-06-08 The classic textbook on fluid mechanics is revised and updated by Dr David Dowling to better illustrate this important subject for modern students With topics and concepts presented in a clear and accessible way Fluid Mechanics guides students from the fundamentals to the analysis and application of fluid mechanics including compressible flow and such diverse applications as aerodynamics and geophysical fluid mechanics Its broad and deep coverage is ideal for both a first or second course in fluid dynamics at the graduate or advanced undergraduate level and is well suited to the needs of modern scientists engineers mathematicians and others seeking fluid mechanics knowledge Over 100 new examples designed to illustrate the application of the various concepts and equations featured in the text A completely new chapter on computational fluid dynamics CFD authored by Prof Gretar Tryggvason of the University of Notre Dame This new CFD chapter includes sample Matlab™ codes and 20 exercises New material on elementary kinetic theory non Newtonian constitutive relationships internal and external rough wall turbulent flows Reynolds stress closure models acoustic source terms and unsteady one dimensional gas dynamics Plus 110 new exercises and nearly 100 new figures

Specialised membrane domains of plasmodesmata, plant intercellular nanopores Jens Tilsner, Emmanuelle Bayer, Sébastien MONGRAND, Lesley Torrance, 2014-12-17 Plasmodesmata PD are plant specific intercellular nanopores defined by specialised domains of the plasma membrane PM and the endoplasmic reticulum ER both of which contain unique proteins and probably different lipid compositions than the surrounding bulk membranes The PD membranes form concentric

tubules with a minimal outer diameter of only 50 nm and the central ER strand constricted to 10–15 nm representing one of the narrowest stable membrane tubules in nature. This unique membrane architecture poses many biophysical structural and functional questions. PM continuity across PD raises the question as to how a locally confined membrane site is established and maintained at PD. There is increasing evidence that the PM within PD may be enriched in membrane rafts or TET web domains. Lipid rafts often function as signalling platforms in line with the emerging view of PD as central players in plant defense responses. Lipid–lipid immiscibility could also provide a mechanism for membrane sub-compartmentalisation at PD. Intricate connections of the PM to the wall and the underlying cytoskeleton and ER may anchor the specialised domains locally. The ER within PD is even more strongly modified. Its extreme curvature suggests that it is stabilised by densely packed proteins, potentially members of the reticulon family that tubulate the cortical ER. The diameter of the constricted ER within PD is similar to membrane stalks in dynamin-mediated membrane fission during endocytosis and may need to be stabilised against spontaneous rupture. The function of this extreme membrane constriction and the reasons why the ER is connected between plant cells remain unknown. Whilst the technically challenging search for the protein components of PD is ongoing, there has been significant recent progress in research on biological membranes that could benefit our understanding of PD function. With this Research Topic we therefore aim to bring together researchers in the PD field and those in related areas such as membrane biophysics, membrane composition and fluidity, protein–lipid interactions, lateral membrane heterogeneity, lipid rafts, membrane curvature and membrane fusion/fission. We wish to address questions such as: What mechanisms restrict lateral mobility of proteins and lipids along the PD membranes? How can specific proteins be targeted to and turned over from membrane domains with restricted lateral access? What elements (lipids, proteins, membrane curvature, packing order, thickness, etc.) may contribute to the identity of PD membranes? How do the structural and functional features of PD compare to other ER/PM contact sites? How is the high curvature of the PD ER stabilised and what are possible functions of such a tightly constricted membrane tubule? Do PD need to be prevented from spontaneous collapse and sealing? What technologies are available to address these questions that can underpin PD research? We welcome interested individuals to contribute their expertise and develop new hypotheses on the particular biological and biophysical questions posed by PD. We are particularly looking for articles: Original Research Articles, Technical Advances and State of the Art reviews that would expand on or challenge current perceptions of PD and stimulate discussion.

Plants Under Stress Hamlyn G. Jones, T. J. Flowers, M. B. Jones, 1989-10-27. The volume identifies how stressful conditions affect plants. Various stresses can have a major impact on plant growth and survival. This book examines some of the more important stresses, shows how they affect the plant and then reviews how new varieties or new species can be selected which are less vulnerable to stress.

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