Patterns In Plant Development

Plant Growth and DevelopmentMechanisms in Plant DevelopmentPlant Growth and DevelopmentPlant DevelopmentPlant Development and EvolutionPatterns in Plant DevelopmentEpigenetics in Plant DevelopmentRoles and regulatory mechanisms of microRNA in plant development, evolution, and adaptationEvolution of Gene Regulatory Networks in Plant DevelopmentModel Organisms in Plant Developmental Biology — their effectiveness and limitationsNovel Aspects of Nucleolar Functions in Plant Growth and DevelopmentDevelopmental Biology of Flowering PlantsPhytohormonesThe Control of Growth and Differentiation in PlantsPlant Development and OrganogenesisProgress in Plant Growth RegulationPlant DevelopmentHormone Action in Plant DevelopmentCellular Integration of Signalling Pathways in Plant DevelopmentHormone Action in Plant Development Donald E. Fosket Ottoline Leyser Aldo Carl Leopold R.F. Lyndon Taylor A. Steeves Mingli Xu Lei Li Federico Valverde Neelima Roy Sinha Munetaka Sugiyama V. Raghavan Mohamed A. El-Esawi P. F. Wareing Giovanna Frugis C.M. Karssen Marja Timmermans Long Ashton Research Station Fiorella Lo Schiavo Gordon Victor Hoad

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plant growth and development a molecular approach presents the field of plant development from both molecular and genetic

perspectives this field has evolved at a rapid rate over the past five years through the increasing exploitation of the remarkable plant arabidopsis the small genome rapid life cycle and ease of transformation of arabidopsis as well as the relatively large number of laboratories that are using this plant for their research have lead to an exponential increase in information about plant development mechanisms in plant growth and development a molecular approach professor fosket synthesizes this flood of new information in a way that conveys to students the excitement of this still growing field his textbook is based on notes developed over more than ten years of teaching a course on the molecular analysis of plant growth and development and assumes no special knowledge of plant biology it is intended for advanced undergraduates in plant development as well as those in plant molecular biology graduate students and researchers who are just beginning to work in the field will also find much valuable information in this book each chapter concludes with questions for study and review as well as suggestions for further reading illustrated with two color drawings and graphs throughout and containing up to date and comprehensive coverage plant growth and development a molecular approach will excite and inform students as it increases their understanding of plant science presents plant development from a molecular and cellular perspective illustrates concepts with two colour diagrams throughout offers key study questions and guides to further reading within each chapter gives an up to date and thorough treatment of this increasingly important subject area derived from the author s many years of teaching plant developmental biology

intended for undergraduate and graduate courses in plant development this book explains how the cells of a plant acquire and maintain their specific fates plant development is a continuous process occurring throughout the life cycle with similar regulatory mechanisms acting at different stages and in different parts of the plant rather than focussing on the life cycle the book is structured around these underlying mechanisms using case studies to provide students with a framework to understand the many factors both environmental and endogenous that combine to regulate development and generate the enormous diversity of plant forms new approach to the study of plant development and a refreshing look at this fast moving area authors focus their discussion on the basic mechanisms which underpin plant development tackling the fundamental question of how a single cell becomes a complex flowering plant from a cellular perspective an up to date modern text in plant development for advanced level undergraduates and postgraduates in plant science thought provoking treatment of a difficult subject the text will satisfy the needs of advanced level undergraduates and postgraduates in plant science experimental case studies throughout the artwork from the book is available at blackwellpublishing com leyser

discusses various stages of plant life emphasizing modern concepts and experiments dealing with physiology bibliogs

the study of plant development in recent years has often been concerned with the effects of the environment and the possible

involvement of growth substances the prevalent belief that plant growth substances are crucial to plant development has tended to obscure rather than to clarify the underlying cellular mechanisms of development the aim in this book is to try to focus on what is currently known and what needs to be known in order to explain plant development in terms that allow further experimentation at the cellular and molecular levels we need to know where and at what level in the cell or organ the critical processes controlling development occur then we will be better able to under stand how development is controlled by the genes whether directly by the continual production of new gene transcripts or more indirectly by the genes merely defining self regulating systems that then function autonomously this book is not a survey of the whole of plant development but is meant to concentrate on the possible component cellular and molecular processes involved consequently a basic knowledge of plant structure is assumed the facts of plant morphogenesis can be obtained from the books listed in the general reading section at the end of chapter 1 although references are not cited specifically in the text the key references for each section are denoted by superscript numbers and listed in the notes section at the end of each chapter

plant development and evolution the latest release in the current topics in developmental biology series highlights new advances in the field with this new volume presenting interesting chapters on the evolution of the plant body plan lateral root development and its role in evolutionary adaptation the development of the vascular system the development of the shoot apical meristem and phyllotaxis the evolution of leaf diversity the evolution of regulatory networks in land plants the role of programed cell death in plant development the development and evolution of inflorescence architecture the molecular regulation of flower development the pre meiotic another development and much more provides the authority and expertise of leading contributors from an international board of authors presents the latest release in the current topics in developmental biology series updated release includes the latest information on plant development and evolution

development in the vascular embryogenesis beginnings of development experimental and analytical studies of embryogenesis the structure of the shoot apex analytical studies of the shoot apex experimental investigations on the shoot apex organogenesis in the shoot leaf origin and position organogenesis in the shoot the determination of leaves and branches organogenesis in the shoot later stages if leaf development shoot expansion modified shoot development and flowering the root differentiation of the plant body early stages differentation of the plant body later stages secondary growth the vascular cambium secondary growth experimental studies on the cambium the cellular basis of organization

during their life cycle plants undergo a wide variety of morphological and developmental changes impinging these developmental

processes there is a layer of gene protein and metabolic networks that are responsible for the initiation of the correct developmental transitions at the right time of the year to ensure plant life success new omic technologies are allowing the acquisition of massive amount of data to develop holistic and integrative analysis to understand complex processes among them microarray next generation sequencing ngs and proteomics are providing enormous amount of data from different plant species and developmental stages thus allowing the analysis of gene networks globally besides the comparison of molecular networks from different species is providing information on their evolutionary history shedding light on the origin of many key genes proteins moreover developmental processes are not only genetically programed but are also affected by internal and external signals metabolism light hormone action temperature biotic and abiotic stresses etc have a deep effect on developmental programs the interface and interplay between these internal and external circuits with developmental programs can be unraveled through the integration of systematic experimentation with the computational analysis of the generated omics data molecular systems biology this research topic intends to deepen in the different plant developmental pathways and how the corresponding gene networks evolved from a molecular systems biology perspective global approaches for photoperiod circadian clock and hormone regulated processes pattern formation phase transitions organ development etc will provide new insights on how plant complexity was built during evolution understanding the interface and interplay between different regulatory networks will also provide fundamental information on plant biology and focus on those traits that may be important for next generation agriculture

model organisms represent an invaluable resource for fundamental and applied research allowing the identification of the mechanistic basis of evolutionary innovations this article collection will showcase studies of established as well as emerging model organisms in plant developmental biology their effectiveness and limitations that have significance to the field broadly including evodevo classically used for genetic and molecular studies in plant biology model organisms are progressively entering many subdisciplines within plant development and evodevo recent advancements in the fast growing field of plant model organisms and their hugely increased phylogenetic breadth and availability of genomes and transgenic techniques have led to a burst of innovative ideas and synthesis in recent publications spanning the range from an analysis of fossils to single cell sequencing however it also raises the question of how broad is the application of knowledge gained from these studies and its relevance to the field of plant development and evodevo to address those questions this research topic focuses on new insights latest discoveries current challenges and future perspectives in the study of model organisms and how much knowledge gained from them can be extrapolated broadly authors are encouraged to identify the greatest unifying concepts in their sub disciplines and the challenges emerging from the use of model plants as well as to put forward potential solutions to address those challenges

the nucleolus is a prominent nuclear domain that is common to eukaryotes since the nucleolus was first described in the 1830s its identity had remained a mystery for longer than 100 years major advances in understanding of the nucleolus were achieved through electron microscopic and biochemical studies in the 1960s to 1970s followed by molecular biological studies these studies finally established the view of the nucleolus that it is a large aggregate of rna protein complexes associated with the rrna gene region of chromosome dna serving mainly as a site of ribosome biogenesis where pre rrna transcription pre rrna processing and ribosome assembly occur this function of the nucleolus appears to indicate that the nucleolus plays a constitutive and essential role in fundamental cellular activities by producing ribosomes recent research has shown however that the nucleolus is more dynamic and can have more specific and wider functions in plants nucleolar functions have been implicated in developmental regulations and environmental responses by accumulating pieces of evidence obtained mostly from genetic studies of nucleolar factor related mutants comprehensive analysis of nucleolar proteins and molecular cytological characterization of sub nucleolar and peri nucelolar bodies have also provided new insights into behaviors and functions of the plant nucleolus in this research topic we would like to collect physiological and molecular links between the nucleolus to plant growth and development shed light on novel aspects of nucleolar functions beyond its classical view and stimulate research activities focusing on the nucleolus across various fields of plant science including molecular biology cell biology genetics developmental biology physiology and evolutionary biology

the study of the development of flowering plants may be said to be in the throes of a revolution the literature on the subject is extensive and continues to grow rapidly as new discoveries pile one on top of the other moreover these striking advances in our knowledge have put plant developmental biology well ahead of other aspects of the study of plants this has come about after a period of neglect and stagnation in the field and has been triggered by the power of recombinant dna technology to analyze genetic information and by a fruitful cross fertilization between physiology genetics and molecular biology whereas considerations of developmental phenomena were at one time largely restricted to the structure and physiology of a wide selection of plants recent molecular and genetic approaches are focused on one or two model systems notwithstanding the difficulty of having to relate developmental mechanisms in a few experimentally attractive models to the enormous range of plants the use of model systems has gained wide accep tance this book is intended to meet the need for a unified account of the general principles of development of flowering plants representing structural physiolog ical biochemical genetic and molecular perspectives it arose out of the revision and upgrading of an undergraduate course in plant development that i have taught here at the ohio state university for more than 20 years

phytohormones are regulatory compounds that play crucial roles in plants this book brings together recent work and progress that has recently been made in the dynamic field of phytohormone regulation in plant development and stress responses it also provides new

insights and sheds new light regarding the exciting hormonal cross talk phenomenon in plants this book will provoke interest in many readers and scientists who can find this information useful for the advancement of their research works

the way plants grow and develop organs significantly impacts the overall performance and yield of crop plants the basic knowledge now available in plant development has the potential to help breeders in generating plants with defined architectural features to improve productivity plant translational research effort has steadily increased over the last decade due to the huge increase in the availability of crop genomic resources and arabidopsis based sequence annotation systems however a consistent gap between fundamental and applied science has yet to be filled one critical point often brought up is the unreadiness of developmental biologists on one side to foresee agricultural applications for their discoveries and of the breeders to exploit gene function studies to apply to candidate gene approaches when advantageous on the other in this book both developmental biologists and breeders make a special effort to reconcile research on the basic principles of plant development and organogenesis with its applications to crop production and genetic improvement fundamental and applied science contributions intertwine and chase each other giving the reader different but complementary perspectives from only apparently distant corners of the same world

the current growing interest of molecular biologists in plant hormone research is undoubtedly the most promising development of recent times many papers were presented during the 14th international conference on plant growth substances illustrating the impact of this new approach on our understanding of hormone controlled processes the specific character is the integrated study of plant growth regulation at all levels ranging from single molecules to the entire plant and its functioning in the environment hormones play an essential role in the regulation but not an exclusive one other compounds and factors such as ca2 for instance are often of equal relevance because they may take part in the signal transduction pathway moreover regulation of the regulator by non hormonal factors is an essential part of any control mechanism the present volume reflects the change in interest from plant growth substances to plant growth regulation

a subgroup of homeobox genes which play an important role in the developmental processes of a variety of multicellular organisms hox genes have been shown to play a critical role in vertebrate pattern formation hox genes can be thought of as general purpose control genes that is they are similar in many organisms and direct the same processes in a variety of organisms from mouse to fly to human provides researchers an overview and synthesis of the latest research findings and contemporary thought in the area inclusion of chapters that discuss the evolutionary development of a wide variety of organisms gives researchers and clinicians insight into how defective hox genes trigger developmental abnormalities in embryos

in the last few years there have been tremendous advances in the understanding of signals and signalling pathways that operate at the cellular level and lead to developmental processes in 27 chapters this volume investigates the cellular and molecular basis of plant development it highlights the most recent progress on signals machinery and pathways in the plant cell emphasis is placed on integrating these studies with those on cell division cell plate formation and other aspects of plant development in order to elucidate the intricate relationships between them

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