

Discoveries In Plant Biology Vol Ii

Metabolomics – which deals with all metabolites of an organism – is a rapidly-emerging sector of post-genome research fields. It plays significant roles in a variety of fields from medicine to agriculture and holds a fundamental position in functional genomics studies and their application in plant biotechnology. This volume comprehensively covers plant metabolomics for the first time. The chapters offer cutting-edge information on analytical technology, bioinformatics and applications. They were all written by leading researchers who have been directly involved in plant metabolomics research throughout the world. Up-to-date information and future developments are described, thereby producing a volume which is a landmark of plant metabolomics research and a beneficial guideline to graduate students and researchers in academia, industry, and technology transfer organizations in all plant science fields.

Plant embryology, dealing with the regularities of initiation and the first stages of development of an organism, is now flourishing because of the overall progress being made in natural sciences. Such discoveries of the 20th century as production of plants from a single somatic cell, experimental haploidy, and parasexual hybridization were of gene

Sunday Times Bestseller ‘A paradigm-smashing chronicle of joyous entanglement’ Charles Foster Waterstones Non-Fiction Book of the Month (September) Are trees social beings? How do trees live? Do they feel pain or have awareness of their surroundings?

A single species of fly, Drosophila melanogaster, has been the subject of scientific research for more than one hundred years. Why does this tiny insect merit such intense scrutiny? Drosophila’s importance as a research organism began with its short life cycle, ability to reproduce in large numbers, and easy-to-see mutant phenotypes. Over time, laboratory investigation revealed surprising similarities between flies and other animals at the level of genes, gene networks, cell interactions, physiology, immunity, and behavior. Like humans, flies learn and remember, fight microbial infection, and slow down as they age. Scientists use Drosophila to investigate complex biological activities in a simple but intact living system. Fly research provides answers to some of the most challenging questions in biology and biomedicine, including how cells transmit signals and form ordered structures, how we can interpret the wealth of human genome data now available, and how we can develop effective treatments for cancer, diabetes, and neurodegenerative diseases. Written by a leader in the Drosophila research community, First in Fly celebrates key insights uncovered by investigators using this model organism. Stephanie Elizabeth Mohr draws on these “first in fly” findings to introduce fundamental biological concepts gained over the last century and explore how research in the common fruit fly has expanded our understanding of human health and disease.

Agrobacterium tumefaciens is a soil bacterium that for more than a century has been known as a pathogen causing the plant crown gall disease. Unlike many other pathogens, Agrobacterium has the ability to deliver DNA to plant cells and permanently alter the plant genome. The discovery of this unique feature 30 years ago has provided plant scientists with a powerful tool to genetically transform plants for both basic research purposes and for agric- tural development. Compared to physical transformation methods such as particle bomba- ment or electroporation, Agrobacterium-mediated DNA delivery has a number of advantages. One of the features is its propensity to generate single or a low copy number of integrated transgenes with defined ends. Integration of a single transgene copy into the plant genome is less likely to trigger “gene silencing” often associated with multiple gene insertions. When the first edition of Agrobacterium Protocols was published in 1995, only a handful of plants could be routinely transformed using Agrobacterium. Ag- bacterium-mediated transformation is now commonly used to introduce DNA into many plant species, including monocotyledon crop species that were previously considered non-hosts for Agrobacterium. Most remarkable are recent devel- ments indicating that Agrobacterium can also be used to deliver DNA to non-plant species including bacteria, fungi, and even mammalian cells.

Molecular Plant Breeding

Biology of Plant Volatiles

Volume II: Plant Genomics and Biotechnology

Pollen Terminology

The genetic manipulation of plants

An illustrated handbook

As scientific progress hinges on the continual discovery and extension of previous discoveries, this series, Discoveries in Plant Biology, is specially compiled to provide an atlas of the landmark discoveries in the broad span of plant biology. The collection of chapters, written by renowned plant biologists, describe how classic discoveries were made and how they have served as the foundation for subsequent discoveries. We hope that this will facilitate our readers’ quest to advance their knowledge based on the advancements made previously by others. The 21 discoveries described in this First Volume all form the foundations of modern plant biology. The contributors, many of whom are themselves the researchers who made the discoveries, bring readers back in time to retrace the steps of the discoveries. Following the creative thoughts of the scientists in deciphering the natural laws, readers may appreciate how each field was developed from a simple subject to an advanced multidisciplinary field. Contents:Abscisic Acid: Discoveries and Exploration of Properties (F T Addicott)History of the Discovery of Ethylene as a Plant Growth Substance (M E Saltveit et al.)The Discovery of Transposable Elements (N Fedoroff)Discovery of T-DNA Agrobacterium Tumefaciens (M P Gordon)The Discovery of Fraction 1 Protein (Rubisco) (S G Wildman)C4 Photosynthesis: Discovery, Resolution Recognition, and Significance (M D Hatch & C R Slack)The Path of Carbon in Photosynthesis: 1942 – 1955 (A A Benson)Discoveries in Biological Nitrogen Fixation (R H Burris)The Discovery of Biological Clocks (F B Salisbury)and other papers Readership: Students and researchers in botany, biochemistry, genetics and plant physiology. keywords:Botany;Plant Biology “ This excellent book should be present in all central libraries and in those of plant biology institutions. The book is recommended to advanced students and researchers. ” Journal of Plant Physiology

Abiotic stress drastically limits agricultural crop productivity worldwide. Climate change threatens the sustainable agriculture with its rapid and unpredictable effects, making it difficult for agriculturists and farmers to respond to the challenges cropping up from environmental stresses. In light of population growth and climate changes, investment in agriculture is the only way to avert wide scale food shortages. This challenge comes at a time when plant sciences are witnessing remarkable progress in understanding the fundamental processes of plant growth and development. Plant researchers have identified genes controlling different aspects of plant growth and development, but many challenges still exist in creating an apt infrastructure, access to bioinformatics and good crop results. Improvement of Crops in the Era of Climatic Changes, Volume 2 focuses on many existing opportunities that can be applied methodically through conventional breeding, without touching upon the latest discoveries such as the power of genomics to applied breeding in plant biology. Written by a diverse faction of internationally famed scholars, this volume adds new horizons in the field of crop improvement, genetic engineering and abiotic stress tolerance. Comprehensive and lavishly illustrated, Improvement of Crops in the Era of Climatic Changes, Volume 2 is a state-of-the-art guide to recent developments vis- à -vis various aspects of plant responses in molecular and biochemical ways to create strong yields and overall crop improvement.

Since the publication of the third edition of the Handbook of Plant and Crop Stress, continuous discoveries in the fields of plant and crop environmental stresses and their effects on plants and crops have resulted in the compilation of a large volume of the latest discoveries. Following its predecessors, this fourth edition offers a unique and comprehensive collection of topics in the fields of plant and crop stress. This new edition contains more than 80% new material, and the remaining 20% has been updated and revised substantially. This volume presents 10 comprehensive sections that include information on soil salinity and sodicity problems; tolerance mechanisms and stressful conditions; plant/crop responses; plant/crop responses under pollution and heavy metal; plant/crop responses under biotic stress; genetic factors and plant/crop genomics under stress conditions; plant/crop breeding under stress conditions; empirical investigations; improving tolerance; and beneficial aspects of stressors. Features: Provides exhaustive coverage written by an international panel of experts in the field of agriculture, particularly in plant/crop stress areas Contains 40 new chapters and 10 extensively revised and expanded chapters Includes three new sections on plant breeding, stress exerted to weeds by plants, and beneficial aspects of stress on plants/crops Numerous case studies With contributions from 100 scientists and experts from 20 countries, this Handbook provides a comprehensive resource for research and for university courses, covering soil salinity/sodicity issues and plant/crop physiological responses under environmental stress conditions ranging from cellular aspects to whole plants. The content can be used to plan, implement, and evaluate strategies to mitigate plant/crop stress problems. This new edition includes numerous tables, figures, and illustrations to facilitate comprehension of the material as well as thousands of index words to further increase accessibility to the desired information.

An accessible and compelling story of a scientist’s discovery of plant communication and how it influenced her research and changed her life. In this "phytobiography"--a collection of stories written in partnership with a plant--research scientist Monica Gagliano reveals the dynamic role plants play in genuine first-hand accounts from her research into plant communication and cognition. By transcending the view of plants as the objects of scientific materialism, Gagliano encourages us to rethink plants as people--beings with subjectivity, consciousness, and volition, and hence having the capacity for their own perspectives and voices. The book draws on up-close-and-personal encounters with the plants themselves, as well as plant shamans, indigenous elders, and mystics from around the world and integrates these experiences with an incredible research journey and the groundbreaking scientific discoveries that emerged from it. Gagliano has published numerous peer-reviewed scientific papers on how plants have a Pavlov-like response to stimuli and can learn, remember, and communicate to neighboring plants. She has pioneered the brand-new research field of plant bioacoustics, for the first time experimentally demonstrating that plants emit their own ‘voices’ and, moreover, detect and respond to the sounds of their environments. By demonstrating experimentally that learning is not the exclusive province of animals, Gagliano has re-ignited the discourse on plant subjectivity and ethical and legal standing. This is the story of how she made those discoveries and how the plants helped her along the way.

Life on Earth would be impossible without plants. Humans rely on plants for most clothing, furniture, food, as well as for many pharmaceuticals and other products. Plant genome sciences are essential to understanding how plants function and how to develop desirable plant characteristics. For example, plant genomic science can contribute to the development of plants that are drought-resistant, those that require less fertilizer, and those that are optimized for conversion to fuels such as ethanol and biodiesel. The National Plant Genome Initiative (NPGI) is a unique, cross-agency funding enterprise that has been funding and coordinating plant genome research successfully for nine years. Research breakthroughs from NPGI and the National Science Foundation (NSF) Arabidopsis 2010 Project, such as how the plant immune system controls pathogen defense, demonstrate that the plant genome science community is vibrant and capable of driving technological advancement. This book from the National Research Council concludes that these programs should continue so that applied programs on agriculture, bioenergy, and others will always be built on a strong foundation of fundamental plant biology research.

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Plant Biology and Biotechnology

Handbook of Plant and Crop Stress, Fourth Edition

Ethnobotany in the New Europe

Discoveries in Photosynthesis

Plant Biotechnology

A Text-Book for Students of Botany and Geology

Advances in Botanical Research

Reproductive Systems

Volume III

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. The present volume includes reviews on genetics, cell biology, physiology, comparative morphology, systematics, ecology, and vegetation science.

Palynology is important in basic as well as in manifold applied sciences, as e.g. biology, medicine, forensics, earth history, climatology and food production. This volume is the first fully illustrated handbook of palynological principles and glossary terms, exclusively using LM and EM micrographs of superior quality. A comprehensive General Chapter on pollen morphology, anatomy, pollen development etc. based on the present knowledge in palynology introduces the reader in the world of pollen. The glossary part comprises more than 300 widely used terms illustrated with over 1.000 high quality light and/or electron microscopic pictures to show the character range of a term. Terms are grouped by feature, e.g. ornamentation, where each term is illustrated on a separate page, definition and original citation included and where necessary, provided with a comprehensive explanatory comment. The term’s use in LM, SEM or TEM and its assignment to anatomical, morphological and/or functional pollen features is indicated by icons and colour coding, respectively. This handbook is not only a valuable source for students and researchers but also for all persons interested in pollen and its aesthetic beauty.

The study of European wild food plants and herbal medicines is an old discipline that has been invigorated by a new generation of researchers pursuing ethnobotanical studies in fresh contexts. Modern botanical and medical science itself was built on studies of Medieval Europeans ’ use of food plants and medicinal herbs. In spite of monumental changes introduced in the Age of Discovery and Mercantile Capitalism, some communities, often of immigrants in foreign lands, continue to hold on to old recipes and traditions, while others have adopted and enculturated exotic plants and remedies into their diets and pharmacopoeia in new and creative ways. Now in the 21st century, in the age of the European Union and Globalization, European folk botany is once again dynamically responding to changing cultural, economic, and political contexts. The authors and studies presented in this book reflect work being conducted across Europe ’ s many regions. They tell the story of the on-going evolution of human-plant relations in one of the most bioculturally dynamic places on the planet, and explore new approaches that link the re-evaluation of plant-based cultural heritage with the conservation and use of biocultural diversity.

Every square inch of soil is rich with energy and life, and nowhere is this more evident than in the garden. At the tips of our trowels, a sun-driven world of microbes, insects, roots, and stems awaits—and it is a world no one knows better than James Nardi. A charming guide to all things green and growing, Nardi is as at home in prairies, forests, and wetlands as he is in the vegetable patch. And with Discoveries in the Garden, he shows us that these spaces aren ’ t as different as we might think, that nature flourishes in our backyards, schoolyards, and even indoors. To find it, we ’ ve only got to get down into the dirt. Leading us through the garden gate, Nardi reveals the extraordinary daily lives and life cycles of a quick-growing, widely available, and very accommodating group of study subjects: garden plants. Through close observations and simple experiments we all can replicate at home, we learn the hidden stories behind how these plants grow, flower, set seeds, and produce fruits, as well as the vital role dead and decomposing plants play in nourishing the soil. From pollinators to parasites, plant calisthenics to the wisdom of weeds, Nardi ’ s tale also introduces us to our fellow animal and microbial gardeners, the community of creatures both macro- and microscopic with whom we share our raised beds. Featuring a copse of original, informative illustrations that are as lush as the garden plants themselves, Discoveries in the Garden is an enlightening romp through the natural history, science, beauty, and wonder of these essential green places.

Focussing on the lives of four great French missionary botanists as well as a group of other French priests, Franciscan missionaries, and a single German Protestant pastor who all amassed significant plant collections, the author unearths a lost chapter of botanical history.

A Fascinating Account of the Physical, Emotional, and Spiritual Relations Between Plants and Man

Pergamon International Library of Science, Technology, Engineering and Social Studies

Discoveries in Plant Biology

African Natural Plant Products

Discoveries in the Garden

A Guided Study

This book provides an excellent opportunity to delve into the current and future contributions that African plants can and will continue to make both internal to Africa and on the global stage. Plant genomics and biotechnology have recently made enormous strides, and hold the potential to benefit agriculture, the environment and various other dimensions of the human endeavor. It is no exaggeration to claim that the twenty-first century belongs to biotechnology. Knowledge generation in this field is growing at a frenetic pace, and keeping abreast of the latest advances and calls on us to double our efforts. Volume II of this two-part series addresses cutting-edge aspects of plant genomics and biotechnology. It includes 37 chapters contributed by over 70 researchers, each of which is an expert in his/her own field of research. Biotechnology has helped to solve many conundrums of plant life that had long remained a mystery to mankind. This volume opens with an exhaustive chapter on the role played by thale cress, Arabidopsis thaliana, which is believed to be the Drosophila of the plant kingdom and an invaluable model plant for understanding basic concepts in plant biology. This is followed by chapters on bioremediation, biofuels and biofertilizers through microalgal manipulation, making it a commercializable prospect; discerning finer details of biotic stress with plant-fungal interactions; and the dynamics of abiotic and biotic stresses, which also figure elsewhere in the book. Breeding crop plants for desirable traits has long been an endeavor of biotechnologists. The significance of molecular markers, marker assisted selection and techniques are covered in a dedicated chapter, as are comprehensive reviews on plant molecular biology, DNA fingerprinting techniques, genomic structure and functional genomics. A chapter dedicated to organellar genomes provides extensive information on this important aspect. Elsewhere in the book, the newly emerging area of epigenetics is presented as seen through the lens of biotechnology, showcasing the pivotal role of DNA methylation in effecting permanent and transient changes to the genome. Exclusive chapters deal with bioinformatics and systems biology. Handy tools for practical applications such as somatic embryogenesis and micropropagation are included to provide frontline information to entrepreneurs, as is a chapter on somaclonal variation. Overcoming barriers to sexual incompatibility has also long been a focus of biotechnology, and is addressed in chapters on wide hybridization and hybrid embryo rescue. Another area of accomplishing triploids through endosperm culture is included as a non-conventional breeding strategy. Secondary metabolite production through tissue cultures, which is of importance to industrial scientists, is also covered. Worldwide exchange of plant genetic material is currently an essential topic, as is conserving natural resources in situ. Chapters on in vitro conservation of extant, threatened and other valuable germplasms, gene banking and related issues are included, along with an extensive account of the biotechnology of spices – the low-volume, high-value crops. Metabolic engineering is another emerging field that provides commercial opportunities. As is well known, there is widespread concern over genetically modified crops among the public. GM crops are covered, as are genetic engineering strategies for combating biotic and abiotic stresses where no other solutions are in sight. RNAi- and micro RNA-based strategies for crop improvement have proved to offer novel alternatives to the existing non-conventional techniques, and detailed information on these aspects is also included. The book’s last five chapters are devoted to presenting the various aspects of environmental, marine, desert and rural biotechnology. The state-of-the-art coverage on a wide range of plant genomics and biotechnology topics will be of great interest to post-graduate students and researchers, including the employees of seed and biotechnology companies, and to instructors in the fields of plant genetics, breeding and biotechnology.

Advanced Topics In Biotechnology And Plant Biology is a comprehensive survey of the major topics in Biotechnology and plant biology. The book comprises 12 articles, written by experts in their

