

The Biochemistry of Plants

A COMPREHENSIVE TREATISE

P. K. Stumpf and E. E. Conn

EDITORS-IN-CHIEF

Volume 9

Lipids:

Structure and Function

P. K. Stumpf

EDITOR

Lipids Structure And Function Volume 9 The Biochemistry Of Plants

Denis J. Murphy



Lipids Structure And Function Volume 9 The Biochemistry Of Plants:

The Biochemistry of Plants, 2012-12-02 The Biochemistry of Plants Volume 14 Carbohydrates provides information pertinent to the fundamental aspects of plant biochemistry This book deals with the function and structure of the plant cell wall by describing the physical and chemical properties of cell wall components Organized into 11 chapters this volume begins with an overview of hexose phosphate metabolism in nonphotosynthetic tissues This text then examines the findings in fructan structures conformations and linkages the enzymes involved in fructan synthesis and degradation and their cellular regulation location and metabolic role in plants Other chapters consider the methods employing enzymes to determine starch structure This book discusses as well the different biosynthetic modes of plant cell walls The final chapter deals with the various environmental factors that influence expression of the amylase gene suggesting how molecular biology may help in understanding carbohydrate biochemistry and the enzymes involved in carbohydrate synthesis and metabolism This book is a valuable resource for plant biochemists Plant Biochemistry P. M. Dey,J. B. Harborne,1997-02-03 Plant Biochemistry provides students and researchers in plant sciences with a concise general account of plant biochemistry The edited format allows recognized experts in plant biochemistry to contribute chapters on their special topics Up to date surveys are divided into four sections the cell primary metabolism special metabolism and the plant and the environment There is a strong emphasis on plant metabolism as well as enzymological methodological molecular biological functional and regulatory aspects of plant biochemistry Illustrations of metabolic pathways are used extensively and further reading lists are also included The coverage of the subject is divided into four sections The plant cell describing both molecular components and function Primary metabolism including the pathways of carbohydrate lipid nitrogen nucleic acid and protein metabolism as well as gene regulation Special metabolism chapters on phenolics isoprenoids and secondary nitrogen compounds The plant and the environment discussions of pathology ecology and biotechnology at the molecular level The Metabolism, Structure, and Function of Plant Lipids Paul K. Stumpf,J. Brian Mudd,W. David Nes,2012-12-06 The Seventh International Symposium on the Structure and Function of Plant Lipids took place at the University of California Davis California July 27th to August 1st 1986 This was the first time the Symposium was held in the United States The list of previous host cities reads Norwich Karlsruhe Goteborg Paris Groningen Neuchatel The addition of Davis to this distinguished list was made by the organizers with the doubts of people who give invitations to parties will anybody come In fact 155 participants registered and there were 21 spouses in attendance The scientific program was composed of nine sessions biochemistry of isoprenoids and sterols function of isoprenoids and sterols structure and function of lipids biosynthesis of complex lipids fatty acid oxygenases and desaturases medium and long chain fatty acids interaction of university government and industrial research algal lipids and genetics and biotechnology In addition to these sessions of plenary lectures there were four poster sessions in which about 140 posters were presented All of this was packed into four days and there was some comment about the scarcity of

time to ask questions of the speakers discuss the posters and even to eat lunch The compression of the program was a result of the continued desire of the organizing committees to avoid concurrent sessions The congregation of participants into a single session increases interaction and generates a feeling of unity at these symposia

Lipids in Photosynthesis: Structure, Function and Genetics Paul-André Siegenthaler, N. Murata, 2006-04-11 Lipids in Photosynthesis provides readers with a comprehensive view of the structure function and genetics of lipids in plants algae and bacteria with special emphasis on the photosynthetic apparatus in thylakoid membranes This volume includes the historical background of the field as well as a full review of our current understanding of the structure and molecular organization of lipids and their role in the functions of photosynthetic membranes The physical properties of membrane lipids in thylakoid membranes and their relationship to photosynthesis are also discussed Other topics include the biosynthesis of glycerolipids and triglycerides reconstitution of photosynthetic structures and activities with lipids lipid protein interactions in the import of proteins into chloroplasts the development of thylakoid membranes as it relates to lipids genetic engineering of the unsaturation of membrane glycerolipids with a focus on the ability of the photosynthetic machinery to tolerate temperature stress and the involvement of chloroplast lipids in the reactions of plants upon exposure to stress This book is intended for a wide audience and should be of interest to advanced undergraduate and graduate students and to researchers active in the field as well as to those scientists whose fields of specialization include the biochemistry physiology molecular biology biophysics and biotechnology of membranes

Humic Substances E A Ghabbour, G. Davies, 2014-01-30 The properties of humic substances HSs in plants soils and sediments regulate the environment and affect all aspects of life yet they are only very imprecisely understood This volume presents work on HSs including instruments and techniques being developed to throw more light on their structure and relationship to macro and microscopic properties

Advances in Botanical Research, 1989-11-16

The latest volume in the series continues to serve botanists with a wide range of interests

Plant Lipids Denis J. Murphy, 2020-02-03 New research tools have revealed many surprising aspects of the dynamic nature of lipids and their participation in processes such as recognition intra and inter cellular signalling deterrence and defense against pathogens membrane trafficking and protein function This is in addition to new information on the more established roles of plant lipids as structural components of membranes and as long term storage products Plant lipids are also increasingly being seen as sources of a new generation of environmentally friendly biodegradable and renewable industrial products including biopolymers and high grade lubricants Plant Lipids Biology Utilisation and Manipulation provides a broad overview of plant lipid research and its many applications Linking various disciplines the editor brings together researchers from major international laboratories to review the history and current state of progress in this quickly evolving field The text starts by providing a fascinating historical perspective on the study of plant lipids from its inception as a branch of alchemy in the seventeenth century to the current post genomic era It then offers a detailed discussion on the formation modification and

utilization of fatty acids This is followed by an exploration of the major classes of macromolecular structures formed by plant lipids including bilayer membranes and storage bodies From there the contributors consider other types of macromolecular lipid assemblies in plants examining proteins and the key plant lipid structure the cuticle The final chapters look at diverse classes of plant lipids that are linked to various aspects of signaling This text provides an excellent resource for researchers and professionals in plant biochemistry molecular biology biotechnology and genetics in both the academic and industrial sectors It also meets the needs of students looking for a comprehensive introduction to this field as well as direction for fut

Biocatalysis and Agricultural Biotechnology Ching T. Hou, Jei-Fu Shaw, 2009-04-27 Worldwide energy and food crises are spotlighting the importance of bio based products an area many are calling on for solutions to these shortages Biocatalysis and Agricultural Biotechnology encapsulates the cutting edge advances in the field with contributions from more than 50 international experts comprising sectors of academia industry an **Plant Secondary Metabolism** David S.

Seigler, 2012-12-06 Life has evolved as a unified system no organism exists similar role also has been suggested for fatty acids from alone but each is in intimate contact with other organisms cyanolipids Nonprotein amino acids cyanogenic glyco and its environment Historically it was easier for workers sides and the non fatty acid portion of cyanolipids also are in various disciplines to delimit artificially their respective incorporated into primary metabolites during germination areas of research rather than attempt to understand the entire Secondary metabolites of these structural types are accumu system of living organisms This was a pragmatic and neces lated in large quantities in the seeds of several plant groups sary way to develop an understanding for the various parts where they probably fulfill an additional function as deter We are now at a point however where we need to investi rents to general predation gate those things common to the parts and specifically those The second type of relationship involves interaction of things that unify the parts The fundamental aspects of many plants with other organisms and with their environment Bio of these interactions are chemical in nature Plants constitute logical interactions must be viewed in the light of evolution an essential part of all life systems phytochemistry provides ary change and the coadaptation or perhaps coevolution of a medium for linking several fields of study **Understanding and**

Measuring the Shelf-Life of Food R. Steele, 2004-05-10 The shelf life of a product is critical in determining both its quality and profitability This important collection reviews the key factors in determining shelf life and how it can be measured Part one examines the factors affecting shelf life and spoilage including individual chapters on the major types of food spoilage the role of moisture and temperature spoilage yeasts the Maillard reaction and the factors underlying lipid oxidation Part two addresses the best ways of measuring the shelf life of foods with chapters on modelling food spoilage measuring and modelling glass transition detecting spoilage yeasts measuring lipid oxidation the design and validation of shelf life tests and the use of accelerated shelf life tests Understanding and measuring the shelf life of food is an important reference for all those concerned with extending the shelf life of food Reviews the key factors in determining shelf life and how they can be

measured Examines the importance of the shelf life of a product in determining its quality and profitability Brings together the leading international experts in the field *Oxygenic Photosynthesis: The Light Reactions* Donald R. Ort, Charles F. Yocum, 2006-04-11 Structure and function of the components of the photosynthetic apparatus and the molecular biology of these components have become the dominant themes in advances in our understanding of the light reactions of oxygenic photosynthesis *Oxygenic Photosynthesis The Light Reactions* presents our current understanding of these reactions in thylakoid membranes Topics covered include the photosystems the cytochrome b6 f complex plastocyanin ferredoxin FNR light harvesting complexes and the coupling factor Chapters are also devoted to the structure of thylakoid membranes their lipid composition and their biogenesis Updates on the crystal structures of cytochrome f ATP synthase and photosystem I are presented and a section on molecular biology and evolution of the photosynthetic apparatus is also included The chapters in this book provide a comprehensive overview of photosynthetic reactions in eukaryotic thylakoids The book is intended for a wide audience including graduate students and researchers active in this field as well as those individuals who have interests in plant biochemistry and molecular biology or plant physiology *Sulfur Metabolism in Phototrophic Organisms* Rüdiger Hell, Christiane Dahl, David B. Knaff, Thomas Leustek, 2008-03-19 Sulfur is one of the most versatile elements in life due to its reactivity in different oxidation and reduction states In phototrophic organisms the redox properties of sulfur in proteins and of sulfur containing metabolites are particularly important in the interaction between the reductive assimilation processes of photosynthesis and reactive oxygen species that arise as by products of electron transport chains Thiol groups in proteins and metabolites are targets of reactive oxygen species resulting in potential damage and at the same time giving rise to redox signal cascades that trigger repair reactions and adaptation to environmental stress Further reduced sulfur compounds play a prominent role as electron donors for photosynthetic carbon dioxide fixation in anoxygenic phototrophic sulfur bacteria Interest in the investigation of the multiple functions of sulfur related processes has increased exponentially in recent years especially in molecular and cellular biology biochemistry agrobiotechnology and ecology This book provides for the first time in depth and integrated coverage of the functions of sulfur in phototrophic organisms including bacteria plants and algae it bridges gaps between biochemistry and cellular biology of sulfur in these organisms and of biology and environments dominated by them This book is designed to be a comprehensive resource on sulfur in phototrophic organisms for advanced undergraduate and graduate students beginning researchers and teachers in the area of photosynthesis bacterial energy metabolism biotechnology plant nutrition plant production and plant molecular physiology **Lipid Biochemistry** J.L. Harwood, M.I. Gurr, 2013-04-17 Lipids can usually be extracted easily from tissues by making use of their hydrophobic characteristics However such extractions yield a complex mixture of different lipid classes which have to be purified further for quantitative analysis Moreover the crude lipid extract will be contaminated by other hydrophobic molecules e g by intrinsic membrane proteins Of the various types of separation processes thin layer and column

chromatography are most useful for intact lipids High performance liquid chromatography HPLC is also rapidly becoming more popular especially for the fractionation of molecular species of a given lipid class The most powerful tool for quantitation of the majority of lipids is gas liquid chromatography GLC The method is very sensitive and if adapted with capillary columns can provide information with regard to such subtle features as the position or configuration of substitutions along acyl chains By coupling GLC or HPLC to a radioactivity detector then the techniques are also very useful for metabolic measurements Although research laboratories use generally sophisticated analytical methods such as GLC to analyse and quantify lipid samples chemical derivatizations are often used in hospitals For these methods the lipid samples are derivatized to yield a product which can be measured simply and accurately usually by colour Thus total triacylglycerol cholesterol or phospholipid phosphorus can be quantitated conveniently without bothering with the extra information of molecular species etc which might be determined by more thorough analyses

REFERENCES Christie W W 1982 *Lipid Analysis* 2nd edn Pergamon Press Oxford

Handbook of Eicosanoids (1987) A. L. Willis, 2017-11-22 Building upon the extensive compilation of biochemical data featured in Volume I of the Handbook of Eicosanoids the new Volume II describes the past present and potential future impact of eicosanoid research on new drug development The reader is taken from a historical perspective through state of the art basic concepts to extensive tabulation of molecular structures of compounds known to act via the eicosanoid system Much emphasis is given to recent breakthroughs in the mechanism of action of anti inflammatory corticosteroids and the development of receptor antagonists for prostaglandins and leukotrienes There is also an introductory chapter that proposes areas that require further investigation and novel approaches using existing technology This handbook will thus be invaluable for medicinal chemists pharmacologists and all those involved in basic research in the eicosanoid area In addition many parts of this handbook are suitable for use by university lecturers and students There are 20 figures and 44 extensive tables as well as a bibliography containing more than 2 000 references that complement the text

Physiology of Woody Plants Theodore T. Kozlowski, Stephen G. Pallardy, 1996-10-18 This completely revised classic volume is an up to date synthesis of the intensive research devoted to woody plants Intended primarily as a text for students and a reference for researchers this interdisciplinary book should be useful to a broad range of scientists from agroforesters agronomists and arborists to plant pathologists ecophysiologicalists and soil scientists Anyone interested in plant physiology will find this text invaluable Includes supplementary chapter summaries and lists of general references Provides a solid foundation of reference information Thoroughly updated classic text reference

The Biochemistry of Plants: Lipids, 1980

Target Sites for Herbicide Action R. Kirkwood, 2013-11-21 The development of chemicals to selectively control the growth of weeds has been a fascinating success story which has unfolded largely during the last four decades The dramatic growth of herbicide research that followed the wartime discoveries of the auxin type herbicides phenoxyalkanoic acids resulted in a whole range of compounds and mixtures which are used to eliminate broad or narrow

leaved weeds from agricultural horticultural or forestry crops Today the safe use of this armament of compounds requires our understanding of their mode of action metabolism and environmental persistence The most recently developed herbicides are highly effective inhibitors of specific enzyme systems and formulation may be an important factor determining their efficient delivery at specific target sites In this book the major target sites of herbicide action are discussed in Chapters 1-5 with particular reference to photosynthesis amino acid lipid and carotenoid synthesis and other primary target sites The effects of synergists or antagonists as modifiers of herbicide action are described in Chapter 6 The importance of efficient target site delivery as a fundamental factor in herbicide activity and selectivity is generally recognized Delivery of a potentially lethal dose of active ingredient may depend on a whole range of factors including the efficiency of application retention absorption translocation immobilization and detoxification These aspects are considered in the remaining chapters with particular reference to the pathways and mechanisms involved in the uptake translocation and metabolism of soil and foliage applied herbicides

Respiration and Crop Productivity Jeffrey S. Amthor, 2012-12-06 Respiration is a large and important component of the carbon economy of crops There are already several good books dealing with the biochemistry and physiology of plant respiration but there are none I know of that are devoted to the relationship between respiration and crop productivity although this relationship is more and more frequently being studied with both experiment and simulation Crop physiology books do cover respiration of course but the treatment is limited The purpose of the present book is to fill this void in the literature The approach taken here is to use the popular two component functional model whereby respiration is divided between growth and maintenance components After thoroughly reviewing the literature I came to the conclusion that at present this is the most useful means of considering respiration as a quantitative component of a crop's carbon economy This functional distinction is used as the framework for describing respiration and assessing its role in crop productivity Discussions and critiques of the biochemistry and physiology of respiration serve primarily as a means of more fully understanding and describing the functional approach to studying crop respiration It is assumed that the reader of this book is familiar with the fundamentals of plant physiology and biochemistry The research worker in crop physiology should find this an up to date summary of crop respiration and the functional model of respiration This book is not however a simple review of existing data

Lipid Metabolism in Plants Thomas S. Moore, 2018-02-01 This text presents a comprehensive description of the fundamental principles of plant lipid metabolism and then uses this base to examine current research in the field The importance of molecular biology and the incorporation of new analytical methods are discussed and the contributions of current research to agricultural and industrial uses are covered in depth Chapters are illustrated with tables and figures to support key concepts and projections for future research in the field are also explored

Physiology, Biochemistry and Molecular Biology of Plant Lipids John Peter Williams, Mobashsher Uddin Khan, Nora Wan Lem, 1997-02-28 The 12th International Symposium on Plant Lipids was held at the University of Toronto Canada from July 7th to 12th 1996

The conference was attended by over 200 scientists from university government and corporate laboratories from 24 different countries The topics covered in the symposium ranged from basic physiology biochemistry and molecular biology of plant lipids to transformation and genetic engineering of crop plants Oil seed plants were a particular focus of the symposium There were 62 oral and 96 posters presentations A special lecture in memory of the founder of this series of symposium Terry Galliard was presented by John Shanklin This Proceedings Book has been dedicated to Grattan Roughan for his important contributions to our knowledge of plant lipid metabolism This volume contains manuscripts submitted from most of the presentations at the symposium It provides a useful summary of the major fields of plant lipid studies and our present state of knowledge The papers are arranged in eight sections covering the major areas in the field of plant physiology biochemistry and molecular biology of plant lipids We would like to thank Valerie Imperial Rajesh Khetarpal and Mary Williams for their invaluable help in organizing and running the meetings and excursions John P Williams Mobashsher U Khan and Nora W Lem Toronto Canada October 1996 xvii DEDICATION This volume is dedicated to Grattan Roughan

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