The Molecular Biology Of Cyanobacteria

Advances in Cyanobacterial Biology presents the novel, practical, and theoretical aspects of cyanobacteria, providing a better understanding of basic and advanced biotechnological application in the field of sustainable agriculture. Chapters have been designed to deal with the different aspects of cyanobacteria including their role in the evolution of life, cyanobacterial diversity and classification, isolation, and characterization of cyanobacteria through biochemical and molecular approaches, phylogeny and biogeography of cyanobacteria, symbiosis, Cyanobacterial photosynthesis, morphological and physiological adaptation to abiotic stresses, stress-tolerant cyanobacterium, biological nitrogen fixation. Other topics include circadian rhythms, genetics and molecular biology of abiotic stress responses, application of cyanobacteria and cyanobacterial mats in wastewater treatments, use as a source of novel stress-responsive genes for development of stress tolerance and as a source of biofuels, industrial application, as biofertilizer, cyanobacterial blooms, use in Nano-technology and nanomedicines as well as potential applications. This book will be important for academics and researchers working in cyanobacteria, cyanobacterial environmental biology, cyanobacterial agriculture and cyanobacterial molecular biologists. Summarizes the various aspects of cyanobacterial research, from primary nitrogen fixation, to advanced nano-technology applications Addresses both practical and

theoretical aspects of the cyanobacterial application Includes coverage of biochemical and molecular approaches for the identification, use and management of cyanobacteria

Molecular biology, particularly molecular genetics, is among the newest and most powerful approach in modern photosynthesis research. Development of molecular biology techniques has provided new methods to solve old problems in many biological disciplines. Molecular biology has its greatest potential for contribution when applied in combination with other disciplines, to focus not just on genes and molecules, but on the complex interaction between them and the biochemical pathways in the whole organism. Photosynthesis is surely the best studied research area in plant biology, making this field the foremost candidate for successfully employing molecular genetic techniques. Already, the success of molecular biology in photosynthesis has been nothing short of spectacular. Work performed over the last few years, much of which is sum marized in this volume, stands in evidence. Techniques such as site-specific mutagenesis have helped us in examining the roles of individual protein domains in the function of multiunit complexes such as the enzyme ribulose-l ,5-bisphos phate carboxylase/oxygenase (RUBISCO) and the oxygen evolving photo system (the photosystem II). The techniques of molecular biology have been very important in advancing the state of knowledge of the reaction center from the photosynthetic bacteria whose structure has been elegantly deduced by H. Michel and 1. Deisenhofer from the X-ray studies of its crystals.

The molecular biology of desiccation tolerance was investigated in the cyanobacteria with emphasis on Nostoc commune. Analysis of DNA from 41 samples of desiccated Nostoc spp. of varied age and global distribution led to the amplification of 43 independent tRNALEU(UAA) group 1 intron sequences. Phylogenetic analysis of the entire data set made it possible to define the form species Nostoc commune. The synthase (spsA) and phosphatase (sppA) genes required for the synthesis of sucrose were isolated from cyanobacterium Synechocystis sp. strain PCC 6803 and overexpressed in E. coli in two different vector constructions. Transformants had a marked increased capacity for desiccation tolerance. Sucrose synthesis was confirmed through thin layer chromatography (TLC) analysis of cell extracts from transformants. Long-term stability of DNA in desiccated Nostoc samples was demonstrated by the ability to amplify selected gene loci from samples stored dry for decades. Successful amplification in some samples was possible only after treatment with phenacylthiazolium bromide, a reagent that disrupts covalent cross-links; indicating that the DNA was modified by cross-links that occurred between reducing sugars and the primary amines on the DNA.

Algal Green Chemistry

From Basic Science to Applications

Ecophysiology and Biochemistry of Cyanobacteria

Third European Workshop on the Molecular Biology of Cyanobacteria

The Biology of Cyanobacteria

Enzymology, Molecular Biology and Ecology

A significant component of many different ecosystems,

cyanobacteria occupy almost every niche of the earth, including fresh and salt waters, rice fields, hot springs, arid deserts, and polar regions. Cyanobacteria, along with algae, produce nearly half the global oxygen, making assessment of their ecophysiologies important for understanding climate impacts and potential remediation. Stress Biology of Cyanobacteria: Molecular Mechanisms to Cellular Responses is a compilation of holistic responses of cyanobacteria, ranging from ecological and physiological to the modern aspects of their molecular biology, genomics, and biochemistry. Covering almost every aspect of cyanobacterial stress biology, this book is divided into two parts: Bioenergetics and Molecular Mechanisms of Stress Tolerance and Cellular Responses and Ecophysiology. The first few chapters focus on the molecular bioenergetics of photosynthesis and respiration in cyanobacteria, and provide a clear perspective on different stress tolerance mechanisms. Part I also covers the effect of specific stresses—including heavy metal, high and low temperature, salt, osmotic, and UV-B stress—on a wide range of vital physiological, biochemical, and molecular processes of cyanobacteria. Part II describes mechanisms of symbiosis, stress-induced bioproducts, and the role of environmental factors on nitrogen fixation, which along with photosynthesis is a major contributor to the current geochemical status of the planet. The text also covers mutation and cyanobacterial adaptation, and the most widely studied cyanotoxin, microcystin, which has effects on both human and animal health. With contributions from experts around the world, representing the global importance of cyanobacteria, this book provides a broad compilation of research that deals

with cyanobacterial stress responses in both controlled laboratory conditions as well as in their natural environment.

The expertise and enthusiasm of an international panel of leading cyanobacterial researchers provides a state-of-the art overview of the field.

Unites a biological and a biotechnological perspective on cyanobacteria, and includes the industrial aspects and applications of cyanobacteria Cyanobacteria Biotechnology offers a guide to the interesting and useful features of cyanobacteria metabolism that keeps true to a biotechnology vision. In one volume the book brings together both biology and biotechnology to illuminate the core acpects and principles of cyanobacteria metabolism. Designed to offer a practical approach to the metabolic engineering of cyanobacteria, the book contains relevant examples of how this metabolic "module" is currently being engineered and how it could be engineered in the future. The author includes information on the requirements and real-world experiences of the industrial applications of cyanobacteria. This important book: Brings together biology and biotechnology in order to gain insight into the industrial relevant topic of cyanobacteria Introduces the key aspects of the metabolism of cyanobacteria Presents a grounded, practical approach to the metabolic engineering of cyanobacteria Offers an analysis of the requirements and experiences for industrial cyanobacteria Provides a framework for readers to design their own processes Written for biotechnologists, microbiologists, biologists, biochemists, Cyanobacteria Biotechnology provides a systematic and clear volume that brings together the biological and biotechnological perspective on cyanobacteria.

Synthetic Biology of Cyanobacteria
Advances in Cyanobacterial Biology
Handbook of Cyanobacteria
Their Diversity in Space and Time
CRC Handbook of Symbiotic Cyanobacteria
Biotechnology of Microalgae, Based on Molecular Biology and Biochemistry of Eukaryotic Algae and Cyanobacteria

Advances in Botanical Research publishes in-depth and up-to-date reviews on a wide range of topics in plant sciences. The series features a wide range of reviews by recognized experts on all aspects of plant genetics, biochemistry, cell biology, molecular biology, physiology and ecology. This thematic volume features reviews on The Genomics of Cyanobacteria. Chapters by internationally renowned researchers share the most up-to-date knowledge on cyanobacteria Even if you have no previous background in the subject, the book's clear language and illustrations tell you what you need to know about the biology and genomics of cyanobacteria and it highlights important directions for future research An essential book for students and researchers

Cyanobacteria have existed for 3.5

billion years, yet they are still the most important photosynthetic organisms on the planet for cycling carbon and nitrogen. The ecosystems where they have key roles range from the warmer oceans to many Antarctic sites. They also include dense nuisance growths in nutrient-rich lakes and nitrogen-fixers which aid the fertility of rice-fields and many soils, especially the biological soil crusts of arid regions. Molecular biology has in recent years provided major advances in our understanding of cyanobacterial ecology. Perhaps for more than any other group of organisms, it is possible to see how the ecology, physiology, biochemistry, ultrastructure and molecular biology interact. This all helps to deal with practical problems such as the control of nuisance blooms and the use of cyanobacterial inocula to manage semi-desert soils. Large-scale culture of several organisms, especially "Spirulina" (Arthrospira), for health food and specialist products is increasingly being expanded for a much wider range of uses. In view of their probable contribution to past oil deposits, much attention is currently focused on their

potential as a source of biofuel. Please visit http://extras.springer.com/ to view Extra Materials belonging to this volume. This book complements the highly successful Ecology of Cyanobacteria and integrates the discoveries of the past twelve years with the older literature. Cyanobacteria constitute the most widely distributed group of photosynthetic prokaryotes found in almost all realms of the earth and play an important role in Earth's nitrogen and carbon cycle. The gradual transformation from reducing atmosphere to oxidizing atmosphere was a turning point in the evolutionary history of the earth and made conditions for present life forms possible. Cyanobacteria: From Basic Science to Applications is the first reference volume that comprehensively discusses all aspects of cyanobacteria, including the diverse mechanisms of cyanobacteria for the advancement of cyanobacterial abilities, towards higher biofuel productivity, enhanced tolerance to environmental stress and bioactive compounds and potential for biofertilizers. Describes cyanobacterial diversity, stress biology, and

biotechnological aspects of cyanobacteria Explores the global importance of cyanobacteria Provides a broad compilation of research that deals with cyanobacterial stress responses in both controlled laboratory conditions as well as in their natural environment
Photosynthesis and Photomorphogenesis
Their Diversity in Time and Space
Expanding Horizon of Cyanobacterial Biology
Cellular and Molecular Strategies in Cyanobacterial Survival
Biodegradation of the Cyanobacterial Hepatotoxin Microcystin LR

More than twenty years ago, as a fledgling graduate some peculiar aspects of the genetics of these student who was just starting to learn about these organisms but to pay respects to the two volumes of organisms that would become my primary research Carr of Whitton that played important roles in my focus, the publication of Noel Carr and Brian own thinking about cyanobacteria (and no doubt in Whitton's The Biology of the Blue-Green Algae in the development of many others as well). Contri 1973 was an event of great significance. Until the buting authors

were asked to describe not only what appearance of this treatise, there was no single volume we know at present, but also to point out things we available that presented a broad overview of the don't know yet. I have attempted to assemble a book biology and biochemistry ofthese organisms. Nearly that would stimulate graduate students and other ten years later, I was privileged to be a contributing researchers in the same way that I was affected by the author to Carr and Whitton's sequel volume The books mentioned above. Biology of the Cyanobacteria. Although the It appears that cyanobacterial molecular biologists intervening period had been marked by heated debates have indeed paid attention to the admonition of their over the taxonomy and taxonomic position of the erstwhile colleague, W Ford Doolittle, to 'study organisms, it was also a time when the comparative those things that cyanobacteria do well.

Algal Green Chemistry: Recent Progress in Biotechnology presents emerging information on green algal technology for the production of diverse chemicals, metabolites, and other products of commercial value. This book describes and emphasizes the emerging

information on green algal technology, with a special emphasis on the production of diverse chemicals, metabolites, and products from algae and cyanobacteria. Topics featured in the book are exceedingly valuable for researchers and scientists in the field of algal green chemistry, with many not covered in current academic studies. It is a unique source of information for scientists, researchers, and biotechnologists who are looking for the development of new technologies in bioremediation, eco-friendly and alternative biofuels, biofertilizers, biogenic biocides, bioplastics, cosmeceuticals, sunscreens, antibiotics, anti-aging, and an array of other biotechnologically important chemicals for human life and their contiguous environment. This book is a great asset for students, researchers, and biotechnologists. Discusses high-value chemicals from algae and their industrial applications Explores the potential of algae as a renewable source of bioenergy and biofuels Considers the potential of algae as feed and super-food Presents the role of triggers and cues to algal metabolic pathways Includes developments in the use of algae as bio-filters

Photosynthesis is one of the most active areas of plant science research. Advances in

molecular biology technology have profoundly affected the work in this area and have opened up the possibility of manipulating the genes involved in photosynthesis. The field is expanding, and this bookprovides a compilation of authoritative reviews covering a variety of important issues.

Ecology of Cyanobacteria II

Recent Progress in Biotechnology

Molecular Biology of Desiccation Tolerance in the Cyanobacterium Nostoc Commune

The Physiology and Molecular Biology of Iron Nutrition for Cyanobacteria

Genomics of Cyanobacteria

Molecular Biology and Cultural Heritage

A Top 25 CHOICE 2016 Title, and recipient of the CHOICE Outstanding Academic Title (OAT) Award. How much energy is released in ATP hydrolysis? How many mRNAs are in a cell? How genetically similar are two random people? What is faster, transcription or translation?Cell Biology by the Numbers explores these questions and dozens of others provid

This book contains forty reviewed papers delivered at the International Congress on Molecular Biology and Cultural Heritage held in Seville, March 2003. It is divided in four parts, the first one presents the state-of-the-art and reviews molecular techniques applied to the study of microbial communities colonizing

monuments and cultural heritage assets. Part two covers specific molecular techniques used in biodetereoration studies, part three includes an updated overview on on-going biodetereoration European Commission projects, and part four presents selected biodetereoration case studies from all over the world.

Cyanobacterial symbioses are no longer regarded as mere oddities but as important components of the biosphere, occurring both in terrestrial and aquatic habitats worldwide. It is becoming apparent that they can enter into symbiosis with a wider variety of organisms than hitherto known, and there are many more still to be discovered, particularly in marine environments. The chapters cover cyanobacterial symbioses with plants (algae, bryophytes, Azolla, cycads, Gunnera), cyanobacterial symbioses in marine environments, lichens, Nostoc-Geosiphon (a fungus closely related to arbuscular mycorrhiza fungi) symbiosis, and artificial associations of cyanobacteria with economically important plants. In addition, cyanobiont diversity, sensing-signalling, and evolutionary aspects of the symbiosis are dealt with. Renowned experts actively involved in research on cyanobacterial symbioses deal with ecological, physiological, biochemical, molecular, and applied aspects of all known cyanobacterial symbioses. This volume on cyanobacteria in symbiosis complements the two earlier volumes on cyanobacteria published by

Kluwer (Molecular Biology of Cyanobacteria, edited by D.A. Bryant and Ecology of Cyanobacteria, edited by B.A. Whitton and M. Potts). Together, the three volumes provide the most comprehensive treatment of cyanobacterial literature as a whole. The book will serve as a valuable reference work and text for teaching and research in the field of plant-microbe interactions and nitrogen fixation.

Transgenic Microalgae as Green Cell Factories

Photosynthesis: Physiology and Metabolism

Programme & Abstracts

Second European Workshop on the Molecular Biology of Cyanobacteria

The Cyanobacteria

Stress Biology of Cyanobacteria

Provides a thorough overview of current research with the green alga Chlamydomonas on chloroplast and mitochondrial biogenesis and function, with an emphasis on the assembly and structure-function relationships of the constituents of the photosynthetic apparatus. Contributions emphasize the multidisciplinary nature of current research in photosynthesis, combining molecular genetics, biochemical, biophysical, and physiological approaches. The 36 articles address topics including nuclear genome

organization; RNA stability and processing; splicing; translation; protein targeting in the chloroplast; photosystems; pigments; glycerolipids; the ATP synthase; and ferrodoxin and thioredoxin. Further contributions address new measurements methods for photosynthetic activity in vivo; starch biosynthesis; the responses of Chlamydomonas to various stress conditions; nitrogen assimilation; and mitochondrial genetics. Annotation copyrighted by Book News, Inc., Portland, OR

This volume highlights recent breakthroughs in the interdisciplinary areas of synthetic biology, metabolic engineering and bioprocess engineering for the production of green chemicals. It also presents practical experimental and computational tools for the design, construction and manipulation of cyanobacteria cell factories. The respective contributions cover new technologies in the field, such as novel genetic transformation techniques and bioinformatics analysis methods and address various aspects of cyanobacterial synthetic biology, offering a valuable

resource for students and researchers in the fields of industry microbiology and biomedical engineering.

The cyanobacteria are a fascinating group of bacteria that have adapted to colonize almost every environment on the planet. They are the only prokaryotes capable of oxygenic photosynthesis, responsible for up to 20-30% of Earth's photosynthetic productivity. They can attune their light-harvesting systems to changes in available light conditions, fix nitrogen, and have circadian rhythms. In addition, many cyanobacteria species exhibit gliding mobility and can differentiate into specialized cell types called heterocysts, and some are symbiotic. Thanks to their simple nutritional requirements, their metabolic plasticity, and the powerful genetics of some model strains, cyanobacteria could be exploited for use as microbial cell factories for carbon capture and storage, and for the sustainable production of secondary metabolites and biofuels. Understanding their cell biology is an essential step to achieving this. In this book, leading senior scientists and young researchers review the current key topics

in cyanobacterial cell biology to provide a timely overview. Topics covered include: historical background * cell division * the cell envelope * the thylakoid membrane * protein targeting, transport, and translocation * chromatic acclimation * the carboxysome * glycogen as a dynamic storage of photosynthetically fixed carbon * cyanophycin * gas vesicles * motility in unicellular and filamentous cyanobacteria * cellular differentiation in filamentous cyanobacteria * cell-cell joining proteins in heterocyst-forming cyanobacteria. This cutting-edge text will provide a valuable resource for all those working in this field and is recommended for all microbiology libraries.

Cyanobacterial Lifestyle and its Applications in Biotechnology

Cyanobacteria

5th European Workshop on the Molecular Biology of Cyanobacteria, June 9-12, 2002, Stockholm, Sweden

The 6th European Workshop on the Molecular Biology of Cyanobacteria

Concepts in Photobiology

The Cell Biology of Cyanobacteria

Expanding Horizon of Cyanobacterial Biology discusses the different aspects of cyanobacteria

cyanobacterial application, providing a better understanding of cyanobacterial metabolism. Chapters deal with cyanobacteria applications and explore how to exploit cyanobacterial metabolism for industrial applications. Sections cover cyanobacterial applications for the production of nanoparticles, cyanobacterial diversity, and the characterization of different assemblages such as cyanolichens and cyanobacterial endophytes, along with their ecological, morphological and physiological aspects. In addition, bioactive compounds and their applications are explored. Increasing attention has been paid by scientists across the globe to Cyanobacteria as they are ubiquitous microbes and, undoubtedly, an important organism in terms of carbon as well as nitrogen fixation. However, the research on these organisms is limited in terms of their diversity and distribution across the globe. Provides background knowledge for researchers concerned with cyanobacterial diversity and characterization of different assemblages Describes the exploitation possibility of cyanobacterial species for human welfare Discusses the different aspects of cyanobacteria, cyanobacterial application and better understanding of cyanobacterial metabolism Deals with the exploitation of cyanobacteria and their mats for bioremediation purposes Includes cyanobacterial nanotechnology and its applications

in industry and allied sectors

In this Special Issue of Life, we invited researchers from all over the world to share advances in their understanding of ecological, cellular, and molecular mechanisms of cyanobacterial survival. This includes original work and review articles dealing with signaling pathways, strategies of gene and protein regulation, global studies, and new discoveries related to the differentiation of spore-like akinetes, motile hormogonia, and nitrogen-fixing heterocysts.

This handbook acquaints readers with the exciting developments in various areas of cyanobacterial research in the backdrop of the publication of complete genome sequence of the cyanobacterium Synechocystis sp. strain PCC 6803 in 1996. It begins with a summary of the current knowledge on the taxonomy, phylogeny and evolution of cyanobacteria followed by the sequenced genomes, differentiation of akinetes and heterocyst. The book considers mechanisms of cellular movements (gliding, swimming and twitching motions) exhibited by various cyanobacteria in order to adjust to their environmental niches and the operation of the circadian rhythms. It covers cyanobacterial symbiosis, cyanophages and cyanobacterial toxins, followed by a discussion on stress responses (salinity, temperature, desiccation and oxidation).

A comprehensive account on the developments in all these spheres has been presented in a lucid style with the required background information, molecular techniques employed and models proposed. This handbook constitutes the first such book written by a single author at a level and depth for graduate and research students in botany and microbiology.

Molecular Biology, Genomics, and Evolution

Cyanobacteria Biotechnology

The Chloroplast: From Molecular Biology to Biotechnology

Cyanobacteria in Symbiosis

Molecular Biology of the Cell

Cytology, Genetics and Molecular Biology of Algae

Cyanobacteria make a major contribution to world photosynthesis and nitrogen fixation, but are also notorious for causing nuisances such as dense and often toxic `blooms' in lakes and the ocean. The Ecology of Cyanobacteria: Their Diversity in Time and Space is the first book to focus solely on ecological aspects of these organisms. Its twenty-two chapters are written by some thirty authors, who are leading experts in their particular subject. The book begins with an overview of the cyanobacteria - or blue-green algae, for those who are not specialists - then looks at their diversity in the geological record and goes on to describe their ecology in present environments where they play important roles. Why is one of the key groups of organisms in the Precambrian still one of the most important groups of phototrophs today?

The importance of ecological information for rational management and exploitation of these organisms for commercial and other practical purposes is also assessed. Accounts are provided of nuisances as well as the ecology of the commercially successful Spirulina and the role of cyanobacteria in ecosystem recovery from oil pollution. Many chapters include aspects of physiology, biochemistry, geochemistry and molecular biology where these help general understanding of the subject. In addition there are three chapters dealing specifically with molecular ecology. Thirty-two pages of colour photos incorporate about seventy views and light micrographs. These features make the book valuable to a wide readership, including biologists, microbiologists, geologists, water managers and environmental consultants. The book complements the highly successful The Molecular Biology of Cyanobacteria already published by Kluwer.

From August 10 to August 15, 1998, an international Advanced Research Workshop-Lecture Course on The chloroplast: from Molecular Biology to Biotechnology was held at the Orthodox Academy of Crete, Kolymbari-Chania, on the island of Crete, Greece. After five previous meetings on the chloroplast topic in Marburg (1975), Spetses (1978), Rhodos (1985), Aghia Pelaghia, Crete (1991) and Marburg (1995) this conference proved again that chloroplast research is continuously in the focus of intensive research interest. The meeting, sponsored by NATO and supported by the Federation of the European Societies for Plant Physiology (FESPP) and the Greek Ministry of Development (General Secretariat of Research

and Development), was held under the auspices of the International Society for Chloroplast Development and the National Center for Scientific Research "Demokritos", Athens-Greece. Aim of the workshop was to bring together experts and students from different disciplines, coming from various countries around the world, studying chloroplast biogenesis from different perspectives in an effort to propose biotechnological approaches, via genetic manipulation of the organelle, applicable in solving problems of economic importance. Ninety scientists (including observers) coming from 19 countries actively participated and discussed recent advances in the field. During the meeting it became clear that as a result of the progress made in molecular biology, including genomic sequence, and in biochemistry over recent years, this exciting field of chloroplast development is continuously promoted by renewed interest in as yet unsolved but very important questions.

Photobiology is an important area of biological research since a very large number of living processes are either dependent on or governed by light that we receive from the Sun. Among various subjects, photosynthesis is one of the most important, and thus a popular topic in both molecular and organismic biology, and one which has made a considerable impact throughout the world since almost all life on Earth depends upon it as a source of food, fuel and oxygen. However, for growth of plants, light is equally essential, and research on photomorphogenesis has revealed exciting new developments with the application of newer molecular biological approaches. The present book brings together and integrates various

aspects of photosynthesis, biology of pigments, light regulation of chloroplast development, nuclear and chloroplast gene expression, light signal transduction, other photomorphogenetic processes and some photoecological aspects under one cover. The chapters cover biochemical and molecular discussions of most of the above topics in a comprehensive manner and include a wide range of `hot topics' that are currently under investigation in the field of photobiology of cyanobacteria, algae and plants. The authors of this book are selected international authorities in their fields from USA, Europe, Australia and Asia. The book is designed primarily to be used as a text book by graduates and post-graduates. It is, however, also intended to be a resource book for new researchers in plant photobiology. Several introductory chapters are designed as suitable reading for undergraduate courses in integrative and molecular biology, biochemistry and biophysics.

The Molecular Biology of Cyanobacteria

Studies on the Molecular Biology of the Cyanobacteria Spirulina Maxima

Molecular Biology of Photosynthesis

Cell Biology by the Numbers

Molecular Mechanisms to Cellular Responses

12-14 May 1995, Sevilla

Xvii, 172 leaves, bound ill. 29 cm.

Environmental change is affecting the world's agricultural productivity. This is coupled with an increase in population: according to the United Nations Department for Economic and Social Affairs, the global population is estimated to reach 9.7 billion by 2050. Therefore, the current situation requires that we

develop climate-smart technologies to improve crop productivity to sustain the ever-rising global population. Current-day farmers are introducing a considerable amount of agrochemicals to enhance crop productivity. Indiscriminate agrochemical application has altered not only the soil's physic-chemical and biological properties but also affected human health through food chain contamination. Cyanobacteria, under these changing environmental conditions, may help to resolve the problem significantly without changing the natural soil properties. In spite of their well-known stress tolerance potential, most of the cyanobacterial stress management and signaling pathways are yet to be fully characterized. Therefore, there is an urgent need to explore cyanobacterial metabolism under stress as well as their regulatory pathways to exploit them for sustainable agriculture. In recent decades, the application of cyanobacteria has attracted scientists because of uniqueness, better adaptability, and synthetic products. Diverse cyanobacterial communities with the ability to fix atmospheric nitrogen, together with their photosynthetic properties, have demonstrated their application under field conditions. Several cyanobacterial species have thus been exploited to enhance soil fertility, mitigate biotic and abiotic stress, and contamination management. Cyanobacterial Lifestyle and its Applications in Biotechnology has been designed to discuss different aspects of cyanobacterial physiology with the aim of helping to provide a better understanding of advanced cyanobacterial molecular biology and their metabolism to uncover the potential of cyanobacteria in the tailoring of stress smart crops for sustainable agriculture. Chapters include valuable information about the role of cyanobacteria in the evolution of life, cyanobacterial photosynthesis, stress-tolerant cyanobacterium, biological nitrogen fixation, circadian rhythms, genetics and molecular biology of abiotic stress responses. Summarizes various aspects of cyanobacterial research. Includes comprehensive coverage of molecular approaches for the identification of cyanobacteria and their evolution. Identifies an expanding horizon

of cyanobacterial lifestyle: stress management in cyanobacteria. Examines cyanobacteria synthetic biology, genetic engineering, photosynthesis and metabolic engineering.

Photosynthesis: Physiology and Metabolism is the we have concentrated on the acquisition and ninth volume in theseries Advances in Photosynthesis metabolism of carbon. However, a full understanding (Series Editor, Govindjee). Several volumes in this of reactions involved in the conversion of to series have dealt with molecular and biophysical sugars requires an integrated view of metabolism. aspects of photosynthesis in the bacteria, algae and We have, therefore, commissioned international cyanobacteria, focussing largely on what have been authorities to write chapters on, for example, traditionally, though inaccurately, termed the 'light interactionsbetween carbon and nitrogen metabolism, reactions'(Volume 1, The Molecular Biology of on respiration in photosynthetic tissues and on the Cyanobacteria;Volume2,AnoxygenicPhotosynthetic control of gene expression by metabolism. Photo- Bacteria, Volume 3, Biophysical Techniques in synthetic carbon assimilation is also one of the most Photosynthesis and Volume 7, The Molecular Biology rapid metabolic processes that occurs in plant cells, of the Chloroplasts and Mitochondria in Chlamy- and therefore has to be considered in relation to domonas). Volume 4 dealt with Oxygenic Photo- transport, whether it be the initial uptake of carbon, synthesis: The Light Reactions, and volume 5 with intracellular transport between organelles, inter- Photosynthesis and the Environment, whereas the cellular transport, as occurs in plants, or transport structure and function of lipids in photosynthesis of photosynthates through and out of the leaf. All was covered in Volume 6 of this series: Lipids in these aspects of transport are also covered in the Photosynthesis: Structure, Function and Genetics, book.

The Molecular Biology of Chloroplasts and Mitochondria in Chlamydomonas

The Ecology of Cyanobacteria

Molecular Genetics of Photosynthesis

Microalgae have been largely commercialized as food and feed additives, and their potential as a source of high-added value compounds is well known. Yet, only a few species of microalgae have been genetically transformed with efficiency. A better understanding of the mechanisms that control the regulation of gene expression in eukaryotes is therefore needed. In this book a group of outstanding researchers working on different areas of microalgae biotechnology offer a global vision of the genetic manipulation of microalgae and their applications.

In one convenient source, this ready reference brings together for the first time, all the information available on various cyanobacterial symbioses/symbiotic cyanobacteria. Comprehensive data on structure, physiology, biochemistry and molecular biology of the cyanobiont in various cyanobacterial symbioses is included. Aplied aspects such as use of Azolla in rice cultivation and artificial symbioses are addressed, along with a chapter dedicated to methodology. This informative new text is useful to researchers, teachers, and students.

This book emphasizes and presents the latest information on eco-physiology and biochemistry of cyanobacteria with special emphasis on their biodiversity, molecular mechanisms of some important biological processes and survival

mechanisms under myriad of environmental conditions as well as bioremediation. Cyanobacteria are the most dominant prokaryotic floras on the Earth ' s surface, and are of great importance in terms of ecological, economical and evolutionary perspectives. They are oldest groups of photosynthetic autotrophs, which create oxygenic atmosphere for the development and sustainability of ecosystems with different life forms. The book presents an integrative approach to their possible biotechnological application in the field of bio-energy and various aspects of biochemistry, biophysics and structural biology of photosynthesis. The various chapters describe the different applications of cyanobacteria as bio-energy sources and in phycoremediation. The contents incorporated in this book can be used as a textbook by undergraduate and post-graduate students, teachers, and researchers in the most interesting fields of physicochemical ecology and biochemistry of cyanobacteria.