The Molecular Biology Of Cyanobacteria

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begins with an overview of blue green algae then looks at their diversity in the geological record and their ecology in present environments

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 wasaffected 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

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

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 and 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

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

in this title experts actively involved in research on cyanobacterial symbioses deal with ecological physiological biochemical molecular and applied aspects of the subject

written by leading experts in the field cyanobacteria an economic perspective is a comprehensive edited volume covering all areas of an important field and its application to energy medicine and agriculture issues related to environment food and energy have presented serious challenge to the stability of nation states increasing global population dwindling agriculture and industrial production and inequitable distribution of resources and technologies have further aggravated the problem the burden placed by increasing population on environment and especially on agricultural productivity is phenomenal to provide food and fuel to such a massive population it becomes imperative to find new ways and means to increase the production giving due consideration to biosphere s ability to regenerate resources and provide ecological services cyanobacteria are environment friendly resource for commercial production of active biochemicals drugs and future energy biodiesel bioethanol and hydrogen topics on isolation identification and classification of cyanobacteria are discussed as well as further sections on summarizing a range of useful products synthesized by cyanobacteria ecological services provided by cyanobacteria including their harmful effect in water bodies and associated flora and fauna chapter on tools techniques and patents also focus on the economic importance of the group this book also provides an insight for future perspectives in each particular field and an extensive bibliography this book will be a highly useful resource for students researchers and professionals in academics in the life sciences including microbiology and biotechnology

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 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

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

this book offers an in depth analysis of the cell biology of cyanobacteria a group of phototrophic microorganisms performing an important function in the biosphere the chapters present the author s and her colleagues pioneering investigations of the ultrastructure of cyanobacteria under high light and dark conditions during irradiation by extremely high fluxes of light in the course of l transformation and within model associations and natural symbioses with plants diverse patterns of ultrastructural change are illustrated in electron micrographs and schematics the book further introduces a new concept of bacterial ultrastructural plasticity the reversible rearrangement of ultrastructure in response to environmental changes as a strategy for finding and investigating cell adaptation mechanisms and intraspecies structural diversity of cyanobacteria and other prokaryotes it serves as a valuable guide for teaching and research in the field of cell biology of microorganisms and plant cyanobacteria symbioses

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

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

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

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

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

this book covers recent advances in cyanobacterial research it deals with diversity evolutionary biology stress physiology molecular biology of stress responses and biotechnology of this group of prokaryotes cyanobacteria are ubiquitous and undoubtedly agriculturally microorganisms in terms of carbon and nitrogen fixation in addition cyanobacteria have long been used to fertilize crops and are a source of protein for humans in parallel with the advances in cyanobacterial research in the 21st century the development and application of innovative techniques in molecular biotechnology has widened the spectrum of commercial applications and potential exploitation of cyanobacteria this book will be of interest to both new and experienced researchers involved in cyanobacterial molecular biology ecology and industrial biotechnology this collection of chapters from experts also serves as essential reading for undergraduate and graduate students of to understand the importance of cyanobacteria in agriculture ecology microbial physiology and environmental sciences

owing to their importance as primary producers of energy and nutrition algae and cyanobacteria are found as symbiotic partners across diverse lineages of prokaryotic and eukaryotic kingdoms algal and cyanobacteria symbioses presents a compilation of recent updated research in fields of diverse symbioses including in marine freshwater and terrestrial habitats it gives a comprehensive overview of algal and cyanobacteria symbioses including reviews on their diversity and information on symbiotic specificity and stress tolerance also covered is a review of regulatory mechanisms in the communication between symbiotic partners the highly interdisciplinary character of this book is demonstrated through the range of algae and cyanobacteria as energy providing symbionts in organismal lineages which are discussed it is a valuable source of knowledge for researchers university lecturers professors and students of biology and life sciences specifically biochemistry mycology cell biology and plant microbe interactions

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