
Microalgae Biotechnology And Microbiology Cambridge Studies In

Handbook of Microalgae-Based Processes and Products
Microalgae
Microbial Biotechnology
Proteins: Sustainable Source, Processing and Applications
Biorefinery Co-Products
Plant Biology and Biotechnology
Sustainable Development of Algal Biofuels in the United States
Sustainable Water and Wastewater Processing
Encyclopedia of Marine Biotechnology
Handbook of Microalgal Culture
Biodiesel Fuels Based on Edible and Nonedible Feedstocks, Wastes, and Algae
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Microbial Biotechnology
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Prospects and Challenges in Algal Biotechnology
Bioenergy and Environmental Biotechnology for Sustainable Development
Application of Microalgae in Wastewater Treatment
Sustainable Downstream Processing of Microalgae for Industrial Application
Microalgae Biotechnology for Food, Health and High Value Products
Industrial Scale Suspension Culture of Living Cells
Microalgal Biotechnology
Biotechnological Applications of Microalgae
Microalgal Production for Biomass and High-Value Products
Biotechnology: Prospects and Applications
BioHydrogen
Manual of Industrial Microbiology and Biotechnology
Biotechnology for Biofuel Production and Optimization
Handbook of Marine Microalgae
Environmental Biotechnology
Algal Culturing Techniques
Grand Challenges in Algae Biotechnology
Nutritional Freshwater Life
Bioremediation and Green Technologies
Marine Macro- and Microalgae
Organic Waste Recycling: Technology, Management and Sustainability
Basic and Applied Phytoplankton Biology
Industrial Biorefineries and White Biotechnology
Phycotoxins

BLACK FITZGERALD

Handbook of Microalgae-Based Processes and Products Springer Science & Business Media

Phycotoxins are a diverse group of poisonous substances produced by certain seaweed and algae in marine and fresh waters and are important to the scientific community for many reasons, the most obvious being that they pose food safety issues which requires a large investment to regularly monitor the presence of these compounds in foods. Phycotoxins: Chemistry and Biochemistry, second edition presents the most updated information available on phycotoxins. Major emphases are given to chemistry and biochemistry, while origins, mechanism of action, toxicology, and analytical methodology are also covered. Since the publication of the first edition, there have been major advances in the science of marine and aquatic toxins, as well as advances in toxicology, analytical chemistry and pharmacology. This fully revised and updated edition includes several new chapters, including those on ciguatoxins, pinnatoxin, ichthyotoxins, as well as new chapters on food safety control of marine toxins, climate change and water toxins, and microalgae as a source of nutraceuticals. The book will be of interest to toxicologists, marine, food, and plant scientists, as well as researchers and academics in the areas of food science, medicine, public health, toxicology, pharmacology and marine biology.

Cambridge University Press

This book covers a range of important topics on environmental remediation, biofuels and value-added microbial products for environmental clean-up, water and wastewater recycling and sustainable wastewater treatment using microalgae. Designed to document advances in biotechnology, this book highlights bio-resource utilization in fostering low-carbon renewable energy-based economies and provides new insights into chlorine disinfectant usage in water treatment, wastewater treatment using microalgae, etc. The book will be useful reference material for scientists and researchers in the fields of microbial biotechnology and bioremediation, environmental biotechnology and sustainable development, climate change mitigation, provision of safe water and sustainable wastewater recycling. Emphasizes recent advances in bioremediation techniques towards environmental sustainability Provides detailed information on how to harness indigenous bio-resources including microorganisms as bioenhancement agents for environmental remediation Introduces new frontiers in the area of wastewater treatment using microalgae — important for sustainability and water safety Reviews biotechniques that could enhance higher levels of sustainability in heavily polluted environments and also provides an intelligent monitoring system for waste recycling and environmental remediation, and fostering a low-carbon renewable energy-based bioeconomy Discusses the need for review of existing guidelines on chlorine disinfectant usage for enhanced water quality Akinola Rasheed Popoola, Ph.D., is a Professor of Plant Pathology and the Director of the Biotechnology Centre, Federal University of Agriculture, Abeokuta, Nigeria. Emeka Godfrey Nwoba, Ph.D., is a research scholar at the Algae Research & Development

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Microalgae John Wiley & Sons

The world needs clean and renewable energy and hydrogen represents an almost ideal resource. Hydrogen is the simplest and most abundant molecule in the universe, yet one that is a challenge to produce from renewable resources. Biohydrogen, or hydrogen produced from renewable resources such as water or organic wastes by biological means, is a goal worthy of increased global attention and resources. The purpose of BioHydrogen '97 was to bring together leaders in the biological production of hydrogen from the United States, Japan, Europe, and elsewhere to exchange scientific and technical information and catalyze further cooperative programs. Participants came from at least different countries representing academia, industry, and government. Especially important participants were young research scientists and engineers: the next generation of contributors. The conference consisted of plenary presentations, topical sessions, posters, and mini-workshop discussions on key areas of biohydrogen. It was designed to maximize information exchange, personal interaction among participants, and formulate new international initiatives. BioHydrogen '97 was an outgrowth of an international workshop convened by the Research Institute of Innovative Technology for the Earth (RITE) and was held in Tokyo, Japan, November 24-25, 1994. The RITE workshop was highly successful but largely limited to traditional biochemical and biological studies and not engineering research topics.

Microbial Biotechnology Springer

The submerged cultivation of organisms in sterile containments or fermenters has become the standard manufacturing procedure, and will remain the gold standard for some time to come. This book thus addresses submerged cell culture and fermentation and its importance for the manufacturing industry. It goes beyond expression systems and integrally investigates all those factors relevant for manufacturing using suspension cultures. In so doing, the contributions cover all industrial cultivation methods in a comprehensive and comparative manner, with most of the authors coming from the industry itself. Depending on the maturity of the technology, the chapters address in turn the expression system, basic process design, key factors affecting process economics, plant and bioreactor design, and regulatory aspects.

Proteins: Sustainable Source, Processing and Applications CABI

Supplying sustenance for millions of the poorest people in the world, freshwater flora and fauna also contribute to overall economic well-being by means of export commodity trade, tourism, and recreation. As sources of high-quality nutrients, freshwater flora and fauna of edible value represent a viable option for alleviating the problems related to malnutrition in developing and underdeveloped countries. Although the nutritional benefits of freshwater flora and fauna are well known, there has long been a need for a book that supplies an assessment of their nutritional qualities. Well-illustrated with approximately 325 photographs, this book fills that need. Nutritional Freshwater Life details the characteristics of more than 300 species of nutritionally important freshwater animals and plants. The book covers algae and plants, crustaceans (prawns, crayfish, and crabs), mollusks (bivalves and gastropods), fish, and frogs. For each species of freshwater life identified, the book provides a photograph and details its characteristics such as scientific name, common names, habitats, global distribution, nutritional facts, and biological features.

Biorefinery Co-Products Elsevier

This contributed volume presents the latest research and state-of-the-art approaches in the study of microalgae. It describes in detail technologies for the cultivation of marine, freshwater and extremophilic algae, as well as phototrophic biofilms, cyanobacterial mats and periphytons, including the media requirements and growth rates of different types of algae. The second part of the book is dedicated to the biotechnological applications of algal biomass and secondary metabolites produced by these organisms, and critically discusses topics such as algae-based biofuels and CO₂ sequestration. In addition, it reviews the prospects and challenges of algal bioremediation of domestic and industrial wastewaters, including the use of planktonic and self-immobilized algae systems in wastewater treatment, explaining their merits and drawbacks. Lastly, it highlights research methods and approaches related to the production of high-value products and bioactive compounds.

Plant Biology and Biotechnology Royal Society of Chemistry

Microalgae are a group of single-celled, photosynthetic microorganisms. They are of great commercial interest as they are capable of producing biomass (with a vast array of biochemical) using sunlight, CO₂ and various other naturally occurring nutrients. Correctly utilised, they have the potential to provide sustainable supply of commercially relevant biochemicals, biofuels, nutraceuticals, food and feed supplements. The field of microalgal biotechnology is a fast-paced area of research, with technologies coming ever closer to commercial viability. Microalgal Biotechnology consolidates the latest research in the field together with a look at market potential and policy considerations. Highlighting the huge potential of microalgae as commercial commodities, it covers progress on various fronts including; bio-refinery and its technological challenges, genetic engineering, biosafety and regulatory issues, open and closed photo-bioreactors for biomass production, market space and sustainability for algal products. This book is a useful resource for researchers, academicians, postgraduate students, industries, policy makers and anyone interested in the status and future possibilities of microalgae commercialisation.

Sustainable Development of Algal Biofuels in the United States CRC Press

This book offers insights into the recent research focusing on green solutions to address

environmental pollution and its impacts. Bioremediation is a vast area that encompasses numerous innovative and cost-effective experimental and research methods involving numerous technologies, such as biotechnological, biochemical, microbial, marine, chemical and engineering approaches. Featuring original research and review articles by leading experts, the book explores potential solutions to the growing issues of waste management and environmental pollution and their impacts, and suggests future research directions. As such, it is a valuable resource for professionals and general readers alike.

Sustainable Water and Wastewater Processing Springer

A comprehensive reference on all aspects of the isolation and cultivation of marine and freshwater algae.

Encyclopedia of Marine Biotechnology Springer Science & Business Media

"Microalgae Biotechnology for Food, Health and High Value Products" presents the latest technological innovations in microalgae production, market status of algal biomass-based products, and future prospects for microalgal applications. It provides stimulating overviews from different perspectives of application that demonstrate how rapidly the commercial production of microalgae-based food, health and high value products is advancing. It also addresses a range of open questions and challenges in this field. The book highlights the latest advances of interest to those already working in the field, while providing a comprehensive overview for those readers just beginning to learn about the promise of microalgae as a sustainable source of both specialty and commercial products. It offers a valuable asset for commercial algae producers, algae product developers, scientific researchers and students who are dedicated to the advancement of microalgae biotechnology for applications in health, diet, nutrition, cosmetics, biomaterials etc.

Handbook of Microalgal Culture CRC Press

In this book, researchers and practitioners working in the field present the major promises of algae biotechnology and they critically discuss the challenges arising from applications. Based on this assessment, the authors explore the great scientific, industrial and economic potential opened up by algae biotechnology. The first part of the book presents recent developments in key enabling technologies, which are the driving force to unleash the enormous potential of algae biotechnology. The second part of the book focuses on how practical applications of algae biotechnology may provide new solutions to some of the grand challenges of the 21st century. Algae offer great potential to support the building of a bio-based economy and they can contribute new solutions to some of the grand challenges of the 21st century. Despite significant progress, algae biotechnology is yet far from fulfilling its potential. How to unleash this enormous potential is the challenge that the own field is facing. New cultivation technologies and bioprocess engineering allow for optimization of the operation strategy of state-of-the-art industrial-scale production systems and they reduce the production costs. Parallel to this, new molecular technologies for genetic and metabolic engineering of (micro)algae develop quickly. The optimization of existing biochemical pathways or the introduction of pathway components makes high-yield production of specific metabolites possible. Novel screening technologies including high-throughput technologies enables testing of extremely large numbers of samples and, thus, allow for large scale modelling of biomolecular processes, which would have not been possible in the past. Moreover, profitable

production can demand for integrated biorefining, which combines consecutive processes and various feedstocks to produce both transportation fuel, electric energy and valuable chemicals.

Biodiesel Fuels Based on Edible and Nonedible Feedstocks, Wastes, and Algae Elsevier

This book focuses on two key issues confronting humanity, viz., energy and environment. There is a need to devise strategies for protecting the environment, at the same time adequately meeting the ever-growing energy needs of the world. Harnessing the power of microbes is one step towards finding cheap, green and sustainable solutions to the problems of energy and environment. The book is divided into eight major topics. These topics include emerging trends in microbial biotechnology, harnessing sustainable energy sources from microorganisms, mechanistics of bioenergy production, bioenergy from wastes and pollutant removal, microalgae for biofuels, bioremediation technologies for petroleum hydrocarbons, polycyclic aromatic hydrocarbons and xenobiotics, bioremediation of nuclear wastes, and the role of extremophilic microorganisms in environmental cleanup.

Biomass to Renewable Energy Processes Springer Nature

Sustainable Water and Wastewater Processing covers the 12 most current topics in the field of sustainable water processing, with emphasis given to water as a resource (quality, supply, distribution, and aquifer recharge). Topics covered include emerging sustainable technologies for potable and wastewater treatment, water reuse and recycling, advanced membrane processes, desalination technologies, integrated and hybrid technologies, process modeling, advanced oxidative and catalytic processes, environmentally, economically and socially sustainable technology for water treatment, industrial water treatment, reuse and recovery of materials, and emerging nanotechnology and biotechnology for water processing. Responding to the goals of sustainability requires the maximum utilization of all water resources, water processing with restricted energy costs and reduced greenhouse gas production. Following these trends, this book covers all the important aspects of sustainable water processing and support. Covers cutting-edge topics of water process engineering, sustainability and energy efficiency Fills the transfer knowledge gap between academia and industry by analyzing the associated environmental, economic and sustainability challenges of water processing Includes theoretical and applied research and technological and industrial solutions for sustainable, economic and large scale water treatment, recycling and reutilization Analyzes potentiality and economic feasibility of already commercialized processes

Microbial Biotechnology John Wiley & Sons

This book examines the utilization of algae for the development of useful products and processes with the emphasis towards green technologies and processes, and the requirements to make these viable. Serving as a complete reference guide to the production of biofuels and other value added products from micro and macro algae, it covers various aspects of algal biotechnology from the basics to large scale cultivation, harvesting and processing for a variety of products. It is authored and edited by respected world experts in the field of algal biotechnology and provides the most up to date and cutting edge information on developments in the field. Over the past decade there has been substantial focus and related literature on the application of algal biomass for the generation of novel processes and products. 'Algae Biotechnology: Products and Processes' encompasses a

holistic approach to critically evaluating developments in the field of algal biotechnology whilst taking into account recent advances and building on the body of knowledge. Aspects of the effects of harmful algae are also discussed, as well as the potential commercial application of algal biotechnology, the techno-economic feasibility of algal biodiesel production and the use of genetic and metabolic engineering for the improvement of yield. Other bioenergy sources such as alcohol fuels, aviation fuels, biohydrogen and biogas are also covered. This book is intended for postgraduates and researchers working in the biofuels and algal industry; it constitutes ideal reference material for both early stage and established researchers.

Algae for Biofuels and Energy National Academies Press

The Handbook of Microalgae-based Processes and Products provides a complete overview of all aspects involved in the production and utilization of microalgae resources at commercial scale. Divided into four parts (fundamentals, microalgae-based processes, microalgae-based products, and engineering approaches applied to microalgal processes and products), the book explores the microbiology and metabolic aspects of microalgae, microalgal production systems, wastewater treatment based in microalgae, CO₂ capture using microalgae, microalgae harvesting techniques, and extraction and purification of biomolecules from microalgae. It covers the largest number of microalgal products of commercial relevance, including biogas, biodiesel, bioethanol, biohydrogen, single-cell protein, single-cell oil, biofertilizers, pigments, polyunsaturated fatty acids, bioactive proteins, peptides and amino acids, bioactive polysaccharides, sterols, bioplastics, UV-screening compounds, and volatile organic compounds. Moreover, it presents and discusses the available engineering tools applied to microalgae biotechnology, such as process integration, process intensification, and techno-economic analysis applied to microalgal processes and products, microalgal biorefineries, life cycle assessment, and exergy analysis of microalgae-based processes and products. The coverage of a broad range of potential microalgae processes and products in a single volume makes this handbook an indispensable reference for engineering researchers in academia and industry in the fields of bioenergy, sustainable development, and high-value compounds from biomass, as well as graduate students exploring those areas. Engineering professionals in bio-based industries will also find valuable information here when planning or implementing the use of microalgal technologies. Covers theoretical background information and results of recent research. Discusses all commercially relevant microalgae-based processes and products. Explores the main emerging engineering tools applied to microalgae processes, including techno-economic analysis, process integration, process intensification, life cycle assessment, and exergy analyses.

Prospects and Challenges in Algal Biotechnology IWA Publishing

The marine environment accounts for most of the biodiversity on our planet, while offering a huge potential for the benefit and wellbeing of mankind. Its extensive resources already constitute the basis of many economic activities - but many more are expected in coming years. This book covers current knowledge on uses of marine algae to obtain bulk and fine chemicals, coupled with optimization of the underlying production and purification processes. Major gaps and potential opportunities in this field are discussed in a critical manner. The current trends pertaining to marine macro- and microalgae are explained in a simple and understandable writing style. This book covers

a wide variety of topics, and as such it will be appropriate as both student text and reference for advances researchers in the field.

Bioenergy and Environmental Biotechnology for Sustainable Development Academic Press

Microalgae are one of the most studied potential sources of biofuels and bioenergy. This book covers the key steps in the production of renewable biofuels from microalgae - strain selection, culture systems, inorganic carbon utilisation, lipid metabolism and quality, hydrogen production, genetic engineering, biomass harvesting, extraction. Greenhouse gas and techno-economic modelling are reviewed as is the 100 year history of microalgae as sources of biofuels and of commercial-scale microalgae culture. A summary of relevant basic standard methods used in the study of microalgae culture is provided. The book is intended for the expert and those starting work in the field.

Application of Microalgae in Wastewater Treatment Springer

This second volume of the Handbook of Biodiesel and Petrodiesel Fuels presents a representative sample of the population papers in the field of feedstock-specific biodiesel fuels. The research on feedstocks for biodiesel fuels has first focused on the edible oils as first-generation biodiesel fuels. However, the public concerns about the competition with foods based on these feedstocks and adverse impact on the ecological diversity and deforestation have resulted in the exploration of nonedible-oil-based biodiesel fuels as second-generation biodiesel fuels in the first instance. Due to the ecological and cost benefits of treating wastes, waste oil-based biodiesel fuels as third-generation biodiesel fuels have emerged. Furthermore, following a series of influential review papers, the research has focused on the algal oil-based biodiesel fuels in recent years. Since the cost of feedstocks in general constitutes 85% of the total biodiesel production costs, the research focused more on improving biomass and lipid productivity in these research fields. Furthermore, since water, CO₂, and nutrients (primarily N and P) have been major ingredients for the algal biomass and lipid production, the research has also intensified in the use of wastewaters and flue gases for algal biomass production to reduce the ecological burdens and the production costs. Part 1 presents a representative sample of the population papers in the field of edible oil-based biodiesel fuels covering major research fronts. It covers soybean oil-based biodiesel fuels, palm oil-based biodiesel fuels, and rapeseed oil-based biodiesel fuels as case studies besides an overview paper. Part 2 presents a representative sample of the population papers in the field of nonedible oil-based biodiesel fuels covering major research fronts. It covers Jatropha oil-based biodiesel fuels, polanga oil-based biodiesel fuels, and moringa oil-based biodiesel fuels as case studies besides an overview paper. Part 3 presents a representative sample of the population papers in the field of waste oil-based biodiesel fuels covering major research fronts. It covers wastewater sludge-based biodiesel fuels, waste cooking oil-based biodiesel fuels, and microbial oil-based biodiesel fuels as case studies besides an overview paper. Part 4 presents a representative sample of the population papers in the field of algal oil-based biodiesel fuels covering major research fronts. It covers algal biomass production in general, algal biomass production in wastewaters, algal lipid production, hydrothermal liquefaction of algal biomass, algal lipid extraction, and algal biodiesel production besides an overview paper. This book will be useful to academics and professionals in the fields of Energy Fuels, Chemical Engineering, Physical Chemistry, Biotechnology and Applied Microbiology, Environmental

Sciences, and Thermodynamics. Ozcan Konur is both a materials scientist and social scientist by training. He has published around 200 journal papers, book chapters, and conference papers. He has focused on the bioenergy and biofuels in recent years. In 2018, he edited 'Bioenergy and Biofuels', that brought together the work of over 30 experts in their respective field. He also edited 'Handbook of Algal Science, Technology, and Medicine' with a strong section on the algal biofuels in 2020. *Sustainable Downstream Processing of Microalgae for Industrial Application* Springer Nature Handbook of Microalgal Culture is truly a landmark publication, drawing on some 50 years of worldwide experience in microalgal mass culture. This important book comprises comprehensive reviews of the current available information on microalgal culture, written by 40 contributing authors from around the globe. The book is divided into four parts, with Part I detailing biological and environmental aspects of microalgae with reference to microalgal biotechnology and Part II looking in depth at major theories and techniques of mass cultivation. Part III comprises chapters on the economic applications of microalgae, including coverage of industrial production, the use of microalgae in human and animal nutrition and in aquaculture, in nitrogen fixation, hydrogen and methane production, and in bioremediation of polluted water. Finally, Part IV looks at new frontiers and includes chapters on genetic engineering, microalgae as platforms for recombinant proteins, bioactive chemicals, heterotrophic production, microalgae as gene-delivery systems for expressing mosquito-cidal toxins and the enhancement of marine productivity for climate stabilization and food security. Handbook of Microalgal Culture is an essential purchase for all phycologists and also those researching aquatic systems, aquaculture and plant sciences. There is also much of great use to researchers and those involved in product formulation within pharmaceutical, nutrition and food companies. Libraries in all universities and research establishments teaching and researching in chemistry, biological and pharmaceutical sciences, food sciences and nutrition, and aquaculture will need copies of this book on their shelves. Amos Richmond is at the Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Israel.

Microalgae Biotechnology for Food, Health and High Value Products American Society for Microbiology Press

In order to successfully compete as a sustainable energy source, the value of biomass must be maximized through the production of valuable co-products in the biorefinery. Specialty chemicals and other bio-based products can be extracted from biomass prior to or after the conversion process, thus increasing the overall profitability and sustainability of the biorefinery. Biorefinery Co-Products highlights various co-products that are present in biomass prior to and after processing, describes strategies for their extraction, and presents examples of bioenergy feedstocks that contain high value products. Topics covered include: Bioactive compounds from woody biomass Phytochemicals from sugar cane, citrus waste and algae Valuable products from corn and other oil seed crops Proteins from forages Enhancing the value of existing biomass processing streams Aimed at academic researchers, professionals and specialists in the bioenergy industry, Biorefinery Co-Products is an essential text for all scientists and engineers working on the efficient separation, purification and manufacture of value-added biorefinery co-products. For more information on the Wiley Series in Renewable resources, visit www.wiley.com/go/rrs

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