



Phytomedicine

A Treasure of Pharmacologically Active Products from Plants

2021, Pages 427-460

Chapter 16 - Bioprospecting of endophytic fungi for antibacterial and antifungal activities

Bhat Mohd Skinder ^a, Bashir Ahmad Ganai ^a, Abdul Hamid Wani ^b

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Abstract

Bioprospecting is a tool to find diversity of various endophytes and ways to commercialize them. Endophytic fungi reside in plant tissues being a vascular plant or grasses) having asymptomatic symbiotic association for part of or the entire life cycle. There are at least more than one endophyte inhabiting 300,000 plant species worldwide. These are considered a paragon of secondary metabolites, which have revolutionized the pharmaceutical industry by producing pharmacologically active substances such as alkaloids, flavonoids, steroids, terpenoids, phenolic acids, benzopyranones, chinones, quinone, tetralones, xanthenes, etc., depicting various activities such as antibacterial, antimycotic, antimalarial, antioxidant, anticarcinogenics, antihelminthic, etc., for example, the β -lactam antibiotic "penicillin" from *Penicillium* sp. and the antifungal agent "griseofulvin ($C_{17}H_{17}ClO_6$)" extracted from *Pencillium griseofulvum*. More than 35% of endophytes are isolated from medicinal plants, and more than 80% of endophytic fungi produce biologically active compounds. The secondary metabolites and medicinal plants contribute more than 80% of natural drugs to the pharmaceutical industry or markets.

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Microbes and Microbial Biotechnology for Green Remediation

2022, Pages 169-183

Chapter 9 - Biochar and its potential use for bioremediation of contaminated soils

Shahnawaz Hassan¹, Sabreena¹, Muzaffar Zaman¹, Aarif Yaseen¹, Bashir Ah Ganai²

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Abstract

In contemporary times, owing to anthropogenic activities, soil contaminated with HMs has progressively become a grave global environmental issue affecting not merely ecosystem health and agricultural production but also posing a grave hazard to human well-being. Substantial efforts have been made to remediate contaminated soils either by immobilization or elimination by bioremediation and phytoremediation. Biochar is documented as an encouraging contrivance because of its large surface area and greater dimensions to engross HMs and organic pollutants. Biochar can possibly be exploited to diminish the HM bioavailability and leachability in soils utilizing diverse mechanisms like adsorption and other physicochemical reactions. Being alkaline in nature, it enhances soil pH and bestows heavy metal stabilization. Understanding the characteristics and interactions of biochar with soil and biota is indispensable to consider its impressions on bioremediation of tainted soils. This may offer a new elucidation to the soil contamination problem for cost-effective remediation strategies.

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Freshwater Microbiology

Perspectives of Bacterial Dynamics in Lake Ecosystems

2019, Pages 137-174

Chapter 4 - Spatio-temporal patterns of bacterial diversity along environmental gradients and bacterial attachment to organic aggregates

[Suhaib A. Bandh](#)¹, [Sana Shafi](#)¹, [Nowsheen Shameem](#)¹, [Rubiya Dar](#)², [Azra N. Kamili](#)², [Bashir A. Ganai](#)²

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Abstract

Variation of microbial diversity along different gradients is now a fact beyond any doubt. Different types of microbes get attached to different types of substrates in water bodies depending on the physical, chemical, and biological features of the attaching surfaces and the adjoining environments. In this chapter, a detailed discussion has been done on the spatial-temporal distribution of microbes along with the drivers of microbial diversity in freshwater ecosystems, explaining the patterns and influence of different drivers on their distribution. It explains the distribution pattern along the lines of gradient like the altitudinal gradient, the latitudinal gradient, the urban water quality gradient along with the effect of grazers and the influence of microcystis decomposition on microbial assemblages in lakes. Role of bottom-up (such as temperature, pH, nitrogen, and phosphorus) and top-down factors (such as predation) regulating the density, diversity, and distribution of bacterial community composition in freshwater lake ecosystems has also been detailed out. The diversity-functioning relationship of bacterial communities in lake ecosystems has also been explained in the chapter. It further goes on explaining the organic aggregates vis-à-vis the diversity and abundance of bacteria, turnover rates, and growth efficiencies. The chapter concludes with a deliberation on the ecological significance of the organic aggregates, showing how well the organic aggregates work as the hotspots of bacterial diversity and their functioning in lake ecosystems.

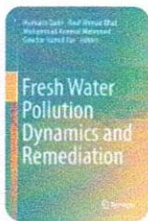
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Bioremediation: A Sustainable and Emerging Tool for Restoration of Polluted Aquatic Ecosystem

| Chapter | First Online: 18 July 2019

| pp 143–165 | [Cite this chapter](#)



Fresh Water Pollution Dynamics and Remediation

Bhat Mohd Skinder, Baba Uqab & Bashir Ahmad Ganai

 1347 Accesses  8 [Citations](#)

Abstract

The most important and visible factors like the population explosion, urbanization and economic growth are accountable for ecological degradation and contamination. Ecological detoxification is a riddle that needs to be solved through ecological concepts and techniques. Thus, the application of advanced science and technology helps us to apply diverse biota for pollution abatement. Diverse and potential biota has efficiency to reinstate the polluted environment effectively, but dearth of knowledge about the factors viz., pH, moisture content, temperature, redox potential, soil type and oxygen controlling the growth and metabolism of microorganism in polluted environments often limits its



Protein Modificomics

From Modifications to Clinical Perspectives

2019, Pages 1-35

Chapter 1 - Posttranslational Modifications of Proteins and Their Role in Biological Processes and Associated Diseases

[Irfan-ur-Rauf Tak *](#), [Fasil Ali †](#), [Jehangir Shafi Dar *](#), [Aqib Rehman Magray *](#), [Bashir A. Ganai *](#), [M.Z. Chishti *](#)

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Abstract

A posttranslational modification (PTM) depicts an imperative means for diversification and regulation of the cellular proteome due to its tremendous scope in various biological processes such as replication, histone modifications, transcription, translation, cell signaling, apoptosis, and cancer, etc. Most PTMs occur in a time- and signal-dependent manner, and determine the overall structure of proteins and also their function in regulating various biological processes. Most PTMs are brought about by small molecular weight functional groups such as phosphate, acyl, acetyl, amide, alkyl, myristoyl, palmitoyl, prenyl, hydroxyl, ubiquitin, and sugars to the amino acid side chains of the protein. Advanced molecular techniques have enumerated more than 200 posttranslational modifications and, in fact, many of them have been discovered recently. Posttranslational modifications can take place at any stage during the maturation of the protein, whereas other modifications usually take place after the process of folding and sorting of proteins and are responsible for their catalytic activity. Study of posttranslational modifications and their mechanism of regulation of various cellular signaling pathways have significant medical implications. Identification, description, and mapping of the posttranslational modifications are very important for discerning their functional implications in a biological context. Therefore, an accurate understanding of protein posttranslational modifications is very important, not only for gaining insight about a multitude of cellular functions and associated diseases, but also regarding drug development for many life-threatening diseases such as neurodegenerative disorders and



Protein Modificomics

From Modifications to Clinical Perspectives

2019, Pages 339-359

Chapter 13 - Protein Glycosylation: An Important Tool for Diagnosis or Early Detection of Diseases

Humayra Bashir *, Barqul Afaq Wani †, Bashir A. Ganai *, Shabir Ahmad Mir †

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Abstract

Proteins are highly dynamic diverse cellular entities regulating all cellular functions. Translated from transcripts, nascent peptides undergo posttranslational modifications (PTMs). Although these modifications impart important characteristic features to the proteins, the unusual modification pattern of some proteins also lead to their loss/gain in functions leading to disorders. Studies on protein modifications are expected to establish potential suitable biomarkers useful for diagnosis and early detection of diseases. Glycosylation is one of the most important PTMs of proteins, which plays an essential role in various biological processes. In fact, alterations in glycosylation are associated with many diseases and, thus, act as promising targets and biomarkers for monitoring health conditions. Understanding the exact mechanism contributing to altered glycoproteomes in specific diseases is very important to advance our molecular knowledge of the underlying pathogenesis. Over the last few years, revolutionary advances in “omics” technologies have highlighted the progressive need to restructure traditional approaches to basic and clinical research in order to facilitate the rapid, efficient integration and translation of these new technologies into novel effective therapeutics. The recent advances in mass spectrometry (MS) instrumentation, combined with innovative peptide fractionation and protein/peptide tagging have advanced our understanding of the complex and dynamic nature of proteomes and opened the way for reliable and high-throughput characterization of protein PTMs. Due to their heterogeneous nature, development of rapid and sensitive methods for analysis of aberrant glycoproteins associated with diseases has become critical. MS has become a powerful tool for the determination of chain length and composition of monosaccharide classes, whereas linkage information and monosaccharide identification are usually deduced using gas chromatography (GC) (after chemical



Phytomedicine

A Treasure of Pharmacologically Active Products from Plants

2021, Pages 1-33

Chapter 1 - Phytomedicines: Diversity, extraction, and conservation strategies

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Abstract

Herbal medicines also called as phytomedicines are mixtures of plant metabolites that contain pharmacologically active compounds that exhibit some therapeutic properties. Phytomedicines have a massive array of biological activities, and therefore these are practiced worldwide since ancient times. The parts of plant utilized for phytomedicines are leaves, barks, tubers, roots, herbs, and the plant extracts. These plant parts secrete substance like alkaloids, terpenes, phenolic compounds, basic metabolites, glycosides, and secondary metabolites, and preparations formed with medicinal plants include decoction, emulsion, apozems, liniments, electroactives, and powdered. The futures of plant-derived medicines are likely to have marvelous opportunity for discovering some novel and innovative therapeutic strategies and products. The important secondary metabolites possess some specific pharmacological properties for the human body. Excessive harvesting and habitat destruction have put most medicinal plants at various degrees of risk. To conserve medicinal plants, various in situ and ex situ efforts have been made by world's richest biodiversity regions so that the sustainable utilization of herbal drugs is ensured for the generations to come without compromising the quality and efficiency of the active constituents present in herbal medicines.

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Protein Modificomics

From Modifications to Clinical Perspectives

2019, Pages 1-35

Chapter 1 - Posttranslational Modifications of Proteins and Their Role in Biological Processes and Associated Diseases

Irfan-ur-Rauf Tak *, Fasil Ali †, Jehangir Shafi Dar *, Aqib Rehman Magray *, Bashir A. Ganai *, M.Z. Chishti *

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Abstract

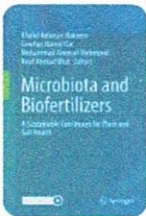
A posttranslational modification (PTM) depicts an imperative means for diversification and regulation of the cellular proteome due to its tremendous scope in various biological processes such as replication, histone modifications, transcription, translation, cell signaling, apoptosis, and cancer, etc. Most PTMs occur in a time- and signal-dependent manner, and determine the overall structure of proteins and also their function in regulating various biological processes. Most PTMs are brought about by small molecular weight functional groups such as phosphate, acyl, acetyl, amide, alkyl, myristoyl, palmitoyl, prenyl, hydroxyl, ubiquitin, and sugars to the amino acid side chains of the protein. Advanced molecular techniques have enumerated more than 200 posttranslational modifications and, in fact, many of them have been discovered recently. Posttranslational modifications can take place at any stage during the maturation of the protein, whereas other modifications usually take place after the process of folding and sorting of proteins and are responsible for their catalytic activity. Study of posttranslational modifications and their mechanism of regulation of various cellular signaling pathways have significant medical implications. Identification, description, and mapping of the posttranslational modifications are very important for discerning their functional implications in a biological context. Therefore, an accurate understanding of protein posttranslational modifications is very important, not only for gaining insight about a multitude of cellular functions and associated diseases, but also regarding drug development for many life-threatening diseases such as neurodegenerative disorders and

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Role of Microbiota in Composting

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Microbiota and Biofertilizers

[Lone Rafiya Majeed](#), [Sumaira Rashid](#), [Heena Nisar Pahalvi](#), [Bisma Nisar](#) & [B. A. Ganai](#)

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Abstract

Waste management in developing countries is so hard to achieve owing to limited resources; composting paves the way due to its adaptability for long-range situations and environmentally sound method as it reduces pollution to a larger extent and also has less potential for environmental degradation comparatively. Decomposition needs direct interaction between the substrates with decomposing substance and the exterior layer of different microbial species. As chemical decomposers, microbiota such as microbes, fungi and actinomycetes break down organic matter to carbon dioxide, water, heat, humus and relatively stable organic end product. Knowledge on waste management demonstrates that composting is an environmentally and economically sound waste treatment process. One of the benefits is that organic waste is converted to a mineral and generates organic fertilizer by application of microorganisms. Composting reduces waste to be dumped in