

Preface

Microorganisms are ubiquitous in the environment playing an important role in biogeochemical cycling. However, their ability to metabolize xenobiotic compounds has received much attention in recent years due to their environmental persistence and toxicity. Hence, microbial degradation of xenobiotics is, today, seen as both cost-effective and eco-friendly technology for removing these pollutants by a process known as bioremediation. Earlier researchers have confirmed that microbes are capable of degrading a wide range of organic pollutants. However, process of biodegradation is generally very slow and hence, this process may be accelerated by augmenting pure and mixed cultures of microorganisms in both aerobic and anaerobic conditions. Metabolic intermediates formed in the degradative pathways were also examined for their toxicity assessments using bacteria and higher organisms. Many of degradative genes responsible for xenobiotic metabolism are present on plasmids, transposons or are grouped in clusters on chromosomes. This indicates evolution of degradative pathways and makes the genetic manipulation easier. Development of the transgenic microbial strains highly capable of degrading xenobiotics is now possible through biotechnological approaches. Besides, several catabolic enzymes involved in xenobiotic metabolism have been isolated and characterized. A number of environmental factors, including pH, temperature, bioavailability, nutrient supply and oxygen availability have been shown to affect biodegradation process. These factors have to be optimized to obtain an effective microbial treatment process for the industrial organic wastes at bench and pilot scales. However, in the field scale treatment, all environmental factors cannot be manipulated to enhance the degradation process.

To update the knowledge on bioremediation which is a natural attenuation process, I present before you an edited volume on 'Microbial degradation of xenobiotics' which has focused on different aspects of microbial degradation of xenobiotic compounds, like poly aromatics hydrocarbons, polychlorophenols, polyurethane, dye containing wastewater, water soluble polymers, azo dyes, explosives, chloroorganic pollutants, styrene, trinitrophenol and high molecular weight alkanes. These aspects have been discussed in 17 chapters contributed by the leading scientists drawn from all over the world.

In this endeavor, I am not alone, but assisted by many fellow workers. First of all, I would like to acknowledge all the contributors who responded to my request and very enthusiastically contributed their chapters containing the latest developments on the relevant issues. The services rendered by my own research scholars Mrs. Babita Kumari, Ms. Shweta Mishra, and Mrs. Sadhna Tiwari in this endeavor are remarkable and highly appreciable. Besides, laboratory trainees Ms. Namarata Pandey, Ms. Jyoti, Ms. Rashi Singhal, Ms. Deepika Verma, Ms. Radha Verma, Ms. Shilpi Dupey and Ms. Shilpi Kumari are also duly acknowledged for their multifaceted help and support. Mr. Dilip Chakraborty deserves special appreciation for computer work for preparing the manuscript on the book format.

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