

Book Reviews

Environmental Biotechnology

Concepts and Applications

Editors: Hans-Joachim Jordening and Josef Winter

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This book is a collection of the most relevant topics from a three-volume publication on Environmental Biotechnology that consisted of Environmental Processes I – Wastewater Treatment (edited 1999); Environmental Processes II – Soil Decontamination (edited 2000); and, Environmental Processes III – Solid Waste and Waste Gas Treatment, Preparation of Drinking Water (edited 2000). In the Preface, the editors noted that the invited authors were given the opportunity to update their contributions when a significant progress was achieved.

Biotechnology is a set of powerful tools based on biological knowledge. Mastery of these tools will ultimately touch every facet of human life from the food we eat and the water we drink to the energy that fuels our machines and the materials from which they are constructed. A vigorous and broadly based science and engineering research enterprise is essential if we are to realize the full economic and social benefits of biotechnology. This book addresses an important additional facet of biotechnology; namely, the processes and technologies applicable to the liquid, solid, and gaseous waste treatments that are crucial to an industrialized society. Without mandatory regulations and their enforcement, safe and effective treatment and disposal of municipal and industrial wastes make the differences between wealthy industrialized and poor developing countries.

This book is divided into 19 chapters. Each chapter provides details (sometimes with great minute) about critical aspect of waste treatment, whether it's in water, as a solid, or as a biogas. Biological processes are generally those that involve microorganisms and the conversion of the waste into mainly carbon dioxide, water, and biomass. Degradation processes may take place under aerobic as well as under anaerobic conditions. Surprisingly for a book whose chapters have been recently 'updated', very little mention is made of genetically engineered organisms. Only in the chapter on 'Bacterial Metabolism in Wastewater Treatment Systems' is there a discussion on bioaugmentation of bacteria and fungi by genetic engineering. The authors correctly point out that there has been only limited success on bioengineering for wastewater treatment, i.e., the successful use of genetically modified bacteria that can serve as donors for plasmids encoding degradative enzymes.

Although not discussed in book, the use of genetically engineered organisms, whether microbes or crops, in Europe has been severely restricted by European regulations on this form of biotechnology. Only two of the twenty-nine authors that contributed to the book are from the United States. Thus it is not surprising that there is little discussion in the book on molecular biology and its use in engineering more efficient organisms to degrade recalcitrant organic compounds. As biological approaches to pollutant clean-up operations, waste minimization, and pollution prevention receive increased attention in this new century, the role of genetically engineered microbes will become more common. This will not occur until our regulatory agencies are sufficiently knowledgeable in the scientific underpinnings of this new biotechnology to ensure safe application.

Why should you be interested in this book? If you are in the waste management profession, this book is a must. As the editors stated: "... the presented comprehensive overview on processes of environmental biotechnology for liquid, solid and gaseous waste treatment will help students and professional experts to obtain a fast fundamental information and an overview over the biological background and general process alternatives. This might then be a useful basis or starting point to tackle a specific process in more detail."

If you are attracted by the title of this book, you are likely to be very disappointed. The cover shows a young corn plant, which of course is NOT the subject of this book. This book is not about genetically modified plants or microorganisms released into the environment, nor is it about the scientific or environmental issues associated with them. It is not about public perception and societal acceptance. It is a book about waste management technologies. To the average reader, this book will be a challenge for two reasons. First, the detailed engineering and applications of process technology will be beyond the novice. Secondly, it was obvious that many of the original texts were prepared in the German language, and the translations to the English language were often difficult and awkward. Nevertheless, this book provides important state-of-the-art information on the science and technology of waste management.