

Preface

This volume contains material first presented at an international workshop on the 'Use of Microorganisms to Combat Pollution', held in Israel, May 10–18, 1992. The workshop was sponsored by the Bat-Sheva de Rothschild Foundation for the Advancement of Science and included microbiologists, biochemists and geneticists from universities, environmental agencies and the military. Each of the contributors to this volume is an acknowledged expert on the treatment of one or more types of pollution using microorganisms or their enzymes.

This book differs from most published symposia proceedings in the breadth of coverage of each subject. Most of the chapters are divided into three parts: (a) A general presentation of the source and toxicity of the pollutant, (b) a review of the current state-of-the-science on the biodegradation of that pollutant and (c) the authors' unique research experiences on the problem. In several examples, the authors have presented data from both laboratory studies and field trials. Thus, the book contains not only the theoretical background on the biodegradation of pollutants, but also practical experiences in applying this knowledge to solving significant pollution problems.

The opening chapters deal with the use of genetically engineered microorganisms (GEM's) in bioremediation research and application. The major use of GEM's is as a tool for an improved understanding of the biodegradation pathways. The actual use of GEM's to treat or avoid pollution appears to be limited at present to totally recalcitrant pollutants, such as certain aromatic halides, and situations where high levels of a specific enzyme are required, e.g., biobleaching of wood pulp with xylanase (Shoham et al.). The presentation of Ron Atlas demonstrates how new molecular biological techniques, such as the use of PCRs, can be applied to detection and containment of GEM's.

The remaining chapters are divided into the type of pollution potentially treatable by microorganisms: metals, lignocellulose, inorganic nitrogen and sulfur molecules, halogenated compounds, hydrocarbons and products produced by the military which must now be destroyed in an environmentally safe manner. In some cases the pollutants are mixtures of compounds that are difficult to define, e.g., petroleum and PCBs. This, of course, makes the quantitative determination of biodegradation more difficult. Nevertheless, the data presented here document and explain the generally successful use of microorganisms to treat a wide variety of pollution problems.

It is hoped that the wide scope of pollution problems presented and the broad approach to discussing them will make this book useful to students and scientists interested in applied microbiology and the environmental sciences.

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