

WASTEWATER MICROBIOLOGY

Third Edition

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PREFACE

I would like to mention some of the changes and additions that have been included in the third edition of *Wastewater Microbiology*. In general, every chapter of the book has been revised (up to July 2004) to include the latest developments in the field, and I will highlight only the major ones.

A review of the most important molecular techniques has been added to Chapter 1, while the most recent methodology for measuring microbial biomass in environmental samples is described in Chapter 2. New developments in enhanced biological phosphorus removal (EBPR) are covered in Chapter 3. Chapter 4 covers new findings on old and emerging (e.g., *Helicobacter pylori*, *Cyclospora*, Microsporidia) microbial pathogens and parasites. Much progress has been made concerning the detection of *Cryptosporidium* and *Giardia* in environmental samples, including wastewater. The improved methodology is also covered in Chapter 4. As regards disinfection of water and wastewater, research efforts are now focusing on UV disinfection in industrialized countries and on the use of solar radiation in developing countries (Chapter 6).

Armed with new molecular tools and microsensor/microelectrode technology, investigators are making progress in understanding the microbial ecology and the surface properties of activated sludge flocs. The methodology used is similar to that used in biofilms. These advances will help us to better understand the flocculation process in activated sludge (Chapter 8). Concerning bulking and foaming in activated sludge plants, most of the recent studies have focused on the characterization and phylogeny of filamentous microorganisms (Chapter 9).

In the last few years we have witnessed an increased interest in biofilm microbiology. Biofilms develop on biological and nonbiological surfaces and are ubiquitous in natural aquatic environments and engineered systems (e.g., fixed-film bioreactors). Their beneficial role in fixed-film bioreactors has been known for years (chapter 10). However, the impact of biofilms on drinking water distribution systems has been the subject of increased research activity around the world (chapter 16). This interest is further heightened by the findings that biofilms are the source of medical problems such as dental plaques or colonization of artificial implants, leading to increased rate of infection in patients. The discovery of communication among members of the biofilm community (i.e., quorum sensing using signaling chemicals such as homoserine lactones) may lead to potential means of controlling biofouling of surfaces.

Chapter 13 shows that new procedures, particularly molecular techniques, have helped shed light on the phylogeny of methanogens and other Archaea.

Part D (Microbiology of Drinking Water Treatment) of the third edition now comprises three chapters instead of two as in the second edition. The third chapter (Chapter 17) introduces the reader to bioterrorism microbial agents and their potential impact on drinking water safety.

In Chapter 18 (Biotechnology of Waste Treatment: Pollution Control Biotechnology), I have added some information about membrane bioreactors (MBR technology), while in Chapter 21, new developments in the area of bioremediation have been included. Finally, in Chapter 23 (Wastewater Reuse), I have made an attempt to introduce the reader to the microbiological aspects of the treatment of wastewater effluents by natural and constructed wetlands and by the use of attached algae for polishing wastewater effluents.

Since the World Wide Web is increasingly becoming an integral part of the learning process at education institutions, I have added some Web resources to each chapter of the book to help students increase their knowledge or satisfy their curiosity about topics discussed in a given chapter. I have also included questions at the end of each chapter. These questions can help students in studying the material or can be used as homework.

I thank Jorge Gomez Moreno for drawing several of the new figures for the third edition of this book. His attention to detail is much appreciated.

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