

# Environmental Microbiology

## Current Technology and Water Applications



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With contributions from a broad range of leading researchers this book focuses on current technology and its applications. Although aimed primarily at research scientists and graduate students in water microbiology, the topics and techniques are equally applicable to all branches of environmental microbiology. The initial chapters cover the concentration, detection and characterization of microbes in drinking water, other chapters are technology focused and cover topics such as geochips and microarrays and their applications, Raman microspectroscopy and related single cell techniques, the use of amoebae hosts, bacteria and bacteriophage as bioreporters, viability of detected microbes and fecal source tracking.

Authors have included comparative tables and figures that address detection sensitivity, specificity, ease of use and other criteria. The value of the book emanates from its explanation of the principles of techniques and the comparison of related techniques. In addition the reader is introduced to key references and important web sites where further details of the technology can be found.

An essential book for water microbiologists, environmental microbiologists and regulators and recommended reading for all microbiologists and environmental scientists.

**Chapter 1.** The Needle in a Haystack: Detection of Microbes in Source and Drinking Water by Molecular Methods. *Keya Sen*

**Chapter 2.** Taking the Hay Out of the Haystack: Collecting and Processing Water Samples. *H. D. Alan Lindquist*

**Chapter 3.** The Coming Together of the Sciences: Biosensors for the Detection of Waterborne Pathogens Using Antibodies and Gene-Based Recognition Chemistries. *Sen Xu and Raj Mutharasan*

**Chapter 4.** Simple, Powerful, and Smart: Using LAMP for Low Cost Screening of Multiple Waterborne Pathogens. *Grégoire Seyrig, Farhan Ahmad, Robert D. Stedtfeld, Dieter M. Tourlousse and Syed A. Hashsham*

**Chapter 5.** Challenges of Multiplexed Detection: Detection of Pathogens in Water and Wastewater Using Microarrays. *Timothy M. Straub*

**Chapter 6.** Discovering New Pathogens: Amoebae as Tools to Isolate Amoeba-resisting Microorganisms from Environmental Samples. *Julia Lienard and Gilbert Greub*

**Chapter 7.** Identity and Function of Single Microbial Cells Within a Community by Raman Microspectroscopy and Related Single-cell Techniques. *Daniel S. Read and Andrew S. Whiteley*

**Chapter 8.** Are They Alive? Detection of Viable Organisms and Functional Gene Expression Using Molecular Techniques. *Paul A. Rochelle, Anne K. Camper, Andreas Nocker and Mark Burr*

**Chapter 9.** Characterization of Microbial Community Structures in Recreational Waters and Primary Sources of Fecal Pollution with a Next-Generation Sequencing Approach. *Orin C. Shanks, Sandra McLellan, Susan M. Huse and Mitchell L. Sogin*

**Chapter 10.** Microbial Source Tracking: Current and Future Molecular Tools in Microbial Water Quality Forensics. *Jorge W. Santo Domingo, Regina Lamendella and Nicholas Ashbolt*

**Chapter 11.** Dynamics of Microbes in the Natural Setting: Development of the Geochip. *Joy D. Van Nostrand, Zhili He and Jizhong Zhou*

**Chapter 12.** The Microbe as a Reporter: Microbial Bioreporter Sensing Technologies for Chemical and Biological Detection. *Steven Ripp, Alice C. Layton and Gary S. Sayler*

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