

Microbial Genomes

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Genomic technologies have transformed the field of microbiology, making it possible to investigate hundreds of genomes and uncover millions of new genes. In *Microbial Genomics*, a panel of genomics pioneers—many from The Institute for Genomic Research (TIGR)—take stock of the current state of the field. Through 28 thought-provoking chapters, the authors describe some of the most common computational methods and their applications to studying pathogenic microorganisms, show how genomics can be used to reconstruct the history and dynamism of the microbial world, and discuss issues as diverse as reconstruction of metabolic pathways, cell cycle processes, microbial evolution, metagenomics, and vaccine development. Additional chapters deal with microarrays and expression analysis and the role of genomics in drug discovery.

Stimulating and comprehensive, *Microbial Genomics* brings together not only many of the major investigators of modern microbial genomics, but also synthesizes a coherent view of the contributions that sequencing has made to our understanding of genomic structures, evolution, and biology.

Features

- ▶ Reviews of microbial metabolism and evolution in the light of genome sequencing
- ▶ Use of microarrays, proteomics, and genomics in vaccine and drug discovery
- ▶ Chapters on microbial annotation and bioinformatics of infectious diseases
- ▶ Thought-provoking articles by many of the major contributors to microbial genomics
- ▶ Multiple whole-genome metabolic pathway figures in color
- ▶ Historical survey to explain how microbial genetics developed

Contents

Part I: Introduction. History of Microbial Genomics. **Part II: Bioinformatics As a Tool in Genomics.** Tools for Gene Finding and Whole Genome Comparison. Bacterial Genome Annotation at TIGR. Bioinformatics and Microbial Pathogenesis. Bacteriophage Bioinformatics. **Part III: Core Functions.** Comparative Microbial Metabolism. Genomic Analysis of Membrane Transport. Genomics-Based Analysis of the Bacterial Cell Cycle. **Part IV: The Evolution of Microbial Genomes.** A Brief History of Views of Prokaryotic Evolution and Taxonomy. How Bacterial Genomes Change. Concepts of Bacterial Biodiversity for the Age of Genomics. Coevolution of Symbionts and Pathogens With Their Hosts. **Part V: A Survey of Microbial Genomes.** A Survey of Plant Pathogen Genomes. Anoxygenic Phototrophic Bacteria. Genomics of

Thermophiles. The Genomes of Pathogenic Enterobacteria. Obligate Intracellular Pathogens. Low G+C Gram-Positive Genomes. Genomics of Actinobacteria, the High G+C Gram-Positive Bacteria. Parasite Genomics. Genome Sequence of an Extremely Halophilic Archaeon. **Part VI: Applications of Genomic Data.** Microarrays, Expression Analysis, and Bacterial Genomes. Microbial Population Genomics and Ecology: A New Frontier. Application of Genomics to Biocatalysis and Biodegradation. Enzyme Discovery and Microbial Genomics. Integration of Genomics in the Drug Discovery Process. A Genomic Approach to Vaccine Development. Microbial Proteomics. Index.

Infectious Disease™ Series

Microbial Genomes

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