PREFACE

Since its inception, microbial science has frequently experienced Kuhnian leaps forward in understanding, often precipitated by technical and methodological advances. Leeuwenhoek's simple spherical lenses, the electron microscope, pure culture technique, and recombinant DNA technology all exemplify such paradigm-shifting tools and methods that have transformed our understandings of the microbial world. Likewise, over the past 20 years, cultivation-independent DNA sequence-based microbial surveys have transformed our understanding of the natural microbial world in remarkable ways, from the deep sea to the human microbiome. New perspectives of microbial community structure, new gene families, patterns of gene distributions in the environment, and the nature of host–symbiont interactions and evolution have all been revealed by applying new "omics" approaches to microbial communities. Most recently, single-cell characterization, high-throughput "next-generation" sequencing methods, and new bioinformatic approaches are all advancing our understanding of microbial ecology in a variety of contexts.

This volume of *Methods in Enzymology* attempts to encapsulate many late-breaking and transformative methods and approaches that are now accelerating advances in microbial biology and ecology. The chapters are loosely organized into five sections: single-cell population genomics, microbial community genomics, microbial community transcriptomics, microbial community proteomics, and microbial community informatics. Each chapter encapsulates a specific developing area and enabling technology, under the general framework of microbial community "omics."

The authors have well captured the technical details, theory, application, and excitement of these newly developing disciplines. I am deeply appreciative to all the authors for their outstanding efforts and to the Editors in Chief as well for the push to initiate this new volume. We all hope that the information and summaries provided will support and enable new research and discovery, for workers new to the field as well as seasoned veterans.

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