

PREFACE

This book has its origin in a longtime fascination for the diversity of microorganisms and their sheer endless metabolic capabilities. This fascination was nurtured over the years by multiple colleagues and friends, which to name all would go far beyond the scope of this preface. However, the person who shaped my view about microorganisms the most and thus contributed to the text being written is Fritz Widdel. As a graduate student in his laboratory at the Max Planck Institute for Marine Microbiology in Bremen, I was not only introduced to principles of thermodynamics and biochemistry but learned to share his affection for isolating and growing microorganisms in the laboratory. As a horticulturist cares for his plants I learned from Fritz how to pamper different microorganisms, pay respect to their needs, and accept their various "temperaments and mood swings." Observing, understanding, and hopefully predicting these "behaviors" became a driving force for my scientific (ad)ventures. And although nowadays isolation and cultivation are considered by many microbiologists to be old-fashioned, they are still the pillars of microbiology.

Microbially mediated processes are at the center of all global biogeochemical cycles. Solid understanding of processes within a cell, at various levels, is paramount if we are going to apply this knowledge to an understanding of the environment, whether the habitat is the size of a sand grain or the whole ocean floor. Evaluating the microbial diversity and identifying individuals that are responsible for specific processes in the environment are fundamental and challenging tasks in microbial ecology and applied microbiology. It seems appropriate to emphasize the topic of accessing microorganisms and their role in the environment at a time when concomitant advances have been made in various research fields to fulfill these tasks. Researchers address these challenges from different angles, use different methods, and often have different perspectives. It seems that over the course of the last years, however, interdisciplinary research became one of the most successful approaches for ground-breaking discover-

ies in environmental microbiology. This book highlights various aspects of assessing and accessing microorganisms from the environment and of ways to elucidate basic biological concepts. It spans from critical evaluations on how to determine, define, and measure microbial diversity, including fungi and protists, discussing various cultivation approaches, as well as presenting molecular tool boxes, and reviewing genomic, proteomic, and metagenomic approaches, to single-cell methods, including the development of synthetic cells. I hope this book will inspire researchers and students from various fields to consider all aspects in the exciting challenge of the present microbiological era to understand and explain the diversity of microorganisms in their environment.

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