Preface

Recombinant DNA technology touches many aspects of our lives. From drought-tolerant crops to biofuels to pharmaceuticals, genetically modified organisms surround us. Throughout its history, biotechnology has relied heavily on DNA cloning to produce protein products more efficiently or to make modified genes or combinations of genes. *E. coli* or other hosts serve as a cellular "factories" to churn out large amounts of protein. Human insulin, for example, is produced recombinantly using many of the same techniques described in this book.

In the seven years since the most recent edition of *Manipulation and Expression of Recombinant DNA: A Laboratory Manual* was published, molecular biology research and its tools have greatly advanced. Genomic sequences of thousands of organisms are now known. Cloning by PCR has all but replaced traditional cloning methods. DNA sequencing is cheap and accessible. Tools to study that elusive nucleic acid, RNA, are now established as mainstream molecular biology techniques.

Emerging evidence suggests that the central dogma of molecular biology, "DNA makes RNA makes protein," is more complex and has more exceptions than we ever imagined. The transition of a human gene from DNA to RNA may not be as faithful as we once thought. Recently, more research has focused on RNA, and this has led to groundbreaking findings. These discoveries draw an even more complex picture of gene expression. Not only can this multifaceted nucleic acid serve as a "messenger," but it can silence genes, perform catalysis, and generate protein diversity!

This new classroom laboratory manual uses the semester-long project concept introduced in *Manipulation and Expression of Recombinant DNA: A Laboratory Manual*, but the laboratory sessions are updated to reflect current cloning techniques. We also added a new section (five laboratory sessions) on measuring mRNA levels to underscore our conviction that today's molecular biology students need to be confident working with RNA. The laboratory sessions in this new manual *Molecular Biology Techniques: A Classroom Laboratory Manual* reflect the nature of modern science; that is, scientists need the experience to work with macromolecules at each level of gene expression: DNA, RNA and protein.

What will we learn in the next seven years? Students taking this course right now will be at the leading edge of exciting new discoveries. We can't wait to find out!