

Contributors

Preface

With the development of biology and biological techniques, a new edged discipline, called molecular biology, began to emerge in the mid-1900s. It is, however, an elusive term that has different definition dependent of who is doing the defining. In this textbook we adopted the definition by Dr. Rob Weaver, a professor of biochemistry and the Dean of the College of Liberal Arts and Sciences, University of Kansas, that molecular biology is the study of genes and their activities at the molecular terms, including transcription, translation, DNA replication, recombination and translocation, and related technologies. As a new period, during which experimental researches focus on the roles of macromolecules such as nucleic acids (including gene/DNA and RNAs) and proteins (including enzymes) in genetic transmission, molecular biology is often described as the third stage of biochemical development. Sometimes, it is also referred to as biochemical genetics. Therefore, it is easily recognized that the emphasis of molecular biology focuses on structure, organization, and regulation of genes, by which scientists study the nature of life processes. Its ultimate purpose is to discover how and to what extent such characteristic manifestations of life as heredity, reproduction, biosynthesis of proteins, excitation, growth and development, storage and transfer of information are determined by the molecular structure, properties, and interactions of biologically important substances, primarily of the two principal classes of macromolecules—proteins and nucleic acids.

This book begins with a briefly historical review of molecular biology in Chapter 1. Chapters 2 and 3 involve genetic materials and genetic information transmission and its regulation. Chapter 4 focuses on DNA damage and repair. Chapter 5 focuses on protein sorting and processing. Chapters 6–8 present the useful methods in molecular biology. Chapter 9 involves the concepts of gene transfer and gene targeting. Indeed, one of the most important practical problems that molecular biology is expected to provide answers for is the molecular basis of malignant growth. This book, therefore, is ended by Chapter 10, molecular biology of cancer, which gives students examples of how molecular biology is implicated in medical sciences. It is hoped that molecular

biology will also discover ways of preventing and perhaps conquering "molecular diseases". The prospects in molecular biology are quite huge today. It covers a wide variety of fields and provides answer to almost every area of sciences such as molecular evolution, molecular virology, molecular immunology, and biomedicine.

As the bioinformatics and microarray develop (see Chapter 8), molecular biology comes to a big stride in screening and diagnosis of genetic and molecular diseases, gene targeting, transgenic animals and gene therapy. Thus, it is essential to study those techniques for undergraduates and graduates to have a good understanding in contemporary medicine and biology. This book is just for meeting these requirements.

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