

Preface

Life as we know it is specified by the genomes of the numerous organisms with which we share the planet. Every organism possesses a genome that contains the biological information in the form of genes and proteins. This book is about basic fundamentals of genes, gene regulation and gene expression. The field of Molecular biology has made spectacular advances and I would credit this major turn of events to Watson and Crick's discovery of DNA and the serendipitous innovation of PCR by Kary Mullis. This in turn has led to the advent of genomes, genome sequencing, proteomes and has opened up avenues in the field of bioinformatics. This revolution has made significant advancements which will now lead to the accurate prediction of disease and the production of custom made drugs. All these applications have benefitted and will continue to assist man and society at large.

This book is organized into 10 chapters and provides the undergraduate student a strong foundation to build upon. The book focuses on essential molecular concepts such as gene structure and function. It delves upon the important aspects in molecular biology such as transcription, regulation and translation as well the latest in research areas such as genomics, bioinformatics and proteomics. This book will encourage students to strengthen their basics and allow them to think and learn more about the subject. I hope that this book will prove to be an effective learning experience for students and not overpower them with its quantity of informative detail. Each chapter opens with an outline and ends with a summary. At the end of each chapter, a reference list has been provided to help the student learn more about this rapidly growing field. Review questions have also been given for the student as part of self-testing.

I would like to acknowledge my God for enabling and equipping me to write this book. I am thankful to Professor M. S. Swaminathan who has so graciously written the Foreword. He has been my guide and my mentor ever since I did my doctorate and has truly exemplified what true humility should be and how knowledge should be shared to one and all.

I extend my heartfelt thanks to Mr. N. K. Mehra and the Production Department of Narosa Publishers for all their assistance and co-operation in this venture.

I would like to thank all my colleagues from my previous institutes where I have worked and the college where I am currently working for their input and suggestions, all of which have contributed to bring this book to the light of day.

I would like to thank my parents who have always supported my endeavours and they have always encouraged me to attempt new challenges. Without them, this book would not have been possible. Finally, I would like to acknowledge and thank my little daughter Alisha for patiently enduring my writing schedule.

Constructive suggestions from the readers are always welcome for improvement in the next edition.

Preeti Mehta

Foreword

M.S. SWAMINATHAN RESEARCH FOUNDATION

M.S. Swaminathan

Founder Chairman

Ex-Member of Parliament (Rajya Sabha)

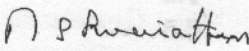
I was happy that one of my students who had earlier pursued her doctoral studies at my foundation had written a Textbook titled "Understanding Molecular biology". I believe it is the need of the hour.

From the very beginning of time, scientists and philosophers have been searching for answers to the question – what is Life? This search has generated a myriad of new disciplines such as Molecular Biology, Genetics, Nanotechnology, Bioinformatics and Stem cell biology and the quest continues. It must be understood that discovery and teaching should go hand-in hand in changing the world. James Watson changed the world with his co-discovery of the double helical DNA structure but he also helped in training new generations of students to think out of the box and develop a long-term vision. Students must understand the importance of having vision to set appropriate goals and work hard towards achieving them.

The Nobel Laureate Har Gobind Khorana also played an important role in deciphering the genetic code which fuelled the recent pace of discoveries such as the completion of the Human Genome Project and successive development of diverse high-throughput analytical approaches such as genomics, transcriptomics and proteomics. This leads us to believe that the field of molecular biology is still evolving.

A teacher should convey a passion for science to students. Nature is so mysterious and it is a privilege that as scientists we can contribute in whatever way we can to understand its complexity. This textbook provides a comprehensive guide for students and will play a major role in helping teachers introduce undergraduate and postgraduate students to this fascinating and revolutionary field of molecular biology and genetic engineering. I wish the book all the success it deserves. 2015 represents the 150th anniversary of the Mendelian laws of genetics. Dr Preeti Mehta has brought out clearly how the transition from Mendelian to Molecular genetics has occurred.

I thank Dr Preeti Mehta for this labour of love in spreading knowledge of Molecular Biology.


M S Swaminathan