Preface

This book's subtitle, *Understanding the Genetic Revolution,* reflects the massive surge in our understanding of the molecular foundations of genetics in the last fifty years. In the next half century our understanding of how living organisms function at the molecular level, together with our ability to intervene, will expand in ways we are only just beginning to perceive.

Today we now know that genes are much more than the abstract entities proposed over a century ago by Mendel. Genes are segments of DNA molecules, carrying encoded information. Indeed, genes have now become chemical reagents, to be manipulated in the test tube. In the days of classical genetics genes represented inherited characteristics but were themselves inviolate, rather like atoms before the twentieth century. Today both genes and atoms have sub-components to be tinkered with.

A full understanding of how living organisms function includes an appreciation of how cells operate at the molecular level. This is of vital importance to all of us as it becomes ever more clear that molecular factors underlie many health problems and diseases. While cancer is the "classic" case of a disease that only became understandable when its genetic basis was revealed, it is not the only one by any means. Today the molecular aspects of medicine are expanding rapidly and it will soon be possible to personally tailor clinical treatment by taking into account the genetic make-up of individual patients.

Rather than attempting to summarize my view of modern molecular biology (the book itself, I hope, accomplishes that) in a short preface, I'd like to briefly address what this book is not. It is not intended as a reference work for faculty or researchers but rather as a survey-oriented textbook for upper division students in a variety of biological sub-disciplines. In particular it is intended for final year undergraduates and beginning graduate students.

This book does not attempt to be exhaustive in its coverage, even as a textbook. There is a second book in this series (Biotechnology: *Applying the Genetic Revolution*, 2006) co-authored with Nanette Pazdernik, which essentially picks up where this book ends. Both books, I hope, effectively survey the foundations and applications of modern molecular genetics.

Many, perhaps most, of the students using this book will be well versed in the basics of modern genetics and cell biology and so can pick and choose from the topics covered as needed. However, others will not be so well prepared, due in part to the continuing influx into molecular biology of students from related disciplines. For them I've tried to create a book whose early chapters cover the basics, before launching out into the depths.

Because of the continuing interest in applying molecular biology to an ever widening array of topics, I have tried to avoid overdoing detail (depth) in favour of breadth. This in no way minimizes the importance of the subject matter for cell biologists but instead emphasizes that molecular biology is applicable to more than just human medicine and health. The genetic revolution has also greatly impacted other important areas such as agriculture, veterinary medicine, animal behaviour, evolution, and microbiology. Students of these, and related disciplines, all need to understand molecular biology at some level.

Finally there are no references or extra reading at the ends of the chapters, for two reasons. My own cross-questioning has revealed that neither myself nor most of my colleagues and students have ever actually used such textbook references just as we rarely watch the extra material on DVDs providing actors' insights, extra scenes, and outtakes. The student has enough to deal with in the core material.

Secondly, anyone who wants up-to-date reference material is far better advised to run a web search. PubMed, Google Scholar and Scirus.com are good choices.

Feedback (hopefully positive!) is welcome.

David Clark, Carbondale, Illinois, January 2005

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