MOLECULAR CELL BIOLOGY

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On the cover: A schematic dissection of globin into the product of the separate exons, with color added for effect. Copyright by the Nobel Foundation, Stockholm, Sweden.

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Preface

We are in the midst of a revolution in biological studies due mainly to the development of precise methods of analysis at the molecular level. The growing excitement in molecular cell biology stems from important new information and insights concerning the elegant and sophisticated worlds within worlds that make up the living cell. The dynamic nature of the cell is evident from its varied responses to many kinds of stimuli, its repertory of regulation mechanisms for coping with a constantly changing internal and external environment, its ability to manage alone or in accommodation with other cells in the test tube or organism, and its properties of repair, growth, reproduction, and flexibility to evolve.

Biology itself is undergoing unification as cell biologists, developmental biologists, geneticists, biochemists, immunologists, and others direct and focus their efforts toward common objectives and the solutions of basic problems. In this book I have tried to convey the ongoing challenge and excitement of current research, the debts we owe to seminal studies of the recent past in paving the way to present-day understanding, and the convergence of ideas, methods, and intellectual approaches of different life sciences.

About This Book

I have written *Molecular Cell Biology* for students with a college-level background in biology and chemistry who are taking a first, one-term course in modern cell biology. In my writing I made every effort to provide discussions and explanations of complex phenomena, data, and processes. In collaboration with members of the publishing staff I assembled an extensive set of photographs and illustrations to provide graphic accompaniment to the written word, and the electron micrographs have been reproduced in their original size for full pedagogical effect. Other aids for the student and the instructor include summaries and extensive sets of readings and references for each chapter, and a glossary of more than 800 terms, all of which are highlighted in boldface type in the text.

A Flexible Organization

To permit the greatest flexibility I have designed the chapter contents to allow for alternative sequences of instruction. The book is subdivided into six parts. Part I contains chapters on cellular structures and molecules and the major biochemical and genetic processes and units of life. With these four chapters as an introduction, the remaining fourteen chapters can be rearranged to suit individual preferences and course organizations. For example, Part IV (Organization of the Genome) and Part V (Reproduction and Development) could be covered prior to Part II (Cell Boundaries and Surfaces) and Part III (Organization of the Cytoplasm) if that order is preferred. Some may wish to assign Chapter 4, Genetic Processes, in conjunction with Part IV, Organization of the Genome. Part VI (Evolution), however, was deliberately written as a summarizing evolutionary perspective of molecular cell biology. I believe this perspective to be the one that brings together any or all of biology in its most basic content and highly recommend that this material be the final, capstone section of the course.

Topic Coverage

Given the massive amounts of information required in an up-to-date text in modern cell biology, a key challenge facing the author of such a book is to keep it to a length that is suitable for an undergraduate first course. I have answered this challenge by setting as my goal the need to avoid overwhelming introductory students with excessive detail or material that should come in a later course. Thus, I have discussed some topics more briefly than is done in other texts, but in all cases I have given at least the flavor and major significance of the subject in sketching the picture of the living cell in all its varied features. I am comfortable with the decisions that I have made in allocating more space to some topics than to others, but I welcome comments and suggestions from the readers.

Acknowledgments

It is a pleasure to acknowledge my debt to many friends and colleagues who generously provided excellent photographs, offered useful comments and suggestions to improve the book, and reviewed all or part of the text and art manuscripts. In particular I wish to thank the following reviewers for their helpful comments:

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I could not have managed the many phases of preparation and production of this book without the cheerful encouragement of my editor, Bruce Spatz; the efficiency of the production staff, Margaret Pinette and Judy Ullman in particular; and the prodigious efforts of James Funston and Dr. Mary Lee S. Ledbetter in writing and revising the summaries and carefully developing and editing the entire set of illustrations. I believe the book has benefited greatly by all these inputs and that the students will be as enthusiastic as I am about the story now emerging in molecular cell biology—a story of the cell as a dynamic and elegant unit of life.

New Brunswick, New Jersey C. J. A.

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