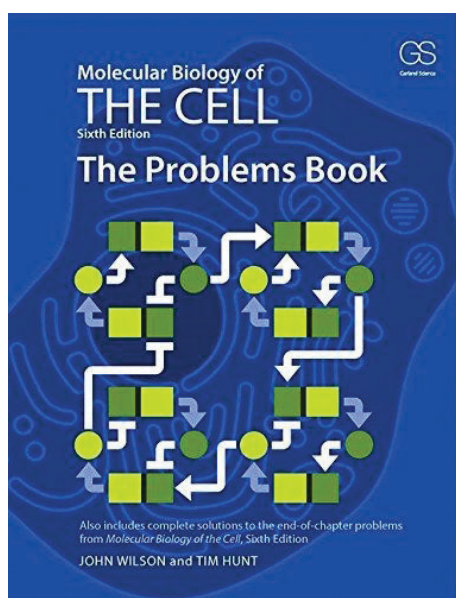


# Molecular Biology of the Cell, Sixth edition

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A “Blue Marble” in the infinite black space, we call it Earth. It is fully filled with diverse unique creatures on its surface and even in the deepest part of the ocean. All these living things are different in shape and size, starting from giant blue whale to plants to humans and to bacteria. Despite differences, they all share one common unit, which is called a “CELL”. Human life starts with the random fusion of two cells from the paternal and maternal side, and then a single cell expands to multi-billion and trillion cellular organism. This single cell is the carrier of all hereditary information, which then forms all of the 1013 cells in our entire body. Even though all cells have the same genetic data, they are all different with their activity, chemical composition, functionality and response to each other, but together shape one whole organism and maintain life to its end. This truly amazing fundamental unit of life has been explained genuinely with its functions in the thousand pages of the *Molecular Biology of the Cell (MBoC)* through the past twenty-plus years.

*MBoC* is known among researchers in life science as the bible of the cell biology and is widely used in advanced courses both at the undergraduate and graduate level, being considered as a reference in many libraries and laboratories around the world. The book was first published in 1983 by Garland Science and subsequently the 2nd edition in 1989, 3rd edition in 1994, 4th edition in 2002, 5th edition in 2008, and the latest 6th edition was published in 2015.

Alongside each new edition authors try to include novel discoveries in cell biology. They have mentioned it in their preface as “With each edition of this book, we marvel at the new information that cell biologists have gathered in just a few years.” Since the 5th edition of the book appeared, more than five million of scientific papers have been published along with multitudinous digital data on new genome sequences and technological innovations. In this edition the authors have added newly discovered functions for RNA molecules such as the roles of small and long noncoding RNAs as well as the bacterial CRISPR system; the latest findings on the structure and function of the human genome; new methods to visualize subcellular structures and

analyze genes and proteins with combination of mathematics to unravel the complexities of cell function. Also, the 6th edition describes the latest findings that renew our basic understanding of the intracellular organization, membrane structure, dynamics, and transport as well as cell signaling pathways. As cancer biology research has been increasing, *MBoC* also added new information on cancer causes, genetics, and treatments which incorporate discussion of personalized therapies, plus new sections on treatment of stem cell biology and technology—including nuclear reprogramming, ES cells, and iPS cells.

*MBoC* is divided into five parts, each part composed of chapters on related topics. The first three parts make a must read and digest source for an introductory molecular biology course, which is crucial for biomedical and medical students. In addition to descriptions of basic cell components and how the cell works, it also includes the techniques for studying cells and molecules. Part I explains cellular universal figures, genomic diversity of eukaryote organisms, basic chemical components, metabolism, and energy system and the most fundamental the proteins of cell. Additionally, commonly used proteins' shape, structure and function are written within broad range compared to any other similar textbooks, which can be very useful for every researcher in any stage of their career. Part II included the basic genetic mechanism such as genome structure, DNA packaging, gene expression and transmission. This part explains Central Dogma of Molecular Biology in the cell. Here we should emphasize that there is no single protein that can be created without generating polypeptides from RNA and genomic DNA. Also gene expression is explained in detail and well organized through transcription, translation and posttranslational modification. Part III presents the principles of the main experimental methods for investigating and analyzing cells. Especially, it has an added chapter 8 with new section "Mathematical analysis of cell functions", which is a new way to explore the cell via systems biology in a logical way that integrates cellular mechanisms, organelles, and function, altogether. Even cover design of textbook is dedicated to not only the cell structure but also marks systems biology. Nevertheless, this part includes all necessary experimental techniques starting from the very traditional way of visualizing cells, the light microscope and electron microscope to the latest confocal. The breadth of Parts IV and V provides the information necessary for any student in cell biology course and is helpful even for those who are working in this field for years. Everything intracellular is

discussed in the nine chapters in Part IV. It describes the internal organization of the cell such as membrane structure, transport, compartments, energy conversion, cell signaling, cell cycle, and apoptosis. Part V follows the behavior of cells in multicellular systems, starting with the development of multicellular organisms and concluding with chapters on pathogens and infection and on the innate and adaptive immune systems.

Each chapter has a full information on its specific field and most interestingly at the end of each chapter there are "Summary", "Problems" and "What We Don't Know" sections and nicely arranged references. The brief summary wraps main points of the entire chapter into one paragraph, which is very helpful to review what was read in the previous hundred pages. The "Problems" section provides an interesting variety of questions, making the reader rethink and discuss with others, leading to deepening the understanding of the chapter and the topic. The most interesting and new part here is the section called "What We Don't Know". Here authors have addressed numerous possible research areas, interesting open-ended questions related to latest discoveries and emerging technologies.

We cannot leave this review without special mention of "Panels" with stunning illustrations and clear comprehensive information. Each panel groups relevant topics together into one series, which makes easy to understand and particularly helpful for those who have more visual memory.

*The Problems Book of MBoC* is also a huge book in terms of size and significance. It has numbers of questions which may look simple but will make readers reconsider the area from a different angle, imagine the cellular processes and calculate the experiment to understand how cells work. Each chapter reviews key terms, tests for understanding basic concepts, and poses research-based problems. *The Problems Book* has been designed to correspond with the first twenty chapters of *MBoC*, 6th Edition. The textbook and problem book together can become one complex studying tool which increases efficiency of students' study.

Since the technological advances came into daily usage, *MBoC* has been always creating great animations and videos, which help people to visually understand the tiny processes in the cells. There are over 170 narrated movies, covering a wide range of cell biology topics, which review key concepts in the book and illuminate subcellular processes.

Additionally, the authors also publish a book called

*Essential Cell Biology (ECB)* which is designed to provide fundamentals of cell biology in a digestible, straightforward, and more simple way that is required for anyone, including non specialists, who is curious about the understanding of ourselves and a world made of cells, fed on cells, live with cells.

It is our pleasure to introduce you this exciting textbook including those updates within the parts and chapters. The art of *MBoC* (jpeg format) and figure integrated lecture outlines (PowerPoint presentations) are a great source for instructors and

lecturers. Beginner scientists in cell biology will also appreciate finding most answers to their endless questions from *MBoC*. Therefore, we would definitely recommend this book to all scientists around the world and particularly to all medical students in the undergraduate course. We have no doubt that at first, the textbook will look like a huge too detailed resource, which is hard to read till the end. Nevertheless, understanding at least the first three chapters as described in the book is crucial for later studies of pathological conditions and diseases.