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### ***Essential Cell Biology***

Second edition. Garland Science/Taylor & Francis Group: New York – Abingdon, 2004.  
XXI+740 pages, answers 58 pages, glossary 20 pages, index 24 pages. CD-ROM inside.  
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First author is president of the National Academy of Sciences and Professor of Biochemistry and Biophysics at the University of California, San Francisco. Other authors are affiliated with University of Cambridge, Massachusetts, University of California, San Francisco, Universities of Oxford and London. As declared in the preface, original purpose in writing this book was to provide a straightforward explanation of the workings of a living cell. In this second edition, the authors have brought the book completely up to date. New imaging and computer technologies have increased access to cell architecture and functions as never before. The volume is composed of 21 chapters arranged into subchapters and specialized paragraphs. Each chapter is concluded with a treatise entitled "Essential Concepts". The key terms introduced in each chapter are highlighted when they first appear, and situated within a frame. Important features of the book present many questions that are located in the page margins and at the end of each chapter.

The initial chapter is intended to give a general introduction while examining the unity and diversity of cells, cells under the microscope, special features of procaryotic and eucaryotic cells, and model organisms. Following chapter 2 delineates chemical components: chemical bonds and molecules in cells, nominally ionic bonds, covalent bonds, hydrogen bonds, further on carbon molecules, and intermediates between small molecules and cell organelles. Next coming chapter 3 focuses on energy, catalysis and the use of energy by cells, activated carrier molecules that store and transfer energy needed for cells, and biosynthesis. Chapter 4 comprises the shape and structure of proteins, how proteins work and are controlled. In subsequent chapters 5 through 7 the DNA as carrier of genetic information is analysed according to the following topics: the structure and function of DNA and the structure of eucaryotic chromosomes, DNA replication, repair and recombination, and the reading genome by cells. Chapter 8 gives an overview of gene expression, of transcriptional switches, and molecular mechanisms that create specialized cell types. Chapter 9 explains how genes and genomes evolve, notably the generating genetic variations, reconstructing life's family tree and examining the human genome. Key terms occurring there are: alternative splicing, divergence, genetic drift, mutation, phylogenetic tree, and the like. Chapter 10 examines the manipulating of genes and cells, in particular isolating cells and growing them in culture, how DNA molecules are analysed, nucleic acids hybridization, DNA cloning and engineering. Among laboratory procedures as DNA sequencing, DNA microarrays, the polymerase chain reaction, *in situ* hybridization, recombinant DNA technology, and the like are described.

Following chapters 11 and 12 deal with principles of membrane transport, carrier proteins and their functions, ion channels: membrane potential and signaling in nerve cells. Chapter 13 accentuates how cells obtain energy from food, namely the breakdown of

sugars and fats and storing and utilizing food molecules, functions of chloroplast and mitochondria in plant cells, biosynthetic pathways, organization and regulation of metabolism. Chapter 14 centres attention upon energy generation in mitochondria and chloroplasts. Illuminated are the mitochondria and oxidative phosphorylation, electron-transport chains and proton pumping, chloroplasts and photosynthesis, and origins of chloroplasts and mitochondria. Chapter 15 delineates intracellular compartments and transport, in particular membrane-enclosed organelles, protein sorting, vesicular transport, secretory and endocytic pathways. Chapter 16 outlines the cell communication, notably general principles of cell signaling, G-protein- and enzyme-linked receptors. Characteristic key terms there are: calmodulin, cytokine receptor, local mediator, neurotransmitter, signal transduction, etc. Chapter 17 gives knowledge about the cytoskeleton while discussing intermediate and actin filaments, microtubules and muscle contraction. Chapter 18 concentrates on the cell-cycle control system and programmed cell death (apoptosis). Key terms in this chapter implicate caspase, checkpoint, cyclin, mitogen, survival factor, etc. Chapter 19 deals with the cell division while encompassing an overview of M phase, mitosis and cytokinesis. For example, some key terms presented here cover the centrosome cycle, chromatid, cyclin-dependent kinase, kinetochore, spindle pole, and the like. Chapter 20 ensures coverage of genetics, meiosis, and molecular basis of heredity, namely the sexual reproduction, chromosome pairing and recombination, the laws of inheritance, and experimental aspects of genetics. Final chapter 21 on tissues and cancer places emphasis on extracellular matrix and connective tissues, cell junctions, tissue maintenance and renewal, and on diverse properties of cancer cells.

In conclusion, there are separate textual parts: answers to all the questions introduced in the text and a glossary of terms relevant to the cell biology, biochemistry and genetics – supplied with proper pagination and illustrations – and a comprehensive index. The volume is superbly illustrated by numerous figures, numbered by individual chapters. Featured are line drawings, mostly in colour, and diagrammatic presentations of diverse molecular, cellular and genetic structures and analyses, arrangements of chromosomes and genes, space-filling models, biochemical cycles, laboratory experiments and procedures, and many more. Besides, there are numerous light and electron microphotographs. In addition, many illustrations are featured in separate panels. Numerous tables give summarizing overviews to textual data. CD-ROM embraces all the images from the book. The CD also contains "concept building". This edition offers an attractive, user-friendly and up-to-day handbook designed to provide fundamentals of cell biology that are required to any one to understand the biomedical, as well as the broader biological issues.

***Jindřich Jira***