



# Cold Spring Harbor Laboratory Press



Fall 2013 Catalog

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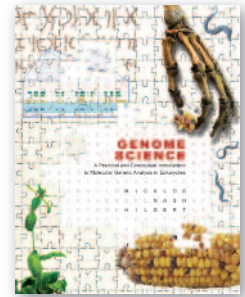
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# Genome Science

## A Practical and Conceptual Introduction to Molecular Genetic Analysis in Eukaryotes

By David Micklos, *Cold Spring Harbor Laboratory*, Bruce Nash, *Cold Spring Harbor Laboratory*, and Uwe Hilgert, *University of Arizona*



**G**enome Science is a textbook and laboratory manual for advanced secondary and post-secondary education. It combines approachable narrative with extensively tested lab exercises that illustrate key concepts of genome biology in humans, invertebrates, and plants. Nineteen labs, organized into four chapters, engage students with both bioinformatics exercises and in vitro experiments. Each chapter also includes an extensive introduction that provides an historical and conceptual framework. This modular structure offers many options for enhancing existing courses, starting new courses, or supporting student research projects. The book is complete with advice for instructors, laboratory planning guidelines, recipes for solutions, and answers to student questions.

2013, 704 pp., illus (3 4C, 606 B&W), index  
 Hardcover \$55 £38

ISBN 978-0-879698-59-1

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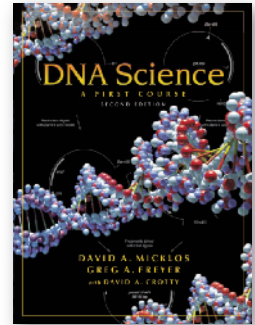
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## DNA Science: A First Course, Second Edition

By David Micklos, *Dolan DNA Learning Center, Cold Spring Harbor Laboratory*; and Greg Freyer, *Columbia University, New York*



This is the second edition of a highly successful textbook (over 50,000 copies sold) in which a highly illustrated, narrative text is combined with easy-to-use thoroughly reliable laboratory protocols. It contains a fully up-to-date collection of 12 rigorously tested and reliable lab experiments in molecular biology, developed at the internationally renowned Dolan DNA Learning Center of Cold Spring Harbor Laboratory, which culminate in the construction and cloning of a recombinant DNA molecule.

Proven through more than 10 years' of teaching at research and nonresearch colleges and universities, junior colleges, community colleges, and advanced biology programs in high school, this book has been successfully integrated into introductory biology, general biology, genetics, microbiology, cell biology, molecular genetics, and molecular biology courses.

The first eight chapters have been completely revised, extensively rewritten, and updated. The new coverage extends to the completion of the draft sequence of the human genome and the enormous impact these and other sequence data are having on medicine, research, and our view of human evolution. All sections on the concepts and techniques of molecular biology have been updated to reflect the current state of laboratory research.

The laboratory experiments cover basic techniques of gene isolation and analysis, honed by over 10 years of classroom use to be thoroughly reliable, even in the hands of teachers and students with no prior experience. Extensive prelab notes at the beginning of each experiment explain how to schedule and prepare, while flow charts and icons make the protocols easy to follow.

As in the first edition of this book, the laboratory course is completely supported by quality-assured products from the Carolina Biological Supply Company, from bulk reagents, to useable reagent systems, to single-use kits, thus satisfying a broad range of teaching applications.

2003, 575 pp., illus., appendices, index  
Paperback \$40 £25

ISBN 978-1-936113-17-0

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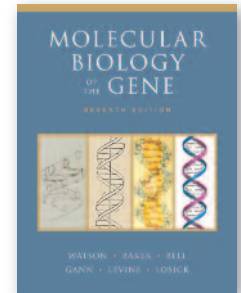
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# Molecular Biology of the Gene

## Seventh Edition

By James D. Watson, *Cold Spring Harbor Laboratory*, Tania A. Baker, *Massachusetts Institute of Technology*, Alexander Gann, *Cold Spring Harbor Laboratory*, Michael Levine, *University of California, Berkeley*, and Richard Losick, *Harvard University*



Now completely up-to-date with the latest research advances, the Seventh Edition of James D. Watson's classic book, *Molecular Biology of the Gene* retains the distinctive character of earlier editions that has made it the most widely used book in molecular biology. Twenty-two concise chapters, co-authored by six highly distinguished biologists, provide current, authoritative coverage of an exciting, fast-changing discipline.

2014 872 pp., illus., index

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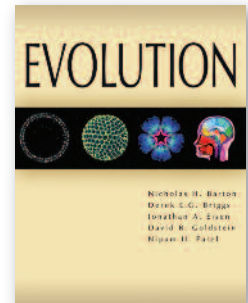


## Evolution

By Nicholas H. Barton, *University of Edinburgh*, Derek E.G. Briggs, *Yale University*, Jonathan A. Eisen, *University of California, Davis*, David Goldstein, *Duke University Medical Center*, and Nipam H. Patel, *University of California, Berkeley*

*Evolution* is a book on evolutionary biology that integrates molecular biology, genomics, and human genetics with traditional studies of evolutionary processes.

- Recommended as a primary textbook for undergraduate courses in evolution
- Required reading for biologists seeking a clear, current, and comprehensive account of evolutionary theory and mechanisms
- Written by experts in population genetics, bacterial genomics, paleontology, human genetics, and developmental biology
- Integrates molecular and evolutionary biology in ways that reflect current directions in research



### Contents and Coverage

This extensively illustrated, full-color book has four sections:

**Introduction** (Part 1) gives an account of how the ideas underpinning evolutionary theory developed and a history of experiments and ideas in the development of molecular biology.

**Origin and Diversity of Life** (Part 2) describes the history of life on earth from the origin of life to the evolution of humans, with emphasis on the major transitions in genetic organization and novel adaptations that have appeared. The diversity of life is emphasized. The chapters make extensive use of information from complete genome sequences and analysis of molecular mechanisms in development.

**Evolutionary Processes** (Part 3) describes how the diversity of life is generated: how variation arises and how selection acts are considered in detail. Many examples used to illustrate these processes are drawn from molecular sources.

**Human Evolution** (Part 4) discusses human evolution and diversity. The benefits of molecular markers for our understanding of human evolution are highlighted and these findings integrated with paleontological evidence. Also discussed is the use of evolutionary methods to identify genetic differences that predispose people to specific diseases and affect their responses to treatment.

### Online-only Chapters

Additional chapters, found on the Web only, deal with techniques and models used in studying evolutionary biology, emphasizing the contribution of molecular biology and genomics to phylogenetic reconstruction methods.

### Resources for Instructors

The *Evolution* web site ([www.evolution-textbook.org](http://www.evolution-textbook.org)) is an invaluable supplement to the textbook, a resource for teachers that contains downloadable figures (for PowerPoint or overhead display) and chapter problems.

### Request exam copies and other information

Visit the *Evolution* web site now for more information about this new book. Request a detailed Table of Contents, Sample Chapters, Exam Copies, and Updates about Evolution.

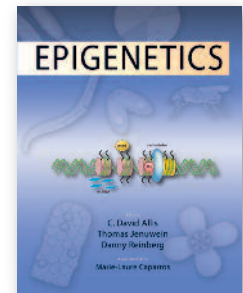
2007, 833 pp., color illus., glossary, index  
 Hardcover \$113 £71 ISBN 978-0-879696-84-9

Find details about the authors and content of *Evolution*, register for exam copies, download figures, problem sets, and more at: <http://evolution-textbook.org>



## Epigenetics

Edited by C. David Allis, *The Rockefeller University, New York*; Thomas Jenuwein, *Research Institute of Molecular Pathology, Vienna*; Danny Reinberg, *Howard Hughes Medical Institute/University of Medicine and Dentistry of New Jersey—Robert Wood Johnson Medical School*; Marie-Laure Caparros, *Associate Editor*



The regulation of gene expression in many biological processes involves epigenetic mechanisms. In this new volume, 24 chapters written by experts in the field discuss epigenetic effects from many perspectives. There are chapters on the basic molecular mechanisms underpinning epigenetic regulation, discussion of cellular processes that rely on this kind of regulation, and surveys of organisms in which it has been most studied. Thus, there are chapters on histone and DNA methylation, siRNAs and gene silencing; X-chromosome inactivation, dosage compensation and imprinting; and discussion of epigenetics in microbes, plants, insects, and mammals. The last part of the book looks at how epigenetic mechanisms act in cell division and differentiation, and how errors in these pathways contribute to cancer and other human diseases. Also discussed are consequences of epigenetics in attempts to clone animals. This book is a major resource for those working in the field, as well as being a suitable text for advanced undergraduate and graduate courses on gene regulation.

2007, 502 pp., illus., appendices, index  
Paperback \$91 £57

ISBN 978-0-879698-75-1

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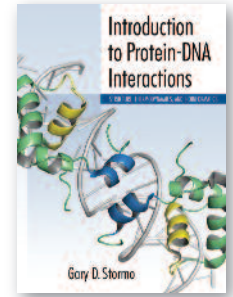


# Introduction to Protein-DNA Interactions

## Structure, Thermodynamics, and Bioinformatics

By Gary D. Stormo, Ph.D.

One of the foundations of molecular biology is how the interactions of proteins with DNA control many aspects of gene expression. Since the mid-20th century, from discoveries of the lac repressor and operator and the competition between the cI and cro proteins for the same segment of DNA, we have learned an enormous amount about the interactions of proteins with DNA and their control of fundamental processes in the cell. *Introduction to Protein-DNA Interactions: Structure, Thermodynamics, and Bioinformatics* describes what we know about protein-DNA interactions from the complementary perspectives of molecular and structural biology and bioinformatics and how each perspective informs the others. A particular emphasis is on how insights from experimental work can be translated into specific computational approaches to create a unified view of the field and a fuller understanding of protein-DNA interactions.



2013, 208 pp., illus. (78 4C, 5 B&W), index

Paperback \$45 £28

Hardcover \$79 £50

ISBN 978-1-936113-50-7

ISBN 978-1-936113-49-1

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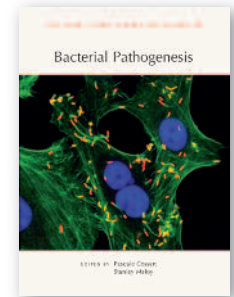
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# Bacterial Pathogenesis

Edited by Pascale Cossart, *Institut Pasteur* and Stanley Maloy, *San Diego State University*

**B**acterial pathogens cause numerous human diseases. This collection from *Cold Spring Harbor Perspectives in Medicine* surveys the spectrum of bacterial pathogens from *Salmonella* and *Shigella* to *Helicobacter pylori*. It examines the basic biology of these parasites, their virulence mechanisms and the host's response to infection. The effectiveness of antibiotics and vaccine strategies are also covered, along with the novel antimicrobial therapies that are being developed.



Due December 2013, 300 pp. (approx.), illus., index  
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ISBN 978-1-936113-36-1

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## Cell Survival and Cell Death

Edited by Eric H. Baehrecke, *University of Massachusetts*, Douglas R. Green, *St. Jude Children's Research Hospital*, Sally Kornbluth, *Duke University*, and Guy S. Salvesen, *Sanford-Burnham Medical Research Institute*

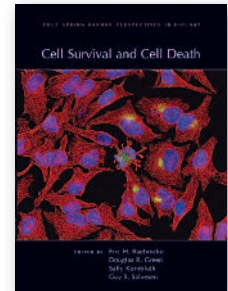
Billions of cells die every day in the human body. This is required for normal development and physiology, as well as the elimination of errant cells. Apoptosis and other cell death mechanisms are complex and carefully controlled. If cell death does not occur when it should, cancer and other diseases may develop.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* covers all aspects of apoptosis, autophagy, and necrosis. Contributors describe in detail the molecular mechanisms of cell death signaling, including death receptor-ligand systems, BCL-2 family proteins, mitochondrial permeabilization, the endocytic pathway, caspases, and signals that trigger the clearance of dying cells. Survival mechanisms and proteins such as IAPs that antagonize cell death are also described.

This volume includes discussion of tumor suppression, the altered metabolism of cancer cells, and the development of therapeutic drugs. It is an essential reference for cell and developmental biologists, cancer biologists, and all who want to understand when and how cell death is required for life.

2013, 380 pp., illus. (59 4C, 25 B&W), index  
Hardcover \$135 £85

ISBN 978-1-936113-31-6



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# Cystic Fibrosis

## A Trilogy of Biochemistry, Physiology, and Therapy

Edited by John R. Riordan, *The University of North Carolina at Chapel Hill*,  
Richard C. Boucher, *The University of North Carolina at Chapel Hill*, and Paul M. Quinton,  
*University of California, San Diego School of Medicine*

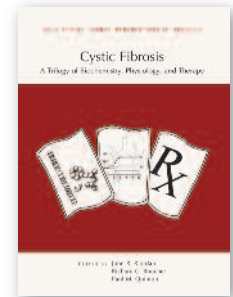
Cystic fibrosis is caused by mutations in the CFTR gene, which encodes an ion channel protein that regulates anion movement across the epithelial membranes of the lungs, pancreas, and other organs. In cystic fibrosis patients, anion transport is impeded, causing sticky, viscous mucus to build up and clog these vital organs.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* provides an in-depth examination of cystic fibrosis biology and treatment strategies. Contributors examine the structure and dynamics of CFTR, its normal physiological roles in the airway and digestive epithelia, and how those operations are impaired in patients with cystic fibrosis. The numerous CFTR mutations and how they alter the expression, synthesis, processing, and function of CFTR in cystic fibrosis and other CFTR-related disorders are considered, as are disease-modifying genes that influence disease severity.

This volume includes discussions of therapy and treatment strategies for cystic fibrosis, ranging from airway clearance techniques and pancreatic enzyme replacements to the modulation of CFTR and related ion transport pathways. It will be an essential reference for molecular and cellular biologists, physiologists, and clinicians interested in understanding the biological basis of the disease and the search for effective therapies.

2013, 340 pp., illus. (40 4C; 15 B&W), index  
Hardcover \$135 £85

ISBN 978-1-936113-34-7



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1-855-452-6793

D9

# DNA Repair, Mutagenesis, and Other Responses to DNA Damage

Edited by Errol C. Friedberg, *University of Texas Southwestern Medical Center*, Stephen J. Elledge, *Harvard Medical School*, Alan R. Lehmann, *University of Sussex*, Tomas Lindahl, *London Research Institute*, and Marco Muzi-Falconi, *Universita degli Studi di Milano*

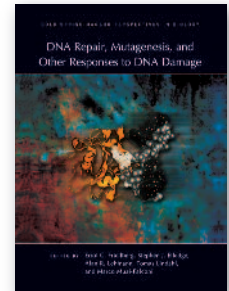
Cellular DNA is constantly bombarded with environmental and chemical assaults that damage its molecular structure. In addition, the normal process of DNA replication is prone to error and may introduce mutations that can be passed to daughter cells. If left unrepaired, these DNA lesions can have serious consequences, such as cancer.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* reviews the mechanisms that cells use to recognize and repair various types of DNA damage. Contributors discuss base excision repair, nucleotide excision repair, mismatch repair, homologous recombination, nonhomologous end joining, the SOS response, and other pathways in prokaryotes and eukaryotes, and describe how these processes are linked to DNA replication, transcription, and cell cycle controls. The repair of telomeric and mitochondrial DNA is described, as is the influence of chromatin structure on DNA repair.

This volume also includes discussion of human genetic diseases that involve defects in DNA damage repair. It is an essential reference for molecular and cell biologists, medical geneticists, cancer biologists, and all who want to understand how cells maintain genomic integrity.

Due October 2013, 445 pp., illus. (86 4C, 10 B&W), index  
 Hardcover \$135 £85

ISBN 978-1-936113-54-5



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# DNA Replication

Edited by Stephen D. Bell, *Indiana University*, and Marcel Méchali, *Institute of Human Genetics, CNRS*, and Melvin L. DePamphilis, *National Institute of Child Health & Human Development, NIH*

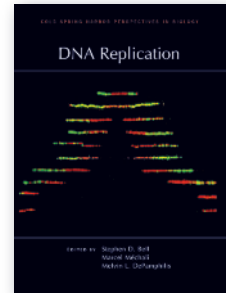
**D**NA replication is essential for the propagation of life on Earth. Cells in living organisms must be able to synthesize a complete copy of their DNA with extraordinary precision, so that they can pass this genetic material on to their descendants. DNA replication involves the coordinated interplay and regulation of many complex protein assemblies during the various stages of cell division. When these processes go awry, cancer and other diseases can ensue.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* covers all aspects of DNA replication and its control across all domains of life. The contributors examine the molecular machinery involved in the assembly of replication origin complexes, the establishment of replication forks, unzipping of the double helix, priming of DNA synthesis, and elongation of daughter strands. Chromatin organization and dynamics, lagging-strand maturation, telomere replication, and mechanisms to handle errors and damage in DNA are also discussed.

Including examination of the complex interactions between the core replication machinery and the regulatory circuits that drive cell cycle progression, this volume is an indispensable reference for not only biochemists and molecular biologists, but also cell biologists and all who want to understand this fundamental process of life.

2013, 576 pp., illus. (88 4C, 33 B&W), appendices, index  
Hardcover \$135

ISBN: 978-1-936113-48-4



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# The Endoplasmic Reticulum

Edited by Susan Ferro-Novick, *University of California, San Diego*, Tom A. Rapoport, *Harvard Medical School*, and Randy Schekman, *University of California at Berkeley*

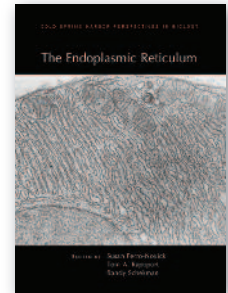
The endoplasmic reticulum (ER) is an extensive network of membranes that folds, modifies, and transports proteins in eukaryotic cells. It also manufactures lipids and interacts extensively with other organelles, playing essential roles in cell growth and homeostasis.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* covers all aspects of ER morphology and function, as well as its interactions with the nucleus, Golgi, and mitochondria. Contributors examine how proteins translocate across the ER membrane, the processes that occur inside the ER lumen (e.g., folding, glycosylation, and disulfide bond formation), and how the proteins are packaged into vesicles and transported to the Golgi. They also review quality-control mechanisms that are employed by the ER to detect and eliminate misfolded or unassembled proteins. Lipid synthesis and transport are also discussed.

This volume covers not only the biochemistry and cell biology of the ER, but also ER stress, metabolism, and the role of the ER in viral replication. Thus, it is an essential reference for cell biologists, physiologists, and pathologists interested in understanding the numerous functions of the ER.

2013, 336 pp., illus (61 4C, 9 B&W), index  
Hardcover \$135 £85

ISBN: 978-1-936113-60-6



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## Hemoglobin and Its Diseases

Edited by David Weatherall, *Weatherall Institute of Molecular Medicine*, Alan N. Schechter, *National Institutes of Diabetes and Digestive and Kidney Disease of the National Institutes of Health*, and David G. Nathan, *Dana-Farber Cancer Institute*

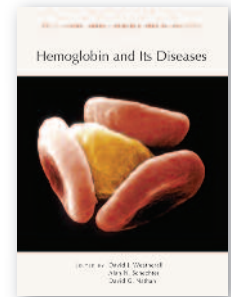
Hemoglobin is an iron-containing protein in red blood cells that transports oxygen to tissues throughout the body. The abundance, stability, and oxygen-carrying properties of hemoglobin can be altered by genetic mutations. More than one thousand hemoglobin disorders are known; hemoglobinopathies (e.g., sickle cell disease) and thalassemias are some of the most common human genetic diseases worldwide.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* covers all aspects of hemoglobin and its diseases. Contributors examine the structure, expression, and evolution of the globin genes, the assembly of globin subunits into functional forms of hemoglobin, and the numerous variants that result from genetic alterations. The pathophysiological consequences of hemoglobin disorders (e.g., ineffective erythropoiesis and aberrant iron homeostasis), their clinical manifestations, and epidemiological trends are also described.

This volume includes discussions of management and treatment strategies for hemoglobin disorders, such as transfusions, iron-chelating agents, gene therapy, and stem cell transplantation. It is an indispensable reference for biochemists, geneticists, cell and developmental biologists, physiologists, and all who are interested in reducing the medical burden of these common genetic diseases.

2013, 445 pp., illus. (66 4C, 19 B&W)  
 Hardcover \$135 £85

ISBN 978-1-936113-45-3



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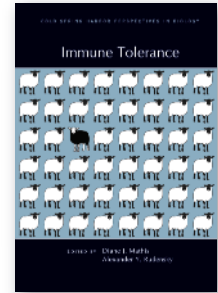
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# Immune Tolerance

Edited by Diane J. Mathis, *Harvard Medical School*; Alexander Y. Rudensky, *Howard Hughes Medical Institute and Memorial Sloan-Kettering Cancer Center*

Immune tolerance ensures that the immune system responds to foreign molecules and not to self-molecules. When tolerance breaks down, severe, self-destructive diseases such as rheumatoid arthritis, lupus, and multiple sclerosis may develop. Understanding the mechanisms involved in establishing and maintaining immune tolerance is essential for effectively treating these autoimmune diseases.



Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* reviews how self-tolerant T- and B-cell populations are produced. The contributors discuss the elimination of autoreactive lymphocytes during their development in the thymus and bone marrow, the suppression of autoreactive cells by regulatory T cells in the periphery, and intrinsic mechanisms that produce clonal anergy. The roles of dendritic cells in antigen presentation and mechanisms that prevent autoreactivity in natural killer cells are also covered.

Including discussions of autoimmune diseases, their genetic bases, and therapeutic strategies, this volume is a valuable reference for all immunologists and clinicians wishing to understand or develop treatments for autoimmune diseases.

2013, 168 pp., illus. (2 B&W, 20 4C), index  
 Hardcover \$135 £85

ISBN 978-0-879698-95-9

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# Mitochondria

Edited by Douglas C. Wallace, *Children's Hospital of Philadelphia, University of Pennsylvania*, and Richard J. Youle, *National Institute of Neurological Disorders and Strokes, Porter Neuroscience Research Center*

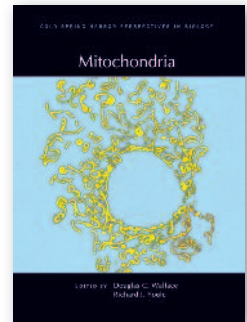
Mitochondria are subcellular organelles that function as 'power plants' for the cell, generating energy in the form of ATP from glucose, oxygen, and other molecules. Thought to have arisen about 2 billion years ago when an aerobic bacterium invaded the primitive eukaryotic cell, they have their own DNA, undergo fission and fusion independently, and play an important role in programmed cell death.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* discusses the evolution of mitochondria, their functions in cells, and the numerous diseases in which mitochondrial dysfunction is implicated. The contributors also examine mitochondrial biogenesis, the molecular mechanisms underlying fission and fusion, how proteins are imported from the cytoplasm, and the organization of the mitochondrial DNA.

This book includes chapters covering the involvement of mitochondria in Parkinson's disease, encephalopathies, tumorigenesis, muscular dystrophy, and other diseases, as well as aging. It is thus a vital reference for all cell and molecular biologists, as well as researchers working on muscle and neurodegenerative diseases, the role of metabolism in aging, and cancer.

Due November 2013, 300 pp. (approx.), illus., index  
Hardcover \$135 £85

ISBN 978-1-936113-35-4



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# Signaling by Receptor Tyrosine Kinases

Edited by Joseph Schlessinger, *Yale University School of Medicine* and Mark A. Lemmon, *University of Pennsylvania School of Medicine*

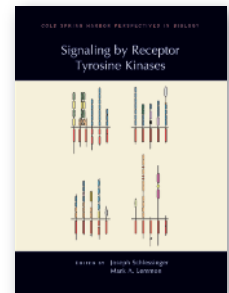
Receptor tyrosine kinases are a large family of cell-surface receptors that respond to a variety of intercellular signals, including insulin, growth factors such as epidermal growth factor (EGF) and fibroblast growth factor (FGF), and molecules involved in neuronal guidance. Ligand binding stimulates the tyrosine kinase activity of the receptors, leading to recruitment of enzymes and adapter proteins that activate intracellular signaling pathways that control cell proliferation, differentiation, and numerous other biological processes.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* discusses the mechanisms underlying receptor tyrosine kinase signaling, including ligand processing, receptor dimerization, receptor trafficking, and the roles of adapters. The contributors also survey the specific functions of the different subfamilies of receptors and examine their many roles in development and normal physiology.

In addition, the authors review the important roles of these proteins in insulin resistance and cancer. This volume is thus a vital reference for cell and developmental biologists as well as those working on cancer biology, diabetes, and obesity.

Due November 2013, 300 pp. (approx.), illus., index  
Hardcover \$135 £85

ISBN 978-1-936113-33-0



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# Transplantation

Edited by Laurence A. Turka, *Harvard Medical School* and Kathryn J. Wood, *University of Oxford*

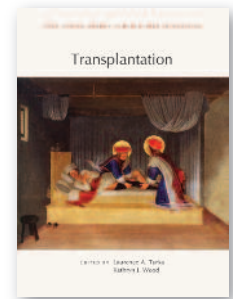
The transplantation of organs such as the heart, kidney, and lungs is an important means of replacing seriously damaged or diseased body parts. However, a transplanted organ may fail if the recipient's immune system mounts a response to it. Transplant patients are usually prescribed a life-long course of immunosuppressive medication, but these drugs can have adverse effects, including increased risk of infection and cancer.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* provides a current and comprehensive review of the molecular mechanisms behind graft rejection and how they may be overcome. Contributors discuss immunosuppressive drug therapies and tolerance induction strategies, including the use of regulatory T cells, mesenchymal stromal cells, and lymphodepletion. They describe how mouse and non-human primate models have been used to gain insight into the immunobiology of transplantation and to test therapeutic approaches. Clinical considerations, such as donor selection, organ preservation, surgery, and post-operative care, are also covered.

This volume includes discussion of the emerging field of regenerative medicine and the bioethical issues surrounding organ transplantation, and provides historical background to the field. It is an essential reference for immunologists, pharmacologists, clinicians, and all who are working to improve this remarkable medical procedure.

Due December 2013, 300 pp. (approx.), illus., index  
 Hardcover \$135 £85

ISBN 978-1-936113-88-0



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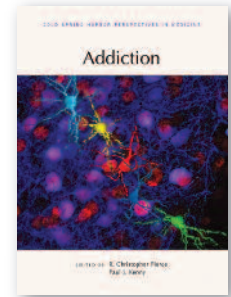




# Addiction

Edited by R. Christopher Pierce, *University of Pennsylvania* and Paul J. Kenny, *The Scripps Research Institute*

**D**rug and alcohol abuse elicits significant biological changes in the brain that drive compulsive behavior and lead to addiction. Abrupt cessation leads to withdrawal, craving, and relapse. A complete understanding of the brain changes produced by abused substances is therefore necessary if we are to develop treatments for drug dependence.



Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* explores the biological basis of addiction to alcohol, nicotine, and other psychoactive drugs. Contributors describe the molecular targets of these drugs, the resulting changes to neural networks, and the various genetic, developmental, and behavioral factors that influence the progression from abuse to addiction. Animal models of addictive behavior and techniques to dissect neural circuits are also described.

This volume includes discussion of compounds currently used or under development to treat drug dependence. Thus, it is an indispensable reference for neuroscientists and all who are interested in reducing the public health burden of substance abuse.

2012, 368 pp., illus (30 4C and 25 B&W), index  
Hardcover \$135 £85

ISBN 978-1-936113-47-7

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# Angiogenesis Biology and Pathology

Edited by Michael Klagsbrun, *Children's Hospital Boston* and Patricia D'Amore, *Schepens Eye Research Institute*

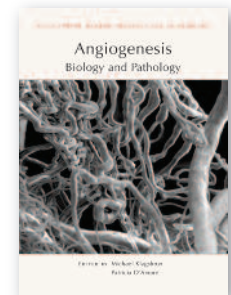
Angiogenesis is the process by which new blood vessels are generated from preexisting vessels. It is vital for proper embryonic development, patterning of the vascular system, and wound healing. It is rate limiting in cancer progression, because the formation of new blood vessels is essential for growth and survival of tumors.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* reviews the mechanisms of angiogenesis that operate in normal development and in diseases such as cancer. The contributors review the biology of endothelial cells, describing the specific roles of tip and stalk cells in vessel sprouting and lumen formation. They discuss the key angiogenic regulators (e.g., vascular endothelial growth factor [VEGF]), as well as antiangiogenic agents including microRNAs, thrombospondins, and semaphorins. Therapeutic approaches that target pathological angiogenesis, such as the ongoing clinical trials of anti-VEGF drugs, are also covered.

This volume, which includes discussions of other vascular dysfunctions (e.g., arteriovenous malformations) and comparisons between the blood vascular system and the lymphatic system, is a vital reference for developmental and cancer biologists, as well as anyone seeking to understand the biology and pathology of the vascular system.

2012, 522 pp., illus., index  
Hardcover \$135 £85

ISBN 978-1-936113-43-9



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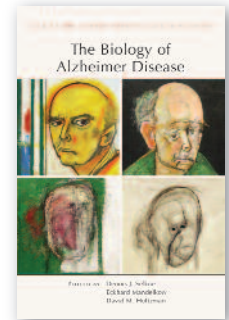
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# The Biology of Alzheimer Disease

Edited by Dennis J. Selkoe, *Harvard Medical School*, Eckhard Mandelkow, *Max-Planck-Unit for Structural Molecular Biology*, and David M. Holtzman, *Washington University School of Medicine*



Alzheimer disease causes the gradual deterioration of cognitive function, including severe memory loss and impairments in abstraction and reasoning. Understanding the complex changes that occur in the brain as the disease progresses—including the accumulation of amyloid plaques and neurofibrillary tangles—is critical for the development of successful therapeutic approaches.

Written and edited by leading experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* includes contributions covering all aspects of Alzheimer disease, from our current molecular understanding to therapeutic agents that could be used to treat and, ultimately, prevent it. Contributors discuss the biochemistry and cell biology of amyloid  $\beta$ -protein precursor (APP), tau, presenilin,  $\beta$ -secretase, and apolipoprotein E and their involvement in Alzheimer disease. They also review the clinical, neuropathological, imaging, and biomarker phenotypes of the disease; genetic alterations associated with the disorder; and epidemiological insights into its causation and pathogenesis.

This comprehensive volume, which includes discussions of therapeutic strategies that are currently used or under development, is a vital reference for neurobiologists, cell biologists, pathologists, and other scientists pursuing the biological basis of Alzheimer disease, as well as investigators, clinicians, and students interested in its pathogenesis, treatment, and prevention.

2012, 511 pp., illus., index  
Hardcover \$135 £85

ISBN 978-1-936113-44-6

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1-855-452-6793

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# Extracellular Matrix Biology

Edited by Richard O. Hynes, *Massachusetts Institute of Technology* and Kenneth M. Yamada, *National Institutes of Health*

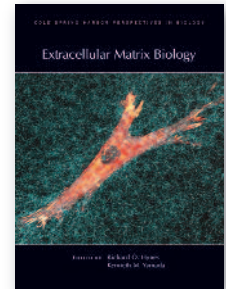
In most tissues, cells are surrounded by an extracellular matrix (ECM) containing proteins such as collagen, laminin, and fibronectin. The ECM plays an important role in regulating cell function. ECM proteins bind to integrins and other cell surface receptors, activating signaling pathways that regulate cellular morphology, adhesion, cell migration, cell proliferation, and apoptosis.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* covers all aspects of ECM composition and function, as well as alterations in the ECM that occur during development, tumorigenesis, and other disease states. The contributors examine the various ECM proteins and proteoglycans, ECM receptors such as integrins, and the signaling pathways that mediate the effects of the ECM on cells. They also describe ECM functions in specific biological contexts, including angiogenesis, hemostasis, and thrombosis.

Covering not only the biochemistry and cell biology of the ECM but also its roles in development, physiology, and pathology, this volume is an indispensable reference for cell biologists and all those interested in exploring the myriad functions of the ECM.

2012, 387 pp., illus., index  
Hardcover \$135 £85

ISBN 978-1-936113-38-5



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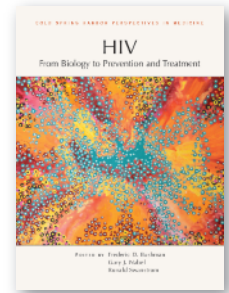
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# HIV

## From Biology to Prevention and Treatment

Edited by Frederic D. Bushman, *University of Pennsylvania School of Medicine*, Gary J. Nabel, *NIAID, National Institutes of Health*, and Ronald Swanstrom, *University of North Carolina at Chapel Hill*



The worldwide AIDS epidemic makes research on HIV, the disease processes it induces, and potential HIV therapies among the most critical in biomedical science. Furthermore, the basic biology of HIV infections provides a model for a more general understanding of retroviruses and their hosts.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* provides a comprehensive review of HIV research, covering everything from the pathogenesis of HIV infection to prevention. Contributors explore the origins and evolution of HIV, the HIV replication cycle, host–virus interactions, host immune responses, and HIV transmission. Vaccines, cell and gene therapies, antiretroviral drugs, microbicides, and behavioral strategies for the treatment and prevention of HIV infections are also explored.

This volume, which includes discussions of social and economic factors that affect HIV transmission and treatment, is an essential reference for virologists, cell and molecular biologists, and immunologists, as well as epidemiologists, physicians, and other public health professionals.

2012, 572 pp., illus., index

Hardcover \$135 £85

ISBN 978-1-936113-40-8

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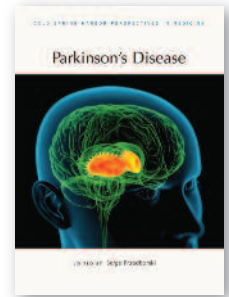
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# Parkinson's Disease

Edited by Serge Przedborski, *Columbia University*

First described as “the shaking palsy” in 1817 by James Parkinson, Parkinson’s disease is a disabling neurodegenerative disorder that is common among the elderly. It involves the gradual depletion of brain cells that control balance and movement, causing trembling, muscle rigidity, and difficulty walking. Characteristic brain changes — such as the formation of Lewy bodies and the degeneration of dopamine-producing neurons — have been identified, but diagnostic tests and therapeutic options remain limited.



Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* includes contributions covering all aspects of Parkinson’s disease, from its neuropathological and clinical bases to the diagnostic challenges and therapeutic interventions. Contributors discuss the mutations in genes encoding proteins such as  $\alpha$ -synuclein, parkin, and LRRK2 that cause Parkinson’s disease; the roles of mitochondria, autophagy, protein quality control, and programmed cell death in disease progression; and the chemistry and anatomy of the basal ganglia that are affected. The use of functional neuroimaging and experimental models to probe the neurobiology of Parkinson’s disease are also described.

Blending both the clinical and basic science of Parkinson’s disease, this volume is a vital reference for neurobiologists, cell biologists, and pathologists pursuing the biological basis of Parkinson’s disease, as well as scientists and clinicians interested in its diagnosis and treatment.

2012, 406 pp., illus. (36 4C images and 19 B&W), index  
 Hardcover \$135 £85

ISBN: 978-1-936113-32-3

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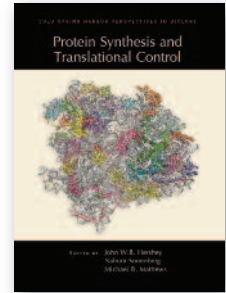
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# Protein Synthesis and Translational Control

Edited by John W.B. Hershey, *University of California, Davis*, Nahum Sonenberg, *McGill University*, and Michael B. Mathews, *New Jersey Medical School, University of Medicine and Dentistry of New Jersey*



The synthesis of proteins by ribosomes is a fundamental cellular process. Cells must tightly control protein synthesis to maintain homeostasis and regulate proliferation, growth, differentiation, and development. Indeed, aberrant translational control is associated with cancer, several neurologic syndromes, and a group of genetic disorders termed “ribosomopathies.”

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* covers our current understanding of all aspects of protein synthesis and its control. The contributors describe the fundamental steps in protein synthesis (initiation, elongation, and termination), the factors involved, and high-resolution structures of translational machinery where this takes place. They review the targets of translational control (e.g., initiation factors, mRNAs, and ribosomes) and how signaling pathways modulate this machinery. The roles of the endoplasmic reticulum, the unfolded protein response, processing bodies (P-bodies), stress granules, and small RNAs are also covered.

This volume includes discussion of translational deregulation in cancer and the development of therapeutic agents that target translation initiation. Thus, it is an essential reference for cell and molecular biologists, as well as cancer biologists and all those investigating human diseases associated with translation dysfunction.

2012, 352 pp., illus. (58 4C and 8 B&W), index  
Hardcover \$135 £85

ISBN 978-1-936113-46-0

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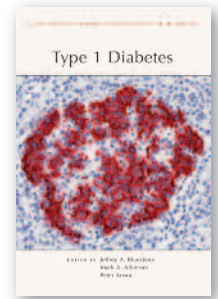
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# Type 1 Diabetes

Edited by Jeffrey A. Bluestone, *University of California, San Francisco*, Mark A. Atkinson, *University of Florida, College of Medicine*, and Peter R. Arvan, *University of Michigan Health System*



Type 1 diabetes, also known as juvenile-onset or insulin-dependent diabetes mellitus, is caused by the destruction of insulin-producing  $\beta$  cells in the pancreas by the body's immune system. It affects millions of individuals worldwide, who require regular insulin injections to control blood glucose levels and avoid severe consequences of glucose dysregulation.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Medicine* provides a detailed examination of the causes and pathogenesis of type 1 diabetes. The contributors discuss genetic risk factors, environmental triggers, and our current understanding of the autoimmune response underlying the condition. Animal models for diabetes, epidemiological considerations in disease etiology, and the development of diagnostic markers and tools are also reviewed.

This volume includes discussions of treatment strategies for type 1 diabetes, such as immunosuppressive drugs, antigen-specific approaches, pancreas and islet transplantation, and the use of stem cells. It is an essential reference for not only immunologists, physiologists, cell and developmental biologists, and geneticists, but all medical scientists and physicians interested in the pathology and treatment of this difficult disease.

2012, 305 pp., illus., index

Hardcover \$135 £85

ISBN: 978-1-936113-21-7

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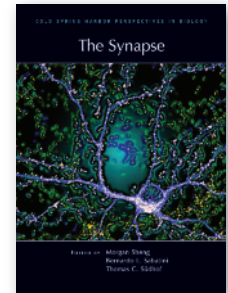
# The Synapse

Edited by Morgan Sheng, *Genentech Research Group*, Bernardo Sabatini, *Harvard Medical School*, and Thomas C. Südhof, *Stanford University School of Medicine*

Synapses are bulbous structures where two neurons communicate. Neurotransmitter molecules released from the pre-synaptic terminal of one neuron diffuse to the post-synaptic terminal on the other, binding to receptors that lead to propagation or modulation of the signal.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* examines the highly complex structures of the pre- and post-synaptic regions, as well as the trafficking mechanisms that transport vesicles containing neurotransmitters. The contributors discuss how long-term potentiation (LTP) and depression (LTD) in signal transmission form the basis of learning and memory. The roles of calcium signaling in regulating synaptic and cell function, and techniques to study such signaling events, are also covered.

This volume also includes discussions of synaptic dysfunction in disorders such as autism and Alzheimer disease. It is an indispensable reference for neurobiologists, cell and developmental biologists, and anyone wishing to understand how the basic building blocks of the brain are put together and communicate.



2012, 397 pp., illus. (78 4C and 6 B&W images), index  
Hardcover \$135 £85

ISBN 978-1-936113-02-6

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# Wnt Signaling

Edited by Roel Nusse, *Stanford University Medical Center*, Xi He, *Children's Hospital Boston*, and Renée van Amerongen, *Stanford University Medical Center*

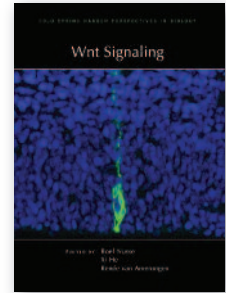
Wnt proteins are signaling molecules that play critical roles during embryonic development and in the regeneration of adult tissues. They bind to Frizzled and LRP family receptors on the cell surface, triggering a series of events that cause  $\beta$ -catenin to enter the nucleus and activate transcription factors that control cell fate and cell proliferation. Mutations in components of the Wnt pathway lead to developmental defects and are common in cancer.

Written and edited by experts in the field, this collection from *Cold Spring Harbor Perspectives in Biology* covers all aspects of canonical Wnt signaling, as well as  $\beta$ -catenin-independent Wnt signaling and cross-talk with other pathways. The contributors examine the numerous Wnt ligands; their production, secretion, and interactions with components of the extracellular environment; and details of the downstream signaling pathways that mediate the effects of Wnt proteins on cells. The roles of Wnt signaling in stem cell self-renewal, cell polarity, body-axis specification, wound healing, and other aspects of normal development and physiology are also covered.

This volume includes discussion of Wnt signaling in cancer, skeletal defects, neurological disorders, and other human disease states. Thus, it is an indispensable reference for cell and developmental biologists as well as those, especially in the fields of stem cell biology and regenerative medicine, who are interested in targeting the Wnt pathway for therapeutic purposes.

2012, 454 pp., illus (75 4C and 6 B&W), index  
 Hardcover \$135 £85

ISBN 978-1-936113-23-1



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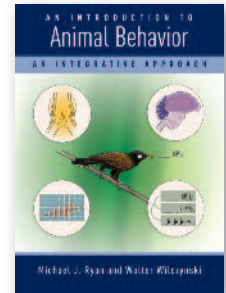
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# An Introduction to Animal Behavior

## An Integrative Approach

By Michael J. Ryan, *The University of Texas at Austin* and Walter Wilczynski, *Neuroscience Institute, Georgia State University, Atlanta*



The study of animal behavior is one of the most integrative endeavors in biology—it encompasses how the behavior is acquired, how it works, why it has come to work as it does, and how it influences the behaving animal and the animals around it. In *An Introduction to Animal Behavior: An Integrative Approach*, Michael J. Ryan and Walter Wilczynski address the interrelationship of these aspects of animal behavior, which Nikolaas Tinbergen codified in his “four questions” as causation, ontogeny, survival value, and evolution. In light of these questions, the authors first review some of the basic concepts of ultimate and proximate aspects of behavior. They make the argument that integrating different levels of analysis is critical for deriving a correct interpretation of behavior. In subsequent chapters, they review topics such as foraging, orientation and migration, sex differences, mate choice, social bonding, cooperation, conflict, and aggression. The authors integrate information from molecular genomics through neuroscience, endocrinology, development, and learning to evolutionary genetics, selection, constraints, and phylogenetics to provide a concise but comprehensive look at current topics in animal behavior. This book provides a well-thought-out and integrated introduction to the complexity of animal behavior that should appeal to advanced undergraduates, graduate students, and professional scientists in other fields in need of a succinct review of the field.

2011, 258 pp., illus. (88 4C and 3 B&W images), index  
 Hardcover \$81 £51  
 Paperback \$46 £29

ISBN 978-1-936113-18-7  
 ISBN 978-0-879698-58-4

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# Means To An End

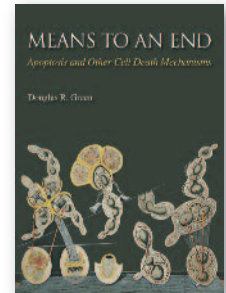
## Apoptosis and Other Cell Death Mechanisms

By Douglas R. Green, *St. Jude Children's Research Hospital*

One million cells in our bodies die every second—they commit suicide by a mechanism known as apoptosis. Apoptosis is essential for survival of the body as a whole and has critical roles in various developmental processes and the immune system.

In *Means To An End*, Douglas Green provides a clear and comprehensive view of apoptosis and other cell death mechanisms. Taking a bottom-up approach, he starts with the enzymes that perform the execution process (a family of proteases termed caspases) and examines their cellular targets and the ways in which they are activated. He then looks at the molecular machinery that links signals that cause cell death to caspases, emphasizing the importance of the BCL-2 family of proteins and the role of cytochrome c released from mitochondria. The final stage of the process, phagocytic removal of dead or dying cells, is also covered.

Green outlines the roles of apoptosis and death mechanisms such as necrosis in embryogenesis, neuronal selection, and the development of self-tolerance in the immune system. In addition, he explains how cell death defends the body against cancer and traces the evolutionary origins of the apoptosis machinery back over a billion years. The book is thus of great use to all biologists interested in how cells function in the context of multicellular organisms and will appeal to everyone from undergraduates encountering the topic for the first time to researchers actively working in the field.



2011, 220 pp., illus., additional reading, index  
 Hardcover \$81 £51  
 Paperback \$46 £29

ISBN 978-0-879698-87-4  
 ISBN 978-0-879698-88-1

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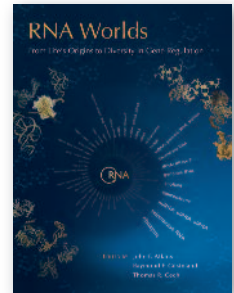


# RNA Worlds

## From Life's Origins to Diversity in Gene Regulation

Edited by John F. Atkins, *University of Utah and University College Cork*, Raymond F. Gesteland, *University of Utah*, and Thomas R. Cech, *Howard Hughes Medical Institute, University of Colorado*

Recent studies on the activities of RNA in the cell have revolutionized our understanding of the functions of this molecule. This volume reviews the role RNA is thought to have played early in the history of life on Earth, when it may have preceded DNA as the hereditary material. It also examines the basis for the catalytic activities of RNA both on the early Earth and in modern organisms then and now, as well as the recently revealed roles of regulatory RNAs in control of gene expression.



2011, 366 pp., illus. (73 4C and 23 B&W images), index  
 Hardcover \$162 £102

ISBN 978-0-879699-46-8

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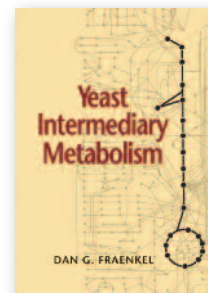
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## Yeast Intermediary Metabolism

By Dan G. Fraenkel, *Harvard Medical School*

The intermediary metabolism of small molecules is the meat and potatoes of cell function. The pathways and modes of obtaining energy, degradation and utilization of exogenous organic nutrients, and formation of the building blocks of the main macromolecules were a major focus of research in biology from the turn of the 20th century into the 1970s. Other matters have come to prominence, but the field is active, with interesting problems that are central to biology and medicine. Molecular biology developed through the use of one bacterium, *Escherichia coli*, with the saying “What’s true for *E. coli* is true for elephants.” In recent years, an analogous workhorse has been the eukaryotic microbe baker’s yeast, *Saccharomyces cerevisiae*, used in many studies of cell biology common to multicellular organisms. This book explains metabolism as based on *Saccharomyces*. The topics include central metabolic pathways; catabolism; fermentation; respiration; biosynthesis of small molecules including cofactors; the metabolism of lipids, polysaccharides, and storage molecules; inorganic ions; transport and compartments; the global analysis of metabolism; and issues of metabolic toxicity. It can be used in courses and as a reference book for research investigators.



2011, 434 pp., illus., appendix, index  
 Hardcover \$128 £81

ISBN 978-0-879697-97-6

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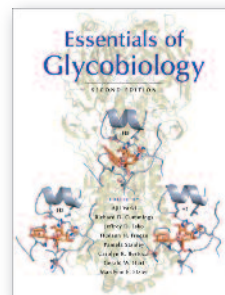
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# Essentials of Glycobiology

## Second Edition



Edited by Ajit Varki, *University of California, San Diego*, Richard D. Cummings, *Emory University School of Medicine, Atlanta*, Jeffrey D. Esko, *University of California, San Diego*, Hudson H. Freeze, *Burnham Institute for Medical Research, La Jolla*, Pamela Stanley, *Albert Einstein College of Medicine of Yeshiva University, New York*, Carolyn R. Bertozzi, *University of California, Berkeley*, Gerald W. Hart, *Johns Hopkins University School of Medicine, Baltimore*, and Marilyn E. Etzler, *University of California, Davis*

The sugar chains of cells—known collectively as glycans—play a variety of impressive, critical, and often surprising roles in biological systems. Glycobiology is the study of the roles of glycans in the growth and development, function, and survival of an organism. Glyco-related processes, described in vivid detail in the text, have become increasingly significant in many areas of basic research as well as biomedicine and biotechnology.

This new edition of *Essentials of Glycobiology* covers the general principles and describes the structure and biosynthesis, diversity, and function of glycans and their relevance to both normal physiologic processes and human disease. Several new chapters present significant advances that have occurred since the publication of the first edition. Three sections of note describe organismal diversity, advances in our understanding of disease states and related therapeutic applications, and the genomic view of glycobiology. “Glycomics,” analogous to genomics and proteomics, is the systematic study of all glycan structures of a given cell type or organism and paves the way for a more thorough understanding of the functions of these ubiquitous molecules.

The first edition of *Essentials of Glycobiology* represented also a notable experiment in publishing, as it became one of the first electronic textbooks. And, now, in recognition of its wide audience and the changing ways in which researchers and students learn and access information, the new edition of *Essentials* will be made available online simultaneously with the print edition. This novel experiment is the result of the collaborative efforts of the Cold Spring Harbor Laboratory Press, the National Center for Biotechnology Information, and the editors of the book. Written and edited by glycobiologists with experience in teaching and in research, this volume will be an invaluable resource, both for students and for established investigators in fields such as developmental biology, cell biology, neuroscience, immunology, and biochemistry who require a complete yet concise introduction to this burgeoning field.

2009, 784 pp., illus., glossary, study guide, index  
 Hardcover \$162 £102

ISBN 978-0-879697-70-9

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### Praise for the Second Edition:

“The basic principles of glycobiology are clearly articulated in this volume, and the roles of complex carbohydrates in disease are an important read for all biomedical scientists.”  
 —Peter Agre, M.D., Nobel Laureate in Chemistry, 2003

“*Essentials of Glycobiology* is a major resource for understanding these post-translational biochemical reactions that affect the function and fate of proteins produced by the genes that are profoundly changed by their added sugars.”

—Baruch S. Blumberg, Nobel Laureate in Medicine, 1976

“The second edition of *Essentials of Glycobiology*, superbly printed and illustrated, develops in simple and absolutely precise terms the complicated intricacies of glycobiology. I would have killed to get this encyclopedic treatise 40 years ago when I was working my way through this field.”

—Edmond H. Fischer, Nobel Laureate in Medicine, 1992



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# Untangling the Double Helix

## DNA Entanglement and the Action of the DNA Topoisomerases

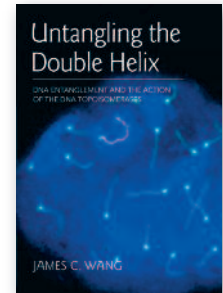
By James C. Wang, *Harvard University*

The problem of unraveling two intertwined strands during the duplication of DNA was recognized shortly after the proposal of the DNA double helix structure in 1953. A group of enzymes called DNA topoisomerases solve this problem by breaking and rejoining DNA molecules in a controlled manner, thereby allowing strands to be passed through each other and thus untangled—not just during DNA replication, but also during many other basic cellular processes. Because of their intimate involvement in the workings of the cell, topoisomerases are also the logical targets of many antibiotics (including Cipro) and anticancer agents.

This book, written by James Wang, the discoverer of the first topoisomerase and a leader in the field since, presents ten chapters covering the historical backdrop of the DNA entanglement problem and the discovery of the DNA topoisomerases, how DNA topoisomerases perform their magic in DNA replication, transcription, genetic recombination and chromosome condensation, and how they are targets of therapeutic agents. The book should appeal to readers from undergraduates upwards with interests in the biological and clinical aspects of topoisomerase function, or in the mathematics and physics of topology.

2009, 233 pp., illus., appendices, index  
 Paperback \$46 £29

ISBN 978-0-879698-79-9



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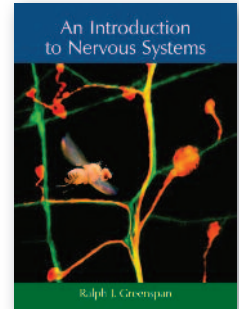
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# An Introduction to Nervous Systems

By Ralph J. Greenspan, *The Neurosciences Institute, San Diego*

*An Introduction to Nervous Systems* presents the principles of neurobiology from an evolutionary perspective—from single-celled organisms to complex invertebrates such as flies—and is ideal for use as a supplemental textbook. Greenspan describes the mechanisms that allow behavior to become ever more sophisticated—from simple avoidance behavior of *Paramecium* through to the complex cognitive behaviors of the honeybee—and shows how these mechanisms produce the increasing neural complexity found in these organisms. The book ends with a discussion of what is universal about nervous systems and what may be required, neurobiologically, to be human. This novel and highly readable presentation of fundamental principles of neurobiology is designed to be accessible to undergraduate and graduate students not already steeped in the subject.



2007, 172 pp., illus., bibliography, glossary, index  
 Hardcover \$67 £42  
 Paperback \$46 £29

ISBN 978-0-879697-57-0  
 ISBN 978-0-879698-21-8

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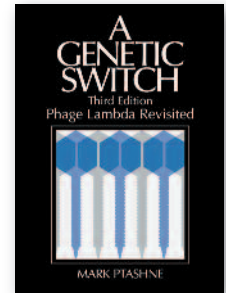


## A Genetic Switch

### Third Edition, Phage Lambda Revisited

By Mark Ptashne, *Sloan-Kettering Memorial Cancer Center, New York*

The first edition of Mark Ptashne's 1986 book describing the principles of gene regulation in phage lambda became a classic in both content and form, setting a standard of clarity and precise prose that has rarely been bettered. This edition is a reprint of the original text, together with a new chapter updating the story to 2004. Among the striking new developments are recent findings on long-range interactions between proteins bound to widely separated sites on the phage genome, and a detailed description of how gene activation works.



2004, 164 pp., illus., appendices, index

Paperback \$40 £25

Also available as an Amazon Kindle book.

ISBN 978-0-879697-16-7

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