The New Frontier Of Genome Engineering With Crispr Cas9

ARELLANO LAM

The Genome Factor SPIE-International Society for Optical Engineering
A National Book Award winner’s personal journey through the ethical dilemmas and unsettling choices raised by the new frontier of DNA testing. Several years after Masha Gessen’s mother died of breast cancer, she discovered she too had the BRCA1 gene mutation, which predisposes women to high rates of ovarian and breast cancer. Her doctors gave her narrow options: surgical removal of her breasts and ovaries or living with the likelihood of one day developing cancer. As Gessen wrestled with her own health decisions, she sought more information about the implications of genetic testing from a variety of sources—ranging from others faced with her same dilemma to medical researchers, historians, and religious thinkers. With concerns both practical and philosophical, personal and societal, her inquiry led her across the globe, with stops in Israel, Russia, Austria, and the United States. Weaving her own story into her journalistic research, Gessen offers insight into how knowledge that was once unimaginable now shapes our lives. Blood Matters explores not only the decisions we must make in our physical and emotional health, but also the ethical choices we face when choosing spouses or having children. “Valuable reading to almost anyone facing a huge health decision, not only for the literary commiseration it offers, but also for the inspired example of medical sleuthing on one’s own behalf that it provides. Gessen keeps an inflammatory topic at room temperature, writing elegantly and without self pity.” —The New York Times Book Review

The Unnatural Selection of Our Species Macmillan
Welcome to a fascinating dive into the world of genetics and precision medicine! In this book, we will explore a wide range of topics related to these areas of science that are revolutionizing the way we understand and approach human and animal health. Genetics has been a subject of fascination and study for decades, but recent technological and scientific advances have allowed for an even deeper understanding of the secrets of our genetic code. With the sequencing of the human genome and the discovery of new genes and genetic variants, we have entered an exciting era of precision medicine, in which treatments are customized based on each patient's individual genetic characteristics. Throughout this book, we will explore the most relevant and promising topics in genetics and precision medicine in different areas of healthcare. From its application in gastrointestinal medicine, through the role of genetics in cancer and its impact on psychosomatic medicine, assisted reproduction, liver disease, infectious diseases, contraception and sports medicine, to gene therapy for cancer and the applications of genes in medicine. We will also address ethical issues related to gene editing, the influence of the environment on gene expression through epigenetics and its application in tropical medicine. Additionally, we'll explore the exciting field of aesthetic medicine and how genetics and precision medicine are transforming animal health care into precision veterinary medicine. This book aims to provide a comprehensive and accessible overview of these complex topics, presenting the concepts clearly and highlighting the latest advances in the field. We hope it piques your interest, sparks your curiosity, and motivates you to explore further the incredible advances and future prospects of genetics and precision medicine. Get ready for a thrilling journey through the intricate details of DNA, the scientific discoveries that are changing medicine, and the inspiring stories of how genetics is transforming people's lives. Enjoy reading and allow yourself to discover the secrets and wonders of our genetic code!

Blood Matters Princeton University Press
Our biology is no longer our destiny. In this newly expanded and updated book, world-renowned integrative medicine pioneer and bestselling author Dr. Kenneth R. Pelletier reveals the new frontier of personalized medicine and steps each of us can take to change our genetic expression for a lifetime of vitality and longevity. We now understand that our inherited DNA does not rigidly determine our health and disease prospects as geneticists once believed. In fact, scientists have confirmed that the vast majority of our genes are actually fluid and dynamic! An endless supply of new studies prove that our health is an expression of how we live our lives, what we eat, how we process thoughts, manage our daily stress, and shield ourselves from the toxicity of our immediate environment creates an internal biochemistry which has the ability to turn genes on or off. This era of epigenetics provides new avenues of prevention, treatment and reversals of heart disease, intestinal disorders, cancer, arthritis, stress conditions, as well as Alzheimer's disease. Managing these biochemical effects on our genome is the new key to radiant wellness and healthy longevity. State-of-the-art technology now constructs precise, high-tech genomic assays that provide highly detailed personalized profiles to guide our health choices. Genomic data, combined with microbiome assessments, will soon analyze trillions of gut bacteria for markers of epigenetic influence. Dr. Pelletier explains what will soon become the standard reference for measuring which specific lifestyle changes are required to optimize a given individual's health and open the door to what futurists call personalized medicine.
Biophotonics New Frontier National Academies Press
This book provides an analysis of the nature vs. nuture debate, arguing for an end to the 'either/or' nature of the discussions in favor of a recognition that environmental and genetic factors interact throughout life to form human traits.
A Crack In Creation University of Chicago Press
This book presents descriptive overviews of gene editing strategies across multiple species while also offering in-depth insight on complex cases of application in the field of tissue engineering and regenerative medicine. Chapters feature contributions from leaders in stem cell therapy and biology, providing a comprehensive view of the application of gene therapy in numerous fields with an emphasis on ophthalmology, stem cells, and agriculture. The book also highlights recent major technological advances, including ZFN, TALEN, and CRISPR. Precision Medicine, CRISPR, and Genome Engineering is part of the highly successful Advances in Experimental Medicine and Biology series. It is an indispensable resource for researchers and students in genetics as well as clinicians.
Plant Genome Diversity Frontiers Media SA
Approximately 75% of emerging infectious diseases are zoonoses, and the rate of emergence of zoonotic diseases is on the rise. Bats are being increasingly recognised as an important reservoir of zoonotic viruses of different families, including SARS coronavirus, Nipah virus, Hendra virus and Ebola virus. Understanding bats' role in emerging zoonotic diseases is crucial to this rapidly expanding area of research. Bats and Viruses: A New Frontier of Emerging Infectious Diseases provides an updated overview of research focusing on bat biology and the role bats play as hosts of many major zoonotic viruses. The text covers bat biology, immunology, and genomics. Chapters also delve into the various major bat-borne virus families, including lyssaviruses, paramyxoviruses, coronaviruses, filoviruses and reoviruses, among others. Edited by leaders in the field, Bats and Viruses: A New Frontier of Emerging Infectious Diseases is a timely, invaluable reference for bat researchers studying microbiology, virology and immunology, as well as infectious disease workers and epidemiologists, among others.
On the Frontier of Science CRC Press
Currently, tissue biopsy, generally from the primary tumor, is used to determine molecular profiles at a single time point, before targeted therapy commences. Tissue biopsies carry some risks for patients, they are painful, costly, time-consuming, and most importantly, may not be a true representation of tumor heterogeneity. Tumor genomes are remarkably unstable and prone to clonal expansion under selection pressure, liquid biopsies via circulating cell-free nucleic acids offer what tissue biopsies can't, the opportunity to take serial samples for longitudinal monitoring of tumor genomic evolution in real time. Liquid biopsy-based testing will allow clinicians to ensure treatment efficacy, monitor drug resistance, metastasis and recurrence, tailoring patients to the right treatment for the right target without delay. Tumor genome sequencing on circulating cfDNA to guide treatment decisions would be the standard-of-care of new-generation cancer management.
Biosocial Surveys Biophotonics New FrontierBiophotonics New Frontier
Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.
Experiencing the New Genetics Academic Press
A Best Book of 2021 by Bloomberg BusinessWeek, Time, and The Washington Post The bestselling author of Leonardo da Vinci and Steve Jobs returns with a "compelling" (The Washington Post) account of how Nobel Prize winner Jennifer Doudna and her colleagues launched a revolution that will allow us to cure diseases, fend off viruses, and have healthier babies. When Jennifer Doudna was in sixth grade, she came home one day to find that her dad had left a paperback titled The Double Helix on her bed. She put it aside, thinking it was one of those detective tales she loved. When she read it on a rainy Saturday, she discovered she was right, in a way. As she sped through the pages, she became enthralled by the intense drama behind the competition to discover the code of life. Even though her high school counselor told her girls didn't become scientists, she decided she would. Driven by a passion to understand how nature works and to turn discoveries into inventions, she would help to make what the book's author, James Watson, told her was the most important biological advance since his codiscovery of the structure of DNA. She and her collaborators turned a curiosity of nature into an invention that will transform the human race: an easy-to-use tool that can edit DNA. Known as CRISPR, it opened a brave new world of medical miracles and moral questions. The development of CRISPR and the race to create vaccines for coronavirus will hasten our transition to the next great innovation revolution. The past half-century has been a digital age, based on the microchip, computer, and internet. Now we are entering a life-science revolution. Children who study digital coding will be joined by those who study genetic code. Should we use our new evolution-hacking powers to make us less susceptible to viruses? What a wonderful boon that would be! And what about preventing depression? Hmmm…Should we allow parents, if they can afford it, to enhance the height or muscles or IQ of their kids? After helping to discover CRISPR, Doudna became a leader in wrestling with these moral issues and, with her collaborator Emmanuelle Charpentier, won the Nobel Prize in 2020. Her story is an "enthralling detective story" (Oprah Daily) that involves the most profound wonders of nature, from the origins of life to the future of our species.
Cap-Analysis Gene Expression (CAGE) University of Pennsylvania Press
This book is a guide for users of new technologies, as it includes accurately proven protocols, allowing readers to prepare their samples for experiments. Additionally, it is a guide for the bioinformatics tools that are available for the analysis of the obtained tags, including the design of the software, the sources and the Web. Finally, the book provides examples of the application of these technologies to identify promoters, annotate genomes, identify new RNAs and reconstruct models of transcriptional control. Although examples mainly concern mammalians, the discussion expands to other groups of eukaryotes, where these approaches are complementing genome sequencing.
Life at the Speed of Light Springer Science & Business Media
How genomics is revolutionizing the social sciences For a century, social scientists have avoided genetics like the plague. But the nature-nurture wars are over. In the past decade, a small but intrepid group of economists, political scientists, and sociologists have harnessed the genomics revolution to paint a more complete picture of human social life than ever before. The Genome Factor describes the latest astonishing discoveries being made at the scientific frontier where genomics and the social sciences intersect. The Genome Factor reveals that there are real genetic differences by racial ancestry--but ones that don't conform to what we call black, white, or Latino. Genes explain a significant share of who gets ahead in society and who does not, but instead of giving rise to a genotocracy, genes often act as engines of mobility that counter social disadvantage. An increasing number of us are marrying partners with similar education levels as ourselves, but genetically speaking, humans are mixing it up more than ever before with respect to mating and reproduction. These are just a few of the many findings presented in this illuminating and entertaining book, which also tackles controversial topics such as genetically personalized education and the future of reproduction in a world where more and more of us are taking advantage of cheap genotyping services like 23andMe to find out what our genes may hold in store for ourselves and our children. The Genome Factor shows how genomics is transforming the social sciences--and how social scientists are integrating both nature and nurture into a unified, comprehensive understanding of human behavior at both the individual and society-wide levels.
Plant Disease Management in the Post-Genomic Era: from Functional Genomics to Genome Editing Beacon Press
BY THE WINNER OF THE 2020 NOBEL PRIZE IN CHEMISTRY | Finalist for the Los Angeles Times Book Prize "A powerful mix of science and ethics . . . This book is required reading for every concerned citizen—the material it covers should be discussed in schools, colleges, and universities throughout the country."— New York Review of Books Not since the atomic bomb has a technology so alarmed its inventors that they warned the world about its use. That is, until 2015, when biologist Jennifer Doudna called for a worldwide moratorium on the use of the gene-editing tool CRISPR—a revolutionary new technology that she helped create—to make heritable changes in human embryos. The cheapest, simplest, most effective way of manipulating DNA ever known, CRISPR may well give us the cure to HIV, genetic diseases, and some cancers. Yet even the tiniest changes to DNA could have myriad, unforeseeable consequences, to say nothing of the ethical and societal repercussions of intentionally mutating embryos to create "better" humans. Writing with fellow researcher Sam Sternberg, Doudna—who has since won the Nobel Prize for her CRISPR research—shares the thrilling story of her discovery and describes the enormous responsibility that comes with the power to rewrite the code of life. "The future is in our hands as never before, and this book explains the stakes like no other." — George Lucas "An invaluable account . . . We owe Doudna several times over." — Guardian
The Age of Genomes Legend Press Ltd
In this timely new 2-volume treatise, experts from around the world have banded together to produce a first-of-its-kind synopsis of the exciting and fast moving field of plant evolutionary genomics. In Volume I of Plant Genome Diversity, an update is provided on what we have learned from plant genome sequencing projects. This is followed by more focused chapters on the various genomic "residents" of plant genomes, including transposable elements, centromeres, small RNAs, and the evolutionary dynamics of genes and non-coding sequences. Attention is drawn to advances in our understanding of plant mitochondrial and plastid genomes, as well as the significance of duplication in genic evolution and the non-independent evolution among sequences in plant genomes. Finally, Volume I provides an introduction to the vibrant new frontier of plant epigenomics, describing the current state of our knowledge and the evolutionary implications of the epigenomic landscape.
Liquid Biopsy - A New Frontier in Cancer Dx Penguin
A cutting-edge new vision of biology that will revise our concept of what life itself is, how to enhance it, and what possibilities it offers. Biology is undergoing a quiet but profound transformation. Several aspects of the standard picture of how life works--the idea of the genome as a blueprint, of genes as instructions for building an organism, of proteins as precisely tailored molecular machines, of cells as entities with fixed identities, and more--have been exposed as incomplete, misleading, or wrong. In How Life Works, Philip Ball explores the new biology, revealing life to be a far richer, more ingenious affair than we had guessed. Ball explains that there is no unique place to look for an answer to this question: life is a system of many levels--genes, proteins, cells, tissues, and body modules such as the immune system and the nervous system--each with its own rules and principles. How Life Works explains how these levels operate, interface, and work together (most of the time). With this knowledge come new possibilities. Today we can redesign and reconfigure living systems, tissues, and organisms. We can reprogram cells, for instance, to carry out new tasks and grow into structures not seen in the natural world. As we discover the conditions that dictate the forms into which cells organize themselves, our ability to guide and select the outcomes becomes ever more extraordinary. Some researchers believe that ultimately we will be able to regenerate limbs and organs, and perhaps even create new life forms that evolution has never imagined. Incorporating the latest research and insights, How Life Works is a sweeping journey into this new frontier of the life sciences, a realm that will reshape our understanding of life as we know it.
CRISPR People PublicAffairs
Our fates lie in our genes and not in the stars, said James Watson, co-discoverer of the structure of DNA. But Watson could not have predicted the scale of the industry now dedicated to this new frontier. Since the launch of the multibillion-dollar Human Genome Project, the biosciences have promised miraculous cures and radical new ways of understanding who we are. But where is the new world we were promised? Now updated with a new afterword, Genes, Cells and Brains asks

why the promised cornucopia of health benefits has failed to emerge and reveals the questionable enterprise that has grown out of bioethics. The authors, feminist sociologist Hilary Rose and neuroscientist Steven Rose, examine the establishment of biobanks, the rivalries between public and private gene sequencers, and the rise of stem cell research. The human body is becoming a commodity, and the unfulfilled promises of the science behind this revolution suggest profound failings in genomics itself.

Bats and Viruses Springer Science & Business Media

Over the past several decades there has been an explosion of interest in genetics and genetic inheritance within both the research community and the mass media. The science of genetics now forecasts great advances in alleviating disease and prolonging human life, placing the family and kin group under the spotlight. In Experiencing the New Genetics, Kaja Finkler argues that the often uncritical presentation of research on genetic inheritance as well as the attitudes of some in the biomedical establishment contribute to a "genetic essentialism," a new genetic determinism, and the medicalization of kinship in American society. She explores some of the social and cultural consequences of this phenomenon. Finkler discovers that the new genetics can turn a healthy person into a perpetual patient, complicate the redefinition of the family that has been occurring in American society for the past few decades, and lead to the abdication of responsibility for addressing the problem of unhealthy environmental conditions. Experiencing the New Genetics will assist scholars and general readers alike in making sense of this timely and multifaceted issue.

The Code Breaker Scientific American / Farrar, Straus and Giroux

In 1953, James Watson and Francis Crick discovered the double helix structure of DNA. The discovery was a profound, Nobel Prize-winning moment in the history of genetics, but it did not decipher the messages on the twisted, ladderlike strands within our cells. No one knew what the human genome sequence actually was. No one had cracked the code of life. Now, at the beginning of a new millennium, that code has been cracked. Kevin Davies, founding editor of the leading journal in the field, Nature Genetics, has relentlessly followed the story as it unfolded, week by week, for ten years. Here for the first time, in rich human, scientific, and financial detail, is the dramatic story of one of the greatest scientific feats ever accomplished: the mapping of the human genome. In 1990, the U.S. government approved a 15-year, $3 billion plan to launch the Human Genome Project, whose goal was to sequence the 3 billion letters of human DNA. At the helm of the project was James Watson, who resigned after only a couple of years, following a feud with National Institutes of Health (NIH) Director Bernadine Healy over gene patenting. His successor was the brilliant young medical geneticist Francis Collins, who had made his name discovering the gene for cystic fibrosis. As Davies reports, Collins is a devout Christian who has traveled to Africa to work in a missionary hospital. He believes the human genome sequence is "the language of God." Just as Collins became project director, J. Craig Venter, a maverick DNA sequencer and Vietnam veteran, was leaving the NIH to start his own private research institute. Venter had developed a simple "shotgun" strategy for sequencing DNA, and his fame skyrocketed when his new institute proved his sequencing system worked by becoming the first to sequence the entire genome of a microorganism. Only 3 percent of the human genome had been sequenced by early 1998, the public project's halfway point. That same year, Venter was approached by PE Corporation to launch a private human genome project. He stunned the world when he announced the formation of a new company to sequence the human genome in a mere three years for $300 million. A war of words broke out between public and private researchers. Undeterred, Venter built Celera Genomics with the motto "Speed matters. Discovery can't wait." and an $80 million supercomputer. While the insults intensified, Celera's stock price soared, tumbled, and soared again. Negotiations for cooperation between the public and private institutes began, only to fall apart in acrimony. Then in the spring of 2000 President Clinton stepped in, telling his science adviser to restart negotiations. History was about to be made. Davies captures the drama of this momentous achievement, drawing on his own genetics expertise and interviews with key scientists including Venter and Collins, as well as Eric Lander, an MIT computer wizard who refers to the public genome project as "the forces of good"; Kari Stefánsson, the genetics entrepreneur who is remaking Iceland's economy; and John Sulston, chief of the UK genome project, who led the charge against gene patenting. Davies has visited geneticists around the world to illustrate a vast international enterprise working on the frontier of human knowledge. Cracking the Genome is the definitive account of how the code that holds the answers to the origin of life, the evolution of humanity, and the future of medicine was broken.

W. W. Norton & Company

In 2018, the first genetically-modified children were born.

Change Your Genes, Change Your Life Bold Type Books

A leading geneticist explores what promises to be one of the most transformative advances in health and medicine in history Almost every week, another exciting headline appears about new advances in the field of genetics. Genetic testing is experiencing the kind of exponential growth once seen with the birth of the Internet, while the plummeting cost of DNA sequencing makes it increasingly accessible for individuals and families. Steven Lipkin and Jon Luoma posit that today's genomics is like the last century's nuclear physics: a powerful tool for good if used correctly, but potentially dangerous nonetheless. DNA testing is likely the most exciting advance in a long time for treating serious disease, but sequencing errors, complex biology, and problems properly interpreting genetic data can also cause life-threatening misdiagnoses of patients with debilitating and fatal genetic diseases. DNA testing can also lead to unnecessary procedures and significantly higher health-care costs. And just around the corner is the ability to cure genetic diseases using powerful gene-editing technologies that are already being used in human embryo research. Welcome to the Age of Genomes! The Age of Genomes immerses readers in true stories of patients on the frontier of genomic medicine and explores both the transformative potential and risks of genetic technology. It will inform anxious parents increasingly bombarded by offers of costly new prenatal testing products, and demonstrate how genetic technology, when deployed properly, can significantly improve the lives of patients who have devastating neurological diseases, cancer, and other maladies. Dr. Lipkin explains the science in depth, but in terms a layperson can follow.

Precision Medicine, CRISPR, and Genome Engineering MSU Press

New Frontiers and Applications of Synthetic Biology presents a collection of chapters from eminent synthetic biologists across the globe who have established experience and expertise working with synthetic biology. This book offers several important areas of synthetic biology which allow us to read and understand easily. It covers the introduction of synthetic biology and design of promoter, new DNA synthesis and sequencing technology, genome assembly, minimal cells, small synthetic RNA, directed evolution, protein engineering, computational tools, de novo synthesis, phage engineering, a sensor for microorganisms, next-generation diagnostic tools, CRISPR-Cas systems, and more. This book is a good source for not only researchers in designing synthetic biology, but also for researchers, students, synthetic biologists, metabolic engineers, genome engineers, clinicians, industrialists, stakeholders and policymakers interested in harnessing the potential of synthetic biology in many areas. Offers basic understanding and knowledge in several aspects of synthetic biology Covers state-of-the-art tools and technologies of synthetic biology, including promoter design, DNA synthesis, DNA sequencing, genome design, directed evolution, protein engineering, computational tools, phage design, CRISPR-Cas systems, and more Discusses the applications of synthetic biology for smart drugs, vaccines, therapeutics, drug discovery, self-assembled materials, cell free systems, microfluidics, and more

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