

## Scientists In China Used Crispr To Genetically Modify Low

The classic personal account of Watson and Crick's groundbreaking discovery of the structure of DNA, now with an introduction by Sylvia Nasar, author of *A Beautiful Mind*. By identifying the structure of DNA, the molecule of life, Francis Crick and James Watson revolutionized biochemistry and won themselves a Nobel Prize. At the time, Watson was only twenty-four, a young scientist hungry to make his mark. His uncompromisingly honest account of the heady days of their thrilling sprint against other world-class researchers to solve one of science's greatest mysteries gives a dazzlingly clear picture of a world of brilliant scientists with great gifts, very human ambitions, and bitter rivalries. With humility unspoiled by false modesty, Watson relates his and Crick's desperate efforts to beat Linus Pauling to the Holy Grail of life sciences, the identification of the basic building block of life. Never has a scientist been so truthful in capturing in words the flavor of his work.

Mitochondrial replacement techniques (MRTs) are designed to prevent the transmission of mitochondrial DNA (mtDNA) diseases from mother to child. While MRTs, if effective, could satisfy a desire of women seeking to have a genetically related child without the risk of passing on mtDNA disease, the technique raises significant ethical and social issues. It would create offspring who have genetic material from two women, something never sanctioned in humans, and would create mitochondrial changes that could be heritable (in female offspring), and therefore passed on in perpetuity. The manipulation would be performed on eggs or embryos, would affect every cell of the resulting individual, and once carried out this genetic manipulation is not reversible. Mitochondrial Replacement Techniques considers the implications of manipulating mitochondrial content both in children born to women as a result of participating in these studies and in descendants of any female offspring. This study examines the ethical and social issues related to MRTs, outlines principles that would provide a framework and foundation for oversight of MRTs, and develops recommendations to inform the Food and Drug Administration's consideration of investigational new drug applications.

What if you could have your own real dragon? While that might seem like just a fantasy, today cutting-edge science has brought us to the point where it might really be possible. This book looks into the possibilities of making living, fire-breathing dragons. The world has been fascinated with dragons for thousands of years. Fictional dragons still have a firm place in pop culture, such as Smaug from *The Hobbit* as well as the dragons in *Game of Thrones* and in the *How to Train Your Dragon* movies. This new book discusses using powerful technologies such as CRISPR gene editing, stem cells, and bioengineering to make real dragons. It also goes through what useful information we can learn from animals such as Pteranodons and amazing present-day creatures in our quest to build actual dragons. The book goes on to discuss the possibility of building other mythical creatures such as unicorns and mermaids. Overall, *How to Build A Dragon* is also meant as a satirical look at cutting-edge science, and it pokes fun at science hype. Anyone who is interested in dragons or cutting-edge science will enjoy this book! It is written in a humorous, approachable way making science fun and easy to understand, including for young adults. The author is well-known scientist Paul Knoepfler who is familiar to the public for his science, his blog *The Niche*, and his frequent contributions to lay stories on new science concepts such as stem cells and CRISPR. He also is known for his TED talk on designer babies with more than 1.3 million views, and his two books — . The co-author, his daughter Julie Knoepfler, is a high school student interested in science and writing. She has her own blog on literary and film analysis, and enjoys taking a humorous look at culture through writing.

New York Times bestselling author Robin Cook takes on the cutting-edge world of gene-modification in this pulse-pounding new medical thriller. When an unidentified, seemingly healthy young woman collapses suddenly on the New York City subway and dies upon reaching the hospital, her case is an eerie reminder for veteran medical examiner Jack Stapleton of the 1918 flu pandemic. Fearful of a repeat on the one hundredth anniversary of the nightmarish contagion, Jack autopsies the woman within hours of her demise and discovers some striking anomalies: first, that she has had a heart transplant, and second, that, against all odds, her DNA matches that of the transplanted heart. Although the facts don't add up to influenza, Jack must race against the clock to identify the woman and determine what kind of virus could wreak such havoc--a task made more urgent when two other victims succumb to a similar rapid death. But nothing makes sense until his investigation leads him into the fascinating realm of CRISPR/CAS9, a gene-editing biotechnology that's captured the imagination of the medical community. . . and the attention of its most unethical members. Drawn into the dark underbelly of the organ transplant market, Jack will come face-to-face with a megalomaniacal businessman willing to risk human lives in order to conquer a lucrative new frontier in medicine--and if Jack's not careful, the next life lost might be his own.

An electrifying memoir of one woman's extraordinary effort to save her husband's life--and the discovery of a forgotten cure that has the potential to save millions more. "A memoir that reads like a thriller." -New York Times Book Review "A fascinating and terrifying peek into the devastating outcomes of antibiotic misuse--and what happens when standard health care falls short." -Scientific American Epidemiologist Steffanie Strathdee and her husband, psychologist Tom Patterson, were vacationing in Egypt when Tom came down with a stomach bug. What at first seemed like a case of food poisoning quickly turned critical, and by the time Tom had been transferred via emergency medevac to the world-class medical center at UC San Diego, where both he and Steffanie worked, blood work revealed why modern medicine was failing: Tom was fighting one of the most dangerous, antibiotic-resistant bacteria in the world. Frantic, Steffanie combed through research old and new and came across phage therapy: the idea that the right virus, aka "the perfect predator," can kill even the most lethal bacteria. Phage treatment had fallen out of favor almost 100 years ago, after antibiotic use went mainstream. Now, with time running out, Steffanie appealed to phage researchers all over the world for help. She found allies at the FDA, researchers from Texas A&M, and a clandestine Navy biomedical center -- and together they resurrected a forgotten cure. A nail-biting medical mystery, *The Perfect Predator* is a story of love and survival against all odds, and the (re)discovery of a powerful new weapon in the global superbug crisis.

Drawing on philosophy, law and political science, and on a wealth of practical experience delivering emergency medical services in conflict-ridden settings, Lepora and Goodin untangle the complexities surrounding compromise and complicity.

A leading physician, scientist, and expert in gene editing explains how a series of scientific breakthroughs led to the medical scandal of the decade. - - - - In November 2018, Dr. He Jiankui of Shenzhen, China, announced via YouTube that he had created the world's first gene-edited babies. It soon became clear that this was not a historic scientific achievement, but rather a historic ethical fiasco, a deeply flawed experiment on unborn human beings. What made it possible for a rogue scientist with no medical training to covertly and recklessly alter the genes of babies? What does the future hold now that the first members of the CRISPR generation have been born? - - - - In *The CRISPR Generation*, Dr. Kiran Musunuru takes the reader through an insider's view of the history of the gene-editing field, key discoveries about how gene editing can be used to prevent and treat diseases like

AIDS and heart attacks, a full account of the events surrounding Dr. He's revelation to the world, a dissection of Dr. He's scientific and ethical lapses, and a look ahead to the consequences of gene editing for humankind, both good and bad. Gene-editing technology has the potential to cause untold damage if taken up by the wrong hands and used irresponsibly. But it also promises to be a boon for the health of patients otherwise destined for disease and suffering.

CRISPR People The Science and Ethics of Editing Humans MIT Press

Gene-editing technologies (e.g., ZFNs, TALENs, and CRISPRs/Cas9) have been extensively used as tools in basic research. They are further applied in manufacturing agricultural products, food, industrial products, medicinal products, etc. Particularly, the discovery of medicinal products using gene-editing technologies will open a new era for human therapeutics. Though there are still many technical and ethical challenges ahead of us, more and more products based on gene-editing technologies have been approved for marketing. These technologies are promising for multiple applications. Their development and implications should be explored in the broadest context possible. Future research directions should also be highlighted. In this book, the applications, perspectives, and challenges of gene-editing technologies are significantly demonstrated and discussed.

'[A]n excellent, brisk guide to what is likely to happen as opposed to the fantastically remote.' - Los Angeles Review of Books In 2018 the world woke up to gene editing with a storm of controversy over twin girls born in China with genetic changes deliberately introduced by scientists – changes they will pass on to their own offspring. Genetic modification (GM) has been with us for 45 years now, but the new system known as CRISPR or gene editing can manipulate the genes of almost any organism with a degree of precision, ease and speed that we could only dream of ten years ago. But is it ethical to change the genetic material of organisms in a way that might be passed on to future generations? If a person is suffering from a lethal genetic disease, is it unethical to deny them this option? Who controls the application of this technology, when it makes 'biohacking' – perhaps of one's own genome – a real possibility? Nessa Carey's book is a thrilling and timely snapshot of a cutting-edge technology that will radically alter our futures and the way we prevent disease. 'A focused snapshot of a brave new world.' - Nature 'A brisk, accessible primer on the fast-moving field, a clear-eyed look at a technology that is already driving major scientific advances - and raising complex ethical questions.' - Emily Anthes, Undark

Current Legal Issues, like its sister volume Current Legal Problems, is based upon an annual colloquium held at University College London. Each year, leading scholars from around the world gather to discuss the relationship between law and another discipline of thought. Each colloquium examines how the external discipline is conceived in legal thought and argument, how the law is pictured in that discipline, and analyses points of controversy in the use, and abuse, of extra-legal arguments within legal theory and practice. Law and Bioethics, the latest volume in the Current Legal Issues series, contains a broad range of essays by scholars interested in the interactions between law and bioethics. It includes studies examining the regulation of stem cell research, human rights and bioethics, the regulation of reproductive technologies, and distributive justice in healthcare and pandemic planning.

CRISPR/Cas is a recently described defense system that protects bacteria and archaea against invasion by mobile genetic elements such as viruses and plasmids. A wide spectrum of distinct CRISPR/Cas systems has been identified in at least half of the available prokaryotic genomes. On-going structural and functional analyses have resulted in a far greater insight into the functions and possible applications of these systems, although many secrets remain to be discovered. In this book, experts summarize the state of the art in this exciting field.

This book tells the dramatic story of Crispr and the potential impact of this gene-editing technology.

They called themselves the Arabian Knights. They were six Yemeni-American friends, a gang of high-school soccer stars, a band of brothers on the grim side streets of Lackawanna's First Ward, just a stone's throw from Buffalo. Later, people would argue about why they left western New York in the spring of 2001 to attend an al-Qaeda camp. Some said they traveled to Afghanistan to become America's first sleeper cell—terrorists slumbering while they awaited orders from on high. Others said that their ill-fated trip was a lark, an adventurous extension of their youthful wrestling with what it meant to be Muslim in America. Dina Temple-Raston returns to Lackawanna to tell the story of a group of young men—born and brought up in small town America—who left otherwise unremarkable lives to attend an al-Qaeda camp. Though they sought to quietly slip back into their roles as middle class Americans, the 9/11 attacks made that impossible. The Jihad Next Door is the story of pre-emptive justice in the age of terror. It follows a handful of ordinary men through an extraordinary time when Muslims in America are often instantly suspect, their actions often viewed through the most sinister lens.

The advent of the CRISPR/Cas9 class of genome editing tools is transforming not just science and medicine, but also law. When the genome of germline cells is modified, the modifications could be inherited, with far-reaching effects in time and scale. Legal systems are struggling with keeping up with the CRISPR revolution and both lawyers and scientists are often confused about existing regulations. This book contains an analysis of the national regulatory framework in eighteen selected countries. Written by national legal experts, it includes all major players in bioengineering, plus an analysis of the emerging international standards and a discussion of how international human rights standards should inform national and international regulatory frameworks. The authors propose a set of principles for the regulation of germline engineering, based on international human rights law, that can be the foundation for regulating heritable gene editing both at the level of countries as well as globally.

Recent developments in biotechnology and genetic research are raising complex ethical questions concerning the legitimate scope and limits of genetic intervention. As we begin to contemplate the possibility of intervening in the human genome to prevent diseases, we cannot help but feel that the human species might soon be able to take its biological evolution in its own hands.

'Playing God' is the metaphor commonly used for this self-transformation of the species, which, it seems, might soon be within our grasp. In this important new book, Jürgen Habermas – the most influential philosopher and social thinker in Germany today – takes up the question of genetic engineering and its ethical implications and subjects it to careful philosophical scrutiny. His analysis is guided by the view that genetic manipulation is bound up with the identity and self-understanding of the species. We cannot rule out the possibility that knowledge of one's own hereditary factors may prove to be restrictive for the choice of an individual's way of life and may undermine the symmetrical relations between free and equal human beings. In the concluding chapter – which was delivered as a lecture on receiving the Peace Prize of the German Book Trade for 2001 – Habermas broadens the discussion to examine the tension between science and religion in the modern world, a tension which exploded, with such tragic violence, on September 11th.

"A gifted and thoughtful writer, Metzl brings us to the frontiers of biology and technology, and reveals a world full of promise and peril." —



Siddhartha Mukherjee MD, New York Times bestselling author of *The Emperor of All Maladies* and *The Gene* Passionate, provocative, and highly illuminating, *Hacking Darwin* is the must read book about the future of our species for fans of *Homo Deus* and *The Gene*. After 3.8 billion years humankind is about to start evolving by new rules... From leading geopolitical expert and technology futurist Jamie Metz comes a groundbreaking exploration of the many ways genetic-engineering is shaking the core foundations of our lives — sex, war, love, and death. At the dawn of the genetics revolution, our DNA is becoming as readable, writable, and hackable as our information technology. But as humanity starts retooling our own genetic code, the choices we make today will be the difference between realizing breathtaking advances in human well-being and descending into a dangerous and potentially deadly genetic arms race. Enter the laboratories where scientists are turning science fiction into reality. Look towards a future where our deepest beliefs, morals, religions, and politics are challenged like never before and the very essence of what it means to be human is at play. When we can engineer our future children, massively extend our lifespans, build life from scratch, and recreate the plant and animal world, should we?

This book is aimed at analyzing the foundations of medical ethics by considering different moral theories and their implications for judgments in clinical practice and policy-making. It provides a review of the major types of ethical theory that can be applied to medical and bioethical issues concerning reproductive genetics. In response to the debate on the most adequate ethical doctrine to guide biomedical decisions, this book formulates views that capture the best elements in each, bearing in mind their differences and taking into account the specific character of medicine. No historically influential position in ethics is by itself adequate to be applied to reproductive decisions. Thus, this book attempts to offer a pluralistic approach to biomedical research and medical practice. One usually claims that there are some basic principles (non-maleficence, beneficence, confidentiality, autonomy, and justice) which constitute the foundations of bioethics and medical ethics. Yet these principles conflict with each other and one needs some criteria to solve these conflicts and to specify the scope of application of these principles. Exploring miscellaneous ethical approaches as introduced to biomedicine, particularly to reproductive genetics, the book shall elucidate their different assumptions concerning human nature and the relations between healthcare providers, recipients, and other affected parties (e.g. progeny, relatives, other patients, society). The book attempts to answer the question of whether the tension between these ethical doctrines generates conflict in the field of biomedicine or if these competing approaches could in some way complement each other. In this respect, lecturers and researchers in bioethics would be interested in this reading this book.

An anthropologist visits the frontiers of genetics, medicine, and technology to ask: Whose values are guiding gene editing experiments? And what does this new era of scientific inquiry mean for the future of the human species? "That rare kind of scholarship that is also a page-turner." —Britt Wray, author of *Rise of the Necrofauna* At a conference in Hong Kong in November 2018, Dr. He Jiankui announced that he had created the first genetically modified babies—twin girls named Lulu and Nana—sending shockwaves around the world. A year later, a Chinese court sentenced Dr. He to three years in prison for "illegal medical practice." As scientists elsewhere start to catch up with China's vast genetic research program, gene editing is fueling an innovation economy that threatens to widen racial and economic inequality.

Fundamental questions about science, health, and social justice are at stake: Who gets access to gene editing technologies? As countries loosen regulations around the globe, from the U.S. to Indonesia, can we shape research agendas to promote an ethical and fair society? Eben Kirksey takes us on a groundbreaking journey to meet the key scientists, lobbyists, and entrepreneurs who are bringing cutting-edge genetic engineering tools like CRISPR—created by Nobel Prize-winning biochemists Jennifer Doudna and Emmanuelle Charpentier—to your local clinic. He also ventures beyond the scientific echo chamber, talking to disabled scholars, doctors, hackers, chronically-ill patients, and activists who have alternative visions of a genetically modified future for humanity. *The Mutant Project* empowers us to ask the right questions, uncover the truth, and navigate this brave new world.

What does the birth of babies whose embryos had gone through genome editing mean—for science and for all of us? In November 2018, the world was shocked to learn that two babies had been born in China with DNA edited while they were embryos—as dramatic a development in genetics as the cloning of Dolly the sheep was in 1996. In this book, Hank Greely, a leading authority on law and genetics, tells the fascinating story of this human experiment and its consequences. Greely explains what Chinese scientist He Jiankui did, how he did it, and how the public and other scientists learned about and reacted to this unprecedented genetic intervention.

International uproar followed the recent announcement of the birth of twin girls whose genomes had been edited with a breakthrough DNA editing-technology. This technology, called clustered regularly interspaced short palindrome repeats or CRISPR-Cas9, can alter any DNA, including DNA in embryos, meaning that changes can be passed to the offspring of the person that embryo becomes. Should we use gene editing technologies to change ourselves, our children, and future generations to come? The potential uses of CRISPR-Cas9 and other gene editing technologies are unprecedented in human history. By using these technologies, we eradicate certain dreadful diseases. Altering human DNA, however, raises enormously difficult questions. Some of these questions are about safety: Can these technologies be deployed without posing an unreasonable risk of physical harm to current and future generations? Can all physical risks be adequately assessed, and responsibly managed? But gene editing technologies also raise other moral questions, which touch on deeply held, personal, cultural, and societal values: Might such technologies redefine what it means to be healthy, or normal, or cherished? Might they undermine relationships between parents and children, or exacerbate the gap between the haves and have-nots? The broadest form of this second kind of question is the focus of this book: What might gene editing—and related technologies—mean for human flourishing? In the new essays collected here, an interdisciplinary group of scholars asks age-old questions about the nature and well-being of humans in the context of a revolutionary new biotechnology—one that has the potential to change the genetic make-up of both existing people and future generations. Welcoming readers who study related issues and those not yet familiar with the formal study of bioethics, the authors of these essays open up a conversation about the ethics of gene editing. It is through this conversation that citizens can influence laws and the distribution of funding for science and medicine, that professional leaders can shape understanding and use of gene editing and related technologies by scientists, patients, and practitioners, and that individuals can make decisions about their own lives and the lives of their families.

' Genetically modified organisms (GMOs) including plants and the foods made from them, are a hot topic of debate today, but soon related technology could go much further and literally change what it means to be human. Scientists are on the verge of being able to create people who are GMOs. Should they do it? Could we become a healthier and "better" species or might eugenics go viral leading to a real, new world of genetic dystopia? *GMO Sapiens* tackles such questions by taking a fresh look at the cutting-edge biotech discoveries that have made genetically modified people possible. Bioengineering, genomics, synthetic biology, and stem cells are changing sci-fi into reality before our eyes. This book will capture your imagination with its clear, approachable writing style. It will draw you into the fascinating discussion of the life-changing science of human genetic modification. Contents: An Introduction to Playing God The Birth and Explosive Growth of GMOs Human Cloning Build-a-Baby Better via Genetics DIY Guide to Creating GMO Sapiens Eugenics and Transhumanism Cultural Views on Human Genetic Modification GMO Sapiens Today and Tomorrow Readership: Undergraduate biology majors, graduate biology majors, non-experts interested in GMOs, biologists and teenagers interested in cloning and human genetic modification. Key Features: Books on this hot new topic of creating GMO people are rare, tend to be out-of-date, or have narrow topic ranges The goal of this book is to educate and entertain an educated lay audience about human genetic modification Keywords: GMO; Genetically Modified Organism; GMO Sapien; Cloning; Genomics; Designer Babies; Mitochondrial Transfer; Stem Cells; Infertility "What I find troubling, exciting but scary, is that I find myself agreeing with an undertone, I do not support human germline genetic modification but with all the new information and perspectives available to me I have found myself questioning my own views and will be watching any developments with a fascinated interest I would

rather not admit to." The NODE '

The bestselling author of *Leonardo da Vinci* and *Steve Jobs* returns with a gripping 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 co-discovery 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? Hmm...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 a thrilling detective tale that involves the most profound wonders of nature, from the origins of life to the future of our species.

Heritable human genome editing - making changes to the genetic material of eggs, sperm, or any cells that lead to their development, including the cells of early embryos, and establishing a pregnancy - raises not only scientific and medical considerations but also a host of ethical, moral, and societal issues. Human embryos whose genomes have been edited should not be used to create a pregnancy until it is established that precise genomic changes can be made reliably and without introducing undesired changes - criteria that have not yet been met, says Heritable Human Genome Editing. From an international commission of the U.S. National Academy of Medicine, U.S. National Academy of Sciences, and the U.K.'s Royal Society, the report considers potential benefits, harms, and uncertainties associated with genome editing technologies and defines a translational pathway from rigorous preclinical research to initial clinical uses, should a country decide to permit such uses. The report specifies stringent preclinical and clinical requirements for establishing safety and efficacy, and for undertaking long-term monitoring of outcomes. Extensive national and international dialogue is needed before any country decides whether to permit clinical use of this technology, according to the report, which identifies essential elements of national and international scientific governance and oversight.

Human embryo research touches upon strongly felt moral convictions, and it raises such deep questions about the promise and perils of scientific progress that debate over its development has become a moral and political imperative. From in vitro fertilization to embryonic stem cell research, cloning, and gene editing, Americans have repeatedly struggled with how to define the moral status of the human embryo, whether to limit its experimental uses, and how to contend with sharply divided public moral perspectives on governing science. *Experiments in Democracy* presents a history of American debates over human embryo research from the late 1960s to the present, exploring their crucial role in shaping norms, practices, and institutions of deliberation governing the ethical challenges of modern bioscience. J. Benjamin Hurlbut details how scientists, bioethicists, policymakers, and other public figures have attempted to answer a question of great consequence: how should the public reason about aspects of science and technology that effect fundamental dimensions of human life? Through a study of one of the most significant science policy controversies in the history of the United States, *Experiments in Democracy* paints a portrait of the complex relationship between science and democracy, and of U.S. society's evolving approaches to evaluating and governing science's most challenging breakthroughs.

Genome editing is a powerful new tool for making precise alterations to an organism's genetic material. Recent scientific advances have made genome editing more efficient, precise, and flexible than ever before. These advances have spurred an explosion of interest from around the globe in the possible ways in which genome editing can improve human health. The speed at which these technologies are being developed and applied has led many policymakers and stakeholders to express concern about whether appropriate systems are in place to govern these technologies and how and when the public should be engaged in these decisions. *Human Genome Editing* considers important questions about the human application of genome editing including: balancing potential benefits with unintended risks, governing the use of genome editing, incorporating societal values into clinical applications and policy decisions, and respecting the inevitable differences across nations and cultures that will shape how and whether to use these new technologies. This report proposes criteria for heritable germline editing, provides conclusions on the crucial need for public education and engagement, and presents 7 general principles for the governance of human genome editing.

One of the world's leading experts on genetics unravels one of the most important breakthroughs in modern science and medicine. If our genes are, to a great extent, our destiny, then what would happen if mankind could engineer and alter the very essence of our DNA coding? Millions might be spared the devastating effects of hereditary disease or the challenges of disability, whether it was the pain of sickle-cell anemia to the ravages of Huntington's disease. But this power to "play God" also raises major ethical questions and poses threats for potential misuse. For decades, these questions have lived exclusively in the realm of science fiction, but as Kevin Davies powerfully reveals in his new book, this is all about to change. Engrossing and page-turning, *Editing Humanity* takes readers inside the fascinating world of a new gene editing technology called CRISPR, a high-powered genetic toolkit that enables scientists to not only engineer but to edit the DNA of any organism down to the individual building blocks of the genetic code. Davies introduces readers to arguably the most profound scientific breakthrough of our time. He tracks the scientists on the front lines of its research to the patients whose powerful stories bring the narrative movingly to human scale. Though the birth of the "CRISPR babies" in China made international news, there is much more to the story of CRISPR than headlines seemingly ripped from science fiction. In *Editing Humanity*, Davies sheds light on the implications that this new technology can have on our everyday lives and in the lives of generations to come.



With the advent of CRISPR gene-editing technology, designer babies have become a reality. Françoise Baylis insists that scientists alone cannot decide the terms of this new era in human evolution. Members of the public, with diverse interests and perspectives, must have a role in determining our future as a species.

In *Mary Shelley and the Rights of the Child*, Eileen Hunt Botting contends that *Frankenstein* is a profound work of speculative fiction designed to engage a radical moral and political question: do children have rights?

2019 PEN/E.O. Wilson Literary Science Writing Award Finalist "Science book of the year"—The Guardian One of New York Times 100 Notable Books for 2018 One of Publishers Weekly's Top Ten Books of 2018 One of Kirkus's Best Books of 2018 One of Mental Floss's Best Books of 2018 One of Science Friday's Best Science Books of 2018

"Extraordinary"—New York Times Book Review "Magisterial"—The Atlantic "Engrossing"—Wired "Leading contender as the most outstanding nonfiction work of the year"—Minneapolis Star-Tribune Celebrated New York Times columnist and science writer Carl Zimmer presents a profoundly original perspective on what we pass along from generation to generation. Charles Darwin played a crucial part in turning heredity into a scientific question, and yet he failed spectacularly to answer it. The birth of genetics in the early 1900s seemed to do precisely that. Gradually, people translated their old notions about heredity into a language of genes. As the technology for studying genes became cheaper, millions of people ordered genetic tests to link themselves to missing parents, to distant ancestors, to ethnic identities... But, Zimmer writes, "Each of us carries an amalgam of fragments of DNA, stitched together from some of our many ancestors. Each piece has its own ancestry, traveling a different path back through human history. A particular fragment may sometimes be cause for worry, but most of our DNA influences who we are—our appearance, our height, our penchants—in inconceivably subtle ways." Heredity isn't just about genes that pass from parent to child. Heredity continues within our own bodies, as a single cell gives rise to trillions of cells that make up our bodies. We say we inherit genes from our ancestors—using a word that once referred to kingdoms and estates—but we inherit other things that matter as much or more to our lives, from microbes to technologies we use to make life more comfortable. We need a new definition of what heredity is and, through Carl Zimmer's lucid exposition and storytelling, this resounding tour de force delivers it. Weaving historical and current scientific research, his own experience with his two daughters, and the kind of original reporting expected of one of the world's best science journalists, Zimmer ultimately unpacks urgent bioethical quandaries arising from new biomedical technologies, but also long-standing presumptions about who we really are and what we can pass on to future generations.

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

CRISPR in Animals and Animal Models, Volume 152, the latest release in the Progress in Molecular Biology and Translational Science series, explores the genome editing CRISPR system in cells and animal models, its applications, the uses of the CRISPR system, and the past, present and future of CRISPR genome editing. Topics of interest in this updated volume include a section on CRISPR history, The genome editing revolution, Programming CRISPR and its applications, CRISPR Delivery methods, CRISPR libraries and screening, CRISPR investigation in haploid cells, CRISPR in the generation of transgenic animals, CRISPR therapeutics, and Promising strategies and present challenges.

Accessible to students and researchers alike Written by leading authorities in the field

With a Foreword by Nathaniel Philbrick, author of the bestseller *In the Heart of the Sea* If you need an appendectomy, he can do it with a stone scalpel he carved himself. If you have a condition nobody can diagnose—"creeping eruption" perhaps—he can identify what it is, and treat it. A baby with toe-tourniquet syndrome, a human leg that's washed ashore, a horse with Lyme disease, a narcoleptic falling face-first in the street, a hermit living underground—hardly anything is off-limits for Dr. Timothy J. Lepore. This is the spirited, true story of a colorful, contrarian doctor on the world-famous island of Nantucket. Thirty miles out to sea, in a strikingly offbeat place known for wealthy summer people but also home to independent-minded, idiosyncratic year-rounders, Lepore holds the life of the island, often quite literally, in his hands. He's surgeon, medical examiner, football team doctor, tick expert, unofficial psychologist, accidental homicide detective, occasional veterinarian. When crisis strikes, he's deeply involved. He's treated Jimmy Buffett, Chris Matthews, and various Kennedy relatives, but he makes house calls for anyone and lets people pay him nothing—or anything: oatmeal raisin cookies, a weather-beaten .44 Magnum, a picture of a Nepalese shaman. Lepore can be controversial and contradictory, espousing conservative views while performing abortions and giving patients marijuana cookies. He has unusual hobbies: he's a gun fanatic, roadkill collector, and concocter of pastimes like knitting dog-hair sweaters. Ultimately, *Island Practice* is about a doctor utterly essential to a community at a time when medicine is increasingly money-driven and impersonal. Can he remain a maverick even as a healthcare chain subsumes his hospital? Every community has—or, some would say, needs—a Doctor Lepore, and his island's drive to retain individuality in a cookie-cutter world is echoed across the country.

Simply, and with great humanity, *The Eradication of Smallpox* tells the story of smallpox - it's origins, the horror of the disease, and

the millions of people killed or disfigured by it. During the 18th and 19th centuries, it is estimated that one out of every ten people died from the disease; some say one out of every seven. Smallpox attacked very young children in particular. The story progresses with the practice of variolation, the life of Edward Jenner who first proposed 'vaccination' with cow pox vaccine (little James Phipps was the first person ever vaccinated in this way), the years of debate about the efficacy of this novel method, and the later worldwide initiatives to rid the planet of this horrific disease. In 1979, the story culminates in the only total eradication of an infectious disease that mankind has ever accomplished. This year celebrates the 20th anniversary of this momentous achievement. In the intervening years, debate has raged about what we should do with the remaining smallpox viral stocks. Do we destroy them, so they can't fall into the hands of bioterrorists, or do we maintain them, in case they may be of use in some unexpected way, for therapeutic purposes? These questions are thoroughly discussed in the book. Covers the background, history and origin of smallpox, and brings the story up to the present day Gives full and interesting details of Jenner's life, and tells how this humble country doctor brought about a revolution in vaccination Includes many quotes from historical figures Features 120 high quality photographs, many originating from unique historical plates in the author's private collection Includes new research data Provides new views on the eradication and destruction of smallpox

A top behavioral geneticist makes the case that DNA inherited from our parents at the moment of conception can predict our psychological strengths and weaknesses. In *Blueprint*, behavioral geneticist Robert Plomin describes how the DNA revolution has made DNA personal by giving us the power to predict our psychological strengths and weaknesses from birth. A century of genetic research shows that DNA differences inherited from our parents are the consistent life-long sources of our psychological individuality—the blueprint that makes us who we are. This, says Plomin, is a game changer. Plomin has been working on these issues for almost fifty years, conducting longitudinal studies of twins and adoptees. He reports that genetics explains more of the psychological differences among people than all other factors combined. Genetics accounts for fifty percent of psychological differences—not just mental health and school achievement but all psychological traits, from personality to intellectual abilities. Nature, not nurture is what makes us who we are. Plomin explores the implications of this, drawing some provocative conclusions—among them that parenting styles don't really affect children's outcomes once genetics is taken into effect. Neither tiger mothers nor attachment parenting affects children's ability to get into Harvard. After describing why DNA matters, Plomin explains what DNA does, offering readers a unique insider's view of the exciting synergies that came from combining genetics and psychology.

*Animal Experimentation: Working Towards a Paradigm Change* critically appraises current animal use in science and discusses ways in which we can contribute to a paradigm change towards human-biology based approaches.

Completion of the Human Genome Project will make possible a staggering array of new medical technologies, including new diagnostic and screening tests for inherited disorders, gene therapies, and the ability to manipulate a person's inherited, non-disease traits. Most of the attention given to the social implications of these technologies has focused on their potential to harm the individual, for example, by denying employment or insurance. This book explores instead the potential harm to society if we unfairly distribute the enormous benefits of genetic technologies. The resulting division of society into genetic haves and have-nots would undermine the basic foundation of Western democratic society—the belief in equality of opportunity. This book explains, in terms that can be understood by the general reader, how DNA works, what the Human Genome Project is, what these genetic technologies are and what they promise, and how they could disrupt our democratic society. In an original contribution to the literature, the book then discusses the alternatives for avoiding the creation of a genetic underclass, ranging from halting the Human Genome Project itself to making genetic technologies available without regard to ability to pay. The authors' provocative conclusion is that a lottery in which everyone has a chance to obtain access to these technologies is the only feasible option. This book will be of interest to anyone who wishes to learn more about the Human Genome Project and the genetic revolution that it will create, as well as those who already are familiar with the project and are concerned about the social consequences of its scientific developments.

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