

# Human Genetic Engineering

**A Times Best Book of 2021 From the very first dog to glowing fish and designer pigs – the human history of remaking nature. Virus-free mosquitoes, resurrected dinosaurs, designer humans – such is the power of the science of tomorrow. But this idea that we have only recently begun to manipulate the natural world is false. We’ve been meddling with nature since the last ice age. It’s just that we’re getting better at it – a lot better. Drawing on decades of research, Beth Shapiro reveals the surprisingly long history of human intervention in evolution through hunting, domesticating, polluting, hybridizing, conserving and genetically modifying life on Earth. Looking ahead to the future, she casts aside the scaremongering myths on the dangers of interference, and outlines the true risks and incredible opportunities that new biotechnologies will offer us in the years ahead. Not only do they present us with the chance to improve our own lives, but they increase the likelihood that we will continue to live in a rich and biologically diverse world. As scientists continue to make genetic breakthroughs, society inches ever closer to confronting the stuff horror movies are made of. Cloning a mourned pet is simply strange, but the thought of human cloning is terrifying. Manipulating genes to reduce genetic disease is encouraging only until we consider the ethical implications of potentially creating a master race. Genetically engineering crops and animals can address many problems like disease, climate change, and world hunger, but altering the environment could have catastrophic results for Earth. Articles presenting these issues from persuasive points of view help readers understanding the controversies surrounding genetic engineering today.**

**William James and John Dewey insisted that pragmatic philosophy finds meaning in its struggle to deal with emergent social problems. Ironically, few have attempted to use pragmatism to articulate methods for ameliorating social difficulties. This dissertation attempts to do just that by putting James' and Dewey's philosophy to work on the moral and scientific problems associated with genetic engineering and the Human Genome Project. The intention is to demonstrate the usefulness of a pragmatic approach to applied ethics and philosophy of biology. The work of proponents and critics of genetic engineering is examined, including LeRoy Hood, Hans Jonas, Leon Kass, Robert Nozick, Jeremy Rifkin, Robyn Rowland, and Paul Ramsey. It is concluded that excessive optimism and pessimism about genetic engineering rests primarily on two errors. The first, basic to the Genome Project, is that organisms are essentially determined by their genes, and that the expression of genes is identical across human populations. I draw both on Richard Lewontin and on Dewey's *Logic: The Theory of Inquiry* to argue that the formation of human natures is instead the result of a fluid and interpenetrative relationship between hereditary information and varying environmental conditions. Organisms express DNA in different ways under different circumstances, and DNA itself is modified by exposure to mutagens. The second error prevalent in the literature is the belief that genetic engineering is uniquely problematic, requiring a new kind of ethics. To counter the received view, I detail numerous cases in the history of biology and philosophy in which humans have faced moral choices similar to those present in the new genetics. In addition, I resituate new reproductive decisions in the context of everyday problems faced by parents in society, arguing that the hopes and choices of parents provide a matrix within which genetic decisions can be made. I caution against the expansion of genetic diagnosis, and detail some of the greatest real dangers present in positive genetic engineering. Finally, I suggest pragmatic alternatives to positive genetic engineering, including education and health care reform.**

**New discoveries in biotechnology are often touted as the answer to many contemporary problems. Genetic engineering, animal cloning, and reproductive technologies are promoted as the keys to a brighter future, while genetic engineers promise more productive agriculture, medical miracles, and solutions to environmental problems. But increasing numbers of farmers, scientists, and concerned citizens disagree. There is growing evidence that genetically engineered foods are**

**hazardous to our health and to the environment. Farmers all over the world are encountering an increasingly monopolized seed and agrichemical industry. Animal cloning and human genetic engineering raise troubling ethical questions and genes from plants, animals, and humans have become objects to be bought, sold, and patented by private interests. Worldwide resistance to genetic engineering and other biotechnologies has brought these issues to the forefront of public controversy. Contributors include Beth Burrows (Edmonds Institute), Mitchel Cohen (freelance writer and activist, US), Martha Crouch (formerly of Indiana University), Marcy Darnovsky (Sonoma State University), Michael Dorsey (environmental justice activist), Steve Emmott (Green delegation to the European Parliament), Alix Fano (Campaign for Responsible Transplantation, NY), Jennifer Ferrara (freelance writer, CA), Chaia Heller (Institute for Social Ecology, VT), David King (GenEthics News, UK), Jack Kloppenburg (University of Wisconsin), Orin Langelle (Native Forest Network), Zoë C. Meleo-Erwin (activist and researcher, PA), Barbara Katz Rothman (City University of New York), Sonja Schmitz (doctoral candidate, University of Vermont), Thomas G. Schweiger (Greenpeace International), Sarah Sexton (The Corner House, UK), Robin Seydel (La Montañita Food Co-op, NM), Hope Shand (Rural Advancement Foundation International, Canada), Lucy Sharratt (Sierra Club of Canada), Vandana Shiva (Research Foundation for Science, Technology and Ecology, India), Ricarda Steinbrecher (Econexus, UK), Victoria Tauli-Corpuz (Tebtebba Foundation, Philippines), Jim Thomas (Greenpeace UK), Brian Tokar, Kimberly Wilson (Greenpeace USA).**

**Reading, Writing and Editing Genes**

**Human Genetic Engineering**

**The Ethics of Genetic Engineering**

**Pragmatism and Human Genetic Engineering**

**A Guide for Activists, Skeptics, and the Very Perplexed**

**Approaches to Assessing Unintended Health Effects**

The advances that have been made in the realm of genetics are astounding. Not only has the entire human genome been mapped, but scientists have also discovered methods of modifying genes in people as well as plants and animals. With this progress has come a great debate about the ethics of genetic modification. People wonder if there should be limits to altering nature. Readers explore basic concepts of cellular biology, including DNA and genes. Then they are guided through the differing sides of the genetics debate and encouraged to take their own informed stance on the issues. Discusses the controversial viewpoints regarding genetic engineering. Breakthroughs in genetics present us with a promise and a predicament. The promise is that we will soon be able to treat and prevent a host of debilitating diseases. The predicament is that our newfound genetic knowledge may enable us to manipulate our nature—to enhance our genetic traits and those of our children. Although most people find at least some forms of genetic engineering disquieting, it is not easy to articulate why. What is wrong with re-engineering our nature? The Case against Perfection explores these and other moral quandaries connected with the quest to perfect ourselves and our children. Michael Sandel argues that the pursuit of perfection is flawed for reasons that go beyond safety and fairness. The drive to enhance human nature through genetic technologies is objectionable because it represents a bid for mastery and dominion that fails to appreciate the gifted character of human powers and achievements. Carrying us beyond familiar terms of political discourse, this book contends that the genetic revolution

will change the way philosophers discuss ethics and will force spiritual questions back onto the political agenda. In order to grapple with the ethics of enhancement, we need to confront questions largely lost from view in the modern world. Since these questions verge on theology, modern philosophers and political theorists tend to shrink from them. But our new powers of biotechnology make these questions unavoidable. Addressing them is the task of this book, by one of America's preeminent moral and political thinkers.

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Editing Humanity

Human Genetics

Human Genome Editing

Genetic Engineering

Genetic Modification: Should Humans Control Nature?

The Mutant Project

*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.*

*"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."*

*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.*

*This essential should serve as an introduction for a contemporary public discussion on genetic engineering. Genetic engineering affects us all in many areas and we must dare to think more colorful and further. In fact, the complete genetic material of viruses and bacteria can already be chemically produced and "brought to life". With genetic surgery, medicine is at a crossroads: do we want to treat hereditary diseases or "repair" them genetically? And the analysis of thousands of human genetic material reveals information that is related to complex diseases, but also to characteristics such as intelligence. How should we use this knowledge? The question is hardly whether we want genetic engineering, but rather how we use it. This Springer essential is a translation of the original German 1st edition essentials, *Gentechnik* by Röbbbe Wünschiers, published by The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Fachmedien Wiesbaden GmbH, part of Springer Nature in 2019. The translation was done with the help of artificial intelligence (machine translation by the service DeepL.com). A subsequent human revision was done primarily in terms of content, so that the book will read stylistically differently from a conventional translation. Springer Nature works continuously to further the development of tools for the production of books and on the related technologies to support the authors.*

*Playing God?*

*Hacking Darwin*

*In Defence of Human Enhancement*

*The Barren Promise of Genetic Engineering*

*Beyond Human*

*Christian Values and Catholic Teaching*

**Human genetic engineering may soon be possible. The gathering debate about this prospect already threatens to become mired in irresolvable disagreement. After surveying the scientific and technological developments that have brought us to this pass, *The Ethics of Genetic Engineering* focuses on the ethical and policy debate, noting the deep divide that separates proponents and opponents. The book locates the source of this divide in differing framing assumptions: reductionist pluralist on one side, holist communitarian on the other. The book argues that we must bridge this divide, drawing on the resources from both encampments, if we are to understand and cope with the distinctive problems posed by genetic engineering. These problems, termed "fractious problems," are novel, complex, ethically fraught, unavoidably of public concern, and unavoidably**

**divisive. Berry examines three prominent ethical and political theories - utilitarianism, Kantianism, and virtue ethics - to consider their competency in bridging the divide and addressing these fractious problems. The book concludes that virtue ethics can best guide parental decision making and that a new policymaking approach sketched here, a "navigational approach," can best guide policymaking. These approaches enable us to gain a rich understanding of the problems posed and to craft resolutions adequate to their challenges.**

**What the Catholic Church teaches on the developing science of Human Genetics and why**

**An overview of the main ethical issues regarding the genetic engineering of plants, animals and human beings, in the light of Christian values and Catholic teaching.**

**A continuing series offering a unique approach to vital issues in the arena of Christian ethics. The books in the series are lively introductory explorations of contemporary issues that not only explain the moral positions that have been adopted, but show how theological convictions shape these assessments. Each book invites readers to engage in their own process of moral deliberation informed by their Christian beliefs. Robert Song describes the attitudes, beliefs, and existential commitments, as well as the medical, scientific, and commercial pressures, which have governed developments in modern medical genetics. Ethics needs to be embodied, and that involves an understanding not only of principle, but also of context. In the case of genetics, a major part of that context is what has been called the technological imperative, the drive to mastery of nature which serves significantly to structure our beliefs and actions, whether we are aware of it or not, whether we like it or not, writes Song. The book highlights the following topics: -- Health, Medicine, and the New Genetics -- the Human Genome Project is set in the context of the Christian tradition's understanding of health and medicine.-- Genetic Enhancement and the New Eugenics -- looks at the moral and theological issues behind genetic engineering.-- Justice, Community, and Genetics -- discusses behavioral genetics, the use of genetic information by insurers, and gene patenting.-- Technological Inevitability and Alternative Futures -- What futures can we imagine for genetic technology?**

**Evolution of the Technological Issues**

**Readings on the Implications of Genetic Engineering**

**The Case against Perfection**

**Redesigning Life?**

**Gene Therapy and Human Genetic Engineering**

**Heritable Human Genome Editing**

*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. The debate over human Genetic Engineering (GE) is about to go mainstream. Not as a one-day wonder about cloning or a theological disagreement about embryos, but as a major political issue, driven in part by a grassroots movement of opposition. Human Genetic Engineering is a highly readable and entertaining guide. It explains in accessible language for a popular audience the essential questions that will arise in the future debates: What is human GE? Will it work? What perspectives should we remember? Who is doing what, and why? Few issues have aroused so much public attention and controversy as recent developments in biotechnology. How can we make sound judgements of the cloning of Dolly the sheep, genetically altered foodstuffs, or the prospect of transplanting pigs' hearts into humans? Are we 'playing God' with nature? What is driving these developments, and how can they be made more accountable to the public? Engineering Genesis provides a uniquely informed, balanced and varied insight into these and many other key issues from a working group of distinguished experts - in genetics, agriculture, animal welfare, ethics, theology, sociology and risk - brought together by the Society, Religion and Technology Project of the Church of Scotland. A number of case studies present all the main innovations: animal cloning, pharmaceutical production from animals, cross-species transplants, and, genetically modified foods. From these the authors develop a careful analysis of the ethical and social implications - offering contrasting perspectives and insightful arguments which, above all, will enable readers to form their own judgements on these vital questions.*

*As part of a continuing effort to tackle issues of major social concern, this 280th conference of internationally recognized experts from the fields of molecular biology, medicine, philosophy, theology, and the law looks into the scientific, legal, ethical, social, and economic issues confronting man and his ability to map and sequence the human genome. A wide variety of subjects are covered, including prenatal diagnosis, advances in the genetics of psychiatric disorders, the problems associated with polygenic disease, and the limits to genetic intervention in humans. The symposium also discusses genetic manipulation, commercial exploitation, and legal implications.*

*Human Genetic Information*

*The Ethics of Human Gene Therapy*

*The Worldwide Challenge to Genetic Engineering*

*Liberal Eugenics*

*Ethics of Genetic Engineering in Non-human Species*

*The CRISPR Revolution and the New Era of Genome Editing*

*In this provocative book, philosopher Nicholas Agar defends the idea that parents should be allowed to enhance their children's characteristics. Gets away from fears of a Huxleyan 'Brave New World' or a return to the fascist eugenics of the past Written from a philosophically and scientifically informed point of view Considers real*

contemporary cases of parents choosing what kind of child to have Uses 'moral images' as a way to get readers with no background in philosophy to think about moral dilemmas Provides an authoritative account of the science involved, making the book suitable for readers with no knowledge of genetics Creates a moral framework for assessing all new technologies

Genetics is currently at the forefront of scientific research and discussed almost daily in the media. The possibilities for good and bad applications of this research are enormous and cannot be properly advanced without a Christian response. This cutting-edge book presents the legal, scientific, medical, and theological perspectives of genetic engineering based on a Christian worldview.

First published in 1998, this volume why and how genetic engineering has emerged as the technology most likely to change our lives, for better or worse, in the opening century of the third millennium. Over twenty international experts, including moral philosophers and social scientists, describe the issues and controversies surrounding modern biotechnology and genetic engineering. They explore ways in which lay individuals and groups can join in an effective and constructive dialogue with scientists and industrialists over the assessment, exploitation and safe management of these new and important technologies. Topics covered include a discussion of the issues surrounding 'Dolly', the cloned sheep, the politics and ethics of the international research programme to sequence the entire human genome, the ethical questions raised by the creation of transgenic farm animals, the morality of genetic experimentation on animals, the controversy surrounding the patenting of genetic material and of the transgenic animals themselves, the ethical implications of engineering animals for transplanting their organs into humans, and the environmental hazards of releasing genetically engineered organisms.

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.

Science, Ethics, and Governance  
Engineering Genesis

Altered Inheritance

Modern Progress Or Future Peril?

Modern Prometheus

Human Genetic Engineering and the Rationalization of Public Bioethical Debate

*They start with the current techniques of gene addition, using non-reproductive (somatic) cells in an effort to cure or treat disease. Next they address the technical problems and moral issues facing attempts to prevent disease through genetically modifying early human embryos or sperm and egg cells. These changes would be passed on to future generations. Chapter 4, in many ways the most original part of this volume, confronts the issue of employing genetic means to improve human abilities and appearance.*

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

*Assists policymakers in evaluating the appropriate scientific methods for detecting unintended changes in food and assessing the potential for adverse health effects from genetically modified products. In this book, the committee recommended that greater scrutiny should be given to foods containing new compounds or unusual amounts of naturally occurring substances, regardless of the method used to create them. The book offers a framework to guide federal agencies in selecting the route of safety assessment. It identifies and recommends several pre- and post-market approaches to guide the assessment of unintended compositional changes that could result from genetically modified foods and research avenues to fill the knowledge gaps.*

*Seminar paper from the year 2016 in the subject English Language and Literature Studies - Culture and Applied Geography, grade: 1,7, University of Koblenz-Landau (Anglistik), course: Ecocriticism, language: English, abstract: Dignity is mankind's unique value, which gives humans the power of self-transcendence. This empowers them to be different to the natural nonhuman species (cf. Heyd 71). Science and engineering establish new ways and opportunities to accomplish the desire to improve humanity. By means of medical and genetic engineering man could be more intelligent, talented, beautiful, and crucially live a healthier and longer life without any particular effort. While this vision generates enthusiasm on the one hand, it triggers anxiety and scepticism on the other hand. Is gene alteration of human nature generally permissible and desirable? Will not authenticity and autonomy go astray when engineering makes us what we are? Are the social impacts sustainable or do we increase social and global inequality? A philosophical debate was raised about these and other questions in the recent years. The English term "Enhancement" gained acceptance as the collective term for diverse physiological, psychological, cognitive and emotional improvement of mankind. However, I will focus on the advantages, disadvantages and consequences of genetic alteration on humans from an ecocritical point of view. As ecocriticism is multifaceted I decided to take a closer look on the interaction between humans or more precisely, the exploitation of humans by humans. Therefore, I will apply an eco-Marxist approach to the novel which represents an anthropocentric ideology (cf. Benton, 28). The paper consists of three sections. Initially, I will explain the term ecocriticism. Secondly, I shall examine the advantages and the disadvantages of human genetic engineering with the example of Brave New World. Finally, the consequences of human genetic engineering are explored. Eventually, the question*

*Why should we not play God? is clarified by an evaluation of the found out consequences.*

*Inside the Global Race to Genetically Modify Humans*

*A Christian Response : Crucial Considerations in Shaping Life*

*Fabricating the Future*

*Life as We Made It*

*Genetic Engineering, Human Genetics, and Cell Biology*

*A Reference Handbook*

The study provides a current perspective of the capabilities in genetics and cell biology which have evolved in the last decade and which appear to be of significance for the next decade.

"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 Metzl 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?

In 2001 the Human Genome Project announced that it had successfully mapped the entire genetic content of human DNA. Scientists, politicians, theologians, and pundits speculated about what would follow, conjuring everything from nightmare scenarios of state-controlled eugenics to the hope of engineering disease-resistant newborns. As with debates surrounding stem-cell research, the seemingly endless possibilities of genetic engineering will continue to influence public opinion and policy into the foreseeable future. *Beyond Biotechnology: The Barren Promise of Genetic Engineering* distinguishes between the hype and reality of this technology and explains the nuanced and delicate relationship between science and nature. Authors Craig Holdrege and Steve Talbott evaluate the current state of genetic science and examine its potential applications, particularly in agriculture and medicine, as well as the possible dangers. The authors show how the popular view of genetics does not include an understanding of the ways in which genes actually work together in organisms. Simplistic and reductionist views of genes lead to unrealistic expectations and, ultimately, disappointment in the results that genetic engineering actually delivers. The authors explore new developments in genetics, from the discovery of "non-Darwinian" adaptive mutations in bacteria to evidence that suggests that organisms are far more than mere collections of genetically driven mechanisms.

While examining these issues, the authors also answer vital questions that get to the essence of genetic interaction with human biology: Does DNA "manage" an organism any more than the organism manages its DNA? Should genetically engineered products be labeled as such? Do the methods of the genetic engineer resemble the centuries-old practices of animal husbandry? Written for lay readers, *Beyond Biotechnology* is an accessible introduction to the complicated issues of genetic engineering and its potential applications. In the unexplored space between nature and laboratory, a new science is waiting to emerge. Technology-based social and environmental solutions will remain tenuous and at risk of reversal as long as our culture is alienated from the plants and animals on which all life depends.

Introduces major concepts in the modification of genes in plants, animals, and humans, including coverage of such topics as DNA and the law, genetically modified foods, and the stem-cell debate.

The Social Management of Genetic Engineering  
Science, Law and Ethics

Human Germline Genome Modification and the Right to Science

Genetic Engineering and the Future of Humanity

Gmo Sapiens

Ecocriticism on Human Genetic Engineering in Aldous Huxley ' s "Brave New World"

*Beyond Human is an informative and accessible guide for all those interested in the developing sciences of genetic engineering, bio printing and human cloning. Illustrating the ideas with reference to well-known science fiction films and novels, the author provides a unique insight into and understanding of how genetic manipulation, cloning, and other novel bio-technologies will one day allow us to redesign our species. It also addresses the legitimate concerns about "playing God", while at the same time embracing the positive aspects of the scientific trajectory that will lead to our transhuman future.*

*High accessible writing and a magazine-style format draw readers into this timely series on cutting-edge science. Each title illustrates how scientists solve problems and develop new technology. This book focuses on genetic engineering.*

*From genetically modified foods to human cloning, aspects of genetic engineering (modifying genes of living things in the laboratory) stir up strong feelings and lively debate. This timely anthology presents overviews and pro and con viewpoints on such subjects as genetic engineering in agriculture, engineering of human genes, and regulation of genetic engineering.*

*Presents varied perspectives on the controversial issue of genetic engineering.*

*Hearings Before the Subcommittee on Investigations and Oversight of the Committee on Science and Technology, U.S. House of Representatives, Ninety-seventh Congress, Second Session, November 16, 17, 18, 1982*

*Beyond Biotechnology*

*The Life-Changing Science of Designer Babies*

*CRISPR and the Ethics of Human Genome Editing*

*How 50,000 years of human innovation refined - and redefined - nature*

*Safety of Genetically Engineered Foods*

**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.

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.*

*A Comparative Study of National Laws and Policies  
Engineering Our Future Evolution*