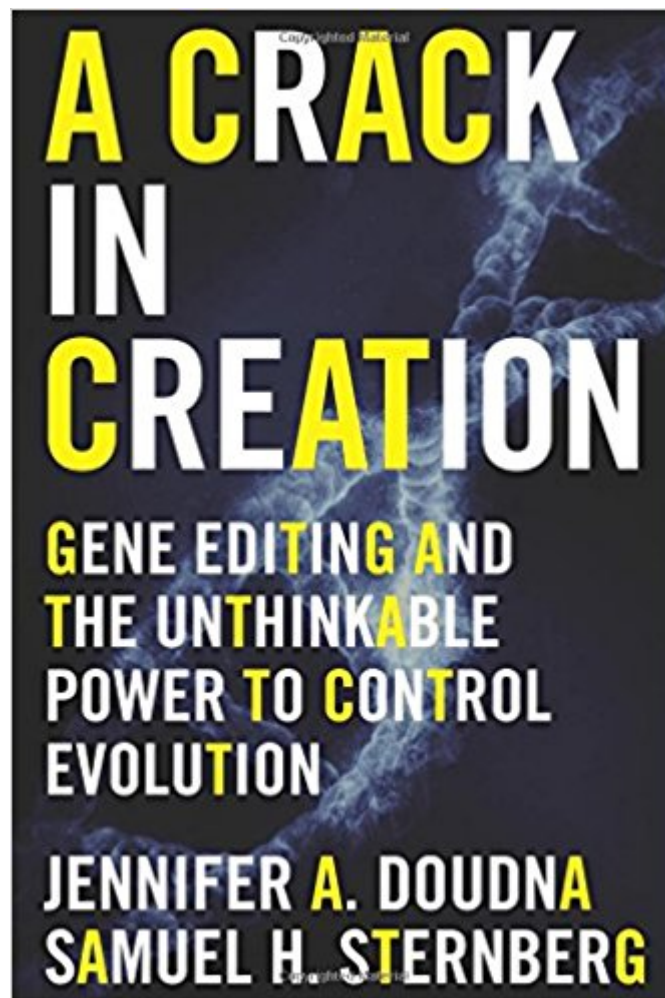




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A Crack In Creation: Gene Editing And The Unthinkable Power To Control Evolution



Synopsis

A trailblazing biologist grapples with her role in the biggest scientific discovery of our era: a cheap, easy way of rewriting genetic code, with nearly limitless promise and peril. Not since the atomic bomb has a technology so alarmed its inventors that they warned the world about its use. Not, that is, until the spring of 2015, when biologist Jennifer Doudna called for a worldwide moratorium on the use of the new 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, and will help address the world's hunger crisis. 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 Samuel Sternberg, Doudna shares the thrilling story of her discovery, and passionately argues that enormous responsibility comes with the ability to rewrite the code of life. With CRISPR, she shows, we have effectively taken control of evolution. What will we do with this unfathomable power?

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Customer Reviews

“The first book on CRISPR to present 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 "Fascinating" | When people refer to CRISPR now, they talk about wiping out disease, resurrecting woolly mammoths, and fashioning designer babies. Such implications fascinate and torment Doudna, and she writes about them movingly with Samuel Sternberg, a biochemist and former research colleague, in *A Crack in Creation*.

•Bloomberg Businessweek "An essential start to educating the public...reveal[s] the complex, interlocking, and thoroughly international nature of today's bioscience...CRISPR heralds a new era of massively increased human control over life, one that will affect every person on Earth, directly or indirectly, and much of the rest of our planet's biosphere. If humans are to have any chance of harnessing its benefits, avoiding its risks, and using it in ways consistent with our values and cultures, then we all • not just the scientists, ethicists, and patent lawyers • need to understand something about CRISPR and its implications. *A Crack in Creation* is a great place to start."

•Los Angeles Review of Books "An invaluable account, by Doudna and Samuel Sternberg, of their role in the revolution that is genome editing...It is unusual to have a popular account of a great scientific breakthrough written by the protagonist, so soon after its discovery. Watson's *The Double Helix* appeared 15 years after the work. We owe Doudna several times over for her discovery, for her zeal to take it from the lab into the clinic, for her involvement in the ethical issues raised, for her public engagement work, and now for this book. It's a fine weapon against the still far too large tribe of those who don't believe in the power of very small things."

•Guardian (UK) "[*A Crack in Creation*] opens with the stark observation that the revolution in gene editing launched by CRISPR offers both the greatest promise and, arguably, the greatest peril for the future of humanity. The first half of the book is a history of CRISPR's development and a lucid explication of how it works. The authors describe the electrifying atmosphere of a laboratory at the front edge of discovery, while generously distributing credit to the legion of scientists who preceded Doudna and Chapentier or have carried their work forward...The book's second half is an examination of CRISPR's great potential to eliminate or cure disease and improve human existence in myriad ways, and of the perils it poses for humanity's future."

•Los Angeles Times "A Crack in Creation is a powerful testament to the role of curiosity and tenacity in scientific research, and also an urgent plea from the celebrated biologist whose discovery enabled us 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, filmmaker "Urgent, riveting, and endlessly fascinating, *A Crack in Creation* is a journey through the past, present, and future of one of

biology's most significant discoveries. Combining deep historical perspectives, personal narrative, and scientific data, Doudna and Sternberg bring the story of CRISPR and gene editing alive with pointed honesty and clarity. This book is destined to become an instant classic. Read it and understand its implications if you want to understand our biological future.

•Siddhartha Mukherjee, Pulitzer Prize-winning author of *The Gene* and *The Emperor of All Maladies* "The technology of gene editing will be the most important advance of our era, one that will create astonishing opportunities combined with frightening moral challenges. In the tradition of *The Double Helix*, one of the pioneers of the field describes the exciting collaborative and competitive hunt for the key breakthrough and what it portends for our future.

•Walter Isaacson, bestselling author of *Steve Jobs*, *Einstein*, and *The Innovators* "A Crack in Creation, by one of the most pioneering women in science, is both exhilarating and frightening. Jennifer Doudna and her co-author Samuel Sternberg challenge us to confront the possible dangers of gene editing, even as we embrace its incredible potential. This book is a roadmap to our future.

•Arianna Huffington, bestselling author of *Thrive* and *The Sleep Revolution* "Jennifer Doudna is the true pioneer who built the bridge between the basic science of CRISPR and its diverse applications in agriculture and medicine. Writing with Samuel Sternberg, she has crafted a beautifully written book with A Crack in Creation •a pure pleasure for both neophyte and expert. Now is the time to read about the revolution that could change our world.

•George Church, Professor of Genetics at Harvard Medical School and author of *Regenesys* "We are developing ever more powerful tools that allow us to change the genetic makeup not only of life around us but also of ourselves. Describing the potential benefits of these tools as well as some of the risks and ethical issues they present to society, A Crack in Creation is a scientific thriller and a gripping read, framed as a personal voyage by a brilliant scientist who played a major role in developing what is currently one of the most promising and powerful ways of editing our genomes.

•Venki Ramakrishnan, president of the Royal Society and winner of the Nobel Prize in Chemistry "[A Crack in Creation] contribute[s] to a public understanding of CRISPR, explaining science in terms that are understandable for the general reader...Fascinating."

•Wall Street Journal "An enthusiastic and definitely not dumbed-down account of gene manipulation that, unlike earlier methods, is precise and easy...an important book about a major scientific advance.

•Kirkus Reviews, STARRED "The authors describe the biological mechanisms in a way that nonspecialists can appreciate...excellent book.

•Publishers Weekly "A Crack in Creation chronicles the origin and potential

application of CRISPR, the powerful new gene-editing technique that established Doudna as a household name in scientific circles...The first section begins with a history of gene-editing technology and how these research endeavors were largely propelled by the quest to eradicate genetic diseases...Reviewing the fundamentals will enable your imagination to unspool. You'll find yourself pausing to plot your own CRISPR-inspired science project or science fiction scenario...In the second half of the book, the authors outline the staggering potential applications of CRISPR technology...The narrative between the lines that propels the book forward." Science

JENNIFER A. DOUDNA, Ph.D. is a professor in the Chemistry and the Molecular and Cell Biology Departments at the University of California, Berkeley, investigator with the Howard Hughes Medical Institute, and researcher in the Molecular Biophysics and Integrated Bioimaging Division at the Lawrence Berkeley National Laboratory. She is internationally recognized as a leading expert on RNA-protein biochemistry, CRISPR biology, and genome engineering. She lives in the Bay Area. SAMUEL H. STERNBERG, Ph.D., will start his own laboratory as an assistant professor in the Department of Biochemistry and Molecular Biophysics at Columbia University, beginning in 2018. He presents his research to international audiences and has received the Scaringe Award and the Harold M. Weintraub Graduate Student Award, among other honors. He presently lives in the San Francisco Bay Area.

The late William Buckley claimed, "A conservative stands athwart history yelling, 'Stop!'" Dr Doudna is no conservative. Still, in *A Crack In Creation* she finds herself standing in the middle of the road of progress shouting, "Wait!" The book recounts her lab's discovery of how a highly adaptable region of bacterial DNA called the clustered regularly interspaced short palindromic repeats (CRISPR) can be programmed to edit DNA itself. Potentially, CRISPR gene editing will cure many human diseases and end much suffering. Amid all the excitement a dream in which she meets Adolph Hitler compelled Dr Doudna to ask the Frankenstein question: Just because we can do something (in this instance, edit the human germline), does that mean we should? In a collection of essays entitled "From Under the Rubble," Nobel laureate Alexander Solzhenitsyn presents the image of technologists running hard to both keep up and stay ahead. They're running hard just to keep pace--heads down and tongues lolling, panting and sweating to stay ahead of the researcher on their heels while trying to overtake the researcher just ahead. But they never take the time to ask IF their research ought to proceed. All credit is due Dr Doudna for exclaiming, Wait! We need to talk

this through; this issue is too big for just science. Yes, she comes down on the side of racing forward. But the way she thinks through this potentially humanity changing science helped me see gene editing not just with layman's knowledge, but with compassion and a bit wider perspective than when I started the book. And yet ... while she pays polite lip service to potential religious concerns about gene editing, her embrace of random evolution leads her to view religious objections as antiquated notions that need only be addressed to be disposed. Scientists (actually, their editors) writing for layman ought to include a glossary. That's missing. And her habit of expressing how brilliant her fellow scientists are gets pretty worn pretty fast. Regardless, *A Crack In Creation* deserves your attention. ~D.A. Nygaard

This book exhibits the touch of an individual who has a comprehensive knowledge of the subject matter. The perspective the author provides on CRISPR-Cas9 via the discovery phase through the application phase is impressive. Trying to stay abreast of such a rapidly evolving technology must be overwhelming, nevertheless, the author does this for the reader through a date not long before publication. The treatment of moral and ethical issues surrounding the application of the technology is very thought provoking. The author provides an excellent view of the potential and the dangers of this relatively new technology.

Doudna and Sternberg's book on CRISPR/Cas 9 explains the basics of this simple-yet-very-powerful technology that can save lives. It provides a basic understanding of the technology and lays out a number of bio-ethical and other challenges the CRISPR/Cas 9 technology presents. However, the purpose and the audience of the book are not clear. The book is not balanced in the sense too little space is devoted to explaining the story behind the discovery and too much space is devoted to the applications and the implementation challenges. The competition / race to finish and the thrill of accomplishment are missing, compared to other stories like 'The Double Helix' or 'Making of the Atomic Bomb'. Some gaps that could be filled in a later version: How do the bacteria get to capture the DNA of a 'new' Virus, before the 'new' Virus kills the bacteria? Is this CRISPR operational in any other species, or has evolution somehow deprecated it? What is the exact role of tracrRNA and why is it critical? What levels of complexities are eliminated by joining the CRISPR RNA and tracrRNA, which, by the way, seems to be the significant contribution of Doudna to this technology? How does this technology reframe the 'Nature Vs Nurture' debate? In the initial chapters, the book gives an impression that the CRISPR/Cas 9 technology is perfect in cutting/replacing the target DNA; however, in Page 178, it lists some potential limitations. Perhaps,

the limitations could be included in Chapter 3 to set the stage for a more even discussion in the later chapters? All in all, a good book!

I am only half way through. Received the book 3 weeks ago (do not live in the U.S) Also reading the book on Telomeres which is really light reading in comparison. Frankly anyone interested in this subject needs some science background. The book may alarm many as to where we are headed in the future as human beings.

Fascinating book. It is a great review of the history of genetics and particularly the newest breakthroughs. First time I understood CRISPR and also fabulous at discussing all of the ethical, social, legal issue in gene editing. Need to be careful about eugenics.

Well written and amazing and scary technology!!! I passed the name of the book on to some of my friends.

page turner about one the most significant genetic discovery of last decade

A mind boggling topic that ushers in a dramatic shift in health care

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