The Gene: An Intimate History

Siddhartha Mukherjee
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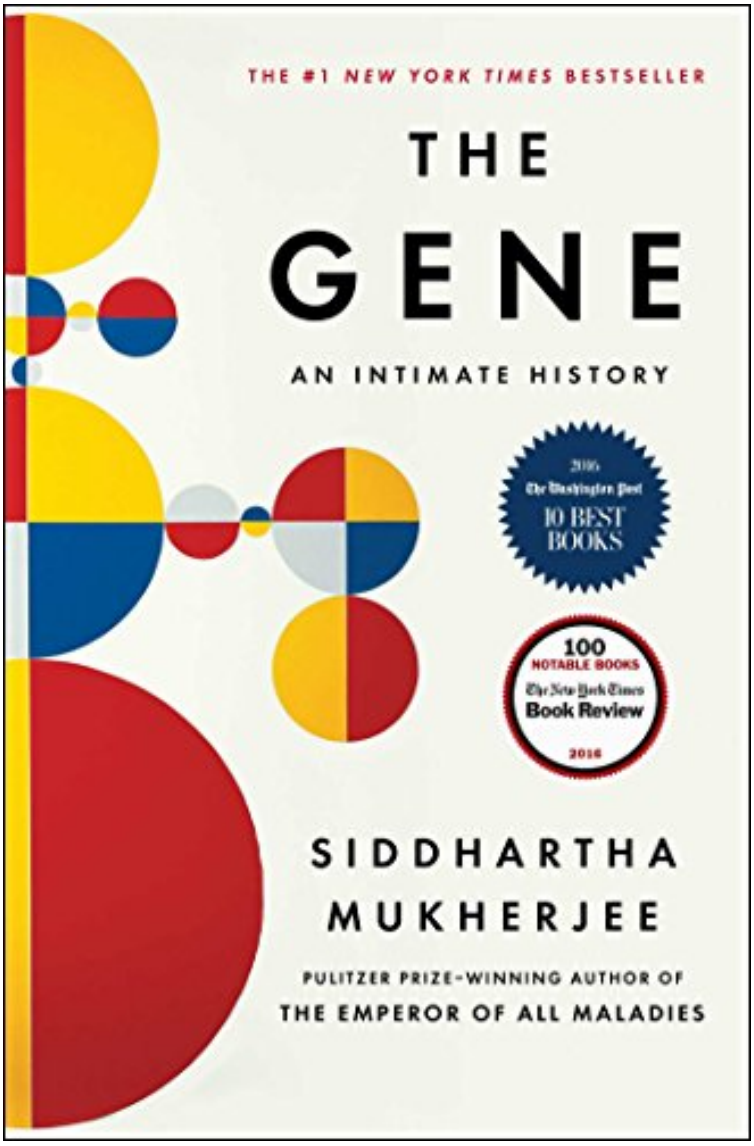

#11241 in Books Siddhartha Mukherjee 2016-05-17 2016-05-17Original language:EnglishPDF # 1 9.25 x 1.70 x 6.12l, .0 #File Name: 1476733503608 pagesThe Gene An Intimate History | File size: 41.Mb

Siddhartha Mukherjee : The Gene: An Intimate History before purchasing it in order to gage whether or not it would be worth my time, and all praised The Gene: An Intimate History:

324 of 346 people found the following review helpful. "We used to think our future was in the stars. Now we know it's in our genes."By Ashutosh S. JogalekarGenetics is humanity and life writ large, and this book on the gene by physician and writer Siddhartha Mukherjee paints on a canvas as large as life itself. It deals with both the history of genetics and its applications in health and disease. It shows us that studying the gene not only holds the potential to

transform the treatment of human disease and to feed the worlds burgeoning population, but promises to provide a window into lifes deepest secrets and into our very identity as human beings.The volume benefits from Mukherjees elegant literary style, novelists eye for character sketches and expansive feel for human history. While there is ample explanation of the science, the focus is really on the brilliant human beings who made it all possible. The authors own troubling family history of mental illness serves as a backdrop and keeps on rearing its head like a looming, unresolved question. The story begins with a trip to an asylum to see his troubled cousin; two of his uncles have also suffered from various "unravelings of the mind". This burden of personal inheritance sets the stage for many of the questions about nature, nurture and destiny asked in the pages that follow.The book can roughly be divided into two parts. The first part is a sweeping and vivid history of genetics. The second half is a meditation on what studying the gene means for human biology and medicine.The account is more or less chronological and this approach naturally serves the historical portion well. Mukherjee does a commendable job shedding light on the signal historical achievements of the men and women who deciphered the secret of life. Kicking off from the Greeks nebulous but intriguing ideas on heredity, the book settles on the genetics pioneer Gregor Mendel. Mendel was an abbot in a little known town in Central Europe whose pioneering experiments on pea plants provided the first window into the gene and evolution. He discovered that discrete traits could be transmitted in statistically predictable ways from one generation to next. Darwin came tantalizingly close to discovering Mendels ideas (the two were contemporaries), but inheritance was one of the few things he got wrong. Instead, a triumvirate of scientists rediscovered Mendels work almost thirty years after his death and spread the word far and wide. Mendels work shows us that genius can emerge from the most unlikely quarters; one wonders how rapidly his work might have been disseminated had the Internet been around.The baton of the gene was next picked up by Francis Galton, Darwins cousin. Galton was the father of eugenics. Eugenics has now acquired a bad reputation, but Galton was a polymath who made important contributions to science by introducing statistics and measurements in the study of genetic differences. Many of the early eugenicists subscribed to the racial theories that were common in those days; many of them were well intended if patronizing, seeking to improve the weak, but they did not see the ominous slippery slope which they were on. Sadly their ideas fed into the unfortunate history of eugenics in America and Europe. Eugenics was enthusiastically supported in the United States; Mukherjee discusses the infamous Supreme Court case in which Oliver Wendell Holmes sanctioned the forced sterilization of an unfortunate woman named Carrie Buck by proclaiming, Three generations of imbeciles are enough. Another misuse of genetics was by Trofim Lysenko who tried to use Lamarcks theories of acquired characteristics in doomed agricultural campaigns in Stalinist Russia; as an absurd example, he tried to re educate wheat using shock therapy. The horrific racial depredations of the Nazis which the narrative documents in some detail of course put the ultimate mark of shame on eugenics.The book then moves on to Thomas Hunt Morgans very important experiments on fruit flies. Morgan and his colleagues found a potent tool to study gene propagation in naturally occurring mutations. Mutations in specific genes (for instance ones causing changes in eye color) allowed them to track the flow of genetic material through several generations. Not only did they make the crucial discovery that genes lie on chromosomes, but they also discovered that genes could be inherited (and also segregated) in groups rather than by themselves. Mukherjee also has an eye for historical detail; for example, right at the time that Morgan was experimenting on flies, Russia was experimenting with a bloody revolution. This coincidence gives Mukherjee an opening to discuss hemophilia in the Russian royal family a genetically inherited disease. A parallel discussion talks about the fusion of Darwin's and Mendels ideas by Ronald Fisher, Theodosius Dobzhansky and others into a modern theory of genetics supported by statistical reasoning in the 40s whats called the Modern Synthesis.Morgan and others work paved the way to recognizing that the gene is not just some abstract, ether-like ghost which transmits itself into the next generation but a material entity. That material entity was called DNA. The scientists most important for recognizing this fact were Frederick Griffiths and Oswald Avery and Mukherjee tells their story well; however I would have appreciated a fuller account of Friedrich Miescher who discovered DNA in pus bandages from soldiers. Griffiths showed that DNA can be responsible for converting non-virulent bacteria to virulent ones; Avery showed that it is a distinct molecule separate from protein (a lot of people believed that proteins with their functional significance were the hereditary material).All these events set the stage for the golden age of molecular biology, the deciphering of the structure of DNA by James Watson (to whom the quote in the title is attributed), Francis Crick, Rosalind Franklin and others. Many of these pioneers were inspired by a little book by physicist Erwin Schrodinger which argued that the gene could be understood using precise principles of physics and chemistry; his arguments turned biology into a reductionist science. Mukherjees account of this seminal discovery is crisp and vivid. He documents Franklins struggles and unfair treatment as well as Watson and Cricks do-what-it-takes attitude to use all possible information to crack the DNA puzzle. As a woman in a mans establishment Franklin was in turn patronized and sidelined, but unlike Watson and Crick she was averse to building models and applying the principles of chemistry to the problem, two traits that were key to the duos success.The structure of DNA of course inaugurated one of the most sparkling periods in the history of intellectual thought since it immediately suggested an exact mechanism for copying the hereditary material as well as a link between DNA and proteins which are the workhorses of life. The major thread following from DNA to protein was the cracking of the genetic code which specifies a correspondence between nucleotides on a

gene and the amino acids of a protein: the guiding philosophers in this effort were Francis Crick and Sydney Brenner. A parallel thread follows the crucial work of the French biologists Francois Jacob and Jacques Monod - both of whom had fought in the French resistance during World War 2 - in establishing the mechanism of gene regulation. All these developments laid the foundation for our modern era of genetic engineering.The book devotes a great deal of space to this foundation and does so with verve and authority. It talks about early efforts to sequence the gene at Harvard and Cambridge and describes the founding of Genentech, the first company to exploit the new technology which pioneered many uses of genes for producing drugs and hormones: much of this important work was done with phages, viruses which infect bacteria. There is also an important foray into using genetics to understand embryology and human development, a topic with ponderous implications for our future. With the new technology also came new moral issues, as exemplified by the 1975 Asilomar conference which tried to hammer out agreements for the responsible use of genetic engineering. I am glad Mukherjee emphasizes these events, since their importance is only going to grow as genetic technology becomes more widespread and accessible.These early efforts exploded on to the stage when the Human Genome Project (HGP) was announced, and thats where the first part of the book roughly ends. Beginning with the HGP, the second part mainly focuses on the medical history and implications of the gene. Mukherjees discussion of the HGP focuses mainly on the rivalries between the scientists and the competing efforts led by Francis Collins of the NIH and Craig Venter, the maverick scientist who broke off and started his own company. This discussion is somewhat brief but it culminates in the announcement of the map of the human genome at the White House in 2000. It is clear now that this map was no more than a listing of components; we still have to understand what the components mean. Part of that lake of ignorance was revealed by the discovery of so-called epigenetic elements that modify not the basic sequence of DNA but the way its expressed. Epigenetics is an as yet ill-understood mix of gene and environment which the book describes in some detail. Its worth noting that Mukherjees discussion of epigenetics has faced some criticism lately, especially based on his article on the topic in the New Yorker.The book then talks about early successes in correlating genes with illness that came with the advent of the human genome and epigenome; genetics has been very useful in finding determinants and drugs for diseases like sickle cell anemia, childhood leukemia, breast cancer and cystic fibrosis. Mukherjee especially has an excellent account of Nancy Wexler, the discoverer of the gene causing Huntingtons disease, whose search for its origins led her to families stricken with the malady in remote parts of Venezuela. While such diseases have clear genetic determinants, as Mukherjee expounds upon at length, genetic causes for diseases like cancer, diabetes and especially the mental illness which plagues members of the authors family are woefully ill-understood, largely because they are multifactorial and suffer from weakly correlated markers. We have a long way to go before the majority of human diseases can be treated using gene-based treatment. In its latter half the book also describes attempts to link genes to homosexuality, race, IQ, temperament and gender identity. The basic verdict is that while there is undoubtedly a genetic component to all these factors, the complex interplay between genes and environment means that its very difficult currently to tease apart influences from the two. More research is clearly needed.The last part of the book focuses on some cutting edge research on genetics thats uncovering both potent tools for precise gene engineering as well as deep insights into human evolution. A notable section of the book is devoted to the recent discovery that Neanderthals and humans most likely interbred. Transgenic organisms, stem cells and gene therapy also get a healthy review, and the author talks about successes and failures in these areas (an account of a gene therapy trial gone wrong is poignant and rattling) as well as ethical and political questions which they raise. Finally, a new technology called CRISPR which has taken the world of science by storm gets an honorary mention: by promising to edit and propagate genes with unprecedented precision - even in the germ line - CRISPR has resurrected all the angels and demons from the history of genetics. What we decide about technologies like CRISPR today will impact what our children do tomorrow. The clock is ticking.In a project as ambitious as this there are bound to be a few gaps. Some of the gaps left me a bit befuddled though. There are a few minor scientific infelicities: for instance Linus Paulings structure of DNA was not really flawed because of a lack of magnesium ions but mainly because it sported a form of the phosphate groups that wouldnt exist at the marginally alkaline pH of the human body. The books treatment of the genetic code leaves out some key exciting moments, such as when a scientific bombshell from biochemist Marshall Nirenberg disrupted a major meeting in the former Soviet Union. I also kept wondering how any discussion of DNAs history could omit the famous Meselson-Stahl experiment; this experiment which very elegantly illuminated the central feature of DNA replication has been called the most beautiful experiment in biology. Similarly I could see no mention of Barbara McClintock whose experiments on jumping genes were critical in understanding how genes can be turned on and off. I was also surprised to find few details on a technique called PCR without which modern genetic research would be virtually impossible: both PCR and its inventor Kary Mullis have a colorful history that would have been worth including. Similarly, details of cutting-edge sequencing techniques which have outpaced Moores Law are also largely omitted. I understand that a 600 page history cannot include every single scientific detail, but some of these omissions seem to me to be too important to be left out.More broadly, there is no discussion of the pros and cons of using DNA to convict criminals: that would have made for a compelling human interest story. Nor is there much exploration of using gene sequences to illuminate the tree of life which Darwin tantalizingly pulled the veil back on: in general I would

have appreciated a bigger discussion of how DNA connects us to all living creatures. There are likewise no accounts of some of the fascinating applications of DNA in archaeological investigations. Finally, and this is not his fault, the author suffers from the natural disadvantage of not being able to interview many of the pioneers of molecular biology since they arent around any more (fortunately, Horace Freeland Judsons superb The Eighth Day of Creation fills this gap: Judson got to interview almost every one of them for his book). This makes his account of science sound a bit more linear than the messy, human process that it is.The volume ends by contemplating some philosophical questions: What are the moral and societal implications of being able to engineer genomes even in the fetal stage? How do we control the evils to which genetic technology can be put? What is natural and what isnt in the age of the artificial gene? How do we balance the relentless, almost inevitable pace of science with the human quest for responsible conduct, dignity and equality? Mukherjee leaves us with a picture of these questions as well as one of his family and their shared burden of mental illness: a mirage searching for realization, a sea of questions looking for a tiny boat filled with answers.Overall I found The Gene: An Intimate History to be beautifully written with a literary flair, and in spite of the omissions, the parts of genetic history and medicine which it does discuss are important and instructive. Its human stories are poignant, its lessons for the future pregnant with pitfalls and possibilities. Its sweeping profile of lifes innermost secrets could not help but remind me of a Japanese proverb quoted by physicist Richard Feynman: To every man is given the key to the gates of heaven. The same key opens the gates of hell. The gene is the ultimate key of this kind, and Mukherjees book explores its fine contours in all their glory and tragedy. We have a choice in deciding which of these contours we want to follow.74 of 76 people found the following review helpful. The author's biggest success is in weaving a beautiful narrative. Starting with the emotionally-charged personal links to ...By NJGene is a must-read history book on genetics. Many accounts have been penned on Relativity and Quantum Mechanics, for instance, to make their importance known to the non-professionals. Gene fills the void for the equally important science of Genetics.The author's biggest success is in weaving a beautiful narrative. Starting with the emotionally-charged personal links to the field to the frequent detailing of personalities of or anecdotes involving famous scientists, the subject is kept 'human'. There are abundant scientific notions to satisfy any reader picking up the book to understand the real subject matter, but not in the general bland fashion of studies-and-conclusions that tend to lose many a lay people.The book also excels because of the simplicity with which countless exotic concepts are explained. From the notions of introns and exons to the polygenic nature of most phenotypes, the feedback from environment to gene mutation and the massive role played by non-gene factors in most our traits, the author uncovers a staggering number of interesting findings in a highly understandable manner.Amid all this, the author keeps the focus on various moral and ethical issues. The narrative is laced with historic episodes of all kinds to emphasise the criticality of the questions confronting us as we make more scientific progress. For example, the book beautifully explains the dangers of genetic modification - which tantamounts to replacing natural selection with human selection. As professionals or parents seek to weed out certain deformities, there are genuine risks of us eliminating some important evolutionary traits mainly out of ignorance of how genes really work at this stage but also out of their possible other utilities in long future.The biggest flaw of the book is insufficient focus on latest developments and near absence of what this science is capable of solving in coming decades. The optimists out there expect congenitally blind people to see and cancers all cured. Some expect us to be able to grow a third arm if we so choose or re-create a dinosaur in a century or so. Genetics is combined with nanotechnology, cryonics, robotics etc by many fantasizers to come up with even more fanciful theories. The author could have added a chapter or two to discuss gene therapy and other recent experiments to complete the excellent work further.That said, a remarkable book in all aspects.1 of 1 people found the following review helpful. Via ihavelynchsyndrome.orgBy Georgia HurstHuman beings are ultimately nothing but carriers passageways for genes. They ride us into the ground like racehorses from generation to generation. Genes dont think about what constitutes good or evil. They dont care whether we are happy or unhappy. Were just means to an end for them. The only thing they think about is what is most efficient for them. Haruki MurakamiSid and I have something profound in common: Scarcely a day passes in my adult life when I do not think about inheritance and my family, writes Sid. He has a family history of schizophrenia; I have a strong family medical history of Lynch syndrome and early deaths we both think about our familial genetics on a daily basis. I fell in love with Sids work back in 2013 when I devoured The Emperor of All Maladies: goo.gl/xGcJLf. The Gene is his latest heroic effort to discuss the history of genetics and the implications that scientific advancements may hold for our genomes.Sid. Is. Nothing. But. Brilliant.sidHe argues: it is impossible to understand organismal and cellular biology or evolution or human pathology, behavior, temperament, illness, race, and identity of fate without first reckoning with the concept of the gene. Having a background in biological anthropology and science I know this, I understand this. Genetic mutations, both good and bad, are necessary for the intricate processes of evolution.Early on in the book, Sid discusses the pillars of genetics including: the Ancient Greeks, Gregor Mendel, William Paley, Charles Darwin, Charles Lyell, Reverend Thomas Malthus and Alfred Russell Wallace. We are introduced to the father of the eugenics movement Francis Galton. Sid discusses history of eugenics and how people, mostly women, who were not deemed normal ranging from dyslexics, orphans, prostitutes, and schizophrenics were sterilized. Nazi Germany, along with Josef Mengeles desire to eliminate genetic detritus is discussed. Honestly, I found this to be one of the most macabre, yet fascinating chapters of the book.

My husband lost three of his grandparents in Auschwitz I could not help but wonder if they endured the horrors Sid discusses.This book is written for the layman but in all honesty, it is dense, deep, and long. Sids depth of knowledge and his uncanny ability to synthesize information from various subjects is overwhelming. As an advocate for those with hereditary cancer syndromes, I was happy to read that Sid shares my sentiments regarding inheritance. We inherit more than just our genes with our families bad habits, bad recipes, neuroses, obsessions, environments, and behaviors. I try to remind people with hereditary cancer syndromes about this all the time consider the recommended risk-reducing surgeries per your mutation, be vigilant with your screenings, but also consider deviating from your familys bad habits and behaviors, too. Cancer is the result of hereditary, evolution, environment, and chance all mixed together, writes Sid. Like Ive always said, cancer is complex and a constellation of factors is involved in its development.A few things more things I found interesting in the bookThe word mutant a word that implies not just statistical uncommonness, but qualitative inferiority, or even moral repugnance. With the genetic testing skyrocketing and more people becoming familiar with their deleterious mutation status, this word must stop being used. Whilst we are at it, lets change the insulting and demeaning language surrounding cancer, too. Survivor, previvor, fighting cancer, losing the battle, medical lexicons it all has to go.My former professor on Human Sexuality from Northwestern University, J. Michael Bailey, a provocative and controversial figure, is mentioned in the book for his progressive work on homosexuality. Yes, unless youve being living in the Mesozoic Era, homosexuality has genetic roots. You may have recalled Professor Bailey in the news five years ago for his after-school sex toy demonstration with a naked woman. Sadly, this after-school demonstration was not offered to my undergraduate class.Thank God for Sid. He does a stellar job of articulating the implications of what it is like knowing you hold a deleterious gene mutation as he hits the nail on the head. The future of a woman carrying a BRCA1 mutation [or any other hereditary cancer syndrome] is fundamentally changed by that knowledge and yet it remains just as fundamentally uncertain. For some women, the genetic diagnosis is all-consuming: it is if their lives and energies are spent anticipating cancer and imagining survivorship from an illness they have not yet developed. A disturbing new word, with a distinctly Orwellian ring, has been coined to describe these women: previvors pre-survivors The prophylactic treatments mastectomy, hormonal therapy all entail physical and psychological anguish and carry risks in their own right. This quote reminded me of Paul Kalanithis quote: How little do doctors understand the hells through which we put patients, from the book When Breath Becomes Air. As a Lynch + female, I greatly appreciate this observation and sentiment this anguish he mentions was the impetus for me to write about my experience with Lynch syndrome. The great lengths, which we, patients, with hereditary cancer syndromes go through to prevent cancer, are often minimized and disregarded. Much gratitude for bringing this to everyones attention, Sid.Genetics are complex and fascinating. Medical advancements and genetic editing technologies are raising complicated ethical and moral questions and this becomes even more complex across cultures.We must realize and accept that humans will produce variants and mutants; its an inextricable part of our biology normalcy is the antithesis of evolution.By the way, even though Sid does not mention this in the book, surely an oversight, men are also at risk for BRCA and other hereditary cancer syndromes. Hereditary cancer syndromes are deemed autosomal dominant meaning that a male or female carrier can pass these deleterious mutations onto both their daughters and sons. Each child of parent carrying a deleterious mutation has a 50/50 of having that mutation, too.This is a must read for those interested in genetics I highly encourage all of those who advocate for those with hereditary cancer to read this book.Georgia M. HurstFounder and Executive Director of the nonprofit: ihavelynchyndrome.org

THE #1 NEW YORK TIMES BESTSELLER A New York Times Notable Book A Washington Post and Seattle Times Best Book of the Year From the Pulitzer Prize-winning, bestselling author of The Emperor of All Maladiesa magnificent history of the gene and a response to the defining question of the future: What becomes of being human when we learn to read and write our own genetic information?Siddhartha Mukherjee has a written a biography of the gene as deft, brilliant, and illuminating as his extraordinarily successful biography of cancer. Weaving science, social history, and personal narrative to tell us the story of one of the most important conceptual breakthroughs of modern times, Mukherjee animates the quest to understand human heredity and its surprising influence on our lives, personalities, identities, fates, and choices. Throughout the narrative, the story of Mukherjees own familywith its tragic and bewildering history of mental illnesscuts like a bright, red line, reminding us of the many questions that hang over our ability to translate the science of genetics from the laboratory to the real world. In superb prose and with an instinct for the dramatic scene, he describes the centuries of research and experimentationfrom Aristotle and Pythagoras to Mendel and Darwin, from Boveri and Morgan to Crick, Watson and Franklin, all the way through the revolutionary twenty-first century innovators who mapped the human genome. As The New Yorker said of The Emperor of All Maladies, Its hard to think of many books for a general audience that have rendered any area of modern science and technology with such intelligence, accessibility, and compassionAn extraordinary achievement. Riveting, revelatory, and magisterial history of a scientific idea coming to life, and an essential preparation for the moral complexity introduced by our ability to create or write the human genome, The Gene is a must-read for everyone concerned about the definition and future of humanity. This is the most crucial science of our time,

intimately explained by a master.

.com An Best Book of May 2016: In 2010, Siddhartha Mukherjee was awarded the Pulitzer Prize for his book The Emperor of All Maladies, a biography of cancer. Here, he follows up with a biography of the geneand The Gene is just as informative, wise, and well-written as that first book. Mukherjee opens with a survey of how the gene first came to be conceptualized and understood, taking us through the thoughts of Aristotle, Darwin, Mendel, Thomas Morgan, and others; he finishes the section with a look at the case of Carrie Buck (to whom the book is dedicated), who eventually was sterilized in 1927 in a famous American eugenics case. Carrie Bucks sterilization comes as a warning that informs the rest of the book. This is what can happen when we start tinkering with this most personal science and misunderstand the ethical implications of those tinkerings. Through the rest of The Gene, Mukherjee clearly and skillfully illustrates how the science has grown so much more advanced and complicated since the 1920swe are developing the capacity to directly manipulate the human genomeand how the ethical questions have also grown much more complicated. We could ask for no wiser, more fascinating and talented writer to guide us into the future of our human heredity than Siddhartha Mukherjee. --Chris Schluep "This is perhaps the greatest detective story ever tolda millennia-long search, led by a thousand explorers, from Aristotle to Mendel to Francis Collins, for the question marks at the center of every living cell. Like The Emperor of All Maladies, The Gene is prodigious, sweeping, and ultimately transcendent. If youre interested in what it means to be human, today and in the tomorrows to come, you must read this book." (Anthony Doerr, author of All the Light We Cannot See)"The Gene is a magnificent synthesis of the science of life, and forces all to confront the essence of that science as well as the ethical and philosophical challenges to our conception of what constitutes being human." (Paul Berg, winner of the Nobel Prize in Chemistry)"Compelling... Highly recommended." (Booklist, starred review)Sobering, humbling, and extraordinarily rich reading from a wise and gifted writer who sees how far we have comebut how much farther far we have to go to understand our human nature and destiny. (Kirkus, starred review)"Mukherjee deftly relates the basic scientific facts about the way genes are believed to function, while making clear the aspects of genetics that remain unknown. He offers insight into both the scientific process and the sociology of science... By relating familial information, Mukherjee grounds the abstract in the personal to add power and poignancy to his excellent narrative." (Publishers Weekly, starred review)A magisterial account of how human minds have laboriously, ingeniously picked apart what makes us tick. . . . [The Gene] will confirm [Mukherjee] as our eras preeminent popular historian of medicine. The Gene boats an even more ambitious sweep of human endeavor than its predecessor. . . . Mukherjee punctuates his encyclopedic investigations of collective and individual heritability, and our closing in on the genetic technologies that will transform how we will shape our own genome, with evocative personal anecdotes, deft literary allusions, wonderfully apt metaphors, and an irrepressible intellectual brio. (Ben Dickinson, Elle)Magnificent. The story [of the gene] has been told, piecemeal, in different ways, but never before with the scope and grandeur that Siddhartha Mukherjee brings to his new history he views his subject panoptically, from a great and clarifying height, yet also intimately. (James Gleick, New York Times Book)Many of the same qualities that made The Emperor of All Maladies so pleasurable are in full bloom in The Gene. The book is compassionate, tautly synthesized, packed with unfamiliar details about familiar people. (Jennifer Senior, The New York Times)Mukherjees visceral and thought-provoking descriptions... clearly show what he is capable of, both as a writer and as a thinker. (Matthew Cobb, Nature)His topic is compelling. . . . And it couldnt have come at a better time. (Courtney Humphries, Boston Globe)"[Mukherjee] nourishes his dry topics into engaging reading, expresses abstract intellectual ideas through emotional stories . . . .[and] swaddles his medical rigor with rhapsodic tenderness, surprising vulnerability, and occasional flashes of pure poetry. . . . . With a marriage of architectural precision and luscious narrative, an eye for both the paradoxical detail and the unsettling irony, and a genius for locating the emotional truths buried in chemical abstractions, Mukherjee leaves you feeling as though you've just aced a college course for which you'd been afraid to register -- and enjoyed every minute of it." (Andrew Solomon, Washington Post)The Gene is equally authoritative [to Emperor], building on extensive research and erudition, and examining the Gordian knots of genes through the prism of his own familys struggle with a disease. He renders complex science with a novelists skill for conjuring real lives, seismic events. (Hamilton Cain, Minneapolis Star Tribune)A fascinating and often sobering history of how humans came to understand the roles of genes in making us who we areand what our manipulation of those genes might mean for our future. . . . The Gene captures the scientific methodquestioning, researching, hypothesizing, experimenting, analyzingin all its messy, fumbling glory, corkscrewing its way to deeper understanding and new questions. (Jim Higgins, Milwaukee Journal-Sentinel)This is an intimate history. . . . This is a meticulous history. . . . This is a provocative history. . . . Most of all, this is a readable history. . . . The Gene is a story that, once read, makes us far better educated to think about the profound questions that will confront us in the coming decades. (Ron Krall, Steamboat Today)Reading The Gene is like taking a course from a brilliant and passionate professor who is just sure he can make you understand what hes talking about. . . . The Gene is excellent preparation for all the quandaries to come. (Mary Ann Gwinn, Seattle Times)Inspiring and tremendously evocative reading. . . . Like its predecessor, [The Gene] is both expansive and accessible . . . . In The Gene, Mukherjee spends most of his time looking into the past,

and what he finds is consistently intriguing. But his sober warning about the future might be the books most important contribution. (Kevin Canfield, San Francisco Chronicle)Destined to soar into the firmament of the years must reads, to win accolades and well-deserved prizes, and to set a new standard for lyrical science writing. . . . Dr. Siddhartha Mukherjee dazzled readers with his Pulitzer-winning The Emperor of All Maladies in 2010. That achievement was evidently just a warm-up for his virtuoso performance in The Gene: An Intimate History, in which he braids science, history, and memoir into an epic with all the range and biblical thunder of Paradise Lost. . . . Thanks to Dr. Mukherjees remarkably clear and compelling prose, the reader has a fighting chance of arriving at the story of todays genetic manipulations with an actual understanding of both the immensely complicated science and the even more complicated moral questions. (Abigail Zuger, New York Times Science Section)[The Emperor of All Maladies and The Gene] both beautifully navigate a sea of complicated medical information in a way that is digestible, poignant, and engaging . . . . [The Gene] is a book we all should read. I shook my head countless times while devouring it, wondering how the authora brilliant physician, scientist, writer, and Rhodes Scholarcould possibly possess so many unique talents. When I closed the book for the final time, I had the answer: Must be in the genes. (Matt McCarthy, USA Today)A brilliant exploration of some of our ages most important social issues, from poverty to mental illness to the death penalty, and a beautiful, profound meditation on the truly human forces that drive them. It is disturbing, insightful, and mesmerizing in equal measure. (Coastal Current)Dr Mukherjee uses personal experience to particularly good effect. . . . Perhaps the most powerful lesson of Dr Mukherjees book [is]: genetics is starting to reveal how much the human race has to gain from tinkering with its genome, but still has precious little to say about how much we might lose. (The Economist)As compelling and revealing as [The Emperor of All Maladies]. . . . On one level, The Gene is a comprehensive compendium of well-told stories with a human touch. But at a deeper level, the book is far more than a simple science history. (Fred Bortz, Dalls Morning News)Mukherjee is an assured, polished wordsmith . . . who displays a penchant for the odd adroit aphorism and well-placed pun. . . . A well-written, accessible, and entertaining account of one of the most important of all scientific revolutions, one that is destined to have a fundamental impact on the lives of generations to come. The Gene is an important guide to that future. (Robin McKie, The Guardian)About the AuthorSiddhartha Mukherjee is the author ofThe Emperor of AllMaladies:A Biography of Cancer, winner of the 2011 Pulitzer Prize in general nonfiction, and The Laws of Medicine. He is the editor of Best Science Writing 2013. Mukherjee isan assistant professor of medicine at Columbia University and a cancer physician and researcher.A Rhodes scholar, he graduated from Stanford University, University of Oxford, and Harvard Medical School.He has published articles in Nature, The New England Journal of Medicine,The New York Times, and Cell.He lives in New York with his wifeand daughters. Visit his website at: SiddharthaMukherjee.com