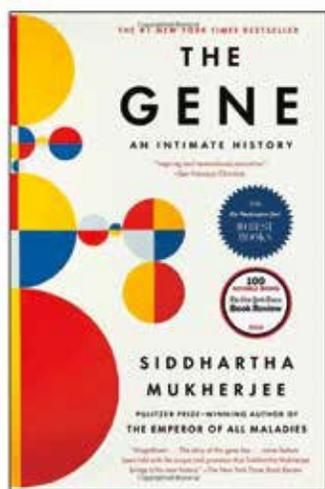


# Reviews and reflections

David A. Bennahum, MD, and Jack Coulehan, MD, Book Review Editors



## The Gene: An Intimate History

Siddhartha Mukherjee  
Scribner, May 17, 2016, 608 pages

Reviewed by David A. Bennahum, MD (AOA, University of New Mexico, 1984, Faculty)

This is a remarkable book written with elegance and in a personal, autobiographical style. The author opens with a prologue that tells the history of psychosis in at least three members of his father's generation. He relates their stories and the tragic, violent history of the 1947 Partition of India, a political, but also an hallucinatory division of the nation into Hindu and Muslim states. After an introspection on the nature of hereditary mental illness in his own family, he turns to a 2009 Swedish study:

In 2009, Swedish researchers published an enormous international study, involving thousands of families and tens of thousands of men and women. By analyzing families that possessed intergenerational histories of mental illness, the study found striking evidence that bipolar disease and schizophrenia shared a genetic link....In 2012, several further studies corroborated these initial findings....I read two of these studies on a winter morning on the subway in New York, a few months after returning from Calcutta.... The study provided a strange interior solace—answering some of the questions that had so haunted my father and grandmother. But it also provoked a volley of new questions: If (my cousin) Moni's illness was genetic, then why had his father and sister been spared? What "triggers" had unveiled these predispositions? How much of Jagu's or

Moni's illness arose from "nature" (i.e., genes that predispose to mental illness) versus "nurture" (environmental triggers such as upheaval, discord and trauma)? Might my father carry the susceptibility? Was I a carrier as well? What if I could know the precise nature of this genetic flaw? Would I test myself, or my two daughters? Would I inform them of the results? What if only one of them turned out to carry that mark?<sup>p8</sup>

On a trip with his father to Calcutta they visit the family home returning to their tragedy of inherited mental illness:

We climbed to the balcony on the roof....Dusk was falling so quickly that it seemed you could almost sense the curvature of the earth arching away from the sun. My Father (who had lost three brothers to mental illness) looked out toward the lights of the station. A train whistled in the distance like a desolate bird. He knew I was writing about heredity. "Genes," he said, frowning. "Is there a Bengali word?" I asked. He searched his inner lexicon...."Abhed," he offered. I had never heard him use the term. It means "indivisible" or "impenetrable," but it is also used to loosely connote "identity"....A flaw in identity; a genetic illness; a blemish that cannot be separated from the self—the same phrase served all meanings. He had made peace with its indivisibility.<sup>p91</sup>

The author turns to the search for the mechanisms of heredity that were gradually teased out between 1890 and 1970. He reminds us that Aristotle had understood that the transmission of heredity was the transmission of information. He then takes the reader on the search for the genetic code that controls the cell. "In the 1890s, a German Embryologist working with sea urchins in Naples, Theodore Boveri, had proposed that genes resided in chromosomes...in the nucleus of cells."<sup>p92</sup>

In 1905, biologist Nettie Stevens demonstrated that maleness in worms depended on the Y chromosome. In the same decade Thomas Morgan began his life long study of fruit flies at Columbia University, and at the laboratories at Woods Hole. Morgan asked, "How were genes organized on chromosomes? Were they strung along chromosomal filaments—like pearls on a string? Did every gene have a unique chromosomal 'address?' Did genes overlap? Was one gene physically or chemically linked to another?"<sup>p93</sup>

The author reminds the reader of the Hemophilia B gene that Queen Victoria appears to have acquired by chance mutation, and then transmitted to her daughter Alice, who transmitted it in turn to her daughter

Alexandra the future czarina of Russia, whose son Alexei had Hemophilia B with catastrophic consequences for himself and the Romanov Court, the Russian Revolution and the Russian people. He also tells the story of Rosalind Franklin, Maurice Wilkins, James Watson, Francis Crick, and the race to describe and explain the structure of DNA:

Like Pythagoras's triangle, like the cave paintings at Lascaux, like the Pyramids at Giza, like the image of a fragile blue planet seen from outer space, the double helix of DNA is an iconic image, etched permanently into human history and memory.<sup>p136</sup>

The author continues with a detailed discussion of the human genome, the latest experiments on gene replacement, and the hope for treatment of genetic disease:

Our genome has negotiated a fragile balance between counterpoised forces, pairing strand with opposing strand, mixing past and future, pitting memory against desire. It is the most human of all things that we possess. Its stewardship may be the ultimate test of knowledge and discernment for our species.<sup>p495</sup>

This is a worthwhile book that is rich in insights, graced by wonderful language, informed by a deep erudition in science, philosophy, literature, and history. It is worth every reader's time and effort, and sets a standard in writing about the history of science.

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