

Siddhartha Mukherjee, **Gen: O dědičnosti v našich osudech (The Gene: An Intimate History)**. Masaryk University, Brno. 2019. Pp. 525. ISBN: 978-80-210-9140-5; 978-80-210-9199-3

This year Masaryk University is celebrating its 100<sup>th</sup> anniversary, and so the University Press, Munipress has decided to mark the occasion by publishing the Czech translation of a book about the history of the gene, or more precisely the history of genetics, which is today, in its molecular form, surely the most dynamic field in life sciences. And because it is an extraordinary work, we can boldly say that the publishing house has given the university a very special gift. After all, Siddhartha Mukherjee, the renowned writer of popular scientific literature, was awarded the Pulitzer Prize for his previous book *The Emperor of all Maladies: A Biography of Cancer*. This successful book, which the New York Times Magazine ranked among the 100 best non-fiction books of all time, was published in 2015 by Munipress, translated by Jan Šmarda. It is therefore logical that this would now follow, a widely-anticipated work, which the reader might find as similarly surprising and revelatory as, in its own time, the now legendary book by Jacob Bronowski, *The Ascent of Man*.

One of the primary things to note about this book, is how the author's narrative style has a readability and manages to convey one of the most complicated stories that humanity has come across. The story of understanding the fundamentals of inheritance. Humanity has long sought to find out what our roots are and how that which we project of ourselves is a product of what we inherited from our ancestors. Are we more of ourselves, or do we carry their identities, their qualities, their wealth and their glory, their power and their sins, curses and illnesses? Humanity has always been fascinating with ideas like inherited sin or inherited disease, which has forced us to repeatedly take a position, to form an opinion or a theory that would allow us to cope with this inherited fate. That's why themes of genetic and inherited madness are such common themes in the gothic novels of the 19<sup>th</sup> century. This plot is very

personal, almost intimate, and is part of the introduction to this book, which weaves itself through practically the whole content of the book. The reader often feels that he has opened the pages of an adventurous detective novel rather than a historical science treatise. What is even more impressive is that the author himself admits that the burden of inheritance is not an abstract term for him. The life and death of his mentally disabled close relatives influenced his thinking as a scientist, researcher, historian, doctor, son and father more than he could ever imagine. If mental illness has a genetic basis, why have he and others in his family been spared? What is the trigger factor for disability? Is he the carrier of genetic predisposition himself? If it were possible to find out in a molecular biological laboratory, would you have to test yourself or your two daughters? What if it turned out to be only one of them? These are, in truth, almost fictional dilemmas that give our lives destiny, and which the author uses masterfully to draw readers into an otherwise complicated plot, into the story of gene recognition and genetic code.

The whole book is organized both chronologically and thematically: it begins with a forgotten and rediscovered discovery at Mendel's Garden, continues with Darwin's theory of evolution and its influence on the effort to manipulate eugenically human hereditary potential. These thoughts then reached a monstrous peak in Nazi Germany. The postwar period of discoveries is crowned by the discovery of DNA structure. The second half of the 20<sup>th</sup> century, we have the technological advance of "reading and writing" genes, i.e. their sequencing and cloning. This opened up new possibilities for mapping genetic information, which in turn enabled the identification of disease-related genes such as cystic fibrosis or Huntington's disease. In many cases, the genes associated with the manifestation of the disease have been found, leading to further progress, to prenatal fetal examination, which helped to determine if a baby would be born with any serious damage. This effort culminates in the late 20<sup>th</sup> and early 21<sup>st</sup> centuries. in the Human Genome Project (mapping and sequencing of the whole human organism).

People are genetically very variable and the value of the genes, which is related to the characteristics of their carriers, is not as much as we might think. Genetics today also interferes with the debate about race and racial discrimination, changing the understanding of sexuality, identity and choice, opening up problems with ethical aspects of gene manipulation, modifying organisms, gene patents, gene biosynthesis and therapy.

However, this is not the only inner structure of the book that has the ambition to fully describe the birth and evolution of genetics, the science that emerged from the epochal discoveries of J. G. Mendel, to the present post-genomic period. This is not an easy task, so it is clear that something will have to be sacrificed in the interests of clarity. So the author used the modern concept of information for the whole story. Therefore, in order to avoid the historically conditioned complications of the gradual and often unclear development of understanding the issue of inheritance, he commits a conscious reduction and accepts a somewhat ahistorical approach to its description. Therefore, he talks about the history of genetics as a history of hereditary information and of code-breaking. From today's perspective, this may seem perfectly fine. Since the discovery of the three-dimensional structure of DNA by J. Watson, F. Crick, M. Wilkins, and R. Franklin, we have a well-known background to this fundamental molecule of life. Therefore, here we can read that for example: *Bateson's "revelation" was not private at all. ... Biologists had to face the impacts of this new theory. Aristotle established heredity as a stream of information... Mendel centuries later found the basic structure of this information, the alphabet of this cipher*. In other places, we can read that Aristotle understood that *inheritance transfer is the transfer of information*. However, we must realize that the modern scientific concept of information, as we understand it today, was only first described in 1948 by the "father of information theory", C. E. Shannon in *The Mathematical Theory of Communication*. We can assume more or less that the individual actors of this history would subscribe to a modern concept of information, but it will always be

speculation. Especially with Aristotle, his approach is quite different, because he understood heredity as a reproduction of copies based on the principle of synonymy, and could not explain the variability that is essential in a modern concept of information as a kind of communication. In the book, passages have only been selected that align with the chosen concept. However, this is not the case for Mendel, who in his discovery actually implied the modern concept of information in today's meaning and even defined it in terms of *Anordnung der Elemente* and *materielle Beschaffenheit*. Unfortunately, this is not mentioned in this book.

The well-known literary work of R. M. Henig, *The Monk in the Garden*, also serves as a frequent source of much information about Mendel. This work is more of a historical fiction, the author's text gives the impression of Mendel's personality as a man who was primarily a gardener educated in physics, which is a somewhat simplified romantic idea, but perhaps there is a certain truth to it. We also learn that if Darwin actually read Mendel's study, he would have quickly

understood its implications for understanding evolution. Today, however, most historians of science would disagree with this, as shown by a number of studies that rightly point to a completely different paradigmatic, conceptual approach to understanding the issue.

On the other hand, the author's chapters on eugenics, and especially its Nazi perverted form, have been brilliantly described, conveying the completely inhuman dimensions. This shameful history for the whole of humanity serves as a reminder at the onset of the rapid development of molecular genetic technologies that make it ever more effective to interfere with the genome of living organisms. As Stanislaw Lem once wrote in 1974 with a bit of bitter irony: *Culture, this set of prostheses, must be rejected in order to entrust the science that remakes us, endow with perfection, and it will be perfection, but absolutely factual... From the masses of information explosions in the next century there will emerge a "Homo optimisans se ipse, Autocreator... Away with evolution, long live Autocreation!* These frightening predictions and fears are

growing in urgency in the Post-Genomic era, and as the author himself concludes, our own genome has created a delicate balance between opposites by pairing one strand with another, past with the future. So it is the most human thing of all we have. Only our knowledge and judgment will examine how we can take care of ourselves.

Finally, the translation of Jan Šmarda in cooperation with Kateřina Danielová should be highlighted. He has mastered the problem of the rapid development in contemporary molecular biology and genomics, which is reflected in a number of new English terms that still don't have an agreed upon Czech form. Only the translator's sensitivity made it possible to translate the original artwork in this non-violent and very understandable, yet professionally sound, way. For all that has been mentioned, we must consider the publishing of this book to be an extraordinary achievement.

*Jiří Sekerák*