Cobb Matthew (2022) The Genetic Age: Our Perilous Quest to Edit Life. Profile Books: London. 442 pages. ISBN 978-1-78816-700-0

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On November 11, 1958, Edward Tatum, the laureate of the Nobel Prize in Physiology or Medicine for that year, passionately forecasted during his Nobel Lecture that, "perhaps within the lifetime of some of us here," we could achieve the control and modulation of genetic structures, not only to cure diseases but also to "produce better organisms" (Tatum, 1958). At this juncture, Crick had just put forth his hypothesis of the pathway of genetic information transmission, and the genetic codons remained incompletely deciphered. Fourteen years later, a team led by Paul Berg of Stanford University successfully created the first recombinant DNA molecule, marking the beginning of rapid development in genetic engineering technology. However, the trajectory of this biotechnology did not continue to advance triumphantly under the banner of unswerving optimism; in fact, as Berg achieved experimental breakthroughs, ethical considerations were simultaneously present. Moral issues, whether arising from within the scientific community or from the public, have consistently accompanied the advancement of genetic technology.

Matthew Cobb's book, *The Genetic Age: Our Perilous Quest to Edit Life*, centers on the developmental history of these ethical problems of genetic engineering. It meticulously depicts how concerns about "life-editing" originated, evolved, and became topical issues. The book explores a broad range of topics in many social problems of new genetic technologies, encompassing genetically modified crops (Chapter 8), gene therapy (Chapter 10), human gene editing (Chapter 12), genetic bioweapons (Chapter 15), etc. Moreover, within Cobb's systematic and meticulous examination of the history of genetic engineering technology, he adeptly integrates a broader social and cultural perspective. Cobb precisely captures transformations in public attitudes towards genetic engineering in the context of societal dynamics, employing abundant references from novels, films, music, as well as historical and firsthand materials from media, letters, and interviews with biologists, sociologists, historians, and entrepreneurs. This rich array of sources serves to illustrate the intricate interplay between technology and society.

An especially riveting portion that engages readers can be found in the fourth chapter, where the author delivers detailed examination and penetrating interpretation of the 1975 Asilomar Conference (officially titled the "International Congress on Recombinant DNA Molecules"). Numerous scientists who orchestrated this convention had been actively engaged in campus protests during the 1960s. Against this cultural backdrop, they expeditiously arrived at a

shared agreement regarding the principles and instructive suggestions governing recombinant DNA experiments, albeit without addressing ethical and moral issues, as well as concerning the potential military and commercial utilization of DNA recombination. Their attention was exclusively directed towards the prevention of mishaps linked to biosafety. In fact, this omission sowed the seeds of complicated ethical issues for subsequent genetic engineering endeavors. According to Cobb's interviews, Paul Berg, as one of the organizers, believed that the outcomes of this conference "wouldn't satisfy everybody, but it certainly seemed like a consensus statement" (p. 82).

In this book, Cobb frequently employs the comparison to nuclear weapons throughout the text as a metaphor of public's disquiet stemming from the advancement of genetic engineering. On one hand, people feel enthusiastic about the potential of a new technology to enhance human welfare and generate economic benefits, driving them to eagerly embrace it. On the other hand, the potential or already apparent hazards of the technology spark alarm, resulting in a quandary when it comes to navigating the array of genetic technologies. Cobb leads us to witness the Greenpeace activists trying to kidnap the cloned sheep Dolly (p. 169), and hear the voices of Chinese nationalists labeling GM crops as a Western conspiracy (p. 182). Nevertheless, there still exists a shared aspiration for genetic freedom: the desire not to be controlled by inherited disease genes and not to be helpless in the face of food crises. Throughout human history, the species has consistently molded its genetic surroundings, prompting certain individuals to challenge the ethical constraints on genetic engineering based on the argument of "tampering with nature." For instance, in Cobb's observations, He Jiankui, the architect behind the CRISPR babies, never openly acknowledged the ethical problems of his research (p. 262). Furthermore, as quoted by Cobb, a mother of a child with an inherited disease issues a plea to scientists: "If you have the skills and the knowledge to eliminate these diseases, then frickin' do it!" (p. 251)

The emergence of this dilemma is not solely due to differences in moral intuitions among different individuals. Traditionally, ethics and laws are viewed as acting as brakes (as noted by Cobb, scientists have hit the brakes four times in 1971, 1974, 2012, and 2019, respectively, see Introduction). Cobb transcends this understanding by adopting the lens of the risk society. In the concluding chapter, he astutely highlights that genetic engineering might not always serve as the default solution. As an interventionist technology, genetic engineering not only creates novel forms of life but also shapes new social relations. This technology generates corresponding social consequences within specific social contexts, encompassing both hopes and benefits, as well as risks and crises.

Cobb's analysis inspires science and technology study to pay attention to the gap between cutting-edge innovation and public understanding when reflecting on emerging biotechnologies. This gap cannot be bridged solely through legal regulation; instead, it requires effective communication and dialogue among all stakeholders. Meanwhile, this requires STS scholars to contemplate how, when technology enters the realm of autopoietic life systems, humans should promote epistemic revolution in understanding of the essence of life. The public, as both "warriors and worriers," should reflect on their own living world and scrutinize every step and its uncertainties within the risk society brought about by genetic engineering. Only through these actions can we actively shape a more sustainable Anthropocene future.

References

Tatum E (1958) Nobel Lecture. Available at: https://www.nobelprize.org/ (accessed 9.9.2023).