A Revolutionary Change Calls for New Paradigms

BOOK REVIEW

by Byron M. Cole

Rifkin, J. (1998). *The biotech century: Harnessing the gene and remaking the world*. New York: Tarcher: Putnam. 272 pp. (ISBN 0-87477-909-x)

Those of us who deal in science and technology in our society are accustomed to having some control over our outputs. This is changing. Soon we may be going on a wild ride with our guidance ability heavily compromised. The biotechnology revolution, in process since the 1950s, is affecting all of us and our work. Biological machines may soon replace mechanical, chemical, and electronic devices with which we currently work. A world created by some of us will affect all of us!

Is there any way to prepare for this? The time line is not in centuries—it is in decades. And, in many cases, it can be measured in years. Also, the implications of our ability to control many aspects of life—not psychologically, but chemically—are almost beyond comprehension. In much the same manner that electronics has permeated every aspect of our lives and work, biotechnology can be expected to be even more pervasive and affect us more rapidly than previous technologies.

> ...the new genetic science raises more troubling issues than any other technology revolution in history. In reprogramming the genetic codes of life, do we risk a fatal interruption of millions of years of evolutionary development? Might not the artificial creation of life spell the end of the natural world? Do we face becoming aliens in a world populated by cloned, chimeric, and transgenic creatures? ...What will it mean to be a human being in a world where babies are genetically designed and customized in the womb...?
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> ...the genetic revolution and the computer revolution are just now coming together to form a scientific, technological...powerful new reality that is going to have a profound impact on our personal and collective lives in the coming decades. Never before in history has humanity been so unprepared for the new technological opportunities, challenges, and risks that lie on the horizon. Our way of life is likely to be more fundamentally transformed in the next 25 than in the previous two hundred years.

The previous paragraphs are from the introduction and initial chapter of Jeremy Rifkin's new book, *The Biotech Century: Harnessing the Gene and Remaking the World*. For some time, Rifkin has been raising questions about the way the world operates and how science and industry tend to control things in a way that may be good for scientists and industrialists, but may be disastrous for the planet. But in this book, Rifkin produces a great deal of analysis and discussion of the future while injecting relatively few of his strongly held biases. The biotech revolution, he tells us, will force each of us to put a mirror to our deeply held values, making us ponder the ultimate meanings of existence. We see some of the effects in our current emotional discussions on moral issues. People want, and are used to, stability. The typical complaints about technology (such as setting time on a VCR) are minor compared to the impact that the breakthroughs of biotech will have on our values, which may be traumatic in their effects on many people.

Rifkin also suggests that the new genetic knowledge raises more problems than any other knowledge development in history. For example, he questions whether commercial institutions and, possibly, governments are using this revolution in genetics and biotechnology as a means of controlling people and only secondarily using it to achieve beneficial technological breakthroughs. His point is that the technology is likely to be used by multinational companies to increase global agriculture and generate new kinds of bacteria, viruses, plants, and animals with cloning for their profit margins, not for humanity in general.

The question then is: Ought control of this type of thing be turned over to commercial organizations who may not have the best interests of the world's populations at heart? The company's bottom line may not be good for people but certainly is thought by the company to be good for the company. While this concern may have some validity, this is not the basic or even a very important problem. Outside of this emphasis, Rifkin does do an excellent job enumerating the major world problems.

Rifkin worries about eugenics. He points to the many attempts at eugenic control of the population, ostensibly, to improve it. Most of these attempts have been based on inadequate information and have resulted in the deaths of millions of people as in the cases of Stalin's and Hitler's evils. Should groups, nations, and societies produce people with characteristics that are "liked" and eliminate those who are "inferior" in the eugenic sense? With increased

biotechnology capabilities, the problem may be more real today even though we may hope that the moral state of the world has advanced so as to foreclose on such possibilities.

Rifkin also looks at genetic analysis (i.e., the pre-implantation screening of embryos for defects and questions whether this can be done in a "democratic" way). He points out that a Jewish community in the United States is trying to screen all young Jewish men and women for Tay-Sachs disease. If the screening is simply used to remove that genetic structure to eliminate Tay-Sachs disease in the future, that is great. But what of the side effect that it tends to inhibit the freedom of certain members of that community to marry?

Actions by the government of Greece illustrate this unintended effect on population behavior. When they screened for sickle-cell anemia, almost one fourth of the population was found to have this trait. Afterwards, many of the people who carried the trait concealed their test results, believing the public exposure would seriously jeopardize their marriage prospects.

Without clanging the alarm, Rifkin's work prompts the realization that merging the information sciences and life sciences via the computer and focusing on the burgeoning knowledge and implications of the gene presages the beginning of a new era in world history. In this regard, it is at least as revolutionary as the technology of the printing press, which helped shape our world and our economy at the beginning of the industrial era.

Mechanical printing systems replacing hand copying changed concepts and led to a revolution in manufacturing. This, in turn, with its ensuing related developments (assembly from uniform and interchangeable parts) led to mass production. These were the foundation stones of the industrial way of life.

Now, on a submicroscopic level, expanding knowledge of DNA is doing the same and is the foundation of the biotechnology revolution enabled by the computer. Communications and information are being organized in a revolutionary new way. Thus, a new tool is available to manage the dynamic flows and interactive processes that make up the fluid world of genes, cells, organs, organisms, and ecosystems.

The Biotech Century looks at the problems and advantages of the biotech revolution. Although there is some question about what controls may be needed, there is a well done summary with background information on where the biotech revolution is today.

This book is recommended for all readers. It provides an excellent overview of what is going on, what can and cannot be controlled, and how the events of the revolution may affect the future. It clearly reports that some engineers, scientists, and technologists are in the vanguard of these revolutionary changes. Others may belong to the group of whom Rifkin asks, "Are we training a whole generation in a field that may not exist for more than a decade or so?" For readers in the technology professions, *The Biotech Century* provides (a) the awareness and sensitivity to the broader issues of the economic, human, societal, and global effects of the revolution; (b) an appreciation of the work of those members of the professions who have been on the cutting edge of developments; and (c) the implications and challenges that these developments hold for professional practice in science and technology in the future.

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