

**book reviews**

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**All aboard the biotech express**

SHELDON KRIMSKY

Sheldon Krimsky is in the Department of Urban and Environmental Policy, Tufts University, 97 Talbot Avenue, Medford, Massachusetts 02155, USA.

**The Biotech Century: Harnessing the Gene and Remaking the World**

by Jeremy Rifkin

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*\$24.95*

This year marks the twenty-fifth anniversary of the discovery of recombinant DNA technology, or gene splicing. Various symposia and publications have paid tribute to the pioneers of genetic engineering and the new industrial developments it has spawned. The largely publicly funded field of molecular biology has provided tools, knowledge and product ideas that have attracted substantial investments from the world's pharmaceutical, diagnostics and agricultural sectors. Designer drugs, genetic screening tests and transgenic crops are moving rapidly from the Petri dish to the marketplace. But throughout this period, critics have questioned the uses to which genetic technology is being put. Of all the sceptics, Jeremy Rifkin has been the most visible in the media and the most maligned by the principal players in the new bio-academic-industrial complex.

*The Biotech Century* is Rifkin's third book devoted primarily to biotechnology. In 1977 he was a co-author of *Who Shall Play God?*, which describes the rise of a new eugenics movement and warns the reader that "it would be wrong to proceed with genetic engineering now". A second work, *Algeny*, published in 1983, is a selective compendium of footnotes in the history of science that positions biotechnology within a neo-Darwinist *Weltgeist* and posits two paths to the future, one with genetic engineering and one without it. ("There could be no lonelier place than a biologically engineered world.")

In *The Biotech Century*, Rifkin is no less passionate in his opposition to a genetically engineered world, but he makes a symbolic effort to dissociate himself from his image as biotechnology's "consummate contrarian", which he skillfully helped to create. He says: "In fact, there is value, great value, in some of the products of genetic engineering and that's what makes the discussion of this ultimate human technology so interesting, difficult, and challenging." This is the one moment in the book where we are led to anticipate a more complex analysis of the many sides to biotechnology. We discover soon enough that it is an empty concession. Rifkin does his best work in drawing attention to the growing inventory of real and potential dangers and the ethical conundrums raised by genetic technologies. For this role he is admired by those disenfranchised from technological choices who see him as their *vox populi*.

This book is in large measure a response to the realization of Francis Bacon's *The New Atlantis*, published in 1622, in which Bacon describes a future science that uses the existing forms of biological life as the raw materials from which to redesign nature. Rifkin's chapters "A second genesis", "Reinventing nature" and "A eugenic civilization", reflecting the Baconian prophecy, raise serious questions. Can we redesign living things to work better for us while protecting the integrity of our natural heritage? Who is the 'us' on whose behalf biotechnology is being developed? Will herbicide-tolerant crops yield a more nutritious and plentiful bounty of food that will be priced and distributed fairly? Does milk production using synthetic growth hormone meet the public need or solve the problem of rapidly declining small farms? Will those who lost out in the genetic lottery be helped by the new generation of genetic tests or will they suffer discrimination for their 'pre-existing condition'?

Some will undoubtedly read this work as another anti-science polemic, but they will not have read it correctly. It is too equivocal to draw such a conclusion. Rifkin shows signs of acknowledging that the 'biotechnology express' has long since left the station. After reports of genetic advances that could serve as copy for a promotional brochure on biotechnology, the early chapters present an inventory of worthy cautions.

The chapter on patenting takes us from the 1980 US Supreme Court decision that set the broad legal mandate for patenting living things to current trends in patenting genes, indigenous crops and human cell lines. Rifkin himself, seeking to test the public's tolerance for the bizarre implications of patenting life, recently teamed up with a scientist and applied for a patent on a human-animal chimaera (see [Nature 392, 423; 1998](#)), a concept he raises in the book. Other chapters are rich in examples but deficient in the more complex analysis of how largely decentralized and diverse industrial sectors producing new technologies and products can be properly managed and publicly overseen to avoid ecological, ethical or human-health mishaps.

Some of this complexity is acknowledged in the final chapter, "A personal note", in which Rifkin writes of using science, and even genetics, in a manner that respects our natural world: "the question is what kind of biotechnologies will we choose in the coming Biotech Century?" Our greatest challenge lies in the social guidance and assessment of biotechnology within a democratic participatory framework and a global awareness.

Rifkin was criticized 20 years ago for exaggerating the untoward paths biotechnology would take and for opposing scientific progress. In hindsight, many of his predictions can hardly be considered hyperbole. Serious discussions are taking place on cloning humans, altering human germ cells, universal genetic screening, mandatory DNA identification and even the unmentionable prospect of 'improving' the human gene pool.

In his role as social critic of biotechnology, Rifkin has become entangled in a paradoxical situation. In an attempt to stir the reader's passions, he overdramatizes in some sections the power of biotechnology: "The biotechnology revolution will affect each of us more directly, forcefully, and intimately than any other technology revolution in history." We must be reminded that the first three main agricultural products of genetic engineering — the Flavr Savr tomato, the Ice Minus bacterium and recombinant bovine growth hormone — have either failed or are failing.

Moreover, like many of the genetic scientists he calls to task, Rifkin at times accepts uncritically a view that vastly overestimates the importance of genes in biological organisms. ("With genetic engineering, we assume control over the hereditary blueprint of life itself.") If he were to question too seriously the ability of science to carry out its "redesign of nature", the book would lose much of its moral force. But, while he plays up the power of genes ("the ultimate exercise of power") in some sections, elsewhere he tempers that view by acknowledging the poverty of genetic reductionism. He points out that, although such a view may be false, it has helped to advance the interests of those involved in molecular biology.

There is no simple reading of this book. A fair-minded reader will agree with some points and disagree with others. At a time when scientific institutions are struggling with the public understanding of science, there is much they can learn from Rifkin's success as a public communicator of scientific and technological trends.