Altered Harvest: Agriculture, Genetics, and the Fate of the World's Food Supply

Reviewed by Joel Schor

Jack Doyle New York Viking Press, 1985, 502 pp, $25 00 (cloth), $7 95 (paper, reprinted by Penguin Books, 1986)

Altered Harvest is going to alter perceptions about the effects of biotechnology on "agriculture, genetics, and the fate of the world's food supply," to use Doyle's subtitle, it is the first book-length study to address the relationship of biotechnology to world agriculture Though written in a journalistic, loose style, possibly designed to help carry the reader through myriad details, contradictions, and complexities, the book is principally a reference text Yet, it provokes, disturbs, and stimulates the reader Chapters are not written in the manner easily grooved for the historian or social scientist, although the text does provide some chronology and social analysis Each section contains a pouch of cameo gems, glittering with insight, though there is some redundancy Nevertheless, Doyle must be read, not simply because he discusses specific agricultural economics topics such as bovine growth hormone but because he has also opened the new genetic world of agriculture in its complexity to all readers

He must also be read because biotechnology is currently moving through its voguish, optimistic phase No serious accidents or personal injuries have been recorded The public at large does not know that some experiments have been stopped by court order on the grounds of public health or that biotechnology has been wrapped in the mantle of national security Doyle is one of a few timely, critical voices

Like most scholars of technological change, Doyle rejects proponents' claims of unmixed socioeconomic virtue in the gene-splicing revolution He has isolated trends older than hybrid corn and its universal acceptance, traced them forward, added biotechnology to the process, and made an overall assessment Perhaps his biggest achievement comes from a detailed analysis of risks that society may be compelled to run as the genetic revolution, fueled by public and private research funds and an almost religious fervor, presses forward Although it holds out a miraculous promise of insecticide/herbicide resistance to diseases and of nitrogen-fixation in plants, biotechnology is also a new myth-maker as Doyle points out

A major theme of his book is the control of agriculture by large corporations that use biotechnology and newly expanded patent laws to control living processes Doyle indicates in an early chapter on hybrid corn that this control follows a precedent established a generation ago by the Wallaces of Iowa, two former Secretaries of Agriculture Such control in the extreme could render the farmer helpless Doyle sees the farmer as less significant in formulating public agricultural policy toward biotechnology and in establishing public and private research priorities than the large seed companies, the food-processing industry, the pesticide/herbicide/fertilizer chemical firms, and the suppliers of feed, medications, and hormones to the animal industry Doyle believes biotechnology may be the final layer of acquired power that the multinational corporation has purchased in is relentless quest to control world markets in grain, livestock, fibers, feeds, and medications. Once that premise, which he documents heavily, has been granted, certain questions follow

Should, or can, the large multinational firms, many of whom have reputations (as Doyle points out) for poisoning the environment, fudging data before Federal agencies, and resisting the order to clean up its mess, be entrusted with biotechnology? What will such new consolidation do to the price of inputs for the American farmer? Doyle sees a world of a few multinationals owning or controlling redesigned seed that will in turn require a package of their patented chemicals, irrigation systems, and machinery Will these giants actually reduce, or will they increase, production costs? The farmer's stake in biotechnology will turn upon the outcome Will the farmer, no matter what size, become the hired hand of industry? Likewise, Doyle juxtaposes aspects of agricultural policy, such as the phasing out of the varietal release of seed by experiment stations, against the landscape

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of decreased competition brought on by corporate consolidation. He probes into what he documents as the marriage of industry and academia

Biotechnology possesses unique characteristics Previous technological revolutions in our century contained a time-lag factor, usually about a decade between basic research/breakthrough and practical application. There simply is none with biotechnology, knowledge flows directly from research laboratory to boardroom Doyle poses and analyzes vital questions arising from the new relationship to gauge its overall impact

Perhaps the most crucial question is how can the public and its policymakers obtain neutral advice, if so many scientists in the field are connected in so many ways with the private sector and thereby to their personal interests? Furthermore, if so many scientists are preoccupied today with applications, who will be left to pursue the independent quest that leads to breakthroughs for tomorrow? Doyle cites manipulation of graduate students by professors to serve the private grantee, the veil of secrecy encouraged by corporate legal officers in scientific meetings, the downplay and falsifying of risks when new products are introduced, and the suppression of hostile data before regulatory bodies

Doyle goes to the roots of American agricultural achievement, the accumulation and refinement of germplasm, usually in the form of seed, plants, animals, or cuttings On this process we can chart our entire agricultural history Colonial Americans found in the wilderness only berries, sunflowers, and the Jerusalem artichoke They either adopted food crops of native Americans or imported the rest as seed In the early nineteenth century, Henry Elsworth, head of the patent office, and officials of the U S Department of Agriculture after its creation in 1862 brought germplasm into America to be tested, refined, and widely dispersed *gratis* This mechanism over time constituted the reality of Johnny Appleseed for our Nation. Germplasm is the vital stuff, the ever-dwindling gene pool, Doyle fears, that provides the basis for genetic engineering and the technology based upon it Therefore, he calls the attention of readers to the gene banks maintained by the land-grant system, and the less-than-adequate efforts to sustain such collections and those maintained by international agencies We have similar difficult problems in sustaining animal stocks

Why is sustenance of the gene pool such a concern for Doyle in writing on biotechnology? His critique goes beyond the funds appropriated for seed repositories to the trend toward genetic uniformity of our plants and animals. Genetic uniformity, he knows, is risky and potentially disasterous He points to the warnings of the seventies manifested in the Southern Corn Leaf Blight and currently to avian influenza among poultry By sustaining the gene pool in its diversity, geneticists, animal breeders, and biotechnologists can identify genes that confer disease/herbicide/pesticide resistance In other words, Doyle contends that genetic diversity will provide the opportunity for long-term improvement of species Yet, will actual improvement occur if research and development is left in private hands exclusively?

Doyle is uncertain as to the outcome He documents reductions in genetic diversity, research directed at other factors such as the quick or one-gene pesticide improvement process instead of the more time-consuming two-gene approach, which requires discovery, insertion, and expression of two genes Research priorities, he shows, are dictated by food processors and transporters The dry, hard tomato is an unquestioned moneymaker, regardless of its nutritional content or taste, so that is where monies are invested In corn, the genetic factors responsible for detasseling corn also carry blight susceptibility An inverse relationship also seems to exist between yield and nutritional content How this dichotomy will be bridged remains the subject of debate Doyle hopes these questions will be resolved with consumer, environmental, farmer, and corporate interests fairly represented, but his years of experience as a legislative aide on Capitol Hill cause him to have doubts Yet, he is hopeful that the public will rally, confront the issues, demand and obtain complete candor from appropriate agencies, and prevail upon industry to honor social values