

THE LAST WORD/

AN ENVIRONMENTALIST'S VIEW

by Rebecca Goldberg

A microbiologist I was talking to at a scientific meeting last summer fell silent after he discovered that I am an environmentalist interested in biotechnology. I explained that the Environmental Defense Fund (EDF) is enthusiastic about a number of developments in biotechnology. The microbiologist raised his eyebrows and then, in a serious tone, replied, "You should sue Jeremy Rifkin."

We laughed. But the encounter—not my first of this sort—drove home the extent to which discussion of biotechnology is colored by hard feelings and preconceptions. This is unfortunate, especially because environmentalists are taking a more active role in shaping public policy for biotechnology. In fact, the Chicago-based Joyce Foundation recently provided three years of financial support to the National Audubon Society, the National Wildlife Federation, EDF, and several other institutions to do just that.

Why are environmentalists involved? At EDF, we are concerned about certain applications—not the techniques—of biotechnology. Two stand out: the ecological consequences of deliberate release and biotechnology's secondary impacts.

Modern techniques for isolating and rejoining lengths of DNA may increase the variance of risk associated with releasing genetically modified organisms. On one hand, genetic engineering permits the creation of well-characterized genetic alterations. This precision may allow more predictable—hence less risky—modifications of organisms than ever before (as in the case of live attenuated vaccines). On the other hand, the technology is also used to combine independent evolutionary lineages, readily creating organisms with novel ecological properties. Organisms modified to tolerate environmental extremes or metabolize new substances may play very different ecological roles than the organisms from which they were derived; some may have undesirable effects. Although releases of organisms altered by modern techniques may, on average, pose risks comparable to those altered by traditional methods, the probabilities of both low- and high-risk releases may be greater. As the pace of releases quickens, high-risk releases will become more common; thus regulation of releases is an environmental issue.

Effective environmental regulation of releases has to be efficient; time spent on low-risk releases should not deter from that needed for riskier ones. It is now possible to categorize as low risk the releases of some organisms, such as certain crop plants that are well-studied and do not survive well without human intervention. Examining the survival, dispersal, and biotic interactions of wild type and genetically modified organisms of other taxa will lead to more release categories. Thus well-planned, careful monitoring of releases—including seemingly low-risk ones—is a vital component of improving regulation.

Environmental problems cannot always be solved simply by action against their sources. If the source (say a dam) confers some social or economic benefit (an adequate water supply), and the benefit cannot be supplied in

some other way, the problem (habitat destruction from dams) is likely to persist. Emphasis on developing solutions to the underlying causes of environmental problems, rather than simply opposing environmental abuses, is what EDF director Fred Krupp has termed the new "third wave" of environmentalism. (The first wave, symbolized by Teddy Roosevelt, focused on conserving wild lands. The second, perhaps begun by Rachel Carson, focused on preventing toxic substances from contaminating both wilderness and populated areas.)

Biotechnology is often touted as providing solutions to environmental problems. New methods of biological control and nitrogen fixation promise alternatives to agricultural chemicals. Engineered microbes may degrade toxic wastes and remove sulfur from coal. Environmentalists clearly have an interest in advocating research (including government funding to support it) intended to achieve these ends.

But, not all biotechnology research should be encouraged, or at least given funding priority. For example, developing organisms resistant to pollutants attempts to treat economic symptoms of pollution rather than the pollution itself. Producing trees, destined for logging, that resist damage from ozone and acid rain, or honey bees that resist insecticides (interests, respectively, of the United States Forest Service and United States Department of Agriculture scientists) are akin to Interior Secretary Donald Hodel's suggestion that, rather than protect the ozone layer, people should wear sunglasses, hats, and sunscreen. The ramifications of herbicide-resistant plants (the only type of resistant organism developed so far) are more complex, since some herbicide-resistant crops may allow farmers to replace environmentally damaging herbicides with less damaging ones. But, no such justification exists for developing crops resistant to slow-to-degrade toxic herbicides such as atrazine. Such herbicide-resistant crops, or insecticide-resistant honey bees, could entrench our reliance on and increase use of toxic agricultural chemicals, because users would suffer fewer economic consequences from the chemicals' toxicity.

Scarce research dollars should be invested to develop alternatives to pollutants—such as biological control—not ways to make pollutants economically less damaging. This applies particularly to government-sponsored research, which exists to develop ideas and technologies to improve our society; it ought to apply to privately funded research as well.

Modern biotechnology offers environmentalists a new role, helping to shape the development and regulation of a new technology. Because environmental benefits and abuses associated with biotechnology are both as yet unrealized, environmentalists can and should be both critics and advocates.

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