THE LAST WORD/

BIOTECHNOLOGY'S FIRST TURNING POINT— AND ITS NEXT

by Jerry D. Caulder

Environmental biotechnology's most violent moment—and perhaps its most significant—is but a year past. In the early morning hours of April 24, 1987, self-proclaimed "Mindless Thugs Against Genetic Engineering" ripped hundreds of strawberry plants from the soil of Contra Costa County, CA. Yet, despite the vandalism, Advanced Genetic Sciences Inc. (AGS) conducted the first outdoor test of live genetically engineered bacteria—a test that was successful.

Today, a half-dozen outdoor tests of recombinant microbes are complete or under way. After five years of public debate, court battles, and scientific evaluation, biotechnology finally is turning the corner of public acceptance of outdoor testing. Acceptance is reinforced by the positive attitude of the Congressional Office of Technology's (OTA) recent report on field-testing of engineered organisms: "None of the small-scale field tests proposed or probable within the next several years are likely to result in an environmental problem that would be widespread or difficult to control."

In the past year the biotech industry and its responsible critics have made substantial progress on controversial issues, while intransigent opponents, who once occupied center stage, have seen their legal and rhetorical tactics fail. Consider the following accomplishments:

Industry broke through the regulatory logjam. AGS, the University of California (Berkeley), Monsanto Company (St. Louis, MO), and BioTechnica International (Cambridge, MA) have started or completed field tests of live gene-spliced microorganisms. Tests of genetically engineered plants have become almost routine.

The scientific community validated the regulatory principles used to approve field tests. A report released last year by the National Academy of Sciences (NAS) concluded that outdoor testing of genetically engineered organisms presents no unique risks to the environment. Each regulatory decision should be based on the nature of the organism used, not the fact that it was produced with recombinant DNA techniques.

Researchers found solutions to problems associated with environmental release of engineered organisms. Despite the apparent safety of biotech products, many people still feared that recombinant microorganisms would spread and cause unforeseen effects. Scientists responded with technological solutions. Monsanto and Clemson University (Clemson, SC) used recombinant bacteria that turn blue when cultured from soil samples, allowing researchers to demonstrate that the microbes stray but inches from their original location. And Mycogen's patented process for killing recombinant bacteria without destroying their insecticidal properties now permits use of dead bacteria rather than live ones.

The U.S. public cast its vote in favor of continued research and development in biotechnology. A Louis Harris poll commissioned by the OTA revealed that, by-and-large, the public believes that the benefits of biotechnology outweigh the risks. Eighty-two percent of the nearly 1,300 respondents favored small-scale field tests of genetically engineered organisms, and 67 percent would allow such tests in their own communities.

Political leaders are showing a great concern for the development of biotechnology. Senators Lawton Chiles (D—FL), Edward M. Kennedy (D—MA), and Pete Domenici (R—NM) recently introduced the Biotechnology Competitive-ness Act, which the Senate passed 88–1. The bill would set up a national center for biotechnology, establish a policy board to review government programs in biotech, and encourage commercialization of new technologies to improve U.S. competitiveness. In May's Last Word column, Senator Patrick Leahy (D—VT), chairman of the Senate Committee on Agriculture, outlined his program to encourage development of biotechnology in the United States.

Along with these successes there were a few setbacks. Gary Strobel's (Montana State University, Bozeman) experiment on elm trees was halted because he allegedly violated the regulatory process. And the Argentinian government has claimed that a genetically engineered rabies vaccine infected workers at an experimental field station. The fact that these incidents did *not* halt the regulatory process, however, is a testament to how far we have come since the days when it was impossible to test a product as innocuous as "ice minus."

Unfortunately, the anti-science, anti-progress forces will not give up. Led by Jeremy Rifkin, a loose coalition of religious leaders, environmentalists, animal rights activists, and radical farm groups are lobbying Congress to declare either a moratorium or a total ban on animal patents. If Congress amends the nation's 198-year-old patent law to appease a vocal minority, the modern-day Luddites will be encouraged to go even further. The biotechnology community must unite once again to protect the rights of companies developing transgenic animals. The important issues are not even patenting of or research on transgenic animals: they are the protection of intellectual property rights and the freedom to conduct research and development.

The right to practice the science and business of biotechnology cannot be taken for granted. Biotechnology cannot proceed without public consent. And public consent is impossible in the face of public ignorance. Eliminating this ignorance does not require training the entire population in molecular biology: people may have a poor grasp of immunology, for instance, yet they don't fear vaccinations. The public only needs to understand modern biology's applications.

It is up to biotech's scientists and executives to explain the technologies' applications. We can afford neither cavalier attitudes nor benign neglect—we all must become active participants. And it is up to government and academia to reverse this nation's decline in scientific literacy. Many people are unable to distinguish between science and technology, fact and fantasy, evidence and anecdote. Biotechnology cannot flourish in this ignorance.

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