Genetic engineering requires caution

David Pimentel of Cornell, Sheldon Krinsky of Tufts, and David Glass of Biotechnologies International, answer questions about releasing genetically engineered organisms to the environment.

(Continued from page 1) and monitor genetically engineered organisms. They cannot deal with the rapidly growing biotechnology industry. Since 1975, 500 new biotechnology firms have emerged in the United States, Krinsky said.

Potential uses

Present biotechnological applications include the production of hormones, vaccines, and pesticides. In particular, dwarfism, insulin for diabetes patients, and diagnostic tests for cancer, Glass said.

Medical uses that are "in the pipeline," according to Glass, include blood clot-dissolving agents for heart attack victims, blood clotting agents to treat hemophiliacs, and vaccine production for both animals and humans.

Although agricultural applications of genetically engineered organisms may develop slower than medical uses, they are no less exciting, Glass said. Possible agricultural uses include developing crop plants with enhanced nutritional value and others with increased resistance to pests, diseases, and herbicides, according to Glass.

Another potential agricultural application is developing plants with improved nitrogen-fixing abilities, Glass said. This would reduce reliance on chemical nitrogen fertilizers, which are the main cause of ground water pollution, he explained.

The recently developed ice-minus bacterium, proposed for use in agriculture in California, can increase the frostsensitivity of certain crop plants by five degrees, Pimentel noted. Although this bacterium offers obvious benefits to the agricultural industry, it is also a pathogen to about 16 plants. Research indicates that it also affects some insects, he added.

Insects are often considered pests but the majority are, in fact, beneficial, Pimentel said. We could not have agriculture or a quality environment without most insects, he asserted.

Pimentel questioned the ability of biotechnologists to thoroughly research an organism's effect on the environment before releasing it outdoors. The fact that there has been no observable change in the past does not guarantee that effects will not be observed in the food chain after several years, researchers who claim that "there's very small chance for problems," should beware, Pimentel said. Rare events do happen. "I'm not proposing that we have 100 percent accuracy before we release organisms into the environment. I'm just trying to [illustrate] that rare events do add up when you're making numerous introductions," Pimentel said.

The overuse of pesticides is another potential environmental hazard that may result from new biotechnologies, Pimentel said. If plants are developed that are resistant to herbicides, farmers will "spray the hell out of the plant,> he said.

- What is the effect of this organism on the target and non-target populations?
- How will the genetic material inserted into the organism?
- What happens to the genetic material inserted into the environment and does it multiply out of control?
- Can the organism spread from the test site on its own or through other vehicles such as wind or ground water?

"We will look at the environment and do what is necessary to keep it safe," Pimentel said.

Glass argued for clear, consistent criteria that biotechnologists must meet in order to market the product.

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