GM Foods: Hard to Swallow

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A primer on genetically modified foods
by Charles Strohmer

It is difficult, if not impossible, to overstate the importance of food. Eating, after all, is a quintessentially human activity. Sure, all life forms, in one way or another, get nutrients and energy from outside themselves, but only people have transformed nutritive consumption into such a varied, elaborate, and ritualistic process. Feats and fasts are central to most every religion and culture. And since having something to eat is a frontrunner for the most basic human requirement, we need not climb much higher on the hierarchy of needs to realize that what we eat is critically important. So when we talk about life-changing and life-shaping technological advances, food?the stuff that we ingest?takes center stage in our hopes and fears.

Case in point: at the end of the nineteenth century, the advent of refrigerated rail cars made large-scale processing, packing, and distribution of meat possible. Suddenly East Coast city dwellers were able to dine on beef and pork that had been killed weeks earlier and a thousand of miles away. It was an unsettling prospect for people who'd grown up eating meat that had been butchered recently and locally. The new technology just seemed wrong. So people reacted, and a significant protest arose from concerned citizens who demanded the right to know just what they were feeding their families. Eventually, the efficiency, cost-effectiveness, and variety offered by technology won out. Today, it's actually the idea of eating fresh-killed meat that sets many of our stomachs to churning.the question "What's for dinner?" takes on new weight and urgency

Today we are on the cusp of another revolution in food, as genetic technology promises to open up vast new opportunities and unknowns in the food industry. As with all potentially sweeping technologies, this can be taken as either good or bad news: superfoods?miracle nutrients capable of saving lives even as they make for a cleaner environment; or Frankenfoods?well-intentioned creations that will nonetheless prove ugly and destructive. So once again the question "What's for dinner?" takes on new weight and urgency.

As recently as 1989, no transgenic crops were commercially marketed in the United States. Today it is increasingly difficult to find and buy non-genetically modified (GM) foods, and some critics speculate that the American public has been lulled to sleep to participate in a nightmarish experiment. But many disagree. "Genetic engineering," says Clare Hasler, director of the functional foods program at the University of Illinois, "[makes] foods that are already good for you even better." Crops will be easier to grow and engineered to resist pesticides, herbicides, and viruses. We will have healthier fruits and vegetables. Oranges would be altered to carry all the nutrients of a multivitamin, common foods would be engineered to reduce cholesterol, and a brand new category we might call pharmacofoods would be created: tomatoes that carried potent cancer-fighting substances; fruit engineered with life-saving vaccines; soybeans genetically altered to carry higher levels of isoflavones?helping to reduce heart disease.

Robert B. Shapiro, chairman and CEO of the pesticide and pharmaceutical giant Monsanto Corporation, which is the current world leader in the production and distribution of GM foods, believes we are seeing the barest beginnings of a revolution in agriculture, food, and, ultimately, human health. Shapiro told Michael Specter, writing in The New Yorker, "People want to live better, and they will use the tools they have to do it. Biology is the best tool we have. There now exists an opportunity to create a genuine science of nutrition, something that has never existed in human history."People want to live better, and they will use the tools they have to do it

Cornell University's Boyce Thompson Institute for Plant Research is closing in on a vaccine for hepatitis B and one for diarrhea that could be engineered into the cells of a banana. The benefits just in developing nations, no one would argue. Another significant advance involves the world's most important crop, rice, which is a poor source of vitamins. Ingo Potyrkus, at the Swiss Federal Institute of Technology in Zurich, and colleague Peter Beyer, at the University of Freiburg in Germany, have experimented for nearly a decade to introduce into the rice plant three genes (taken from bacteria) that complete the genetic pathway needed to produce beta carotene, which is then broken down into Vitamin A. Finally in 1999, voila! Now dubbed Golden Rice because of its pale yellow color?courtesy of beta carotene?it would help prevent Vitamin A deficiency and its symptoms, such as loss of eyesight, in millions of people where rice is the main diet. Charles Arntzen, of the Boyce Thompson Institute, is ecstatic: "This one

accomplishment of genetic engineering could alleviate more suffering and illness than any single medicine has done in the history of the world."

It is often argued that such modification is no different from what farmers all over the world have been doing for centuries. Genetic crop engineering, however, bears little resemblance to traditional hybrids and breeding techniques, which take place within natural boundaries between closely related foods. For instance, tomatoes can crossbreed with other tomatoes, but not with soybeans. It was the twentieth century discovery of the structure of DNA that helped human beings make the quantum leap from manipulating natural variation to directly inserting genes from one species into another.

What worries many people, however, is that genetically engineered crops and foods may alter bodily processes in fundamental ways. Once released into the food supply, genetically engineered organisms become part of our complex ecosystem, and there are few clues about what the cumulative effects will be.

The introduction of new toxins and allergens into GM foods is a case in point. In one incident, scientists at state universities in Nebraska and Wisconsin inserted genetic threads from a Brazil nut into a soybean plant to create a new and better protein that would be spliced into any number of foods made from soy. Further tests before product release, however, revealed that this food would cause severe allergic reaction, even death, in people who were allergic to Brazil nuts. With little regulation and even less required labeling in the U.S., the question is being asked: how would these people have known not to eat the bread, the pizza, the cereal, the chocolate, the ice cream, and the hundreds of other foods processed with this GM soy? (The courts tend to uphold the Food and Drug Administration's contention that genetically modified foods are generally safe, and thus do not require the same labeling as foods containing other chemical additives.)

One of the hottest legal skirmishes is over Bt corn, genetically engineered with the common soil bacteria Bacillus thuringensis and grown on approximately twenty million acres in the U.S. Because widespread use of the corn may wipe out the effectiveness of Bt on pests, hurting organic farmers who rely on it in place of pesticides, a coalition of 70 plaintiffs has filed a lawsuit to halt Monsanto's distribution of Bt corn. Also this autumn, a Kraft Foods recall in September of its Taco Bell brand taco shells snowballed into a nationwide recall affecting many restaurants and supermarket chains and covering nearly three hundred varieties of tacos, tortillas, and snack chips. Tests confirmed that the products were made from a genetically engineered corn called StarLink (made by Aventis Crop Science), which was approved by the Environmental Protection Agency in 1998 for use only in animal feed, due to concerns that the corn may cause allergic reactions in some people. Both cases underline the increasing potential for unexpected paths from manufacture through supply and consumption and the need to identify checkpoints to implement tighter controls.
Terminator seeds
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But, suggests Hope Shand, research director of RAFI (Rural Advancement Foundation International, a Canadian environmental organization), all of this is small potatoes compared with "terminator technology." The terminator, or suicide, seed?developed jointly by the Mississippi-based Delta & Pine Land Seed Company, Monsanto, and the USDA?has been genetically altered to sprout an infertile plant, one unable to produce viable seed. Such a crop could be harvested and eaten, but its seed could not be replanted. (It couldn't produce another crop.) If this were the only kind of seed available in the future, then farmers, collectives, and even home gardeners would be forced to purchase new seed every growing season.

On a global scale, this technology could be "terribly dangerous," says Shand. "Half the world's farmers are poor and can't afford to buy seed every growing season." Yet patents are pending with several biotech multinationals, including Monsanto and AstraZeneca, to experiment with terminator seeds in the developing world, where farmers grow about 15 to 20 percent of the world's food and depend on their "saved seeds" (seeds that reproduce) for next year's crops. Although the biotech food multinationals say not to worry, some analysts argue that developing nations will be ruined not only by the economic but also by the moral and social costs of dependence on terminator technology.

Although not reported much in the U.S. media and press, professional ecologists, environmental lobbies, and many public and

private agencies around the world recognize the national security issues latent in terminator seed technology and they are calling for their governments to stop sponsoring it and to eliminate it. Due largely to tremendous and concerted European activism during 1999 (despite staunch support for GM foods from many European Community governments), Monsanto announced a commitment not to commercialize terminator or other sterile seed technologies. Critics remain skeptical, saying that Monsanto and the other biotech firms have merely hunkered down until the dust settles. "This is a patent that really turns on the greed gene," says Camila Montecinos of the Chilean-based Center for Education and Technology. "It's too profitable for companies to ignore."

So what's a hungry person to do? The issues are complex and there's little to be gained in villainizing either the scientists, who are hoping to use their skills to feed the world's hungry, or the corporations, merely because they stand to profit immensely from such a feast. But for many who are justly concerned about the risks associated with GM foods, a policy of informed, strategic complaint may offer a good stop-gap solution. Policy reversals in Europe may be indicative of how the GM food controversy could play out in North America. Some nations, like France and Italy, where television ads decry GM crops and foods, have moved to ban planting GM corn. And sustained public outcry has prompted thousands of European supermarkets to remove GM foods from their shelves. Denmark, Switzerland, and Norway require labels on GM foods, and the European Agricultural Commission now requires labels on all GM seeds, grains, and animal feed.

Such moves are cause to celebrate for those who for political, socioeconomic, or environmental reasons find GM foods unsavory at best. At present in America the debate is deeply divided between reactionaries fleeing the complexities of a new technology and the scientists and businessmen who think that what they're doing really is good for humanity (or at least isn't harmful). In Europe, a third way is being pursued called the "precautionary principle," which (in its narrow interpretation) urges that even remote risks from GM crops and foods be given more weight than any possible benefit. Too narrowly interpreted, however, the precautionary principle could stall any progress because it would preclude marketing to foods unless the outcome was absolutely guaranteed in advance. A wider interpretation could foster humane progress while ensuring safety before profit.

Evolving a synthesis for a just third way to be pursued for the entire world community will also mean overcoming a universal problem. Throughout human history, our knowledge has often outstripped our moral sensitivity. As British theologian and philosopher John Peck says, "At the back of our fear of GM food technology is that human beings can't be trusted with it." The technology itself is not bad, notes Peck, but "as Christians we must bear testimony that knowledge is not a god, not an end in itself, but that the search for it has a responsibility to God and the moral conscience. It sounds heretical today to say this, especially in the scientific community, but if we took this responsibility seriously, it would mean saying ?no, we're not going there' to certain expressions of technology unless we can agree on a transcendent moral authority by which to control it. And to some technologies, we may simply need to say no, full stop."

Religious, or ultimate, beliefs also ought to be an aspect of a third-way paradigm, and they are actually shaping some boardroom decisions. When asked why he had decided to stop using GM ingredients in Gerber baby food, Novartis chairman and ceo, physician Daniel Vasella (Switzerland's best-known corporate leader), told The New Yorker, "We are not missionaries. We sell things. No company can prosper by telling customers what is good for them.... This is not just about plants. This is about our myths, our history, our culture. It's about what we put in our mouths and in our babies' mouths.... What is more basic?and what could be more frightening?than playing with that? Of course it scares people. How could something so important not scare people?"A theology of food is ultimately one of where (and in whom) you put your trust

A theology of food is ultimately one of where (and in whom) you put your trust, and how you handle your fears. There are no hard and fast rules. If you're Joseph in Egypt, the faithful thing to do is to build storehouses for your nation's grain. To the rich merchant of Jesus' parable, however, the one who's life was to be demanded of him that very night, bigger barns are of no value. For the Israelites wandering towards the promised land, a strict set of dietary laws was just the thing to promote obedience to God and to set them apart from other cultures. But for Peter, daydreaming on a rooftop in Joppa, every sort of food was declared clean, for God's greater purpose of revealing Christ to all the earth's people.

The immense promises and purposes bound up in the development of genetically modified foods provoke questions of trust and fear that cut both ways. Unwise though it may be to blindly trust in the goodness of a GM-food-fueled human future, it is also naive to fear the future by placing a similarly blind trust in the good old days before all of this cropped up. Ultimately, no technology should be trusted more than God; but neither should any future (genetically modified or other) be feared more than God. Food is vital, but at least theologically, the maxim "you are what you eat" is misleading at best. (Published in re:generation quarterly, 6.4; 2000. Edited for the Web.)

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