WEDNESDAY, JULY 5, 2000 AT 12 A.M.

BY **MARGARET WERTHEIM**

Photo by Zachary Scott

The late-afternoon sun casts a golden radiance across the fields and, between the rows of young spring plants, jackrabbits bounce up and down. It's a scene straight out of some deep rural fantasy: nature benignly transforming sunlight and soil into nourishment for our tables. But all is not well among these neatly tended rows of lettuce and tomatoes, broccoli, melons and grapes. The fields are owned by the University of California at Davis, a leading center for agricultural research and education. These two goals have been quietly pursued for over a century, but last September, Davis scientists had a rude awakening when several fields were ripped out during the night. The reason for this vegetable vandalism? The plants had been genetically modified.

Since then the farm has been attacked several more times, and so it is that my host, Kent Bradford, director of the UC Davis Seed Biotechnology Center, won't say which plots contain genetically modified ("GM") crops. They can't be too careful, Bradford explains darkly. At the moment there are no obvious signs of defense, but Bradford says the center is considering installing a high-security fence and alarm system. The problem is, this would immediately signal the target to would-be aggressors. It would also be expensive: "We'd far rather be spending the money on our research," Bradford says.

Bradford is a GM enthusiast. A liberal-seeming guy and former member of the Union of Concerned Scientists, he went into agricultural research believing he could do something to truly help the world. With genetic engineering, he says, "The possibilities of what can be done with improving food are almost endless." The future he envisions includes enhanced nutritional value of foods, reduction in the use of pesticides and herbicides (now a major environmental hazard), and alleviation of world hunger. So he is puzzled by the increasing chorus of concern about GM foods. "We thought we were doing what everyone wanted," Bradford says. "When did we become the enemy?"

The debate over GM foods, long the subject of intense resistance in Europe, is finally moving stateside. Of the hundreds of thousands of products available in our nation's supermarkets, it is estimated that over 60 percent now contain genetically modified ingredients, including oil from modified soy and canola, and flour from modified soy and corn. Last year, 55 percent of the U.S. soybean crop were genetically modified varieties, as were 35 percent of the corn crop. There are currently 46 GM crops in our food supply, including potatoes, tomatoes, sugar beets, squash and papaya. Chances are you're already consuming GM foods on a daily basis. And you have no way of knowing. In 1992, the Food and Drug Administration (FDA) ruled that there was "no substantial difference" between GM foods and conventional varieties, and so no form of labeling was necessary. Likewise it deemed there was no need for human-safety tests.

Belated concerns over the safety of GM foods are now prompting organizing and protests, including local attempts to get the Trader Joe's chain of stores to agree to pull GM products off the shelves (something protesters felt the chain's shoppers would particularly care about). In the eyes of protesters milling outside Trader Joe's one recent afternoon in West Hollywood, the government has colluded in a massive form of force-feeding. Brett Doran of the Action Resource Center in Venice and a co-organizer of the rally waves aloft a placard in the shape of a giant tomato, emblazoned with the slogan "No fish genes in our tomatoes!" -- a reference to the fact that anti-freeze genes from flounders have been engineered into these fruits. Still in his early 30s, Doran is already a veteran environmental activist; to him, genetic modification of plants is a hazard both to human health and to the environment. "It's untested, and it's not predictable what effects it's going to have on humans in the long run," he tells me. "The DNA that is the building block of life on our planet is being tinkered with -- that's why some people call them 'Frankenfoods,'" he continues. Speaking for the group, Doran says, "We don't see a need for genetic engineering. We see a need for more community-based farming."

Around the country, anti-GM sentiment is building. Last year, Mothers for Natural Law presented to Congress a petition with half a million signatures, demanding the introduction of labeling for GM foods, and there are now labeling bills before both the House and the Senate, with the Senate bill having been sponsored by California's own Barbara Boxer. Tom Hayden is currently sponsoring a labeling bill at the state level. Earlier this year, a group of 50 environmental, consumer and farmers groups formally petitioned the FDA, demanding the implementation of mandatory safety testing.

All this activity seems to be making the industry nervous. In March, a consortium of seven leading biotechnology companies announced a $52 million advertising campaign to "educate" Americans about ä the advantages of GM foods. Consisting of all the major players -- Monsanto, DuPont, Dow AgroSciences, Novartis, Aventis, AstraZeneca and BASF Corp. -- the consortium

will blitz the nation with advertisements for the next three to five years.

People dislike being told what they have to eat. Just as kids rebel against parental edicts about broccoli, so adults are rebelling against Monsanto. But do we really have anything to be concerned about here? Amid the protests and corporate reaction, some important questions emerge. Are GM foods intrinsically evil? Do they pose serious threats to human health? Or to the environment?

Both sides of the debate are fueled by a great deal of moral passion, but both are also subject to blind spots. And as with most issues, the answers are complicated and nuanced. GM opponents may well be overestimating the human-health risks, while proponents may be underestimating the potential for environmental disaster. Mandatory labeling and safety testing are both important, but some of the activists pushing for these goals are, in their zeal, poorly informed about the science and its effects. Proponents, for their part, are too often subject to a naive techno-utopianism that fails to consider the social and political context within which farms and farmers operate. At its heart the story of GM foods is not essentially a technological story; it is a window onto the much larger issue of modern industrialized agriculture -- which is the hidden specter we must eventually confront.

II. Inside the GM Lunch Box

Well before the introduction of recombinant DNA technologies -- what is popularly known as "genetic engineering" -- scientists had been radically manipulating crop genomes. In the 1960s, researchers routinely irradiated plants and subjected them to powerful chemicals in an effort to force genetic mutations. Between 1,500 and 1,800 new plant strains were created this way. Indeed, some varieties now used by organic farmers had their origins in this technique. Triticale, a nutritious grain used in many health-food products, was created by genetically forcing a mating between wheat and rye, two entirely separate genera.

Contemporary genetic technologies, however, offer much more precise control and power over what manipulations can be done. So says Bradford's colleague Pam Ronald, a UC Davis scientist married to an organic farmer. Ronald has been genetically modifying rice, adding in a single gene from a wild relative that makes the plant resistant to a number of virulent pathogens. Rice is a critical crop for billions of people in the developing world, so anything that helps to stave off pathogens has potentially enormous value in terms of global human health. Now that the basic science has been understood, this pathogen - resistance gene can easily be inserted into local varieties around the world. One surprising thing about genetic engineering is how little equipment is needed -- unlike many other technologies, it's one that developing nations can afford. All

unlike many other technologies, it's one that developing nations can afford. All this work could be done with traditional breeding techniques, Ronald says, but "with genetic engineering it's much more precise, and faster." It's also cheaper, she says. Like Bradford, Ronald is clearly a progressive thinker, someone who views genetic engineering as an opportunity to help the developing world. Ronald says the rice gene she's been working on has attracted a good deal of commercial interest, but she has insisted that it be given freely to rice institutes in Asia and Africa -- where the gene originated.

Another of Bradford's colleagues is Ann Powell, a petite woman who speaks with gentle but unabashed passion about her work on tomatoes. Here at the UC Davis Bennett Lab, a center devoted to fruit genetics, Powell and her colleagues are particularly interested in the genes that control the process of ripening. Tomatoes are their primary research crop, but they also study melons, strawberries and grapes. On her bench Powell has a tray of tomatoes that resolutely will not ripen; determinedly hard and yellow, some have been sitting there for two months. This fortuitous aberration was wrought by a naturally occurring mutation, and Powell is trying to determine just what genes are responsible. By tagging various genes with fluorescent markers, she can track exactly when each candidate gene turns on and off throughout the fruit's development. She is interested in the research for its own sake, "for the sheer intellectual excitement," she tells me, but commercial companies are also extremely keen on such work and increasingly provide large amounts of funding. Slowing down the ripening process would prolong a fruit's shelf life and make shipping easier. Indeed, Monsanto has already engineered several strains of slow-ripening tomatoes. Powell and her colleagues have also produced a genetically modified tomato with more pulp and less water, which is helpful in the commercial production of tomato paste, and Zeneca Plant Sciences has created a tomato with more pectin and less water.

Another recent GM development is the much ä ballyhooed "golden rice," a strain of rice genetically engineered for enhanced vitamin-A content. Funded by the Rockefeller Foundation, golden rice (so-called for its distinctive yellow color, caused by the presence of beta carotene) was developed to address the problem of vitamin-A deficiency in the Third World. In Southeast Asia alone, 5 million children a year develop the eye disease xerophthalmia because of insufficient vitamin A, and 250,000 of them eventually go blind. Bradford and other GM proponents believe that innovations like golden rice will help to alleviate this and other nutritional deficiencies throughout the developing world. Indeed, Bradford suggests that as we look to the future, with world population rising to 9 billion or 10 billion, genetic engineering will be the only viable solution to the world's food crisis. (See sidebar.) In the U.S., where most GM crops originate, canola has been modified to raise the oil content, as has corn, and soy has been modified to reduce the concentration of polyunsaturated fatty acids.

Most of the innovations to date have been designed to aid in the large-scale growing, handling and processing of food, but Bradford believes that with the next generation of GM crops we will see modifications to enhance nutritional value and improve flavor. It was Davis scientists who gave us the "flavor-savor" tomato, and they have recently been studying the genes responsible for sweetness in fruit. Bradford notes that as scientists decipher plant genomes, they will also identify genes responsible for allergic reactions, and he speculates that it may be possible to engineer out the offending proteins. "What if we had peanuts that no one had anaphylactic shock over?" he enthuses. "A lot of people can't eat wheat," he continues. "Well, maybe we could get over that. These things are just leftovers from traits in the original wild relatives." People have been breeding out wild toxins for millennia; with genetic engineering we can now speed up that process. Both corn and cotton have been engineered to express a natural pesticide normally found in the *Bacillus thuringiensis* (Bt) microbe. In effect, Bt crops produce their own pesticide, negating the need for spraying. Squash has been engineered to resist the watermelon mosaic virus and the zucchini yellow mosaic virus. Most famously (or infamously), Monsanto has engineered versions of canola, soy, corn and cotton that are resistant to its glyphosate herbicide known as "Roundup." Because these "Roundup Ready" plants are resistant to the herbicide, it can be sprayed liberally over fields, killing weeds but leaving the crops themselves unharmed.

III. The Specter of the "Unnatural"

"There's nothing natural about a modern farm!" Kent Bradford declares as we drive through the Davis fields. "Every crop we eat has been highly genetically modified" through centuries of selective breeding, he says. "Corn doesn't exist in the wild. It's strictly a human creation." Ditto for many of the other staples on our tables. But however unnatural present-day crops may be, genetically modified plants will be significantly more artificial. One of the primary concerns about these plants is that with all this genetic dabbling we may inadvertently wreak environmental havoc.

Anti-GM activists worry deeply that engineered plants may have unintended side effects. A case in point is Bt-corn, designed to kill corn worms feeding on it and now widely planted across the Midwest. Biotech proponents argue that Bt crops are good for the environment because they cut down the amount of pesticides sprayed. But during the past year, several concerns have surfaced about the crops themselves. Most notably, in May '99 Cornell University scientists reported that pollen from Bt-corn had killed the caterpillars of monarch butterflies in laboratory tests. When this news hit the wires, a media firestorm erupted. Pundits who had never heard of *Bacillus thuringiensis* suddenly sounded like experts and weighed in on behalf of the beloved lepidoptera. Further studies have suggested that the risk to the butterflies is likely to be small, since wild monarchs never ingest anything like the amounts fed to the caterpillars of the original study. But if monarchs are not in danger of

fed to the caterpillars of the original study. But if monarchs are not in danger of imminent extinction from the new corn, the merest hint of that possibility propelled the issue of transgenic crops to the top of the news. When scientists at New York University further reported that toxins from the roots of Bt-corn ooze into soil, where they could potentially hurt microfauna critical to soil ecosystems, it became clear that this story wasn't going away anytime soon. Another concern of environmental activists is the problem of what is known as "gene flow" -- the possibility that engineered genes will escape into non-GM crops, or into wild plants. In theory, such genes might also escape into insect pests or viruses, creating new strains with novel characteristics. Jeremy Rifkin, a science writer and longtime biotech opponent, has dubbed this problem "genetic pollution." Yet another concern is that genetic modifications designed to counter pests and weeds will accelerate the evolution of those very same pests and weeds, thereby precipitating new strains of "superpests" or "superweeds."

The biotech industry likes to portray GM opponents as dangerous radicals or marginal fringe groups, but some scientists are also concerned. One is Margaret Mellon, a molecular biologist at the Union of Concerned Scientists in Washington, D.C. Mellon points out that the problem of weed and pest resistance is actually an acceleration of a problem that farmers have been facing since the introduction of chemical pesticides and herbicides. Given the inexorable march of evolution, pests inevitably evolve resistance to each generation of chemicals, necessitating a new generation. This has been dubbed "the chemical treadmill." With the introduction of genetically engineered resistance, Mellon suggests, we might soon begin to see a "biological treadmill" as well.

GM proponents acknowledge these concerns, but believe they can be adequately managed, often with further biotech solutions. Martina McGloughlin, a molecular biologist and now director of the Biotechnology Life Sciences Informatics Program at UC Davis, is emerging as an important spokesperson for the industry. McGloughlin exudes immense charm and brings an almost evangelical enthusiasm to her subject. In a recent article, she bluntly acknowledged that "In biology no solutions are permanent," but she says, as we

sit in her sparse office, biotechnologists are developing many lines of defense against pests. Combinations of different genes, even the introduction of synthetic genes, can be used to minimize pest-selection pressure, McGloughlin says. Over 4,000 field trials of GM crops have been performed in the U.S. over the last 15 years, she notes, and, according to her, the overwhelming evidence is that these plants are environmentally safe. Vis-à-vis gene flow, McGloughlin stresses that the risks are not unique to genetically modified organisms; plants bred by conventional ä means may also leak genes to wild relatives. To counteract this risk, she says, scientists are developing ways to modify plants so that introduced genes are not expressed in pollen, thus voiding the risk of cross-pollination. In her view, genetic pollution is unlikely to constitute a long-term problem.

What we have here, then, is a monumental clash of world-views -- one in which both sides call upon scientific studies to support their positions. Even the most basic facts are often in dispute. Take the question of reduced herbicide use, which proponents claim as a major victory. Opponents reject this notion. According to Mellon, "You do not get reduced herbicide use [with GM crops], just different herbicides." Monsanto's Roundup Ready crops are engineered to resist glyphosate, which is certainly more benign than many of the alternatives, but the bottom line is, you still have to spray something. Some opponents even worry, not without reason, that herbicide-resistant crops will actually encourage farmers to spray *more* liberally.

Which brings us to the people caught in the middle of this increasingly titanic struggle: the nation's farmers. As the ones who must choose -- or not -- to plant GM crops, they are the biotech industry's frontline, and also potentially the frontline of resistance. None more so than organic farmers. Whether or not the biotech industry stays ahead in its war with pests, organic farmers are likely to suffer. So says Jenny Broome, associate director of the UC Davis Sustainable Agriculture Research and Education Program (SAREP). Since California is a major center for organic farming, this should be of no small concern, Broome says. Organic farmers won't be planting the flashy new seeds developed by the biotech industry, so they won't be protected if pest resistance develops. Of special concern to them are Bt crops, because *Bacillus thuringiensis* is one of the few natural pesticides they have. According to Broome, some mathematical models suggest that Bt resistance could develop within just three to five years. If that tool is made useless, organic farmers will face a huge problem. Who will be responsible? Will they be compensated?

All farmers who don't use GM seeds will potentially have to contend with fallout from genetically modified plants. Last year, Monsanto sued a Canadian farmer, Percy Schmeiser, found to have Roundup Ready canola in his fields when he hadn't paid for the seeds. Monsanto accused him of theft, but Schmeiser insisted the seeds had drifted in from neighboring fields. Again, who will protect farmers who don't want to go the GM route? And when problems occur, where will the burden of responsibility lie?

IV. To Label or Not To Label?

Many of the genes inserted into GM foods so far have come not from plants at all, but from bacteria and viruses. Other major category lines are also being crossed -- think of the flounder genes inserted into tomatoes, or firefly genes inserted into tobacco. To Laura Ticciati, executive director of Mothers for Natural Law, such practices are appalling. In 1996, Ticciati attended a lecture on GM foods by John Hagelin, founder of the Natural Law Party and a current presidential candidate. "I felt that every mother in America would want to know about this," she tells me by phone from her office in Fairfield, Iowa. Since then, Ticciati has devoted her organization to this issue, notably coordinating last year's petition to Congress on GM labeling. Ticciati worries about the safety of GM foods, particularly about feeding them to growing children. How do we know these novel foods won't contain allergens or toxins? she asks. She points to the case of the Brazil-nut gene that was engineered into soybeans. Some people are highly allergic to Brazil nuts, and it turned out that the engineered soy could also cause reactions. The new plant did not make it to commercial production, but Ticciati worries that with no mandatory safety testing, genetically engineered crops may precipitate reactions that are not detected before commercialization. "Whether it's DDT or a new brake system on cars, you need time to test it," she says, and believes the FDA should mandate testing before any further GM products are added to our shopping carts. Once again, she tells me, our legal framework lags behind our technological capabilities.

One activist insists, "We are all becoming guinea pigs for Monsanto." The idea that we are unwitting participants in a giant corporate experiment is a common theme among GM opponents. Ticciati herself put it to me that "Consumers have a right to choose if they want to be involved in this experiment." As she sees it, mandatory labeling of GM foods is the only democratic option. She notes that the industry has good reason to fear labeling: In a 1999 *Time* magazine survey, 81 percent of Americans said they believed GM foods should be labeled, and 58 percent said that such labels would deter them from purchase. In Ticciati's eyes, the consumer's right to choose should be paramount. She was on Capitol Hill the day Kenneth Starr delivered his massive files on Clinton's extramarital sex life, she says, and it made her think that if the American people have a "right to know" where the president puts his pecker, then surely "they have a right to know what they are putting into their own mouths."

Rising public concern about GM foods has finally registered with the FDA. In May, the agency released a revised set of guidelines that, to the disgust of many GM activists, recommends voluntary rather than mandatory labeling. Likewise, it again dodged the bullet of legally mandated testing and opted instead for what

it has called mandatory "consultation." But according to Andrew Kimbrell, executive director of the FDA's Center for Food Safety, neither voluntary labeling nor mandatory consultation is in keeping with U.S. law.

At issue here is whether or not genetic modifications should count as food "additives." Under FDA regulation, all food additives (such as artificial colorings and flavorings) are required to go through strict safety-testing procedures. The biotech industry has long argued that genetic modifications are not additives, but Kimbrell insists that, under U.S. law, this is how they ought to be classified. The offer of mandatory "consultation" is a ruse, Kimbrell says: "'Consultation' is not a legal term." In his view, this is a sop to make the public feel that we are being protected when, really, we are not. Likewise, Kimbrell rejects the offer of voluntary labeling, which he says "is a legal sleight of hand."

Davis seed physiologist Bradford opposes mandatory labeling and testing of GM foods, believing them to be based on a misunderstanding about the history of our food supply. According to Bradford, modifications made prior to the introduction of recombinant DNA technologies were often far more radical than anything now being done. Compared to the genetic manipulations of the past -- the irradiation and chemical forcing of mutations, and the wholesale mixing of genes, such as with triticale -- Bradford says, current methods are extremely modest and a good deal safer. Genes are now inserted just one at a time. Over the past 40 years, no one demanded that altered crops be labeled or subjected to special safety tests. So, Bradford asks, why now?

Bradford is not unaware of the ironies of this reasoning. "If you go out and make this argument," he says, "people get upset. 'You've been irradiating our food! You've been mixing these genes together!' It scares the hell out of them." Yet this is the reality of modern American food. According to Bradford, scientists were completely "taken off guard" by recent public antagonism to GM foods. Much of the science was developed during the 1980s, and as far as they were concerned, due process and caution, as well as all regulatory requirements, were fully exercised then. He seems genuinely puzzled as to why people are objecting now.

I put it to him that perhaps much of the anger could have been defused if scientists had come out sooner and told us what they were doing. In conversations with activists, one emotion that kept surfacing was a sense of betrayal, a feeling that the public has been deceived not just by the industry, of whom we might expect little better, but also by scientists, of whom we generally expect more. Bradford listened patiently to my spiel, then without a touch of rancor declared, "But no one ever cared before!"

Bradford's response stopped me in my tracks. Damn right we haven't cared -- not the vast majority of us, ä anyway. Like afternoon sleepers dozing on the couch, we have been willfully unconscious of our food supply, and while we have been sleeping it has morphed beyond our bucolic fantasies. Over the past half-century our food supply has been industrialized, and as with all modern

half-century our food supply has been industrialized, and as with all modern industries, its captains have sought out the latest technologies -- including genetic engineering -- to streamline the production process and boost their profit margins. We've been blithely happy to eat this ever-cheaper food -- as Bradford notes, we have even come to take it for granted. It will not do to cast ourselves as innocent victims here.

To label, then, or not to label? Bradford suggests that because we have not labeled modified plants before, we should not do so now. But just because we haven't done something in the past is no reason not to do so in the present. My own conclusion is that we should label genetically modified foods: Genes are being *added* into plants, and many of these genes are indeed novel -- particularly when you are talking about genes from entirely other realms of the organic world. But I say this with muted zeal, for the line between "genetic engineering" and what came before is indeed blurred, and we will be kidding ourselves if we think that by not buying anything with a GM label we are opting out of the system. Likewise, while I do support mandatory safety testing, it is again with muted zeal. Personally, I am far more concerned about E. coli and botulism in canned and processed food than genetically induced allergens and toxins. Let us label and let us test, but let us not forget where our primary battle lies. The far more difficult question we must ask ourselves is to what degree we are prepared to accept the industrialization of our food supply.

V. Industrial Food

There's no such thing as a free lunch. Just as there is a hidden underbelly to cheap sneakers and T-shirts, so cheap food casts a shadow across our social landscape. We kidded ourselves when we thought there was no downside to foreign manufacturing by Nike and the Gap, and so too we must open our eyes to the downside of cheap tomato paste and cookie dough. Like any other commodity, food gets cheaper when it's produced in bulk, hence the trend over the past century to consolidate and industrialize agriculture. As with producers of every other commodity, industrial agriculturalists face the attendant pressures of free-market competition. If our brand of tomato paste can be produced for 5 cents less per can than the competitors' brand, then, hell, let's do it! Isn't that what capitalism is all about?

The quest for ever-cheaper tomato paste necessitates ever-cheaper tomatoes, which has led inexorably to monocropping, automated harvesting, and bulk use of herbicides and pesticides. Any technology that promises further cost reduction is welcomed -- hence, the industry's embrace of biotechnology. Tomato-paste manufacturers have no less urge to increase efficiency and maximize profits than do cell-phone or computer manufacturers. The difference is that we are not talking about cell phones or PCs, but about food, which, as Julie Miles of the California Public Interest Research Group (CALPIRG) notes,

"is something very fundamental."

One of the arguments repeatedly voiced by biotech proponents is that opposition to GM foods is elitist. It's all well and good for middle-class people to buy organic, but many people can't afford this option, they rightly point out. "You have to think about who you are disenfranchising," biologist Martina McGloughlin told me. Such sentiments are no doubt well-intended, but I believe there is something deeply wrong with this argument. What it tacitly accepts is a wage structure that locks vast numbers of people into the cheapest possible food options. The bottom line is that the cost of food is a central factor in our economic system, and dependence on what Kimbrell calls "industrial food" is one of the increasing injustices of that system. Genetic modification must be seen in context, not as an isolated technology but, as Kimbrell puts it, "the reductio ad absurdum of industrial agriculture." If we seriously wish to challenge this system, we will have to look beyond the technology to the political and social structures in which it is embedded. Both Kimbrell and Miles see the fight for GM labeling as the first step in what they hope will be a paradigm shift in our culture. Miles believes the issue of genetic modification "has the potential to bring us back in touch with where our food comes from and who's producing it." In other words, sleepers awake!

Farmers themselves are already suffering from the constant pressure of downward-spiraling food prices. Their share of the consumer's food dollar has declined over the past century from 41 percent in 1910 to just 9 percent by 1990. (During the same period, the marketers' share increased from 44 percent to 65 percent.) Moreover, if minimizing the cost of production is to be our major consideration, then, as with so many other goods, food can be produced even cheaper elsewhere -- say, in Mexico. Tomato growing and processing are already moving south of the border. Is this the future we want to embrace?

One possible alternative to the current system is to encourage direct relationships between urban and rural folks. Michelle Mascarenhas, co-organizer of the Trader Joe's rallies, serves on the board of directors of Community Alliance with Family Farmers (CAFF), a Davis-based organization whose mission is "to build a movement of rural and urban people who foster family-scale agriculture that cares for the land, sustains local economies, and promotes social justice." CAFF publishes a directory of places around the state where consumers can buy direct from farmers. Mascarenhas has also developed a program for Los Angeles schools in which food is purchased directly from local farms.

The debate over GM foods is often framed as a bipolar choice -- all or nothing. But Pam Ronald insists this is a false dichotomy. Indeed, more and more California farmers are pioneering an agricultural "third way." Third-way systems are not always fully organic, but use many of the benign practices of organic farming. Technology is not anathema here, and there is no reason GM crops could not play a role, provided they are carefully considered within the context of the whole system. As a plant scientist who uses genetic engineering in her own work, Ronald is not only the wife of an organic farmer; she likes to eat organic herself. In a sense, she is both a third-way producer and a consumer. For her, organics and genetics are intersecting sets.

- Anaheim Ducks v. Buffalo Sabres
  Fri., Mar. 17, 7:00pm

TICKETS

[redacted]

- Robbers Are Targeting DTLA Revelers
- The Oscars Are Less White, but Hollywood Still Turns Its Back...
- L.A. Drops Out of Top 50 Quality-of-Life Ranking
- Cannabis Software Companies Seek to Legitimize the Marijuana...