

Chapter 6

Turning the GM Battleship: The Tide of Popular Opinion and the Future of Genetically Modified Foods

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6.1 Introduction

The corporate pioneers of transgenic crops must never lose sight of the average consumer. They cannot afford to. Laypeople with minimal scientific literacy but heightened safety concerns wield tremendous cultural and consumer power. And, given that they are routinely asked to swallow a conflicting concoction of questionable information, they are impatient and frustrated. And really, who could blame them?

What is especially unfortunate about this prevalent frustration among consumers is that it stems the progress of an important technology with an impressive array of beneficial applications. Transgenic technology will never become a silver bullet solution to anything, much less a major agricultural problem. But in light of the problems that global agriculture faces in the upcoming decades, it has the potential to play critical roles in nearly every aspect of twenty-first century food production. Critics of industrial agriculture—and, by extension, critics of transgenic technology—have stubbornly refused to confront the most pressing question in agriculture today: how are we going to feed over nine billion people with minimal agricultural expansion? How are we going to achieve a density of production capable of doubling the food supply without destroying rain forests and undermining biodiversity in the process? While supporters of transgenic technology would be amiss to claim that genetically modified crops will in and of themselves solve this global quandary, there is no denying that the traits that this technology brings to the table—insect resistance, drought resistance, herbicide resistance (see Lee et al., Chap. 10; Gianessi and Williams, Chap. 14), nitrogen uptake efficiency, biofortification, and so many other benefits—can play pivotal roles in shaping a future

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agricultural system that is highly productive, profitable, humanitarian, and sustainable (Fedoroff 1999).

But again, from the consumer's perspective mixed messages about GMOs abound. Pro-biotech interests have spent the last decade promoting their products as environmentally beneficial agricultural techniques that will lower food prices, feed the world, and mitigate the negative impacts that climate change is projected to have on the global poor. In a typically salient endorsement, one industry publication explained, "genetically modified plants and animals have the potential to be one of the greatest discoveries in the history of farming" (Rousu et al. 2007). Perhaps. But these optimistic assessments raise hackles of opposition and have been assiduously countered by torrents of negativity. Environmental nongovernmental organizations (NGOs) in particular have persistently impugned genetically modified foods as ecologically destructive, a threat to public health, and sinister tools in the grips of greedy corporations interested in nothing more than the bottom line. Greenpeace, perhaps the most unhinged critic of transgenic technology, deems genetic modification "one of the most dangerous things being done to your food sources today" (Rousu et al. 2007). Extremes and distortions predominate.

Given the heavy cross-currents of information and misinformation that consumers are routinely asked to negotiate, it is perfectly understandable why so many uninformed consumers pursue the path of least resistance and, however dubious their grounds for doing so, reject genetically modified foods. It should come as no surprise that consumers who see no direct benefit in transgenic technology opt to play it safe and keep the technology at arm's length. Even the quickest risk/benefit sketch confirms that, from the consumer's perspective, this choice makes a certain amount of sense. Why take a risk when there is no perceived benefit to be gained in so doing?

But the problem with this widespread popular rejection, and often downright disdain of GM crops, is twofold. First, although there's been hyperbole on both sides, the NGOs have been far more manipulative and propagandistic when it comes to presenting accurate "information" on GMOs. As a result, they have insidiously misinformed consumers under numerous veils of "authority." Second, these distortions are hardly trivial matters—in fact, tremendous humanitarian and environmental advancements are at stake. The future of a sustainable, affordable, and healthy food supply hinges to a large degree on an active public acceptance of agricultural biotechnology. In the end, we are confronting a situation in which the public is being misled, perhaps at times all too willingly, about a potentially powerful humanitarian and environmentally beneficial approach to farming. The court of public opinion, as a result, must be set straight.

This chapter explores how this task might be accomplished. It will primarily evaluate the extent and nature of our entrenched skepticism of GMOs. It will do so, moreover, with an eye toward suggesting exactly what strategies might eventually erode that skepticism and, perhaps, turn the GM battleship in a new direction, one that points to a radical reconceptualization of agricultural biotechnology by mainstream consumers. The first half of my analysis examines why anti-GMO efforts have succeeded as well as they have in swaying public opinion away from

transgenic technology. Answering this question requires exploring three themes: the ideological depth and sociological nuance of the anti-GMO critique, the media's frequent complicity in perpetuating negative perceptions, and the underappreciated impact of the local food movement on popular consumer opinions. Building on these mitigating factors, the second half of this essay explores how these seemingly inveterate negative reactions to transgenic technology could realistically yield to a more responsibly presented pro-GMO message, a message marked by credulity and accuracy rather than ideologically charged distortion. Central to this change would be industry's reconsideration of several fundamental issues—issues including labeling, the ideal avenue through which to tell the truth about biotechnology's potential, and the importance of “connecting” with consumers from the “bottom up” through valuable products with which they can identify.

6.2 The Sources of Anti-GMO Outrage

6.2.1 *Motivation of Anti-GMO Movement*

Understanding the nature of the opposition to biotechnology begins with a simple question: What are opponents of GMOs actually protesting when they protest genetically modified crops? As it turns out, rarely are they protesting genetically modified crops. In fact, rarely are they even talking about science or technology or even agriculture. Indeed, one of the more troubling aspects of the anti-GMO advocates is the assumptions based on a petrified premise mired in anticorporate, antiglobalization, and anti-industrial ideology. This is not to say that it is inherently problematic to critique these complex global trends. There must always be room for healthy debate on such critical issues. But when, in the opposition's condemnation of modernity's defining features, these groups reflexively dismiss a specific technology because of its association with a larger trend of which they disapprove, they are being intellectually deceptive rather than engaging the specific issue on its own terms. As a result, we have every justification to scrutinize the anti-GMO movement's deeper motivations—motivations that, as we will see, have little to do with precise claims against GMOs per se.

In their article “Sustaining Outrage,” William A. Munro and Rachel Schurman explore the roots of opposition to GMOs in considerable depth, mining the underlying ideological impulses behind the most fervent opposition to biotechnology. Locating the movement's “motivating sensibilities” in the “new” social movements that developed in the 1970s, they reveal a telling perspective. Passions at that time fomented around a complex set of issues that predated biotechnology—issues such as nuclear power, renewable energy, the military–industrial complex, and toxic waste. These movements gradually cohered into a broader condemnation of corporate consolidation and globalization in general. As it did, a diffuse grassroots

movement became poised to (ipso facto) place in its crosshairs any technology prone to corporate consolidation and “neoliberal” application, especially when it came to the global south.

6.2.2 Prefigured Opposition to Agricultural Biotechnology

Agricultural biotechnology, as it developed in the early 1980s, happened to fit these prerequisites to a tee. With minimal debate, anti-GMO activists instantly placed biotechnology “under the umbrella of concerns about a potentially apocalyptic and unnecessary technology.” In this sense, the direction of popular outrage reflexively followed the same course of protest previously forged by opponents of nuclear proliferation and toxic waste dumping. Again, the point here is not to suggest that biotechnology should have been allowed to slip into the public sphere with a free pass. No technology deployed in a democratic society ever warrants such privileged treatment. The point is simply to show how, in many respects, formal opposition to biotechnology was, in a sense, prefigured. It was set in stone before a fair and open discussion of its comparative merits and drawbacks might have taken place (Munro and Shurman 2008).

The rhetoric of opposition animating the anti-GMO movement clearly betrays this presumption. As Munro and Shurman document, one activist explained that the roots of opposition derived from a desire “to question the whole industrial paradigm.” Note that, as this comment reveals, fear was not directed against a questionable scientific or technological danger. Instead, it was pegged to such amorphous phenomenon as “huge systems” and “the dominion of the means of production.” Another activist writer described agricultural biotechnology as “an economic race to own the biological and genetic ingredients of agriculture.” Yet another based his opposition to GMOs on the general grounds that “any new technology introduced into a society which is not fundamentally just will exacerbate the disparities between rich and poor” (Munro and Shurman 2008).

Munro and Shurman observe that the common thread running through so much of the oppositional camp was not a scientifically grounded critique of GMO safety. Instead, it was a rejection of “the predominant values of late capitalist society.” Such a position has a tendency to encourage hysterical commentary, such as when two authors wrote in an academic volume that GMOs would compromise biodiversity to the point that they would cause “the single biggest environmental catastrophe in human history (Munro and Shurman 2008). The last comment notwithstanding, there are perfectly legitimate reasons for being wary of the power structures characterizing “late capitalist society,” but those concerns are not enough to forego a balanced discussion of the science and safety of genetic engineering. Still, anti-GMO activists have done a remarkable job of subsuming any factual-based discussions of biotechnology under the emotionally charged rubric of an antiglobalization campaign.

6.2.3 *The Media and GMOs*

This elision between larger global inequities and a condemnation of GMOs has been especially evident in the fraught relationship between agricultural biotechnology and the popular press. By no means is it the case that “the press” as a whole is categorically skeptical of GMOs. But there is little doubt that, generally speaking, the mainstream media has closely followed public opinion in their failure to evaluate the underlying positive potential of transgenic technology. An important study published in 2006 found that media coverage of GMOs was “intimately associated with other political events of the time, notably the invasion of Iraq” (Cook 2006). While pro-GMO media outlets stressed the issue as a scientific one, the much more influential anti-GMO media response rejected “scientists and companies as unreliable” and cast the issue of GMOs in “a more global frame” (Cook 2006). Many traditional news outlets practice an insidious form of suggestive (and sloppy) journalism, as one article confirmed when, after citing no evidence that GMOs are in any way linked to allergic reactions, noted that “In Britain, the number of children developing potentially fatal allergies to nuts has trebled in the last decade” (Cook 2006). Others redirect concerns from a balanced assessment of GMO’s pros and cons to who is most likely to benefit financially from the ongoing adoptions of transgenic crops. As the authors of the 2006 report note, the *Guardian* routinely “emphasized the social and political context of GM knowledge or practices [and] the economic interests of those who fund or support it” (Cook 2006). Conflating transgenic technology with global conflagrations such as international warfare, or with something as universally detestable as corporate greed, far too many press reports “appear to share the view of C. Wright Mills, expressed half a century ago, that a ‘power elite’ consisting of military, economic, and political leaders, have oligopolistic control over foreign and domestic policy decisions and regard GM as symbolic of this domination” (Cook 2006).

No matter what bias a particular news source might have with respect to agricultural biotechnology, media accounts of GMOs are almost universally marked by overwrought claims and glaring headlines. In a typical case of hyperbolic headlining, the UK’s *Independent* screamed, “Exposed: the great GM crops myth”. The piece went on to impugn GM soybeans as causing yield losses. This categorical claim is not only based on one small study, but the article failed to contextualize it in the following necessary points: (a) GM soy is not designed to increase yields but to prevent yield losses; and (b) a number of other studies have found substantial decreases in yield losses. Positive reports err as well in their obsession with the issue of yield. Reporters will often present transgenic technology as integral to solving “the food crisis” without mentioning the numerous other beneficial functions they serve beyond the singular issue of yield. Given that Martin Taylor, chairman of Syngenta, has publicly explained that, “GM won’t solve the food crisis, at least not in the short term,” media reports have badly distorted the matter by reducing the success or failure of GMOs to the sacred benchmark of yield (Brainard 2008). Perhaps more problematically, such simplistic success-or-failure

media treatments of transgenic technology ignore its underlying scientific complexity—a complexity that concerned consumers should be encouraged to negotiate. In so doing, it perpetuates popular distrust of scientists, thereby contributing to the kind of “denialism” that prevents lay consumers from attempting to appreciate the less accessible scientific aspects of transgenic technology (Specter 2009).

A final issue preventing many reporters from delving into the science underscoring transgenic technology involves the pressure to be “objective.” Despite the clear biases that many news outlets continually indulge, there is a corresponding effort to mitigate that bias by balancing one opinion against another. For example, a *Chicago Tribune* story ultimately critical of GMOs began with a quote from one food expert explaining, “It is established fact that a number of bio-engineered crops have shown themselves to increase yields through their drought resistance and pest resistance.” Then, a few paragraphs later, the story proceeded to quote a representative from the organic lobby, who remarked that “it’s pretty obvious at this point that genetically engineered crops...don’t increase yields.” The writer Seth Mnookin, who has written extensively about public perception of vaccines (and is now a journalism professor at MIT), refers to this balancing act as “manufactured equivalence” (Mnookin 2010).

The juxtaposition of favorable and unfavorable quotes in an objective news story might seem to be a basic tenet of responsible journalism. But there is a bit more to it. Newspaper writers are being pushed to balance out their stories in order to give their work the appearance of judiciousness. But this literal interpretation of fairness—one positive quote for every negative one—ultimately backfires in that it does nothing to advance data-driven conclusions. Instead, it exonerates the reporter from doing what he or she should have been doing all along: researching and reporting on *which* of the conflicting opinions dutifully presented was more accurate. As a writer in the *Columbia Journalism Review* notes, “Too often, science journalists think that adhering to the old norm of ‘balance’ fulfills their obligation to readers. But two conflicting statements do not enlightenment make.” If a position in a debate is so obviously wrong, why should it deserve representation? (Brainard 2008).

6.2.4 *The Internet and GMOs*

If mainstream print media errs by manufacturing equivalence, the Internet fails by fomenting chaos. Lacking gatekeepers (and, very often, basic decency), web-based sources of information tend to create a toxic informational atmosphere characterized by fear mongering and rhetorical hysteria. In his recent book, *The Panic Virus*, Seth Mnookin explores how the unique connectivity of the Web promotes the unprecedented spread of dangerous misinformation. Although Mnookin is writing about the growing denialist opposition to vaccines, it becomes immediately apparent that an identical Web-induced “panic” has misled consumers about the dangers of transgenic technology. “The anonymity and lack of friction inherent in the online

world,” writes Mnookin, “means that a small number of committed activists—or even an especially zealous individual—can create the impression that a fringe viewpoint has strong support” (Mnookin 2010).

A case in point with respect to GM seeds would be that of Jeffrey Smith. Smith heads an organization of his own creation called the Institute for Responsible Technology. He has self-published a small shelf of books so packed with innuendo and outright lies about the dangers of GM seeds that Academics Review, an independent organization of scientists dedicated to ferreting out scientific misinformation, maintains a website that systematically debunks Smith’s books point by point. Either by taking studies out of context or failing to cite peer-reviewed work at all, Smith has claimed that Bt corn is linked to liver cancer and birth defects while listing 65 specific health problems attributable to GM seeds (Academics Review 2010).

It is important to note that Smith would not be able to make his claims without an unregulated World Wide Web to make them in. He keeps a blog that he routinely updates with unsubstantiated anti-GMO messages alongside conspicuous advertisements for his books. The penultimately revealing thing about Smith is that he has no background in science. Instead, his training is in Maharishi studies and swing dancing. His most notable accomplishment before reinventing himself as an anti-GMO barnburner was to convince thousands of people all over the world to practice a meditation maneuver called the “flying yogic technique” at the same time. Nonetheless, he is often the media’s go-to guy for supposedly legitimate information on a technology that he not only fails to understand, but exploits to his professional advantage.

6.2.5 Food Movement

Another (but hardly final) factor contributing to public distrust of transgenic technology centers on the popularity of a new but influential Food Movement. Unlike Jeffrey Smith, the Food Movement is a perfectly legitimate endeavor. It just happens to be narrowly focused and deeply opposed to GM seeds. Members of the Food Movement generally seek to eat local, organic, and “all natural” food—food that has preferably not been processed or produced by a multinational company. Underscoring this mission is the idea that the Western diet has become alienated from its subsistence-oriented, pre-industrial roots. People have, in this assessment, lost contact with where the food comes from, who makes it, and why it tastes the way it does. A central mission of the Food Movement is thus to reduce the distance between producer and consumer, going so far as to encourage consumers to be their own producers, or at least become close enough with a local farmer to have a fuller understanding of the methods used to grow local food. Defined by mantras such as “don’t eat anything your grandmother didn’t eat,” (Pollan 2008) this is a movement that has little to no sympathy for (or understanding of) transgenic technology. Efforts to present GM seeds as compatible with organic methods or as just the

latest step in a many thousand year history of plant breeding tend to be met with indifference, if not outright hostility from this very influential group (McWilliams 2009; Ronald and Adamchak 2008). The media, one might add, adores virtually everything the Food Movement represents.

6.3 Turning the Battleship

Are there solutions to these problems? In light of the myriad and powerful forces preventing everyday consumers from developing positive assessments of transgenic technology, one would be justified in thinking that pushing public opinion in a more positive direction was a losing proposition. Indeed, when I recently gave a talk at a large seed company with a less than pristine public image, this attitude was certainly in evidence. I was told that a significant portion of the company was simply not interested in continuing its attempt to win the hearts and minds of average consumers. There was too much scientific illiteracy, they claimed, too much muddled skepticism and ideological blindness. I think that this position, while perfectly understandable, is a mistake. Thus this section of this chapter will attempt to argue that, with the right methods and message, public opinion about GM seeds could realistically change for the better.

6.3.1 *Voluntary Labeling*

First, although this idea sits poorly with the industry, some form of voluntary labeling must be enacted. Currently, the FDA does not require food products to contain any information about GM contents. It is important to understand why this is the case. The FDA currently relies on the principle of “substantial equivalence” as its reason for not requiring GMOs to be labeled. According to this idea (which was formulated by the Organization for Economic Cooperation and Development in 1991), a novel food such as GM food should be evaluated and regulated according to the same standards as its conventional counterpart if its composition and characters are the same. Another reason that the FDA does not require GMO labeling is because, consistent with the Federal Food, Drug, and Cosmetic Act, a whole food—such as corn or soy—is considered GRAS (“generally recognized as safe”) and thus does not have to be subjected to the extensive and expensive safety review. It is extremely unlikely that the federal government is going to abandon its adherence to these established and basically effective methods of evaluating the food system.

That said, a voluntarily sought out label would go a long way toward dispelling the popular, albeit paranoid, assumption that a handful of seed companies are surreptitiously trying to conquer or contaminate the world’s food supply. A typical—albeit completely hyperbolic—example of this all-too-popular opinion comes from

a commenter to a Huffington Post article who wrote that “One of the reasons so many Americans are overweight is because corporations like Monsanto are sneaking GM foods into our diets.” Sadly, many consumers believe this kind of talk. Labeling products made with GM ingredients would not only directly counter this widespread delusion (one that has done a great deal to foster interest in organic choices), but it would also remind consumers that GM ingredients are integral to our food supply—and have been for 18 years—without a single documented negative side effect. In short, labeling would help earn consumers’ much needed trust in the fact that seed companies have nothing to hide while normalizing the fact that GM ingredients are indeed everywhere. Otherwise, it is simply too easy to portray the Monsantos of the world as being duplicitous and deceptive (Roe and Tiesl 2007).

Labels would not only enable the industry to avoid popular perceptions of duplicity, but it would allow it to present a more accurate message to a more receptive audience. Considerable research suggests that labels—especially those certified by the USDA and FDA—work very well in establishing consumer confidence (Degnan 2000; Pornpitakpan 2004). According to a 2006 study published in *Food Policy*, consumer credibility is especially strengthened when “genetic modification is mentioned as the means for implementing a more fundamental claim” such as lowered pesticide usage (see Redick, Chap. 3; Lee et al., Chap. 10). As the authors explain, “When the GM claim was expanded to include the reason for the genetic modification respondents’ purchase intent tended to be higher and, in several instances, significantly higher.” When accurate and elaborated labeling was accompanied with a toll-free telephone number and web address for consumers to pursue further questions they might have, labeling credibility increased even further. The potential rise in food prices notwithstanding, these are important findings to consider, especially given the fact that more and more products are being sold with “non-GMO” labels, a development that significantly tips the scales of public opinion against GM foods.

Another reason why accurate labeling is a promising idea centers on an often underappreciated reality: many (if not most) consumers are actually undecided about biotechnology. Indeed, despite the fact that many more people are likely to be overtly opposed rather than overtly supportive of GM seeds, consumers tend to hold, according to the most comprehensive study of public perceptions of biotechnology, “a complex set of beliefs about a range of health, environmental, and social risks and benefits of GM food and crops” (Poortinga and Pidgeon 2007). According to an extensive survey of citizens in the UK, a region that is far more skeptical of GM seeds than the USA, consumers have not become more opposed to transgenic technology over the years, but rather “more undecided about GM food” (Poortinga and Pidgeon 2007). This ambivalence represents an opportunity.

Many of the undecided respondents even leaned in a supportive direction. While people certainly harbor a range of concerns about agricultural biotechnology, the authors note that “a substantial proportion of our sample appreciate the various (potential) benefits of GM food and crops.” The study found, for example, that responders were more than twice as likely to support the claim that “some GM

crops could benefit the environment by requiring less pesticides and chemical fertilizers than traditional crops.” In the same vein, more respondents agreed than disagreed with the statement that GM crops could “improve the prospects of British farmers by helping them compete with farmers around the world.” Only 11 % of those surveyed disagreed with the remark that “some GM non-food crops could have useful medical benefits.” Overall, the documented ambivalence over GM crops among a significant portion of the population, in addition to what seems to be an encouraging predisposition toward acceptance, suggests that the time is quite ripe for a carefully considered labeling campaign (Poortinga and Pidgeon 2007).

6.3.2 *Third-Party Reviews*

A second decision the agricultural biotechnology industry should make to further the process of promoting positive public opinion is also one that it will initially resist: it should stop attempting to be the bearer of its own good news. Companies such as Monsanto and Syngenta need to recognize that their interests are too conflicted to be trusted by the public to provide accurate assessments of its own products. Anyone who has read the science knows that GM seeds will reduce pesticide applications, increase food availability in developing countries, and help confront the world’s impending crisis. But the companies that make these seeds must allow other sources of information to convey this information. A number of marketing and economic studies confirm this assessment. For example, in a 2007 study, researchers found that “the perspectives of interested parties are consequential in an auction market setting; pro-biotech information distributed by the biotech industry has significantly negative effects on bid price” (Rousu 2007). However, this is not the case when the positive information comes via a credible third party. As the authors note, “verifiable third-party information in the GM food market has potentially large and statistically significant social value” (Rousu 2007). While the industry’s outreach efforts are admirable, its focus should be on transparency (which includes labeling) while allowing a fair-minded third party to present accurate biotech information to the general public.

Such an organization might consist of scientists, environmentalists, and even religious leaders. It should be carefully vetted in order to have no affiliation with any of the interested parties surrounding the issue. It should be nonprofit and have no activist mission. What the involvement of such an agency would mean for the biotech industry is, admittedly, a lessening of control over their message—something no company wants to experience. As the authors of the 2007 assessment note, the optimistic rhetoric behind GM crops would be toned down. For example, the industry has presented the environmental impact of GM plants in these terms: *GM technology has produced new methods of insect control that reduce chemical insecticide application by 50 % or more. This means less environmental damage. GM weed control is providing new methods to control weeds, which are a special problem in no-till farming. Genetic modification of plants has the potential to be one of the most*

environmentally helpful discoveries ever. But, in the hands of a third party, the same message might read like this: The effects of genetic modification on the environment are largely unknown. Bioengineered insect resistance has reduced farmers' applications of environmentally hazardous insecticides. More studies are occurring to help assess the impact of bioengineered plants on the environment. One study's reported harm to Monarch butterflies from GM crops, but other scientists were not able to recreate the results. The possibility of insects growing resistant to GM crops is a legitimate concern.

It is true that the authority consumers might grant to such a statement, as a result of its third party status, means that industry will have to settle with less-than-promotional portrayal. But consider a couple of countervailing points. First, even-handed third-party verifications, even if they are not as enthusiastic as the industry might hope, will very likely open up more consumer minds (recall, a large portion of whom do remain genuinely ambivalent about transgenic technology) than would industry's own promotion of its product. Second, the emergence and acceptance of fair-minded third-party assessments would go a long way toward delegitimizing the hysteria that comes from radical anti-GMO groups such as Greenpeace. Consider their statement about the environmental impact of GM seeds: *Genetically modified foods could pose major environmental hazards. Sparse testing of plants for environmental impacts has occurred. One potential hazard could be the impact of GM crops on wildlife. One study showed that one type of GM plant killed Monarch butterflies. Harmful insects and other pests that get exposed to these crops could quickly develop tolerance and wipe out many of the potential advantages of GM pest resistance.* The value of a third-party assessment is that it would correct for this all-too-common brand of propaganda. In the end, industry's decision to allow their products' benefits and drawbacks to be introduced to the public through a credible and responsible third party might have short-term costs, but it promises to pay off in terms of long-term consumer trust of biotechnology (Rousu 2007).

6.3.3 Direct Consumer Benefits

The final way in which biotech can achieve greater consumer support would be to develop and market more products with direct consumer benefits. Reminding the general public that GM seeds will lead to cheaper food, confront starvation in Africa, and even diminish the application of highly toxic pesticides is certainly important, but it ultimately fails to address the "what's in it for me" issue. Because consumers overwhelmingly feel that there's no direct consumer benefit to come from GM seeds, they remain much more open to the suasions of anti-GM activists who portray Monsanto as the avatar of evil and its seeds as the basis of environmental degradation. The only way to stop this cycle of negativity is to appeal directly to the consumer in a way that requires them to reassess risk. And if there's a vulnerable spot in the consumer's armor of suspicion—that is, an area where he or she has historically shown a remarkable willingness to take risks and entertain

personal change—it is in the realm of nutrition. Put simply, transgenic technology must initiate and make itself indispensable to a twenty-first century nutritional revolution.

Never before has the timing been better to do this. The future of nutrition is an extremely exciting one. Right now food chemists, nutritionists, and plant biologists are exploring how our food supply—which has been nutritionally depleted over hundreds of years (<http://www.scientificamerican.com/article.cfm?id=soil-depletion-and-nutrition-loss>)—cannot only be enhanced and biofortified to replenish dozens of lost micronutrients, but possibly even individualized as personal diets based on a person's precise nutritional needs. Nutrigenics, as this new way of thinking about food is called, will happen at the intersection of human genomics, personal nutrition, and biotechnology. Many of you are likely aware that the one area where the public maintains a relatively high regard for biotechnology is in the field of pharmaceuticals. As our quest to optimize the nutritional quality of the human diet brings us closer and closer to designing foods that prevent and fight disease, the potential for nutritionally enhanced GM products—not to mention the companies who make them—to thrive with the utmost public support would very likely skyrocket.

6.3.4 *Learning from History*

Perhaps the best support for this final argument comes from history. It is worth noting that, a hundred years ago, consumers had to make sense of another controversial and frequently misunderstood technology. So controversial is this technology that, at its inception, critics insisted that it would utterly ruin the global food supply. They worried that real food as we know it would disappear, yielding to a fabricated cornucopia of processed, bad tasting junk. Worse, detractors argued that food would become inherently unsafe with the advent of this invention, that unscrupulous corporations would monopolize and exploit this technology to deceive the general public, and that we'd all succumb to a variety of strange diseases. Advocates of this technology predictably went on and on about how it was going to feed the world and cut food costs, but diehard opponents dismissed such claims as rotten propaganda. Many European countries went so far as to ban this technology altogether. The French, as it happens, led the way.

The technology in question here is *refrigeration* (Friedman 2009). Of course, despite its initial unpopularity, refrigeration went on to become perhaps the most critical technology related to food production and consumption. When I think about the parallels between the refrigeration and GM seeds I'm especially drawn to the post WWI era. It was then that something critical happened in order to radically, and almost immediately, change public opinion about refrigeration. It had nothing to do with the dissemination of information and everything to do with the fact that people could now buy compact refrigerators and put them in their homes. The advent of GE's Monitor Top compact fridge in the 1920s transformed refrigeration

from a distant technology that benefitted companies who were transporting perishables to the one that offered a tangible and direct good for the average everyday household. In its 2004 survey, the Pew Charitable Trusts noted that “consumers are most supportive of [the] uses of biotechnology that they feel will directly help them and their families” (Miller 2004). This conclusion applies perfectly to refrigeration. In fact, and somewhat ironically, consumers were so responsive to the obvious conveniences offered by the compact refrigerator that they easily overlooked the fact that the refrigerating medium—sulfur dioxide—was corrosive to the eyes and capable of causing visual impairment and severe burns. It just goes to show: our personal assessment of a technology’s risk is dramatically altered when that technology improves the quality of our lives. Transgenic technology can, and should, do precisely that.

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