

Science and Food Fictions: Agricultural Technologies, the Evolution of the Modern Industrial Diet, and Calls for a Food Revolution

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Individual food choices are culturally and historically contingent practices that arise through an amalgamation of often hidden political, scientific, and economic policies that shape desire and influence access. Food, like all other man-made mechanisms of control and authority, has been used “as a political tool for [...] subjugating (either economically or politically) other nations” according to William A. Dando, a professor at the University of North Dakota, who in 1975 urged American agricultural officials not to use food as “a weapon” against starving nations, something he feared was eminently possible given the economic and political climate of agricultural production (13). Dando, among those wearily emerging from the chemical stupor created by the Green Revolution, argued that “famines are a facet of the agricultural revolution and man’s cultural biases” rather than simply natural phenomenon resulting from droughts or the unpredictable invasions of pests (14). He warned other scientists and agricultural officials in attendance that future “food shortages and famines [would] be contrived for economic, political, and ideological purposes” (18). Dando’s dystopic vision was not an apocalyptic warning, but an impassioned recognition of the growing disparity in world food supplies resulting from political, economic, and cultural practices that often ignore the moral and ethical implications of industrial food production.

The problem of food and technology arises in a multiplicity of complex and sometimes competing discourses, perhaps because ingestion is a universal act of voluntary transgression that engenders power relations built on curiosity and fear. Food is necessary for survival, but it is available only as it penetrates the boundaries of the human body and makes the individual vulnerable in ways not always immediately visible or knowable. The modern eater knows little about his food, knows little about how or where his food was produced. He must believe that the ground upon which his food was produced is safe, that the technologies used to grow, transport, and produce his foods are safe, that the food itself is nutritious and safe. Ingestion is an act of faith. But beginning with the Green Revolution, that act of faith has been badly shaken throughout the growing global markets, where the “supply, demand, and need for food are principal preoccupations of people and their governments” (Perissé 67). An interdisciplinary approach to the conundrum of food—particularly agricultural crops—and food technologies through an examination of the ways in which agricultural technologies are politically, economically, and culturally constructed provides a framework for better understanding the intersections of science, technology, politics and culture.

In order to better trace the ways in which food production influences (and often guides and controls) individual ingestion, this article examines the historical shifts that led to the implementation of food technologies, and the ways in which both industry and non-industry writers bring these technologies into the public discourse. Of particular interest here will be chemical supports (including chemical pesticides and fertilizers) as well as agricultural bioengineering interventions, such as Bt (*Bacillus thuringiensis*) transgenic plants and other GMOs (genetically modified organisms). Just as important as the revolutionary scientific texts of

Rachel Carson, and the essays of environmental theorists William Cronon and Wendell Berry is the fictional techno-fantasy of assault proffered recently by Ruth Ozeki. Together, agriculturists, biologists, journalists, anthropologists, economists, and novelists attempt to raise public awareness about increasingly invasive food technologies and their potential effects on humans and nonhumans. In many ways, these multiple discourses proliferate our modern world, highlighting the ongoing anxiety that attends our consumption and inundating modern readers with conflicting ideas about food. Modern food choices then are at once more transparent and illusive. Although sometimes in conflict, discourse surrounding consumption demonstrates that the food of our imagination is very rarely the food on our plates.

The rise of the modern industrial agricultural complex came into full bloom during what has ironically been identified as the Green Revolution, and has continued to burgeon with the aid of controversial biotechnologies and genetic modifications that promise to reduce world hunger and improve crop yields even in areas of the world where agricultural production has been stunted. The Green Revolution began in earnest in the 1950s as a noble endeavor intended to feed the world and stave off growing rates of starvation. Food producers were desperate to find ways to increase agricultural production in order to meet increasing nutritional demands, and to reduce growing world hunger borne of quickly expanding populations in areas of the world with limited natural agricultural resources and even greater limits on access to technology. Capitalism, to be sure, was also a driving force behind the age of chemicals, as discoveries meant profits, which have been bountiful for a very small few and have had the legacy of “increasing the gap between rich and poor” around the world, according to anthropologist E.N. Anderson (224). But, initially at least, practical rather than economic concerns were the driving force behind the race to improve crop yields. Industrial scientists and chemical engineers worked with farmers,

particularly in America and England, where production was already fairly plentiful compared to global standards, to increase production yields and reduce agricultural losses from pests and disease through a host of newly engineered fungicides, herbicides, and pesticides.

The chemicals were intended to target the most notorious offenders that proved to be the greatest threat to food crops. Better described as the Chemical Revolution than the Green, these products appeared to provide the answer to increasing food demands, at least for a short while. Anderson argues that the Green Revolution “clearly saved the world from mass famine” as it was intended to do (224). Indeed the numbers bear out his claims. Crop yields between 1965 and 1975 surpassed demand and global agricultural yields continued to increase through 2003 before hitting a plateau (“Future of Food” 188-89). Chemicals, it appeared, had averted a worldwide food shortage, and had ushered in a new era of food production, in which science and nature appeared to coevolve seamlessly and for the benefit of the world population.

Despite the promise of the agri-chemical alliance that gave rise to the science of farming, the more prevailing legacy of the Green Revolution has resulted in the most sustained, prolific, costly, and all too often-overlooked or unrecognized, war in American history: the chemical war, which has been waged by corporations and agribusinesses against humans and the natural world for more than half a century. Biologist Rachel Carson is often credited with being the first scientist to sound the alarm about the potential far-reaching and disastrous consequences of the agri-chemical warfare. Her book, published in 1962, was one of the first to make concerns about chemical use available to the ordinary consumer. *Silent Spring* offered a prophetic, if alarming, examination of the immediate hazards and potential long-term consequences of the widespread use of chemical pollutants, both those used in aerial and land-based applications, in agricultural

production on the health and well being of the natural world and on humans. The book, which made complicated scientific findings cogent and accessible to consumers without condescension, was widely disregarded, or worse discredited, by many of her male scientific counterparts, who not surprisingly worked for the very companies whose profits relied on chemical patents, or the United States government, which had a stake in maintaining US dominance in world trade markets. Carson's text, sadly, continues to read as a contemporaneous call to recognize the latent and insidious infiltration of harmful chemicals into our "soil, water, and food" and thereby our own bodies (188). Although many of the names and designations for chemicals manufactured in the US have changed—or moved to other parts of the world where other governments will risk anything to increase food production and profits—since Carson's book was first published, the chemical scourge continues to destroy and devastate bodies indiscriminately even as supposedly safer new technologies have been introduced.

In fact, the ravaging consequences of chemical pollutants that are the central concern of *Silent Spring* may be more prolific in the wake of expanding global trade markets than they were when Carson came under attack as the harbinger of bad tidings. Herbicides, fungicides, and insecticides continue to inundate soils, plants, waterways, and bodies. We are all living poisoned daily. Corn provides one example of the ongoing use of these chemicals, and demonstrates the extent to which we have come to rely on chemicals for an agricultural boost. Corn is an American symbol of innovation and excess. Author Michael Pollan, a journalist whose books on food and consumption have been widely praised, has declared that "corn has succeeded in domesticating the human animal in extraordinary ways" (23). Corn is the most prolific of the abundant crops that pushed out "nutritionally better and more critically needed crops like legumes and vegetables" precisely because it responded so well to the burgeoning chemical

assault (Anderson 224). In the US, farmers produce two types of corn: one is meant for direct human consumption, and the other is meant for indirect human consumption through animal proteins—as Pollan notes, “the industrial food chain transforms bushels of corn into steaks” through livestock intakes (66).

Corn production for direct ingestion by humans requires 473.6 million pounds of fertilizer, 315,700 gallons of herbicides and 1.16 million gallons of insecticides each year in the US alone in order to produce 14.2 billion kernels (“Future of Food” 191-92). Corn production for ingestion by livestock requires 35.7 million gallons of herbicides and 91.8 million gallons of insecticides in order to produce 2.8 trillion kernels in the US each year (“Future of Food” 191-92). Each type of corn carries a chemical legacy as it enters the human body, either through direct consumption or through the passive consumption of beef and other industrial farm raised proteins.

Many of the chemical applications used today to protect and improve the growth of corn, and other agricultural products, are manufactured by the very companies Carson identified as practicing in secrecy and without proper concern for public safety a half a century ago. Criticism was swift and harsh. Many of the “chemical companies” she had dared to name “demonized her” (McKenn and Pratt 205). Even those who did not outright reject her findings dismissed her writing as banal. Frederick Stare of the Department of Nutrition at the Harvard School of Public Health responded that while Carson wrote “with passion and with beauty,” she had not appropriately maintained the requisite “scientific detachment” necessary for her subject (“Comments” 1). In a subsequent article published in 1992, Stare described Carson as a “nonscientist” and seems to lay blame on Carson for what he describes as the current state of

“chemophobia” (“More Comments” 1). Although critics were abundant, so too were those who found compelling evidence in Carson’s warnings. Carson’s *Silent Spring* is a deceptively straightforward scientific exploration of the science behind chemical production and the risks involved in using the chemicals in the growing industrial food complex. Even Stare reluctantly credits Carson with “arousing an apathetic, unscientific public to a most serious problem” (“More Comments” 61). Of course, for Stare the only problem she raises that is worth recognizing the need to provide “enough food for an exploding population” (“More Comments” 61). In his second reading, he refuses to acknowledge that Carson established the ecological chain that connected man to his environment. Carson provided a clear link to the poisoned Earth and humans: “Man, however much he may like to pretend the contrary, is part of nature. Can he escape a pollution that is now so thoroughly distributed throughout our world?” (188). Scientist and layman could not avoid coming to the conclusion she had led them to: humans are not immune. There is a “Human price.” Carson not only recognized the terrible public health nightmare on the horizon, but she also understood the need to wrest the subject from the sole proprietorship of the scientific community—the so-called experts, who claim to maintain a healthy, professional distance from their subject, to be detached from their concentrations or areas of professional interest: a fiction that few scientists can credibly claim. Science is equally bound up in the political, social, and economic realities from which its theoretical endeavors emerge. Feminist scholar Londa Schiebinger articulates the ways in which pseudo-sciences have often been used as “justifications for social inequalities” particularly along race, gender, and economic trajectories (22). Scientific evidence is frequently used as a tool to reify standards of difference, rather than to eliminate them. Schiebinger demonstrates the way in which science can be implicated in insidious acts of defining, identifying, marking, and categorizing to create

hierarchies of control that tend to withstand, at least initially, discursive strategies of resistance by marginalized identities. Although powerful forces attempted to silence Carson, her book was persuasive and has had a powerful legacy that continues: she is often invoked by those who call on new counterrevolutionaries to examine the real cost of proliferating food technologies.

Organizations responsible for tracking human health concerns began to examine the effects of chemical exposure on humans as a result of Carson's highly publicized claims. "According to the World Health Organization, pesticides had caused a million cases of acute poisoning—most of them agricultural workers—by 1985" (Fernández-Armesto 209). Increased awareness does not appear to have improved working conditions for workers around the world or the US. In Deborah Barndt's ethnography of the tomato and farm workers in Mexico, she found that migrant workers were not trained in the use of agrochemicals provided by Bayer, Dupont, or Monsanto—the big three chemical producers (15). Barndt's 2002 book, *Tangled Routes: Women, Work, and Globalization of the Tomato Trail*, demonstrated the absolute disregard with which farm workers continue to be treated as "protective gear [was not] provided for workers in fields where pesticides are sprayed by hand, combine, or small plane" (15). Even in the US, where agricultural workers accounted for just 2% of the work force between 1994-1999, they suffered 13% of all occupational deaths (Larson 8-13). According to the 2003 report of the National Center for Health Statistics, agricultural workers die at a rate of 22.8 deaths per 100,000 compared to the overall workforce death rate of 4.3 per 100,000 employees each year in the US. While not all of these deaths can be attributed to chemical exposure, a great number of deaths are due to respiratory and other illnesses related to chemical exposure. As crop production, and the chemicals needed to assist their growth, illustrates, the danger from chemical exposure

continues, especially for agricultural workers, who remain at greater risk due to prolonged and intensive exposure to a variety of understudied chemical stewes.

Perhaps the greatest difference between the application of chemicals for agricultural uses at the beginning of the Green Revolution and today is that the gains in crop yields are no longer keeping up with the increasing demands, which means the benefits no longer outweigh the dangers. Carson stood alone in rebellion against the agri-chemical industry, but now a growing number of scientists question the efficacy of such tactics in producing world food supplies. As we celebrated the start of a new millennium, crop yields began to decrease. They have since stabilized, but at subsistence levels that have not grown with the soaring population (“Future of Food” 189). “The Green Revolution is still going on, but in the long run it looks unsustainable: it relies on technologies which damage the environment and outrage the public” (Fernández-Armesto 209). Demand is once again outpacing production and the threat of global hunger has emerged as a very real threat to worldwide human health. “The benefits of the GR have now been eaten up (literally) by population growth, leaving the world in danger again” (Anderson 225). Indeed, as the threat of famine looms once more, calorie intakes around the world are, ironically increasing, even in countries still identified as poor. Between the periods 1969-71 and 2001-03, India’s daily caloric intake per individual increased from 2,040 to 2,470 (“Future of Food” 190-91). During the same period, China’s increased from 1,990 to 2,930. Unfortunately, caloric increases have not meant nutritional improvements in either country. The greatest increase comes from fairly nutrient poor grains. Even in countries where widespread hunger remains relatively at bay, the “vast corporate garden” has done nothing to improve the nutritional intakes of the consumer (Cook 1). In the United Kingdom and United States, the numbers are even more astounding. The UK diet increased from 3,300 to 3,460 calories and the US rose from

3,040 to 3,760 calories a day. It should come as no surprise that the increased calories come from sugars or vegetable oils, which are now equal to those that come from grains for UK and US citizens (“Future of Food” 190-91). Of the ten countries included in *Wired’s* article, only Madagascar’s caloric intake has decreased: from 2,430 to 2,050 (“Future of Food” 190-91). Agricultural production simply cannot continue to sustain the kind of increases that the modern diet demands.

Agribusiness executives long ago realized the limits of their chemical paradise and turned to scientists and to more sophisticated technology sources once again to bolster and extend food supplies, and to maintain their control over food production and profits. Biotechnologies and genetically modified organisms became the new hope as they promised to allow “crop plants [to] defend themselves from pests without the need for supplementary pesticides” (Feldman 1). The irony of the claim appears to be lost only on governmental and biotech officials, like those at Monsanto, who championed the necessity of these products and for decades defended the safety of pesticides for agricultural and domestic purposes. “The US Department of Agriculture and corporate biotech officials have claimed publicly that genetically modified crops are helping to cleanse the environment by reducing pesticides” (Cook 163). The claim appears to be a tacit admission that the chemicals previously hailed as safe in fact led to an unhealthy environment, and likely to unhealthy global dietary citizens. The reality of Bt and GMOs and agri-chemicals is that they are “two sides of one corporate coin:” that is, biotech advances are underwritten by the same companies that produce pesticides (Cook 163). Bt foods and GMOs grew out of the chemical enterprise and reproduce the centralized US dominance over world food markets that

the Green Revolution established: rather than feeding the world, American borne technologies have further increased Western domination through capitalist enterprises.

Bt foods and GMOs are a continuation of the Green Revolution enterprises in which scientific technologies attempt to manipulate the natural processes of growth and production in an effort to meet the demands of the wealthiest consumers, and once again it is US businesses leading the way and imposing these on individuals around the globe. Anderson argues that “[g]enetic engineering merely does quickly what natural or artificial selection does slowly: it changes gene systems in a particular direction” (225). Anderson never addresses the potential implications of speeding these processes, or choosing the direction in which these changes will migrate. He does not acknowledge “[t]he fact that the genetic revolution is unfolding within a neoliberal era driven by global trade agendas [that] very much shapes the direction and issues” (Barndt 39). Genes are now political enterprises. Instead Anderson describes the controversy over genetically modified (GM) foods as “hyped” and claims that they are neither the “bonanza” described by the “biotechnology establishment,” nor the next “monstrous” plague upon the natural world as described by its detractors (225). Instead he seeks a moderate stance, while at the same time accepting the dangers and “unknown potential for risk” associated with biotechnology and genetically modified food (255). Anderson and other scholars take up this ‘moderate’ stance, perhaps without realizing that they are encouraging a riskocentric view that merely ascribes passivity among its non-scientific member constituents. “[R]iskocentrism is [...] the process through which actors are induced to voluntarily reproduce ‘risk’ as the central and natural way to talk about a variety of concerns,” according to food scholar Chaia Heller. But because the risks are becoming so difficult to identify, it also means that individuals must rely on others to assess risk. Individual consumers have no way of identifying chemicals, or of knowing

which ones are dangerous and which are safe, or whether a tomato carries a gene that has been implanted by scientists in a lab in Monsanto's headquarters. Consumers must rely on "scientific risk expertise" to help them better assess danger, or they simply assume that the products they can purchase are safe because they are there: that someone, an expert, would not allow unsafe products to enter the supply chain. Of course, the fact that this has been proven incorrect repeatedly, has done little to alter this reality, because most consumers have been inculcated in the risk model.

Risk is but one among a number of other potential issues worth exploring at greater length, but these often go unaddressed among those ensconced in the expert scientific community. Ethical dilemmas that may promise short-term relief to developing countries, while stripping them of natural resources and pushing them to greater dependency have been less prolific. Risk is but one of the many concerns that should be addressed when it comes to food supplies, but it the one most easily discussed and often debated. But other issues, "including food quality [and] the ethics of life-patenting," are of equal, if not greater, significance, Heller argues. Just as Carson attempted to extend the discussion to include consumers, and potentially unwitting victims, in the discussion of the potential harm of the Green Revolution boon, non-scientists attempt to raise awareness through fictional transgenic narratives aimed at exploring the ethical dilemma of the "homogenization of cultures by multinational capitalism," which has come to control the global food markets and has been the site of sometimes violent counterrevolutions (Heller 91).

Ruth Ozeki's *All Over Creation* fictionalizes an important moment in industrial food production: the introduction of, and subsequent controversy concerning, biomedical technologies

into agribusiness commodities—specifically the potato—in order to ‘protect’ the product from insects and increase production yields, and therefore profits for industrial growers and biochemical manufacturing companies, under the guise of feeding a hungry population. Susan McHugh, who examines *All Over Creation* in “Flora, not Fauna: GM Culture and Agriculture,” identifies Ozeki’s novel as “a transgenic plant fiction” that attempts to make visible the invisible practices of agribusiness (27). Ozeki does this through the colonized figure of the potato—something of an unlikely choice to many readers, but a perfect choice given that “potatoes, corn, [and] cotton” were among the first crops approved for genetic modification by the Environmental Protection Agency in 1995. According to the UC Vegetable Research and Information Center, 40,000 acres of potatoes were planted that year. The potato, along with the tomato and the soybean, represents a hybrid vegetable figure that at once represents salvation and dependence.

The novel follows the lives of interesting and often unpredictable individuals, but while they are certainly important to the text, human characters are often subsumed by an even greater dramatic character, the potato, which stands in for all other potentially manipulated food objects. The text argues that the items consumers freely ingest, that they allow to cross the threshold of their bodies defenses, not only with permission, but also with anticipation and desire, is an unknown entity created rather than grown. The humans that populate her text are those whose livelihoods are threatened as the agri-business companies strip them of their indigenous plants by hijacking their production. The most dramatic point of Ozeki’s novel demands that individuals recognize food as the ultimate modern fiction. And, if individuals believe that the corporeal body, once transgressed and colonized by our fictional intakes, is changed and altered by the

non-food substances we call food, then consumers also become characters in a much larger fictional narrative played out at the global level.

In the novel's final passages, as the group is preparing to scatter itself upon other territories, perhaps to places where their resistance will germinate, or where it will simply become as sterile as terminator seeds, the subtext of the novel is fully revealed. "The last thing that Momoko did was to take a piece of packing tape and a label that said TOASTER and stick it to the back of Phoenix's jacket when he wasn't looking" (414). No one stopped Momoko, indeed they joined her in the ruse, and Phoenix traveled none the wiser. The small band "made it all the way to the Big Island before Phoenix even noticed." Once he discovered that he had been part of the joke, of a supposedly harmless conspiracy, he responds mildly, "[c]ute [...] I'm not a toaster," as he peels the unwanted label from his clothing. But, if putting the label on fails reveal something about the contents of Phoenix's person, can removing it tell us anything more? "And you know what Geek would have said to that—in this day and age, without a label, how can you tell?" (414). The novel highlights two equally disturbing contemporary realities: first, that modern consumers have been transformed into receptacles who know only what a label provides, and second, individuals can never be sure that a label allows them to know anything.

The controversy over food labeling has been one of the most time consuming, and perhaps least productive, areas for those who oppose Bt and GM products. Food labels have been fairly ineffective and often "present inaccurate or incomplete information" that does little to protect consumers (Goldstein and Goldstein 119). For instance, food manufactured at one facility can be contaminated by other products processed at the same facility, although labeling would not necessarily reflect the potential cross contaminants as they would not be ingredients in

the food product. Food nutrition experts Myrna Chandler Goldstein and Dr. Mark A. Goldstein argue that food labeling can help individual consumers better understand the items they ingest, especially for individual consumers with particular problems; however, they recognize that food labeling is “often confusing, misleading or inaccurate” (130). Of course the failure to label can be equally problematic. The 2002 food aid crisis began because the US failed to label GMOs sent to the starving nations of Africa. Despite “looming famine in the drought stricken region,” many South African government officials initially refused to accept the products once it became clear that the aid was made up of GM foods (Clapp 539). African officials were concerned about health safety and the potential for GM foods to alter indigenous crops and impair their future trade opportunities with European countries. Many European nations refused to accept GM commodities from the US because of the limited data on their safety and the implications for future crop production. Interestingly, in 1992, despite the limited data, the US FDA deemed genetically modified foods “[a]s safe as foods developed through other agricultural technologies” (Marshall qtd. in Goldstein and Goldstein 236). As other technologies were never proven safe, and in some cases the dangers have been substantiated, this approval simply meant that US scientists could move forward with their patents and capitalist enterprises. The decision paved the way to an increasing number of GM foods and assumed that all GM foods were created through safe processes that would not pose a threat to human life. Even foods labeled GM would not tell consumers anything about the process through which the food they ate came to their plates, nor how they had been modified. The FDA made a strange assumption: that all genetic modifications are equal. Many European nations, which prefer to adhere to the precautionary principle, that is a wait and see method, to evaluate safety before introducing new products, refused to trade in GM foods. Food safety concerns, regarding potential negative effects of GM

foods on animals, was only part of their reasoning; European nations were also rightly concerned about how GM foods might impact indigenous plants and biodiversity of indigenous regions.

Economic approaches to food supply have little to do with ethical models.

All Over Creation demonstrates that corporate technologies turn foodstuffs into patented, duplicable, reproducible commodities of desire among those economically preened and culturally induced to desire a homogeneous set of products that no longer resemble the objects of origin, and are really byproducts of a natural process that has been hijacked by competing corporate entities. Wendell Berry, in his essay “The Pleasures of Eating” articulates a similar complaint against corporately corrupted foodstuffs and the consumer (non)response, especially in the US. The corporatizing of agribusiness has tended to manufacture not merely a particular kind of food, but also a particular kind of eater—here and abroad—who Michael Pollan identifies as “industrial eater[s]” in his deeply troubling ethnographic interrogation of the industrial food complex, *The Omnivore’s Dilemma: The Natural History of Four Meals* (90). Berry argues that modern eaters are “patrons of the food industry, who have tended more and more to be mere consumers—passive, uncritical, and dependent” (231). Pollan and Berry concur that these patrons have been transformed from curious eaters into mere drones, which is precisely what industrialized food processing is set on achieving, and what Ozeki is determined to expose and undermine through her fictional participants and rebels. As Berry notes, there is a “politics of food that, like any politics, involves our freedom.” Ozeki’s novel anticipates a coming into freedom, at least imaginatively and provides the reflective lens that anticipates the historical moment in ways that science very often fails to do. As Barndt argues,

[i]t is always harder to grapple with historical shifts when we are in the middle of them and have neither the value of hindsight nor the luxury of simplifying the debates in our memories. This is the case of the genetic revolution, as battles are being fought daily around the questions of the production, labeling, and sales of genetically modified foods, the uncertain ecological impact of their cultivation, their potential health dangers, and the political and ethical issues of their ultimate application (39).

Ozeki steps out from the middle of the dialogue to consider the potential implications for a future filled with GM foods and little else.

Ozeki's narrative terrain combines the industrial, pastoral, and the personal, which Pollan argues are necessarily the byproduct of three very different moral geographies of human consumption. Pollan's journalistic endeavor and Ozeki's fictional narrative are both concerned with the consequences that 'not looking' at food have had on the body—human and non-human—the economy and landscape. Both are determined to understand “what can happen to [individuals] when ... [they] look” at their food for the first time (Pollan 318). The difference is that Pollan and Ozeki take on a different subject. Pollan, although he examines the monstrous agri-politics of corn production, he is most interested in how industrial corn production fuels beef and other meat consumption. Ozeki's novel remains firmly, if uncharacteristically, grounded on vegetation, the products that “have become the medium of daily encounters with transgenic organisms” as McHugh argues. McHugh praises Ozeki's work, which she believes demonstrates that “plants can be catalysts for new ideas about GMOs and the problems they engender” (27). Plants, as radically and as dramatically as animals, might allow for a more “critical posthumanist approach to the epistemological and political issues” especially those issues that are “raised by the

production and use of GMOs” that emerge through frank and honest discussions that make these uses visible, as Jill Didur argues in “Re-Embodying Technoscientific Fantasies: Posthumanism, Genetically Modified Foods, and the Colonization of Life” (112).

It is plants through which Claudé Levi-Strauss’s rigid taxonomy of oppositions of food transformations most productively articulates our modernity. Plants, as they are now imagined and grown, have passed from the “natural” into the “cultural” and from the “unprocessed” into the “processed.” Genetically modified foods force us to call into question the larger implications as Levi-Strauss conceived of them. Have we finally moved from the uncivilized to the civilized through the transformation of our food? Or, have GMOs allowed us to conquer the natural world so completely as John McPhee argues in *The Control of Nature* that we have nearly destroyed it by removing it from our collective memories in much the same way that we have disassociated our minds from our bodies through a similar process of control and manipulation. Lame Deer, in his chapter “Talking to the Owls and Butterflies,” argues that modern men have done nothing to nature that they have not done to themselves. “The food you eat, you treat it like your bodies, take out all the nature part, the taste, the smell, the roughness, then put the artificial color, the artificial flavor in” (122). We don’t recognize manipulated foods, just as we no longer recognize our own manipulations of our own physicality. Just as we tend to want our bodies to be specimens of aesthetic perfection—actual health is of little concern—so to do we make similar demands of our food. “So it all comes in a neat plastic bag, all cut up, ready to eat, with no taste and no guilt” and little recognition, Lame Deer argues (247). But we cannot simply reject the possible benefits that biotechnologies may offer, nor can we simply return to a past that no longer exists. Didur works to “restore the multiple and ever-shifting meanings these crops will

have for society as debates over their production, use, and safety continues to unfold” (112).

Honest discussion is certainly part of the solution, but as Ozeki demonstrates, this is no easy task as hidden agendas and economic demands almost always obscure the political exigencies that bring products into existence.

Current production and consuming practices may present a challenge for which there is no simple solution. Alan Thein Durning, in “The Conundrum of Consumption,” argues that the solution may be complicated, but it also may be equally unsatisfactory. Durning warns that “the difficulty of transforming the consumer society into a sustainable one can scarcely be overestimated” (201). Reducing consumer dependence on Bt and GMO foods will be equally difficult given our swelling caloric requirements; however, rarely in the discussion of the ethics behind these new food technologies is there an argument for reducing these demands. The push is always to find new and better ways to meet them, even if the demands themselves are proven unreasonable. Agritechnologies have made more abundant crops, yet they have not netted improvements in nutrition worldwide. Instead, they have increased the costs of eating. “For most of history [...] long-range trade in food [was] limited to luxury items,” but now nothing is beyond the reach of the tables of the wealthy (Fernandez-Armesto 210). “Affluence and excellent transportation are creating a greater imbalance in the world’s maldistributed food base than in any period of the history of the human race” (Dando 20-1). Wealthy nations have relied on Bts and GMOs to increase their reach and their profits, but not to attack the absurdity of the demand. Indeed such a feat may be accomplished only when individuals regain a sense of competence over their own choices and over their own bodies. Food intake is perhaps one of the most important, and yet invisible, daily human acts and occurs almost thoughtlessly. Because, as Berry insists, “eating [...] is inescapably an agricultural act,” we must reacquaint ourselves with

the process of agricultural production (234). Berry suggests that consumers participate in food production, prepare their own food, deal with local growers, but most importantly that they learn about what is put in their food, especially that which is not food. He urges people to learn about the origins of their food, and learn the histories of the food species they ingest, not merely as a digestive act, but as an act of rebellion and freedom. In Ozeki's *All Over Creation*, Yumi recognizes that food offers "something divine in [its] potency" and that as such it requires "care and protection," but it is Momoko who "cultivate[s] her garden" and understands that there is a balance that demands something of the human (112-13). Momoko does not wish to become a food slave, but rather a cultivator. Carson demonstrated that the most significant "problem of ecology, of interrelationships, of interdependence" is any action creates a chain of reactions, many of which cannot be easily anticipated or undone when substances, often hidden or obscured, commingle with bodies (189). What we do to our food we do to ourselves: we cannot escape the connection. We do not have to believe in, nor do we need to demand a return to, a pristine nature, but nor do we have to accept corporate manipulations that masquerade as natural. Lest we become cynical, and believe that we are doomed to a lost agricultural world, we can find hope in the proclamation: "Resistance is Fertile" (Ozeki 416).

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