Genetic Engineering and the Concept of the Natural

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Why do many consumers view genetically engineered foods with suspicion? I want to suggest that it is largely because the food industry has taught them to do so. Consumers learn from advertisements and labels that the foods they buy are all natural—even more natural than a baby's smile. "The emphasis in recent years," *Food Processing* magazine concludes, "has been on natural or nature-identical ingredients" (Food Processing, 1988). According to *Food Product Design*, "The desire for an all natural label extends even to pet food" (Saunders, 1995).

The food industry, I shall argue, wishes to embrace the efficiencies offered by advances in genetic engineering. This technology, both in name and in concept, however, belies the image of nature or of the natural to which the food industry constantly and conspicuously appeals. It should be no surprise that consumers who believe genetically modified foods are not "natural" should regard them for that reason as risky and as undesirable. Consumers might be as suspicious of many other foods, however, if they were less misled about the extent to which technology—not nature—is responsible for producing them and especially for endowing them with color and flavor.

ALL-NATURAL TECHNOLOGY

Recently, I skimmed through issues of trade magazines, such as Food Technology and Food Processing, that serve the food industry. In full-page advertisements, manufacturers insist that the ingredients they market come direct from primordial Creation or, at least, that their products are identical to nature's own. For example, Roche Food Colors runs in these trade magazines a full-page ad that displays a bright pink banana over the statement: "When nature changes her colors, so will we." The ad continues:

Today more and more people are rejecting the idea of artificial colors being used in food and drink. . . .

Our own food colors are, and always have been, strictly identical to those produced by nature.

We make pure carotenoids which either singly or in combination achieve a whole host of different shades in a range of yellow though orange to red.

And time and time again they produce appetizing natural colors, reliably, economically, and safely.

Just like nature herself.

Advertisement after advertisement presents the same message: food comes directly from nature or, at least, can be sold as if it did. Consider, for example, a full-page ad that McCormick and Wild, a flavor manufacturer, runs regularly in *Food Processing*. The words "BACK TO NATURE" appear under a kiwi fruit dripping with juice. "Today's consumer wants it all," the advertisement purrs, "great taste, natural ingredients, and new ideas... Let us show you how we can put the world's most advanced technology in natural flavors at your disposal..."

This advertisement clearly states the mantra of the food industry: "Today's consumer wants it all." Great taste. Natural ingredients. New ideas. The world's most advanced technology. One can prepare a flavor artificially with just a little chemistry know-how, for example, that of almond by mixing oil of clove and amyl acetate to produce benzaldehyde. To get exactly the same compound as a "natural" flavor, one must employ far more sophisticated technology to extract and isolate benzaldehyde from peach and apricot pits. The "natural" flavor, an extract, contains traces of hydrogen cyanide, a deadly poison evolved by plants to protect their seeds from insects. Even so, consumers strongly prefer all-natural to artificial flavors, which sell, therefore, at far lower prices.

In its advertisements, the Haarman and Reimer Corporation ("H&R") describes its flavor enhancers as "HypR Clean Naturally." With "H&R as your partner, you'll discover the latest advances in food technology" that assure "the cleanest label possible." A "clean" label is one that includes only natural ingredients and no reference to technology. In a competing advertisement, Chr. Hansen's laboratory announces itself as the pioneer in "culture and enzyme technologies. And because our flavors are completely natural, you can enjoy the benefits of 'all-natural' labeling." Flavor manufacturers tout their stealth technology—*i.e*. technology so advanced it disappears from the consumer's radar screen. The consumer can be told he or she is directly in touch with nature itself.

The world's largest flavor company, International Flavors & Fragrances (IFF), operates manufacturing facilities in places like Dayton, NJ, an industrial corridor of refineries and chemical plants. Under a picture of plowed, fertile soil, the IFF Laboratory, in a full-page display states, "Where Nature is at Work, IFF is at work." The text describes "IFF's natural flavor systems." The slogan follows: "IFF technology. In Partnership with Nature." Likewise, Meer

Corporation of Bergen, NJ, pictures a rainforest under the caption, "It's A Jungle Out There." The ad states that "true-to-nature" flavorings "do not just happen. It takes... manufacturing and technical expertise and a national distribution network... for the creation of natural, clean label flavors."

Food colors are similarly sold both as all-natural and as high tech. "Vegetone' colors your foods *naturally* for a healthy bottom line," declares Kalsec Corp. of Kalamazoo, MI. Its ad shows a technician standing before a computer and measuring chemicals into a test tube. The ad extols the company's "patented natural color systems." The terms "natural" and "patented" fit seamlessly together in a conceptual scheme in which there are no trade-offs and no compromises. Only the most sophisticated technology will assure your product a clean, all-natural label. The natural is patentable.

If you think any of this is contradictory, you will not get far in the food industry.

Organic TV Dinners

As a typical American suburbanite, I can buy not just groceries but "Whole Foods" at Fresh Fields and other upscale supermarkets. I am particularly impressed by the number of convenience foods that are advertised as "organic." Of course, one might think that any food may be whole and that all foods are organic. Terms like "whole" and "organic," however, appeal to and support my belief that the products that carry these labels are less processed and more natural—closer to the family farm—than are those that might be sold by multinational megacorporations, such as Pillsbury or General Foods.

My perusal of advertisements in trade magazines helped disabuse me of my belief that all-natural, organic, and whole foods are closer to nature in a substantive sense than are other manufactured products. If I had any residual sentiments, they were removed by an excellent cover story, "The Organic-Industrial Complex," that appeared in the May 13, 2001, issue of the *New York Times Magazine*. The author, Michael Pollan, was shocked to find that the prepackaged microwavable all-natural organic TV dinners at his local Whole Foods outlet are not gathered from the wild by red-cheeked peasants in native garb. They are highly processed products manufactured by multinational corporations. Contrary to the impression created by advertisements, organic and other all-natural foods are often fabricated by the same companies—using comparable technologies—as those that produce Velveeta and Miracle Whip. And the ingredients come from as far away as megafarms in Chile, not from local farmers' markets.

Reformers who led the organic food movement in the 1960s wished to provide an alternative to agribusiness and to industrial food production. But some of these same reformers bent to the inevitable. As Pollan pointed out, they became multimillionaire executives of Pillsbury and General Mills in charge of organic-food production systems. This makes sense. A lot of advanced

technology is needed to produce and market an all-natural or an organic ready-to-eat meal. Consumers inspect food labels to ward off artificial ingredients; yet they also want the convenience of a low-priced, pre-prepared, all-natural dinner.

General Mills Senior Vice President, Danny Strickland, told Pollan, "Our corporate philosophy is to give consumers what they want with no trade-offs." Pollan interpreted the meaning of this statement as follows. "At General Mills, the whole notion of objective truth has been replaced by a value-neutral consumer constructivism, in which each sovereign shopper constructs his own reality."

Mass-marketed organic TV dinners do not compromise; they combine convenience with a commitment to the all-natural, ecofriendly, organic ideology. The most popular of these dinners are sold by General Mills through its subsidiary, Cascadian Farms, whose advertising slogan, "Taste You Can Believe In," as Pollan observed, makes no factual claims of any sort. It "allows the consumer to bring his or her personal beliefs into it," as Vice President for Marketing, R. Brooks Gekler, told Pollan. The absence of any factual claim is essential to selling a product, since each consumer buys an object that reflects his or her particular belief-system.

What is true of marketing food is true of virtually every product. A product will sell if it is all-natural and ecofriendly and, at the same time, offers the consumer the utmost in style and convenience. A recent *New York Times* article, under the title "Fashionistas, Ecofriendly and All-Natural," points out that the sales of organic food in the United States topped $6.4 billion in 1999 with a projected annual increase of 20%. Manufacturers of clothes and fashion accessories, such as solar-powered watches, are cashing in on the trend. Maria Rodale, who helps direct a publishing empire covering "natural" products, founded the women's lifestyle magazine *Organic Style*. Rodale told the *Times* that women want to do the right thing for "the environment but not at the cost of living well." Advances in technology give personal items and household wares an all-natural ecofriendly look and feel that is also the last word in fashion. Consumers "don't want to sacrifice anything," Ms. Rodale told a reporter. Why should there be trade-offs between a commitment to the natural and a commitment to the good life? "Increasingly there are options that don't compromise on either front" (La Ferla, 2001).

The food industry does not sell food any more than the fashion industry sells clothes or the automobile industry sells automobiles. They sell imagery. The slogan, "Everything the consumer wants with no tradeoffs," covers all aspects of our dream-world. Sex without zippers, children without zits, lawns without weeds, wars without casualties, and food without technology. Reality involves trade-offs and rather substantial ones. For this reason, if you tried to sell reality, your competitor would drive you out of business by avoiding factual claims and selling fantasy—whatever consumers believe in—instead. Consumers should

not be confused or disillusioned by facts. They are encouraged to assume that they buy the products of Nature or Creation not industry. In view of this fantasy, how could consumers view genetic engineering with anything but suspicion?

NATURE'S OWN METHODS

Genetic engineering, with its stupendous capacity for increasing the efficiencies of food production in all departments, including flavors and colorings, raises a problem. How can genetic recombination be presented to the consumer as completely natural—as part of nature's spontaneous course—as have other aspects of food technology? A clean label is needed to tell consumers that there is nothing unnatural or inauthentic about genetic engineering. Industry has responded in two complementary ways to this problem.

First, the food industry has resisted calls to label bioengineered products. Gene Grabowski of The Grocery Manufacturers Association, for example, worries that labeling "would imply that there's something wrong with food, and there isn't" (Lambrecht, 1999). Michael J. Phillips, an economist with the Biotechnology Industry Organization (BIO), adds that labeling "would only confuse consumers by suggesting that the process of biotechnology might, in and of itself, have an impact on the safety of food. This is not the case" (Wilson, 2000).

Second, many manufacturers point out that today's genetic technologies do not differ, except in being more precise, from industrial processes that result in the emulsifiers, stabilizers, enzymes, proteins, cultures, and other ingredients that do enjoy the benefits of a clean label. Virtually every plant consumed by human beings, canola, for example, is the product of so much breeding, hybridization, and genetic modification that it hardly resembles its wild ancestors. This is a good thing, too, since these wild ancestors were barely edible if not downright poisonous. Manufacturers argue that genetic engineering differs from conventional breeding only in that it is more accurate and, therefore, changes nature less.

For example, Monsanto Corporation, in a recent full-page ad, pictures a bucolic landscape reminiscent of a painting by Constable. The headline reads, "FARMING: A picture of the Future." The ad then represents genetic engineering as all-natural, or at least as natural as are conventional biotechnologies that have enabled humanity to engage successfully in agriculture. "The products of biotechnology will be based on nature's own methods," the ad assures the industry. "Monsanto scientists are working with nature to develop innovative products for farmers of today, and of the future."

In this advertisement, Monsanto applies the tried-and-true formula to which the food industry has long been committed by presenting their technology as revolutionary, innovative, highly advanced, and as "based on nature's own methods." *Everything* is natural. Why not? As long as there are no distinctions,

there are no trade-offs. Consumers can buy what they believe in. A thing is natural if the public believes it is. "There is something in this more than natural," as Hamlet once said, "if philosophy could find it out."

Four Concepts of the Natural

If consumers reject bioengineered food as "unnatural," what does this mean? In what way are foods that result from conventional methods of genetic mutation and selection, which have vastly altered crops and livestock, more "natural" than those that depend on gene splicing? Indeed, is anything in an organic TV dinner "natural" other than, say, the rodent droppings that may be found in it? Since I am a philosopher, not a scientist, I am particularly interested in the moral, aesthetic, and cultural—as distinct from the chemical, biological, or physical—aspects of the natural world. I recognize that many of us depend in our moral, aesthetic, and spiritual lives on distinguishing those things for which humans are responsible from those that occur as part of nature's spontaneous course.

Philosophers have long pondered the question whether the concept of the natural can be used in a normative sense, that is, whether to say a practice or a product is "natural" is to imply that it is better than one that is not. Why should anyone assume that a product that is "natural" is safer, more healthful, or more aesthetically or ethically attractive than one that is not? And why is technology thought to be intrinsically risky when few of us would survive without quite a lot of it?

Among the philosophers who have questioned the "naturalistic fallacy"—the assumption that what is natural is, for that reason, good—John Stuart Mill (1969) has been particularly influential. In his "Essay on Nature," he argued that the term "nature" can refer either to the totality of things ("the sum of all phenomena, together with the causes which produce them") or to those phenomena that take place "without the agency... of man." Plainly, everything in the world, including every technology, is natural and belongs equally to nature in the first sense of the term. Mill commented:

> *To bid people to conform to the laws of nature when they have no power but what the laws of nature give them—when it is a physical impossibility for them to do the smallest thing otherwise than through some law of nature—is an absurdity. The thing they need to be told is, what particular law of nature they should make use of in a particular case.*

Of nature in the second sense, *i.e.* that which takes place without the agency of man, Mill had a dour view: "Nearly all the things which men are hanged or imprisoned for doing to one another, are nature's every day performances." Nature may have cared for us in the days of the Garden of Eden. In more recent years, however, humanity has had to alter Creation to survive. Mill concluded, "For while human action cannot help conforming to nature in one meaning of

the term, the very aim and object of action is to alter and improve nature in the other meaning."

Following Mill, it is possible to distinguish four different conceptions of nature to understand the extent to which bioengineered food may or may not be natural. These four senses of the term include:

- Everything in the universe. The significant opposite of the "natural" in this sense is the "supernatural." Everything technology produces has to be completely natural because it conforms to all of nature's laws and principles.
- Creation in the sense of what God has made. The distinction here lies between what is sacred because of its pedigree (God's handiwork) and what is profane (what humans produce for pleasure or profit).
- That which is independent of human influence or contrivance. The concept of "nature" or the "natural" in this sense, e.g., the "pristine" is understood as a privative notion defined in terms of the absence of the effects of human activity. The opposite of the "natural" in this sense is the "artificial."
- That which is authentic or true to itself. The opposite of the "natural" in this sense is the specious, illusory, or superficial. The "natural" is trustworthy and honest, while the sophisticated, worldly, or contrived is deceptive and risky.

These four conceptions of nature are logically independent. To say that an item or a process—genetic engineering, for example—is consistent with the laws of nature, for example, is by no means to imply it is "natural" in any other sense. That genetically manipulated foods can be found within the totality of phenomena does not show that they are "natural" in the sense that they are part of primordial Creation, free of human contrivance, or authentic and expressive of the virtues of rustic or peasant life.

The problem of consumer acceptance of biotechnology arises in part because the food industry advertises its products as natural in the last three senses. The industry wishes to be regulated, however, only in the context of the first conception of nature, which does not distinguish among phenomena on the basis of history, source, or provenance. The industry argues that only the biochemical properties of its products should matter to regulation; the process (including genetic engineering) is irrelevant to food safety and should not be considered.

The food industry downplays the biochemical properties of its products, however, when it advertises them to consumers. The industry—at least if the approach taken by General Mills is typical—tries to give the consumer whatever (s)he believes in. If the consumer believes in a process by which rugged farmers on the slopes of the Cascades raise organic TV dinners from the soil by sheer force of personality, so be it. You will see the farm pictured on the package to suggest the product is close to Creation, free of contrivance, and

authentic or expressive of rural virtues. What you will not see on any label, if the industry has its way, is a reference to genetic engineering. The industry believes regulators should concern themselves only with the first concept of nature—the scientific concept—and thus with the properties of the product. Concepts related to the process are used to evoke images that "give consumers what they want with no trade-offs."

SHAKESPEARE ON BIOTECHNOLOGY

I confess that, as a consumer, I find organic foods appealing and I insist on "all-natural" ingredients. Am I just foolish? You might think that I would see through labels like "all natural" and "organic," not to mention "whole" foods, and that I would reject them as marketing ploys of a cynical industry. Yet like many consumers, I want to believe that the "natural" is somewhat better than the artificial. Is this just a fallacy?

Although I am a professional philosopher (or perhaps because of it), I would not look first to the literature of philosophy to understand what may be an irrational, or at least an unscientific, commitment to buying "all natural" products. My instinct would be to look in Shakespeare, who has been correctly called the world's most underrated poet, to understand what may be contradictory attitudes or inexplicable sentiments.

Shakespeare provides his most extensive discussion of biotechnology in *The Winter's Tale*, one of his comedies. In Act IV, Polixenes, King of Bohemia, disguises himself to spy upon his son, Florizel, who has fallen in love with Perdita, whom all believe to be a shepherd's daughter. In fact, though raised as a shepherdess, Perdita is the castaway daughter of the King of Sicily, a close, but now estranged, friend of Polixenes. Perdita welcomes the disguised Polixenes and an attendant lord to a sheep-shearing feast in late autumn, offering them dried flowers "that keep / Seeming and savour all winter long." Polixenes merrily chides her: "well you fit our ages / With flowers of winter." She replies that only man-made hybrids flourish so late in the fall:

> *…carnations, and streak'd gillyvors,*
> *Which some call nature's bastards. Of that kind*
> *Our rustic garden's barren; and I care not*
> *To get slips of them.*

Polixenes asks why she rejects cold-hardy flowers such as gillyvores, a dianthus. She answers that they come from human contrivance, not from "great creating nature." She complains there is "art" in their "piedness" or variegation. Polixenes replies:

> *Say there be;*
> *Yet nature is made better by no mean*
> *But nature makes that mean; so over that art*
> *Which you say adds to nature, is an art*
> *That nature makes... This is an art*

Which does mend nature—change it rather; but
The art itself is nature.

The statement, "The art itself is nature" anticipates the claim made by Monsanto that "the products of biotechnology will be based on nature's own methods." Polixenes, Mill, and Monsanto remind us that everything in the universe conforms to nature's own principles, and relies wholly on nature's powers. From a scientific perspective, in other words, all nature is one. The mechanism of a lever, for example, may occur in the physiology of a wild animal or in the structure of a machine. Either way, it is natural. One might be forced to agree, then, that genetic engineering applies nature's own methods and principles; in other words, "the art itself is nature."

The exchange between Perdita and Polixenes weaves together the four conceptions of nature I identified earlier in relation to John Stuart Mill. When Polixenes states, "The art itself is nature," he uses the term "nature" to comprise everything in the universe, that is, everything that conforms to physical law. Second, Perdita refers to "great creating nature," that is, to Creation, *i.e.*, the primordial origin and condition of life before the advent of human society. Third, she contrasts nature to art or artifice by complaining that hybrids do not arise spontaneously, but show "art" in their "piedness." Finally, Perdita refers to her "rustic garden," which, albeit cultivated, is "natural" in the sense of simple or unadorned, in contrast to the ornate horticulture that would grace a royal garden. The comparison between the court and the country correlates, of course, with the division that exists in Perdita herself: royal in carriage and character by her birth, yet possessed of rural virtues by her upbringing.

Shakespeare elaborates this last conception of "nature" as the banter continues between Perdita and the disguised Polixenes. To his assertion, "The art itself is nature," Perdita concedes, "So it is." Polixenes then drives home his point: "Then make your garden rich in gillyvors, / And do not call them bastards."

To which Perdita responds:

I'll not put
The dibble in earth to set one slip of them;
No more than were I painted I would wish
This youth should say 'twere well, and only therefore
Desire to breed by me.

Besides comparing herself to breeding stock—amusing in the context, since she speaks to her future father-in-law in the presence of his son—Perdita reiterates a fourth and crucial sense of the "natural." In this sense, what is "natural" is true to itself; it is honest, authentic, and genuine. This conception reflects Aristotle's theory of the "nature" of things, which refers to qualities that are spontaneous because they are inherent or innate.

Perdita stands by her insistence on natural products—from flowers she raises to cosmetics she uses—in spite of Polixenes' cynical but scientific reproofs. Does this suggest Perdita is merely a good candidate for Ms. Rodale's organic chic? Should she receive a free introductory copy of *Organic Style*? Certainly not. There is something about Perdita's rejection of biotechnology that withstands this sort of criticism. Why have Perdita's actions a moral authority or authenticity that the choices consumers make today may lack?

Having It Both Ways

Perdita possesses moral authority because she is willing to live with the consequences of her convictions and of the distinctions on which they are based. By refusing to paint herself to appear more attractive, for example, she contrasts her qualities, which are innate, with those of the "streak'd gillyvor," which result from technological meddling. This comparison effectively gives her the last word because she suits the action to it: she does not and would not paint herself to attract a lover. Similarly, Perdita does not raise hybrids, though she admits, "I would I had some flow'rs" that might become the "time of day" of the youthful guests at the feast, such as Florizel.

She does not try to have it both ways, to reject hybrids but expect to grow cold-hardy flowers. She ridicules those who match lofty ideals with ordinary actions, whose practice belies their professed principles. For example, Camillo, the Sicilian lord who attends Polixenes, compliments Perdita on her beauty. He says, "I should leave grazing, were I of your flock, / And only live by gazing." She laughs at him and smartly replies, "You'd be so lean that blasts of January / Would blow you through and through."

Many people today share Perdita's affection for nature and her distaste for technology. Indeed, it is commonplace to celebrate Nature's spontaneous course and to condemn the fabrications of biotechnology. Jeremy Rifkin speaks of "Playing Ecological Roulette with Mother Nature's Designs," and Ralph Nader has written the foreword to a book titled, "Genetically Engineered Food: Changing the Nature of Nature." Prince Charles, in a tirade against biotechnology, said, "I have always believed that agriculture should proceed in harmony with nature, recognizing that there are natural limits to our ambitions. We need to rediscover a reverence for the natural world to become more aware of the relationship between God, man, and creation."

Insofar as consumers reject genetically engineered food, this need not be understood as an animadversion to recombinant DNA as such. In fact, consumers are equally likely to reject "mutated" foods even if the mutation occurs (as it does in nearly every food product) through cross-breeding, hybridization, and other conventional methods. In a typical survey of consumer attitudes, "only 28% (of respondents in New Jersey) thought they had ever eaten a hybrid fruit or vegetable that was the product of traditional cross-breeding. Moreover, 40% did not approve of making hybrid plants." The consensus view held it was best "not to meddle with nature" (Hamstra, 1998).

While consumers today share Perdita's preference for the natural in the sense of the authentic and unadorned and spurn technological meddling, they do not share her willingness to live with the consequences of their commitment. Even in winter, they expect to enjoy fruits and vegetables of unblemished appearance and consistent taste and nutritional quality. Gardeners wish to plant lawns and yards with species that are native and indigenous, and they support commissions and fund campaigns to throw back the "invasions" of exotic and alien species. Yet they also want lawns that resist drought, blight, and weeds, and—to quote Perdita again—to enjoy flowers that "come before the swallow dares, and take / The winds of March with beauty." In other words, the consumer wants it both ways. As Ms. Rodale knows, they "don't want to sacrifice anything." Today's consumers insist, as did Perdita, on the local, the native, the spontaneous. Yet, they lack her moral authority because they are unwilling to live with the consequences of their principles or preferences. Consumers today refuse to compromise; they expect fruits and flowers that survive "the birth / Of trembling winter" and are plentiful and perfect all year round.

NAKED LUNCH

Those who defend genetic engineering in agriculture are likely to regard as irrational consumer concerns about the safety of genetically manipulated crops. The oil and other products of Roundup Ready® soybeans, according to this position, pose no more risks to the consumer than do products from conventional soybeans. Indeed, soybean oil, qua oil, contains neither DNA nor protein and so will be the same whether or not the plant is herbicide resistant. Even when protein or DNA differs, no clear argument can be given to suppose that this difference—e.g., the order of a few nucleotides—involves any danger. Crops and livestock are the outcome of centuries or millennia of genetic crossing, selection, mutation, breeding, and so on. Genetic engineering adds but a wrinkle to the vast mountains of technology that separate the foods we eat from wild plants and animals.

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The same kind of argument may undermine consumer beliefs that "natural" colors and flavors are safer or more edible than artificial ones. In fact, chemical compounds that provide "natural" and "artificial" flavors can be identical and may be manufactured at the same factories. The difference may lie only in the processes by which they are produced or derived. An almond flavor that is

produced artificially, as I have mentioned, may be purer and, therefore, safer than one extracted from peach or apricot pits. Distinctions between the natural and the artificial, then, need not correspond with differences in safety, quality, or taste, at least from the perspective of science.

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Distinctions consumers draw between the natural and the artificial, and preferences for the organic over the engineered, reflect differences that remain important nonetheless to our cultural, social, and aesthetic lives. We owe nature a respect that we do not owe technology. The rise of objective, neutral, physical and chemical science invites us, however, to disregard all such moral, aesthetic, and cultural distinctions and act only on facts that can be scientifically analyzed and proven. Indeed, the food industry, when it is speaking to regulators rather than advertising to consumers, insists on this rational, objective approach.

In an essay titled, "Environments at Risk," Mary Douglas (1975) characterized the allure of this objective, rational, value-neutral science:

> *This is the invitation to full self-consciousness that is offered in our time. We must accept it. But we should do so knowing that the price is William Burroughs' Naked Lunch. The day when everyone can see exactly what it is on the end of everyone's fork, on that day there is no pollution and no purity and nothing edible or inedible, credible or incredible, because the classifications of social life are gone. There is no more meaning.*

Advances in genetic engineering invite us to the full self-consciousness that Douglas described and aptly analogizes to the prison life depicted in *Naked Lunch*. It is the classifications of social life—not those of biological science—that clothe food and everything else with meaning. Genetic engineering poses a problem principally because it crosses moral, aesthetic, or cultural—not biological—boundaries. The fact that the technology exists and is successful shows, indeed, that the relevant biological boundaries (*i.e.* between species) that might have held in the past now no longer exist.

Given advances in science and technology, how can we maintain the classifications of social life, for example, distinctions between natural and artificial flavors and between organic and engineered ingredients? How may we, like Perdita, respect the difference between the products of "great creating nature" and those of human contrivance? She honors this distinction by living with its consequences. Her severest test comes when Polixenes removes his disguise and threatens to condemn her to death if she ever sees Florizel again. Florizel asks her to elope, but she resigns herself to the accident of their origins—his high, hers (she believes) low—that separates them forever. Dressed up as a queen for the festivities, Perdita tells Florizel: "I will queen it no further. Leave me, sir; I will go milk my ewes and weep."

Perdita, of course, both renounced her cake and ate it, too. In Act IV, she gives up Florizel and his kingdom, but in Act V she gets them. Her true identity as a princess is eventually discovered, and so the marriage happily takes place. If you or I tried to live as fully by our beliefs and convictions—if we insisted on eating only those foods that come from great creating nature rather than from industry—we would not be so fortunate. "You'd be so lean that blasts of January / Would blow you through and through."

Perdita is protected by a playwright who places her in a comedy. Shakespeare allows her to live up to her convictions without compromising her lifestyle. This is exactly what the food industry promises to do: "to give consumers what they want with no trade-offs." It is exactly what Ms. Rodale offers: to protect the environment, "but not at the cost of living well." The food, fashion, and other industries work off-stage to arrange matters so that consumers can renounce genetic engineering, artificial flavors, industrial agriculture, and multinational corporations. At the same time, consumers can enjoy an inexpensive, all-natural, organic, TV dinner from Creation via Cascadian Farms

Perdita lives in the moral order of a comedy. In that moral order, no compromises and no trade-offs are necessary. You and I are not so fortunately situated. Indeed, we must acknowledge the tragic aspect of life, the truth that good things are often not compatible and that we have to trade off one for the sake of obtaining the other. The food industry, by suggesting that we can have everything we believe in, keeps us from recognizing that tragic truth. The industry makes all the compromises and hides them from the consumer.

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Q: In a debate that has become confrontational through and through, how do you introduce trade-offs without weakening your position immediately?

A: It would help to have a greater availability of literature on the history of crops, such as corn, that people accept as being safe, and show the vast differences that have resulted from technology—breeding and selection. Then people would begin to understand that technology is a normal part of food production and there would be less embarrassment about admitting it with respect to biotechnology.