The Plant Protection Racket

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Inferiority as a Luxury Item

Before the Industrial Revolution, artists and artisans would strive to make a work as perfect as possible. They used the technologies of their time to make as fine a product as their skill and limited technology allowed. Given the long painstaking efforts involved in creation, such items were few in number and available to only a minuscule number of elites. They were the crowning achievement of their time and brought great prestige to those fortunate few who owned them. Renaissance painters used the mathematics of perspective to create their trompe l'oeil (a French term meaning "trick the eye.") David Hockney's recent claim that some of the Renaissance artists achieved realism by using a camera obscura to design their paintings is controversial and shocking to many today but one wonders whether it would have mattered to anyone prior to the Industrial Revolution (Hockney 2001).

With the advent of the Industrial Revolution, one of the qualities that allegedly makes a craft item superior became its demonstrable inferiority. Before that time, increasing precision was one aspect of the way in which artisans sought to refine and improve their craft. Nineteenth and twentieth century technology not only carried this refinement beyond the point that our hands or eyes can detect, it did so with mass production. Today some people will point with pride to the imperfections that indicate handcrafting. Thorstein Veblen makes reference to the "claims to excellence put forward" for some products that "rest in some measure on the degree of its approximation to the crudities" of earlier inferior technologies (Veblen 1934, 121). Veblen was referring specifically to the very expensive books produced by William Morris and the Kelmscott Press. Veblen went into great detail on the means and methods used for book production by the Kelmscott Press and scathingly referred to their "painstaking crudeness and elaborate ineptitude" (Veblen 1934, 122). William Morris, an ardent socialist and leader of the Arts and Crafts movement, earned his livelihood by selling his non-industrial arts and crafts to those made rich by industrialization.

In Veblen's example of book production, limiting an edition is the ultimate reversion to a criterion of earlier technology to enhance a product's pecuniary value (Veblen 1934, 122). It is an artificially-contrived scarcity, whether it be in a "hand-produced" item of William Morris or the mass-produced results of technologies. The crudeness must be contrived to be different because modern industry has taught us how to turn out great quantities of high quality items (Kouwenhoven 1967, 35).

No previous transformation was as beneficial to human enterprise and creativity as the Industrial Revolution. Yet it was damned for being dehumanizing, and its technology was considered antithetical to artistic endeavors. The dualism between thought and practical action that characterized earlier civilizations such as that of classical Greece was revived with a vengeance. It is more than appropriate that among the anti-technology artists and artisans, there was a revival of Greek forms in neoclassicism. William Blake, who is famous for his reference to "dark Satanic Mills," was himself "dependent upon prosperous patrons for his livelihood" (Boime 1985, 111). The "fiery chariots," the furnaces, and other technologies were important images in Blake's poetry and drawings, reflecting more of an ambivalence to industrialization than is recognized by many who quote him. The neoclassicism in fine arts that followed Blake and the revival of Greek ideals were facilitated by "one of the first and most refined products of modern manufacture … the steel pen, which everyday recorded the images, means, and ideas of the new era" (Howard 1985, 790-2). Steel pens were better and they were cheaper (Howard 1985, 794).

By the late 19th century, the elitist mania for handcrafted items led to an interest in "primitive" art which pre-Industrial European elites would have considered too crude to be art. A strange contradiction emerged as the art was praised while those who created it were degraded. Leah Dilworth uses Veblen's analysis when writing about

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the demand for crafts produced by Indians of the American Southwest in the late 19th and early 20th centuries. Mass-produced objects had a “sameness” to them, and because they were mass-produced they were by definition “perceived as being common and it is this commonness that the leisure class objected to.” To Veblen the leisure class “preference for the singular marks of imperfection, or marks of the hand, became ‘honorific’.” For collectors of Indian crafts, “singularity and the mark of the maker’s hand were highly valued” (Dilworth 1996, 154-155 and Veblen 1934). The belief in the eventual “dying out” of the Indian, undoubtedly further enhanced the value of the craft. It was “natural” and “authentic.”

One can appreciate “primitive” art and the great works of earlier times apart from any crudeness or extraordinary effort to achieve perfection. The elite’s preference for that which is inferior was carried over to other areas of life. Occasionally manufacturers found it profitable to advertise the inferiority of their technologies such as “fire-brewed” beer when any brew master will testify to the superiority of electric kettles for more precise heat control.

As societies become more affluent and wages rise, hand made products become more expensive, sometimes prohibitively so. Even reaching out for overseas production in low wage countries is not always effective as these areas are seeking to improve their lot with low cost industrial production serving a mass global market. Affluence also creates an ever-growing class of well-off consumers, many of whom seek to emulate the crudities of consumption of the elites. The crude items of every day use that were the few meager processions of the poor have become the prestige consumption of the affluent. To acquire the “authentic” or “natural” or “real,” be it in construction with expensive stone or wood or in foods, eating only the rare or organically grown – these natural lifestyles are expensive because the means for providing them are extremely limited, making it a way of life possible only for a privileged portion of the world’s population. Time magazine had a cover story on “The Simple Life.” A perceptive correspondent for The New Yorker made an “unofficial tally of Time’s ‘expensive, high tech and sophisticated’ stuff, as against the new simplicity’s ‘recyclable, cheap, plain and nostalgic’ stuff.” The results were:

> ‘Recyclable, cheap, plain and nostalgic’ goods … : $459.40.
> ‘Expensive, high tech and sophisticated’ equivalents: $145.83.
> He concluded that he didn’t think that he could “afford the simple life (The New Yorker 1991, 30, and Time 1991, see also Carlson 2000).

It seems that the poor can no longer afford the crudities that were once their lot in life and have to make do with the products of industry when they can afford any consumption at all. Even the poverty of Gandhi was costly, as his trademark goats had to be boarded when he was in urban areas, prompting the often-paraphrased comment of Edgar Snow that Ghandi never realized how much it cost the Indian rich to keep him in his poverty.

Consumption of inferior products has become a growth industry in affluent societies particularly in the area of food and health where the fetish of ‘inferior is better, safer and healthier’ has deep ideological roots. Terms like “organic,” “biodynamic,” “all natural,” “alternative therapies,” “herbal” and “holistic” have lost any meaning that they may once have had and are to be understood as endowing a commodity with immeasurable, not fully definable vital properties. The quintessential inferior vitalist product is the homeopathic remedy whose mystic vitalist potency is derived from having virtually every last molecule of the “medication” diluted away.

The Vitalist Revolt

The ongoing vitalist revolt against the emergence of modern chemistry and agricultural science since the work of Antoine Laurent Lavoisier, Friedrich Wöhler and Justus Baron von Liebig is most evident in food production and consumption. First it was claimed that it was impossible to synthesize an organic compound, and then it was argued that minerals could not be used to help plants grow. When these claims were disproved, the argument was made that the food grown using minerals as fertilizer lacked some vital or living force. To Lady Balfour, a proponent of “organic agriculture” and a founder of the Soil Association in England, Liebig’s “naive theory” that inorganic material could be used in plant production, did result in increased food production but the food was nutritionally inferior (Balfour 1948, 50-51 and Balfour 1976, 56). It lacked a “vital quality,” as the modern world, “largely ruled by chemistry,” had neglected the “continuity of the living principle in nature” (Balfour 1976, 25).

The emergence of synthetic urea brought an even stronger response -it was man-made, alien to the environment and dead, in the words of Rudolf Steiner. We must remember that the movement for “organic” or “biodynamic” agriculture was first a response to the use of synthetic fertilizer and not to pesticides. Synthetic fertilizers have proved their worth and there is no question that we would not be able to feed 6.3 billion people today without them, nor could we do so for the expected 9 billion people in 2050 when population growth is

expected to level off or even decline (Smil 2000 and 2001, 159). Though many believe in the mystic vitalist properties that manure provides to the crop, plant physiology tells us that manure has to be broken down in the soil and that the plant takes in cations and anions that are no different from those provided by synthetic fertilizer. The difference is that with modern agronomy, the farmer can more accurately provide the needed nutrient in proper proportions with synthetic fertilizer than with manure whose nutrient content may vary considerably.

However post-modernists and others may attack modern science, it has permeated our society sufficiently that there is often a felt need to find scientific evidence to justify a belief, even essentially vitalist ideas like the belief that “natural” is better. Having failed to prove that “organic” produce was superior in any other way, its proponents have now turned to the argument that its superiority results from its being less well protected from competitors, which means that it is being produced in an agronomically inferior way. After all, from the earliest agriculture, farmers have sought to protect their crops from competitors such as other plants, rodents, birds and microorganisms. In the attempt to find nutritional benefit in “organic” food crops on the basis of their being less well protected, the advocates are venturing into a mine field where there is a vast array of unexploded ordinance.

Trace Amounts

The “organic” enthusiasts never seem to tire of trying to find evidence of the superiority of their product. In March 2002, yet another study was announced which purported to show that “organic” vegetables were more nutritious than those that were conventionally grown (Baxter et al. 2002). Canned soups made with “organic” vegetables were found to have a higher level of salicylic acid than vegetable soups that were not labeled “organic.” These higher levels were the result of the fact that the organic plants were less well protected against various forms of infestations, and they expressed salicytes to protect against the invaders. Since farmers from time immemorial have sought to protect their crop, being less successful at it could be defined as being inferior, but an Orwellian inferiority where inferior is really superior.

Salicylic acid is the active ingredient in aspirin for which there is a claim that it has beneficial health effects for those who take one or two a day. This was taken as tantalizing evidence of nutritional superiority that warranted further research even though salicylic acid is not known as a nutrient. No matter how heroic the efforts to hold other factors constant, it is difficult to take seriously a study comparing commercially canned vegetable soups where one could either have compared the vegetables directly or made the soups themselves to make sure that everything else was the same except the vegetables.

Even if we accept the study’s validity, its conclusions are still in doubt. The tiny amount of salicylic acid that they found was 117 nanograms/gram. This is “1/10,000,000 of a gram or 0.00001% or (1/100,000 of 1%). For a typical 400 gram serving of soup at 117 nanograms/gram = 50,000 nanograms of SA, which is 0.005% of a gram, or 0.05 milligrams of salicylic acid, or 1/20th of one milligram” (Avery 2002). A bowl of organic soup provides “roughly 1/6,000 of a standard aspirin compared to conventional soup” which provides “only 1/36,000 of an aspirin” (Avery 2002).

A more recent paper found that foodstuffs produced by “organic” or “sustainable” methods produced more phenolics because they were less protected (Asami et al. 2003). Once again, phenolics are not thought to be a nutrient but they are believed to be anti-oxidants and therefore possibly helpful in preventing cancer. If being less well protected is the source of the alleged benefit, then conventional farmers could reduce the protection that they provide plants and thereby improve their “nutritional” value. Of course this would reduce the farmers’ output and raise the price of the product.

Consider all Factors

In my view as an economist, the authors missed the point that consumption of fruits and vegetables is price sensitive, so that even if the authors are correct one would still have to balance the alleged nutritional benefits of the foodstuffs with the reduction in the consumption of them, particularly by those in lower income groups who need them most. Phenolics and salicytes are called secondary metabolites because they are not essential for the plant’s metabolism. They are expressed in response to some attack against the plant. Some secondary metabolites have been found to be rodent carcinogens. Simply stated, if a plant is less well protected than it will be producing a variety of chemical defenses and it is likely to be carrying some residue from whatever attacked it. It is not valid or good science to cherry-pick what one wants to measure and ignore the rest. One has to look at the total potential benefits and harm to be able to say anything meaningful about the difference between various forms of plant production, and then one has to consider the cost factor for any judgment about nutrition to have any validity. The authors of the articles, finding “organic” foods have more nutrients, fail to test for higher levels of other secondary metabolites that may be carcinogenic, nor do they test for higher levels of a microbial infestation that may have caused the plant to express the chemical toxins.

In my judgment, it would be helpful if authors spoke about the increased production of “chemical toxins” to ward off infestation in less well-protected plants. After all, in spite of the use of the term “chemicals” as a pejorative,

chemicals are what the plant is producing. And if they are being produced to protect against an invader then they are likely to be in some way toxic to it. Once we have the generic category of “chemical toxins” than we can proceed to enumerate them and identify which are (or may be) beneficial to humans, which are (or may be) harmful to humans and which are likely to be neither. Unfortunately, just as we have words like “organic” that are endowed with vitalist virtues, we also have terms like “chemicals” and “toxins” that have been so demonized that sensible discourse using them has become almost impossible.

Much of the opposition to transgenic food crops is that they are allowing and will increasingly allow farmers to produce food crops with reduced pesticides or even no pesticides and use agronomic methods such as sustainable conservation tillage which prevent soil erosion, conserve water and preserve biodiversity in ways that “organic” agriculture cannot. When honestly and properly understood, pesticide-free transgenic food crops (crops using lower amounts of less environmentally toxic pesticides than the “all natural” pesticides of “organic” farmers) undercut the benefits of “organic” food consumption. This means that conventional farmers could mass-produce food that more than matches the alleged health and environmental benefits of “organic” food at a lower cost and price. Why then, would anyone buy “organic” food let alone pay a premium for it? Further, the transgenic food crops have vastly lower levels of fungal or other infestation, and as recent pro-organic studies show, they produce far fewer toxins. Even the most optimistic supporters of pest resistant Bt corn and cotton fully expected that in time some insects would develop resistance to their bioengineered insecticide (the Bt gene expresses a protein fully digestible by humans but lethal to target insects), yet six years have passed and “target insect pests have developed little or no resistance to Bt crops thus far, according to US Department of Agriculture-funded scientists.” Ironically, the diamondback moth “evolved resistance to Bt sprays used by organic growers, but no pest has evolved resistance to transgenic Bt crops in the field” (Fox 2003, see also DeGregori 2003). The irony is of course that it is the organic growers who have vociferously complained that the transgenic Bt varieties would lead to the emergence of super bugs resistant to their Bt spray.

> More than 500 species of insect have evolved resistance to one or more conventional insecticides. So far, the track record for Bt is better.
> In the field, only one pest, the diamondback moth, has evolved resistance to Bt sprays, and none has evolved resistance to Bt crops. Despite this success, the incredible adaptive ability of insects means that resistance remains a threat (Fox 2003).

Transgenic food crops using rDNA are the most predictable and therefore the safest form of plant breeding humans have ever devised. And almost everywhere in the world they are regulated, as they are the only food crops where we know what to test for. The potential for enhanced nutrition or even using the plant to express a protein that has pharmaceutical capabilities at an incredibly low price is enormous. But in the perverse logic of inferior-is-better, because “organic” foods are inferior to those resulting from transgenic food crop production, they are really superior.

Never has human food production been safer or more abundant than it is now. But we must always remember that in any human endeavor, there is never 100% certainty. The food crops in the field today, conventional and “organic” alike, are the products of 20th century plant breeding. In addition to the traditional crossing of closely related types, throughout the last century there emerged mutation-breeding using either highly toxic mutagenic chemicals or gamma radiation from a nuclear source that immediately produces random, massive change throughout the plant’s genome. There is nothing predictable in the outcome here. What could be more frightening to the consumer should critics wish to use it than for our food to be the product of carcinogenic chemicals or radioactivity (which of course it is not)? But of course this would leave nothing on the shelves or in the fields for people to eat. In addition, plant breeding has added techniques such as somaclonal variation, protoplastic cell fusion, embryo rescue, self-pollination and tissue culture to put crops in the field and food on our table. Again, there is nothing predictable here but of course that is the intention, namely to produce quickly as much variation as possible so that the plant breeder has more possibilities to choose from.

> The use of tissue culture in plant breeding has also often resulted in somaclonal variation of plant lines and irregular phenotypes or field performance. Somaclonal variations are mutational and chromosomal instabilities of embryonic plants regenerated from tissue cultures (Haslberger 2003).

Unfortunately, these “chromosomal instabilities” persist for some time not only in the original crop but in future crops in which it is part of the breeding stock.

> These instabilities may result from activation of dormant transposons in the chromosome. The consequent genetic variability is known to persist for many generations and is difficult to eliminate by backcrossing (Haslberger 2003).

Yet our food supply remains safer than it ever has been. And we must never forget that these mutation crops are very much a part of the crops of the “organic” farmers whose opposition to synthetic pesticides requires them to use varieties that are more resistant to disease infestation.

Natural Toxins

It is interesting to note that in searching for the possible “unintended consequences” of rDNA. the most serious unintended outcome was found in crops from “traditional breeding.”

> a traditionally bred squash caused food poisoning, a pest-resistant celery variety produced rashes in agricultural workers (which was subsequently found to contain sevenfold more carcinogenic psoralens than control celery) and a potato variety Lenape contained very high levels of toxic solanine (Haslberger 2003).

These crops are no longer cultivated (Kirschmann and Suber 1998, Ames and Gold 1990a and Prakash 2001). The most recent episode was an outbreak of “killer zucchini” which produced the “only food scare in recent history in New Zealand” and interestingly it “stemmed from the farming methods of organic farmers and others who use unconventional farming practices” (LSN 2003). In February 2003, Zucchini with “high levels of natural toxins” was sold on the vegetable market and resulted in “several recorded cases of people suffering food poisoning” (LSN 2003). We often worry about the toxicity resulting from spraying crops but rarely are we as concerned about those from not spraying them.

> An examination of common factors shows the levels of toxin apparently increased among zucchini growers who did not spray their crops. Unusual climatic conditions meant there were huge numbers of aphids about in January and insect predation is sometimes associated with increased levels of toxins in plants (LSN 2003).

In this case, there was a “clear link between increased toxin levels and older open-pollinating varieties of seeds” (LSN 2003). It is another of the “inferior is superior” views that there is something inherently virtuous in farmers planting their own saved seeds but it is “likely zucchini grown from saved seed will therefore be more vulnerable to toxin build-up” (LSN 2003).

The scientists who reviewed the “killer zucchini” case were very clear that the “most likely cause of the build-up of toxins is a genetic weakness in older varieties.” However worthy the farmer’s intentions may have been, “the growers’ decision to use older varieties and to save seeds is likely to have resulted in a health risk for consumers – something which has never happened with crops derived from genetic modification” (LSN 2003).

The work of Bruce Ames and two different National Academy of Science studies have shown that over 99.9% of the toxins that we ingest are the natural products of plants, and as we have noted, most of them are rodent carcinogens (Ames et al. 1990a&b, NAS 1973 and NRC 1996). Worst of all from the inferior-is-superior perspective, with rDNA, conventional farmers will mass-produce better protected food with fewer toxins in the plant and on it. Mass production means that those who consume these safer foods are not partaking of some special virtue, apart from better health.

Some Ideas are Dangerous

The inferior-is-superior food fetish is harmless as long as it is the exercise of personal consumption practices of those who can afford it. But it has taken a nasty turn, as these ideas are now lined up in opposition to the use of the latest and best in modern science and technology to contribute to meeting the needs of a growing world population for improved nutrition provided in an environmentally sustainable way. When these ideas galvanize street protests, the burning of crops in the field and buildings, the destruction of research in improved crop production, and other actions that make advances in agriculture more difficult, then these ideas have become dangerous and must be countered vigorously and continuously with better ideas. Freedom of speech and freedom for research must protect the minority but also the majority that may wish to carry forward the enterprise of science/technology and promote the benefits that they allow. This means that the laws protecting crops in the field, research, and researchers must be enforced. Modern agricultural science has given us much and our task is both to defend it and to find ways to allow access to those who have not fully realized these benefits.

Scarcity and Snob-value

In addition to higher levels of nutrition and cleaner, safer food, modern consumers now have an incredible array of foodstuffs from around the world as well as an opportunity to savor, with some frequency, cuisines from cultures whose culinary delights were unknown to their parents or grandparents. In an article appropriately titled, “Mean Cuisine,” Greg Critser asks the question, “Why, in a time of unprecedented abundance for everyone–vine-ripened Mexican tomatoes for $1 a pound! World-class reds and whites from Montepulciano d’Abruzzo for $5 a bottle! An international glut of inexpensive extra virgin olive oils and cheeses and nuts and fruits at Trader Joe’s and Price Club! – why oh why are the chefs of America so dour, so chary – so very very very bummed out?” (Critser 2001). “Why the big change” Critser asks? “Ten years ago, a pint of cold-pressed, extra-virgin Italian olive oil would set you back about $20. It was scarce, and so it was the chef’s preference. Today one can buy a gallon for the same price. Today, of course, imported oil is not the chef’s choice” (Critser 2001). The answer is abundance, and abundance is a threat to the values of snobbery of the critics of modernity.

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Critser adds that the “culprit is globalization.” The foods, particularly, those that were once imported at a price beyond the reach of ordinary citizens, have now become common and relatively cheap in supermarkets across the land. Globalization has been the mechanism by which the increasing global food production leads to greater diversity of available foodstuffs and therefore greater choice, but it also deprives the snobs of that sense of exclusivity in the items they consume. In a world of increasing free trade and technological advancement, the food snobs seek to pursue an anti-trade (“buy locally”), anti-technology agenda in order to preserve their status and self-esteem, even if it is at the expense of continuing the increase in food production to meet a growing world population and make the technologies of accessibility and abundance available to those who have not had the opportunity to benefit as fully as others from them. Rules that make items of consumption more expensive, restrict access to them to those who can afford them, thus making them more prestigious. Whatever the rhetoric used to defend them may be, the fact remains that those actively opposing the advance of science and technology are also working against the well-being of the less fortunate citizens of this planet. Humanism and science are today, as in the past, intricately interrelated in the endeavor not only to understand the world but also to make it a better place for all who call it home.

Thomas R. DeGregori (http://www.uh.edu/~trdegreg/)is a Professor of Economics at the University of Houston and the author of the forthcoming book, Origins of the Organic Agriculture Debate Iowa State Press: A Blackwell Publishing Company - http://store.yahoo.com/isupress/0813805139.html – which formed the basis of much of the material in this paper along with material from his other recent books.

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