

50 Harmful Effects of Genetically Modified Foods

By

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We are confronted with what is undoubtedly the single most potent technology the world has ever known - more powerful even than atomic energy. Yet it is being released throughout our environment and deployed with superficial or no risk assessments - as if no one needs to worry an iota about its unparalleled powers to harm life as we know it - and for all future generations.

Introduction

Biotechnology is a vital issue that impacts all of us.

Largely between 1997 and 1999, gene-modified (GM) ingredients suddenly appeared in *2/3rds of all US processed foods*. This food alteration was fueled by a single Supreme Court ruling. It allowed, for the first time, the patenting of life forms for commercialization. Since then thousands of applications for experimental GM organisms have been filed with the US Patent Office alone, and many more abroad. Furthermore an economic war broke out to own equity in firms which either have such patent rights or control the food-related organisms to which they apply. This has been the key factor behind the scenes of the largest food/agri-chemical company mergers in history. Few consumers are aware this has been going on and is continuing. Yet if you recently ate soya sauce in a Chinese restaurant, munched popcorn in a movie theatre, or indulged in an occasional candy bar - you've undoubtedly ingested this new type of food. You may have, at the time, known exactly how much salt, fat and carbohydrates were in each of these foods because regulations mandates their labeling for dietary purposes. But you would not know if the bulk of these foods, and literally every cell had been genetically altered!

In just those three years, as much as 1/4th of all American agricultural lands or 70-80 million acres were quickly converted to raise GM crops. Yet in most other countries, the same approach is subject to moratoriums, partially banned, restricted or requires labeling - and with stiff legal penalties for non-compliance. This refers to laws in Great Britain, France, Germany, the Netherlands, Italy, Spain, Portugal, Greece, Denmark, Sweden, Belgium, Finland, Ireland, Austria, Portugal - or in virtually all European nations. The same trend has further spread to Latin America, the Near East and Asia.

By contrast, an unregulated, quiet, and lightning speed expansion has been spearheaded in the US by a handful of companies in the wake of consolidations. We hear from their sales departments that nothing but positive results will follow - and for everyone from farmers to middlemen and the ultimate consumers. This "breakthrough" technology will aid the environment by reducing toxic chemical use, increase food production to stave off world hunger, and lead to an agricultural boom. In addition it will provide nutritionally heightened and much better storing and tasting foods. Finally, all of this is based on nothing but "*good science*" - which in the long run will convince the wary public that GM foods are either equivalent or better than the ordinary.

The size of a technology's market penetration - 1/4 of US agriculture - is not necessarily indicative that the majority of these claims are true. Biotechnology attempts a deeper "control" over nature. But a powerful temporary control is illusionary. For example, a farmer in Ottawa planted three different kinds of GM canola seeds that came from the three leading producers (Monsanto's Roundup, Cyanamid's Pursuit, and Aventis' Liberty). At first, he was happy to see he needed to use less of costly herbicides. But within just three years, "superweeds" had taken in the genes of all three types of plants! This ultimately forced him to use not only more herbicides, but far more lethal products.

The central problem underlying all of this technology is not just its short-term benefits and long-term drawbacks, but the overall attempt to "control" living nature based on an erroneous mechanistic view.

"Bioengineering" thus offers a contradiction in terms. "**Bio**" refers to *life*, what is not mechanistically predictable or controllable - and "**engineering**" refers to making the blueprints for machines that are predictable - but not alive. They are *dead*. Thus there is the joining of what is living with what applies to the opposite.

What is patentable also needs to be mentally "distinctive" - fixed or mostly unchanging in our minds to obtain an ownership or right-to-control patent. Again, something unchanging is not constantly adapting to its surrounding environment. It is less alive, and strategies to maintain that are often *deadly*. For example, much of GM technology is directed at eliminating surrounding biological environment - competing animals and plants, soaking them with lethal toxins. Secondly, there are terminator plants that do not reproduce a second generation - preventing a subsequent generation from escaping the controlling patented mold. In contrast to nature's rainforests teeming with life, GM

technology has planted forests of flowerless, fruitless "terminator trees." They are not habitats for life, but exude poisons from every leaf, killing all but a few insects. Thirdly, GM companies have gone on multi-billion dollar buying sprees, purchasing seed companies and destroying their non-patented (potentially competitive) seed stocks. Time magazine called the widespread consequences of this effort a global *Death of Birth*. All of this is why "biotechnology," in its naked essence, has been tagged by some as *thano- (meaning death) technology*.

In this light there comes to mind the eloquent words of the late Rachel Carson's *Silent Spring*, condensed as follows:

" A year after...a massive spraying...there was not a sound of the song of bird.... What was man doing to...our beautiful world...Who has made the decision that sets in motion...this ever-widening wave of death."

No doubt mechanical patterns in nature are real. But they can be a superficial by-product and not reflective of the deepest or true essence of life.

Hybridizations does work harmoniously with superficial aspects of nature without fully disturbing the essential life force at the center of each cell. Also with hybridizations, conscious life makes primary genetic decisions. We can understand this with an analogy. There is an immense difference between being a matchmaker and inviting two people for dinner - encouraging them to go on a date - as opposed to forcing the union or even a date rape.

With biotechnology, roses are no longer crossed with just roses. They can be mated with pigs, tomatoes with oak trees, fish with asses, butterflies with worms, orchids with snakes. The technology that makes this possible is called biolistics - a gunshot-like violence that pierces the nuclear membrane of cells. This essentially violates the consciousness that forms and guides living nature. Some also compare it to the violent crossing of territorial borders of countries, subduing inhabitants against their will.

What will happen if this technology is allowed to spread? Fifty years ago few predicted that chemical pollution would cause so much environmental harm - with nearly 1/3rd of all species now threatened with extinction. Or that cancer rates would have doubled and quadrupled.

No one has a crystal ball to see future consequences. Nevertheless, alarm signals go off when a technology goes directly to the center of every living cell - and under the guidance of a mechanical or non-living way of restructuring or recreating nature. The potential harm can far outweigh chemical pollution because chemistry only deals with things altered by fire - or things that are not alive. For example, a farmer may use toxic chemicals for many decades, and then let the land lie fallow for a year or two to convert back to organic farming. The chemicals tend to break down into natural substances within

months or years. A few may persist for decades. But genetic pollution can alter the life in the soil forever!

Farmers who view their land as their primary financial asset have reason to heed this. If new evidence of soil bacteria contamination arises - what is possible given the numerous (1600 or more) distinct microorganisms we classify in just a teaspoon of soil - and if that contamination is not quickly remediable but remains permanent - someday the public may blacklist farms that have once planted GM crops. No one seems to have put up any warning signs when selling these inputs to farmers who own 1/4 of all agricultural tracks in the US. Furthermore, the spreading potential impact on all ecosystems is profound.

Writes Jeremy Rifkin, in the *Biotech Century*,

"Our way of life is likely to be more fundamentally transformed in the next several decades than in the previous one thousand years...Tens of thousands of novel transgenic bacteria, viruses, plants and animals could be released into the Earth's ecosystems...Some of those releases, however, could wreak havoc with the planet's biospheres."

In short these processes involve unparalleled risks. Voices from many sides echo this view. Contradicting safety claims, no major insurance company has been willing to limit risks, or insure bio-engineered agricultural products. The reason given is the high level of unpredictable consequences. Over two hundred scientists have signed a statement outlining the dangers of GM foods and The Union of Concerned Scientists (a 1000 plus member organization with many Nobel Laureates) has expressed similar reservations. The prestigious medical journal, *Lancet*, issued a warning that GM foods should never have been allowed into the food chain. Britain's Medical Association (the equivalent of the AMA) with 100,000 physicians and Germany's with 325,000 issued similar statements. In a gathering of political representatives from over 130 nations, approximately 95% insisted on new precautionary approaches. The National Academy of Science released a report that GM products introduce new allergens, toxins, disruptive chemicals, soil-polluting ingredients, mutated species and unknown protein combinations into our bodies and into the whole environment. This may also raise existing allergens to new heights as well as reduce nutritional content. Even within the FDA, prominent scientists have repeatedly expressed profound fears and reservations. Their voices were muted not for cogent scientific reasons but due to political pressures from the Bush administration to buttress the nascent biotech industry.

To counterbalance this, industry-employed scientists have signed a statement in favor of genetically engineered foods. But are any of these scientists impartial? Writes the *New York Times* (about a similar crisis involving genetic engineering and medical applications), "Academic scientists who lack industry ties have become as rare as giant pandas in the wild...lawmakers, bioethics experts and federal regulators are troubled that so many researchers have a financial stake [via stock options or patent participation] ... The fear is that the lure of profit could color scientific integrity, promoting researchers to withhold information about potentially dangerous side-effects."

Looked at from outside of commercial interests, perils are multi-dimensional. They include the creation of new "transgenic" life forms - organisms that cross unnatural gene lines (such as tomato seed genes crossed with fish genes) - and that have unpredictable behavior or replicate themselves out of control in the wild. This can happen, without warning, *inside of our bodies* creating an unpredictable chain reaction. A four-year study at the University of Jena in Germany conducted by Hans-Hinrich Kaatz revealed that bees ingesting pollen from transgenic rapeseed had bacteria in their gut with modified genes. This is called a "horizontal gene transfer." Commonly found bacteria and microorganisms in the human gut help maintain a healthy intestinal flora. These, however, can be mutated.

Mutations may be able to travel internally to other cells, tissue systems and organs throughout the human body.

Not to be underestimated, the potential domino effect of internal and external genetic pollution can make the substance of science-fiction horror movies become terrible realities in the future. The same is true for the bacteria that maintain the health of our soil - and are vitally necessary for all forms of farming - in fact for human sustenance and survival.

Without factoring in biotechnology, milder forms of controlling nature have gravitated toward restrictive monocropping. In the past 50 years, this underlies the disappearance of approximately 95% of all native grains, beans, nuts, fruits, and vegetable varieties in the United States. GM monoculture, however, can lead to yet greater harm. Monsanto, for example, set a goal of converting 100% of all US soy crops to Roundup Ready strains by the year 2000. If effected, this plan would have threatened the biodiversity and resilience of all future soy farming practices. Monsanto laid out similar strategies for corn, cotton, wheat and rice. This represents a deep misunderstanding of how seeds interact, adapt and change with the *living* world of nature.

One need only look at agricultural history - at the havoc created by the Irish potato blight, the Mediterranean fruit fly epidemic in California, the current international crisis with cocoa plants, the regional citrus canker attack in the Southeast, and the 1970's US corn leaf blight. In the latter case, 15% of US corn production was quickly destroyed. Had weather changes not quickly ensued, the most all crops would have been laid waste because a fungus attached their cytoplasm universally. The deeper reason this happened was that approximately 80% of US corn had been standardized to help farmers crossbreed - and by a method akin to current genetic engineering. The uniformity of plants then allowed a single fungus to spread, and within four months to destroy crops in 581 counties and 28 states in the US. According to J. Browning of Iowa State University: "Such an extensive, homogeneous acreage of plants... is like a tinder-dry prairie waiting for a spark to ignite it."

The homogeneity is unnatural - a byproduct of deadening nature's creativity in the attempt to grasp absolute control - what ultimately can yield wholesale disaster.

Europeans seem more sensitive than Americans to such approaches - given the analogous metaphor of German eugenics.

Historical Context

Overall the revolution that is presently trying to overturn 12,000 years of traditional and sustainable agriculture was launched in 1980 in the US. This was the result of a little-known US Supreme Court decision *Diamond vs. Chakrabarty* where the highest court decided that biological life could be legally patentable.

Ananda Mohan Chakrabarty, a microbiologist and employee of General Electric (GE), developed at the time a type of bacteria that could ingest oil. GE rushed to apply for a patent in 1971. After several years of review, the US Patent and Trademark Office (PTO) turned down the request under the traditional doctrine that life forms are not patentable. GE sued and won. In 1985, the PTO ruled that the Chakrabarty ruling could be further extended to all plants, seeds, and plant tissues - or to the entire plant kingdom.

Scouring the world for valuable genetic heritage, W.R. Grace applied for and was been granted fifty US patents on the neem tree in India. It even patented the indigenous knowledge of how to medicinally use the tree (what has since been called bio-piracy). Furthermore, on April 12, 1988, the PTO issued its first patent on an animal to Harvard Professor Philip Leder and Timothy A. Stewart. This involved the creation of a transgenic mouse containing chicken and human genes. On October 29, 1991, the PTO granted patent rights to human stem cells, and later human genes. A United States company, Biocyte was awarded a European patent on all umbilical cord cells from fetuses and newborn babies. The patent extended exclusive rights to use the cells without the permission of the 'donors.' Finally the European Patent Office (EPO) received applications from Baylor University for the patenting of women who had been genetically altered to produce proteins in their mammary glands. Baylor essentially sought monopoly rights over the use of human mammary glands to manufacture pharmaceuticals. Other attempts have been made to patent cells of indigenous peoples in Panama, the Solomon Islands, and Papua New Guinea. Thus the Chakrabarty ruling evolved within the decade from the patenting of tiny, almost invisible microbes to virtually all terrains of life on Earth.

Certain biotech companies then quickly moved to utilize such patenting for the control of seed stock - including buying up small seed companies and destroying their non-patented seeds. In the past few years, this has led to a near monopoly control of certain commodities, especially soy, corn, and cotton (used in processed foods via cottonseed oil). As a result, nearly 2/3rd of such processed foods showed some GM ingredient. Yet again without labeling, few consumers in the US were aware any of this was pervasively occurring. Industry marketers found out that the more the public knew, the less they wanted to purchase GM foods. Thus a concerted effort was organized to convince regulators not to require such labeling.

Condensed Summary of Hazards

This book reviews and disputes the industry claims that GM foods are the equivalent of ordinary foods not requiring labeling. It offers an informative list of at least fifty hazards, problems, and dangers. There is also a deeper philosophical discussion of how the "good science" of biotechnology can turn out to be thano-technology. When pesticides were first introduced, they also were heralded as absolutely safe and a miracle cure for farmers. Only decades later the technology revealed its lethal implications.

The following list also is divided into easily referred to sections on health, environment, farming practices, economic/political/social implications, and issues of freedom of choice. There is a concluding review of inner concerns - philosophical, spiritual and religious issues involving "deep ecology" - or our overall way of relating to nature. Furthermore there is a list of practical ideas and resources for personal, political and consumer action on this vital issue. Finally, this book as a whole is subject to change as new information becomes available.

The reader is encouraged to keep in touch with the many web sites that have updating information - and to contact *Americans for Safe Food* to offer new information or feedback to help make this book a timely resource.

HEALTH

" Recombinant DNA technology faces our society with problems unprecedented not only in the history of science, but of life on Earth. It places in human hands the capacity to redesign living organisms, the products of three billion years of evolution. Such intervention must not be confused with previous intrusions upon the natural order of living organisms:

animal and plant breeding...All the earlier procedures worked within single or closely related species...Our morality up to now has been to go ahead without restriction to learn all that we can about nature. Restructuring nature was not part of the bargain...this direction may be not only unwise, but dangerous. Potentially, it could breed new animal and plant diseases, new sources of cancer, novel epidemics."

Dr. George Wald: Nobel Laureate in Medicine, 1967

Higgins Professor of Biology, Harvard University

HEALTH

Deaths and Near-Deaths

1. Recorded Deaths from GM- In 1989, dozens of Americans died and several thousands were afflicted and impaired by a genetically altered version of the food supplement – L-tryptophan. A settlement of \$2 billion dollars was paid by Showa Denko, Japan's third largest chemical company. (Mayeno and Gleich, 1994).
2. Near-deaths from Allergic Reactions- In 1996, Brazil nut genes were spliced into soybeans by a company called Pioneer Hi-Bred. Some individuals, however, are so allergic to this nut, they go into anaphylactic shock (similar to a severe bee sting reaction) which can cause death. Animal tests confirmed the peril and fortunately the product was removed from the market before any fatalities occurred. "The next case could be less than ideal and the public less fortunate," writes Marion Nestle, head of the Nutrition Department of NYU in an editorial to the New England Journal of Medicine. About 25% of Americans have adverse reactions to foods. 8% of children and 2% of adults have food allergies as tested by blood immunoglobins.

Cancer and Other Degenerative Ailments.

3. **Direct Cancer and Degenerative Disease Links-** In 1994, FDA approved Monsanto's rBGH, a genetically produced growth hormone, for injection into dairy cows – even though scientists warned the resulting increase of IGF-1, a potent chemical hormone, is linked to 400-500% higher risks of human breast, prostate, and colon cancer. According to Dr. Samuel Epstein of the University of Chicago, it "induces the malignant transformation of human breast epithelial cells." Rat studies confirmed the suspicion and showed internal organ damage with rBGH ingestion. In fact, the FDA's own experiments indicated a spleen mass increase of 46% - a sign of developing leukemia. The contention was that the hormone was killed by pasteurization. But in research conducted by two Monsanto scientists, Ted Elasser and Brian McBride, only 19% of the hormone was destroyed despite boiling milk for 30 minutes when normal pasteurization is 30 seconds. Canada, the European Union, Australia and New Zealand have banned rBGR. The UN's Codex Alimentarius, an international health standards setting body, refused to certify rBGH as safe. Yet Monsanto continues to market this product in the US. Part of the reason may be that the policy in the FDA was initiated by Margaret Miller, Deputy Director of Human Safety and Consultative Services, New Animal Drug Evaluation Office, Center for Veterinary Medicine... and former chemical laboratory supervisor for Monsanto. She spearheaded the increase in the amount of antibiotics farmers were allowed to have in their milk - and by a factor of 100 or 10,000 percent. Michael Taylor, Esq. was the executive assistant to the director of the FDA. He drafted the Delaney Amendment that allowed for the minimizing of cancer risk and was later hired as legal counsel to Monsanto, and subsequently again became Deputy Commissioner of Policy at the FDA. Several other GM approved products involve herbicides that are commonly known carcinogens - bromoxynil used on transgenic cotton and Monsanto's Roundup or glufosinate used on GM soybeans, corn, and canola. Furthermore and according to researcher Sharyn Martin, a number of autoimmune diseases are enhanced by foreign DNA fragments that are not fully digested in the human stomach and intestines. DNA fragments are absorbed into the bloodstream, potentially mixing with normal DNA. The genetic consequences are unpredictable and unexpected gene fragments have shown up in GM soy crops.
4. **Indirect, Non-traceable Effects on Cancer Rates-** The twentieth century saw an incremental lowering of infectious disease rates – especially where a single bacteria was overcome by an antibiotic– but a simultaneous rise in systemic, whole body or immune system breakdowns - such as with cancer. Cancer is affected by the overall polluted state of our environment - including in the air,

water, and food we take in. There are unimaginably many combinations for the 100,000 or so chemicals released into the environment. The real impact cannot be revealed by a handful of stringent experiments that isolate just a few controlled factors or chemicals at a time. Rather all of nature is a testing ground. Scientists a few years ago were startled that a random combination of chemicals (mostly pesticides) caused a 1000 times more cancer than the sum of the individual chemicals indicated in separate tests. More startling was the fact that some chemicals were thought to be harmless by themselves. Similarly, there is the potential, with entirely new ways of rearranging the natural order - with genetic mutations - that such non-traceable influences can also cause cancer. We definitively know X-rays and chemicals cause genetic mutations, and mutagenic changes are behind many higher cancer rates - where cells duplicate out of control. If nothing else, this should make us extremely cautious. In the US in the year 1900 cancer affected approximately 1 out of 11 individuals. It now inflicts 1 out of 2 men, and 1 out of 3 women in their lifetime. These rates relentlessly shot upward throughout the twentieth century.

Viral and Bacterial Illness

5. Superviruses- Viruses can mix with genes of other viruses and retroviruses such as HIV. This can give rise to more deadly viruses – and at rates higher than previously thought. One study showed that gene mixing occurred in viruses in just 8 weeks (Kleiner, 1997). This kind of scenario applies to the cauliflower mosaic virus CaMV, the most common virus used in genetic engineering - in Round Up ready soy of Monsanto, Bt-maise of Novartis, and GM cotton and canola. It is a kind of "pararetrovirus" or what multiplies by making DNA from RNA. It is somewhat similar to Hepatitis B and HIV viruses and can pose immense dangers. In a Canadian study, a plant was infected with a crippled cucumber mosaic virus that lacked a gene needed for movement between plant cells. Within less than two weeks, the crippled plant found what it needed from neighboring genes - as evidence of gene mixing. This is significant because genes that cause diseases are often crippled to make the end product "safe." Results of this kind led the US Department of Agriculture to hold a meeting in October of 1997 to discuss the risks and dangers of gene mixing and superviruses, but no regulatory action was taken.

6. Antibiotic Threat – Via Milk Cows injected with rBGH have a much higher level of udder infections and require more antibiotics. This leaves unacceptable levels of antibiotic residues in the milk. Scientists have warned of public health hazards due to growing antibiotic resistance.

7. Antibiotic Threat – Via Plants Much of genetic implantation uses a marker to track where the gene goes into the cell. GM maize plants use an ampicillin resistant gene. In 1998, the British Royal Society called for the banning of this marker as it threatens a vital antibiotic's use. The resistant qualities of GM bacteria in food can be transferred to other bacteria in the environment and throughout the human body.

8. Resurgence of Infectious Diseases- The *Microbial Ecology in Health and Disease* journal reported in 1998 that gene technology may be implicated in the resurgence of infectious diseases. This occurs in multiple ways. There is growing resistance to antibiotics misused in bioengineering, the formation of new and unknown viral strains, and the lowering of immunity through diets of processed and altered foods. There is also the horizontal transfer of transgenic DNA among bacteria. Several studies have shown bacteria of the mouth, pharynx and intestines can take up the transgenic DNA in the feed of animals, which in turn can be passed on to humans. This threatens the hallmark accomplishment of the twentieth century - the reduction in infectious diseases that critically helped the doubling of life expectancy.

Allergies

9. Increased Food Allergies- The loss of biodiversity in our food supply has grown in parallel with the increase in food allergies. This can be explained as follows. The human body is not a machine-like "something" that can be fed assembly line, carbon copy foods. We eat for nourishment and vitality. What is alive interacts or changes with its environment. Unnatural sameness - required for patenting of genetic foods - are "dead" qualities. Frequently foods we eat and crave are precisely those testing positive for food allergies. Cells in our body recognize this lack of vitality, producing antibodies and white cells in response. This is analogous to our brain's cells recognizing and rejecting mechanically repeated thoughts - or thinking "like a broken record." Intuitively our body cells and the overall immune system seems to reject excess homogeneity.

Birth Defects, Toxicity, and Lowered Nutrition

10. Birth Defects and Shorter Life Spans- As we ingest transgenic human/ animal products there is no real telling of the impact on human evolution. We know that rBGH in cows causes a rapid increase in birth defects and shorter life spans.

11. Interior Toxins- "Pesticidal foods" have genes that produce a toxic pesticide inside the food's cells. This represents the first time "cell-interior toxicity" is being sold for human consumption. There is little knowledge of the potential long-term health impacts.

12. Lowered Nutrition- A study in the Journal of Medicinal Food (Dr. Marc Lappe, 1999) showed that certain GM foods have lower levels of vital nutrients – especially phytoestrogen compounds thought to protect the body from heart disease and cancer. In another study of GM Vicia Faba, a bean in the same family as soy, there was also an increase in estrogen levels, what raises health issues - especially in infant soy formulas. Milk from cows with rBGH contains substantially higher levels of pus, bacteria, and fat. Monsanto's analysis of glyphosate-resistant soya showed the GM-line contained 28% more Kunitz-trypsin inhibitor, a known anti-nutrient and allergen.

General

13. No Regulated Health Safety Testing- The FDA only requests of firms that they conduct their own tests of new GM products in what Vice President Quale back in 1992 referred to as a "regulatory relief program." The FDA makes no review of those tests unless voluntarily requested by the company producing the product. Companies present their internal company records of tests showing a product is safe - essentially having the "fox oversee the chicken coup." As Louis J. Pribyl, an FDA microbiologist explained, companies tailor tests to get the results they need. They further relinquish responsibility as Pjil Angell, Monsanto's director of corporate communications expressed it "Monsanto should not have to vouchsafe the safety of biotech foods. Our interest is in selling...Assuring its safety is the FDA's job." But the FDA has not assumed the responsibility. Essentially it is "like playing Russian roulette with public health," says Philip J. Regal, a biologist at the University of Minnesota. In his contacts with the FDA, he noted that in the

policy of helping the biotech industry grow "government scientist after scientist acknowledged there was no way to assure the health safety of genetically engineered food... [yet] society was going to have to bear an unavoidable measure of risk." The situation was summarized by Richard Steinbrecher, a geneticist working for the Women's Environmental Network "To use genetic engineering to manipulate plants, release them into the environment and introduce them into our food chains is scientifically premature, unsafe and irresponsible."

14. Unnatural Foods- Recently, Monsanto announced it had found "unexpected" gene fragments in their Roundup Ready soybeans. It is well known that modified proteins exist in GE foods, new proteins never before eaten by humanity. In 1992, Dr. Louis J. Pribyl of the FDA's Microbiology Group warned (in an internal memo uncovered in a lawsuit filed) that there is "a profound difference between the types of expected effects from traditional breeding and genetic engineering." He also addressed industry claims of no "pleiotropic" (unintended and/or uncontrolled) effects. This was the basis for the industry position that GM foods are "equivalent" to regular foods, thus requiring no testing or regulation. "Pleiotropic effects occur in genetically engineered plants...at frequencies of 30%...increased levels of known naturally occurring toxicants, appearance of new, not previously identified toxicants, increased capability of concentrating toxic substances from the environment (e.g. pesticides or heavy metals), and undesirable alterations in the level of nutrients may escape breeders' attention unless genetically engineered plants are evaluated specifically for these changes." Other scientists within the FDA echoed this view - and in contrast to the agency's official position. For example, James Marayanski, manager of the FDA's Biotechnology Working Group warned that there was a lack of consensus among the FDA's scientists as to the so-called "sameness" of GM foods compared to non-GM foods. The reason why this is such an important issue is that Congress mandated the FDA to require labeling when there is "something tangibly different about the food that is material with respect to the consequences which may result from the use of the food."

15. Radical Change in Diet- Humanity has evolved for thousands of years by adapting gradually to its natural environment - including nature's foods. Within just three years a fundamental transformation of the human diet has occurred. This was made possible by massive consolidations among agri-business. Ten companies now own about 40% of all US seed production and sales. The Biotech industry especially targeted two of the most commonly eaten and lucrative ingredients in processed foods - corn and soy. Monsanto and Novartis, through consolidations, became the second and third largest seed companies in the world. They also purchased related agricultural businesses to further monopolize soy and corn production. Again within three years, the majority of soybeans and one third of all

corn in the US are now grown with seeds mandated by the biotech firms. Also 60% of all hard cheeses in the US are processed with a GM enzyme. A percentage of baking and brewery products are GM modified as well. Most all of US cotton production (where cotton oil is used in foods) is bioengineered. Wheat and rice are next in line. In 2002, Monsanto plans to introduce a "Roundup" (the name of its leading herbicide) resistant wheat strain. The current result is that approximately two-thirds of all processed foods in the US already contain GM ingredients – and this is projected to rise to 90% within four years according to industry claims. In short, the human diet, from almost every front, is being radically changed - with little or no knowledge of the long-term health or environmental impacts.

ENVIRONMENT

"Genetic Engineering is often justified as a human technology, one that feeds more people with better food. Nothing could be further from the truth. With very few exceptions, the whole point of genetic engineering is to increase sales of chemicals and bio-engineered products to dependent farmers."

David Ehrenfield: Professor of Biology, Rutgers University

ENVIRONMENT

General Soil Impact

16. Toxicity to Soil- The industry marketing pitch to the public is that bioengineered seeds and plants will help the environment by reducing toxic herbicide/pesticide use. Isolated examples are given, but the overall reality is exactly opposite. The majority of GM agricultural products are developed specifically for toxin-resistance - namely for *higher doses* of herbicides/ pesticides sold by the largest producer companies – Monsanto, Dupont Novartis, Dow, Bayer, Ciba-Geigy, Hoescht, AgroEvo, and Rhone-Poulenc. Also the majority of research for future products involves transgenic strains for increased chemical resistance. Not to be fooled, the primary intent is to sell more, not less of their products and to circumvent patent laws. According to an article by R.J. Goldberg scientists predict herbicide use will triple as a result of GM products. As an example of the feverish attempt to expand herbicide use, Monsanto's patent for Roundup was scheduled to expire. Not to lose their market share, Monsanto came up with the idea of creating "Roundup Ready" seeds. It bought out seed companies to monopolize the terrain - then licensing the seeds to farmers with the requirement that they continue buying Roundup past the expiration of the patent. These contracts had stiff financial penalties if farmers used any other herbicide. As early as 1996, the investment report of Dain Boswell on changes in the seed industry reported that Monsanto's billion dollar plus acquisition of Holden Seeds (about 1/3rd of US corn seeds) had "very little to do with Holden as a seed company and a lot to do with the battle between the chemical giants for future sales of herbicides and insecticides." Also as revealed in corporate interviews conducted by Marc Lappe and Britt Bailey (authors of *Against the Grain - Biotechnology and the Corporate Takeover of your Food*), the explicit aim was to control 100% of US soy seeds by the year 2000 only to continue to sell Roundup - or to beat their patent's expiration. In fact in 1996, about 5000 acres were planted with Roundup Ready soy seeds when Roundup sales accounted for 17% of Monsanto's \$9 billion in annual sales. Not to lose this share but to expand it, Monsanto saw to it that by 1999, 5000 acres grew to approximately 40 million acres out of a total of 60 million - or the majority of all soy plantings in the United States. Furthermore, Roundup could now be sprayed over an entire field, not just sparingly over certain weeds. However, the problem with evolving only genetically cloned and thus carbon-copy seeds and plants is that historically, extreme monoculture (high levels of sameness in crop planting) has led to a loss of adaptive survival means - or where deadly plant infections have spread like wildfire. As a separate issue, according to the United States Fish and Wildlife Service, Monsanto's Roundup already threatens 74 endangered species in the United States. It attacks photosynthesis in plants non-specifically - their

quintessential, life-giving way to process sunlight. Farmers sowing Roundup Ready seeds can also use more of this herbicide than with conventional weed management. Since the genetically modified plants have alternative ways to create photosynthesis, they are hyper-tolerant, and can thus be sprayed repeatedly without killing the crop. Though decaying in the soil, Roundup residues are left on the plant en route to the consumer. Malcolm Kane, (former head of food safety for Sainsbury's chain of supermarkets) revealed that the government, to accommodate Monsanto, raised pesticide residue limits on soy products about 300-fold from 6 parts per million to 20 parts. Lastly Roundup is a human as well as environmental poison. According to a study at the University of California, glyphosphate (the active ingredient of Roundup) was the third leading cause of farm worker illnesses. At least fourteen persons have died from ingesting Roundup. These cases involved mostly individuals intentionally taking this poison to commit suicide in Japan and Taiwan. From this we know that the killing dose is so small it can be put on a finger tip (0.4 cubic centimeters). Monsanto, however, proposes a universal distribution of this lethal substance in our food chain. All of this is not shocking, given Monsanto's history - being the company that first distributed PCBs and vouched for their safety.

17. Soil Sterility and Pollution- In Oregon, scientists found GM bacterium (*klebsiella planticola*) meant to break down wood chips, corn stalks and lumber wastes to produce ethanol - with the post-process waste to be used as compost - rendered the soil sterile. It killed essential soil nutrients, robbing the soil of nitrogen and killed nitrogen capturing fungi. A similar result was found in 1997 with the GM bacteria *Rhizobium melitoli*. Professor Guenther Stotzky of New York University conducted research showing the toxins that were lethal to Monarch butterfly are also released by the roots to produce soil pollution. The pollution was found to last up to 8 months with depressed microbial activity. An Oregon study showed that GM soil microbes in the lab killed wheat plants when added to the soil.

Seeds

18. Extinction of Seed Varieties- A few years ago *Time* magazine referred to the massive trend by large corporations to buy up small seed companies, destroying any competing stock, and replacing it with their patented or controlled brands as "*the Death of Birth.*" Monsanto additionally has had farmers sign contracts not to save their seeds - forfeiting what has long been a farmer's birthright to remain guardians of the blueprints of successive life.

Plants

19. Superweeds- It has been shown that genetically modified Bt endotoxin remains in the soil at least 18 months (according to Marc Lappe and Britt Bailey) and can be transported to wild plants creating superweeds - resistant to butterfly, moth, and beetle pests – potentially disturbing the balance of nature. A study in Denmark (Mikkelsen, 1996) and in the UK (National Institute of Agricultural Botany) showed superweeds growing nearby in just one generation. A US study showed the superweed resistant to glufosinate to be just as fertile as non-polluted weeds. Another study showed 20 times more genetic leakage with GM plants – or a dramatic increase in the flow of genes to outside species. Also in a UK study by the National Institute of Agricultural Botany, it was confirmed that superweeds could grow nearby in just one generation. Scientists suspect that Monsanto's wheat will hybridize with goat grass, creating an invulnerable superweed. The National Academy of Science's study stated that " concern surrounds the possibility of genes for resisting pests being passed from cultivated plants to their weedy relatives, potentially making the weed problem worse. This could pose a high cost to farmers and threaten the ecosystem." (quoting Perry Adkisson, chancellor emeritus of Texas A&M University, who chaired the National Academy of Science study panel). An experiment in France showed a GM canola plant could transfer genes to wild radishes, what persisted in four generations. Similarly, and according to New Scientists, an Alberta Canada farmer began planting three fields of different GM canola seeds in 1997 and by 1999 produced not one, but three different mutant weeds - respectively resistant to three common herbicides (Monsanto's Roundup, Cyanamid's Pursuit, and Aventis' Liberty). In effect genetic materials migrated to the weeds they were meant to control. Now the Alberta farmer is forced to use a potent 2,4-D what GM crops promised to avoid use of. Finally Stuart Laidlaw reported in the Toronto Star that the Ontario government study indicated herbicide use was on the rise primarily largely due to the introduction of GM crops.

20. Plant Invasions- We can anticipate classic bio-invasions as a result of new GM strains, just as with the invasions of the kutzu vine or purple loosestrife in the plant world.

Trees

21. Destruction of Forest Life- GM trees or "supertrees" are being developed which can be sprayed from the air to kill literally all of surrounding life, except the GM trees. There is an attempt underway to transform international forestry by

introducing multiple species of such trees. The trees themselves are often sterile and flowerless. This is in contrast to rainforests teeming with life, or where a single tree can host thousands of unique species of insects, fungi, mammals and birds in an interconnected ecosphere. This kind of development has been called "death-engineering" rather than "life-" or "bio-engineering." More ominously pollen from such trees, because of their height, has traveled as much as 400 miles or 600 kilometers - roughly 1/5 of the distance across the United States.

22. Terminator Trees- Monsanto has developed plans with the New Zealand Forest Research Agency to create still more lethal tree plantations. These super deadly trees are non-flowering, herbicide-resistant and with leaves exuding toxic chemicals to kill caterpillars and other surrounding insects – destroying the wholesale ecology of forest life. As George McGavin, curator of entomology Oxford University noted, "If you replace vast tracts of natural forest with flowerless trees, there will be a serious effect on the richness and abundance of insects...If you put insect resistance in the leaves as well you will end up with nothing but booklice and earwigs. We are talking about vast tracts of land covered with plants that do not support animal life as a sterile means to cultivate wood tissue. That is a pretty unattractive vision of the future and I for one want no part of it."

Insects and Larger Animals

23. Superpests- Lab tests indicate that common plant pests such as cottonboll worms, will evolve into superpests immune from the Bt sprays used by organic farmers. The recent "stink bug" epidemic in North Carolina and Georgia seems linked to bioengineered plants that the bugs love. Monsanto, on their Farmsource website, recommended spraying them with methyl parathion, one of the deadliest chemicals. So much for the notion of Bt cotton getting US farmers off the toxic treadmill. Pests the transgenic cotton was meant to kill - cotton bollworms, pink bollworms, and budworms - were once "secondary pests." Toxic chemicals killed off their predators, unbalanced nature, and thus made them "major pests."
24. Animal Bio-invasions- Fish and marine life are threatened by accidental release of GM fish currently under development in several countries – trout, carp, and salmon several times the normal size and growing up to 6x times as fast. One such accident has already occurred in the Philippines – threatening local fish supplies.

25. Killing Beneficial Insects- Studies have shown that GM products can kill beneficial insects – most notably the monarch butterfly larvae (Cornell, 1999). Swiss government researchers found Bt crops killed lacewings that ate the cottonworms which the Bt targeted. A study reported in 1997 by New Scientist indicates honeybees may be harmed by feeding on proteins found in GM canola flowers. Other studies relate to the death of bees (40% died during a contained trial with Monsanto's Bt cotton), springtails (Novartis' Bt corn data submitted to the EPA) and ladybird beetles .
26. Poisonous to Mammals- In a study with GM potatoes, spliced with DNA from the snowdrop plant and a viral promoter (CaMV), the resulting plant was poisonous to mammals (rats) – damaging vital organs, the stomach lining and immune system. CaMV is a pararetrovirus. It can reactivate dormant viruses or create new viruses - as some presume have occurred with the AIDES epidemic. CaMV is promiscuous, why biologist Mae Wan-Ho concluded that "all transgenic crops containing CaMV 35S or similar promoters which are recombinogenic should be immediately withdrawn from commercial production or open field trials. All products derived from such crops containing transgenic DNA should also be immediately withdrawn from sale and from use for human consumption or animal feed."
27. Animal Abuse- Pig number 6706 was supposed to be a "superpig." It was implanted with a gene to become a technological wonder. But it eventually became a "supercripple" full of arthritis, cross-eyed, and could barely stand up with its mutated body. Some of these mutations seem to come right out of Greek mythology - such as a sheep-goat with faces and horns of a goat and the lower body of a sheep. Two US biotech companies are producing genetically modified birds as carriers for human drug delivery – without little concern for animal suffering. Gene Works of Ann Arbor, Michigan has up to 60 birds under "development." GM products, in general, allow companies to own the rights to create, direct, and orchestrate the evolution of animals.
28. Support of Animal Factory Farming- Rather than using the best of scientific minds to end animal factory farming - rapid efforts are underway to develop gene-modified animals that better thrive in disease-promoting conditions of animal factory farms.

Genetic Uncertainties

29. Genetic Pollution- Carrying GM pollen by wind, rain, birds, bees, insects, fungus, bacteria – the entire chain of life becomes involved. Once released, unlike chemical pollution, there is no cleanup or recall possible. As mentioned, pollen from a single GM tree has been shown to travel 1/5th of the length of the United States. Thus there is no containing such genetic pollution. Experiments in Germany have shown that engineered oilseed rape can have its pollen move over 200 meters. As a result German farmers have sued to stop field trials in Berlin. In Thailand, the government stopped field tests for Monsanto's Bt cotton when it was discovered by the Institute of Traditional Thai Medicine that 16 nearby plants of the cotton family, used by traditional healers, were being genetically polluted. US research showed that more than 50% of wild strawberries growing inside of 50 meters of a GM strawberry field assumed GM gene markers. Another showed that 25-38% of wild sunflowers growing near GM crops had GM gene markers. A recent study in England showed that despite the tiny amount of GM plantings there (33,750 acres over two years compared to 70-80 million acres per year in the US) wild honey was found to be contaminated. This means that bees are likely to pollinate organic plants and trees with transgenic elements. Many other insects transport the by-products of GM plants throughout our environment, and even falling leaves can dramatically affect the genetic heritage of soil bacteria. The major difference between chemical pollution and genetic pollution is that the former eventually is dismantled or decays, while the later can reproduce itself forever in the wild. As the National Academy of Science's report indicated - "the containment of crop genes is not considered to be feasible when seeds are distributed and grown on a commercial scale." Bioengineering firms are also developing fast growing salmon, trout, and catfish as part of the "blue revolution" in aquaculture. They often grow several times faster (6x faster for salmon) and larger in size (up to 39X) so as to potentially wipe out their competitors in the wild. There are no regulations for their safe containment to avoid ecological disasters. They frequently grow in "net pens," renown for being torn by waves, so that some will escape into the wild. If so, commercial wild fish could be devastated according to computer models in a study of the National Academy of Sciences by two Purdue University scientists (William Muir and Richard Howard). All of organic farming - and farming per se - may eventually be either threatened or polluted by this technology.
30. Disturbance of Nature's Boundaries-Genetic engineers argue that their creations are no different than crossbreeding. However, natural boundaries are violated –

crossing animals with plants, strawberries with fish, grains, nuts, seeds, and legumes with bacteria, viruses, and fungi; or like human genes with swine.

31. Unpredictable Consequences of a Gunshot Approach- DNA fragments are blasted past a cell's membrane with a "gene gun" shooting in foreign genetic materials in a random, unpredictable way. According to Dr. Richard Lacey, a medical microbiologist at the University of Leeds, who predicted *mad cow disease*, "wedging foreign genetic material in an essentially random manner...causes some degree of disruption...It is impossible to predict what specific problems could result." This view is echoed by many other scientists, including Michael Hansen, Ph.D., who states that "Genetic engineering, despite the precise sound of the name, is actually a very messy process."

IMPACT ON FARMING

"The decline in the number of farms is likely to accelerate in the coming years...gene-splicing technologies... change the way plants and animals are produced."

Jemery Rifkin

IMPACT ON FARMING

Small Farm Livelihood and Survival

32. Decline and Destruction of Self-Sufficient Family Farms- In 1850, 60% of the working population in the US was engaged in agriculture. By the year 1950 it was 4%. Today it is 2% (CIA World Factbook 1999 – USA). From a peak of 7 million farms in 1935, there are now less than one-third or 2 million left. In many urban areas, the situation is more stark or where family farms are becoming largely extinct. For example, Rockland Country, New York (1/2 hour from New York City) had 600 family farms in 1929. Exactly seventy years later only 6 remained. Similar declines have occurred throughout the US and abroad. Of the one-third remaining US farms, 100,000 or 5% produce most of our foods. Agri-corporations have taken economic and legislative power away from the small, self-sufficient family farms – sometimes via cutthroat competition (such as legal product dumping below production costs to gain market share - what was legalized by GATT regulations). The marketing of GM foods augments this centralizing and small-farm-declining trend in the US - as well as on an international level. For example, two bioengineering firms have announced a GM vanilla plant where vanilla can be grown in vats at a lower cost – and which could eliminate the livelihood of the world’s 100,000 vanilla farmers – most of whom are on the islands of Madagascar, Reunion and Comoros. Other firms are developing bioengineered fructose, besides chemical sugar substitutes, that threatens, according to a Dutch study, a million farmers in the Third World. In 1986, the Sudan lost its export of gum arabic when a New York company discovered a bioengineering process for producing the same. Synthetic cocoa substitutes are also threatening farmers. It is estimated that the biotech industry will find at least \$14 billion dollars of substitutes for Third World farming products. Far beyond hydroponics, scientists are developing processes to grow foods in solely laboratory environments – eliminating the need for seeds, shrubs, trees, soil and ultimately the farmer.
33. General Economic Harm to Small Family Farms- GM seeds sell at a premium, unless purchased in large quantities, which creates a financial burden for small farmers. To add to this financial injury, Archer Daniels Midland has instituted a two-tier price system where it offers less to farmers per bushels for GM soybeans because they are not selling well overseas. Many GM products, such as rBGH, seem to offer a boom for dairy farmers - helping their cows produce considerably more milk. But the end result has been a lowering of prices, again putting the smaller farmers out of business. We can find similar trends with other GM techniques – as in pig and hen raising made more efficient. The University of Wisconsin’s GM brooding hens lack the gene that produces prolactin proteins.

The new hens no longer sit on their eggs as long, and produce more. Higher production leads to lower prices in the market place. The end result is that the average small farmer's income plummeted while a few large-scale, hyper-productive operations survived along with their "input providers" (companies selling seeds, soil amendments, and so on). In an on-going trend, the self-sufficient family farmer is shoved to the very lowest rung of the economic ladder. In 1910 the labor portion of agriculture accounted for 41% of the value of the finally sold produce. Now the figure has been estimated at between 6-9% in North America. The balance gets channeled to agri-input and distribution firms - and more recently to biotech firms. Kristin Dawkins in *Gene Wars: The Politics of Biotechnology*, points out that between 1981 and 1987, food prices rose 36%, while the percentage of the pie earned by farmers continued to shrink dramatically.

Organic Farming

34. Losing Purity- At the present rate of proliferation of GM foods, within 50-100 years, the majority of organic foods may no longer be organic.

35. Mixing- A Texas organic corn chip maker, Terra Prima, suffered a substantial economic loss when their corn chips were contaminated with GM corn and had to be destroyed.

36. Losing Natural Pesticides Organic farmers have long used "Bt" (a naturally occurring pesticidal bacterium, *Bacillus thuringiensis*) as an invaluable farming aide. It is administered at only certain times, and then sparingly, in a diluted form. This harms only the target insects that bite the plant. Also in that diluted form, it quickly degrades in the soil. By contrast, genetically engineered Bt corn, potatoes and cotton - together making up roughly a third of US GM crops - all exude this natural pesticide. It is present in every single cell, and pervasively impacts entire fields over the entire life span of crops. This probably increases Bt use at least a million fold in US agriculture. According to a study conducted at NYU, BT residues remained in the soil for as much as 243 days. As an overall result, agricultural biologists predict this will lead to the destruction of one of organic farming's most important tools. It will make it essentially useless. A computer model developed at the University of Illinois predicted that if all US Farmers grew Bt resistant corn, resistance would occur within 12 months. Scientists at the University of North Carolina have already discovered Bt resistance among moth

pests that feed on corn. The EPA now requires GM planting farmers to set aside 20-50% of acres with non-BT corn to attempt to control the risk and to help monarch butterflies survive.

Control and Dependency

37. Terminator Technology- Plants are being genetically produced with no annual replenishing of perennial seeds so farmers will become wholly dependent on the seed provider. In the past Monsanto had farmers sign agreements that they would not collect seeds, and even sent out field detectives to check on farmers.

38. Traitor Technology- Traitor technologies control the stages or life cycles of plants – when a plant will leaf, flower, and bear fruit. This forces the farmer to use certain triggering chemicals if he is to yield a harvest - again causing much deeper levels of economic dependence. These technologies are being developed and patented at a furious pace.

Farm Production

39. Less Diversity, Quality, Quantity and Profit- One of the most misleading hopes raised by GM technology firms is that they will solve the world's hunger. Some high technology agriculture does offer higher single crop yields. But organic farming techniques, with many different seeds interplanted between rows, generally offer higher *per acre yields*. This applies best to the family farm, which feeds the majority of the Third World. It differs from the large-scale, monocrop commercial production of industrialized nations. Even for commercial fields, results are questionable. In a study of 8,200 field trials, Roundup Ready soybeans produced fewer bushels of soy than non-GM (Charles Benbrook study, former director Board of Agriculture at the National Academy of Sciences). The average yield for non-GM soybeans was 51.21 bushels per acre; for GM soybeans it was

- 49.26. This was again confirmed in a study at the University of Nebraska's Institute of Agricultural Resources. They grew five different strains of Monsanto soya plants in four different locations of varied soil environments. Dr. Elmore of the project found that on average GM seeds, though more expensive, produced 6% less than non-GM relatives, and 11% less than the highest yielding conventional crops. "The numbers were clear," stated Dr. Elmore. The yield for Bt corn, however, in other studies was higher. But this did not lead to greater profit because GM related costs in terms of insecticides, fertilizer and labor were nearly \$4 more per acre.
40. Fragility of Future Agriculture- With loss of biological diversity there inevitably develops a fragility of agriculture. During the Irish potato famine of the 19th century, farmers grew limited varieties of potatoes. This allowed a crop blight to spread throughout. By contrast, there are thousands of varieties of potatoes in Peru – what provides adaptability and thus a constant resource for blight resistance. Farm researchers have tapped into this treasure chest for the benefit of the rest of the world. Reminiscent of the Irish potato catastrophe of the 1840's, Cornell Chronicle reports a still more virulent strain than ever - known as potato late blight is presently attacking Russian potato crops and threatening regional food shortages. The new strain can survive harsh winters. In January of 2000, the NY Times reported a citrus canker blight in Southern Florida - one seriously threatening the state's entire \$8.5 billion citrus fruit industry. Coca plants, monocropped and nearly identical, are also endangered by an international blight. Thus the destruction rather than preservation of alternative, adaptable seed stocks by GM companies, follows a dangerous path for the future of all of agriculture.
41. Lower Yields and More Pesticides Used with RR Seeds- Contrary to claims, a Rodale study shows that the best of organic farming techniques - using rich natural compost - can produce higher drought resistance as well as higher yielding plants than with current technological attempts. Dr. Charles Benbrook, a consultant for the Consumer's Union, published a summary of a report revealing Roundup Ready soybeans actually used 2-5 times more pounds of herbicides per acre than conventional soybeans sprayed with other low-dose pesticides.

ECONOMIC, POLITICAL AND SOCIAL THREATS

"Even for the biggest "winners," it is like winning at poker on the Titanic."

Jerry Mander: Facing the Rising Tide

ECONOMIC, POLITICAL AND SOCIAL THREATS

42. Monopolization of Food Production- The rapid and radical change in the human diet was made possible by quick mergers and acquisitions that moved to control segments of the US farming industry. Although there are approximately 1500 seed companies worldwide, about two dozen control more than 50% of the commercial seed heritage of our planet. The consolidation has continued to grow, In 1998 the top five soy producers controlled 37% of the market (Murphy Family Foods; Carroll's Foods, Continental Grain, Smithfield Foods, and Seaboard). One year later, the top five controlled 51% (Smithfield, having acquired Murphy's and Carroll's, Continental, Seaboard, Prestige and Cargill). Cargill and Continental Grain later merged. With corn seed production and sales, the top *four* seed companies controlled 87% of the market in 1996 (Pioneer Hi-Bred, Holden's Foundation Seeds, DeKalb Genetics, and Novaris). In 1999, the top *three* controlled 88% (Dupont having acquired Pioneer, Monsanto having acquired Holden's and DeKalb, and Novaris. In the cotton seed market, Delta and Land Pine Company now control about 75% of the market. *The concentration is staggering.* National farming associations see this dwindling of price competition and fewer distribution outlets as disfavoring and threatening the small family farm. Average annual income per farm has plummeted throughout the last decade. Almost a quarter of all farm operating families live below the poverty level, twice

the national average – and most seek income from outside the farm to survive. A similar pattern is developing in Europe.

43. Impact on Long -Term Food Supply- If food production is monopolized, the future of that supply becomes dependent on the decisions of a few companies and the viability of their seed stocks. Like the example of Peru, there are only a few remaining pockets of diverse seed stocks to insure the long-term resilience of the world's staple foods. All of them are in the Third World. Food scientists indicate that if these indigenous territories are disturbed by biotech's advance, the long-term vitality of all of the world's food supply is endangered.

44. Biocolonization – In past centuries, countries managed to overrun others by means of fierce or technologically superior armies. The combined control of genetic and agricultural resources holds a yet more powerful weapon for the invasion of cultures. For only when a person loses food self-sufficiency do they become wholly dependent and subservient. That is why 500,000 farmers in India staged a protest on October 2, 1993 against GATT trade regulations and now oppose GM seed products.

45. Dependency Under the new regulations of WTO, the World Bank, GATT, NAFTA, the autonomy of local economies can be vastly overridden. Foreign concerns can buy up all the major seed, water, land and other primary agricultural resources – converting them to exported cash rather than local survival crops. This is likely to further unravel the self-sufficiency of those cultures - and as with the past failures of the "green revolution."

46.

RIGHTS

"The FDA's failure to require labeling of genetically altered foods is effectively restricting Americans from exercising this right and subjects individuals to foods they have sound...reasons to avoid. FDA policy thus appears to violate the First Amendment of the Constitution....the Food, Drug, and Cosmetic Act, which requires that added substances to food be labeled...and mandates disclosure of material facts."

Alliance for Bio-integrity Statement - in a lawsuit filed against the FDA by nine scientists and twelve religious leaders.

RIGHTS

47. For Health/Environmental/Socio-Political Reasons- The lack of labeling violates the right to know what is in our foods - given the list of health, environmental, and socio-political reasons to avoid GM ingredients. Even if GM foods were 100% safe, the consumer has a right to know such ingredients - due to their many potential harms.

48. For Religious Dietary Reasons- Previously if someone wanted to avoid foods not permitted in certain religions, the process was simple. With transgenic alterations, every food is suspect – and the religious and health-conscious consumer has no way of knowing without a mandated label.

DEEP ECOLOGY

"All things are connected like the blood which unites one family. Whatever befalls the Earth befalls the sons [and daughters] of the Earth."

Chief Seattle of the Duwamish Tribe

DEEP ECOLOGY

49. Contradiction in Terms- The term bioengineering is a contradiction in terms. "Bio" refers to *life* - that which is whole, organic, self-sufficient, inwardly organizing, conscious, and living. That consciousness of nature creates a web that is deeply interconnecting. The term "engineering," on the other hand, refers to the opposite - to mechanical design of *dead* machines - things made of separate parts, and thus not consciously connected - to be controlled, spliced, manipulated, replaced, and rearranged.
50. Imposing a Non-Living Model onto Nature- "The crying of animals is nothing more than just the creaking of machines," wrote the philosopher René Descartes in the 17th century. This powerfully expressed an inhumane and mechanical view of nature that does not respect life. The genetic model is derivative of this mechanistic way of relating to nature.
51. Atomic Weapons vs. Gene Mutated Foods- The image of modern progress brought about solely by perfected mechanisms or technology was punctured in the 1940's with the explosion of atomic weapons - which brought humanity to the brink of global annihilation. Einstein's formulas created the bomb. His formulas hinged on the very same ideas of the philosopher René Descartes for their foundation. Descartes developed the underlying geometry that space may be universally or infinitely *separated* ("Cartesian coordinates") into distinct points. If we perfectly visualize this, we run the risk of bringing that exact image to life. Einstein's famous formula ($E = mc^2$), for example, allows us to explode space. Only in hindsight and seeing this result, Einstein expressed the wish of never having taken on the career of a physicist. Genetic engineering, or the splicing of genes, may be viewed as a still more perilous outcome of a Cartesian-like approach to nature. We can prevent nuclear disaster or hopefully keep nuclear weapons bottled up. But genetic engineering applies a similar philosophy and

creates products intentionally released - *with potential chain reactions that may not be stoppable.*

ACTIONS YOU CAN TAKE

"The new genetic science raises more troubling issues than any other technological revolution in history. In reprogramming the genetic code of life, do we risk a fatal interruption of millions of years of evolutionary development? Might not the artificial creation of life spell the end of the natural world?... Will the creation, mass production, and wholesale release of thousands of genetically engineered life forms...cause irreversible damage to the biosphere, making genetic pollution an even greater threat to the planet than nuclear or petrochemical pollution?"

Jeremy Rifkin: *The Biotech Century*

Political/Community Action

- **Contact elected officials-** As of the present writing, only about 50 Congressmen (out of over 400) have endorsed the GM labeling bill currently before Congress. A similar piece of legislation is being introduced into the US Senate. It is vitally important that 100,000 or more letters be sent to Congress urging them to support these bills. It is best to write a personal letter, what has the most impact. Form letters are also available. Many health food stores carry them, or they can be downloaded at the Web site www.thecampaign.org. Make copies for your self and 5-10 friends and family members. Several letters may also be collected and sent in a single envelope. Emails can also be sent, but do not have as much impact or influence as postal letters. Even with form letters, adding a personal note explaining you views on the subject doubles the weight placed on the letter by legislators. At The Campaign's Web site, additional form letters are also available to the President, Vice President, political candidates, Department of Agriculture, EPA, and FDA - plus media contacts and major food companies. The media contact service on the web allows you to instantly reach hundreds of newspapers, magazines, radio stations and the like, in each of the 50 states - to tell them to cover this issue.
- **Sign petition-** A petition is also attached and further copies are available through the Organic Consumers Association (OCA) at www.purefood.org and at most local health food stores. The OCA petition calls for 30% of US produce to be organic by the year 2010. At the present rate of growth, 10% of European produce will be organic by 2005. Australia has already passed 10% and Sweden and Switzerland are not far behind.
- **Vote-**Support political candidates that favor labeling and/or a moratorium on GM foods. At present two national political parties have already included the issue of labeling bioengineered foods in their platform - the Greens and the Natural Law Party. For more information visit www.naturallaw.org and www.greens.org/ny/.
- **Join and volunteer to help activist organizations-**There are many activist organizations working on the GM issue. A few prominent ones are The Campaign, Greenpeace, Friends of the Earth, Bioengineering Action Network, RAGE, Organic Consumers Association - and locally NOFA, the Greens, and

Americans for Safe Food. Websites or contact information are listed in the resource section.

- **Mobilize parents, students, and teachers**-Contact school officials asking them to follow the example of the Berkeley, California district - eliminating GM products or offering organic food in cafeterias.
- **Attend Forums and Conferences**

See websites listed were updates are available as to local events.

Consumer Action

- **Buy organics whenever possible**-Educate your family on this issue and buy organic products whenever you can.
- **Communicate with Producers and Distributors**-Call and send a letter to the largest companies that distribute GM foods. Ask them to change their policies (see a sample list below). A national consumer action plan is being coordinated by the People's Earth Network (see www.peoplesearch.com). For more information send them an email on their site - to be part of their listserve to contact companies. You can also reach the Network by mail at 35 Asticou Road, Jamaica Plain, MA 02130 or call **617-522-9605**. As a result and as of this writing, 17 companies have taken positive steps. This includes Hain's Food Group, the largest health food conglomerate along with Wild Oats and Whole Foods, the largest health-oriented supermarkets in the US. A sample letter to a corporation, which should be restated in your own words, might be :

Dear President,

I am writing to express my very serious concern about genetically engineered ingredients in your products. Research has shown many negative health and environmental effects such aswhat effects me and my family. Other companies have begun to take steps to eliminate these ingredients and I am urging you and XXXX Corporation to do the same.

- **Contact Store Owners**-Join (or start) a local network of people, who individually or together contact nearby supermarket and food storeowners about the

seriousness of this issue. Ask the owners to survey their suppliers for GM-free products, as well as their own private-label products - and to make a list of all GM free products available to their customers.

- **Corporate Persuasion-** Divest of shares in GM producing or distributing companies, or use shares for shareholder protests.

List of Largest US Food Distributors:

Safeway 800-723-3929

Frito-Lay 800-352-4477

Kellogg's 800-962-1413

Nestle's 800-452-1971

Heinz Foods 888- 472-8437

Healthy Choice 800-323-9980

Kraft 800-543-5335

Hershey's 800-468-1714

Coca Cola 800-438-2653

Nabisco 800-862-2638

Quaker Oats 800-367-6287

Starbucks 800-782-7282

McDonald's 630-623-3000

General Mills 800-328-1144

Proctor & Gamble 800-595-1407

Personal Action

- **Become informed**- Knowledge, understanding, commitment and resolve precede action. Attached are brief lists of resources - books, videos, tapes, conferences and Internet resources for more information on the issue of genetically engineered foods.
- **Inform others** -Share information, a video, book or tape about GM foods with friends and family members. Write a letter to your newspaper. Inform others through your personal WebPages and links.
- **Organic lifestyles**- When we buy organic products we not only enhance our own personal health, but support businesses and farms committed to a clean environment plus not destroying the living web of nature. For more information about local organic products, CSA's (community supported agriculture), organic gardening, discounted food coops, and related resources, contact NOFA - Northeast Organic Farmer's Association at **315-365-2299**.

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Resources

Books

Boyens, Ingeborg, *Unnatural Harvest: How Corporate Science Is Secretly Altering Our Food*. Doubleday Books, 1999.

British Medical Association, *Biotechnology, Weapons and Humanity*. London BMJ Bookshop, 1999.

Dawkins, Kristin, *Gene Wars: The Politics of Biotechnology* (Open Media Pamphlet Series). Seven Stories Press, 1997.

Fagan, John, *Genetic Engineering: The Hazards, Vedic Engineering, The Solutions*, Maharishi University, 1995.

Fox, Michael W. *Beyond Evolution, The Genetically Altered Future of Plants, Animals, the Earth Humans*. Lyons Press, 1999.

Grace, Eric S. *Biotechnology Unzipped: Promises and Realities*, Joseph Henry Press. 1997.

Heinberg, Richard, *Cloning the Buddha: The Moral Implications of Biotechnology*. Quest, 1999.

Ho, Mae Wan, *Genetic Engineering Dream or Nightmare?: The Brave New World of Science and Business*. Gateway Books, 1998.

Hubbard, Ruth and Ward, E. *Exploding the Gene Myth*. Beacon Press, 1996.

Jack, Alan, *Imagine Life Without Monarch Butterflies*. Bookworld Services, 2000.

Keen, Brewster, *Farmageddon: Food and the Culture of Biotechnology*. New Society Publishers, 1999.

Kimbrell, Andrew and Nathanson, B. *The Human Body Shop: The Cloning, Engineering, and Marketing of Life*. Regnery Publishing, 1998.

Lappe, M. and Bailey, B. *Against the Grain: Biotechnology and the Corporate Takeover of Your Food*. LPC, 1998.

Marshall, Elizabeth, *High-Tech Harvest: A Look at Genetically Engineered Foods*. Franklin Watts, 1999.

Montgomery, Jane F., Sivramiah Shantharam (editor), *Biotechnology, Biosafety, and Biodiversity: Scientific and Ethical Issues for Sustainable Development*. Science Publishers, Inc. 1999.

Nottingham, Dr. Stephen, *Eat Your Genes: How Genetically Modified Food Is Entering Our Diet*. St. Martins Press, 1998.

Raeburn, Paul, *The Last Harvest: The Genetic Gamble That Threatens to Destroy American Agriculture*. University of Nebraska, 1996.

Rifkin, Jeremy, *The Biotech Century: Harnessing the Gene and Remaking the World*. J.P. Tarcher, 1999.

Rifkin, Jeremy and Teitel, M., *Rain Forest in Your Kitchen: The Hidden Connection Between Extinction and Your Supermarket.* Island Press, 1992.

Rissler, J. and Mellon, M. *The Ecological Risks of Engineered Crops.* MIT Press, 1996.

Shiva, Vandana, *Biopiracy: The Plunder of Nature and Knowledge.* South End Press, 1997.

Shiva, Vandana, *Monocultures of the Mind: Perspectives on Biodiversity and Biotechnology.* South End Press, 1999.

Shiva, Vandana, *Stolen Harvest: The Hijacking of the Global Food Supply.* South End Press, 1999.

Teitel, M. and Wilson, K.A. *Genetically Engineered Food: Changing the Nature of Nature: What You Need to Know to Protect Yourself, Your Family, and Our Planet.* Inner Traditions International, Ltd. 1999.

Ticciati, L. and Ticciati, R., *Genetically Engineered Foods: Are They Safe? You Decide.* Keats Publishing, 1998.

Videos

Food for Thought, Ed Schehl, Director, Film and Video, Santa Cruz, California. 1-800-4-Planet.

Against the Grain, Britt Bailey, Producer, The Video Project, Ben Lomond, California. 1-800-4-Planet.

Risky Business- Biotechnology and Agriculture, Mark Dworkin and Melisa Young. Bullfrog Films. 1-800-543-3764

Audio Tapes

Frankenfood: Genetically Modified Cuisine. Contact Americans for Safe Food at 607-431-9577 for a copy of the audiotape. It is suitable for radio broadcast and is very stirring. The tape is recorded by Marc Lappe and Britt Bailey, authors of *Against the Grain: Biotechnology and the Corporate Takeover of our Food*.

Articles

See the Web site of www.thecampaign.org, www.purefood.org, and www.sage-intl.org.

Email Updates

- 1) www.thecampaign.org (follow instructions)
- 2) ban-gef@lists.txinfinet.com (in the subject area type "subscribe")
- 3) listserv@iatp.org (in the body type "subscribe_biotech_activists")
- 4) debbie@organicconsumers.org (send regular email request)

Author-Related Websites

Jeremy Rifkin www.foet.org

Vananda Shiva www.vshiva.net

Mae Wan Ho www.i-sis.org

Marc Lappe www.cetos.org

Organization Websites

Alliance for BioIntegrity www.bio-integrity.org

Australian GenEthics Net www.essential.zero.com/agen

Binas (Biosafety Info Network) <http://binas.unidos.org/binas/binas.html>

Biodemocracy www.purefood.org

Bioengineering Action Network www.tao.ca/~ban

Campaign to Ban GE Foods www.netlink.de/gen/home.html

Center for Food Safety www.icta.org

Center for Food Policy www.wolfson.tvu.ac.uk/

research/food/index.html

Centro Internazionale Crocevia www.crocevia.org

Council of Canadians www.canadians.org

Council for Responsible Genetics www.gene-watch.org

Earth Island Institute www.earthisland.org

The Ecologist www.gn.apc.org

Ecoropa www.ecoropa.org

Edmonds Institute www.edmonds-institute.org

Environmental Defense Fund www.edf.org

Food First Institute <http://foodfirst.org>

Friends of the Earth www.foe.co.uk

The Genetics Forum www.geneticsforum.org.uk

Global 2000 (Friends of the Earth) www.global2000.org

Greenpeace www.greenpeace.org

Indigenous Peoples Coalition Against

Biopiracy www.niec.net/ipcb/

Institute for Agriculture & Trade Policy www.iatp.org

International Centre for Trade &

Sustainable Development www.ictsd.org

International Forum on Globalization www.ifg.org

Mothers for Natural Law www.safe-food.org

Natural Law Party www.naturallaw.org

Norfolk Genetic Information Net (ngin) <http://members.tripod.com/~ngin>

People's Earth Network www.peoplesearch.org

RAGE (Resistance Against GE) nerage@sover.net (Northeast)

RAFI (Rural Advancement Foundation) www.rafi.org

Organic Consumers Association www.organicconsumers.org

Red interamericana de Agriculturas y

Democracia (RIAD) www.sustain.org/riad

SAGE (Students for Alternatives to GE) www.sage-intl.org

Union of Concerned Scientists www.ucsusa.org/agriculture/biotech.html

Washington Biotech Action Council <http://students.washington.edu/radin>

"The fact is, it is virtually impossible to even conceive of a testing procedure to assess the health effects of genetically engineered foods when introduced into the food chain, nor is there any valid nutritional or public interest reason for their introduction."

Richard Lacey: Professor of Food Safety, Leeds University