

Genetically Modified Foods Present Unprecedented Health Dangers

Rhetoric from the United States government since the early 1990s proclaims that genetically modified (GM) foods are no different from their natural counterparts that have existed for centuries. But this is a political, not a scientific assertion. Numerous scientists at the FDA consistently described these newly introduced gene-spliced foods as cause for concern. In addition to their potential to produce hard-to-detect allergies and nutritional problems, the scientists said that “The possibility of unexpected, accidental changes in genetically engineered plants” might produce “unexpected high concentrations of plant toxicants.”¹ GM crops, they said, might have “Increased levels of known naturally occurring toxins, . . . appearance of new, not previously identified” toxins, and an increased tendency to gather “toxic substances from the environment” such as “pesticides or heavy metals.” They recommended testing every GM food “before it enters the marketplace.”² But the Food and Drug Administration (FDA) was under orders from the first Bush White House to promote the biotechnology industry, and the political appointee in charge of agency policy was the former attorney for biotech giant Monsanto—and later became their vice president. The FDA policy ignored the scientists’ warnings and allowed GM food crops onto the market without any required safety studies.

From the few safety tests that have been conducted, the results are disturbing—lab animals fed GM diets show damage to virtually every system studied. Reports from farmers are even less encouraging—thousands of sick, sterile and dead animals are traced to GM feed.³ And there are sufficient links to allergies to conclude that GMOs are probably contributing to the rise in food allergies. This article explores some of the disturbing findings.

GM diet shows toxic reactions in digestive tract

The very first crop submitted to the FDA’s voluntary consultation process, the FlavrSavr tomato, showed evidence of toxins. Out of 20 female rats fed the GM tomato, 7 developed stomach lesions.⁴ The director of FDA’s Office of Special Research Skills wrote that the tomatoes did not demonstrate a “reasonable certainty of no harm,”⁵ which is their normal standard of safety. The Additives Evaluation Branch agreed that “unresolved questions still remain.”⁶ The political appointees, however, did not require that the tomato be withdrawn.¹

According to Arpad Pusztai, PhD, one of the world’s leading experts in GM food safety assessments, the type of stomach lesions linked to the tomatoes “could lead to life-endangering hemorrhage, particularly in the elderly who use aspirin to prevent [blood clots].”⁷ Pusztai believes that the digestive tract should be the first target of GM food risk assessment, because the gut is the first (and largest) point of contact with the foods; it can reveal various reactions to toxins. He was upset, however, that the research on the FlavrSavr never looked passed the stomach to the intestines. Other studies that did look found problems.

Mice were fed potatoes with an added bacterial gene, which produced an insecticide called Bt-toxin. Scientists analyzed the lower part of their small intestines (ileum) and found abnormal and damaged cells, as well as proliferative cell growth.⁸ Rats fed potatoes engineered to produce a different type of insecticide (GNA lectin from the snowdrop plant) also showed proliferative cell growth in both the stomach and intestinal walls (see photo).⁹ Although the guts of rats fed GM peas were not examined for cell growth, the intestines were

¹ Calgene had submitted data on two lines of GM tomatoes, both using the same inserted gene. They voluntarily elected to market only the variety that was not associated with the lesions. This was not required by the FDA, which did not block approvals on the lesion-associated variety. The FlavrSavr tomato has since been taken off the market. After the FlavrSavr, no other biotech company has submitted such detailed data to the FDA. And the superficial summaries they do present to the agency are dismissed by critics as woefully inadequate to judge safety.

mysteriously heavier; possibly resulting from such growth.¹⁰ Cell proliferation can be a precursor to cancer and is of special concern.

GM diets cause liver damage

The state of the liver—a main detoxifier for the body—is another indicator of toxins.

- Rats fed the GNA lectin potatoes described above had smaller and partially atrophied livers.¹¹
- Rats fed Monsanto's Mon 863 corn, engineered to produce Bt-toxin, had liver lesions and other indications of toxicity.¹²
- Rabbits fed GM soy showed altered enzyme production in their livers as well as higher metabolic activity.¹³
- The livers of rats fed Roundup Ready canola were 12%–16% heavier, possibly due to liver disease or inflammation.¹⁴
- And microscopic analysis of the livers of mice fed Roundup Ready soybeans revealed altered gene expression and structural and functional changes.¹⁵ Many of these changes reversed after the mice diet was switched to non-GM soy, indicating that GM soy was the culprit. The findings, according to molecular geneticist Michael Antoniou, PhD, “are not random and must reflect some ‘insult’ on the liver by the GM soy.” Antoniou, who does human gene therapy research in King's College London, said that although the long-term consequences of the GM soy diet are not known, it “could lead to liver damage and consequently general toxemia.”¹⁶

Higher death rates and organ damage

Some studies showed higher death rates in GM-fed animals. In the FlavrSavr tomato study, for example, *a note in the appendix* indicated that 7 of 40 rats died within two weeks and were replaced.¹⁷ In another study, chickens fed the herbicide tolerant “Liberty Link” corn died at twice the rate of those fed natural corn.¹⁸ But in these two industry-funded studies, the deaths were dismissed without adequate explanation or follow-up.

In addition, the cells in the pancreas of mice fed Roundup Ready soy had profound changes and produced significantly less digestive enzymes;¹⁹ in rats fed a GM potato, the pancreas was enlarged.²⁰ In various analyses of kidneys, GM-fed animals showed lesions, toxicity, altered enzyme production or inflammation. Enzyme production in the hearts of mice was altered by GM soy.²¹ And GM potatoes caused slower growth in the brain of rats.²²

Reproductive failures and infant mortality

In both mice and rats fed Roundup Ready soybeans, their testicles showed dramatic changes. In rats, the organs were dark blue instead of pink (see photo).²³ In mice, young sperm cells were altered.²⁴ Embryos of GM soy-fed mice also showed temporary changes in their DNA function, compared to those whose parents were fed non-GM soy.²⁵

More dramatic results were discovered by a leading scientist at the Russian National Academy of sciences. Female rats were fed GM soy, starting two weeks before they were mated.

- Over a series of three experiments, 51.6 percent of the offspring from the GM-fed group died within the first three weeks, compared to 10 percent from the non-GM soy group, and 8.1 percent for non-soy controls.
- “High pup mortality was characteristic of every litter from mothers fed the GM soy flour.”²⁶
- The average size and weight of the GM-fed offspring was quite a bit smaller.²⁷
- In a preliminary study, the GM-fed offspring were unable to conceive.²⁸

After the three feeding trials, the supplier of rat food used at the Russian laboratory began using GM soy in their formulation. Since all the rats housed at the facility were now eating GM

soy, no non-GM fed controls were available for subsequent GM feeding trials; follow-up studies were canceled. *After two months on the GM soy diet, however, the infant mortality rate of rats throughout the facility had skyrocketed to 55.3 percent (99 of 179).*²⁹

Farmers report livestock sterility and deaths

About two dozen farmers reported that thousands of their pigs had reproductive problems when fed certain varieties of Bt corn. Pigs were sterile, had false pregnancies, or gave birth to bags of water. Some cows and bulls also became sterile. Bt corn was also implicated by farmers in the deaths of cows, horses, water buffaloes, and chickens.³⁰

When Indian shepherds let their sheep graze continuously on Bt cotton plants, within 5-7 days, one out of four sheep died. There was an estimated 10,000 sheep deaths in the region in 2006, with more reported in 2007. Post mortems on the sheep showed severe irritation and black patches in both intestines and liver (as well as enlarged bile ducts). Investigators said preliminary evidence “strongly suggests that the sheep mortality was due to a toxin. . . . most probably Bt-toxin.”³¹

GM Foods May Cause Allergies

Allergic reactions occur when the immune system interprets something as foreign, different and offensive, and reacts accordingly. All GM foods, by definition, have something foreign and different. And several studies show that they provoke reactions.

Rats fed Monsanto’s GM corn, for example, had a significant increase in blood cells related to the immune system.³² GM potatoes caused the immune system of rats to respond more slowly.³³ And a harmless protein was transformed into a potentially deadly allergen, when produced within GM peas.³⁴ Although the potatoes and peas were not commercialized, they had passed the superficial tests normally used to approve most GM crops. Crops that did make it to the market, however, may be triggering immune responses in the unsuspecting population.

GM soy might have doubled UK soy allergies

Soon after GM soy was introduced into the UK, researchers at the York Laboratory reported that allergies to soy had skyrocketed by 50% in a single year. Although no follow-up studies were done, there are many ways in which genetic engineering could be the culprit.

Monsanto’s “Roundup Ready” GM soy is planted in 89% of US soy acres. A foreign gene from bacteria (with parts of virus and petunia DNA) is inserted, which allows the plant to survive applications of the otherwise deadly Roundup herbicide. Because people aren’t usually allergic to a food until they have eaten it several times, we don’t know in advance if the protein produced by bacteria, which has never been part of the human food supply, will provoke a reaction. As a precaution, scientists compare the amino acid sequence of the novel protein with a database of known allergens. If there is a match, according to criteria recommended by the World Health Organization (WHO) and others, the GM crop should either not be commercialized or additional testing should be done. Sections of the protein produced in GM soy *are* identical to known allergens, but the soybean was introduced before WHO criteria were established and the recommended additional tests were not conducted.

To make matters worse, the *only* published human feeding study on GM foods verified that portions of the gene inserted into GM soy transfers into the DNA of human gut bacteria. This means that years after people stop eating GM soy, they may still be exposed to its potentially allergenic protein that is continuously produced inside their intestines.

GM soy has new (or more) allergens

Although biotech advocates describe genes like Legos that cleanly snap into place, the process of creating a GM crop can produce massive collateral damage in plant DNA. Native genes can be mutated, deleted, permanently turned on or off, and hundreds may change their

levels of protein expression. The result may be an increase of an existing allergen or production of a completely new one. Both appear to have happened in GM soy.

Levels of one soy allergen, trypsin inhibitor, were as much as seven times higher in cooked GM soy compared to a non-GM control.³⁵ Another study verified that GM soybeans contain a unique, unexpected protein, not found in controls. Moreover, it reacts with IgE antibodies, suggesting that it may provoke dangerous allergic reactions. The same study revealed that one human subject showed a skin prick immune response only to GM soy, but *not* to natural soy.

In addition, a protein in natural soy cross-reacts with peanut allergies.³⁶ That means that soy may trigger reactions in some people who are allergic to peanuts. This cross-reactivity could theoretically increase in GM varieties. Thus, the doubling of US peanut allergies in the five years immediately after GM soy was introduced might not be a coincidence.

GM soy might impede digestion, leading to widespread allergies

GM soy also produces an unpredicted side effect in the pancreas of mice—production of digestive enzymes is dramatically reduced. If fewer enzymes cause food proteins to breakdown more slowly, there is more time for allergic reactions to take place. Thus, digestive problems from GM soy might promote allergic reactions to a wide range of proteins, not just to soy.

Pesticides producing GM crops may cause allergies

In addition to herbicide tolerant crops, the second major trait in GM crops is built-in pesticide production. When bugs take a bite of such a GM plant, the toxin creates holes in their stomach and kills them.

The fact that we consume that same toxic pesticide is hardly appetizing. But biotech companies tell us that the pesticide, called Bt-toxin, has a history of safe use, is quickly destroyed in our stomach; and wouldn't react with humans or mammals in any event. Research tells a different story.

Natural Bt spray is dangerous to humans

For years, organic farmers and others have used solutions containing natural Bt bacteria (*Bacillus thuringiensis*) as a method of insect control. Genetic engineers take the gene that produces the toxin in bacteria and insert it into the DNA of crops, so that the plant does the work, not the farmer. Studies verify, however, that natural Bt-toxin is *not* fully destroyed from digestive and *does* react with mammals. Mice fed Bt-toxin, for example, showed an immune response as potent as cholera toxin, and become immune sensitive to formerly harmless compounds.^{37,38}

Moreover, when natural Bt was sprayed over areas around Vancouver and Washington State to fight gypsy moths, about 500 people reported reactions—mostly allergy or flu-like symptoms.^{39,40} Farm workers and others also report serious reactions^{41,42,43,44,45} and authorities have long acknowledged that “People with compromised immune systems or preexisting allergies may be particularly susceptible to the effects of Bt.”⁴⁶

The toxin in GM plants is more dangerous

The Bt-toxin produced in GM crops is “vastly different from the bacterial [Bt-toxins] used in organic and traditional farming and forestry.”⁴⁷ GM plants produce about 3,000-5,000 times the amount of toxin as the spray, which is also designed to be more toxic than natural varieties.⁴⁸ And like the protein in GM soy, properties of Bt protein fail the WHO criteria designed to prevent allergenic GM crops from being approved.

Bt cotton triggers allergic reactions

In 2005, a medical team reported that hundreds of agricultural workers in India are developing allergic reactions when exposed to Bt cotton, but not to natural varieties.⁴⁹ Their symptoms are virtually identical to those described by the 500 people in Vancouver and Washington who were sprayed with Bt (see table).

	Upper respiratory	Eyes	Skin		Overall
Bt Spray	Sneezing, runny nose, exacerbations of asthma	Watery, red	Itching, inflammation, red, swelling	burning, red,	Fever, some in hospital
Bt cotton	Sneezing, runny nose	Watery, red	Itching, eruptions, red, swelling	burning,	Fever, some in hospital

Bt corn pollen may cause allergies

Bt-toxin is produced in several varieties of GM corn. The toxin can be eaten intact or even breathed in from pollen. In 2003, during the time when an adjacent Bt cornfield was pollinating, virtually an entire Filipino village of about 100 people was stricken by mysterious skin, respiratory, and intestinal reactions. The symptoms appeared progressively from those living closest to the field to those further away. Blood samples from 39 individuals showed antibodies in response to *Bt*-toxin—supporting, but not proving, a link. When the same corn was planted in four other villages the following year, however, the symptoms returned in all four areas—only during the time of pollination.

The potential dangers of breathing GM pollen had been identified in 1998 by the UK Joint Food Safety and Standards Group, who also warned that genes from inhaled pollen might transfer into the DNA of bacteria in the respiratory system.⁵⁰ **If Bt genes transfer to human bacteria, either in the lungs or, as confirmed in the soy study above, in the intestines, the microorganisms may be converted into living pesticide factories, possibly producing Bt-toxin inside of us year after year.**

Dangerous denial

The warnings of the FDA scientists appear to have come true. But we were not supposed to know about their concerns. The agency's internal memos were only made public due to a lawsuit. Instead, we were supposed to believe the official FDA policy, claiming that the agency is not aware of information showing that GM foods are meaningfully different. This statement, crafted by political appointees, directly contradicts the scientific consensus at the FDA.

Nearly every independent animal feeding safety study on GM foods shows adverse or unexplained effects. But we were not supposed to know about these problems either—the biotech industry works overtime to try to hide them. Industry studies described above, for example, are neither peer-reviewed nor published. It took lawsuits to make two of them available. And adverse findings by independent scientists are often suppressed, ignored, or denied. Moreover, researchers that discover problems from GM foods have been fired, stripped of responsibilities, deprived of tenure, and even threatened. The myth that GM crops are the same safe food we have always eaten continues to circulate.

With the overwhelming evidence of problems since their introduction in 1996, however, it is likely that GM foods are contributing to the deterioration of health in the United States, Canada, and other countries where it is consumed. Without human clinical trials or post-marketing surveillance, we can't tell which worsening health statistic may be due to these foods. But we also can't afford to wait until we find out. GM foods must be removed from our diet immediately. Ideally, this should be mandated by the government. Until then, more and more people are making healthy non-GM choices for themselves and their family.

To learn which foods are genetically modified and how to protect yourself, visit www.GeneticRoulette.com.

-
- ¹ Edwin J. Mathews, Ph.D., in a memorandum to the Toxicology Section of the Biotechnology Working Group. Subject: Analysis of the Major Plant Toxicants. Dated October 28, 1991
- ² Division of Food Chemistry and Technology and Division of Contaminants Chemistry, "Points to Consider for Safety Evaluation of Genetically Modified Foods: Supplemental Information," November 1, 1991, www.biointegrity.org
- ³ Jeffrey M. Smith, *Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods*, Yes! Books, Fairfield, IA USA 2007
- ⁴ Department of Veterinary Medicine, FDA, correspondence June 16, 1993. As quoted in Fred A. Hines, Memo to Dr. Linda Kahl. "Flavr Savr Tomato: . . . Pathology Branch's Evaluation of Rats with Stomach Lesions From Three Four-Week Oral (Gavage) Toxicity Studies . . . and an Expert Panel's Report," Alliance for Bio-Integrity (June 16, 1993) <http://www.biointegrity.org/FDAdocs/17/view1.html>
- ⁵ Robert J. Scheuplein, Memo to the FDA Biotechnology Coordinator and others, "Response to Calgene Amended Petition," Alliance for Bio-Integrity (October 27, 1993) www.biointegrity.org
- ⁶ Carl B. Johnson to Linda Kahl and others, "Flavr Savr™ Tomato: Significance of Pending DHEE Question," Alliance for Bio-Integrity (December 7, 1993) www.biointegrity.org
- ⁷ Arpad Pusztai, "Genetically Modified Foods: Are They a Risk to Human/Animal Health?" June 2001 Action Bioscience www.actionbioscience.org/biotech/pusztai.html
- ⁸ Nagui H. Fares, Adel K. El-Sayed, "Fine Structural Changes in the Ileum of Mice Fed on Endotoxin Treated Potatoes and Transgenic Potatoes," *Natural Toxins* 6, no. 6 (1998): 219–233.
- ⁹ Stanley W. B. Ewen and Arpad Pusztai, "Effect of diets containing genetically modified potatoes expressing Galanthus nivalis lectin on rat small intestine," *Lancet*, 1999 Oct 16; 354 (9187): 1353-4.
- ¹⁰ Arpad Pusztai, "Facts Behind the GM Pea Controversy: Epigenetics, Transgenic Plants & Risk Assessment," *Proceedings of the Conference, December 1st 2005* (Frankfurt/Main, Germany: Literaturhaus, 2005).
- ¹¹ Arpad Pusztai, "Can science give us the tools for recognizing possible health risks of GM food," *Nutrition and Health*, 2002, Vol 16 Pp 73-84.
- ¹² John M. Burns, "13-Week Dietary Subchronic Comparison Study with MON 863 Corn in Rats Preceded by a 1-Week Baseline Food Consumption Determination with PMI Certified Rodent Diet #5002," December 17, 2002 www.monsanto.com/monsanto/content/sci_tech/prod_safety/fullratstudy.pdf
- ¹³ R. Tudisco, P. Lombardi, F. Bovera, D. d'Angelo, M. I. Cutrignelli, V. Mastellone, V. Terzi, L. Avallone, F. Infascelli, "Genetically Modified Soya Bean in Rabbit Feeding: Detection of DNA Fragments and Evaluation of Metabolic Effects by Enzymatic Analysis," *Animal Science* 82 (2006): 193–199.
- ¹⁴ Comments to ANZFA about Applications A346, A362 and A363 from the Food Legislation and Regulation Advisory Group (FLRAG) of the Public Health Association of Australia (PHAA) on behalf of the PHAA, "Food produced from glyphosate-tolerant canola line GT73," www.iher.org.au/
- ¹⁵ M. Malatesta, C. Caporaloni, S. Gavaudan, M. B. Rocchi, S. Serafini, C. Tiberi, G. Gazzanelli, "Ultrastructural Morphometrical and Immunocytochemical Analyses of Hepatocyte Nuclei from Mice Fed on Genetically Modified Soybean," *Cell Struct Funct.* 27 (2002): 173–180
- ¹⁶ Jeffrey M. Smith, *Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods*, Yes! Books, Fairfield, IA USA 2007
- ¹⁷ Arpad Pusztai, "Can Science Give Us the Tools for Recognizing Possible Health Risks for GM Food?" *Nutrition and Health* 16 (2002): 73–84.
- ¹⁸ S. Leeson, "The Effect of Glufosinate Resistant Corn on Growth of Male Broiler Chickens," Department of Animal and Poultry Sciences, University of Guelph, Report No. A56379, July 12, 1996.
- ¹⁹ Malatesta, et al, "Ultrastructural Analysis of Pancreatic Acinar Cells from Mice Fed on Genetically modified Soybean," *J Anat.* 2002 November; 201(5): 409–415; see also M. Malatesta, M. Biggiogera, E. Manuali, M. B. L. Rocchi, B. Baldelli, G. Gazzanelli, "Fine Structural Analyses of Pancreatic Acinar Cell Nuclei from Mice Fed on GM Soybean," *Eur J Histochem* 47 (2003): 385–388.
- ²⁰ Arpad Pusztai, "Can science give us the tools for recognizing possible health risks of GM food," *Nutrition and Health*, 2002, Vol 16 Pp 73-84
- ²¹ R. Tudisco, P. Lombardi, F. Bovera, D. d'Angelo, M. I. Cutrignelli, V. Mastellone, V. Terzi, L. Avallone, F. Infascelli, "Genetically Modified Soya Bean in Rabbit Feeding: Detection of DNA Fragments and Evaluation of Metabolic Effects by Enzymatic Analysis," *Animal Science* 82 (2006): 193–199.

-
- ²² Arpad Pusztai, "Can science give us the tools for recognizing possible health risks of GM food," *Nutrition and Health*, 2002, Vol 16 Pp 73-84
- ²³ Irina Ermakova, "Experimental Evidence of GMO Hazards," Presentation at Scientists for a GM Free Europe, EU Parliament, Brussels, June 12, 2007
- ²⁴ L. Vecchio et al, "Ultrastructural Analysis of Testes from Mice Fed on Genetically Modified Soybean," *European Journal of Histochemistry* 48, no. 4 (Oct-Dec 2004):449-454.
- ²⁵ Oliveri et al., "Temporary Depression of Transcription in Mouse Pre-implantation Embryos from Mice Fed on Genetically Modified Soybean," *48th Symposium of the Society for Histochemistry, Lake Maggiore (Italy), September 7-10, 2006*.
- ²⁶ I.V.Ermakova, "Genetically Modified Organisms and Biological Risks," *Proceedings of International Disaster Reduction Conference (IDRC) Davos, Switzerland August 27th - September 1st, 2006*: 168-172.
- ²⁷ Irina Ermakova, "Genetically modified soy leads to the decrease of weight and high mortality of rat pups of the first generation. Preliminary studies," *Ecosinform* 1 (2006): 4-9.
- ²⁸ Irina Ermakova, "Experimental Evidence of GMO Hazards," Presentation at Scientists for a GM Free Europe, EU Parliament, Brussels, June 12, 2007
- ²⁹ I.V.Ermakova "GMO: Life itself intervened into the experiments," Letter, *EcosInform* N2 (2006): 3-4.
- ³⁰ Jeffrey M. Smith, *Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods*, Yes! Books, Fairfield, IA USA 2007
- ³¹ "Mortality in Sheep Flocks after Grazing on *Bt* Cotton Fields—Warangal District, Andhra Pradesh" *Report of the Preliminary Assessment*, April 2006, <http://www.gmwatch.org/archive2.asp>
- ³² John M. Burns, "13-Week Dietary Subchronic Comparison Study with MON 863 Corn in Rats Preceded by a 1-Week Baseline Food Consumption Determination with PMI Certified Rodent Diet #5002," December 17, 2002 http://www.monsanto.com/monsanto/content/sci_tech/prod_safety/fullratstudy.pdf, see also Stéphane Foucart, "Controversy Surrounds a GMO," *Le Monde*, 14 December 2004; and Jeffrey M. Smith, "Genetically Modified Corn Study Reveals Health Damage and Cover-up," *Spilling the Beans*, June 2005, <http://www.seedsofdeception.com/Public/Newsletter/June05GMCornHealthDangerExposed/index.cfm>
- ³³ Arpad Pusztai, "Can science give us the tools for recognizing possible health risks of GM food," *Nutrition and Health*, 2002, Vol 16 Pp 73-84
- ³⁴ V. E. Prescott, et al, "Transgenic Expression of Bean α -Amylase Inhibitor in Peas Results in Altered Structure and Immunogenicity," *Journal of Agricultural Food Chemistry* (2005): 53.
- ³⁵ Stephen R. Padgett et al, "The Composition of Glyphosate-Tolerant Soybean Seeds Is Equivalent to That of Conventional Soybeans," *The Journal of Nutrition* 126, no. 4, (April 1996); including data in the journal archives from the same study.
- ³⁶ See for example, Scott H. Sicherer et al., "Prevalence of peanut and tree nut allergy in the United States determined by means of a random digit dial telephone survey: A 5-year follow-up study," *Journal of allergy and clinical immunology*, March 2003, vol. 112, n 6, 1203-1207; and Ricki Helm et al., "Hypoallergenic Foods—Soybeans and Peanuts," *Information Systems for Biotechnology News Report*, October 1, 2002.
- ³⁷ Vazquez et al, "Intragastric and intraperitoneal administration of Cry1Ac protoxin from *Bacillus thuringiensis* induces systemic and mucosal antibody responses in mice," *Life Sciences*, 64, no. 21 (1999): 1897-1912; Vazquez et al, "Characterization of the mucosal and systemic immune response induced by Cry1Ac protein from *Bacillus thuringiensis* HD 73 in mice," *Brazilian Journal of Medical and Biological Research* 33 (2000): 147-155.
- ³⁸ Vazquez et al, "*Bacillus thuringiensis* Cry1Ac protoxin is a potent systemic and mucosal adjuvant," *Scandinavian Journal of Immunology* 49 (1999): 578-584. See also Vazquez-Padron et al., 147 (2000b).
- ³⁹ Washington State Department of Health, "Report of health surveillance activities: Asian gypsy moth control program," (Olympia, WA: Washington State Dept. of Health, 1993).
- ⁴⁰ M. Green, et al., "Public health implications of the microbial pesticide *Bacillus thuringiensis*: An epidemiological study, Oregon, 1985-86," *Amer. J. Public Health* 80, no. 7(1990): 848-852.
- ⁴¹ M.A. Noble, P.D. Riben, and G. J. Cook, "Microbiological and epidemiological surveillance program to monitor the health effects of Foray 48B BTK spray" (Vancouver, B.C.: Ministry of Forests, Province of British Columbi, Sep. 30, 1992).

-
- ⁴² A. Edamura, MD, “Affidavit of the Federal Court of Canada, Trial Division. Dale Edwards and Citizens Against Aerial Spraying vs. Her Majesty the Queen, Represented by the Minister of Agriculture,” (May 6, 1993); as reported in Carrie Swadener, “*Bacillus thuringiensis (B.t.)*,” *Journal of Pesticide Reform*, 14, no. 3 (Fall 1994).
- ⁴³ J. R. Samples, and H. Buettner, “Ocular infection caused by a biological insecticide,” *J. Infectious Dis.* 148, no. 3 (1983): 614; as reported in Carrie Swadener, “*Bacillus thuringiensis (B.t.)*,” *Journal of Pesticide Reform* 14, no. 3 (Fall 1994)
- ⁴⁴ M. Green, et al., “Public health implications of the microbial pesticide *Bacillus thuringiensis*: An epidemiological study, Oregon, 1985-86,” *Amer. J. Public Health*, 80, no. 7 (1990): 848–852.
- ⁴⁵ A. Edamura, MD, “Affidavit of the Federal Court of Canada, Trial Division. Dale Edwards and Citizens Against Aerial Spraying vs. Her Majesty the Queen, Represented by the Minister of Agriculture,” (May 6, 1993); as reported in Carrie Swadener, “*Bacillus thuringiensis (B.t.)*,” *Journal of Pesticide Reform*, 14, no. 3 (Fall 1994).
- ⁴⁶ Carrie Swadener, “*Bacillus thuringiensis (B.t.)*,” *Journal of Pesticide Reform* 14, no. 3 (Fall 1994).
- ⁴⁷ Terje Traavik and Jack Heinemann, “Genetic Engineering and Omitted Health Research: Still No Answers to Ageing Questions, 2006. Cited in their quote was: G. Stotzky, “Release, persistence, and biological activity in soil of insecticidal proteins from *Bacillus thuringiensis*,” found in Deborah K. Letourneau and Beth E. Burrows, *Genetically Engineered Organisms. Assessing Environmental and Human Health Effects* (cBoca Raton, FL: CRC Press LLC, 2002), 187–222.
- ⁴⁸ See for example, A. Dutton, H. Klein, J. Romeis, and F. Bigler, “Uptake of Bt-toxin by herbivores feeding on transgenic maize and consequences for the predator *Chrysoperla carnea*,” *Ecological Entomology* 27 (2002): 441–7; and J. Romeis, A. Dutton, and F. Bigler, “*Bacillus thuringiensis* toxin (Cry1Ab) has no direct effect on larvae of the green lacewing *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae),” *Journal of Insect Physiology* 50, no. 2–3 (2004): 175–183.
- ⁴⁹ Ashish Gupta et. al., “Impact of Bt Cotton on Farmers’ Health (in Barwani and Dhar District of Madhya Pradesh),” *Investigation Report*, Oct–Dec 2005.
- ⁵⁰ N. Tomlinson of UK MAFF’s Joint Food Safety and Standards Group 4, December 1998 letter to the U.S. FDA, commenting on its draft document, “Guidance for Industry: Use of Antibiotic Resistance Marker Genes in Transgenic Plants,” <http://www.food.gov.uk/multimedia/pdfs/acnfp1998.pdf>; (see pages 64–68).