

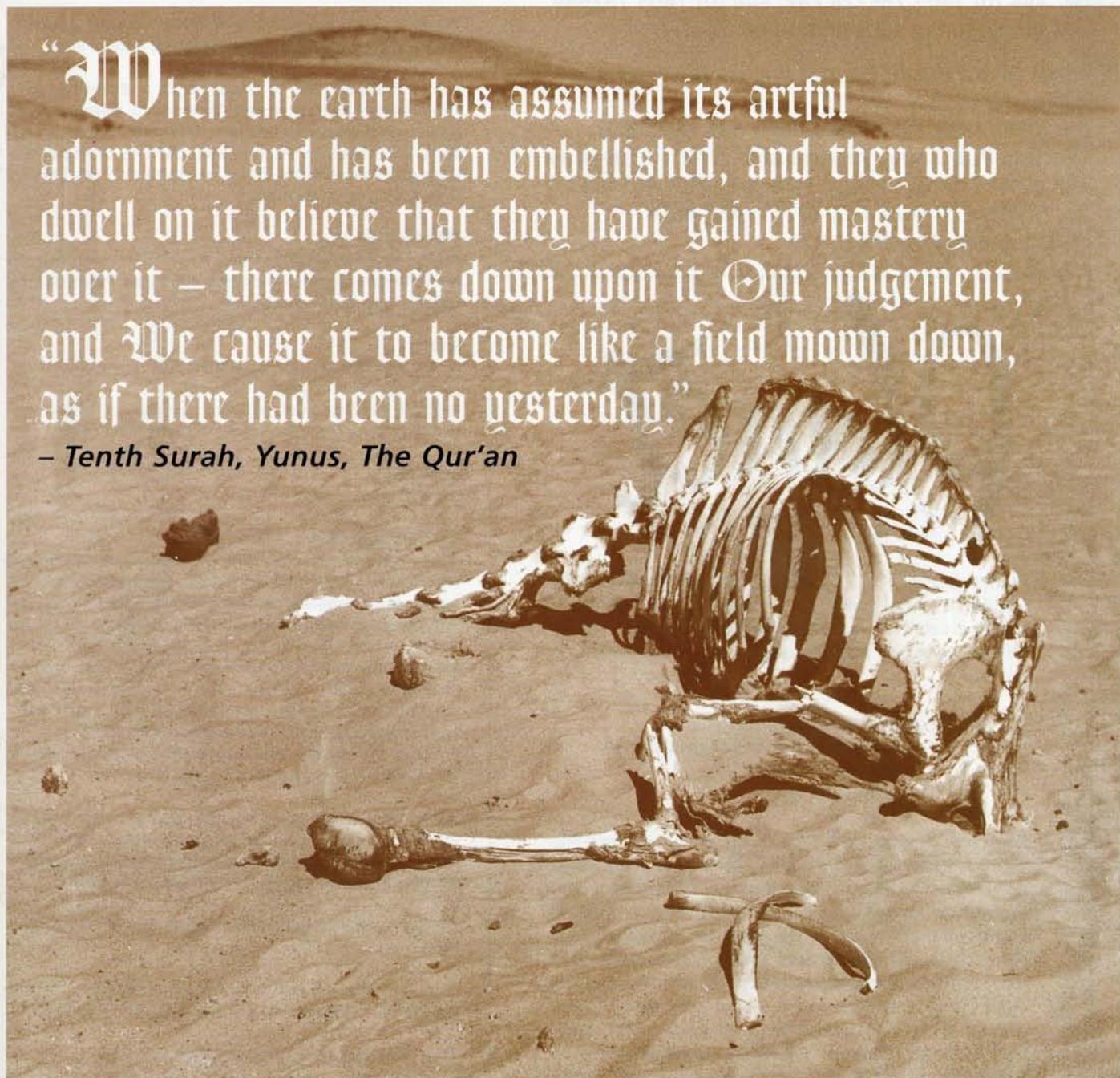
The Ecologist

Rethinking Basic Assumptions

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“When the earth has assumed its artful adornment and has been embellished, and they who dwell on it believe that they have gained mastery over it – there comes down upon it Our judgement, and We cause it to become like a field mown down, as if there had been no yesterday.”

– Tenth Surah, Yunus, The Qur'an



The Monsanto Files

Can we survive genetic engineering?

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See inside back cover

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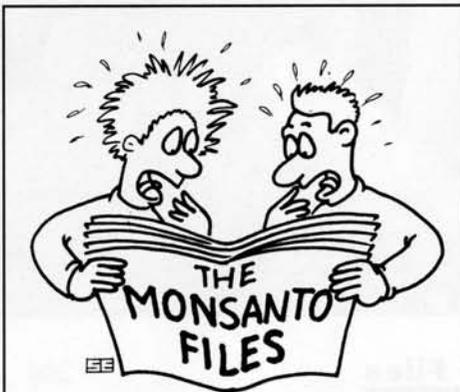
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Brave New World Delayed?
Update of events for the second edition of *The Monsanto Files*

By Paul Kingsnorth and Zac Goldsmith

Events move quickly in the Brave New World of biotechnology; sometimes more quickly than its begetters would like. Since *The Monsanto Files* first appeared, in September 1998, genetic engineering has been thrown into the public spotlight world-wide – and the public has not liked what it's seen.

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An Open Letter to Robert Shapiro, Chief Executive Officer of Monsanto

Dear Mr Shapiro,

This special issue of *The Ecologist* takes a close look at biotechnology, focussing in particular on the activities of your own company, Monsanto – one of the largest and most powerful corporations in the world.

Our reason for doing this is simple: it was you yourselves who asked us to. In your recent advertising campaign you called for free and open discussion about the impact of your work. “Food biotechnology”, as you put it, “is a matter of opinions. Monsanto believes you should hear all of them.”

The opinions we present here are far less widely heard, but very much more widely held than your own. In fact, they represent something of a movement against biotechnology in general, and food biotechnology in particular. We hope very much that, in response to your invitation, they begin to get the full public airing they deserve.

You portray Monsanto as a decent and fair corporation whose interests coincide perfectly with those of the natural world and our place in it. There are some apparent contradictions here. You tell us in your advertisements that you want to help preserve the environment, yet Monsanto has caused environmental pollution on a massive scale — not least through the production of enough PCBs to kill all mammal life in the world’s oceans. You tell us that your aim is to feed the hungry of the world, yet Monsanto has been directly responsible for undermining one of the key practices of sustainable, subsistence agriculture – that of saving and improving locally- adapted seeds from year to year. And you tell us that you see genetic engineering as a means of *reducing* the need for pesticides, yet Monsanto is the producer of Roundup, one of the biggest-selling pesticides in the world.

We are not pre-judging your response to the debate you have initiated, but nor are we very optimistic that you truly intend to listen. In the past you have had a very hard time accommodating the views of your critics. Indeed, as the following pages make clear, you have been quick to stifle any debate that might threaten your interests.

Biotechnology, you tell us, is ‘a matter of opinions’ – do you really believe we should hear them all?

Yours sincerely,

The Editors

The following article by HRH the Prince of Wales appeared first in the *Daily Telegraph*. The editors of *The Ecologist* were moved by its depth and tone, and obtained permission to republish it as a contextual introduction to this special issue on the subject. We emphasize that the views expressed in this special issue should in no way be associated with those of the Prince. However, we thank him for his courage in speaking out on this vital issue.

Seeds of Disaster

by HRH the Prince of Wales

I have always believed that agriculture should proceed in harmony with nature, recognizing that there are natural limits to our ambitions. That is why, some twelve years ago, I decided to farm organically – without artificial pesticides or fertilizers. From my own experience I am clear that the organic system can be economically viable, that it provides a wide range of environmental and social benefits, and, most important, that it enables consumers to make a choice about the food they eat.

But at a time when sales of organic food are soaring, a development in intensive agriculture is actually removing a fundamental choice about the food we eat, and raising crucial questions about the future of our food and of our environment which are still to be answered. Genetically modified (GM) crops are presented as an essentially straightforward development that will increase yields through techniques which are merely an extension of traditional methods of plant breeding. I am afraid I cannot accept this.

The fundamental difference between traditional and genetically modified plant breeding is that, in the latter, genetic material from one species of plant, bacteria, virus, animal or fish is literally inserted into another species, with which they could never naturally breed. The use of these techniques raises, it seems to me, crucial ethical and practical considerations.

I happen to believe that this kind of genetic modification takes mankind into realms that belong to God, and to God alone. Apart from certain highly beneficial and specific medical applications, do we have the right to experiment with, and commercialize, the building blocks of life? We live in an age of rights – it seems to me that it is time our Creator had some rights, too.

We simply do not know the long-term consequences for human health and the wider environment of releasing plants bred in this way. We are assured that these new plants are vigorously tested and regulated, but the evaluation procedure

seems to presume that unless a GM crop can be shown to be unsafe, there is no reason to stop its use. The lesson of BSE and other entirely man-made disasters in the cause of “cheap food” is surely that it is the *unforeseen* consequences which present the greatest cause for concern.

We are told that GM crops will require less use of agrochemicals. Even if this is true, it is certainly not the whole story. What it fails to take into account is the *total* ecological and social impact of the farming system. For example, most of the GM plants marketed so far contain genes from bacteria which make them resistant to a broad-spectrum weedkiller available from the same manufacturer. When the crop is sprayed with this weedkiller, every other plant in the field is killed. The result is an essentially sterile field, providing neither food nor habitat for wildlife. These GM crop plants are capable of interbreeding with their wild relatives, creating new weeds with built-in resistance to the weedkiller, and of contaminating other crops. Modified genes from a crop of GM rape were found to have spread into a conventional crop grown more than a mile away. The result is that both conventional and organic crops are under threat, and the threat is one way.

GM crop plants are also being developed to produce their own pesticide. This is predicted to cause the rapid appearance of resistant insects. Worse still, such pesticide-producing plants have already been shown to kill some beneficial predator insects as well as pests. To give just two examples, inserting a gene from a snowdrop into a potato made the potato resistant to greenfly, but also killed the ladybirds feeding on the greenfly. And lacewings, a natural predator of the corn borer, and food for farmland birds, died when fed on pest insects raised on GM maize.

Despite the vast acreages which are likely to be involved, there is no official requirement to monitor genetically modified commercial crops to see exactly what is happening. Think of the agricultural disasters of the past which have stemmed

from over-reliance on a single variety of a crop, yet this is what genetic modification will encourage. It is entirely possible that within 10 years virtually all of the world's production of staple crops, such as soya, maize, wheat and rice, will be from a few GM varieties, unless consumer pressure dictates otherwise.

English Nature and other official bodies have sounded warnings about the potentially damaging consequences for the environment of introducing GM crops on a wide scale. They have called for a moratorium on the use of at least one of these crops.

Once genetic material has been released into the environment it cannot be recalled. The likelihood of a major problem may, as some people suggest, be slight, but if something does go badly wrong, we will be faced with the problem of clearing up a kind of pollution which is self-perpetuating. I am not convinced that anyone has the first idea of how this could be done, or indeed who would have to pay.

We are also told that GM techniques will help to "feed the world". This is a fundamental concern to all of us. But will the companies controlling these techniques ever be able to achieve what they would regard as a sufficient return from selling their products to the world's poorest people? Nor do I believe that the basic problem is always so simple. Where the problem is lack of food, rather than lack of money to buy food, there may be better ways of achieving the same ends. Recent research has shown, for example, that yields from some traditional farming systems can be doubled, and even trebled, through techniques that conserve natural resources while making the best use of labour and management skills.

Do we need to use GM techniques at all? Technology has brought massive benefits to mankind, but there is a danger, especially in areas as sensitive as food, health and the long-term future of our environment, in putting all our efforts into establishing what is technically possible without first stopping to ask whether this is something we *should* be doing. I believe we should stop and ask that question, through a wide public debate of the issues of principle which cannot be addressed effectively through science and regulation alone. Is it not better to examine first what we actually want from agriculture in terms of food supply and security, rural employment, environmental protection and landscape, before we go on to look at the part genetic modification might, perhaps, play in achieving



TIM ROOKE/REX FEATURES

those aims?

Obviously, we all have to make up our own minds about these important issues. I personally have no wish to eat anything produced by genetic modification, nor do I knowingly offer this sort of produce to my family or guests. There is increasing evidence that a great many people feel the same way. But if this is becoming a widely-held view, we cannot put our principles into practice until there is effective segregation of genetically modified products, backed by a comprehensive labelling scheme based on progress through the food chain.

Arguments that this is either impossible or irrelevant are simply not credible. When consumers can make an *informed* choice about whether or not they eat products containing genetically modified ingredients, they will be able to send direct and unmistakable messages about their preferences. I hope that manufacturers, retailers and regulators will be ready to take on the responsibility to ensure that this can happen.

This article first appeared in the Daily Telegraph. A contribution of the fee is to be made to The Prince of Wales Charitable Foundation.

Monsanto: A Checkered History

by Brian Tokar

Monsanto's high-profile advertisements in Britain and the US depict the corporation as a visionary, world-historical force, working to bring state-of-the-art science and an environmentally responsible outlook to the solution of humanity's pressing problems. But just who is Monsanto? Where did they come from? How did they get to be the world's second largest manufacturer of agricultural chemicals, one of the largest producers of seeds, and soon – with the impending merger with American Home Products – the largest seller of prescription drugs in the United States? What do their workers, their customers, and others whose lives they have impacted, have to say? Is Monsanto the “clean and green” company its advertisements promote, or is this new image merely a product of clever public relations? A look at the historical record offers some revealing clues, and may help us better understand the company's present-day practices.

Headquartered just outside St. Louis, Missouri, the Monsanto Chemical Company was founded in 1901 by John Francis Queeny. Queeny, a self-educated chemist, brought technology to manufacture saccharin, the first artificial sweetener, from Germany to the United States. In the 1920s, Monsanto became a leading manufacturer of sulphuric acid and other basic industrial chemicals, and is one of only four companies to be listed among the top ten US chemical companies in every decade since the 1940s.¹

By the 1940s, plastics and synthetic fabrics had become a centrepiece of Monsanto's business. In 1947, a French freighter carrying ammonium nitrate fertilizer blew up at a dock 270 feet from Monsanto's plastics plant outside Galveston, Texas. More than 500 people died in what came to be seen as one of the chemical industry's first major disasters.² The plant was manufacturing styrene and polystyrene plastics, which are still important constituents of food packaging and various consumer products. In the 1980s the US Environmental Protection Agency (EPA) listed polystyrene as fifth in its ranking of the chemicals whose production generates the most total hazardous waste.³

PCBs

In 1929, the Swann Chemical Company, soon to be purchased by Monsanto, developed polychlorinated biphenyls (PCBs), which were widely praised for their nonflammability and extreme chemical stability. The most widespread uses were in the electrical equipment industry, which adopted PCBs as a nonflammable coolant for a new generation of transformers. By the 1960s, Monsanto's growing family of PCBs were also widely used as lubricants, hydraulic fluids, cutting oils, water-proof coatings and liquid sealants. Evidence of the toxic

effects of PCBs appeared as early as the 1930s, and Swedish scientists studying the biological effects of DDT began finding significant concentrations of PCBs in the blood, hair and fatty tissue of wildlife in the 1960s.⁴

Research in the 1960s and seventies revealed PCBs and other aromatic organochlorines to be potent carcinogens, and also traced them to a wide array of reproductive, developmental and immune system disorders [see J. Cummins in this issue].⁵ Their high chemical affinity for fat tissue, is responsible for their dramatic rates of concentration and bioaccumulation, and their wide dispersal throughout the North's aquatic food web: Arctic cod, for example, carry PCB concentrations 48 million times that of their surrounding waters, and predatory mammals such as polar bears can harbour tissue concentrations of PCBs more than fifty times greater than that. Though the manufacture of PCBs was banned in the United States in 1976, its toxic and endocrine-disruptive effects persist worldwide.⁶

The world's centre of PCB manufacturing was Monsanto's plant on the outskirts of East St. Louis, Illinois. East St. Louis is a chronically economically depressed suburb, across the Mississippi River from St. Louis, bordered by two large metal-processing plants in addition to the Monsanto facility. “East St. Louis”, reports education writer Jonathan Kozol, “has some of the sickest children in America.” Kozol reports that the city has the highest rate of fetal death and immature births in the state, the third highest rate of infant death, and one of the highest childhood asthma rates in the United States.⁷

Dioxin: A Legacy of Contamination

The people of East St. Louis continue to face the horrors of high-level chemical exposure, poverty, a deteriorating urban

“From our point of view, Monsanto is at the heart of the problem here in Missouri,” explains TBAG's Steve Taylor.



Licence to kill

infrastructure, and the collapse of even the most basic city services, but the nearby town of Times Beach, Missouri was found to be so thoroughly contaminated with dioxin that the US government ordered it evacuated in 1982. Apparently the town, as well as several private landowners, hired a contractor to spray its dirt roads with waste oil to keep dust down. The same contractor had been hired by local chemical companies to pump out their dioxin-contaminated sludge tanks. When 50 horses, other domestic animals, and hundreds of wild birds died in an indoor arena that had been sprayed with the oil, an investigation ensued that eventually traced the deaths to dioxin from the chemical sludge tanks.⁸ Two young girls who played in the arena became ill, one of whom was hospitalized for four weeks with severe kidney damage, and many more children born to mothers exposed to the dioxin-contaminated oil demonstrated evidence of immune system abnormalities and significant brain dysfunction.⁹

While Monsanto has consistently denied any connection to the Times Beach incident, the St. Louis-based Times Beach Action Group (TBAG) uncovered laboratory reports documenting the presence of large concentrations of PCBs manufactured by Monsanto in contaminated soil samples from the town.¹⁰ "From our point of view, Monsanto is at the heart of the problem here in Missouri," explains TBAG's Steve Taylor. Taylor acknowledges that many questions about Times Beach and other contaminated sites in the region remain unanswered, but cites evidence that close investigations of the sludge sprayed in Times Beach were limited to those sources traceable to companies other than Monsanto.

The cover-up at Times Beach reached the highest levels in the Reagan Administration in Washington. The nation's environmental agencies during the Reagan years became notorious for officials' repeated backroom deals with industry officials, in which favoured companies were promised lax enforcement and greatly reduced fines. Reagan's appointed administrator of the Environmental Protection Agency, Anne Gorsuch Burford, was forced to resign after two years in office and her special assistant, Rita Lavelle, was jailed for six months for perjury and obstruction of justice. In one famous incident, the Reagan White House ordered Burford to withhold documents on Times Beach and other contaminated sites in the states of Missouri and Arkansas, citing "executive privilege", and Lavelle was subsequently cited for shredding important documents.¹¹ An investigative reporter for the *Philadelphia Inquirer* newspaper identified Monsanto as one of the chemical companies whose executives frequently hosted luncheon and dinner meetings with Lavelle.¹² The evacuation sought by residents of Times Beach was delayed until 1982, eleven years after the contamination was first discovered, and eight years after the cause was identified as dioxin.

Monsanto's association with dioxin can be traced back to its manufacture of the herbicide 2,4,5-T, beginning in the late 1940s. "Almost immediately, its workers started getting sick with skin rashes, inexplicable pains in the limbs, joints and other parts of the body, weakness, irritability, nervousness and loss of libido," explains Peter Sills, author of a forthcoming book on dioxin. "Internal memos show that the company knew

these men were actually as sick as they claimed, but it kept all that evidence hidden."¹³ An explosion at Monsanto's Nitro, West Virginia herbicide plant in 1949 drew further attention to these complaints. The contaminant responsible for these conditions was not identified as dioxin until 1957, but the US Army Chemical Corps apparently became interested in this substance as a possible chemical warfare agent. A request filed by the St. Louis Journalism Review under the US Freedom of Information Act revealed nearly 600 pages of reports and correspondence between Monsanto and the Army Chemical Corps on the subject of this herbicide byproduct, going as far back as 1952.¹⁴

Agent Orange: The Poisoning of Vietnam

The herbicide "Agent Orange", which was used by US military forces to defoliate the rainforest ecosystems of Vietnam during the 1960s (see H. Warwick in this issue) was a mixture of 2,4,5-T and 2,4-D that was available from several sources, but Monsanto's Agent Orange had concentrations of dioxin many times higher than that produced by Dow Chemical, the defoliant's other leading manufacturer. This made Monsanto the key defendant in the lawsuit brought by Vietnam War veterans in the United States, who faced an array of debilitating symptoms attributable to Agent Orange exposure. When a \$180 million settlement was reached in 1984 between seven chemical companies and the lawyers for the veterans, the judge ordered Monsanto to pay 45.5 per cent of the total.¹⁵

In the 1980s, Monsanto undertook a series of studies designed to minimize its liability, not only in the Agent Orange suit, but in continuing instances of employee contamination at its West Virginia manufacturing plant. A three and a half year court case brought by railroad workers exposed to dioxin following a train derailment revealed a pattern of manipulated data and misleading experimental design in these studies. An official of the US EPA concluded that the studies were manipulated to support Monsanto's claim that dioxin's effects were limited to the skin disease chloracne.¹⁶ Greenpeace researchers Jed Greer and Kenny Bruno describe the outcome:

"According to testimony from the trial, Monsanto misclassified exposed and non-exposed workers, arbitrarily deleted several key cancer cases, failed to verify classification of chloracne subjects by common industrial dermatitis criteria, did not provide assurance of untampered records delivered and used by consultants, and made false statements about dioxin contamination in Monsanto products."¹⁷

The court case, in which the jury granted a \$16 million punitive damage award against Monsanto, revealed that many of Monsanto's products, from household herbicides to the Santophen germicide once used in Lysol brand disinfectant, were knowingly contaminated with dioxin. "The evidence of Monsanto executives at the trial portrayed a corporate culture where sales and profits were given a higher priority than the safety of products and its workers," reported the *Toronto Globe and Mail* after the close of the trial.¹⁸ "They just didn't care about the health and safety of their workers," explains author Peter Sills. "Instead of trying to make things safer, they relied on intimidation and threatened layoffs to keep their employees

Monsanto's association with dioxin can be traced back to its manufacture of the herbicide 2,4,5-T, beginning in the late 1940s. "Almost immediately, its workers started getting sick with skin rashes, inexplicable pains in the limbs, joints and other parts of the body, weakness, irritability, nervousness and loss of libido," explains Peter Sills.

working.”

A subsequent review by Dr. Cate Jenkins of the EPA's Regulatory Development Branch documented an even more systematic record of fraudulent science. “Monsanto has in fact submitted false information to EPA which directly resulted in weakened regulations under RCRA [Resources Conservation and Recovery Act] and FIFRA [Federal Insecticide, Fungicide and Rodenticide Act] . . .” reported Dr. Jenkins in a 1990 memorandum urging the agency to undertake a criminal investigation of the company. Jenkins cited internal Monsanto documents revealing that the company “doctored” samples of herbicides that were submitted to the US Department of Agriculture, hid behind “process chemistry” arguments to deflect attempts to regulate 2,4-D and various chlorophenols, hid evidence regarding the contamination of Lysol, and excluded several hundred of its sickest former employees from its comparative health studies:

Monsanto covered up the dioxin contamination of a wide range of its products. Monsanto either failed to report contamination, substituted false information purporting to show no contamination or submitted samples to the government for analysis which had been specially prepared so that dioxin contamination did not exist.¹⁹

Roundup: The World's Biggest-Selling Herbicide

Today, glyphosate herbicides such as Roundup account for at least one sixth of Monsanto's total annual sales and half of the company's operating income,²⁰ perhaps significantly more since the company spun off its industrial chemicals and synthetic fabrics divisions as a separate company, called Solutia, in September 1997. Monsanto aggressively promotes Roundup as a safe, general purpose herbicide for use on everything from lawns and orchards, to large coniferous forest holdings, where aerial spraying of the herbicide is used to suppress the growth of deciduous seedlings and shrubs and encourage the growth of profitable fir and spruce trees.²¹ The Oregon-based Northwest Coalition for Alternatives to Pesticides (NCAP) reviewed over forty scientific studies on the effects of glyphosate, and of the polyoxyethylene amines used as a surfactant in Roundup, and concluded that the herbicide is far less benign than Monsanto's advertising suggests [For more on Roundup, see J. Mendelson in this issue]:

In 1997, Monsanto responded to five years of complaints by the New York State Attorney General that its advertisements for Roundup were misleading: the company altered its ads to delete claims that the herbicide is “biodegradable” and “environmentally friendly”, and paid \$50,000 toward the state's legal expenses in the case.²²

In March 1998, Monsanto agreed to pay a fine of \$225,000 for mislabelling containers of Roundup on 75 separate occasions. The penalty was the largest settlement ever paid for violation of the Worker Protection Standards of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Accord-

ing to the *Wall Street Journal*, Monsanto distributed containers of the herbicide with labels restricting entry into treated areas for only four hours instead of the required 12 hours.²³

This is only the latest in a series of major fines and rulings against Monsanto in the United States, including a \$108 million liability finding in the case of the leukaemia death of a

Texas employee in 1986, a \$648,000 settlement for allegedly failing to report required health data to the EPA in 1990, a \$1 million fine by the state Attorney General of Massachusetts in 1991 in the case of a 200,000 gallon acid wastewater spill, a \$39 million settlement in Houston, Texas in 1992 involving the deposition of hazardous chemicals into unlined pits, and numerous others.²⁴ In 1995, Monsanto ranked fifth among

US corporations in the EPA's Toxic Release Inventory, having discharged 37 million pounds of toxic chemicals into the air, land, water and underground.²⁵

Monsanto's pharmaceutical products also have a troubling track record. The flagship product of Monsanto's GD Searle pharmaceuticals subsidiary is the artificial sweetener aspartame, sold under the brand names Nutrasweet and Equal. In

1981, four years before Monsanto purchased Searle, an FDA Board of Inquiry consisting of three independent scientists confirmed reports that had been circulating for eight years that “aspartame might induce brain tumours.”²⁶ The FDA revoked Searle's licence to sell aspartame, only to have its decision reversed under a

new commissioner appointed by President Ronald Reagan.

A 1996 study in the *Journal of Neuropathology and Experimental Neurology* has renewed this concern, linking aspartame to a sharp increase in brain cancers shortly after the substance was introduced. Dr. Erik Millstone of the University of Sussex Science Policy Research Unit cites a series of reports from the 1980s linking aspartame to a wide array of adverse reactions in sensitive consumers, including headaches, blurred vision, numbness, hearing loss, muscle spasms and

Monsanto covered up the dioxin contamination of a wide range of its products. Monsanto either failed to report contamination, substituted false information purporting to show no contamination or submitted samples to the government for analysis which had been specially prepared so that dioxin contamination did not exist.

In 1995, Monsanto ranked fifth among US corporations in the EPA's Toxic Release Inventory, having discharged 37 million pounds of toxic chemicals into the air, land, water and underground.

Genetic Engineering is Out of Control

The production of genetically engineered crops in the US appears to be out of control. So, at least, is the view of Monsanto, the biggest producer of genetically modified soya seed. They stated the other day in an interview with Geoff Tansey, “Last year we had one million acres of soya worldwide, this year eight to ten million. The acreage is only limited by the seed availability.”

Presumably our undeniably patchy understanding of genetics is also going to grow exponentially, since that would be the only justification for increasing production by such a rate.

induced epileptic-type seizures, among numerous others.²⁷ In 1989, Searle again ran foul of the FDA,²⁸ which accused the company of misleading advertising in the case of its anti-ulcer drug, Cytotec. The FDA said that the ads were designed to market the drug to a much broader and younger population than the agency had advised. Searle/Monsanto was required to take out an ad in a number of medical journals, which was headed "Published To Correct a Previous Advertisement Which The Food And Drug Administration Considered Misleading."²⁹

Biotechnology's Brave New World

Monsanto's aggressive promotion of its biotechnology products, from recombinant Bovine Growth Hormone (rBGH), to Roundup Ready soybeans and other crops, to its insect-resistant varieties of cotton, is seen by many observers as a continuation of its many decades of ethically questionable practices.

Originally, Monsanto was one of four chemical companies seeking to bring a synthetic Bovine Growth Hormone, produced in *E. coli* bacteria genetically engineered to manufacture the bovine protein, to market. Another was American Cyanamid, now owned by American Home Products, which is in the process of merging with Monsanto. As Jennifer Ferrara describes in this issue, Monsanto's 14-year effort to gain approval from the US Food and Drug Administration (FDA) to bring recombinant BGH to market was fraught with controversy, including allegations of a concerted effort to suppress information about the hormone's ill effects. One FDA veterinarian, Richard Burroughs, was fired after he accused both the company and the agency of suppressing and manipulating data to hide the effects of

rBGH injections on the health of dairy cows.³⁰

In 1990, when FDA approval of rBGH appeared imminent, a veterinary pathologist at the University of Vermont's agricultural research facility released previously suppressed data to two state legislators documenting significantly increased rates of udder infection in cows that had been injected with the then-experimental Monsanto hormone, as well as an unusual incidence of severely deforming birth defects in offspring of rBGH-treated cows.³¹ An independent review of the University data by a regional farm advocacy group documented additional cow health problems associated with rBGH, including high incidences of foot and leg injuries, metabolic and reproductive difficulties and uterine infections. The US Congress's General Accounting Office (GAO) attempted an inquiry into the case, but was unable to obtain the necessary records from Monsanto and the University to carry out its investigation, particularly with respect to suspected teratogenic and embryotoxic effects. The GAO auditors concluded that cows injected with rBGH had mastitis (udder infection) rates one third higher than untreated cows, and recommended further research on the risk of elevated antibiotic levels in milk produced using rBGH.³²

Monsanto's rBGH was approved by the FDA for commercial sale beginning in 1994. The following year, Mark Kastel of the Wisconsin Farmers Union released a study of Wisconsin farmers' experiences with the drug. His findings exceeded the 21 potential health problems that Monsanto was required to list on the warning label for its Posilac brand of rBGH. Kastel found widespread reports of spontaneous deaths among

rBGH-treated cows, high incidences of udder infections, severe metabolic difficulties and calving problems, and in some cases an inability to successfully wean treated cows off the drug. Many experienced dairy farmers who experimented with rBGH suddenly needed to replace large portions of their herd.³³ Instead of addressing the causes of farmers' complaints about rBGH, Monsanto went on the offensive, threatening to sue small dairy companies that advertised their products as free of the artificial hormone, and participating in a lawsuit by several dairy industry trade associations against the first and only mandatory labelling law for rBGH in the United States.³⁴ Still, evidence for the damaging effects of rBGH on the health of both cows and people continued to mount.³⁵

Roundup-Ready Soybeans (RRS)

Efforts to prevent labeling of genetically engineered soybean and maize exports from the United States suggest a continuation of the practices that were designed to squelch complaints against Monsanto's dairy hormone. While Monsanto argues that its "Roundup Ready" soybeans will ultimately reduce herbicide use, the widespread acceptance of herbicide-tolerant crop varieties appears far more likely to increase farmers' dependence on herbicides [see J. Mendelson in this issue]. Weeds that emerge after the original herbicide has dispersed or broken down are often treated with further applications of herbicides.³⁶ "It will promote the overuse of the herbicide," Missouri soybean farmer Bill Christison told Kenny Bruno of Greenpeace International. "If there is a selling point for RRS, it's the fact that you can till an area with a lot of weeds and use surplus chemicals to combat your problem, which is not what anyone should be doing."³⁷ Christison refutes Monsanto's claim that herbi-

In Canada, Monsanto had to recall 60,000 bags of genetically engineered rape seed in 1997. Apparently the shipment of Roundup-resistant seed contained an inserted gene different from the one that had been approved for consumption by people and livestock.

cide-resistant seeds are necessary to reduce soil erosion from excess tillage, and reports that Midwestern farmers have developed numerous methods of their own for reducing overall use of herbicides.

Monsanto, on the other hand, has stepped up its production of Roundup in recent years. With Monsanto's US patent for Roundup scheduled to expire in the year 2000, and competition from generic glyphosate products already emerging worldwide, the packaging of Roundup herbicide with "Roundup Ready" seeds has become the centrepiece of Monsanto's strategy for continued growth in herbicide sales.³⁸ The possible health and environmental consequences of Roundup-tolerant crops have not been fully investigated, including allergic effects, potential invasiveness or weediness, and the possibility of herbicide resistance being transferred via pollen to other soybeans or related plants.³⁹

While any problems with herbicide-resistant soybeans may still be dismissed as long-range and somewhat speculative, the experience of US cotton growers with Monsanto's genetically engineered seeds appears to tell a very different story. Monsanto has released two varieties of genetically engineered cotton, beginning in 1996. One is a Roundup-resistant variety and the other, named "Bollgard", secretes a bacterial toxin intended to control damage from three leading cotton pests. The toxin, derived from *Bacillus thuringiensis*, has been used by organic growers in the form of a natural bacterial spray since the early 1970s. But while B.t. bacteria are relatively short-lived, and secrete their toxin in a form that only becomes activated in the

alkaline digestive systems of particular worms and caterpillars, genetically engineered B.t. crops secrete an active form of the toxin throughout the plant's life cycle.⁴⁰ Much of the genetically engineered maize currently on the market, for example, is a B.t. secreting variety, designed to repel the corn rootworm and other common pests.

The first widely anticipated problem with these pesticide-secreting crops is that the presence of the toxin throughout the plant's life cycle is likely to encourage the development of resistant strains of common crop pests. The US EPA has determined that widespread resistance to B.t. may render natural applications of B.t. bacteria ineffective in just three to five years and requires growers to plant refuges of up to 40 per cent non-B.t. cotton in an attempt to forestall this effect. Second, the active toxin secreted by these plants may harm beneficial insects, moths and butterflies, in addition to those species that growers wish to eliminate.⁴¹

But the damaging effects of B.t.-secreting "Bollgard" cotton have proved to be much more immediate, enough so that Monsanto and its partners have pulled five million pounds of genetically engineered cotton seed off the market and agreed to a multimillion dollar settlement with farmers in the southern United States. Three farmers who refused to settle with Monsanto were awarded nearly \$2 million by the Mississippi Seed Arbitration Council.⁴² Not only were plants attacked by the cotton bollworm, which Monsanto claimed they would be resistant to, but germination was spotty, yields were low, and

They have successfully cast off their industrial chemical divisions and are now committed to replacing chemicals with "information" – an ironic stance for a company whose most profitable product is a herbicide.

plants were misshapen, according to several published accounts.⁴³ Some farmers reported crop losses of up to 50 per cent. Farmers who planted Monsanto's Roundup-resistant cotton also reported severe crop failures, including deformed and misshapen bolls that suddenly fell off the plant three quarters of the way through the growing season.⁴⁴

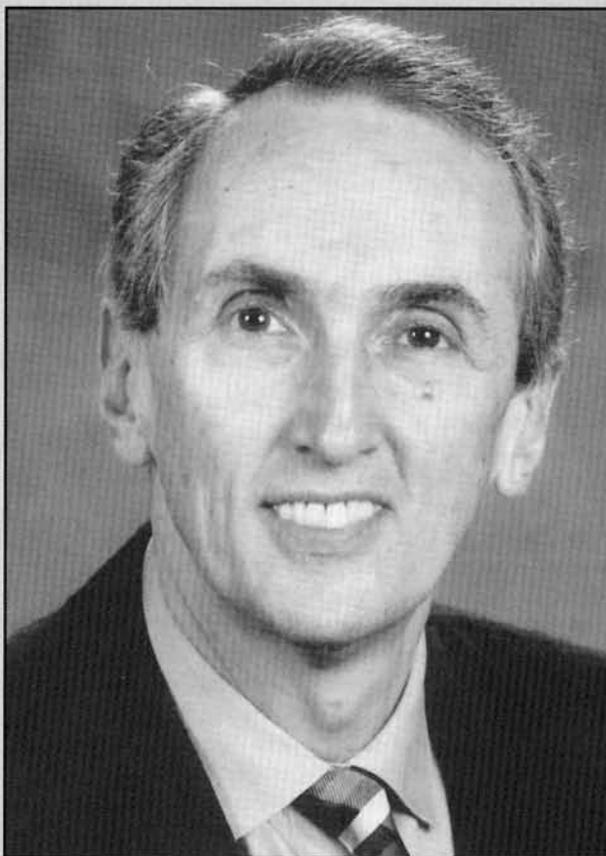
Despite these problems, Monsanto is advancing the use of genetic engineering in agriculture by taking control of many of the largest, most established seed companies in the United States. Monsanto now owns Holdens Foundation Seeds, supplier of germplasm used on 25-35 per cent of US maize acreage, and Asgrow Agronomics, which it describes as "the leading soybean breeder, developer and distributor in the United States".⁴⁵ This past spring, Monsanto completed its acquisition of De Kalb Genetics, the second largest seed company in the United States and the ninth largest in the world, as well as Delta and Pine Land, the largest US cotton seed company.⁴⁶ With its Delta and Pine acquisition, Monsanto now controls 85 per cent of the US cotton seed market.⁴⁷

The company has been aggressively pursuing corporate acquisitions and product sales in other countries as well. In 1997, Monsanto bought Sementes Agrocere S.A., described as "the leading seed corn company in Brazil", with a 30 per cent market share.⁴⁸ Earlier this year, the Brazilian Federal Police investigated an alleged illegal importation of at least 200 bags of transgenic soybeans, some of which were traced to

Monsanto Madness

The firm's chief executive, Bob Shapiro, now talks of "Monsanto's Law", a spin-off of "Moore's Law", named after Gordon Moore, a co-founder of computer chipmaker Intel Corp., who first predicted that computing power would double every 18 months or so.

By applying information technology to biology, Shapiro promises in Monsanto's Law that genetic information will double every year or two, providing an exponential increase in new products. While early work focussed on changing a single gene, scientists now work to re-engineer several genes in a plant to radically change its properties.



Robert B. Shapiro. President and Chief Operating Officer, Monsanto Company

an Argentine subsidiary of Monsanto.⁴⁹ According to Brazilian law, foreign transgenic products can only be introduced after a period of quarantine and testing to prevent possible damage to native flora. In Canada, Monsanto had to recall 60,000 bags of genetically engineered rape ("canola") seed in 1997.⁵⁰ Apparently the shipment of Roundup-resistant seed contained an inserted gene different from the one that had been approved for consumption by people and livestock.

Shapiro, The Image-Maker

Given this long and troubling history, it is easy to understand why informed citizens throughout Europe and the US are reluctant to trust Monsanto with the future of our food and our health. But Monsanto is doing everything it can to appear unperturbed by this opposition. Through efforts such as their massive advertising campaign in Britain, their sponsorship of a new high-tech Biodiversity exhibit at the American Museum

of Natural History in New York, and many others, they are trying to appear greener, more righteous and more forward-looking than even their opponents.

In the US they are bolstering their image, and likely influencing policy, with the support of people at the highest levels of the Clinton administration. In May 1997, Mickey Kantor, an architect of Bill Clinton's 1992 election campaign and United States Trade Representative during Clinton's first term, was elected to a seat on Monsanto's Board of Directors. Marcia Hale, formerly a personal assistant to the President, has served as Monsanto's public affairs officer in Britain.⁵¹ Vice President Al Gore, who is well-known in the US for his writings and speeches on the environment, has been a vocal supporter of biotechnology at least since his days in the US Senate.⁵² Gore's Chief Domestic Policy Advisor, David W. Beier, was formerly the Senior Director of Government Affairs at Genentech, Inc.⁵³

Under CEO Robert Shapiro, Monsanto has pulled out all the stops to transform its image from a purveyor of dangerous chemicals to an enlightened, forward-looking institution crusading to feed the world. Shapiro, who went to work for GD Searle in 1979 and became the president of its Nutrasweet Group in 1982, sits on the President's Advisory Committee for Trade Policy and Negotiations and served a term as a member of the White House Domestic Policy Review.⁵⁴ He describes himself as a visionary and a Renaissance Man, with a mission to use the company's resources to change the world: "The only reason for working at a large company is that you have the capability of doing things on a large scale that really are important," he told an interviewer for *Business Ethics*, a flagship journal for the "socially responsible business" movement in the United States.⁵⁵

Shapiro harbours few illusions about Monsanto's reputation in the United States, recounting with sympathy the dilemma of many a Monsanto employee whose neighbours' children might wince when they find out where the employee works. He is anxious to demonstrate that he is in step with the widespread desire for systemic change, and is determined to redirect this desire toward his company's ends, as he demonstrated in a recent interview with the *Harvard Business Review*: "It's not a question of good guys and bad guys. There is no point in saying, 'If only those bad guys would go out of business, then the world would be fine.' The whole system has to change; there's a huge opportunity for reinvention."⁵⁶

Of course, Shapiro's reinvented system is one where huge corporations not only continue to exist, but exercise an ever-increasing control over our lives. But Monsanto has reformed, we are told. They have successfully cast off their industrial chemical divisions and are now committed to replacing chemicals with "information", in the guise of genetically engineered seeds and other products of biotechnology. This is an ironic stance for a company whose most profitable product is a herbicide. It is an unlikely role for a company that seeks to intimidate critics with lawsuits and suppress criticism in the media [see Peter Montague in this issue].

Monsanto's latest Annual Report, however, clearly demonstrates that it has learned all the right buzzwords. Roundup is not a herbicide, it is a tool to minimize tillage and decrease soil erosion. Genetically engineered crops are not just about profits for Monsanto, they're about solving the inexorable problem of population growth. Biotechnology is not reducing every-

thing alive to the realm of commodities – items to be bought and sold, marketed and patented – but is in fact a harbinger of "decommodification": the replacement of single mass-produced products with a vast array of specialized, made-to-order products.⁵⁷ This is Newspeak of the highest order.

Finally, we are to believe that Monsanto's aggressive promotion of biotechnology is not a matter of mere corporate arrogance, but rather the realization of a simple fact of nature. Readers of the Monsanto Annual Report are presented with an analogy between today's rapid growth in the number of identified DNA base pairs and the exponential trend of miniaturization in the electronics industry, a trend first identified in the 1960s. Monsanto has dubbed the apparent exponential growth of what it terms "biological knowledge" to be nothing less than "Monsanto's Law". Like any other putative law of nature, one has little choice but to see its predictions realized and, here, the prediction is nothing less than the continued exponential growth of Monsanto's global reach.

But the growth of any technology is not merely a "law of nature". Technologies are not social forces unto themselves, nor merely *neutral* "tools" that can be used to satisfy any social end we desire. Rather they are products of particular social institutions and economic interests. Once a particular course of technological development is set in motion, it can have much wider consequences than its creators could have predicted: the more powerful the technology, the more profound the consequences.

For example, the so-called Green Revolution in agriculture in the 1960s and seventies temporarily increased crop yields, and also made farmers throughout the world increasingly dependent on costly chemical inputs. This spurred widespread displacements of people from the land, and in many countries has undermined the soil, groundwater and social land base that sustained people for millennia.⁵⁸ These large-scale dislocations have fuelled population growth, urbanization and social disempowerment, which have in turn led to another cycle of impoverishment and hunger.

The "second Green Revolution" promised by Monsanto and other biotechnology companies threatens even greater disruptions in traditional land tenure and social relations. In rejecting Monsanto and its biotechnology, we are not necessarily rejecting technology per se, but seeking to replace a life-denying technology of manipulation, control and profit with a genuinely ecological technology, designed to respect the patterns of nature, improve personal and community health, sustain land-based communities and operate at a genuinely human scale. If we believe in democracy, it is imperative that we have the right to choose which technologies are best for our communities, rather than having unaccountable institutions like Monsanto decide for us. Rather than technologies designed for the continued enrichment of a few, we can ground our technology in the hope of a greater harmony between our human communities and the natural world. Our health, our food and the future of life on Earth truly lie in the balance.

Let us now examine the true nature of Monsanto's flagship products, and their effects on our health and the world's environment.

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*The "second Green Revolution" promised
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companies threatens even greater
disruptions in traditional land tenure and
social relations.*

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PCBs – Can The World's Sea Mammals Survive Them?

by Joseph E. Cummins

Monsanto assures us in its recent advertisements that the health of the world's environment is a top priority. But this is not borne out by its record. Its products have caused extensive environmental destruction, and continue to do so. Among other things, it is largely responsible for putting the world's ocean mammals at serious risk of extinction.

In 1929, Swann Corporation, which later became part of Monsanto, began manufacturing polychlorinated biphenyls (PCBs) for commercial use. PCBs are oily liquids that conduct heat but not electricity. As such, they could be used as an insulating fluid in electrical appliances and were widely applied in everything from hydraulic equipment to degreasing agents for nuclear submarines.

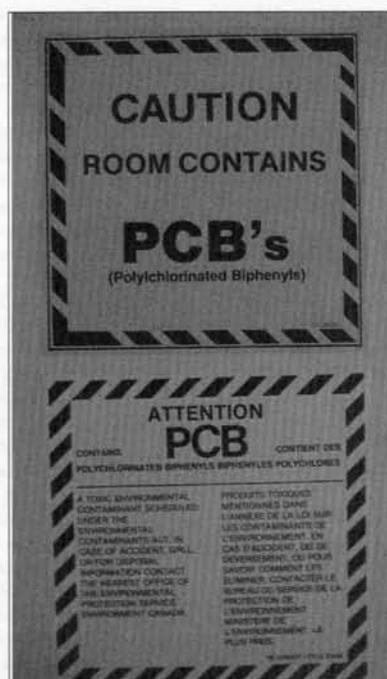
In effect, Monsanto has either produced or granted production licences for all but a very small fraction of the world's PCBs, and is responsible for the release of a massive 1.2 million tonnes of the deadly chemicals worldwide.

Although the company was aware of adverse health affects in workers exposed to PCBs as early as the late 1930s,^{1,2,3,4} Monsanto continued to mass-produce them for decades until a highly-publicized PCB health scare 30 years later alerted policy-makers to the hazardous nature of the chemicals. The news has since only worsened.

In 1968, 1,300 residents of Kyush, Japan, fell ill after eating PCB-contaminated rice. Many of the affected women later gave birth to children with severe defects.

In 1969, the *New Scientist* published a report revealing the capacity of PCBs to "bioaccumulate along the food chain."⁵ The chemicals, which take many years to biodegrade, pass easily through the lipid portions of cell membranes and are readily absorbed into mammalian fat tissue. Animals at the top of the food chain, like whales, polar bears, dolphins and humans, can store PCBs at highly concentrated levels. The result has been a terrifying array of adverse reactions.

And in 1995, it was revealed⁶ that women who had eaten fish from the contaminated waters of the Great Lakes, Canada, gave birth to children with an unusually high susceptibility to bacterial infection. PCBs were also shown to damage nerves in the brains of developing mammalian fetuses, leading to



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behavioural and learning defects.

Cancers, particularly malignant melanomas⁷ have also been clearly linked to PCB-poisoning. In Ontario, State compensation is provided for the toxins' malignant effects. In addition, PCB-pollution has been seen to result in immune defence deficiencies, hypertension and strokes.

Initially, it was assumed that PCB-accumulation was greatest nearest the sources of pollution. However, in 1988, the journal *Environmental Pollution* published an article revealing the extent of contamination borne in particular by marine mammals.⁸ Dolphins, whales and porpoises all contained levels of PCBs that far exceeded that of their terrestrial counterparts. Mediterranean blue-white dolphins, for example, were found to carry 833 parts per million in their blubber – nearly 17 times the level requiring goods to be labelled and handled as toxic waste.

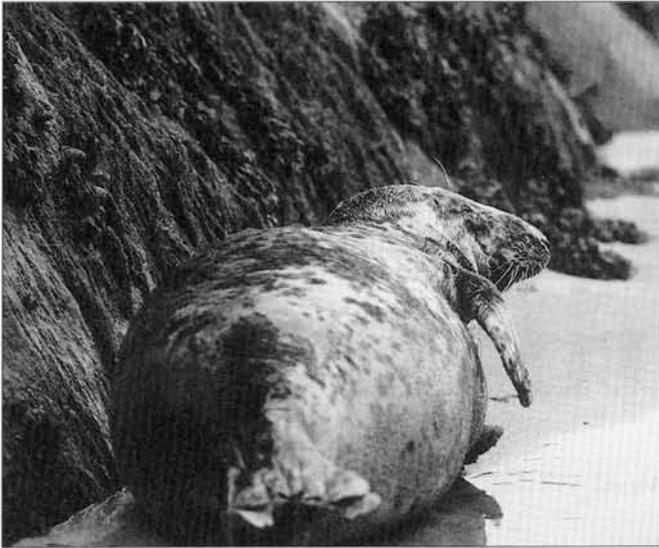
Marine mammals were also found to have a genetically pre-determined sensitivity to PCB-induced reproductive impairment;^{9,10} a sensitivity that only one in ten humans of European origin share.¹¹ The chemicals, which mimic mammalian hormones, thus pose a real threat of extinction to these animals.

Accumulation at the Poles

Revelations that PCBs have actually been condensing at the Earth's poles, where there is no industrial activity to speak of, provoked both governmental activity and real concern from polar populations. The North Pole, because of the intensity of industrial activity in the Northern hemisphere,

has been the most badly affected. In 1998, for example, ringed seals from Arctic Norway were found to contain five times more PCBs than seals from the Canadian Arctic.¹² For the last three years, the Norwegian Polar Institute has been finding polar bears with both male and female sexual organs.¹³ This

In effect, Monsanto has either produced or granted production licenses for all but a very small fraction of the world's PCBs



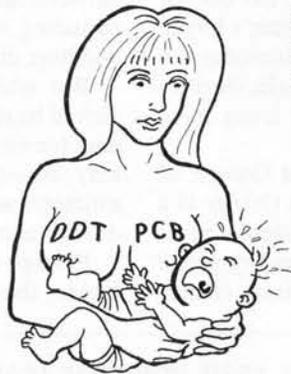
PAUL GLENDELL

Marine mammals can store PCBs at highly concentrated levels. The results have been catastrophic.

year, four hermaphroditic cubs have been seen – the highest tally so far – and researchers fear that up to four per cent of the bears may be affected. The Norwegian Special Adviser on polar affairs has pointed out the findings' implications for other life forms, including humans: "The polar bear, like us, is at the top of the food chain. We are very concerned," he said.¹⁴

Native Arctic populations have little choice but to eat the food their environment provides. But the accompanying toxic overdose is causing inevitable disease. For instance, in Greenland, the children, partly at least as a result, are being administered two to three times as many prescriptive drugs as those in Sweden, Norway and the US. There are also many documented cases in that country of an increase in reproductive disorders.^{15,16,17,18,19,20}

Despite the obvious cause for alarm, Canada's Northwest Territory officials recently issued a misleading public report, stating that blood taken from a group of newborn babies



STAN EALES

Two international organizations now deal with issues relating to Arctic pollution: the Arctic Monitoring and Assessment Program (AMAP) and the North American Free Trade Agreement's Environmental committee – the Commission for Environmental Cooperation (CEC)

AMAP has published no-nonsense papers on the need for statutory measures in circumpolar countries to manage Arctic pollution. The CEC has prepared a number of reports examining the remaining quantities of PCBs. As far as possible, these attempt to trace the pollutants' path back to the environment.

contained *less* PCBs than the Canadian national average. A closer examination of the data, however, showed that PCB levels in Northern Territory babies were actually significantly *higher* than the national average²¹ – an illuminating insight into the growing tendency of Canadian bureaucrats to manipulate scientific studies to satisfy their immediate needs and desires.

Although PCBs have been banned in many countries, research suggests that 20 per cent of the 1.2 million tonnes produced now pollute the world's oceans.²² The United Nations Environment Program committee is to begin negotiations between 120 nations on a global, legally-binding ban of 12 persistent organic pollutants, including PCBs. Such a global agreement is desperately needed but long overdue. Furthermore, who is going to pay for the safe destruction and replacement of the world's remaining PCB stock, particularly an estimated 180,000 tonnes in the Third World? Perhaps Monsanto, as the Earth's prime PCB-producer and profiteer, should begin to balance its accounts with the Arctic ecosystems. It would certainly make its new self-image, as a defender of the environment, a little less incredible.

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Agent Orange: The Poisoning of Vietnam

by Hugh Warwick

Monsanto was heavily involved in, and was the major financial beneficiary of one of the most shocking scandals of our age.

Monsanto was one of the principal companies involved in supplying the 19 million gallons of herbicide used on Vietnam between 1962 and 1971. Under the military project code-named Operation Ranch Hand, the US Air Force sprayed some 6 million acres of South Vietnam's forest, while some was used specifically to kill crops. Non-crop use was designed to cut wide swathes through the jungle, denying ground cover to the opposition army, especially along main transport routes, making ambush more difficult.

The most widely deployed defoliant was Agent Orange, of which at least 11 million gallons was used. Agent Orange is a 50:50 mix of two phenoxy herbicides: 2,4-D (2,4-dichlorophenoxy acetic acid) and 2,4,5-T (2,4,5-trichlorophenoxy acetic acid). These components were common agricultural chemicals, widely used in the United States. Its name comes from the coloured coding on the drums used by the military (there was a whole range of different chemicals used as defoliants – including Agent's White, Blue and Pink). Unfortunately in the rush to meet the military's demand for Agent Orange, a contaminant became concentrated in the manufacture process.

TCDD (2,3,7,8-tetrachlorodibenzo-para-dioxin) is an unavoidable, and unwanted, by-product of the manufacture of 2,4,5-T. However, in domestic preparations, it is present in much lower concentrations, 0.05 ppm (parts per million) as opposed to peaks of 50 ppm in stock shipped to Vietnam. Therefore dioxin contamination of Agent Orange was up to 1,000 times higher than in domestic herbicides. TCDD is believed to be the most toxic of the dioxins, a family of chemicals that has been described as, "the most toxic substances known to humans".^{1,2}

So the legacy of the use of Agent Orange is more profound than just the damage to the ecosystem. And it is one that has had consequences far beyond the forests of South-East Asia.

Indeed, it has followed the American personnel home. Despite much conjecture from chemical companies, an independent scientific review has concluded that there is a significant link between exposure to Agent Orange and serious illness – including various cancers, serious skin disorders (chloracne) and liver disorders.³

But while these cases have received great attention, it should be remembered that rarely did Americans serve in Vietnam for more than a year. For those whose homes were repeatedly dosed with poison, there was no escape. And some estimates now put the figure of children born in Vietnam with dioxin related deformities since the 1960s as up to 500,000.

Perhaps the most gruesome legacy of the contaminated herbicide, though, is to be found in a locked room in Tu Du Obstetrical and Gynaecological Hospital in Saigon. Here the walls are lined with shelves filled with jars of formalin, containing aborted and full-term fetuses. They are just a sample of the horror that emerged from Vietnam – and the hospital has for a long time now been unable to afford the bottles and formalin to preserve more specimens. They

Perhaps the most gruesome legacy of Agent Orange is to be found in a locked room in Tu Du Obstetrical and Gynaecological Hospital in Saigon. Here the walls are lined with jars containing aborted and full term fetuses

feature double and triple conjoined bodies, faces covered in cancerous growths and other terrible deformities.⁴

So it would seem that when the veterans of the war in Vietnam started to succumb to a wide range of illness, the companies responsible for the contamination would offer compensation. However, companies such as Monsanto and Dow Chemicals were involved in a lengthy campaign of belittling scientific evidence proving the toxicity of dioxins. A class action suit was brought against seven companies involved (Monsanto, Dow Chemicals, Uniroyal, Hercules, Diamond Shamrock, Thompson Chemical and TH Agriculture). This was settled out of court in May 1984 for victims and families exposed to herbicides for \$180 million, but the companies continued to deny Agent Orange was responsible for the health



NIC DUNLOPP/PIANOS PICTURES

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complaints.⁵

The foundation for the chemical industry's defence comes from the fact that there are differences in the way that species react – and that there are obvious obstacles preventing experimentation on humans. Of the few studies on exposure of dioxins to humans, some failed to show any increased risk of cancer. Principal amongst these were two Monsanto-sponsored studies of Monsanto workers accidentally exposed to dioxin.⁶

That is why the veterans had to settle for little more than 'nuisance value' compensation. By the time further evidence emerged of the carcinogenicity of dioxins, it was too late for the veterans as the courts had closed their doors on further settlements.⁷

However, Dr Cate Jenkins, a chemist with the US Environmental Protection Agency (EPA), wrote in 1990 that there was evidence that the Monsanto studies had been undertaken fraudulently. She called for a scientific investigation – but was ignored and the EPA embarked upon a criminal investigation of Monsanto. The chemical giant lobbied hard: the investigation lasted over two years, and ended up being 'spun' onto the whistleblower, Dr Jenkins. While the criminal investigation was quietly dropped, the campaign of harassment against Dr Jenkins was only stopped by the Secretary of Labor.

It seems that despite the best efforts of Monsanto, the reality of the risks associated with dioxin are emerging. Thus recent EPA reports state that there is convincing human evidence of dioxin's carcinogenicity. The World Health Organization has recently slashed its recommended safe limit for dioxin intake by 60-90 per cent. This will mean that many con-

sumers will already have intakes well in excess of the new limits. A panel of experts noted that "Subtle effects might already be occurring in the general population at current background levels . . . every effort should be made to reduce exposure to the lower end of this range."⁸ The question is whether Monsanto deliberately manipulated its studies to reduce its liability to Vietnam veterans?⁹

A great many lives were ruined by the senseless conflict in Vietnam. That a multinational company, now trying to sell itself as the saviour of a starving world, should have profited out of this enduring misery is a sad indictment of the state we are in. That Monsanto still continues to shirk its responsibility to the veterans of the conflict, both American and Vietnamese is disgraceful.

Hugh Warwick is a freelance journalist and editor of *Splice*, the magazine of the Genetics Forum.

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Bovine Growth Hormones

by Paul Kingsnorth

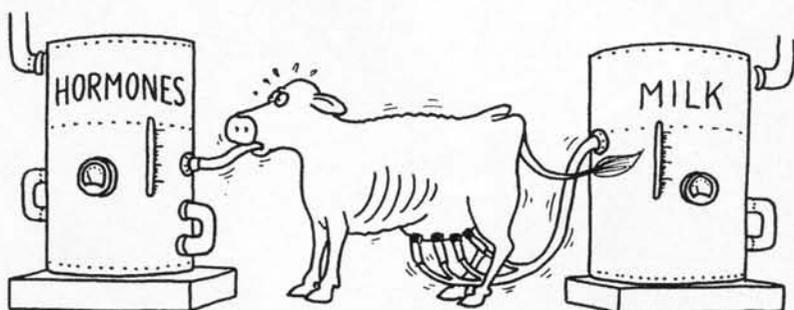
The classic Monsanto combination of bad science, misleading claims, the silencing and rubbishing of opponents and the hushing-up of damning information, is abundantly evident in the case of the corporation's first commercially-available genetically-modified product: bovine growth hormone, or Bovine Somatotropin as it is known in the US.

Recombinant Bovine Growth Hormone (rBGH – also known as Bovine Somatotropin, or BST) is a genetic-ally engineered copy of a naturally-occurring hormone produced by cows. The purpose of rBGH is to enable cows to produce more milk than they naturally would. It works by altering gene expression of glucose transporters in the cow's mammary gland, skeletal muscle and omental fat. The gene facilitates the repartitioning of glucose to the mammary gland, which in turn produces more milk.

Cows injected with a daily dose of Monsanto's rBGH – marketed under the brand name Posilac – are generally expected to increase their milk yield by between 10 and 20 per cent. However, the problems and side-effects associated with rBGH are legion. Such are its actual and potential dangers that it is banned in Canada, the European Union and a number of other countries, despite the best efforts of Monsanto to prise open those markets. However, rBGH has been in use in other countries – most notably the USA – for some years. And it is from there that the bad news has been emerging.

Who Benefits?

The US Food and Drug Administration (FDA) declared rBGH officially "safe" in 1993, and Monsanto began selling Posilac to dairy farmers in February of the next year.¹ In the USA there are two obvious benefits of its widespread use: an estimated annual income for Monsanto of between \$300 and \$500 million, and an estimated 12 per cent increase in the nation's supply of milk.² Yet since the 1950s, America's dairies have consistently produced more milk than the nation can consume, the surplus being bought up every year by the Federal Government to prevent the price from plummeting. In the period 1980-85, the US government spent an average of \$2.1 billion every year buying surplus milk.³ No-one in the US needs the extra milk that Posilac can provide.



What's more, the animals treated with the hormone are subjected to tremendous stress as a result. Normally, for about 12 weeks after a cow calves, she produces milk at the expense of her health. The cow loses weight, is infertile and is more susceptible to diseases. Eventually, milk output diminishes and

the cow's body begins to recover. By injecting rBGH, a farmer can postpone that recovery for another eight to 12 weeks, substantially increasing the cow's milk output, but also rendering her more susceptible to disease.⁴

For a comprehensive list of the potential ill-effects of rBGH on cows, one need look no further than the warning label which the US Food and Drugs Administration (FDA) requires Monsanto to include

in every shipment of Posilac. The label outlines 21 health problems associated with the use of Posilac, including cystic ovaries, uterine disorders, decrease in gestation length and birth weight of calves, increased twinning rates and retained placenta.⁵

Potentially the most serious problem, however, is the increased risk of mastitis, or inflammation of the udder. A cow with mastitis produces milk with pus in it. Dairies will not accept milk which has an abnormally high somatic cell count (i.e., a high proportion of pus), and mastitis can thus be a serious source of lost revenue to the dairy farmer. Many farmers seek to treat the problem with antibiotics, but antibiotic

In 1994, the company's researchers claimed that "there is no evidence that hormonal content of milk from rBST treated cows is in any way different from cows not so treated." Yet, in 1993, Monsanto had admitted that "the IGF-1 level [in milk] went up substantially [about five times as much]" when rBGH was used.

residues in milk are suspected of causing health problems in humans who drink it, as well as contributing to the development of antibiotic resistance amongst bacteria.⁶

Concerned by the potential effects of rBGH, the US National Farmers Union (NFU) set up an rBGH telephone hotline in 1994, for farmers to report any problems associated with Posilac. Hundreds of farmers called the hotline. John Shumway, a New York State dairy farmer, told the hotline that he had had to replace 50 cows as a result of adverse reactions to Posilac. His estimated losses from the use of rBGH came to about \$100,000.⁷ Melvin Van Heel, a Minnesota farmer, experienced mastitis, abortions and open sores in his rBGH-treated cows. "I got more milk, but I didn't think it was worth it," he said. Michigan farmer Steve Schulte reported that his vet's bill fell dramatically after he stopped using rBGH. Florida Farmer Al Cole lost eight cows and had to cull an additional 15. Three others later gave birth to deformed calves.⁸

The NFU has a record of many more such complaints. Such is the dissatisfaction, that farmers all over the States are giving up using the hormone. In 1995, the NFU reported that "in some areas of the country, farmers are reporting that 60 to 90 per cent or more of the farms that have tried BGH have discontinued its use."⁹

It should thus be quite clear that it is only Monsanto that benefits from the sale of this perfectly useless product.

The Human Health Risks

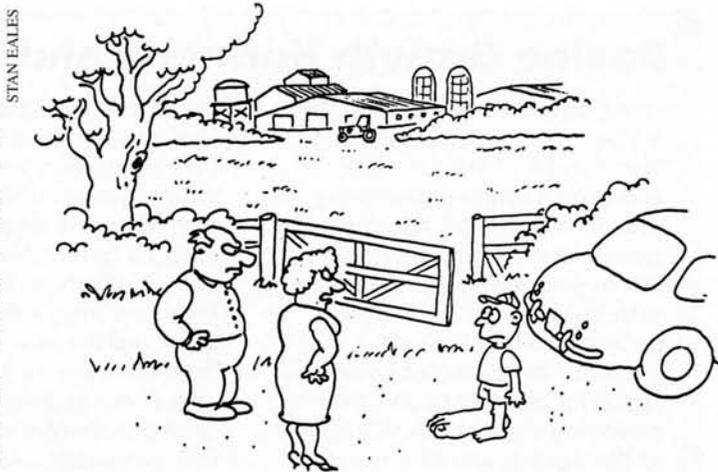
Even leaving aside the health problems caused by antibiotic residues in milk – a side-effect of an increase in mastitis – the effects of rBGH on human health could be devastating. Most worrying are scientific studies linking rBGH to cancer.

When a cow is injected with rBGH, its presence in the blood stimulates production of another hormone, called Insulin-Like Growth Factor 1 (IGF-1), a naturally-occurring hormone-protein in both cows and humans. The use of rBGH increases the levels of IGF-1 in the cow's milk. Because IGF-1 is active in humans – causing cells to divide – some scientists believe that ingesting high levels of it in rBGH-treated milk could lead to uncontrolled cell division and growth in humans – in other words, cancer.¹⁰

Monsanto have naturally been keen to deny that IGF-1 levels in rBGH treated milk could be high enough to pose a threat. Writing in *The Lancet* in 1994, the company's researchers claimed that "there is no evidence that hormonal content of milk from rBST treated cows is in any way different from cows not so treated."¹¹ Yet in a later issue of the same journal, a British researcher pointed out that Monsanto had admitted, in 1993, that "the IGF-1 level [in milk] went up substantially [about five times as much.]" when rBGH was used.¹²

A number of studies have since warned of the effects of excess IGF-1. Two British researchers reported in 1994 that IGF-1 induced cell division in human cells.¹³ The next year, a separate study discovered that IGF-1 promoted the growth of cancer tumours in laboratory animals, by preventing natural cell death.¹⁴

In 1996, Professor Samuel Epstein, from the University of Illinois, Chicago, conducted a detailed study of the potential effects of increased levels of IGF-1 on humans. Epstein's



Trust you to go and stand in some growth hormone

resulting, peer-reviewed, paper found that IGF-1 from rBGH treated cows may lead to breast and colon cancer in human milk-drinkers. Epstein's fiery conclusion was that "with the complicity of the FDA, the entire nation is currently being subjected to an experiment involving large-scale adulteration of an age-old dietary staple by a poorly characterized and unlabelled biotechnology product . . . it poses major potential health risks for the entire US population."¹⁵

Two studies published earlier this year seem to back Professor Epstein's findings. A study of American women published in *The Lancet* in May found a seven-fold increased risk of breast cancer among pre-menopausal women with high levels of IGF-1 in their blood.¹⁶ A separate study published in *Science* in January found a four-fold increase in risk of prostate cancer among men with high levels of IGF-1 in their blood.¹⁷ [See boxes 1 and 2]

Hormone Economics

Quite apart from the health risks associated with rBGH, its increased use across the world would contribute to the decline of the small farm and the monopolization of agriculture by multinational corporations.

Basic economics tells us that an increase in the supply of a product leads to a fall in its price. The US government has only avoided an overall crash in milk prices in recent decades by buying up surplus milk. If widespread use of rBGH in any country leads to a significant increase in milk supply, and if the government is unable or unwilling to buy up any surplus, the resulting dramatic fall in prices will drive small farmers to the wall and ensure, as many other aspects of the 'Green revolution' have done, that big, intensive, high-technology farms are the ones that survive in an increasingly competitive marketplace.

Gagging the Critics

Monsanto's response to those who dare to criticize rBGH has been the usual intimidation, lawsuits, manipulation of facts and expensive propaganda. In this they have been aided and abetted, in the US, by the FDA, which has been referred to by critics as 'Monsanto's Washington Office' [see Ferrara in this issue].

"With the complicity of the FDA, the entire nation is currently being subjected to an experiment involving large-scale adulteration of an age-old dietary staple by a poorly characterized and unlabelled biotechnology product . . . it poses major potential health risks for the entire US population." – Professor Sam Epstein

Bovine Growth Hormone and Prostate Cancer

As reported in a January 23, 1998 article in *Science*, men with high blood-levels of the naturally occurring hormone, insulin-like growth factor 1 (IGF-1), are over four times more likely to develop full-blown prostate cancer than are men with lower levels. The report emphasized that high IGF-1 blood-levels are the strongest known risk factor for prostate cancer, even exceeding that for a family history of the disease, and that reducing IGF-1 levels is likely to prevent this cancer. It was further noted that IGF-1 markedly stimulates the division and proliferation of normal and cancerous prostate cells and that it blocks the programmed self-destruction of cancer cells, thus enhancing the growth and invasiveness of latent prostate cancer. These findings are highly relevant to any efforts to prevent prostate cancer, whose rates have escalated by 180 per cent since 1950, and which is now the commonest cancer in non-smoking men, with an estimated 185,000 new cases and 39,000 deaths in 1990.

While warning that increasing IGF-1 blood-levels, due to treating

the elderly with growth hormone (GH) to slow ageing, may increase risks of prostate cancer, the 1998 report appears unaware of the fact that the entire US population is now exposed to high levels of IGF-1 in dairy products. In February 1995 the Food and Drug Administration (FDA) approved the sale of unlabelled milk from cows injected with Monsanto's genetically engineered bovine growth hormone, rBGH, to increase milk production. As detailed in a January 1996 report in the *International Journal of Health Services*, rBGH milk differs from natural milk chemically, nutritionally, pharmacologically and immunologically, besides being contaminated with pus and antibiotics resulting from mastitis induced by the biotech hormone. Most critically, rBGH milk is supercharged with high levels of abnormally potent IGF-1, up to ten times the levels in natural milk and over ten times more potent. IGF-1 resists pasteurization and digestion by stomach enzymes and is well absorbed across the intestinal wall. Still-unpublished Monsanto tests, disclosed by the FDA in summary

form in 1990, showed that statistically significant growth-stimulating effects were induced in organs of adult rats by feeding IGF-1 at the lowest dose levels for only two weeks. Drinking rBGH milk would thus be expected to increase blood IGF-1 levels and to increase risks of developing prostate cancer and promoting its invasiveness. Apart from prostate cancer, multiple lines of evidence have also incriminated the role of IGF-1 as risk factors for breast, colon and childhood cancers.

Faced with such evidence, the FDA should immediately withdraw its approval of rBGH milk, the sale of which benefits only Monsanto while posing major public health risks for the entire US population. Failing early FDA action, consumers should demand explicit labelling and only buy rBGH-free milk.

Prepared by The Cancer Prevention Coalition.

Contact: Samuel S. Epstein, MD, Professor of Environmental Medicine at the University of Illinois School of Public Health, Chicago, and Chairman of the Cancer Prevention Coalition.

The first response by the Monsanto/FDA axis to concerns about rBGH in milk (US surveys have consistently shown that more than 70 per cent of respondents do not want to drink it) was to turn to the law. In 1994, the FDA warned retailers not to label milk that was free of rBGH – thus effectively removing from consumers the right to choose what they drank. The FDA's main justification for this was that, in their words, there was "virtually" no difference between rBGH-treated milk and ordinary milk. Labelling would thus unfairly discriminate against companies like Monsanto.¹⁸



STAN EALES

"I'm going to put you on a course of hormones – I recommend drinking three pints of milk a day".

The FDA official responsible for developing this labelling policy was one Michael R. Taylor. Before moving to the FDA, he was a partner in the law firm that represented Monsanto as it applied for FDA approval for Posilac. He has since moved back to work for Monsanto.¹⁹

As a result of this policy, the FDA threatened retailers with legal action if they dared to label their milk 'BGH-free'. Monsanto itself filed two lawsuits against milk processors who labelled their milk, and posted warnings to others not to do so.²⁰ The American ice-cream makers Ben and Jerry, who have always refused to use BGH-treated milk, recently filed a lawsuit against the state of Illinois, which ruled that they cannot label their products 'BGH-free'.²¹

Monsanto and its allies have even used the US Constitution to prevent consumers knowing what is in the milk they drink. In April 1994, the State of Vermont passed a law requiring that products containing rBGH be clearly labelled. A coalition of dairy industries and Monsanto immediately filed a suit asserting that the new law was "unconstitutional", on the grounds that it violated the First Amendment, which asserts a constitutional right not to be forced to disclose information. Monsanto won.²²

Faced with growing consumer outrage at these tactics, Monsanto has now reluctantly abandoned its lawsuits against retailers, and labelling milk 'BGH-free' is now permitted in the US. But the FDA still refuses to require producers to so label their milk, and even now, many people have no idea what's really in their milk.

In other areas of society, Monsanto has also been accused of

Bovine Growth Hormone and Breast Cancer

As reported in a May 9 article in *The Lancet*, women with a relatively small increase in blood-levels of the naturally occurring growth hormone, Insulin-like Growth Factor 1 (IGF-1), are up to seven times more likely to develop premenopausal breast cancer than women with lower levels. Based on those results, the report concluded that the risks of elevated IGF-1 blood-levels are among the leading known risk factors for breast cancer, and are exceeded only by a strong family history of the disease or unusual mammographic abnormalities. Apart from breast cancer, an accompanying editorial warned that elevated IGF-1 levels

are also associated with greater-than-any-known risk factors for other major cancers, particularly colon and prostate.

This latest evidence is not unexpected. Higher rates of breast, besides colon, cancer have been reported in patients with gigantism (acromegaly) who have high IGF-1 blood-levels. Other studies have also shown that administration of IGF-1 to elderly female primates causes marked breast enlargement and proliferation of breast tissue, that IGF-1 is a potent stimulator of human breast cells in tissue culture, that it blocks the programmed self-destruction of breast cancer cells, and enhances their growth and

invasiveness.

Again, these various reports appear surprisingly unaware of the fact that the entire US population is now exposed to high levels of IGF-1 in dairy products.

For these reasons too, the FDA should withdraw its approval of rBGH milk. A Congressional investigation of the FDA's abdication of responsibility is well overdue.

*Prepared by The Cancer Prevention Coalition.
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underhand methods as it tries to cover up the truth about rBGH. The now-notorious 'Fox TV Episode' [see Montague in this issue], where the corporation was accused of forcing a documentary about rBGH off the air, is but one obvious example. In their book *Toxic Sludge Is Good For You*, John C. Stauber and Sheldon Rampton recount one episode in 1990 where the corporation's PR firm sent a 'mole' to a meeting of anti-rBGH campaigners. The 'mole', posing as a concerned housewife, was in fact an employee of Monsanto's PR firm Burson-Marsteller, sent to discover in advance what the opposition's tactics would be.²³

Down at the grassroots, American farmers have reported many instances of Monsanto officials playing down, disguising or trying to cover up the adverse effects of rBGH, including telling farmers that their mastitis problems were unique, or that health problems that arose after using Posilac were the fault of the farmer, rather than the drug.

Monsanto's conduct in this, as in so many other matters

relating to rBGH, has been less than honest. Is it surprising then, that their current claims to welcome an 'open debate' about biotechnology are so often taken with several lorryloads, rather than the proverbial 'pinch' of salt?

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A summary of all the available evidence of the veterinary and public health hazards of rBGH milk from 1985-1998 contained in just under 100 papers published in peer-reviewed journals has been drawn up by Professor Samuel S. Epstein, Professor of Environmental and Occupational Medicine, University of Illinois, School of Public Health, Chicago, and Chairman of the Cancer Prevention Coalition. This summary is being published as an annexe to Professor Epstein's book *The Politics of Cancer Revisited*, 1998, East Ridge Press, Fremont Center, New York, NY 12736, USA. Telephone +1 (914) 887 4589; Fax: +1 (914) 887 6506.

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Roundup: The World's Biggest-Selling Herbicide

by Joseph Mendelson

Though one of Monsanto's main arguments for biotechnology is that it reduces the need for herbicides, its main emphasis has been on developing crops that are resistant to Roundup, and which can only further increase the sales of this herbicide.

This past spring Monsanto launched a £1 million advertising campaign in the United Kingdom to tout the benefits of genetically engineered foods. Currently Monsanto and its subsidiaries hold the patents on half of the 36 genetically engineered whole foods being marketed in the United States. A centrepiece of the advertising campaign is the multinational's claim that genetically engineered foods will significantly reduce the use of pesticides and herbicides.¹ As the company proclaims, "We believe food should be grown with less pesticides and herbicides." Unmentioned in its advertising blitz is that Monsanto is a major producer of agricultural chemicals, and is using genetic engineering to dramatically increase, not decrease, the use of herbicides on crops.

Monsanto has built much of its corporate empire upon the back of one chemical – glyphosate. Introduced almost 25 years ago, glyphosate, marketed mainly as the herbicide Roundup, is Monsanto's key agri-chemical product. Glyphosate product sales are worth \$1,200 million a year.² In the United States, glyphosate's estimated annual use ranges from between 19 and 26 million pounds.³ In 1994, it was used on almost 800,000 acres in the UK.⁴ Registered in the United States since 1974, glyphosate is a broad-spectrum herbicide used to kill crop weeds. It is used on a wide variety of annual, biennial and perennial grasses, sedges, broad-leafed weeds, woody shrubs and commercial crops and is the eighth most commonly used herbicide in US agriculture and the second most commonly used herbicide in non-agricultural situations.⁵ This Monsanto flagship product continues to generate a remarkable annual

growth of about 20 per cent year after year. Its continued growth has led one industry analyst to state, "Roundup rules the world."⁶

There is, however, a natural barrier to continued significant increases in the use of Roundup. Obviously the use of too much of the herbicide on any crop will not only destroy unwanted weeds but also the crop itself. Monsanto's solution to this dilemma has been to create crops resistant to the herbicide. Farmers using the new resistant crops can now use far greater amounts of Roundup without fear of destroying the plants. It's a double financial win for Monsanto in that they can now sell the herbicide-resistant plants and ever more amounts

of Roundup. While the increased sales of Roundup are a major boost for Monsanto, increased use of the chemical poses numerous health and ecological risks.

Despite advertising claims that Roundup is safe for humans, pets and wildlife, and is benign to the environment, it is known to cause a variety of often serious health problems (see Box). An extensive scientific review by the US-based National Coalition for

Monsanto has claimed that "We believe food should be grown with less pesticides and herbicides," but unmentioned in its advertising blitz is that Monsanto is a major producer of agricultural chemicals, and is using genetic engineering to dramatically increase, not decrease, the use of herbicides on crops.

Alternatives to Pesticides (NCAP) found a variety of human health and environmental problems associated with the herbicide.⁷ In particular, oral and skin testing on glyphosate placed the herbicide in Toxic Category III (Caution), and other testing suggested that glyphosate can cause toxic reactions on mammals (which include convulsions and even cessation of breathing).⁸

Severe toxicity problems associated with Roundup, however, are not thought to stem primarily from the active ingredient



Roundup: the world's biggest-selling herbicide

Monsanto's Roundup: a recipe for soil erosion and an end to diversity

The most widespread application of genetic engineering in agriculture is herbicide-resistance, ie the breeding of crops to be resistant to herbicides. Monsanto's Roundup-Ready Soya and Cotton are examples of this application. When introduced to Third World farming systems, this will lead to increased use of agri-chemicals, thus increasing environmental problems. It will also destroy the biodiversity that is the sustenance and livelihood base of rural women. What are weeds for Monsanto are food, fodder and medicine for Third World women.

In Indian agriculture women use 150 different species of plants for vegetables, fodder and health-care. In West Bengal, 124 "weed" species collected from rice fields have economic importance for farmers. In the Expana region of Veracruz, Mexico, peasants utilize about 435 wild plant and animal species, of which 229 are eaten.

The spread of Roundup-Ready crops would destroy this diversity and the value it provides to farmers. It would also undermine the soil conservation functions of cover crops and mixed crops, thus leading to accelerated soil erosion. Contrary to Monsanto myths, Roundup-Ready crops are a recipe for soil erosion, not a method for soil conservation.



Vandana Shiva

glyphosate, but rather from unlabelled "inert" ingredients designed to make Roundup easier to use and more efficient. Roundup consists of 99.04 per cent "inert" ingredients, many of which have been identified, including polyethoxylated tallowamine surfactant (known as POEA), related organic acids of glyphosate, isopropylamine, and water. Researchers have found that the acute lethal dose of POEA is less than one-third that of glyphosate alone.⁹ Studies by Japanese researchers on poisoning victims discovered that this "inert" ingredient caused acute toxicity in patients. Symptoms of acute POEA poisoning included gastrointestinal pain, vomiting, excess fluid in the lungs, pneumonia, clouding of consciousness and destruction of red blood cells.¹⁰ Another Roundup "inert", isopropylamine, is extremely destructive to mucous membrane tissue and the upper respiratory tract.¹¹ Ultimately, the Japanese researchers calculated that ingestion of slightly more than 200 ml (three quarters of a cup) of Roundup would be fatal.¹² Subsequent laboratory studies have also shown that glyphosate-containing products cause genetic damage and reproductive effects in a wide variety of organisms.¹³

NCAP's analysis also revealed that Roundup can cause a number of negative environmental impacts. For instance, while it is claimed that Roundup is inactivated rapidly in soil, it is more accurate to say it is usually absorbed into soil components. Thus, glyphosate *remains* active in soils, and residues of glyphosate have been found in lettuce, carrots and barley planted one year after glyphosate treatment.¹⁴ The chemical has detrimental environmental effects. Glyphosate-containing products have been found to kill beneficial insects such as parasitoid wasps, lacewings and ladybugs.¹⁵ Roundup has also been shown to affect earthworms and beneficial fungi, to inhibit nitrogen fixation, and to increase the susceptibility of crop plants to disease.¹⁶

Despite Roundup's myriad risks, Monsanto's ads for the product continue to represent the herbicide as environmentally benign or even beneficial. Some government officials have begun to address this gross misrepresentation. In 1991, for example, the New York State Attorney General challenged Monsanto's use of language in its Roundup advertisements, in particular the terms "biodegradable" and "environmental friendly". The state recently got Monsanto to agree to stop using the language and to pay \$50,000 towards pursuit of the legal effort.

Monsanto's Herbicide-Resistant Crops

Minor legal setbacks have not stopped Monsanto's campaign to market its herbicide-resistant plants. Monsanto has already produced and marketed Roundup-Ready soybeans, canola and corn, and has plans to introduce Roundup-Ready sugar beets, wheat and potatoes. These crops pose new and significant ecological and human health concerns beyond those reported by NCAP. The products also allow the multinational to exert further control over the world's farmers.

As noted, the Roundup-Ready crops will allow farmers to use Roundup on a much wider and less discriminatory manner. Whereas fields were once sprayed with Roundup in pre-plant weed emergence situations, crop producers will now be able to apply Roundup to the genetically engineered crops throughout the growing season. Not only does this create obvious water, air and food contamination problems, it also presents herbicide-resistance problems. Over the last several years herbicide-resistance in weeds has become more common. As noted by one researcher, "With Roundup-Ready crops, there is the possibility in the future that the farmer is going to be planting Roundup-Ready soybeans one year and Roundup-Ready corn the next. Spraying nothing but Roundup in a field for numer-

KATE MOUNT

Some Health Consequences of Roundup Poisoning

Symptoms of acute poisoning in humans following ingestion of Roundup include gastrointestinal pain, vomiting, swelling of the lungs, pneumonia, clouding of consciousness, and destruction of red blood cells. Eye and skin irritation has been reported by workers mixing, loading and applying glyphosate. The EPA's Pesticide Incident Monitoring System had 109 reports of health effects associated with exposure to glyphosate between 1966 and October, 1980 – well before Roundup came to be widely used. These included eye or skin irritation, nausea, dizziness, headaches, diarrhoea, blurred vision, fever and weakness.¹

A series of suicides and attempted suicides in Japan during the 1980s using Roundup herbicide allowed scientists to calculate a lethal dose of six ounces. The herbicide is 100 times more toxic to fish than to people, toxic to earthworms, soil bacteria and beneficial fungi, and scientists have measured a number of direct physiological effects of Roundup in fish and other wildlife, in addition to secondary effects attributable to defoliation of forests. Breakdown of glyphosate into N-nitrosoglyphosate and other related compounds has heightened concerns about the possible carcinogenicity

of Roundup products.²

A 1993 study at the University of California at Berkeley's School of Public Health found that glyphosate was the most common cause of pesticide-related illness among landscape maintenance workers in California, and the number three cause among agricultural workers.³ A 1996 review of the scientific literature by members of the Vermont Citizens' Forest Roundtable – a group which successfully lobbied the Vermont Legislature for a statewide ban on the use of herbicides in forestry – revealed updated evidence of lung damage, heart palpitations, nausea, reproductive problems, chromosome aberrations and numerous other effects of exposure to Roundup herbicide.⁴

Brian Tokar

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ous years is a resistance prone pattern."¹⁷ Weed resistance to Roundup is yet a further financial boon for Monsanto. It means that farmers will need to continue increasing their purchase and use of the chemical as prior doses become ineffective.

Yet another devastating impact of these herbicide-tolerant crops could be the genetic flow of the "Roundup-Ready" trait into weedy relative plants. The planned 2002 introduction of Roundup-Ready wheat has run into resistance from many farmers who feel that the wheat will cross with grassy weeds like goat grass and render them herbicide-tolerant. Farmers are also concerned that they will not be able to control volunteer wheat that grows from herbicide-resistant seed.¹⁸ It is also unclear how the widespread introduction of these crops will impact beneficial species. For example, French researchers have discovered that some varieties of transgenic canola can harm bees, a farm's most effective pollinator, by destroying their natural ability to recognize flower smells.¹⁹

Finally, the introduction of these products has allowed Monsanto to exert more direct control over farmers. When a farmer buys a bag of Roundup-Ready seed he pays a special "technology fee" and signs a contract he will not use any of the harvested crop as seed for the next year. The licensing fees for Roundup-Ready cotton varieties popular in Texas were \$5 an acre, \$8 per acre for varieties prevalent in the Cotton belt, and \$40 per acre for "stacked" varieties (Roundup-Ready-resistant and containing transgenic *Bacillus thuringiensis*).²⁰

Roundup-Resistant Cotton

Even Monsanto's aggressive public relations campaign has not been enough to hide the numerous failures surrounding genetically engineered crops. The most glaring example was Monsanto's first year of Roundup-Ready cotton which ran into

disastrous performance problems. In July of 1997 farmers in the Mississippi Delta began to report that Roundup-Ready cotton was not growing properly and that the bolls on the cotton were dropping prematurely or were malformed.²¹ By October 1997 at least 19 farmers in Coahoma County, Mississippi had filed complaints with the state Department of Agriculture.²² "The bottom line is that virtually everybody who planted this stuff has had a problem," said Steve Cox, an attorney representing some of the affected farmers. "The problems that we

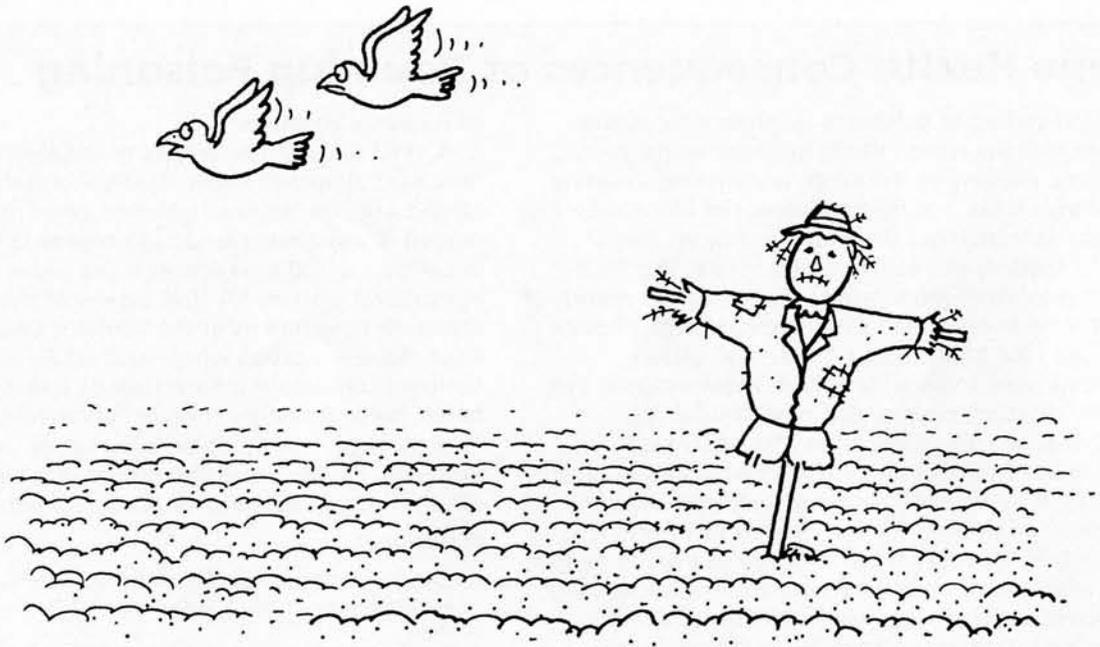
are seeing range from hawk-billed bolls to total fruit loss."²³ Complaints were also heard from farmers in Arkansas, Louisiana, Tennessee and Texas.²⁴

Monsanto has tried to rationalize the crop's failure by blaming the year's cold, wet spring and dry, hot summer as well as potential farmer error

in applying Roundup.²⁵ As one farmer declared, "They blamed us and they blamed God for the weather. But they don't blame themselves. Monsanto has 10,000 employees, but not one of them ever called me to discuss my plight."²⁶ Some US government experts claim that Monsanto hurried the new seed varieties to market without the customary three-year testing period. One research manager for the US Department of Agriculture attempting to test the product sought one pound of seed (enough for a tenth of an acre) but was told by the companies they could not spare it.²⁷

The failure of Monsanto's genetically engineered cotton embroiled the company in legal difficulties. Initially, Monsanto privately settled a dispute with a group of 55 farmers for \$5 million.²⁸ But on June 12, 1998, the Mississippi Seed Arbitration Council of the Mississippi Department of Agriculture and Commerce, ruled that Monsanto's Roundup-Ready cotton "failed to produce or perform as represented by the labels attached to the seeds."²⁹ Instead they recommended a payment

French researchers have discovered that some varieties of transgenic canola can harm bees, a farm's most effective pollinator, by destroying their natural ability to recognize flower smells.



“Who needs a scarecrow when the pesticides are frightening enough?”

to farmers (not involved in the first settlement) of more than \$1.9 million by Monsanto and its two subsidiaries, Delta and Pine Land Co. and Paymaster Technology Co.³⁰ The decision was non-binding and Monsanto has refused to pay the damages.³¹ The company plans to file a motion asking the Council to reconsider.³² Similar claims were filed by farmers in Arkansas with the Arkansas Seed Arbitration Council.³³

Subsequent to the first year failure, Monsanto had to announce in February that it was withdrawing five varieties of Roundup-Ready cotton from the market because of substandard seed quality.³⁴ However, the company is continuing to market its genetically altered cotton. In 1998 Monsanto licensees sold 800,000 acres worth of Roundup-Ready cotton.³⁵

Roundup-Resistant Soybean

Monsanto's herbicide-resistant crops have met stiff opposition from NGOs. In the autumn of 1996 US grain producers began exporting Roundup-Ready soybeans to Europe and other nations. The imports into Europe were approved by the European Commission even though labelling provisions covering genetically engineered foods were not finalized at the EU level. This set off protests and blockades by Greenpeace, Friends of the Earth and a number of other NGOs in European ports and galvanized a consumer demand for the mandatory labelling of genetically engineered soy. To date the controversy continues with current EU labelling being required only in instances where the genetically engineered soy is detected in a product.³⁶ Despite such contentious battles, in the United States Roundup-Ready soybeans were available from 85 seed companies in the spring of 1998.³⁷ Worldwide it is expected that 30 million acres were planted with Roundup-Ready soybeans.³⁸ Market reports state that soybeans are being grown on 25 million acres, nearly triple last year's 9 million acres and totalling one-third of the historical soybean base of about 70 million acres.³⁹

Roundup-Resistant Beet

NGOs have also been fighting the introduction of herbicide-resistant beets in Britain. In December 1997, Britain's Nation-

al Institute of Agricultural Botany announced Roundup-Ready beets could be introduced as early as 2001. The next regulatory hurdle is the Ministry of Agriculture's approval for marketing. As the market approval hangs in the balance, current experiments in Ireland on Roundup-Ready beets have been steadfastly opposed by the organization Genetic Concern. The activists have challenged the Irish EPA permits, issued on May 1, 1997, allowing Monsanto to conduct field trials of the beets in Co. Carlow.⁴⁰ The legal challenge has highlighted the Irish government's failure to observe correct procedure when granting the field test permission and a failure to satisfy an "effectively zero" risk of adverse effect on human health and environment from the deliberate release. The lawsuit focusses on the application of a 1990 European Council Directive on deliberate release of GMOs, the Irish Environmental Protection Agency Act of 1993, and the 1994 Genetically Modified Regulation. Currently, a decision is pending before the Irish High Court.

Roundup-Resistant Canola

Herbicide-resistant crops have run foul of government regulations in Canada. Monsanto introduced Roundup-Ready Canola into one-fifth of the country's total crop in 1997.⁴¹ Sown in New Zealand for Canadian seed company Zenica, the seed is expected to be planted on 2 million acres, up from the 600,000 acres last year.⁴² However, in the spring of 1997, two varieties of Roundup-Ready canola seeds had to be recalled by Monsanto Canada (its licensee was the seed company Limagrain) after quality assurance tests revealed the seed contained genetic material that had not received full government clearance.⁴³ The recall amounted to 60,000 bags of seed sold in Manitoba, Saskatchewan and Alberta. Two Alberta farmers who had planted the crop ploughed it under and received undisclosed compensation from Monsanto Canada.⁴⁴

The incident should have served as a reminder to the Canadian government that precaution, as a minimum, should prevail in the regulation of genetically engineered crops. Yet, despite Monsanto's potentially devastating error, the Western Canada Canola/Rapeseed Recommending Committee approved the registration of ten new canola varieties this past

February. Five of these are Roundup-Ready varieties, including two varieties grown in Argentina.⁴⁵

Roundup-Resistant Corn?

1998 marks the first year of Roundup-Ready corn with the expectation of 750,000 US acres being planted.⁴⁶ Most of the seed was produced in South America, primarily in Argentina and Chile.⁴⁷ As with so many Roundup Ready crops, the corn introduction has initiated controversy within the EU and the industry itself. In October 1997 Pioneer Hy-Brid the United States' largest producer of seed corn said it would not add Roundup-Ready technology because Monsanto's proposed restrictions and charges outweigh the benefits for farmers.⁴⁸ That same month, French chemical giant Rhone-Poulenc filed a lawsuit against DeKalb Genetics and Monsanto concerning the rights to Roundup-Ready corn genes.⁴⁹ According to Rhone Poulenc, when it sold its Roundup-tolerant corn genes to DeKalb in 1994 to incorporate into corn strains it did not allow DeKalb to transfer or sell the genes to any other company. Rhone Poulenc alleged that such an illegal transfer did take place during licensing agreements between DeKalb and Monsanto, and that Roundup-Ready corn violates two patents.⁵⁰ The alleged misuse of its patent technology was uncovered during an examination of two Monsanto petitions to the USDA seeking to register the corn. The situation was further muddled

on May 11, 1998 when Monsanto announced an agreement to acquire DeKalb, a top hybrid seed corn company in the United States. The acquisition is under anti-trust scrutiny from the US Department of Justice.⁵¹

If those legal battles were not enough, farmers using Roundup-Ready corn are faced with an export dilemma. Roundup-Ready corn has not been fully approved for importation in the EU.⁵² This consumer-driven resistance has caused US Vice President Gore and USDA officials to stump for Monsanto, warning that about \$250 million in exports could be imperilled if genetically engineered maize is not approved by the EU.⁵³ France has moved to avoid the threat of a possible trade battle at the WTO by announcing it would clear the way for the corn's importation into Europe.⁵⁴

Even though faced with the outright failure of crops, virulent public opposition, health and environmental impacts and numerous unanswered scientific questions Monsanto is charging ahead with its profitable new crops. It will take the combined will of activists, the public and international policy makers to halt the spread of this dangerous new technology.

Joseph Mendelson, III, is the legal director for the International Center for Technology Assessment (CTA) (Washington, DC). He is serving as a lead attorney in a legal challenge to the US Food and Drug Administration's failure to require the labelling of genetically engineered foods.

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Terminator Technology

The Threat to World Food Security

by Ricarda A. Steinbrecher
and Pat Roy Mooney

Monsanto's latest flagship technology makes a nonsense of its claim that it seeks to feed the worlds hungry. On the contrary, it threatens to undermine the very basis of traditional agriculture – that of saving seeds from year to year. What's more, this "gene cocktail" will increase the risk that new toxins and allergens will make their way into the food chain.

In 1860, fully five years before Abbé Gregor Mendel published his obscure tome on the genetics of peas, launching so-called "modern" plant breeding, a certain Major Hallett, F.L.S., of Brighton was warning farmers and fellow seedsmen that any abuse of his "pedigree" trademark for cereals would be "severely dealt with".¹ But his seeds were not patentable and there was little he could do to keep farmers from buying his wheat varieties, sowing them, selecting the best seed for the next season, and breeding their own varieties uniquely adapted to local soils, slopes, and weather.

It was only in 1908 that George Shull came up with what Major Hallett really wanted – a biological weapon to keep farmers from saving and developing their own seeds. Called "hybridization", a wonderfully euphemistic term that led farmers to think that crossing two distant plant relatives could create a "hybrid vigour" that so improved yield as to make the resulting seed sterility – meaning it could not be replanted – financially worthwhile.² Today, almost every ear of corn grown from California to Kazakhstan is a hybrid controlled by any one of a handful of very large seed companies.

Exactly 90 years after Shull's revelation, one of the biggest and most powerful of those companies, Monsanto, is fighting for control of the most important seed monopoly technology

since the hybrid. But unlike 1860, this piece of life control can be patented. On March 3rd, the US Department of Agriculture (USDA) and a little-known cotton-seed enterprise called Delta and Pine Land Company, acquired US patent 5,723,765 – or

the Technology Protection System (TPS). Within days, the rest of the world knew TPS as Terminator Technology. Its declared goal is to promulgate plants that will produce self-terminating off-spring – suicide seeds. Terminator

Technology epitomizes what the genetic engineering of food crops is all about and gives an insight into the driving forces behind the corporate campaign to control and own life.

The Terminator rides to the rescue of long-suffering multinationals who have been unable to hold farmers back from their 12,000 year tradition of saving and breeding seeds. Farmers buy the seed once and do their own work thereafter. Patents and Pinkerton detectives have been employed to stop farmers from doing so. The Terminator though provides a built-in biological "patent", enforced by engineered genes. Small farming

communities of the Third World especially, rely upon their own plant breeding since neither corporate nor public breeders show much interest or aptitude in breeding for their often difficult environments. Old-fashioned hybrids and the Terminator Technology with its terminated seeds force farmers back to the

According to critics, the only advantage to hybrids lies in their profitability for companies.

"The centuries old practice of farmer-saved seed is really a gross disadvantage to Third World farmers"

– Dr. Harry B. Collins,
Delta and Pine Land Co.

market every season. Terminator also scuttles community conservation of agricultural biodiversity. There's nothing to conserve. It is the "neutron bomb" of agriculture.

Hybrid seeds

Following the rediscovery of Mendel's Laws in 1900, money-minded plant breeders pursued strategies that would force farmers back to the marketplace every season to spend their hard-earned money on seeds. Although the concept of hybrids evolved with George Shull in 1908, the first hybrid maize was not commercialized until 1924 by Henry A. Wallace. Two years later, Wallace formed Pioneer Hi-Bred the world's largest seed company and still largely controlled by the founding family. Wallace went on to become US Secretary of Agriculture and, finally (in 1941), Vice-President of the United States. Wallace's championship of hybrids made it an immutable, if unscientific, Act of Faith to argue that "hybrid vigour" made maize the "bin-busting" bonanza it is today. More recently, however, respected scientific and economic critics like Jean-Pierre Berlan of France's INRA and Richard C. Lewontin of Harvard, as well as Jack R Kloppenburg Jr. of the University of Wisconsin, have challenged this assumption insisting that conventional maize-breeding programmes would always out-perform hybrids given the same research investment. According to these critics, the only advantage to hybrids lies in their profitability for companies.

How hybrids work

Hybrid seeds are the first generation (F1) progeny of two distinct and distant parental lines of the same species. The seed will incorporate and express the desired genetic traits of each parent for just one generation. Seeds taken from an F1 hybrid may either be sterile or, more commonly, fail to "breed true", not express the desirable genetic qualities found in F1. Farmers in industrialized agricultural systems rarely attempt to replant a hybrid because of the exacting requirements of machine-harvesting and food-processing for crop uniformity. Resource-poor farmers in countries such as Brazil, on the other hand, will often take F2 (second generation) hybrid seeds as a source of breeding material to be blended with their traditional varieties. In this way, skilled local breeders, mostly women, be they in Brazil, Burundi or Bangladesh, isolate useful genetic characteristics and adapt them to their immediate market. The most commonly hybridized crops are maize, cotton, sunflowers and sorghum.

Until recently, small grain cereals such as rice, wheat, barley, oats, and rye and leguminous crops such as soybeans, have defied such commercial hybridization. Now this is changing. Public breeding initiatives led by governments such as China and institutions such as the Rockefeller Foundation and Cornell University have developed commercial rice hybrids. The seed multinationals are hot on their heels. Most recently, giants like Monsanto and Novartis have been waxing poetic over the prospect of F1 hybrid wheat. With more land sown to wheat than any other crop on the planet, a new hybrid monopoly for this crop would be a windfall for seed companies.³

Terminator Technology : The Terminator as Biological Warfare on Farmers and Food Security

The Terminator does more than ensure that farmers can't successfully replant their harvested seed. It is the "platform" upon which companies can load their proprietary genetic traits – patented genes for herbicide-tolerance or insect-resistance – and get the farmers hooked on their seeds and caught in the chemical treadmill. The Terminator is a guarantee that even Brazil's innovative farmers will have to buy access to these traits every year.

The target market for the Terminator is explicitly the South's farmers. Beginning with company news releases announcing the patent, Delta and Pine has trumpeted that its Technology Protection System will make it economically safe

As with all genetic engineering, its direct effect and its side-effects are unpredictable

for seed companies to sell their high-tech varieties in Africa, Asia and Latin America. The company has even estimated that 405 million hectares will be sown with Terminator seeds within a few years. This is a land mass almost equal to South Asia. Although Terminator Technology has only been tested in cotton and tobacco, its designers are convinced that it can be applied to any species. Delta and Pine has specifically suggested that rice and wheat farmers in countries like India, China and Pakistan are a priority market. According to the company, Terminator Technology's value could run as high as \$4.00 per hectare for upmarket garden crops. The patent could be worth a billion dollars.⁴

"The centuries old practice of farmer-saved seed is really a gross disadvantage to Third World farmers who inadvertently become locked into obsolete varieties because of their taking the "easy road" and not planting newer, more productive varieties." – Dr. Harry B. Collins, Delta and Pine Land Co, Vice-President for Technology Transfer (June 12, 1998)⁵

How the Terminator Technology works

The Terminator Technology is the main application of a broadly framed patent for the "control of plant gene expression". The Terminator is basically a genetically engineered suicide mechanism that can be triggered off by a specific outside stimulus. As a result the seeds of the next generation will self-destruct by self-poisoning. The preferred trigger is the antibiotic tetracycline applied to seeds. The main version of the Terminator consists of a set of three novel genes inserted into one plant [see Box 1]; another version divides two or three genes on to two plants, which are later to be cross-pollinated. The end-result is always a dead seed in the following generation.

Terminator Technology is the Trojan Horse for the spread of genetically-engineered crops in the South. In the absence of "effective" patent regimes, companies can still market their wares and enforce constant returns for their investments. In the absence of adequate biosafety legislation, countries might be persuaded to accept the Terminator on the assumption that the technology is safe and that transgenic traits can not survive to a second generation, even by cross-pollination. This assumption is ill-founded. As with all genetic engineering, its direct effect and its side-effects are unpredictable and carry all the

Since Terminator Technology has absolutely zero agronomic benefit, there is no reason to jeopardize the food security of the poor by gambling with genetic engineering in the field. Whether the Terminator works immediately or later, in either instance it is biological warfare on farmers and food security.

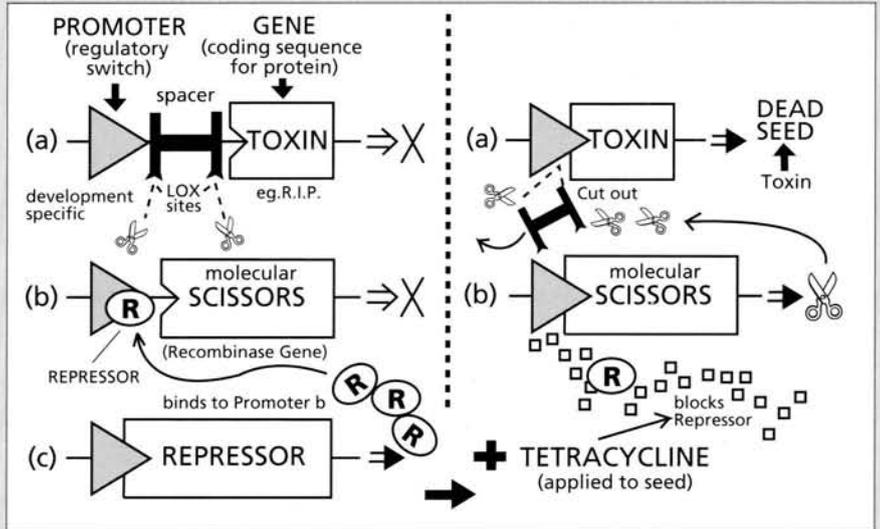
Box 1. In a Terminator plant, three genes are inserted, each with an associated regulatory switch, called a 'promoter'. One of these genes, when switched on, produces a protein called Recombinase, which acts like molecular scissors [Fig.1b]. The Recombinase removes a 'spacer' between the toxin-producing gene [Fig.1a] and its promoter. While it is there, the spacer acts as a safety catch to prevent the toxin gene from being activated.

A third gene is engineered to produce a Repressor [Fig.1c], which keeps the Recombinase gene turned off until the plant with the Terminator Technology is exposed to a specific outside stimulus, such as a particular chemical, temperature shock, or osmotic shock. When the chosen stimulus is applied to the seed before sale, the functioning of the Repressor gets interrupted. And as it is no longer repressed, the recombinase gene is switched on. The Recombinase that is now produced, removes the spacer 'safety catch'. Because the promoter in front of the toxin gene is chosen to only become active in the late stages of seed maturation, only then will it initiate the production of the poison that kills the seed.

The preferred genes used in the Terminator Technology are:

For toxin geneR.I.P. gene (ribosomal inhibitor protein)
 promoterLEA promoter (late embryonic abundance)
 spacera stretch of DNA framed with specific recognition sites (LOX)

For Recombinase genCRE/LOX system from bacteriophage (viruses that attack bacteria)
 promotera promoter that can be repressed
 For Repressor gene Tetracycline repressor system (Tn10 tet)



Box 2. "Gene silencing" was discovered in the early nineties when, in a field of 10,000 petunias genetically-engineered to carry a uniform red gene, many of the plants were found blooming white and pink.¹ Plants are capable of deactivating genes and their promoters if recognized as intruders or as duplicates of their own DNA.² Furthermore, genes that have been deactivated can become active again generations later. The LEA promoter, which is used to regulate Terminator's toxin gene, is very common among plants and shows significant similarities across many species; once added, the plant might choose to switch it off. If this were to happen whilst plants were being multiplied for the commercial market, no one could tell. Seeds of such plants will eventually be treated with tetracycline; the blocking sequence (Fig.1a) will be cut out but no toxin is produced at the end of the life cycle. The pollen carrying the silent but functional toxin gene

could spread into neighbouring crop-fields and forests.

Another likely scenario is that some plants will not react to the tetracycline treatment. Consider the vast quantities of antibiotics necessary to soak millions of seeds. Who is going to check that all seeds have taken up the chemical, with a generation having to pass before results can be seen? Again pollen will spread – with all its novel genes. If down the line the Repressor passes onto one plant, but the toxin and the Recombinase pass to another, all the seeds produced by the second plant would commit suicide. Even if all three genes stay together, there might be a future chemical input that acts like tetracycline.

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Box 3.

Tetracycline

is a broad spectrum antibiotic. It is used in medicine to kill bacteria, but it can also affect humans if wrongly used. The soil is full of vital micro-organisms, including bacteria, on which the health of plants depend. Whilst plants will normally grow up in close partnership with soil-organisms, the tetracycline-soaked seeds could create a death zone around them, destroying the fragile balance of the microbial soil web. As a consequence farmers would have to resort to chemicals to protect their crop from disease and apply fertilizers to make them grow. The Terminator would not only deplete diversity, but also destroy soil.

risks inherent in this technology. The gene-cocktail of the Terminator increases the risks that new toxins and allergens will show up in our food and animal fodder.

Most alarming though is the possibility that the Terminator genes themselves could infect the agricultural gene pool of the neighbour's crops and of wild and weedy relatives, placing a time-bomb. Temporary "gene silencing" of the poison gene or failed activation of the Terminator countdown enables such infection [see Box 2].

Between 15 and 20 per cent of the world's food supply is grown by poor farmers who save their seed. These farmers feed at least 1.4 billion people. The Terminator "protects" companies by risking the lives of these people. Since Terminator Technology has absolutely zero agronomic benefit, there is no reason to jeopardize the food security of the poor by gambling with genetic engineering in the field. Whether the Terminator works immediately or later, in either instance it is biological warfare on farmers and food security.

The Terminator also portends a hidden dark side. As a Trojan Horse for other transgenic traits, the technology might also be used to switch any trait off or on. At least in theory, the technology points to the possibility that crop diseases could be triggered by seed exports that would not have to "kick in" immediately – or not until activated by specific chemicals or conditions. This form of biological warfare on people's food and economies is becoming a hot topic in military and security circles.⁶

Terminator meets the "Monster"

Scarcely two months after USDA and Delta & Pine Land announced the receipt of the Terminator patent, Monsanto bought the company. The announcement of the \$1.76 billion purchase came on May 11th even as parties to the Convention on Biological Diversity were meeting in Bratislava. The Terminator had already elbowed its way into conference debates when press stories reached delegations. Overnight the US delegation, who had not uttered a word when even the USDA was under attack for its Terminator involvement, came out fighting for Monsanto. With former Clinton White House staffers on Monsanto's lobby payroll and Mickey Cantor, the US Trade Representative for much of the Uruguay Round, on Monsanto's board, the American government's zeal was less than surprising. [See Ferrara in this issue]

Seed technology has moved a long way since 1860 and the proprietary passions of Major Hallett. Short months before the Major trade-marked his pedigreed seed, the keynote speaker to the Wisconsin agricultural fair warned the farmers and scientists to beware of new technologies that distance farmers from their crops. Although his immediate concern was the steam engine's use in agriculture – he wasn't against it, just worried about whose interests it was serving – the speaker opined that the task of agricultural technology is to provide a decent living for farmers and to feed people. Clinton's administration might do well to heed Abraham Lincoln's advice before allowing the Terminator to enslave the world's farmers today.⁷

Terminating the Terminator

People's organizations and governments can halt the Terminator. Legal means are available through International Law and existing intergovernmental convention to outlaw the technology. Here are a few possibilities.

1. The USDA/Delta patent is pending around the world. The patent can and should be rejected on the grounds that it is in conflict with public morality. The Terminator is a threat to food security and destructive of agricultural biodiversity. On

these grounds, governments are fully entitled under the terms of even the quarrelsome TRIPS chapter of the WTO (World Trade Organization) agreement to refuse the patent. In doing so, governments are also (according to the WTO) agreeing not to allow the technology to be exploited by others within their territory.

2. Pressure (within and without the United States) should be put on the USDA to refuse to surrender the patent to the company. In fact, the USDA (which surprised itself with the March 3rd patent announcement) should also petition the US Patent and Trademark Office to revisit the claims and determine whether or not it is indeed in conflict with public morality.

3. The 100+ member states to the Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological and Toxic Weapons, and on Their Destruction (1972) should call for the abolition of Terminator Technology as a form of economic biological warfare that not only makes war on farming communities but could be manipulated to threaten national food security and destroy the national agricultural economy.

4. At its October 1998 meeting the Consultative Group on International Agricultural Research (CGIAR), the world's largest international public plant breeding network) should announce its opposition to the Terminator and its refusal to use it itself.

5. At its May 1999 meeting, the Convention on Biological Diversity's Subsidiary Body on Science and Technology should pass a resolution declaring the Terminator a threat to agricultural biodiversity and calling for its removal. Such an initiative would strengthen national efforts to ban the patent and the technology under the terms of the World Trade Agreement.

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Revolving Doors: Monsanto and the Regulators

by Jennifer Ferrara

Traditionally, key figures at the FDA in particular have either held important positions at Monsanto, or are destined to do so in the future. Is it surprising therefore that Monsanto gets clearance for its often dangerous products?

Though the evolution of genetic engineering from a laboratory science to a method of creating commercial products happened very fast – within a decade – the US government saw the commercialization of biotechnology coming and deliberately chose a path that has amounted to non-regulation. Genetic engineering broke through natural barriers of reproduction and sped up plant and animal breeding processes, but agribusiness corporations were wary that burdensome regulations would hinder new discoveries and therefore the commercial development of the technology. The federal government took up industry's cause. Instead of establishing strict, precautionary regulations that gave priority to public and environmental health, the government patched together an inadequate regulatory system that relied on risk assessment, industry science, and corporate volunteerism.

The US was in the heat of a high-tech economic race with Japan, and, as far as agriculture was concerned, lawmakers saw genetic engineering as the new technology that would allow the US to maintain its position as the world's agricultural "leader". The federal government would erect no law that might reduce America's competitiveness in the future world market for bioengineered products.

The first government body to establish guidelines for biotechnology research was the National Institutes of Health (NIH) in 1976.¹ Since the NIH is an advisory and not a regulatory body, it could formulate guidelines, but it had no power to enforce them. From the beginning, the NIH guidelines relied on the scientific community's and industry's self-regulation, starting a trend that continues today. As corporations became more involved in genetic engineering, NIH guidelines made accommodations for field tests and mass production of genet-

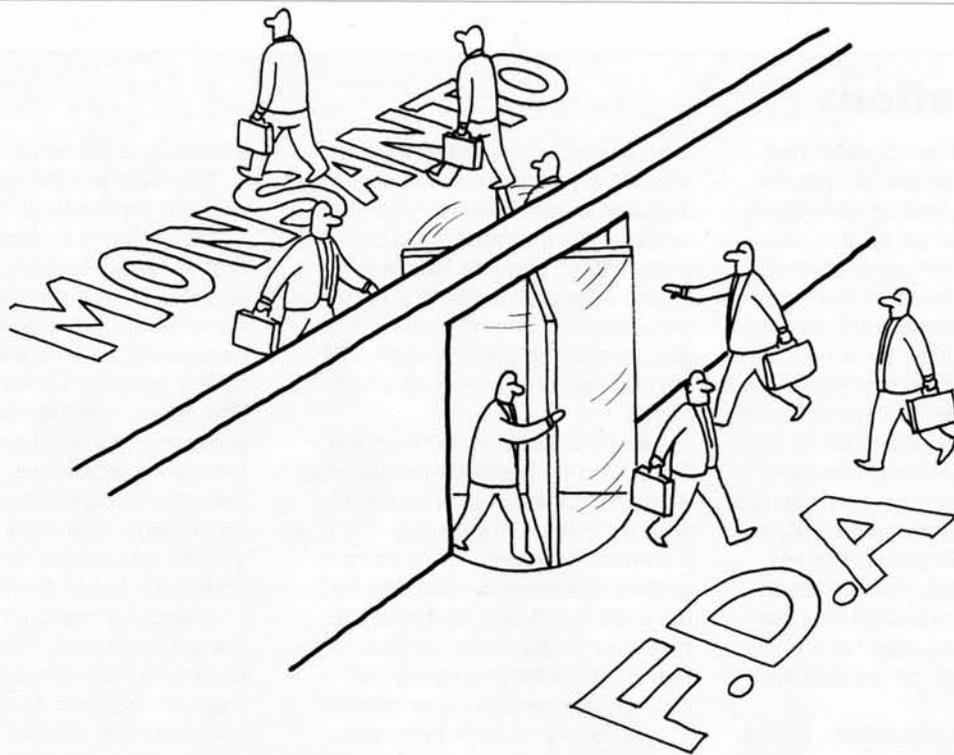
ically engineered organisms. In 1977 and 1978, 16 bills to regulate genetic research were introduced in the US Congress. None was passed, and the NIH guidelines – which dealt primarily with medical and pharmaceutical research and did not take a precautionary approach – remained the sole regulatory mechanism for biotechnology research.

In the early 1980s, agribusiness corporations were developing genetically engineered plants, animal drugs, and livestock, but no system was in place to regulate the development, sale, or use of these products.² This was the era of the deregulatory Reagan/Bush administration, which developed the framework by which bioengineered products, including food, are "regulated" today. Industrial profit, not public safety, was the administration's top priority. Government officials in the Office of Management and

In an ironic twist, Monsanto and other corporations have actually favoured some seemingly tight regulations, but, it turns out, only when the regulations serve corporate marketing purposes.

Budget, the Departments of State and Commerce, and the White House Office of Science and Technology Policy wanted to ensure that the administration did not do anything to "stifle" the development of biotechnology or to send the "wrong" message to Wall Street.³ The Bush-era President's Council on Competitiveness, chaired by Vice-President Dan Quayle, joined the biotechnology industry in opposing strong regulations and close oversight by federal agencies.⁴

The result was a 1986 "biotechnology regulatory framework".⁵ The policy was founded on the corporate-generated assertion that bioengineering was just an extension of traditional plant and animal breeding, and that bioengineered products did not differ fundamentally from non-engineered organisms.⁶ The administration determined that existing federal agencies could regulate bioengineered products sufficiently and gave them overlapping regulatory authority.⁷ For instance, the Food and Drug Administration (FDA) would regulate bio-



engineered organisms in food and drugs. The United States Department of Agriculture would regulate genetically engineered crop plants and animals. The Environmental Protection Agency would regulate genetically engineered organisms released into the environment for pest control. And the NIH would look at organisms that could affect public health. In determining that existing agencies could do the job of regulating bioengineered products, the administration avoided passing new, more stringent federal laws or establishing a new regulatory agency devoted to the task.

The policy left gaping communication gaps between agencies, plenty of regulatory ground uncovered, and confusion over who would regulate what.^{8,9} But most importantly, the regulations were founded on the false premise that bioengineered organisms used for food and agricultural products are no different from non-engineered, conventional products.¹⁰ In fact, to produce genetically engineered foods, researchers take genes from food or non-food organisms and add them to another organism to alter its genetic makeup in ways not possible through sexual reproduction. The process deletes essential proteins or adds entirely new ones, and can modify genetic characteristics in entirely unexpected ways. As long as the new genes come from an approved food source, the government treats new or altered genes in bioengineered foods as natural, not novel, additives. So in most cases regulators are not required to take a precautionary approach when evaluating new genetically engineered food products; products are considered safe until proven otherwise.

As late as 1994, it appeared that the federal government was still playing catch-up in establishing working biotechnology safety regulations. The Union of Concerned Scientists (UCS), which monitors the biotechnology industry and the federal regulatory system, was pointing out big holes in the so-called framework.¹¹ "Fundamentally, it does not contain sufficient

statutory authority to oversee all of the products and activities entailed in genetic engineering," wrote UCS in February 1994. "Where authority does exist, there are problems with implementing regulations and policies." For example, a 1992 FDA policy exempted corporations from having to test bioengineered food for safety and get FDA approval before the foods are put on the market.¹² Unless the corporation determined that "sufficient safety questions exist",¹³ corporations could undergo voluntary, private "consultations" with the agency before marketing their product.¹⁴

It is not unusual for agribusiness corporations like Monsanto to manipulate the limited safety regulations that exist. To establish safety standards for new products, federal agencies rely on studies performed by the very corporations that are trying

to get their products on the market. Studies to determine the long-term health consequences of new products are not always required. Over the years, many corporations have submitted fraudulent test results showing that their products are safe, or they have simply withheld information or studies indicating otherwise. Because the federal government protects corporate safety studies as trade secrets,

they are not available for public scrutiny. By sheltering corporations in this way, federal agencies hold corporations' pursuit of profits above the public's right to good health and a safe environment.

The Regulatory Irony

Laws governing biotechnology continue to favour agribusiness and biotechnology corporations, but as the industry has developed, the corporate push for specific types of regulations has taken ironic twists. The initial lack of a cautious regulatory approach enabled small biotechnology companies to develop and market new bioengineered products at a rapid pace. In the meantime, larger agribusiness corporations like Monsanto and

Not only did the FDA fail to act upon evidence that rBGH was not safe, the agency actually promoted Monsanto's product before and after the drug's approval. In so doing, the FDA took on the impossible double role of regulator and promoter of bioengineered foods.

Cosy Relations

The Chairman of the government body charged with protecting the environment is growing genetically modified crops on his land. In June 1998, *The Observer* revealed that Lord de Ramsey, head of the Environment Agency, could make more than £1 million by selling greenfield land from his huge Cambridgeshire estate. He is one of a number of landowners being paid by the US multinational company Monsanto to have such crops tested on their land. The crops have been attacked by the Prince of Wales, green campaigners and the Royal Society for the Protection of Birds, who fear that they may have a catastrophic effect on wildlife and the food chain.

Last week, English Nature called for a three-year moratorium on the crops until research into the effects on wildlife has been completed. De Ramsey will not discuss why he has allowed Monsanto to test on his land. A Conservative and friend of

John Major, he is paid more than £50,000 a year for his two and a half day post at the Environment Agency, the quango set up two years ago to make 'a better environment for present and future generations'. One of its aims is to 'encourage the conservation of natural resources, animals and plants'.

Liberal Democrat MP Norman Baker said de Ramsey's relationship with Monsanto was incompatible with his role at the Agency. "This is a scandal," he said. "He's there to protect the environment and he's potentially helping to destroy it. How can he reconcile his duty with the fact that he is carrying out possibly dangerous experiments?"

The family of John Fellowes, fourth Baron de Ramsey, farms 6,500 acres from its base at Abbots Ripton, near Huntingdon. The farm manager has allowed Monsanto to use a small area to test a sugar beet genetically engineered to tolerate

Roundup, a powerful herbicide.

The farm will be paid for the loss of crops on the land.

"Roundup is a Monsanto product that is extremely toxic to plants," said Sue Mayer, director of GeneWatch. "Its use will mean the destruction of all plants, which will have a knock on effect on wildlife. This flies in the face of the government's proclaimed policy to reduce herbicide use. It confirms our fears that inside the government and its agencies there is a pro-genetic engineering mood that is at odds with public feeling."

Friends of the Earth spokesman Adrian Bebb said, "If he [de Ramsey] is growing genetically modified crops on his land, there's an obvious and worrying conflict of interest. His agency should be taking a strong stand against this."

"Environment guardian to test genetic crops on his land." *The Observer*, Sunday 19th July 1998, by Jonathan Calvert and Lucy Johnson.

Ciba-Geigy were buying up these small companies while developing their own expansive in-house biotechnology research and marketing operations. During this time, Monsanto, Ciba-Geigy, and several other agribusiness corporations came virtually to dominate the world market for bioengineered food products, strengthening their hold over much of the world's food supply.

From their position at the top, Monsanto and other corporations have actually favoured some seemingly tight regulations, but, it turns out, only when the regulations serve corporate marketing purposes. Regulations that require corporations to submit a plethora of costly scientific data to regulatory agencies, for example, discourage competition from smaller biotechnology and seed companies while giving the public the illusion that new biotechnology products undergo rigorous safety evaluations and are therefore safe.

In 1995, for example, Monsanto lobbied against a provision in the EPA funding bill that would have prevented the EPA from regulating agricultural plants bioengineered to contain the toxic bacterium *Bacillus thuringiensis* (Bt).¹⁵ Genetically engineered foods had just hit the market, and Monsanto was fully aware that almost any EPA regulations for Bt plants would publicly sanction the genetically engineered products and defuse resistance from public interest environmental groups. Furthermore, corporations could only get their Bt products to market if they had extensive money and resources to jump through all the regulatory hoops. Big corporations alone can meet data requirements and, once in the system, manipulate and pass the EPA's safety evaluation process. With the competition out of the way, the market is theirs.

Taylor wasn't the only FDA official involved in rBGH policy who had worked for Monsanto.

FDA Scandals and Revolving Doors

To better understand how genetically engineered foods and the associated safety hazards were unleashed onto the American public, take a look at the story of the first mass-marketed bioengineered food product, the Monsanto corporation's recombinant bovine growth hormone (rBGH). rBGH has been linked to cancer in humans and serious health problems in cows, including udder infections and reproductive problems. rBGH's development and approval was rife with scandal and protest. But the right combination of government backing, corporate science, and heavily-funded corporate public relations schemes paved the way for the first major release of a genetically engineered food into the nation's food supply.

The roles played by the FDA and the Monsanto corporation in the development, safety evaluation, approval, and marketing of rBGH led to the exposure of the American public to the multiple hazards of bioengineered foods. These

organizations hid important information about safety concerns, masked disturbing conflicts of interest, and stifled those who were asking the "wrong" questions and telling the truth about rBGH.

The FDA declared rBGH-milk safe for human consumption before important information about how rBGH-milk might affect human health was even available.¹⁶ When critical information about how rBGH raised the levels of insulin-like growth factor, IGF-1, in milk¹⁷ and the possible link between IGF-1 and human cancer began to emerge,¹⁸ [See Kingsnorth in this issue] the FDA was already apparently in too deep to change its mind or ask more questions about the drug's effect on human health. Instead, the agency relied almost exclusive-

Getting the government on your side

Americans love to believe that the food they eat, the drugs they take, the air they breathe, and the water they drink are all safe because such agencies as the EPA and the FDA are standing guard. However these bureaucracies are infiltrated by past and future employees of the corporation whose products they are considering. In the case of FDA approval for Monsanto's recombinant bovine growth hormone (rBGH), the 'revolving door' almost spun off its hinges. Ferrara sites, among others, FDA Deputy Commissioner, Michael Taylor, Margaret Miller, Deputy Director of the FDA's Office of New Animal Drugs, and Suzanne Sechen, lead reviewer of scientific data on rBGH for the FDA, as important FDA officials with strong Monsanto connections. But there was also John Gibbon, chair of the Congressional Office of Technological Assessment, who had at the same time been a Monsanto consultant for more than a decade.

But the door swings the other way as well. Marcia Hale, formerly assistant to President Clinton for intergovernmental relations, has a new job coordinating public affairs and corporate strategy for Monsanto in the United Kingdom.¹ And Mickey Kantor, former US Trade Representative and US Secretary of Commerce, recently accepted a position on the Monsanto Board of Directors.²

Perhaps more important than the revolving door between biotech companies and the agencies meant to regulate them is the support genetic engineering has received from government as a whole. The entire biotechnology enterprise would have been impossible without vast direct and indirect subsidies,

as well as a Patent Office willing to ensure that new life forms are patentable — and therefore profitable. And since the President's Council on Competitiveness Biotechnology Working Group, charged with positioning US biotechnology in the global marketplace, sits *above* all the regulatory agencies on the government flowchart, it is clear that the US government is far more interested in promoting biotech than regulating it.³

And if a corporate-friendly government and its revolving doors don't get your your product a stamp of approval, bribery may do the trick. According to a documentary

aired by the Canadian Broadcasting Corporation (CBC), Monsanto tried to bribe Health Canada (Canada's version of the FDA), offering to pay as much as \$2 million if Monsanto received approval to market rBGH in Canada without being required to submit data from any further studies or trials.⁴

Steven Gorelick

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RICHARD WILSON

MONSANTO vs FRANCE

1 - 0

Since last June, Monsanto has spent 15 million French francs (£1.5 million) in a huge advertising campaign to "explain" the merits of genetically modified (GM) food. Full pages have been dedicated to this campaign in virtually every French newspaper and magazine.

And it seems to have paid off. Indeed, although a number of polls have indicated that public opinion is strongly opposed to food biotechnology, the French government has authorized Monsanto (July 30th) to produce its genetically modified maize in France.

The decision, taken by Prime Minister Lionel Jospin and Dominique Voynet, the Environment Minister and also leader of the Green Party (!), manifestly mocks recent appeals from both a "conference of citizens" called together by the Government on the subject of biotechnology and a parliamentary committee asking precisely for a two-year moratorium on the commercial planting of genetically modified crops.

The move follows a personal appeal by Vice President Al Gore – the same Al Gore who (apparently) wrote *Earth in the Balance* – to Jospin, who, we are told, subsequently "definitely understood the importance of this issue to American farmers."

Bruno Erhard-Steiner – Deputy Secretary-General of the Europe of Nations Group in the European Parliament.

ly on data generated by the Monsanto corporation and highly criticized by independent scientists to justify a decision it had made years before.^{19,20} Many independent scientists have called for more extensive, long-term studies, which have never been done.

In 1991, a researcher at the University of Vermont (UVM), where Monsanto was spending nearly half a million dollars to fund test trials of rBGH, leaked information about severe health problems affecting rBGH-treated cows, including mastitis and deformed births.²¹ The scientist heading the research had already made numerous public statements to state lawmakers and the press and released a preliminary report indicating that rBGH-treated cows suffered no abnormal rates of health problems compared with untreated cows.²² The US General Accounting Office (GAO) investigated. During the investigation, the FDA stalled in providing the GAO with original Monsanto test data,²³ and the GAO was unable to obtain critical data from UVM and Monsanto.²⁴ The GAO terminated its investigation, concerned that Monsanto had had time to manipulate the questionable data and that any further investigation would be fruitless. In an effort to dissipate public concern, UVM scientists finally released information showing rBGH's negative effect on

cow health, years after the findings had been made.²⁵

Even FDA insiders have criticized the agency for its slack review of the drug, but the FDA has dismissed these concerns and fired at least one official who blew the whistle on the organization's corrupt drug approval process. Veterinarian Dr. Richard Burroughs reviewed animal drug applications at the FDA's Center for Veterinary Sciences from 1979 until he was fired in 1989.²⁶ In 1985, Burroughs headed the FDA's review of rBGH and remained directly involved in the review process for almost five years. Burroughs wrote the original protocols for animal safety studies and reviewed the data that rBGH developers, including Monsanto, submitted as they carried out safety studies.

A 1991 article in *Eating Well* magazine quotes Burroughs describing a change in the FDA beginning in the mid-1980s. "There seemed to be a trend in the place toward approval at any price. It went from a university-like setting where there was independent scientific review to an atmosphere of 'approve, approve, approve.'"²⁷ This is the atmosphere in which the FDA carried out its review of rBGH. According to Burroughs, the FDA was totally unprepared to review rBGH, the first bioengineered animal drug to go through the FDA's approval process; rBGH was out of the scope of most FDA employees' knowledge. But rather than admit incompetence, the FDA "decided to cover up inappropriate studies and decisions," and agency officials "suppressed and manipulated data to cover up their own ignorance and incompetence."²⁸

Burroughs himself was faced with corporate representatives who wanted the agency to ease strict safety testing protocols, and he saw corporations drop sick cows from rBGH test trials and manipulate data in other ways to make health and safety problems disappear. According to Burroughs, the raw, untouched data stashed away behind the agency's doors and protected as trade secrets would show otherwise.

Burroughs challenged the agency's lenience and its changing role from guardian of public health to protector of corporate profits. He criticized the FDA and its handling of rBGH in statements to Congressional investigators, in testimony to state legislatures, and to the press.²⁹ Inside the FDA, he rejected a number of corporate-sponsored safety studies as insufficient and was prevented by his superiors from investigating data submitted by industry revealing possible health problems caused by rBGH. Though Burroughs had a record at the FDA showing eight straight years of good performance, he began receiving poor performance reports, for which he claims he was set up. Finally, in November 1989, he was fired for "incompetence".

Not only did the FDA fail to act upon evidence that rBGH was not safe, the agency actually promoted the Monsanto corporation's product before and after the drug's approval. In doing so, the FDA took on the impossible double role of regulator and promoter of bioengineered foods. Dr. Michael Hansen of Consumers Union notes that the FDA acted as an rBGH advocate by issuing news releases promoting rBGH, making public statements praising the drug, and writing promotional pieces about rBGH in the agency's publication, *FDA Consumer*.³⁰

Listen to the Experts?

"There is no reason to believe BSE will be any different from scrapie."

– John Gummer, Minister of Agriculture, Fisheries and Food, 1990

"There is no reason to believe that the genetic modification of maize will give rise to any adverse effects on human health from its use in human food."

– John Gummer, Secretary of State for the Environment, 1996.

Call to sack UK biotech advisers

The Government was urged to sack the panel advising it on genetic releases into the environment after claims that some of its members have financial links to the biotech industry.

Claiming an "extreme bias" in favour of the new technology on the Advisory Committee on Releases into the Environment (Acre), Friends of the Earth said eight of its 13 members had links with the industry and six were paid by organizations allowed by the committee to grow genetically engineered crops.

"You may as well put wolves in charge of sheep," said Adrian Bebb of Friends of the Earth. He claimed Acre members had interests in almost 40 per cent of the trials the panel had approved, and the panel had not refused one application to release genetically modified organisms (GMOs) since it was set up in 1992.

"If the Government wants to

restore public confidence in its dealings with the biotech industry, it should draft in people more likely to command public confidence," Mr Bebb said.

Acre members, none of whom was appointed under Labour, are mainly drawn from academia and institutes researching genetic engineering. They are appointed by the Environment Secretary in consultation with the Ministry of Agriculture, the DTI, and the Department of Health.

But an environment ministry spokesman yesterday replied robustly: "There are no secrets. All the interests of the members are clearly shown. Individual members play no part in the decision-making process when it has anything to do with the company they are linked to. To suggest there is collusion is totally wrong."

The committee members include some of the country's most eminent

scientists and academics in the biotechnology field. One of the members, Nigel Poole – who works for biotech company Zeneca, which has had six applications to the committee approved – said he left the room when his company's application came up.

Julie Hill, who works for the Green Alliance, and is known as Acre's "token green", said yesterday: "Most of the panel come with a positive view of the technology. It might be possible to have a different view of the risks GMOs pose if Acre had more people critical of the technology."

The call for the panel to be sacked came 24 hours after English Nature, the Government's statutory wildlife advisers, called for a three-year ban on commercial growing of GM crops because of their potential threat to wildlife.

This article, written by John Vidal, was first published in *The Guardian*, 9 July 1998.

This dual role also manifested itself in other ways. In an apparent attempt to quell public controversy over rBGH, for example, two FDA researchers published industry and "independent" data in the journal *Science* in 1990 to show that rBGH was safe for consumers.³¹ Gerald Guest, the director for FDA's Center for Veterinary Medicine told *Science*, "We'd like to get our side of the story out, to show why we're comfortable with the safety. We'd like for people to know that it's a thoughtful process, and we want it to be open and credible."³²

Guest was apparently doing a lot of wishful thinking. Professor Samuel Epstein criticized the FDA for acting "as a booster or advocate for an animal drug that hasn't yet been approved."³³ Epstein and others faulted the FDA for including only pieces of unpublished studies about rBGH in the *Science* article, but not making the full studies available for independent review.³⁴

The FDA's pro-rBGH activities make more sense in light of conflicts of interest between the FDA and the Monsanto corporation.^{35,36} Michael R. Taylor, the FDA's deputy commissioner for policy, wrote the FDA's rBGH labelling guidelines. The guidelines, announced in February 1994, virtually prohibited dairy corporations from making any real distinction between products produced with and without rBGH.³⁷ To keep rBGH-milk from being "stigmatized" in the marketplace, the FDA announced that labels on non-rBGH products must state that there is no difference between rBGH and the naturally occurring hormone. In March 1994,

Taylor was publicly exposed as a former lawyer for the Monsanto corporation for seven years. While working for Monsanto, Taylor had prepared a memo for the company as to whether or not it would be constitutional for states to erect labelling laws concerning rBGH dairy products.³⁸ In other words, Taylor helped Monsanto figure out whether or not the corporation could sue states or companies that wanted to tell the public that their products were free of Monsanto's drug.

Taylor wasn't the only FDA official involved in rBGH policy who had worked for Monsanto. Margaret Miller, deputy director of the FDA's Office of New Animal Drugs was a former Monsanto research scientist who had worked on Monsanto's rBGH safety studies up until 1989. Suzanne Sechen was a primary reviewer for rBGH in the Office of New Animal Drugs between 1988 and 1990. Before coming to the FDA, she had done research for several Monsanto-funded rBGH studies as a graduate student at Cornell University. Her professor was

one of Monsanto's university consultants and a known rBGH promoter. Remarkably, the GAO determined in a 1994 investigation that these officials' former association with the Monsanto corporation did not pose a conflict of interest. But for those concerned about the health and environmental hazards of genetic engineering, the revolving door between the biotechnology industry and federal regulating agencies is a serious cause for concern.

Michael R. Taylor, the FDA's deputy commissioner for policy, wrote the FDA's rBGH labelling guidelines, which virtually prohibited dairy corporations from making any real distinction between products produced with and without rBGH. In March 1994, Taylor was publicly exposed as a former lawyer for the Monsanto corporation for seven years.

The Corruption of "Organic"

In December 1997, the United States Department of Agriculture (USDA) released a 600-page document which attempted to set new national organic food standards. Under pressure from large genetic and agro-chemical companies, including Monsanto, the proposed standards would have allowed the use of genetic engineering, nuclear irradiation and toxic sewage sludge in organic agriculture, as well as a more liberal use of synthetic chemicals on crops and in processed organic foods. Intensive animal farming practices, with a subsequent reliance on antibiotics and cruel confined conditions, would also be acceptable.

With a rigour that can only be described as food fascism, the USDA also planned to outlaw attempts to create organic food standards that were higher than their own.

Clearly, the proposal would have made a mockery of the term 'organic', not only in the US, but across the world. Had the said bill been passed, the \$4.2 billion US organic food market would have fallen prey to the giant US genetic and agro-chemical industries, leaving thousands of small farmers by the wayside. Since 1990 the organic food market has increased by 20 per cent per annum – a telling



consumer verdict on a 'cheap' food industry (which now produces over 80 million cases of food poisoning a year).

The USDA encountered an unprecedented response, receiving 220,000 comments – 99 per cent of which denounced the proposal. In an important tactical move, 27 of the US's 40 non-governmental and state organic certifiers agreed to adopt a unified organic agricultural standard, which would conform to the high standards expected by American consumers.

Although informed sources in Washington believe that the USDA

will eventually try to push through a diluted version of their original proposal, the outrage provoked has left little room for compromise. A new nationwide consumer organization – the Organic Consumers Association – has been created to harness the burst of activism that the USDA's proposal has unleashed. Thus, ironically, the bill has created a unique opportunity for change within the food industry. Never have the lines been so clearly drawn . . .

Adapted from an article by Ronnie Cummins and Ben Lilliston, *The Ecologist* Vol.28 No.4 (July/August 1998).

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Monsanto's Failing PR Strategy

by Kenny Bruno

Monsanto's PR strategy is to depict itself as a philanthropic organisation interested in protecting the natural environment and feeding the world's hungry. The reality however could not be more different.

“Monsanto believes you should hear all opinions” about food biotechnology. So opens an unusual European advertising campaign by the US's leading corporate genetic engineers. With the help of Bartle Bogle Hegarty (BBH), Monsanto, the St. Louis-based chemical and agribusiness giant, is out “to encourage a positive understanding of food biotechnology” in Europe.¹

In this campaign, Monsanto does not ask us to buy their products. The ads are almost all text, and the copywriters attempt a tone of enlightenment and openness. Dozens of commonly seen TV and print media images from other Corporations outrage far more people than the Monsanto ads. Still, some readers will do a double take when they see the last line of the ads – an invitation to visit the website or telephone the offices of Monsanto's most vociferous critics, Greenpeace, Friends of the Earth and Food for Our Future. These pressure groups have positions on biotechnology which threaten Monsanto's very lifeblood – genetically engineered products.

Monsanto is rather proud of the ad campaign's “important contribution to the necessary public debate.”² In retrospect, it seems it was only a matter of time before some clever advertising executive saw the benefit of the simple strategy of announcing the website and phone number of its critics. Everyone knows who they are anyway, and the ads imply the complicity of these Non-governmental organizations (NGOs) in an “open debate” on the issues. At the same time, the company demonstrates its serene, if subjective, interest on these topics. Nike, on its webpage, refers often to the arguments of its critics on sweatshop issues, though in a more defensive tone than Monsanto.³ The nuclear industry has used this tactic recently as well.⁴ We'll be seeing more of this tactic as corporations attempt to appear as open-minded as possible.

So what does it mean? With information more available than ever, has the *fin de siècle* multinational given up the fight to control information? Will the transnational corporation (TNC) of the 21st century be so committed to democracy that they voluntarily initiate public scrutiny of their operations? Monsanto's “Information Manager” for Europe says they

encourage the reader to explore other points of view because the “case for the safety and benefits of biotechnology is overwhelming.”⁵ If that is true, why are there no similar ads in North America? What is really behind Monsanto's decision to spend money to alert people to the campaigns of their own critics?

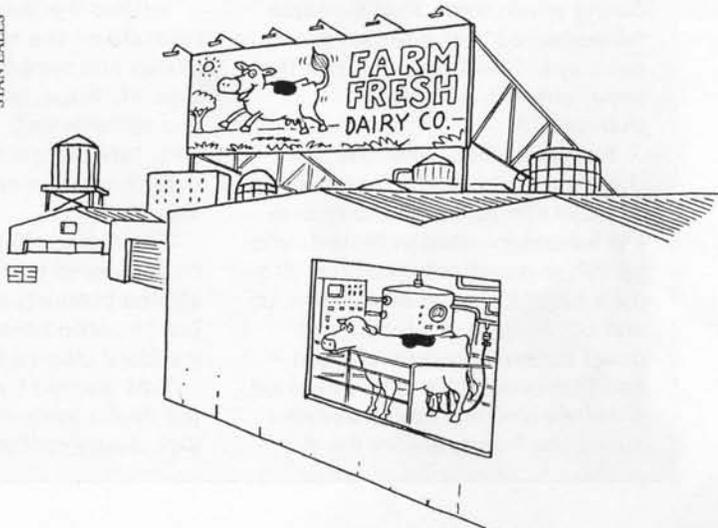
As Monsanto admits, it is a reaction to their critics, whom they accuse of spreading misinformation, voodoo theories, vandalism, obscurantism, and a steady diet of scare stories about so-called “superweeds” and “Frankenfoods.”⁶ Aside from the innovation of sharing the Greenpeace telephone number, the ads are clearly in the tradition of corporate environmental advertising known as *Greenwash*. This article will analyze the ad campaign in the context of the history of *Greenwash*. I argue that Mon-

santo chose this approach in Europe due to the public relations fiasco around the introduction of genetically engineered soya to Europe in 1997, which will also be discussed.

Greenwash was conceived after the major ecological catastrophes of the 1980s – Love Canal, Bhopal, Chernobyl, Basel, the Exxon Valdez, the ozone hole. The place of these catastrophes in the public mind, and the global environmental degra-

Aside from the innovation of sharing the Greenpeace telephone number, the ads are clearly in the tradition of corporate environmental advertising known as Greenwash.

STAN EALES



dation they represented, became so prominent that the freedoms and profits of the industries involved were threatened. Environmental regulations proliferated, environmental pressure groups grew as never before, and environmental protection became a genuinely popular issue. The blame was placed squarely on the offending companies. Monsanto, the inventor of one of the world's most ubiquitous pollutants (PCBs), deserved a substantial share of the blame. The companies needed to do something other than the traditional denial of responsibility which had been a serviceable strategy until then. The Greenwash counterstrategy was born.

The major tenets of Greenwash were environmental image

advertising, voluntary corporate Codes of Conduct, and more traditional political campaigns to avoid environmental regulations. In the US, DuPont (primary manufacturer of ozone-depleting chemicals) and Occidental (creators of Love Canal) featured ads using images of whales, seals, birds and beautiful ocean or forest scenes. Rhone Poulenc, Sandoz, Waste Management, Mitsubishi, Ford, General Motors, and Union Carbide followed suit. UK-based multinational ICI tried Greenwash ads in Malaysia ("Paraquat and Nature in Perfect Harmony"), while Shell photographed an adorable Asian girl holding a globe for an ad in the Hong Kong Friends of the Earth magazine. The tone was pious, caring, more-environmentalist-than-thou.⁷ With

In other words, the public had no right to know, and no right to choose, whether or not to eat genetically engineered milk, soybeans or other foods

Burson Marsteller: The PR Professionals

EuropaBio is Europe's largest biotechnology trade federation, representing 540 companies and 8 national associations. Formed through a 1996 merger between Europe's two most firmly established bioindustry lobbying unions, EuropaBio wields influence both at

the policy-making and local level.¹

So far, the European Parliament and Commission have extended nothing but friendly patronage towards the federation. On September 10th 1997, for example, the Commission announced plans to pass statutory measures that will

obligate Austria, Italy and Luxembourg to repeal bans on the use and sale of genetically modified maize. Yet, despite such political affluence, consumer distrust has rendered biotechnology a precarious market.

Cue Burson Marsteller.

Burson Marsteller (B-M) is the world's largest PR firm, operating from over 60 offices in 30 different countries. They specialize in "Perceptions", which they insist, "are real. They colour what we see . . . what we believe . . . They can be managed to motivate behaviour . . . to create positive business results."

When US oil giant, Exxon, produced the world's most devastating oil slick, B-M was called in to touch up the company's tarnished image. And when Argentina's military dictatorship was having difficulty attracting foreign investment, B-M was hired to "improve the (country's) international image", over a period during which some 35,000 people "disappeared". As B-M was proud to point out: "the facts remained the same; only the perceptions changed."²

But perceptions will have to change a great deal if EuropaBio's member companies are to recoup the billions invested in biotechnology. When genetically modified produce first hit shop shelves in the US and EU, a storm of protest and direct action activism broke out – and that protest has only increased.

Here's where Burson Marsteller enters the frame. Before the first

European Bioindustry Congress, EuropaBio '97 (June 25-27, Amsterdam), B-M was commissioned to write up a strategy proposal for achieving a change in public 'perceptions'. The document was leaked to Greenpeace.

The federation were advised to steer clear of any form of public debate and particularly the industry's "killing fields" – namely: "public issues of environmental and human health risk". The task of persuading consumers to embrace genetically modified products should be left to "those charged with public trust – politicians and regulators".

Instead the industry should concentrate on the spread of positive stories and symbols, eliciting a message of "hope, satisfaction, caring and self-esteem". "Symbols", they add, "are central to politics because they connect to emotions, not logic."

The public, they advised, should be convinced that genetically altered products are not simply safe but "environmentally superior to standard crop varieties".

B-M warned EuropaBio to keep the media away from the 1997 Bioindustry conference. Instead they

were advised to feed journalists the kind of ready-made, positive stories "that we really want running back home". Yet, despite the PR tactics, Greenpeace had little difficulty in ruffling the federation's feathers. Before the discussion had even begun, a truckload of soya beans was dumped at the conference entrance. As Peter Linton, manager of the Bioindustry Congress, noted reluctantly: "Now TV stations all over Europe show pictures of a load of beans outside the industry conference. We missed a chance there."

Can the likes of Burson Marsteller really save the face of biotechnology in Europe? Monsanto and other biotech investors will have to bank on it.

Lucinda Labes

Notes

1. This article is adapted from "Smooth Façade: Greenwash Guru Burson Marsteller and the Biotech Industry" by the Corporate Europe Observatory, which was published in Vol 28, No 3, May/June 1998 of The Ecologist.
2. See B-M's web-site on www.bm.com "Perception Management: An Active Strategy for Marketing and Selling", Valeska C. Stupak and Ronald J. Stupak.

only a few PR companies serving a great many industrial TNCs, Greenwash advertising fast became a global industry.

Codes of Conduct were the second plank of the strategy. In the US, Responsible Care – a Code for all members of the US Chemical Manufacturers Association (CMA) – became the catch-all environmental programme for the chemical industry. It spread quickly to CEFIC in Europe, and later to Latin America and Asia. Responsible Care started as a response to the Bhopal gas leak, and later got a push from the development of the CERES Code of Conduct circulated by the responsible investment community in the US.⁸ Responsible Care, like environmental advertising, was not a proactive programme, but the reaction of a frightened industry. Monsanto, a member of Responsible Care, was learning the art of Greenwash.

The stance of Responsible Care was a fascinating balancing act, especially because its ambivalence is repeated again and again in corporate policies on environment and labour issues, including that of Monsanto. Responsible Care had a dual audience of the general public and the industry itself. To the general public, there was the assurance that the industry acknowledged its concerns, and would do everything to avoid the kinds of catastrophe everyone feared. But with its own members in the audience, the crafters of Responsible Care could not admit outright that their industry as a whole had been guilty of grievous environmental crimes. So they admitted only that there had been “too many incidents” and that the industry had failed to properly “communicate” to the public. The language in Responsible Care – for example their motto of “continuous improvement” – leaves open to interpretation whether improvements in environmental performance are truly necessary for the planet’s health or are necessary mainly to save their public image.⁹ The mixed message is “there is no problem, but a lot of you think there is so we’re going to fix it anyway.” Not entirely reassuring.

Meanwhile, these same companies and trade associations were lobbying against the very environmental legislation which aimed to address their past practices. In these fora, industry argued that Responsible Care and other voluntary Codes of Conduct were a more efficient approach than “command and control” regulation. The message, paraphrased:

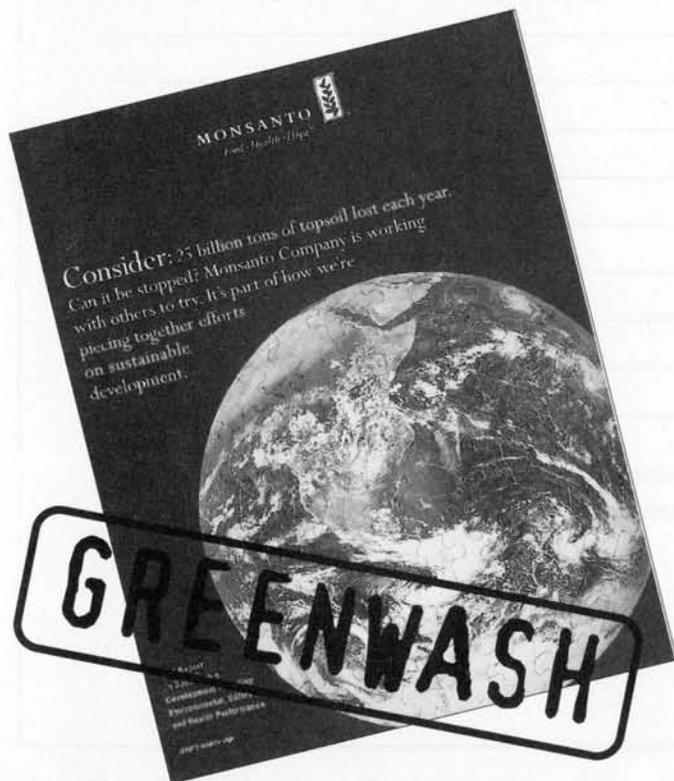


“We’re the experts, we love nature, and we’ll take care of it. If you government types get involved, you’ll just screw it up.”

With Greenwash, environmentally destructive companies in the chemical, waste, fossil fuel, automotive and nuclear industries commandeered ecological images and language from the environmental movement to deflect criticism of their practices. The Earth and its flora and fauna became the most common images for the very companies which had done the most to destroy it. Corporations took over Earth Day, endorsed recycling and redefined pollution prevention to their liking. “Self-regulation” made new environmental legislation seem anachronistic.

While the companies had continued their efforts to weaken or derail environmental legislation at the national level, environmental issues had become prominent at the intergovernmental level. During the UNCED process, Greenwash went global in a deeper sense. In this global forum, industry banded together in the Business Council for Sustainable Development (BCSD) and the International Chamber of Commerce in a global political campaign to benefit their members (which again included Monsanto).¹⁰ The goal was to be visibly pro-environment while making sure the Summit did not become an effective check on their own powers. The practice of globally co-ordinated political action by industry was better known during the lead up to the Climate Convention meeting in Kyoto last year, when the Global Climate Coalition and the US Business Roundtable launched multimillion dollar campaigns against the climate treaty. But the earlier corporate efforts at UNCED were smoother, aiming for the impression that business was all for the Summit and indeed was helping make it happen.

For the most part those efforts succeeded. The UNCED Secretary General Maurice Strong publicly lauded industry’s efforts. The UNCED documents did not attempt to rein in TNCs, and in addition the world’s commitment to Agenda 21 has been notoriously lacking.¹¹ By the UN General Assembly Special Session Fifth Year Review of the Rio Earth Summit (UNGASS), the UNCED process had been marginalized. The Chairman of the G-77 complained that the development agenda had been sidelined; Commission on Sustainable Development officers adopted the BCSD language of “technology co-operation”¹² and the President of the General Assembly, Ambassador Razali of Malaysia, hosted a closed luncheon for



A draft Monsanto Company statement, sent by Dr Donald Easum,* Vice-President, Global Business Access Ltd., to 'developing country leaders' for their endorsement.

* Dr Donald Easum has been "engaged by Monsanto to assist them in publicizing their efforts to promote the role of biotechnology in increasing the food supply and protecting the environment . . ."



LET THE HARVEST BEGIN

Across the vast farms of Europe and the United States, crops grow plentifully, providing an over-abundance of food. But in other parts of our world, hunger still confronts the population every day. Finding new ways to meet our global need for food, while maintaining ecological balance, might be the greatest challenge we face in the next century.

We all share the same planet – and the same needs. In agriculture, many of our needs have an ally in biotechnology and the promising advances it offers for our future. Healthier, more abundant food. Less Expensive crops. Reduced reliance on pesticides and fossil fuels. A cleaner environment. With these advances, we prosper; without them, we cannot thrive.

To feed the world in the next century, we need food that is more plentiful and more affordable than it is today. With more productivity needed from less tillable land, we need new ways to yield more from what is left – after development and erosion take their toll. To strengthen our economies, we need to grow our own food as independently as we can. Agricultural biotechnology will play a major role in realizing the hope we all share. Accepting this science can make a dramatic difference in millions of lives.

The seeds of the future are planted. Allow them to grow. Then let the harvest begin. Because securing food for our future begins a better life for us all.

Signatures:

A message from some of the world's most respected voices, made possible by some of the world's most respected companies, including Monsanto, committed to finding better ways to feed the world's people.

NO – LET NATURE'S HARVEST CONTINUE!

Response from all the African delegates (except South Africa) to FAO negotiations on the International Undertaking for Plant Genetic Resources, June 1998

During the past few weeks European citizens have been exposed to an aggressive publicity campaign in major European newspapers trying to convince the reader that the world needs genetic engineering to feed the hungry. Organised and financed by Monsanto, one of the world's biggest chemical companies, and titled "Let the Harvest Begin", this campaign gives a totally distorted and misleading picture of the potential of genetic engineering to feed developing countries.

We, the undersigned delegates of African countries participating in the 5th Extraordinary Session of the Commission on Genetic Resources, 8-12 June 1998, Rome, strongly object that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology that is neither safe, environmentally friendly, nor economically beneficial to us.

It is time to look at some of the facts about the company behind this campaign:

- Monsanto is one of the world's largest pesticide companies. During the past two years only it spent over US\$6,000 million to take control over other seed and biotechnology companies and is now the major industrial player in this field. Its major focus is not to protect the environment, but to develop crops that can resist higher doses of its best-selling chemical weedkiller 'Roundup'.
- Rather than stretching a helping hand to farmers, Monsanto threatens them with lawsuits and jail. In the USA, the company employs detectives to find and bring to court those farmers that save Monsanto soybean seeds for next year's planting. Backed by patent law, the company demands the rights to inspect the farmers' fields to check whether they practise agriculture according to Monsanto conditions and with Monsanto chemicals.
- Rather than developing technology that feeds the world, Monsanto uses genetic engineering to stop farmers from replanting seed and further develop their agricultural systems. It has spent US\$18,000 million to buy a company owning a patent on what has become known as Terminator Technology: seed that can be planted only once and dies in the second generation. The only aim of this technology is to force farmers back to the Monsanto shop every year, and to destroy an age-old practice of local seed-saving that forms the basis of food security in our countries.

In "Let the Harvest Begin" the Europeans are asked to give an unconditional green light to gene technology so that chemical corporations such as Monsanto can

start harvesting their profits from it. We do not believe that such companies or gene technologies will help our farmers to produce the food that is needed in the 21st century. On the contrary, we think it will destroy the diversity, the local knowledge and the sustainable agricultural systems that our farmers have developed for millennia and that it will thus undermine our capacity to feed ourselves.

In particular, we will not accept the use of Terminator or other gene technologies that kill the capacity of our farmers to grow the food we need. We invite European citizens to stand in solidarity with Africa in resisting these gene technologies so that our diverse and natural harvests can continue and grow.

We agree and accept that mutual help is needed to further improve agricultural production in our countries. We also believe that Western science can contribute to this. But it should be done on the basis of understanding and respect for what is already there. It should be building on local knowledge, rather than replacing and destroying it. And most importantly: it should address the real needs of our people, rather than serving only to swell the pockets and control of giant industrial corporations.

NAME:

Jean Marie Fodoun, Cameroun
 George A. Agbahungba, Benin
 Paul Therence Senghor, Senegal
 Koffi Goti, Côte d'Ivoire
 Mokosa Madende, Congo Democ
 Jean Jacques Rakotonalala, Madagascar
 Juvent Baramburiye, Burundi
 Worku Damena, Ethiopia
 Gietaturn Mulat, Ethiopia
 M. S. Harbi, Sudan
 Eltahir Ibrahim Mohamed, Sudan
 Maria A. Calane da Silva, Mozambique
 Kohna Nganara Ngawara, Tchad
 Nkeoua Gregoire, Congo
 Mugorewera Drocella, Rwanda
 H. Yahia-Cafrif, Algeria
 Abebe Demissie, Ethiopia
 G. P. Mwila, Zambia
 Dr S. H. Raljtsogle, Lesotho
 Naceu Hamza, Tunisia
 Hambourne Mellas, Morocco
 Elizabeth Matos, Angola
 Tewolde Berhane Gebre Egziabher, Ethiopia

Chief Executive Officers (CEOs), allowing attendance of just two NGO representatives, with barely a whisper of protest.¹³

During the five years between UNCED and UNGASS the world's mighty global corporations had mercilessly pursued their own objectives: free trade, liberalized investment and control over technology. The World Trade Organization (WTO), unlike UNCED, had teeth without meaningful public participation. The TNCs gave lip service to the importance of UNCED, but they saw to it that the WTO – not the United Nations – would control the critical processes of globalization.

In the post-UNCED age, sustainable development and environment issues folded into each other. This “unholy alliance”, as Wolfgang Sachs called it before Rio,¹⁴ led to deeper understanding in the international community of the relationship between environment and development, especially for the South. However, it also played into the hands of the TNCs, which could place virtually any project or practice with economic implications under the sustainable development umbrella.

Greenwashing Biotechnology

This is where Monsanto places its genetically engineered crops. At a time when even UN diplomats have tired of the rhetoric of sustainable development, companies like Monsanto have increased their use of the phrase to describe their activities. As a leading biotechnology company, Monsanto would have us believe they are also a leader of sustainable development. And in promoting this vision, they are using the techniques of Greenwash.

Monsanto CEO Robert Shapiro is a devoted practitioner of the sustainable development phase of Greenwash. Environmental concerns are still prominent as well, but sustainability is the cornerstone. In the company's 1996 Environmental Review, Shapiro writes, “Sustainable development will be a primary emphasis in everything we do.” The formulation is perfect: to the industry and public relations insider, Shapiro is saying that they will *emphasize* sustainable development aspects of everything they do. To the general public, on the other hand, Shapiro is saying they will become a company actually devoted to sustainable development itself. Back on the business side of the Annual Reports, Shapiro makes it clear that what they are devoted to is genetic engineering. His phrase, a classic example of greenspeak, is “genetically improved” crops.

When Monsanto introduced genetically “improved” crops into the US, there was no fanfare, no advertising campaign, no invitation to “hear all the opinions”. In fact, Monsanto has gone to great lengths to avoid debate about its transgenic products, primarily by fighting labelling. Posilac, Monsanto's recombinant Bovine Growth Hormone (rBGH) was introduced in the US over strenuous objections by consumer and family farm advocates. Monsanto threatened to sue states that wished to label milk products free of rBGH. As the *New York Times* noted recently, “Because most consumers are unaware of the amount of genetically engineered food that is available . . . it is hard to judge their resistance to such products.”¹⁵ The enormous benefit of consumer ignorance was not lost on Monsanto, and opposition to labelling became central to their strategy for introducing the new foods.

Thus when Monsanto's genetically engineered Roundup Ready Soybeans (RRS) were first planted commercially in the US, there was no significant public discussion of the fact that



for the first time, virtually all Americans were about to begin eating genetically modified ingredients in hundreds of processed foods containing soya. Monsanto opposed the segregation of the transgenic soybeans from conventional ones. The company said consumers did not need to know if they were eating Roundup Ready or not “since there was no difference” between them and ordinary soybeans.¹⁶ In other words, the public had no right to know, and no right to choose, whether or not to eat genetically engineered milk, soybeans or other foods. The major grain traders like Cargill and Archer Daniels Midland agreed with Monsanto,¹⁷ as did the authorities in Washington. Despite pockets of protest, transgenic soybeans were planted, harvested and mixed with the conventional crop and are now eaten by most Americans – yet only a tiny percentage of those Americans know of this fundamental change in their daily diet.

When it was time to export soybeans to Europe, which buys approximately 25 per cent of the US soy crop, Monsanto maintained its stance: no segregation, no labelling for RRS, no public right to know. The result was a public relations fiasco for the company. EU approval was still in process when the first shipments left the US in autumn 1997. Most European consumers were caught completely off guard – suddenly their diet was to contain genetically altered ingredients! They had not been warned, and the foods would not be labelled. The public was outraged. Several countries and companies began scrambling for RRS-free supplies of soya to reassure consumers. The soy market was thrown into considerable chaos.¹⁸ The arrogance of Monsanto – assuming that Europe would take the transgenic soya without questioning it – led to a political storm over the prosaic soybean.

What befuddles and irritates Monsanto and other genetic engineering advocates is that the storm has not subsided. They see European resistance to genetic engineering as “Ludite superstition”¹⁹ which must be overcome. “It is just another step in the history of agriculture,” according to Joseph Zak of the American Soybean Association, which is trying to fos-

Its commitment to food biotechnology is total. If food biotechnology goes down, Monsanto goes with it.

ter European acceptance of Monsanto's Roundup Ready soya.²⁰

Monsanto's current advertising campaign is best understood in the context of their first foray into the European market for genetically engineered food. Their miscalculation – that the European consumer would react the same as the US consumer – was so monumental that the company had no choice but to try a completely different approach. Their first approach was to suppress public awareness. Now they say "food is so fundamentally important that everyone should know all they want to about it." Only *after* the fiasco did the company convert to the belief that a "transparent approach will find favour with consumers everywhere."²¹ Monsanto's lately acquired commitment to dialogue, to reducing pesticide use, to feeding the world, is the reaction of a company in a dilemma. Its critics, perhaps annoyed at being named in the Monsanto ads, can take heart from the fact that these ads reflect the genuine threat that their efforts represent to the unfettered spread of food biotechnology. As Doug Parr of Greenpeace UK puts it: "These ads are a sign of a company losing an argument."

Yet Monsanto should not be underestimated. Its commitment to food biotechnology is total, and the financial community is bullish on the company's future. Monsanto has even spun off its traditional chemical businesses, preferring to concentrate on biotechnology as its strategic business. If food biotechnology goes down, Monsanto goes with it. Monsanto has of necessity developed some rather compelling-sounding arguments to bolster its contention that food biotechnology equals sustainable development and vice-versa.

The most dangerous of these arguments is that genetic engineering is the answer to the world's food supply problems. Monsanto tugs at our heart strings by pointing to the gap between a growing world population and food supply.²² In *The Independent* they tell us "worrying about starving future generations won't feed them. Food biotechnology will." Who would want to deny the world's poor children a chance for better nutrition, their parents a chance to grow crops more easily? Who would be so selfish as to oppose genetically altered foods for themselves when they will benefit the less fortunate? This is Greenwash with a Guilt Trip.

But will genetically engineered crops help feed the hungry? In theory, it is possible that some transgenic plants could be more nutritious, travel better, or produce better yields in harsh climates. But that is a far cry from bringing these foods to hungry people. In any case, Monsanto's main emphasis has been on developing crops that cannot conceivably play any part in feeding the impoverished masses of the third world. A detailed analysis of the relationship between genetic engineering and world hunger is beyond the scope of this article, but a brief look at few Monsanto products shows why the food supply argument is Greenwash.

For example, Monsanto's rBGH is designed to increase milk production. But the US already has an oversupply of milk, and the expense of using it excludes it from use by poor dairy farmers in the Third World.

Roundup-Ready soybeans are not designed to increase yield, though their ease of use might allow farmers to plant more soybeans (while increasing use of Monsanto's Roundup herbicide in those marginal acres). But these additional soybeans will not make it to the mouths of protein-deficient kids. Most soybeans end up in oil or become minor ingredients in a wide variety of processed foods never seen by undernourished peasants in Bangladesh or Chad.²³

Most of Monsanto's Yieldgard corn goes to animal feed. And so it goes for Monsanto's transgenic canola, sugar beets, cotton, corn or potatoes – none of them is designed to put food

in the mouths of hungry children.

Monsanto's exploitation of this emotional issue may create its own backlash. Diplomats from 24 African countries recently issued a joint statement with NGOs objecting "strongly that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology which is neither safe, environmentally friendly, nor economically beneficial to us."²⁴ [See box "Let the Harvest Continue" in this issue]

High technology, high input cash crops are not the solution for world hunger. They are, however, helpful to Monsanto's appetite for increased control over food production. Their purchase of seed companies, their contractual prohibitions on farmers' brown-bagging seeds, their opposition to smaller companies trying to avoid rBGH, their fear of labelling, all speak of a company anxious to advance our dependence on them for our basic sustenance.

In the long term, Monsanto believes it will win us over to transgenic crops. I imagine its executives see European opposition as a temporary setback, but one which will be inevitably overcome as progress – and profit – marches on. Their advertising campaign is necessary to undo the damage caused by the arrogance of the last few years, just a small price to pay considering what is at stake for them.

In Monsanto's 1995 Environmental Review, CEO Shapiro wrote: "There have been times in Monsanto's 94-year history when we, like others, weren't as aware of our actions as we should have been. These days have been over for a long time." Critics of genetic engineering are crying out for a re-evaluation of Shapiro's conclusion. Perhaps he should call the numbers in their advertisements after all.

Kenny Bruno is the the Co-author, with Jed Greer, of *Greenwash: the Reality Behind Corporate Environmentalism*, 1996, Third World Network, Penang, Malaysia.

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Why Biotechnology and High-Tech Agriculture Cannot Feed the World

by Andrew Kimbrell

Kenny Bruno has shown quite clearly why Monsanto's flagship products cannot, by the widest stretch of the imagination, help feed the world. In this article, Andrew Kimbrell shows why neither biotechnology in general, nor indeed high-input agriculture itself can conceivably do so.

“Guess Who’s Coming to Dinner? 10 billion by 2030” proclaims the headline on Monsanto’s home page. The company warns of the “growing pressures on the Earth’s natural resources to feed more people.” The agribusiness giant then cautions that low-technology agriculture “will not produce sufficient crop yield increases and improvements to feed the world’s burgeoning population.”

However, there is no need to despair, because, according to Monsanto, “Today’s high-yield agriculture is a stunning success . . .” Further, the company asserts that “biotechnology innovations will triple crop yields without requiring any additional farmland, saving valuable rainforests and animal habitats.” Even better, the biotechnology revolution will mean “less chemical use in farming.”² The conclusion is obvious and one that will be trumpeted in an upcoming Monsanto ad campaign “Biotechnology can feed the world . . . let the harvest begin.”³

Monsanto’s current commercial propaganda is steeped in numerous dangerous modern agricultural myths about hunger, food production and agriculture. Unfortunately, these myths have been, and are being, repeated so often that they are taken as true. They provide convenient cover for Monsanto and the other agribusiness and biotechnology transnationals which are themselves a major culprit in increasing world hunger. Unmasking these myths needs to be an ongoing task for those advocating sustainable agriculture. So, let us begin by examining the four primary and interrelated myths used by Monsanto in its current ads and public information campaign.

• **World hunger is caused primarily by a shortage of food with which to feed a growing population.**

There is no myth about hunger. It is estimated that 786 million people go hungry each day. And hunger is increasing. From

1970 to 1990, with the exception of China, the number of hungry people in the world increased by more than 11 per cent.⁴

The myth is not about hunger but rather its primary cause. Monsanto would have us believe that as the world population increases, food production just cannot keep up. The result is that hundreds of millions are hungry. Yet numerous studies and statistics refute this claim. In fact, even as world hunger has increased since 1970, so has the food production per capita. In South America the number of those hungry went up by 19 per cent. Yet per capita food supplies rose almost 8 per cent. In south Asia hunger and food per capita both increased by 9 per cent.⁵

These statistics and numerous others indicate that population growth has not been, at least so far, the primary cause of the increase in hunger since 1970. Total food theoretically available for each person has actually increased significantly. What then is the primary cause of world hunger? The basic cause is food dependence. The industrial system has, over centuries, in virtually every area of the globe, “enclosed” peasants off the land so that the land can be used for export crops. The profits gained from these exports is the essential “primitive accumulation of capital” required for industrial development in any society. The result of enclosure has been, and continues to be, that untold millions of peasants lose their land, community, traditions and most directly their food independence. Removed from their land, they

then flock to the newly industrialized cities where they quickly become a class of urban poor competing for low-paying jobs in the urban industrial setting. Those that stay on the land generally attempt to survive by low-paying farm work on the large newly industrialised farms. Currently, more than half a billion rural people in the Third World are landless, or do not have sufficient land to grow their own food.⁶

After enclosure, both the urban and rural poor are com-

Monsanto's current commercial propaganda is steeped in numerous dangerous modern agricultural myths about hunger, food production and agriculture. These myths have been repeated so often that they are now taken as true.



THOMAS RAUPACH/GENETIC RESEARCH, GERMANY

After enclosure, both the urban and rural poor are completely food-dependent. Their access to food is solely by purchase and should they lose that purchasing power they starve. Increasing agricultural output has little effect on the hungry because it fails to address the key issues of access to land and purchasing power which are at the root of hunger. As summarized in an upcoming Food First Report, "If you don't have land on which to grow food or the money to buy it, you go hungry no matter how dramatically technology pushes up food production."⁷

• **Larger, technology-intensive farms are more efficient for food production.**

The myth that bigger, technology-oriented farms are better is a corollary of the myth that food output is the solution to hunger. To address world hunger, we need more output, therefore we need larger farms and more advanced technology.

The most immediate effect of this drive towards larger, more technology-intensive farms is that it accelerates the tragic enclosure trend. In the United States since World War II the size of the average farm has more than doubled. At the same time, the number of farms has dropped by two-thirds and the number of farmers by twice that percentage.⁸ The pattern is familiar, the destruction of rural communities, the exodus to the cities of thousands of uprooted and impoverished farmers and others in the rural communities. The result: increases in unemployment, crime, food-dependency and hunger. As large-scale farms and technologies continue to proliferate in the Third World, even more dire consequences are predicted.

It is not only the size of farms which obliterates farm communities and food-independence, but also the technology applied. New technological advances replace workers in agriculture, and represent economic disaster for all but the largest farms. As one researcher investigating biotechnology notes: "The majority of farmers do not benefit from technological change: 'the farmer beneficiaries are largely limited to the

early adopters – usually larger operators.' They are able to expend quickly the capital to invest in the new technology. They profit even as the price per unit drops. At the same time, the price drop hampers the efforts of late adopters to remain in the changing market."⁹

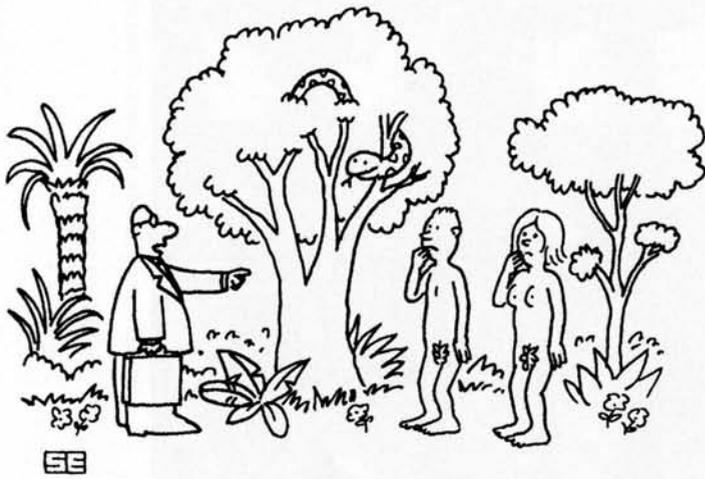
Monsanto and others have acknowledged the price that technology and size exact from the farm community but insist it is the price that has to be paid for greater efficiency in food production. But as writer and activist Marty Strange has detailed, large farms are *not* more efficient. Her research convincingly demonstrates that even by conventional assessments of efficiency medium-sized farms are the most efficient.¹⁰ Moreover, the calculations which support even the more moderate

Even by conventional assessments of efficiency which exclude 'externalities' like water and air pollution, top soil and biodiversity loss, medium-sized farms are the most efficient

"economy of size" view that bigger is better are fatally flawed. Conventional efficiency analysis completely ignores the social and environmental cost of large-scale industrial farming. The costs of water and air pollution, topsoil loss, biodiversity loss are not considered. Numerous studies have shown that large farms have far greater environmental impacts than smaller farms, including up to 40 per cent more erosion – whose consequences are at present being masked by increasing application of artificial fertilizers, but which must increasingly affect farm output.

The efficiency analysis also ignores the human health costs of consuming foods contaminated with pesticides, hormones and other poisons. The dislocation, over the decades, of millions of farmers and thousands of farm communities also does not appear in the efficiency calculation. All these costs are viewed as external to farm production and termed "externalities". With these costs excluded the public is never informed of the "real" price of the food produced on large industrialized farms.

What's more, the efficiency analysis does not take into consideration the unique character of small farms. In that it is



"I'm afraid I'm patenting you"

measuring only outputs, the economy of size view ignores significant advantages that small farms have in reducing input. For example, diversification increases efficiency because it allows the more complete use of inputs, such as a variety of crops grown in different seasons. As Strange summarizes, "In agricultural economics, a bias against diversification persists, reflecting the conviction that doing one thing well on a large scale is more important than doing many things well on a small scale. It is a function of our fixation with maximums, and our indifference to optimums."¹¹

In 1989, the United States National Research Council was

asked to assess the true efficiency of large industrial farms versus alternatives. Their conclusion went exactly contrary to the "bigger is better" myth:

"Well managed alternative farming systems nearly always use less synthetic chemical pesticides, fertilizers, and antibiotics per unit of production than conventional farms. Reduced use of these inputs lowers production costs and lessens agriculture's potential for adverse environmental and health effects without decreasing – and in some cases increasing – per acre crop yields and the productivity of livestock management systems."¹²

• **"Low-tech" alternatives to high-yield industrial crop production require more land to produce the same output, thus threatening wetlands, forests and other unique ecosystems.**

Monsanto and other agribusiness conglomerates are seeing the birth of a powerful new competitor for consumers in the United States and Europe, organic food production. No longer a "niche" market, the organic food market soared to \$4 billion in the United States in the mid-1990s and is increasing 20 per cent each year. Over 2 million American families now buy organic, with more than 14 million searching out "natural" foods. Of even greater concern to Monsanto is the growing resistance to its corporate tactics and message in India and other Third World nations. Public outcry has forced the corporation to back down on numerous enterprises. The bigger is better myth is beginning to lose its power.

Monsanto's response has been to launch media attacks on "low-tech" agricultural alternatives. The company does so

Run-Away Industrial Technologies

Agrochemical genetic engineering (AGE) is the third generation of run-away industrial technologies. The first and second generation technologies were petrochemical and nuclear, emerging in the 1940s and 1950s, respectively. At their inception, these technologies were widely greeted as triumphs of industrial innovation with immense potential benefits for humanity. Needless to say, there was scant consideration for their possible ecological and public health implications, which as everybody knows, have proved extremely serious.

In striking contrast, and as described in this issue of *The Ecologist*, there is, even at this early stage of the era of agrochemical genetic engineering, a wealth of scientific data which more than justifies an international ban on the new technology — a ban which would in any case be justified by social and ethical considerations alone. What makes the argument for a ban even more persuasive is that serious evidence of the value of these technologies for feeding the poor and the hungry has yet to be provided.

Government authorities simply cannot ignore the numerous studies in peer-reviewed scientific journals which point to the veterinary and public health hazards of rBGH milk. No serious studies have yet appeared to suggest that these hazards have been exaggerated. The biotechnology industry has of course reacted to these studies but only with biased press releases or unpublished critiques, by their indentured academic spokesmen. For this reason the scope of the AGE debate should be widened and extended to the

international public health and independent scientific communities whose contributions to this relatively new issue have, so far, with singular notable exceptions, been minimal.

At the same time, rather than look at this new technology on its own, scientists and regulatory authorities should see it as motivated by the same commercial considerations that led to the development of the nuclear industry with all its empty promises (that it would produce electricity "too cheap to meter" for instance), and which has created large-scale and largely irreversible pollution problems throughout the world. They should note also that the development of the petrochemical industry, which has made possible industrial agriculture and hence the green revolution in the third world — with its equally empty promises, was similarly motivated. As is generally known it has left a legacy of erosion, desertification and pollution, forced countless millions of small farmers off the land and into the slums and has undermined our health with its devitalized, pesticide-contaminated foods, whose consumption has made singular contribution to the growth of a number of chronic diseases, including cancer which now affects nearly one person in two.

Fortunately there is evidence that the public is becoming increasingly aware of these issues, hence the phenomenal growth in the demand for organic food — not only so as to avoid having to consume pesticide-contaminated food, but also food that has been genetically manipulated.

by Dr Samuel Epstein



MIKE SCHROEDER/GENETIC RESEARCH, GERMANY

output as their industrial, chemical-based counterparts.¹³ Additionally, the Monsanto argument fails to account for the declining yields now associated with the technological and chemical-intensive "Green Revolution" foisted on the Third World. In the Philippines, India and Nepal research is indicating significant loss in yields after they peaked in the 1980s.¹⁴ Soil degradation and a proliferation of pests, typical of large-scale monoculture farming are suspected as the culprits in the decline.¹⁵

Researchers at the Henry Wallace Institute also note that, just as industrial agriculture destroys the productivity of farmland, it also compromises other food sources. Chemical contamination and eutrophication (primarily from runoff of nitrogen and phosphorus from cropland) threaten the productivity of the marine and aquatic systems responsible for much of the world's food supplies. Sixty per cent of the world's population receive more than 40 per cent of the yearly protein from fish and seafood.¹⁶ Chemical contamination has also devastated wildlife and the very biodiversity that Monsanto now claims to want to protect.

under the guise of being environmentally conscious. Given the corporation's record on environmental issues, this stance is not credible, yet Monsanto persists. Their primary claim (which they are attempting to transform into a new myth) is that in order to "feed the world" low-tech agriculture (with its purportedly low yields) will need to massively expand the amount of land being used to grow food, which will destroy important wildlife habitat and other vital ecosystems.

As described above, however, numerous studies continue to indicate that alternatives to industrial, high-tech agriculture are, when properly calculated, at least as efficient in producing

Over 2 million American families now buy organic, with more than 14 million searching out "natural" foods.

• Biotechnology will feed the world, with less chemical use less pollution and fewer resources

Monsanto's recent ad campaigns have been almost entirely devoted to purveying the myth that biotechnology

can feed future generations and can replace chemical agriculture. Though Monsanto built its financial success selling the world's leading herbicide Roundup and other agricultural poisons, it now purports to reject the chemical industrial model. "More Biotechnology Plants Mean Less Industrial Ones," proclaims the headline of one ad. "The world grows its food at great cost to the environment," it continues. The ad then bemoans the environmental impacts of "insecticides, fertilizers and herbicides". It concludes, "At Monsanto, we believe plant biotechnology can limit industrial and chemical impact on the earth. For instance, we have developed crops that are insect-resistant, in some cases eliminating the need to apply insecticides altogether."¹⁷

In reality of course, much of Monsanto's work in biotechnology will directly or indirectly lead to the use of more chemicals in agriculture. Most of the genetically engineered foods on which Monsanto has over a dozen patents are crops genetically engineered to be resistant to the herbicide Roundup.¹⁸ Now farmers can buy and use ever more Roundup with the resulting contamination of air, water and food. Monsanto as noted in their ad has also engineered a version of the natural pesticide Bt into a variety of food plants hoping to make them pest-resistant. This technology has not yet proven successful,

Agriculture as War

Monocultures and monopolies symbolize a masculinization of agriculture. The war mentality underlying military-industrial agriculture is evident from the names given to herbicides which destroy the economic basis of the survival of the poorest women in the rural areas of the Third World. Monsanto's herbicides are called "Roundup", "Machete", "Lasso". American Home Products which has merged with Monsanto, calls its herbicides "Pentagon", "Prowl", "Scepter", "Squadron", "Cadre", "Lightning", "Assert", "Avenge". This is the language of war, not sustainability. Sustainability is based on peace with the Earth.

Vandana Shiva

and will almost certainly have the effect of creating widespread resistance in pest populations to Bt. This would be a near-death blow to many organic farmers for whom Bt is an essential pest control tool. If Bt is lost because of increased pest-resistance, the only alternative for many farmers will be to increase the use of pesticides.

However, Monsanto has been guilty of an even more important sleight of hand in the selling of the biotech myth. Monsanto knows that most of the world's population is familiar with and concerned about chemical pollution from agriculture and industry. This is bad enough, but biological pollution is more fundamental and very much more malignant, as is evident when exotic plants, animals or other organisms are released into the environment. In the United States this type of biological pollution, including the invasion of the US by the Gypsy Moth, the Kudzu vine and the organisms responsible for Chestnut Blight and Dutch Elm Disease, has wreaked environmental havoc. Now Monsanto and others are releasing thousands of new genetically engineered microbes, plants and animals into the environment. Each of these genetically altered organisms is a potential "exotic" which could harm the environment. The long-term impact of thousands upon thousands of genetically modified organisms could well eclipse the damage that has already resulted from the wholesale release of petro-chemical products.

In the case of chemical pollution, the offending chemical

does not reproduce itself, and though it might spread, its concentrations will become increasingly dilute. Thus the damage caused by chemical pollution is most often localized and dissipates with time. With biological pollution, and hence the release of biotechnological organisms, the disturbance to the ecosystem increases and intensifies as the organisms multiply, disseminate and mutate. The problem will not remain localized, but will expand in a potentially irreversible manner. For example, if pest-resistance spreads from crops to weeds, the

disease-resistant weeds will multiply and be virtually impossible to isolate and control (even with the massive and indiscriminate use of herbicides). Each release of a genetically modified organism is a form of ecological roulette which Monsanto and others are playing. The ecosystem can only be the loser. Biological pollution may well be the most urgent pollution problem of the 21st century.

Beyond the problems of biological pollution, biotechnology completes the enclosure process in agriculture. Monsanto and other transnationals are now patenting the genes, plants and animals essential for agricultural production. Monsanto has developed the ability to sterilize seeds genetically so they cannot be saved. These companies are enclosing the genetic commons of all agricultural life making all farmers and consumers even more dependent on corporate entities for their very survival.

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Monsanto's response has been to launch media attacks on "low-tech" agricultural alternatives. The company does so under the guise of being environmentally conscious, but given the corporation's record on environmental issues this stance is not credible.



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How Monsanto 'Listens' to Other Opinions

by Peter Montague

"In advertisements in the national press, Monsanto promised to supply readers with the addresses of vocal green critics of the food industry. It was rare for a company to give free publicity to its opponents, Monsanto boasted, 'but we believe that food is so important, everyone should know all they want to about it'. But the claim that this was an open, transparent company raised hollow laughs on the other side of the Atlantic".¹

In the autumn of 1996, award-winning reporters Steve Wilson and Jane Akre were hired by WTVT in Tampa to produce a series on Monsanto's controversial milk hormone, rBGH, in Florida milk. After more than a year's work on the rBGH series, and three days before the series was scheduled to go on air starting February 24, 1997, Fox TV executives received the first of two letters from lawyers representing Monsanto saying that Monsanto would suffer "enormous damage" if the series ran. Although WTVT had been advertising the series aggressively, they cancelled it at the last moment. Monsanto's second letter warned of "dire consequences" for Fox if the series went on air as it stood. (How Monsanto knew what the series contained remains a mystery.) According to documents filed in Florida's Circuit Court (13th Circuit), Fox lawyers then tried to water down the series, offering to pay the two reporters if they would leave the station and keep mum about what Fox had done to their work. The reporters refused Fox's offer, and on April 2, 1998, filed their own lawsuit against WTVT.

Steve Wilson has 26 years' experience as a working journalist and has won four Emmy awards for his investigative reporting. His wife, Jane Akre, has been a reporter and news anchor for 20 years, and has won a prestigious Associated Press award for investigative reporting.

The Wilson/Akre lawsuit charges that WTVT violated its licence from the Federal Communications Commission (FCC) by demanding that the reporters include known falsehoods in their rBGH series. The reporters also charge that WTVT violated Florida's "whistle blower" law. Many of the legal documents in the lawsuit – including Monsanto's threatening letters – have been posted on the world wide web at <http://www.foxbghsuit.com> for all to see.

No one will be surprised to learn that powerful corporations can intimidate TV stations into rewriting the news, but this

case offers an unusually detailed glimpse of specific intimidation tactics and their effects inside a news organization. It is not pretty.

It has been well-documented by Monsanto and by others that rBGH-treated cows undergo several changes: their lives are shortened, they are more likely to develop mastitis, an infection of the udder (which then requires use of antibiotics, which end up in the milk along with increased pus), and they produce milk containing elevated levels of another hormone called IGF-1. It is IGF-1 that is associated with increased likelihood of human cancers.²

The US Food and Drug Administration (FDA) approved rBGH for use in cows in 1993, but the approval process was controversial because former Monsanto employees went to work for the FDA to oversee the approval process, and then returned to work for Monsanto.

Monsanto is notorious for marketing dangerous products while falsely claiming safety. The entire planet is now contaminated with hormone-disrupting, cancer-causing PCBs (polychlorinated biphenyls), thanks to Monsanto's poor judgement and refusal to be guided by early scientific evi-

dence indicating harm [see J. Cummins in this issue]. The 2,4,5-T in Agent Orange – the herbicide that has brought so much grief to tens of thousands of Vietnam veterans – is another example of Monsanto's poor judgement and failure to heed scientific evidence to prevent harm [see H. Warwick in this issue]. Critics warn that rBGH is just one more example of Monsanto's monumentally poor judgment. When Wilson and Akre asked Monsanto officials to respond to these allegations of past poor judgement, Monsanto had no comment.

If the Wilson/Akre rBGH series was never shown by Fox TV, the script is nevertheless available to those interested on the website www.foxbghsuit.com. What follows are some of the more enlightening points it raises:

No one will be surprised to learn that powerful corporations can intimidate TV stations into rewriting the news, but this case offers an unusually detailed glimpse of specific intimidation tactics and their effects inside a news organization.

• rBGH was never properly tested before the FDA allowed it on the market. A standard cancer test of a new human drug requires two years of testing with several hundred rats. But rBGH was tested for only 90 days on 30 rats. This short-term rat study was submitted to the FDA but was never published. The FDA has refused to allow anyone outside the FDA to review the raw data from this study, saying it would "irreparably harm" Monsanto.³ Therefore the linchpin study of cancer and rBGH has never been subjected to open scientific peer review.

• Some Florida dairy herds grew sick shortly after starting rBGH treatment. One farmer, Charles Knight – who lost 75 per cent of his herd – says on camera that Monsanto and Monsanto-funded researchers at University of Florida withheld from him the information that other dairy herds were suffering similar problems. He says Monsanto and the university researchers told him only that he must be doing something wrong.

• The law required Monsanto to notify the FDA if they received complaints by dairy farmers such as Charles Knight. But four months after Knight complained to Monsanto, the FDA had heard nothing from Monsanto. Monsanto's explanation? Despite a series of visits to Knight's farm, and many phone conversations, Monsanto officials say it took them four months to figure out that Knight was complaining about rBGH.

• Monsanto claims on camera that every truckload of milk is tested for excessive antibiotics – but Florida dairy officials and scientists on camera say this is simply not true.

• Monsanto says on camera that Canada's ban on rBGH has nothing to do with human health concerns – but Canadian government officials speaking on camera say just the opposite.

• Canadian government officials, speaking on camera, say they believe Monsanto tried to bribe them with offers of \$1 to \$2 million to gain approval for rBGH in Canada. Monsanto officials say the Canadians misunderstood their offer of "research" funds.

At the website, you will find the version of the Wilson/Akre rBGH series as it was re-written by Fox's attorneys. It has been laundered and perfumed. Most importantly, nearly all the references to cancer have been removed from the script.

• Monsanto officials claim on camera that "the milk has not changed" because of rBGH treatment of cows. As noted earlier, there is abundant evidence – some of it from Monsanto's own studies – that this is definitely not true.

• On camera, a Monsanto official claims that Monsanto has not opposed dairy co-ops labelling their milk as "rBGH-free". But this is definitely not

true. Monsanto brought two lawsuits against dairies that labelled their milk "rBGH-free". Faced with the Monsanto legal juggernaut, the dairies folded and Monsanto then sent letters around to other dairy organizations announcing the outcome of the two lawsuits – in all likelihood, for purposes of intimidation. (Conveniently, the FDA regulations that discourage labelling of milk as "rBGH-free" were written by Michael Taylor, an attorney who worked for Monsanto both before and after his tenure as an FDA official.)

At the website www.foxbghsuit.com, you will find the version of the Wilson/Akre rBGH series as it was re-written by Fox's attorneys. It has been laundered and perfumed. Most importantly, nearly all the references to cancer have been removed from the script. Instead of cancer we now have "human health effects" – whatever those may be.

The Wilson/Akre story is one of talented, hard-working journalists trying to tell an important public health story, exposing lies and corruption by Monsanto, by the FDA, and now by Fox, too. If nothing else, perhaps the courage of Steve Wilson and Jane Akre will awaken many more of us to the potential dangers of Monsanto's latest experiment on America's children.

Peter Montague is the Editor of The Environment Research Foundation's weekly publication Rachel's Environment and Health Weekly, PO Box 5036, Annapolis, MD 21403-70336, USA.

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Hiding damaging information from the public

by Steven Gorelick

Getting a government stamp of approval for your genetically-engineered food product may not suffice if the public hears about studies documenting serious health and environmental problems. Even though the corporate-run media is unlikely to run stories on the hazards of biotech when there are so many details about Monica Lewinsky's wardrobe to disseminate, potentially embarrassing information must nonetheless be kept carefully under wraps:

- As Jennifer Ferrara points out in this issue, it took leaked information by a whistleblowing researcher to bring to light severe health and reproductive problems in cows treated with rBGH in a Monsanto-commissioned study at the University of Vermont (UVM). Even an investigation by the US General Accounting Office (GAO) could not prise critical data from UVM and Monsanto.¹

- Three British scientists who analysed data on rBGH for Monsanto found that the hormone was linked to increased pus and bacteria counts in milk – much higher than reported by Monsanto looking at the same data. According to the scientists, Monsanto tried to block publication of their research.²

- Shortly after the staff of the Center for Ethics and Toxics (CETOS) completed their book, *Against the Grain*, an account of the perils of agricultural biotechnology, their publisher received a threatening letter from Monsanto's General Counsel's office, claiming that a short article titled "Genes in Your Beans", adapted from the book, was defamatory and potentially libellous. The publisher, fearing a major lawsuit, stopped the presses, and told Monsanto the book would not be published.³

- When an Iowa dairy co-operative decided to advertise that their company "will not knowingly accept milk from BST-treated cows", Monsanto filed suit to prevent them from doing so. A milk and ice-cream company in Waco, Texas was also sued for similarly labelling its products.⁴ Monsanto lawyers also sent letters to 2,000 retailers warning them against advertising that they carry "rBST-free milk", and sent a 30-page "legal memorandum" with a similar message to 4,000 food processors and dairy co-operatives.⁵

- Two days into Vermont's 1998 legislative session, Monsanto sent a letter to policy-makers threatening to sue the state if a proposed voluntary rBGH labelling bill became law. Governor Howard Dean reversed his earlier support for the bill and instead threatened to veto it.⁶

The corporation also polishes its image by giving away a tiny portion of the billions it earns to science and mathematics programmes, cultural events and social service projects. Such give-aways are not only a small price to pay for an improved public image, they can even help silence dissent, as when the Missouri Botanical Garden – recipient of a \$3-million grant toward construction of a Monsanto Research Center – pulled

... at *The Guardian*

Just over a week ago, three representatives of Monsanto were thumping the table in the editor's office at *The Guardian*. They demonstrated a vocal range that visitors to the paper rarely exhibit. Monsanto's American reps were concerned about the paper's coverage of developments in biotechnology. The coverage was too negative, they suggested.

Its approach was anti-science and anti-technology. Where were the positive stories about the benefits that genetic engineering could bring to the world? What about some recognition of the commercial risks taken in pioneering the technology and of the ongoing research that the company continued to fund? Why was there so little appreciation of how Monsanto had accepted that there was another side to the story and, in its multimillion dollar publicity campaign for its products, was directing members of the public to organizations with opposing views?

Monsanto is not shy in coming forward. As the remarkable advances in genetic engineering unfolded in the late 1980s, the company was extraordinarily quick to offer science journalists expenses-paid trips to its headquarters at St Louis in Missouri.

Taken from a recent article by Bill O'Neill, editor of ONLine *Guardian* on the military uses of genetic engineering.

copies of the environmental quarterly *Confluence* from its literature table. The periodical's offence? It claimed that Monsanto had a "poor environmental record".⁷

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SLAPPIng Resistance

by Andrew Rowell

This month [September] five women from the GenetiX Snowball campaign will appear in Court charged with criminal damage. GenetiX Snowball is a campaign of non-violent civil responsibility whose intention is to build active resistance to biotechnology as a way of promoting dialogue with a government that has not asked whether people want this unproven and irreversible technology.

"One of the most important things about this campaign is taking direct action," argues Katherine Tulip, from GenetiX Snowball, a 39-year-old solicitor, "I believe that this was necessary because the Government wasn't listening to what people were saying and had waived its responsibility. The regulatory bodies such as ACRE that have been set up are wholly inadequate, and the only people who seem to be in control are the transnationals and they are putting profit before people's health and their environment. They refuse to accept liability for the risks of genetic modification. It has been left to

individuals to take responsibility."

Others too, believe that the government, having failed in its responsibility on GMOs, is forcing citizens to take action. "There are moments and issues in history where parliament is inadequate and it falls to the people themselves to act. With the case of genetic engineering and the granting of patents on life, I believe we have reached one of those historic moments," argues Alan Simpson, MP.

In July, the five women participated in the group's first action against a Monsanto test site in Oxfordshire. Wearing protective suits, the five each pulled up a symbolic number of plants. One of the protesters, Katherine Tulip, chose 64 for the number of experimental trials in the country. Another, Zoë, plucked just one plant, as it was the first action. All the women now face unlimited damages, which could run into millions of pounds.

"Monsanto's strategy is simply to silence people who are



NICK COBBING/DAVID HOFFMAN PHOTO LIBRARY

Monsanto Took Me to Court – and Lost!

I was sued last winter by the US agrochemical corporation Monsanto for distributing an announcement on GENESIS, an electronic mailing list in Germany concerned with novel food.

I received a message from Greenpeace activists in Düsseldorf who were preparing a demonstration against Monsanto Germany on 25th November, 1996 to protest about the import of RR-Soya, Monsanto's genetically engineered soybeans. It was the first time that a genetically engineered organism had been used in processed foods imported into the European common market.

I decided to post the announcement to the mailing list. Two days later, I received a letter from a German lawyer representing Monsanto. It stated that I had distributed a proclamation on the Internet calling Monsanto a "corporation of poisons, genes and swindle". (The slogan came from the Greenpeace activists.)

Monsanto claimed that I offended the company with the word "swindle" and endangered their creditworthiness. They gave me three days to sign a declaration promising never again to say "Monsanto, the corporation of swindle". Every time I repeated this sentence, I would have to pay Monsanto 100,000 DM (\$66,666).

I sent Monsanto's lawyer a fax refusing to sign the declaration, firstly because I was not the author of the proclamation, and secondly, the opinions expressed are

sheltered by the German constitution.

Monsanto asked a Düsseldorf court for a ruling that would forbid me to speak or write the sentence. The court granted a preliminary judgement, ruling that if I repeated the sentence, I would have to pay 500,000 DM (\$333,333) or spend six months in prison.

Monsanto argued that because the proclamation was distributed on the Internet, anyone with an Internet connection could read the message. But the GENESIS EMail list had only 24 members and wasn't directly reachable from the Internet.

How did Monsanto know about the proclamation? Court proceedings revealed that Monsanto's public relations in Germany are performed by the New York company Young & Rubicam (Y&R). A so-called "Internet counsellor" from Y&R who subscribed to GENESIS received the proclamation in the US. From there, the message was redirected to the Y&R subsidiary in Frankfurt, which faxed it to Monsanto Germany in Düsseldorf.

In court, the Y&R Internet counsellor declared that he read an explanation of how to subscribe to GENESIS on one of my web pages, and he presented a copy of the said page. But everyone could see that the page was about GENTECH, not GENESIS.

On 8th January, 1997, all of Monsanto's claims were rejected. I won. Monsanto has to pay the court costs.

Werner Reisberger, Schoellmannstr. 20, D-44807 Bochum, Germany.

protesting against what they do", argues Katherine Tulip. "I believe it is a classic SLAPP." SLAPPs, or Strategic Lawsuits Against Public Participation, are designed to chill people into silence, by suing them for defamation, injury or conspiracy, not necessarily to win the case, but to bring victims to the point where financially or emotionally they cannot continue their defence. According to Professor Pring of the University of Denver, in Colorado, who first coined the term, "SLAPPs send a clear message: that there is a 'price' for speaking out politically."²

SLAPPs work best when eco-protesters have the most to lose – homes and careers, for example – and have been

used to stop Middle England becoming involved in anti-roads activism, although they were first deployed in this country by McDonalds in the famous McLibel case. In the case of Monsanto's action, it is strategic legal intimidation, designed to stop the spread of concern against its GMO crops.

"By suing us for damages," continues Katherine, "they hope it will shut us up and discourage other people from participating. But people don't like the idea of a small group of people being stamped on by a big corporation like Monsanto. I think it will backfire on them – it brings to mind the McLibel case – us being David and Monsanto being the Goliath."³

Monsanto is undertaking a two-pronged strategy to get GMOs onto Europe's dinner tables. Whilst undertaking intimidating legal action, the GMO Goliath has mounted an

unprecedented advertising campaign and PR offensive to woo over consumers to the biotechnology cause.

This is not the first time the company has used intense public relations and intimidation. Monsanto have a history of aggressive litigation and action aimed at its critics and those who do not sanction its products in North America.

Monsanto's legal action has set a pattern for others to follow. In August two women were charged with £605,000 of damages for undertaking direct action at the National Institute of Agricultural Botany (NIAB) trial site in Devon. But only time will tell whether Monsanto's high-risk, high-profile tactic will work.

If it is trying to silence its critics then the tactic could well backfire, as did the McLibel case. Although McDonalds won the legal action, they were generally regarded as having lost the PR battle, and it may be the PR war that determines whether European consumers swallow GMOs.

Andy Rowell is a freelance consultant and author of *Green Backlash – Global Subversion of the Environmental Movement*, Routledge, 1996. He is currently working for the International Society for Ecology and Culture (ISEC) in Devon.

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“Monsanto: You Have Shamed Us”

by Freida Morris

It was a hot and exciting Saturday afternoon, July 18, when protesters gathered on the lawn of Monsanto World Headquarters, in Creve Coeur, a suburb of St. Louis. As the heat hovered near 100 degrees Fahrenheit, demonstrators marched with giant puppets, masks, black armbands, and signs informing the world and the world's largest agricultural biotech company that “Monsanto, you have shamed us.”

The demonstrators came from all over the United States, and from Japan, India, Mexico, the UK and Belgium. They arrived by bus and car, parked in the lot of a nearby church and headed for the manicured Monsanto site, where they found a group of sullen company guards and a sign saying “Welcome”. Quickly taking down the sign, the demonstrators made it apparent their ardour would not be dampened nor their protest contained.

The demonstration was part of the First Grassroots Gathering on Biodevastation, a conference hosted by three US groups: the Gateway Green Alliance, the Pure Food Campaign and the Edmonds Institute. The conference – focussing on genetic engineering – was co-sponsored by organizations ranging from the Industrial Workers of the World to the Vegetarian Society of St. Louis, from the Sierra Club and Greenpeace, to the Sisters of Loretto and the local Lickhalter Bakery.

The action at Monsanto had been billed as a “field trip to a site salient for biotechnology”.

Don Fitz of the St. Louis area Gateway Greens led off the rally in a pig mask and tuxedo, decorated with a sign indicating “Monsanto PR agent. Mine is the only truth you have to hear.” Some 150 demonstrators circled the company's lawn, chanting anti-Monsanto slogans and occasionally seeking refuge in the shade of nearby trees. The marchers, led by two giant puppets, voiced a long list of complaints about everything from the company's lack of labelling of its genetically engineered foods (“If you're so proud of it, why don't you label it?”) to Monsanto's recent purchase of the company that developed the seed-killing technology that strips farmers of their ancient right to save seeds (“Terminate the Terminator.”)

There was a kind of joy to the demonstration, as participants marched in the sweltering sun, carrying homemade signs, shouting slogans, and cajoling passing motorists to honk their horns in support. The demonstrators sucked ice cubes and ate ice-cream to keep cool. They took pictures of themselves in front of the Monsanto Corporation sign. And they laughed, despite the sweltering heat. As Hope Shand of the Rural

Advancement Foundation International (RAFI) noted later, “It just felt therapeutic to be out there shouting at Monsanto.”

After half an hour, activist Beth Burrows of the Edmonds Institute asked the crowd to gather in the shade for speeches. She exhorted them to punctuate her opening remarks with a chorus of “Monsanto, you have shamed us.” And the crowd obliged.

“This large company . . . does not represent what was supposed to have been the American dream,” she began.

And the crowd answered, “Monsanto you have shamed us.”

She continued: “That dream was not meant to be a dream of theft of the seeds and plants of other people.”

“Monsanto you have shamed us,” they responded.

“That dream was not to have been about millions of tons of pollution you poured into the Mississippi.”

“You have shamed us,” the crowd said again.

“That dream was not about the Agent Orange you produced or the dioxins your research lied about or about any of the products that you have brought us.”

“Shame.”

“It was not about injecting cows with recombinant bovine growth hormone no one wanted . . . it was not about a terminator technology designed to kill seeds and ensure profits . . . It was not about a whole world of Roundup-Ready crops.”

“Monsanto, you have

shamed us.”

“It was not meant to be a dream of fake research or television companies or book publishers pressured to lie and lie and lie,” she went on.

And as she recited a litany of corporate crime, the crowd punctuated each deed with its chorus of “shame”. At the end, the speaker asked for a moment of silence to contemplate or pray for the rehabilitation of the company. After that moment, she turned the bullhorn over to a long series of other speakers.

Greens organizers Don Fitz, Mark Quercus and Tammy Shea said the rally was the culmination of years of effort to expose Monsanto's shameless disregard for safety, the environment and human health. They passed out literature, playing upon Monsanto's newly trade-marked slogan (“Food, Health, Hope”) with the statement: “Monsanto has tainted our FOOD with PCBs, and is threatening the HEALTH of the environment with genetically manipulated crops in the HOPE of greater profits. Monsanto is an embarrassment to our city. Monsanto has shamed St. Louisans, Missourians, the US and the world.”

Numerous visitors from Japan – some representing consumer organizations with millions of members – stepped to the microphone to state concern about Monsanto's Roundup-Ready soybeans. Pledging not to eat the products, they asked American farmers not to grow the crops.



Vandana Shiva told the crowd that companies like Monsanto have conflicting goals. They may claim that breeding insect-resistance into crops reduces the need for pesticides, she said, but most of their genetic manipulation has only created herbicide-tolerant crops that enable the sale of more and more herbicides. Brian Tokar of the Vermont-based Institute for Social Ecology recounted Monsanto's checkered history, asking the assembled whether this was a company they wanted to trust with the future of our food and health.

Numerous visitors from Japan – some representing consumer organizations with millions of members – stepped to the microphone to state concern about Monsanto's Roundup-Ready soybeans. Pledging not to eat the products, they asked American farmers not to grow the crops.

Representatives of US farmers, from Greens in Europe and Mexico, and from numerous other groups – all spoke and all complained about Monsanto and its corporate policies. At the end of the rally, a small group claiming to be supporters of Monsanto, also spoke. Calling themselves Concerned Residents About Cows and Kids (CRACK), the group voiced support for genetic engineering. One said she was happy they were splicing fish genes into tomatoes. "I have a hard enough time getting my kids to eat protein. We're pushing our supermarkets to carry only genetically engineered items."

As the crowd roared with laughter, another "supporter" responded to the charges that Monsanto was seeking the gene for making money. She approved of the research, noting,

"That's the Wall Street gene. It makes you fat, white and male. What could be more American than that?"

Another CRACK representative urged the crowd not to be fooled by fear of genetically engineered food and read from a press release saying, "Frankenstein was just a book." He also noted "...since the success of the Atoms for Peace programme, which led to a vast increase in nuclear reactors and nuclear weapons keeping America strong, Genes for Peace can certainly do the same. What's good for Monsanto is good for America."

Amazingly, the next day, the *St. Louis Post Dispatch* reported that a local station, "KMOX radio, believed the (CRACK) group, airing reports Saturday and Sunday noting demonstrators at the protest loyal to Monsanto." The newspaper also reported that Monsanto spokesperson Gary Barton, "said that his company did not worry that the gathering might mushroom into a potent political movement. 'What did they have, 120 people? We have 2,000 scientists working at the Chesterfield Monsanto research facility'"

The *Post-Dispatch* reported in another section of the paper that Monsanto CEO Robert B. Shapiro, far and away the top-paid CEO in St. Louis, "pull(ed) down \$51.2 million in cash and stock-related incentives from Monsanto last year." The fact that the Gateway Green Alliance, main sponsor of the rally, is an all-volunteer outfit was not mentioned.

Freida Morris is a Research Associate for The Edmonds Institute, Washington, USA

The Frankenstein Corporation: Monsanto's Merger with American Home Products

by Andrew Kimbrell

Both parties in this new merger have shown themselves to be utterly oblivious of social, ecological and moral concerns. Their merger can only give rise to a correspondingly more powerful – monster corporation that will prove very difficult to control.

On June 1, 1998, American Home Products (AHP) and Monsanto announced that they would merge to form a giant mega-company worth some \$96 billion.¹ With Monsanto's buy-out price of \$33 billion, this constitutes the largest consolidation ever in the drug industry, and the sixth largest merger of all time.² The new company, yet to be named, is expected to bring in \$23 billion in combined sales this year.³

Although AHP is almost twice the size of Monsanto – earning \$14 billion in 1997 compared with Monsanto's \$7.5 billion – both companies contend that this is “not an acquisition by one company of the other but rather is a merger of equal transaction.”⁴ The resulting company is slated to be based in Madison, NJ (AHP's current headquarters), and headed by both John Stafford (AHP's CEO) and Robert Shapiro (Monsanto's CEO) as “co-Chairmen and co-CEOs”⁵.

Monsanto has consistently maintained a high public profile, a result of its aggressive marketing and its many controversies and scandals. Monsanto's financial success has been matched by its corporate irresponsibility. From its promotion of Agent Orange and bovine growth hormone, Roundup, genetically engineered crops and Terminator technology, Monsanto has become a pariah to many in the international environmental and sustainable agriculture community.

AHP has not achieved Monsanto's notoriety despite its own combination of market success and corporate misbehaviour. AHP is the sixth largest drug company in the world, relying primarily on its sales of such medicines as Advil, Robitussin and Premarin. However, the company has recently been expanding its empire to include the broader “life sciences” industry. Monsanto is only the latest in an AHP series of buy-

outs in this field. In 1994, CEO Stafford made his way into the agricultural sector by executing a hostile takeover of American Cyanamid, the third largest pesticide company in the US, for \$9.7 billion.⁶ Two years later, AHP augmented its biopharmaceutical production by acquiring the Genetics Institute for \$1.3 billion. In February of 1997, Stafford established AHP's presence in the animal health industry by purchasing the Belgium-based Solvay S.A., whose products include pharmaceuticals for poultry and swine.⁷

AHP expanded significantly with the Monsanto merger. Prior to its buy-out, Monsanto had just completed its own series of mergers in the life sciences field. Last month it bought the majority share in the Dekalb Genetics Corporation, the second-largest seed company in the US.⁸ It had previously bought out Calgene Inc., and Delta & Pine Land, which both produce genetically engineered foods.

The new AHP and Monsanto “life sciences” conglomerate brings with it the ability and intent to produce an unprecedented amount of genetically modified foods, pharmaceuticals and other products. It is in this controversial capacity that their merger has received the most media attention. However, there has been surprisingly little publicity about American Home's plethora of legal prob-

lems and a history of product mishaps in the human health sector.

AHP is currently embroiled in a major scandal over the devastating health impacts of its diet drugs Fenfluramine and Redux. The drugs, which were withdrawn from the market last autumn at the request of the US Food and Drug Administration (FDA), were used by approximately 6 million Americans, primarily women. Fenfluramine, one half of the popular fen-phen

Some 80,000 mares are used by American Home Products in the oestrogen collection process in North Dakota and Canada. They are kept in tiny stalls where they are unable to turn around or lie down comfortably. Moreover, they must stay pregnant constantly in order to produce the hormones required for the drug, and are typically reimpregnated seven to nine days after they give birth to their foals.



DAVID HOFFMAN

“diet cocktail”, and the related drug dexfenfluramine, or Redux, is designed to alter brain chemistry to reduce appetite. A Mayo Clinic study released in July 1997, however, linked the diet drugs to serious heart-valve leaks. A 1996 report in the *New England Journal of Medicine* also suggested a link between the diet drugs and a rare, but sometimes deadly, lung disease called primary pulmonary hypertension.⁹

The FDA has cited reports of heart-valve abnormalities in 32 per cent of the drugs' users whose physicians reported results to the agency. Untold thousands of women have been made ill. The FDA initially cleared Redux for marketing, only under the condition that American Home Products would conduct a phase IV study on the long-term safety of the drug. At the time of the drug's removal, AHP had yet to begin the study. Since the drugs were taken off the market almost a year ago, a wave of class-action and individual suits have been filed. American Home is the major defendant in the suits, which have been categorized by Paul Rheingold, who is chair of the fen-phen litigation group of the American Trial Lawyers Association, as “slam-dunk liability cases”.¹⁰

American Home is also currently facing thousands of lawsuits from women who used their female contraceptive, Norplant. Norplant, the first major new contraceptive since the birth control pill, was introduced in the US in 1991 and adver-

tised as a safe, effective, no-fuss form of protection. Six match-stick-sized, implanted silicone-coated rods were supposed to release a synthetic hormone into the bloodstream that would prevent pregnancy for up to five years. Close to 1 million women tried Norplant in the nineties. Now over 50,000 women are suing Wyeth-Ayerst Laboratories, a division of American Home Products, because they were not adequately warned about the side-effects – weight gain, persistent menstrual bleeding, hair loss or growth, ovarian cysts, anaemia, acne, severe headaches, vision loss, depression, and removal problems.

American Home can be traced back to another female contraceptive disaster as well – a Dalkon Shield. Dalkon Shield, a contraceptive used by more than 4 million women in the early 1970s, was a product of A.H. Robbins and company. When the Shield was

ultimately linked to inflammatory disease, scarred reproductive organs and infertility, hundreds of thousands of individual and class-action lawsuits were filed. The company filed for bankruptcy in 1985, but was saved when bought out for \$800 million by American Home Products.

In addition to its legal troubles from human health side-effects, AHP is also being targeted by animal welfare advocates. A number of groups around the country are currently attacking AHP for the processes used to produce their drug Premarin. Selling \$860 million-worth last year alone, the drug

Given all AHP's legal and human, environmental, and animal welfare troubles, not to mention the controversy surrounding Monsanto's products and processes, one cannot help but wonder if the merger between the two has created the world's most irresponsible corporation.

makes up 10 per cent of all of American Home's sales and is currently the most prescribed drug in America. Premarin is essentially an oestrogen pill, and is used to stabilize hormonal imbalances in women to treat the ill-effects of menopause. The different oestrogens it contains are extracted from the urine of pregnant mares, which is how the word Premarin, a shortened version of the phrase "pregnant mare urine", got its name. Animal protection organizations maintain that the horses used for producing the drug are kept in cruel conditions and are treated inhumanely.¹¹

Some 80,000 mares are used in the oestrogen collection process in North Dakota and Canada each year at Wyeth-Ayerst Labs, a subsidiary of American Home Products. According to reports, the horses are kept in tiny stalls where

they are unable to turn around or lie down comfortably, and often develop lameness. Moreover, the mares must stay pregnant constantly in order to produce the hormones required for the drug. They are typically reimpregnated seven to nine days after they give birth to their foals, whom they are separated from within a few months in order to be sent back to the "pee line". Except for a few that are kept for re-breeding, all the foals are sold for slaughter at four months of age.¹²

Several alternative menopause drugs have been developed which are made from plant derived oestrogen or synthetics. For almost ten years one company, Duramed Pharmaceuticals Inc., has sought FDA approval for its plant-derived oestrogen pill as a generic for Premarin. A cheaper and more humanely produced generic would obviously cripple sales of AHP's prized product. As a result, American Home began an aggressive lobbying campaign against the generics, recruiting Washington insiders to make their case to Congress and other key institutions.¹³ Their lobbying and campaign contributions paid off last year, as the FDA announced on May 5 that it would not approve generic forms of Premarin for sale in the US. The ruling was based in large part on a study conducted by AHP sub-

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For several years the company has fought a legal battle with several insurance companies over payment for the cleanup of 37 American Home hazardous waste contamination sites in 11 states and Puerto Rico.

subsidiary Wyeth-Ayerst.¹⁴ [See Ferrara in this issue]

Not content with harming human health and animals, American Home is also a major polluter of the environment. For several years the company has fought a legal battle with several insurance companies over payment for the cleanup of 37 American Home hazardous waste contamination sites in 11 states and Puerto Rico.¹⁵

Current legal problems were partially responsible for the public rejection of American Home by British drug conglomerate Smith kline Beecham during merger talks earlier this year. The combined suits facing American Home and its divisions could cost the company up to \$4 billion.¹⁶ Given all AHP's legal and human, environmental and animal welfare troubles, not to mention the controversy surrounding Monsanto's products and processes, one cannot help but wonder if the merger between the two has created the world's most irresponsible corporation.

This article was compiled by ICTA staff. The International Center for Technology Assessment is a non-profit organization in Washington, DC, working on issues related to biotechnology, environment and food safety. For more information email at office@icta.org.

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Boycott – Brands and Products to Avoid

by Jim Thomas

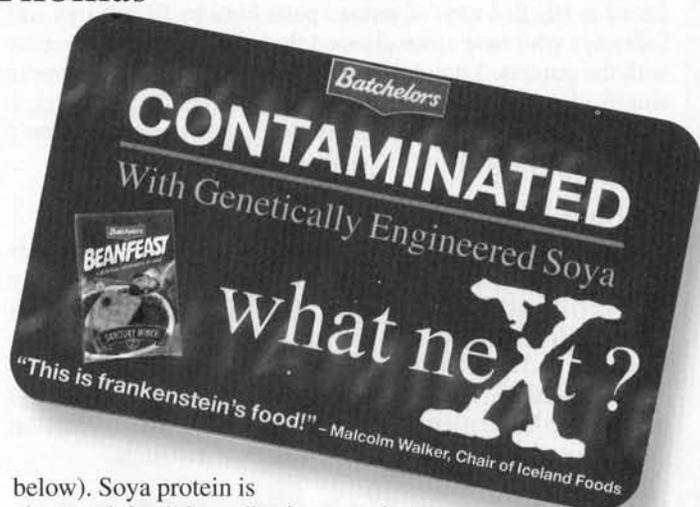
There are currently four genetically engineered (GE) crops allowed into our foods in the UK as well as a number of processing aids and enzymes. While this may seem a paltry amount, 2 of those crops, soya and maize, find their way into up to 80 per cent of processed foods between them. Over and above this there are many non-food uses of GE crops bringing, in particular, another major GE crop into our everyday lives: cotton. What follows is an outline of some of the more common uses of these ingredients.

Roundup-Ready Soya (Monsanto)

So far this is the most ubiquitous of the gene foods. Genetically engineered to tie farmers to Monsanto's own herbicide (Roundup) it currently accounts for 15 per cent of the US soya crop and will next year constitute 30 per cent. While Brazilian, Canadian, European and Eastern soya is currently GE-free, the bulk of soya used for ingredients is from the US, and Monsanto have ensured that GE soya has been mixed with, and has therefore contaminated conventional supplies. In food, look for the following ingredients: soya protein, textured vegetable protein (TVP), soya protein isolate, soya flour, lecithins (most are soya-based. Look also for the number E322). Some flavourings are also based on soya.

Examples of products that may contain GE soya

Not surprisingly vegetarian foods have been among the first to be contaminated by GE soya: Batchelor's Beanfeast, a readymix soya meal produced by food giant Unilever is currently the subject of a campaign by Greenpeace, Friends of the Earth and The Genetic Engineering Network since it was the first admitted GE soya product in the UK. Since then Unilever has also labelled Vesta Currys (another ready-to-eat meal) as containing GE soya. Soya protein of this type also gets into sausages, noodles, baby-food (SMA products for example will likely contain GE soya), beer, breads, pet foods, pies (eg Co-op vegetable pasties or Asda's Farm Stores shepherd's pies) and frozen foods (Ross frozen foods have been found to contain GE soya), patés (Sainsbury have 23 kinds of paté and spread definitely containing GE soya) and animal food. Walker's Crisps have confirmed that 29 of their Smiths, Walkers, Quavers and Monster Munch brands may contain GE-derived soya flour or protein from either GE soya or maize (see



below). Soya protein is also used for inks, adhesives, packaging films, paints, plastics and, ironically, pesticides.

Soya oil is much more widely used. Very often it is mixed with other oils in margarines (eg Co-op soya margarine), most of which use soya lecithins anyway (Vitalite probably contains GE soya, and Safeway's Soya Spread labels itself "new and improved" now that it is genetically engineered!). Mayonnaise, cooking oil, sandwich spreads and ice-creams may all contain GE soya oil (chocolate Haagen Dass probably contains GE soya) as might cheese replacements (Summer County cheese alternative contains GE soya and is another Unilever product). Soya oil is used as a processing aid in, for example, the production of some Alpen and Ready Brek cereals.

As for GE soya lecithins, they are widely used for chocolate, baked goods, margarines and dietary products (eg Slim Fast drinks). Examples include Nestlé chocolates and McVitie's chocolate biscuits. Marks and Spencer have admitted that they are using GE soya in many of their products.

BT maize (Novartis)

Genetically modified maize (corn), like soya, is also entering Europe unsegregated and often unlabelled. Although this year only a tiny percentage of the French maize crop (less than half a per cent) will be genetically engineered, the industry is claiming they cannot segregate. BT maize produces a small toxin intended to kill the corn borer, which has in turn been shown to harm beneficial lacewing insects. It is also the subject of much criticism from, for example, the French competent authority on antibiotics for the use of a marker gene that confers antibiotic resistance. Also, like soya, maize is used for a wide variety of food and non-food uses either as whole corn

in products such as corn chips (Doritos, Uncle Ben's Tacos) or more usually as corn oil, corn syrup and corn starch. Starch occurs in many goods, from soups and sweets to toothpaste. Below are some examples of products identified as containing GE maize in the UK:

Asda Farm Stores vegetable and chicken curry, mayonnaise, Irish stew's and salad dressings. Sources from within Unilever suggest that they may begin putting GE maize in Batchelor's soups and elsewhere in their range. Maize, like soya, is a major animal feed and so will undoubtedly enter the human food chain indirectly.

The FlavrSavr Tomato (Zeneca)

The FlavrSavr Tomato, referred to when it was launched in 1996 as 'the Trojan Tomato', was the first whole GE crop to reach UK shelves. It is genetically engineered to delay the rotting process, thereby saving processing costs. It was introduced in labelled cans of tomato paste both by Sainsburys and Safeways who have since claimed that it is a soaraway success with the punters. Look for the tins of tomato paste that appear almost identical to normal paste – except that they are bigger and therefore better value for money – you probably won't notice the label until you look very closely.

GE chymosin – 'vegetarian rennet'

Natural chymosin is produced from a calf's stomach and is used in cheesemaking. Its equivalent is made by a genetically engineered bacteria. It is used in a number of 'vegetarian cheeses' (for example Co-op vegetarian cheese) and has in the past been endorsed by the Vegetarian Society. There are, however non-animal, non-GE rennets available that are endorsed both by the Vegetarian Society and The Soil Association – so alternatives for the ethical cheese-eater are available!

Bollgard BT Cotton and Roundup-Ready Cotton (Monsanto)

These two genetically engineered cotton varieties already account for around 50 per cent of the US cotton crop. US cotton is used for jeans, clothing, fabrics as well as cotton-seed oil which can be used in processed food or cans of fish (eg John West smoked oysters!)

Roundup Ready Canola (Monsanto)

Canola is the American name for what is known in Europe as rapeseed. Canadian GE rape has just been approved for import into Europe and will primarily be used as an oil in margarines, cooked foods, biscuits etc. More worryingly DNA from GE rape has been detected in Germany in jars of Canadian honey produced by Clover Crest and Fuersten-Reform. Since around half the field trials testing GE crops in the UK are currently rape (mostly from Plant Genetic Systems, Agrervo and Monsanto) it is quite likely that similar contamination is occurring in European honey. The Beekeepers Association recently expressed strong concern that the effects on both its products and its bees from this genetic pollution are wholly unpredictable.

Bovine Growth Hormones

Originally Michael Taylor, FDA Deputy Commissioner, persuaded the FDA to prohibit the labelling of normal milk as being BGH-free. However, there was an outcry from consumers. In addition, Monsanto tried but failed to get a court ruling against those companies that were labelling their milk in this way (Horizon, Swiss Valley Dairy Farms, among others). This meant that the FDA had to adopt a less extreme position and it is now legal to label normal milk as BGH-free, so long

as there is no reference to issues of safety.

Beware Labelling!

At present a smattering of products containing GE ingredients are labelled and often it takes a long time and lots of letter writing to deduce whether your own diet is currently contaminated (the standard reply is, "It may be but we can't tell"). From September 1st new labelling directives across Europe mean that products contain GE soya and maize protein will have to be labelled. Jeff Rooker, the UK food safety minister, has hailed this as "a victory for consumers", while in fact it will only serve to further confuse matters. Around 95 per cent of products containing GE soya and maize ingredients will not be labelled under the new legislation. This is because the directive excludes oils, lecithins, starch and flavourings. It also attempts to set a threshold limit for the presence of GE protein beneath which manufacturers can escape having to label. Unilever has suggested a figure as high as 10 per cent but the final figure is yet to be set. Labelling will give a false sense of security. Merely labelling a problem (in this case genetic pollution) doesn't banish it. The only real way to ensure choice and protect the environment is to support those who are avoiding GE ingredients in their products altogether.

Avoiding genetically engineered ingredients

While it's tempting to become disheartened by the wide reach of GE soya and maize into common foodstuffs, the only people claiming that the battle is over are the biotech industry themselves who want GE food to be considered a *fait accompli*. In fact, many small US soya suppliers are offering guaranteed non-GE supplies (known as 'identity preserved') as are major suppliers such as Central Soya or Norgrow from both Brazil and Canada. Companies who use large amounts of soya also have the option of placing orders with farmers who grow GE-free soya. The same is true of maize.

For the consumer, the following brands, companies and trades are guaranteeing GE-free good food:

- Organic food – must by definition be non-GE; this is an internationally agreed standard and even US organic food remains non-GE (for the time being). Look for The Soil Association symbol.
- Vegetarian food – the Vegetarian Society for the UK have recently decided not to endorse products containing GE ingredients. They currently endorse over 2,000 products and over the next 12 months will be telling over 250 manufacturers to either remove GE ingredients or lose their endorsement. Look for the V logo – and avoid products without the "approved by the Vegetarian Society" endorsement.
- Wholefoods – from the 21st September, the wholefood trade will declare itself a GE-free trade. This covers all but a small handful of products sold in wholefood shops and indeed many shops will be entirely GE-free zones. This includes large producers such as Infinity, Plamil, Suma, Rainbow, Granose, Cauldron and even Haldane wholefoods. Holland and Barrett have also confirmed that their own brands are non-GE and that they are actively working with their suppliers to encourage them to go GE-free. They recently delisted Batchelor's Beanfeast because they felt Unilever weren't trying hard enough to source natural soya.
- Iceland – amongst the supermarkets Iceland is leagues ahead in protecting its customers. On 1st May Iceland announced that none of their own brand would contain either GE ingredients or ingredients from animals fed with GE crops. According to recent surveys of a thousand consumers, 65 per cent supported Iceland and 26 per cent said they would now shop at Iceland as a result of this policy.

- Spar UK have confirmed that none of their own brands contains genetically engineered ingredients.
- Sainsbury – Sainsbury have reformulated most of their 1,100 own brands in order to exclude GE-free soya protein. There are still 25 products containing GE soya protein in their range (list available on request). They are not, however, excluding other GE soya ingredients (eg oils and lecithins). They have instructed their suppliers not to use GE maize.
- Kelloggs – currently not using any GE ingredients. According to Careline operator: “We believe there needs to be an awful lot more testing before we would even consider using genetically modified ingredients . . . and the way public opin-

Insisting On The Right To Choose

The situation at the United Nations is not good. At the May meeting of the UN's Codex Alimentarius Commission the idea of mandatory labelling for genetically modified foods was abandoned, following pressure from some of the government and industry representatives present. Codex rules will call for GM foods containing allergens to be labelled, but nothing more.

The only way to give the public a real choice is to trace ingredients from grower, to shipper, to food processor, to point of sale. There are plenty of suppliers for GM-free crops, and both companies and governments have now admitted that segregation is possible. In a speech to the House of Commons on 30th July the UK's Food Minister Jeff Rooker acknowledged the strength of consumer feeling, saying that: “they [the Americans] are beginning to slowly understand that the consumer ethos in Europe is different from that in the United States. People in Europe want to know more about their food and want effective labelling, showing the ingredients and methods of production.”

However instead of introducing labelling that would require segregation, the government is hoping that food manufacturers will take on the responsibility for providing consumers with the right to choose, by forcing American suppliers to segregate their crops. The drawbacks to this approach are all too clear if one looks at the response of the major food trade associations to the flawed EU regulations. Take the US-based National Food Processors Association, whose 500 members account for 90 per cent of US food sales. Spokesman Tim Willard claims, “This [the EU regulations] will place a substantial burden on manufacturers, and will really provide no important information to consumers . . . It is driven by ideology masquerading under the banner of the consumers' right to know.” Similar positions have been taken by the Grocery Manufacturers of America, and by the American Soybean Association (ASA). Jim Hershey of the ASA is clear that: “We want to make sure their [the EU's] labelling regime doesn't turn into a requirement for how we handle crops shipped to Europe.”

The time has come for European governments to stand up to the US corporations and to give EU consumers what they want, the right to know what is in the food they buy. Nothing less is acceptable.

ion is going at the moment we wouldn't consider using it.”

- Heinz – Heinz have told the Vegetarian Society that all the products they license (over 50 products) are free of GE ingredients and will remain so.
- Linda McCartney products – McVitie's recently decided that no Linda McCartney products would contain GE ingredients – unfortunately this decision is not to be applied to other McVitie's products though.
- The National Trust say “We do not support the use of such foodstuffs, in fact all our current work on developing our menus is to source as much product as we can from our estates, local suppliers and organic meat producers.” – Sue Wright, National Catering Manager
- Chartwell School Dinners – if you are a schoolchild in Kent, the safest place to eat is the school canteen. Over 1,600 schools in Kent provide non-GE school meals every day.
- Prêt à Manger – a chain of coffee and sandwich bars guarantees not to use GE food.
- House of Commons – or alternatively – if you are a member of parliament or a peer of the realm, the catering committee in the Palace of Westminster has instructed the bars and restaurants of the mother of all parliaments to avoid GE ingredients. It's a shame the same standard isn't applied to the voters.

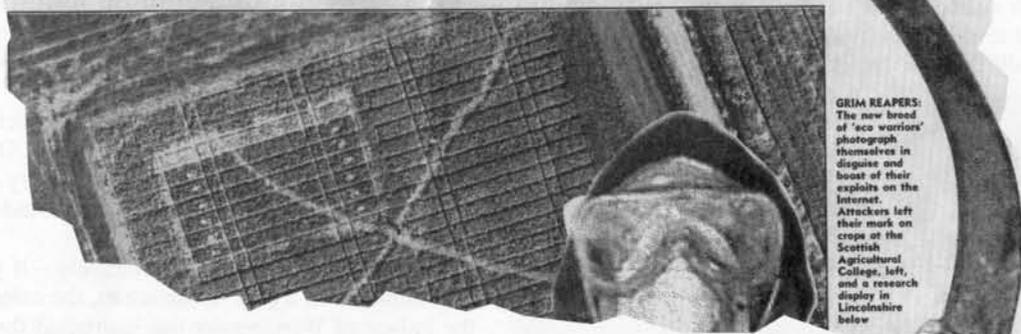
Consumers do have tremendous power to divert society away from what is in effect a massive, uncontrolled experiment with their and their children's lives. Clearly, action is needed at all levels, and ideally everything will be done to encourage a societal shift from the long-distance, mass, centralized production of food, to a more localized, diverse and organic system. This would not only guarantee superior quality, but would remove the need for enormously wasteful plastic packaging, preservatives designed to accommodate long-distance transportation, and of course the transportation itself, which is a major contributor to the destabilization of the world's climate. The current system, which is justified through the principle of ‘comparative advantage’, whereby countries are encouraged to specialize in and trade those products which they can most efficiently produce, is in fact heavily subsidized, as Helena Norberg-Hodge explained in the last issue of *The Ecologist* [See *Think Global – Eat Local! Delicious Ways to Counter Globalization*, Vol 28, No 4, 1998]. One vital step therefore is to acknowledge and shift those subsidies away from an emphasis on the current chemical – intensive, resource-depleting and highly destructive model towards a system which more closely mirrors the cycles of nature, and which alone can ensure a healthy future for the planet.

Jim Thomas is a genetics campaigner for Greenpeace UK

To keep up to date with those foods which are and aren't genetically engineered, contact the following:

- Online list of Products made using GE ingredients (regularly updated) <http://www.uea.ac.uk/~f098/gmlist.htm> or <http://i.am/gm>
- Protect Your Food Campaign – Campaign run jointly by Greenpeace, Friends of the Earth and the Genetic Engineering Network to make Unilever brands GE-free. Phone 0171 8658222 to get involved.
- Nationwide Food Survey – produce a booklet entitled ‘How to Avoid Genetic Foods’ – Write to Nationwide Food Survey, Beacon House, Skelmersdale, WN8 6UR or email pbrown@cableinet.co.uk.
- The Genetic Engineering Network have copies of a list compiled by Helen Ellery of Dorset detailing replies she has received from a wide range of companies whose food she eats. To contact GEN phone 0181 3749516 or email genetics@gn.apc.org

Eco warriors or vandals?



GRIM REAPERS: The new breed of 'eco warriors' photograph themselves in disguise and boast of their exploits on the Internet. Attackers left their mark on crops at the Scottish Agricultural College, left, and a research display in Lincolnshire below.

Who Are the *Real* Terrorists?

by Zac Goldsmith

Unable to rely upon courts, experts, politicians, or regulations, 'normal' people have decided to take things into their own hands. They are branded as terrorists, vandals and hooligans. But who are the real hooligans?

By all accounts the people of Europe are more than just sceptical about biotechnology. Indeed numerous studies have shown that the great majority of people are actively *opposed* to any further development in the field. One recent Mori poll found that 77 per cent of those questioned would like to see an end to experimentation with genetically engineered crops in the UK, and a study of UK consumer attitudes to genetically modified organisms (GMOs) in food, backed by Unilever, the Green Alliance and the University of Lancaster, has shown that consumers "harbour significant unease about the technology as a whole." More importantly it found that consumers have "mixed feelings about the integrity and adequacy of present patterns of government regulation, and in particular about *official scientific assurances of safety.*"

Such assurances are, of course, meaningless, since the knock-on effects of biotechnology are inherently unpredictable [see Mae Wan Ho, A. Kimbrell, P. Kingsnorth, J. Mendelson etc. in this issue]. According to the Soil Association, the organisation responsible for issuing the "organic" label to UK farmers, "once released, the spread of genetically modified organisms in the environment cannot be halted, nor can the consequences be predicted . . . genetic engineering is

incompatible with sustainable agriculture." There have already been a number of potential disasters with accidentally released GMO's. In mid-April for example Monsanto announced that it was recalling small quantities of genetically engineered canola seed which contained "an unapproved gene that had found its way into the product by *mistake.*"

Significantly, there has been an 8 per cent increase in public rejection of the technology since 1996, during which time there has been a great deal more information on the subject. What's more, a study published in *Nature* shows that the more people learn about biotechnology, the less faith they have in its safety or usefulness. "How much more evidence does the government need that the public does not want genetically engineered food, and that this opposition is *increasing?*" asks Sue Meyer, Director of Genewatch, the organization responsible for commissioning the Mori poll.

Widespread rejection of genetic engineering stretches far beyond the shores of Britain. In Austria, more than 20 per cent of the population signed a petition to ban genetically engineered food, and test crops have been uprooted in Germany, Ireland and the Netherlands. A number of highly respected and usually uncontroversial organizations like, for example, Scot-

Not one application so far presented to the British Government's committee of experts on genetic engineering has been turned down



“And they’re accusing us of being Eco-terrorists!”

tish Natural Heritage and the one million-member Royal Society for the Protection of Birds (RSPB) have clamoured for a ban, or at least a moratorium, on genetic engineering. John Vidal of *The Guardian* newspaper tells us that over 200 whole food companies are calling for a similar moratorium, that Greenpeace has mobilized over 250,000 consumers in Germany, and that riots are expected among small farmers in India if biotechnology takes a grip on their country. Some UK retailers, including Iceland frozen foods and British Sugars, have already begun to exclude genetically engineered foods from their produce.

In March the Genetic Engineering Network, together with Friends of the Earth and Greenpeace, launched a "protect your food" campaign, designed to name and shame influential food producers, in particular Unilever, that continue to use GMOs. Already, over half a million "disloyalty cards" [as opposed to supermarket customer loyalty cards] have been distributed around the UK, in supermarkets and wholefood shops. Holland and Barrett, one of the UK's leading health food shops, has delisted a number of products as a result of the above campaign, and some Japanese firms have agreed to stop the marketing of processed foods manufactured with genetically engineered tomatoes.

At the same time, as Mae Wan Ho points out in this issue, there has been a massive increase in the popularity of organic foods, which more and more people are coming to see as their only safe haven from biotechnology. And as an unprecedented 220,000 US consumers illustrated in letters to the United States Department of Agriculture earlier this year, in protest against the proposed inclusion of genetically modified foods under the "organic" label [see R. Cummins in this issue], they

Monsanto says new press campaign has generated a 'vitriolic' response from some consumers.

Director of public and government affairs Ann Foster said Monsanto's GMO hotline has dealt with 2,717 calls following the launch of the press ads last month and not all of them were pleasant. "We were totally unprepared for the hostility – some calls were pure vitriol." Monsanto's campaign has also led to complaints being lodged with the Advertising Standards Authority.

The firm is now urging retailers to do more to help educate anxious consumers.

Foster said: "Opposition to GMOs is very effective but also aggressive, heavy-handed and very hostile. We don't have the stores or the brands or the products to tell consumers what GMOs are about. We have to advertise to stimulate the debate. But we want to tell people like Marks & Spencer, Safeway, Sainsbury and Tesco that it's their turn to take the flak."

She explained that in the US there was no reaction to GMOs, but in the UK people think of it as one of the most controversial developments ever to hit the food industry.

"In America, the Food and Drug Administration has built up respect. In the UK, people just don't have faith in the regulators because of the numerous food scares. What the government says doesn't have the same impact in the UK."

From The Grocer, 25th July 1998

The Consumer's Right to Choose

Consumers around the world are demanding the right to choose whether or not they eat foods that contain genetically modified material or that have been produced using genetic modification. Survey after survey reveals the strength of consumer opinion. An official EU poll showed overwhelming support for labelling of genetically engineered foods, with the percentage of respondents in favour as follows: Austria – 73 per cent; Belgium – 74 per cent; Denmark – 85 per cent; Finland – 82 per cent; France – 78 per cent; Germany – 72 per cent; Greece – 81 per cent; Ireland – 61 per cent; Italy – 67 per cent; Luxembourg – 67 per cent; Netherlands – 79 per cent; Portugal – 62 per cent; Spain – 69 per cent; Sweden – 81 per cent; United Kingdom – 82 per cent.¹ In the United States, a survey financed by agricultural giant Novartis showed that 93 per cent of respondents wanted genetically engineered food to be labelled as such.² Surveys in Canada, Australia and other industrialized countries have led to similar results.

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are determined to ensure that the term "organic" is not usurped by the likes of Monsanto.

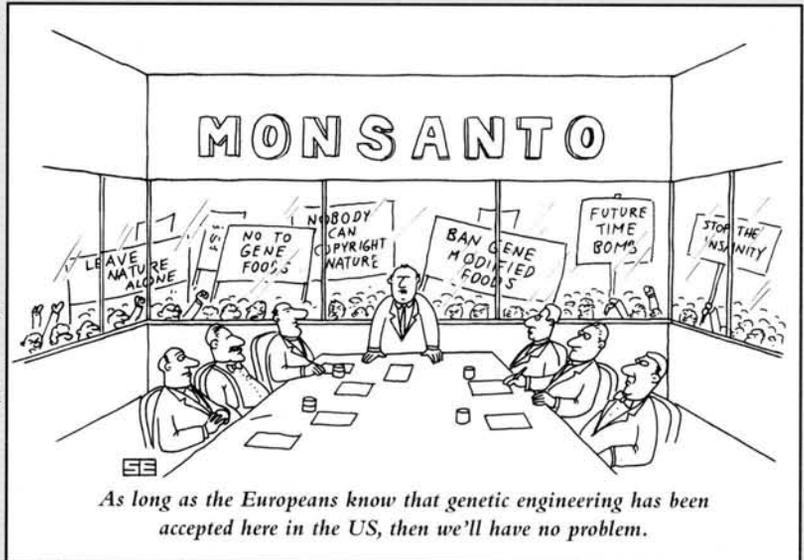
There can be little doubt that most ordinary, independent people reject the genetic manipulation of life, and yet licences for such experiments are being handed out by governments like confetti. By April of this year, there were 332 test sites in the UK, 70 per cent of which are controlled by just four companies: Monsanto, Agrevo/BGS, Novartis/Hilleshog, and Sharp's International Seeds Ltd. Indeed not one application so far presented to the British government's committee of experts on genetic engineering has been turned down.

In effect, we have allowed a small number of very large corporations, which are by definition concerned almost exclusively with short-term profit, to gamble with our very existence on Earth. The rhetoric can be quite compelling. Monsanto, for instance, is apparently keen to ensure that we are "fully aware of the facts before making a purchase". They have "often provided more information [on the subject] than necessary," they tell us. Yet the very same company is doing all in its power to prevent any form of labelling which might inform consumers of the genetically modified nature of their products [see Gorelick in this issue]. The company also tells us that they believe food should be grown with fewer pesticides and herbicides, yet in their 1994 report to shareholders they point out that, "approximately 90 per cent of the world's farm lands suitable for *conservation tillage* remain to be converted to this technique. For herbicide manufacturers this untouched potential means significant opportunities for sales growth."

Robin Page, Director of the Countryside Restoration Trust,

"Acceptance" in the US

If you believe Monsanto's PR spin, European consumers are resisting biotech foods largely because they are "less scientific" than their North American counterparts, who have supposedly taken to genetic engineering like fish to water. Perhaps opposition to biotech has been less heated in the US than in Europe, but Americans have been consistent in saying that they don't want genetically-engineered products among their foods. This sentiment has come not only from the many environmentalists, food safety activists, farmers' groups, and consumer advocates that have railed against agricultural biotech corporations and the government agencies that effectively promote their products. Surveys of American consumers over many years have revealed that more than 90 per cent want mandatory labelling of genetically-engineered foodstuffs – presumably so they can be avoided.¹ The first engineered product to be marketed – the highly touted Flavr-Savr tomato – was such a flop it was taken off the shelves in mid-1996; another corporation's gene-altered "Endless Summer" tomato didn't even make it through the test marketing phase.² Monsanto's rBGH has never been popular with dairy farmers, and in one survey over 85 per cent doubted they would ever use the drug on their herds.³ Meanwhile, the notion that genetically-engineered foods might be allowed to carry the "organic" label was a major reason the USDA received over 200,000



comments – virtually all of them negative – on the agency's proposal for a national organics standard [See R. Cummins in this issue]

Steven Gorelick

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is rightly sceptical. "We have heard it all before," he points out. "DDT-based chemicals were going to help feed the world – instead they created an environmental catastrophe. BSE was another product of high-tech husbandry, involving a mixture of junk cattle food and organophosphates chemicals. Now again we are seeing a science described as 'no risk', when we have good reason to believe that there are major risks involved."

Other influential voices of opposition include Florianne Koechlin, who ironically comes from the Geigy Pharmaceuticals empire. "Genetic engineering", she says, "is like a jumbo jet with bicycle brakes." Koechlin helped organize demands for a Swiss referendum on the issue. The campaign was a success until the tables were turned on them by the Swiss biotech company, Novartis, which among other things threatened to abandon the Swiss economy in favour of more sympathetic policies elsewhere.

The biotechnology industry is keen to suggest that public opposition to genetic engineering is essentially "emotional", and that science is on industry's side. But, given that the vast majority of resources funnelled into research on the subject comes from industry itself, it would be naïve to suppose that such research is entirely "objective". No institution can be expected to fund self-discrediting research. Numerous examples of misleading "findings" are listed in the pages of this

magazine. Collectively they make it quite clear that we simply cannot believe the likes of Monsanto when they tell us that "we know.... that biotech's seeds and plants are safe for human consumption, for farm animals and the environment."

But even in cases where science does raise serious doubts about the safety of individual experiments it is largely ignored, unless its findings are consistent with the interests of industry. For example, Swiss research into a genetically modified strain

of maize, designed by Novartis as a poison to the larvae of the corn borer, has shown that it can kill beneficial insects as well as pests, and therefore disrupt the entire food chain. And yet still the European Union has declared that approval of the GM maize can

be withdrawn only if new scientific evidence raises questions of safety. But, as Dr Ian Taylor of Greenpeace points out, that is exactly what the Swiss scientists have provided. Perhaps for the EU, research can only be classified as scientific if it serves to promote the interests of the biotechnology industry.

If official assurances of safety are so unsatisfactory, where can consumers turn for honest information? As Peter Montague illustrates in his article on the sacking of two veteran news reporters from Fox TV Florida, for scrutinizing Monsanto's involvement in BGH, the media seem unable to provide such a service. The likes of Monsanto are, after all, very major advertisers in television and the print media throughout the

The revolving door between big business and the regulators operates so smoothly that the two are becoming barely distinguishable

Generalised Opposition

Opposition within the United Kingdom has grown sharply within the past two years. Four statutory advisory bodies to the Government – English Nature, the Countryside Council for Wales, Scottish Natural Heritage and the Northern Ireland Environment and Heritage Services – all called for a moratorium until Government-funded research projects directed at the risks of genetically engineered crops are completed. They have been joined by the Consumers Association, the Women's Institute, the Townswomen's Guild and The Country Landowners. Iceland Frozen Foods, a retail chain in the UK, has taken the lead in excluding genetically engineered produce in its own brand. British Sugars soon followed in declaring they would not accept sugar made from transgenic sugar beet. The Soil Association, which sets standards for organic foods in the UK, is rejecting genetic engineering and is also

actively campaigning for a moratorium. Organic produce has greatly increased in popularity throughout Europe and in the US.¹

There have been legal actions taken by private citizens against the biotech corporations and Government regulatory agencies over field trials of genetically engineered crops in Ireland, The Netherlands, Germany and, just recently, the UK. In May, a coalition of scientists, health professionals, religious leaders and chefs in the US filed a lawsuit challenging the FDA policy on genetically engineered foods, demanding adequate safety testing and mandatory labelling.

Local protest groups have mushroomed all over the UK and elsewhere. There has been a series of "global days of action" involving many countries around the world. Demonstrations were held outside supermarkets and laboratories. Fields destined for test trials were occupied. Transgenic crops have

been destroyed, either surreptitiously or openly, with perpetrators ranging across the social spectrum risking arrests and injunctions.² Innumerable letters have been written by concerned citizens to newspapers, to members of parliament, and other government representatives, as well as the local supermarkets.

All these actions are crucial for building public awareness and sending a clear message to our governments that they should, at the very least, impose a moratorium and support open, wide-ranging debate.

Mae-Wan Ho

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world, and therefore often exercise a determinant influence over what we, the public, get to see or read.

Even governments are to a worrying and increasing extent, controlled by these corporations. They too depend primarily on science generated by industry itself to form their views on biotechnology, and in any case tend to be obsessed by short-term economic indicators, frequently at the expense of more fundamental considerations of environmental health or human wellbeing. In the name of "inward investment" nations offer special trading terms and subsidies of every conceivable sort to woo the TNC's to their shores. Keeping big business happy is now one of the basic governmental priorities – both left and right – in every country of the world. As a result, corporate "irregularities" are routinely overlooked. For example, even though by 1994 Monsanto had been named by the US Environmental Protection Agency as a potentially responsible party at a great many Superfund sites (sites of unacceptable environmental damage), the company was able to assure its shareholders that "Monsanto's liquidity, financial position, profitability are *not* expected to be materially affected."

On the issue of regulations at least, Monsanto has in the past been perfectly honest: "... in many cases we and others were writing the rules for this new science as we went along, particularly regarding applications in foods and plants", it admitted. It is hardly surprising therefore that in response to Prince Charles' attack on what he sees as an invasion into "realms that belong to God and to God alone", Monsanto advised the public that "while [he] is an intelligent man and perfectly capable of deciding whether he wants to eat these foods ... *this should be the province of regulatory agencies*".

As Gorelick and others point out in this issue, the revolving door between big business and the regulators operates so smoothly that the two are becoming barely distinguishable.

It is clear that democracy is failing us. Despite unambigu-

ous resistance from the public at large, genetic engineering is being allowed to storm ahead – virtually unhindered. As a result, increasing numbers of people are deciding to take things into their own hands. Angry at the prospect of giving in to corporate bullying, they are setting out to accomplish by “direct action” what their political representatives have so lamentably failed to do on their behalf.

Writing in *The Guardian* newspaper about Patrick Whitefield, a lecturer with no history of civil disobedience, John Vidal shows how this is not just a fringe movement, but one which involves a cross-section of “respectable”, law-abiding citizens. The same is true in the UK with the anti-road movement which is partly at least responsible for having scaled down government investments in road building from an initial £23 billion, to the present £6 billion.

“After hearing that five women had . . . gone into a test field and pulled up some genetically modified plants being tested for Monsanto, Whitefield phoned a Manchester-based group called Genetix Snowball and offered to do the same. Should he do so he risks being sued, fined and given a criminal record. Within weeks of his offer, a Manchester community worker, a Welsh lawyer and at least 250 others including TV chef Antony Worrall-Thomson had phoned to support or to join others taking ‘non-violent direct action’ against the controversial crops.”

From the *Lincolnshire Loppers*, who pulled up a demonstration crop of genetically engineered Spring wheat, to the *Kenilworth Croppers*, who destroyed a display of GM wheat at the Royal Agricultural show; from the decontamination of an experimental crop of oilseed rape near Coventry to the destruction of a plot of AgrEvo’s basta-resistant rapeseed in

Australia by “Mothers Against Genetic Engineering”; from the decontamination of 30 tons of transgenic maize seeds in France by 120 members of the farmers’ Confédération Paysanne, to mass gatherings outside Monsanto’s headquarters in Missouri, the clear message is that “normal” people are not prepared to allow their leaders to license away the stability of the living world.

So determined are an increasing number of people that the world should remain free from the possibility of infection by “Frankenstein foods”, that direct action organizations are appearing as if from nowhere. As one participant in a Norfolk occupation pointed out, “it now seems that direct actions of this kind are the only way left to put the genie back in the bottle.” “Biotechnology companies must realise that they will be taken to task for their actions,” warned another group of Scottish campaigners.

Not surprisingly this demonstration of public resistance has generated a backlash from the mainstream. Congressman Bill McCollum, for instance, condemned direct action as “terrorism in the name of Mother Nature”, while Congressman Riggs described activists as “terrorists engaged in a criminal conspiracy”. Some newspapers in England have complained that a number of campaigners were on government-funded educational grants. But to what greater use could students possibly put their grants than towards ensuring the world remain viable for future generations?

These dedicated people, from the old to the young, from mothers to grandmothers, from students to scientists, are referred to as ‘hooligans’, ‘vandals’ and ‘terrorists’. But in the end we should stand back and ask ourselves honestly, “Who are the *real* terrorists?”

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Applicants are responsible for arranging affiliation with an African institution able to provide needed research support, such as laboratory facilities, access to study sites, and technical advice. The candidate's faculty advisors, the host institution in Africa, and the agency with primary responsibility for financing the student's graduate work must all send letters of endorsement. The maximum award is \$20,000. Deadlines for applications are October 1, 1998 and March 1, 1999.

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Alumni of the ADIA program and African scholars who have received support from other Rockefeller Foundation programs and who obtained their doctoral degrees after December 31, 1990 are invited to apply for Rockefeller Foundation **African Science-Based Development Career Awards**. Applicants must have returned to Africa or be planning to return upon completion of their doctoral training.

For a full description of the competition, application requirements, or program components please write to: Africa Dissertation Internship Awards, The Rockefeller Foundation, 420 Fifth Avenue, New York, NY 10018. Additional information can be found on the web at <http://www.rockfound.org>. Choose “The Programs,” then “African Initiatives.”

The Inevitable Return to a Sane Agriculture

by Mae-Wan Ho

Andrew Kimbrell has shown very clearly how neither biotechnology, nor indeed large-scale high input agriculture can possibly feed the world, and that only small-scale, low-input, largely organic agriculture can conceivably do so. Fortunately there are signs of a move in this direction.

A very important initiative, which has perhaps not received the attention it deserves, is seed-saving.¹ Several years ago, more than 750,000 small farmers in India held a mass rally against the WTO and patents on seeds. Since then, a large number of Indian farmers working with activists have gone back to cultivating unirrigated indigenous varieties by traditional methods in Madhya Pradesh.² Vandana Shiva in New Delhi has played a major role in the women farmers' Navdanya (Seeds of Freedom) movement, saving and recovering valuable indigenous pulses and grains that had been displaced and marginalized by the Green Revolution. In Brazil, hundreds of rural communities in the north-east have also been organizing communal seed banks to recover traditional indigenous varieties and to promote sustainable agricultural development with little or no government support.

Corporate control threatens agricultural biodiversity as well as farmers' rights to save and sell seeds, or to sow the seeds they choose. This especially affects small organic farmers who have planted indigenous varieties for hundreds, if not thousands of years, each of which has special characteristics adapted to the local conditions and to the specific purposes served.

Seed-savers movements have been growing all over the world, spreading to Europe and the US, and are more important than ever with the recent merger of the seed cartel Cargill with Monsanto, which has considerably tightened the corporate stranglehold. The corporation is now in a very good position to decide that only genetically engineered seeds will be supplied in the future.

In addition, farming communities in many areas of the Third World have been actively regenerating and revitalizing degraded agricultural land with many forms of sustainable, organic agriculture, and recovering agricultural biodiversity – the key to food security.³ Since the early 1990s, a number of non-government organizations have joined forces to form the Latin American Consortium on Agroecology and Development to promote agroecological techniques which are sensitive to the complexities of local farming methods. Yields have tripled or quadrupled within a year. Large-scale implementation of biodynamic farming and sustainable agriculture is succeeding

in the Philippines. Successive studies have highlighted the productivity and sustainability of traditional peasant farming in the Third World as well as in the North.

In twenty Third World countries, more than 2 million families are farming sustainably on 4-5 million hectares, with tripled or doubled yields, fully matching if not surpassing intensive agrochemical agriculture. And this has happened only within the past five to ten years.⁴ Contracting in to corporate food-production schemes now will set them back once again down the road to escalating debt and poverty, not to mention often irreversible devastation of agricultural land and the environment.

The recent experience of Cuba is instructive.⁵ US economic blockade since the 1960s caused a shortage of agrochemicals, making it necessary for Cuba to go organic on a grand scale. They maintained one-third of the 11 million hectares of agricultural land on agrochemicals, turned another third fully organic,

and kept the rest 'transitional' as half agrochemical and half organic. The yields per hectare of the fully organic are equal to the fully agrochemical, while the yields of transitional fields are only half as much. This is the clearest evidence that organic agriculture can work on a large scale.

Mae-Wan Ho, Reader in Biology at the Open University, is author of *Genetic Engineering – Dream or Nightmare? The Brave New World of Bad Science and Big Business*, Gateway Books, Bath, 1998; available from: <sales@gatewaybooks.com>, <amazon.com>

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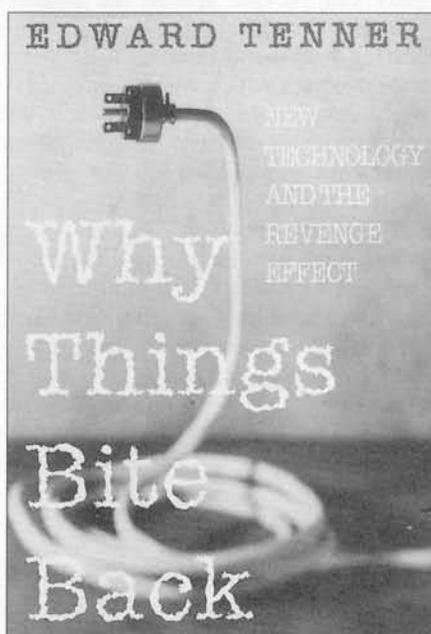
Reviews

Technology – A False Religion

WHY THINGS BITE BACK

by Edward Tenner

Fourth Estate Limited, London, 1996,
346pp, £18.99 (hb),
ISBN 1 85702 -560 -1



The most fundamental tenet of, what is in effect, the religion of modern Man is that science and technology (with a little help from industry) can solve all the problems that confront us, such as poverty, unemployment, disease, malnutrition, crime and delinquency, and create a veritable material paradise on Earth.

This being so, Edward Tenner's book is truly blasphemous. Its thesis is that our technological efforts to manage the world of living things are not working out too well. At first, they may seem magically successful, but then comes what Tenner calls their "revenge effect" which at best transforms acute problems into chronic ones, at worst gives rise to all sorts of new problems, often more serious than whatever problem was targeted in the first place.

The book is well-written, easy to read, and full of interesting information.

He illustrates his thesis very convincingly, with reference to such things as our efforts to control disease, to acclimatize alien species of plants and animals, to control agricultural pests with chemical pesticides, and to computerize the office in order to improve decision-making.

Of course, I am far from shocked by this book's blasphemous tenor. Indeed, my only complaint – and a mild one at that – is that it is not sufficiently blasphemous.

I remember seeing graffiti on a wall in a run-down area of London, which read "Technology is the answer – but what is the question?" That is a point I want to make. Technology undoubtedly provides a means of doing all sorts of very impressive things – to take an obvious example – landing people on the moon. But it is not clear what real human problem this really solves. Even the most ardent admirer of our technological prowess must admit that if we were to draw up a list of the problems that confronted us since we first began to live on this planet, not being able to visit the moon would be pretty low down on the list.

My contention is that the real problems that confront us today are due to the disruption of natural systems such as the family, the community and the ecological system (ecosystem), and that for these problems there are no technological solutions. One reason is that our technological intrusions into the workings of the living world are unnecessarily crude when compared with the highly sophisticated – one might even say – brilliantly intelligent way in which it is capable of responding. Consider the way in which the humble mosquito was able to learn, very rapidly, and in all sorts of different ways, how to deal with the DDT with which it was mercilessly assailed during the World Health Organization's malaria-eradication programme in the sixties. It learnt for instance not to alight on the walls of the houses that were sprayed with this poison; it developed a thick cuticle through which the poison cannot penetrate; it grew much fatter so that there would be more fatty tissue in which the poison could be diluted; or it developed an enzyme that breaks down the poison into

a perfectly harmless substance.

Equally illustrative is the hopeless failure of the US Department of Agriculture to eradicate the red fire ant – a native of South America – that invaded the southern states of North America in the thirties, where they have proliferated and caused terrible problems, littering the land with their mounds and killing just about everything, including birds, reptiles and small mammals, that dare get too close to them. Efforts to eradicate them have failed miserably. As Tenner notes, by 1978 "the USDA had sprayed millions of acres, spent \$200 million, and left more fire ants than ever." It has been calculated that the spraying programmes actually "helped fire ants increase their share of the resident ant population from 1 per cent to 99 per cent in only four years," largely by killing off their predators. The spraying further increased the problem as the fire ants reorganized themselves into densely spaced super colonies, of which there were as many as 500 per acre, each with a hundred queens or more. What is more, the colonies became linked by tunnels that enabled them "to form an extended fighting organization, capable of wiping out almost all other forms of insect, reptile, bird, and rodent life in its path." What is interesting is that this is something quite new, which does not occur in the ants' original South American habitat – an improvisation that USDA scientists could never have predicted.

Our technological efforts to eradicate microbes have, in the long run at least, proved even less successful. Tenner notes how the use of penicillin has "selected natural variants of bacteria that could not only resist but destroy penicillin. Resistant strains began to overwhelm hospitals in the fifties, sixties, and seventies. Then, in the seventies, resistant forms of the bacteria causing meningitis and gonorrhoea began to appear." He points out that very much the same thing occurred after the introduction of streptomycin that was used in particular against the tuberculosis bacillus.

The truth is that to wage chemical warfare against insects, let alone against micro-organisms that adapt even faster

to the poisons, is possibly the most unequal struggle that man has ever yet waged.

In 1966 the US Surgeon General, William Stewart, declared, as Tenner notes, that "It is time to close the books on infectious disease." This reflected a quasi religious belief in the omnipotence of technology, as well as a total ignorance of biology and ecology. Needless to say, twenty years later the incidence of just about every infectious disease, with the exception of smallpox and poliomyelitis, is escalating worldwide; new ones are appearing and our ability to combat them is decreasing exponentially.

How then do we deal with them? The answer is by learning to live with the parasites and the pathogens that we will never be able to eliminate, which means, above all, adopting social and ecological policies that minimize rather than maximize their numbers.

Among other things, this means drastically changing current agricultural practices, which involve maximizing vulnerability to potential pests by growing endless stretches of a single crop – and often of a single variety of that crop – providing thereby a veritable feast for whatever particular bug lives off it, and a permanent feast at that, since the same crop is planted year after year with monotonous regularity. If we want to minimize pest outbreaks we must on the

contrary plant a great many different crops of different varieties and different ones every year. This, furthermore, would have a "solution multiplier" effect since it would help maintain soil fertility and provide us with food that is uncontaminated with cancer-causing pesticide residues.

Social and ecological problems require social and ecological solutions. Technological expedients can only mask symptoms, and render these problems that much more tolerable, thereby serving to perpetuate them.

Take the present epidemic of crime, delinquency, drug addiction and general violence. It is, as must be clear to most people, the inevitable consequence of the breakdown of the family and the community and the values with which the members of a society based on these key social units are normally imbued.

Money spent on burglar alarms and video cameras or on building more prisons, as Michael Howard insisted when Home Secretary, can provide us with some protection against criminals, but does little more than mask the symptoms of the real problems involved. To solve them there is only one solution. It is to adopt those policies that will permit the reconstitution of the family and the community.

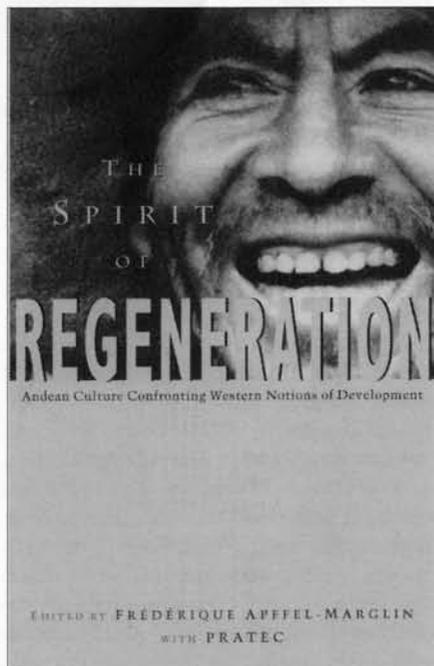
Another example is global warming – by far and away the most serious problem that confronts us today. It is caused

by the massive and ever-increasing volume of greenhouse gases, in particular carbon dioxide from the combustion of fossil fuels that are emitted by a modern technological society. This is leading to a dramatic change in the chemical composition of the atmosphere; in other words it is disrupting that natural system that Jim Lovelock calls Gaia (the biosphere or world of living things taken together with its atmospheric environment).

The US National Academy of Sciences has proposed that we apply "geo-engineering" solutions to this problem, such as siting 50,000 one-hundred-square-kilometre mirrors in space to deflect the heat of the sun. Whatever precarious protection this mega-gadgetry can provide against the destabilization of world climate, it is still only dealing with the symptoms of the problem involved, which we can only solve by learning once more to satisfy our needs without having to change the chemical composition of the atmosphere.

I do not know if Edward Tenner would agree with these views. For me, if one pursues his arguments to their logical conclusion, they are inescapable. If he reads this review, maybe he can give me a call and let me know.

Edward Goldsmith



The Dementia of Development

**THE SPIRIT OF REGENERATION:
Andean Culture Confronting Western
Notions of Development**

edited by Frédérique Appfel-Marglin
with PRATEC

ZED Books, London and New York, 1998,
272pp,
£44 (\$65) (hb) ISBN 1 85649 547 7
£14.95 (\$25) (pb) ISBN 1 85649 548 5

Upon my first reading, a decade ago, of *Ancient Futures*, Helena Norberg-Hodge's spirited plea for protecting the people of Ladakh from the onslaught of Western development, the title struck me as an oxymoron. But after reading the kindred *The Spirit of Regeneration* – the account of a similar movement in the Peruvian Andes – it no longer strikes me as a contradiction in terms. The principal difference between the two accounts is that *Ancient Futures*

reflected the concerns of an outside observer, who, in spite of her Western origins and education, came to recognize and appreciate the fact that the Ladakh lifestyle was one of enviable simplicity, eminently suited to the rugged environment of the Himalayan highlands. *The Spirit of Regeneration*, on the other hand, tells the story of a spontaneous movement by indigenous peoples in search of their long-lost identity. Both books offer a lesson in empathy and humility for us Westerners, brainwashed from infancy into believing that our lifestyle is necessarily superior to that of so-called primitive people.

The Spirit of Regeneration is a compilation of essays by members of PRATEC, the Andean Project of Peasant Technologies, a network of village representatives, field agents and researchers working to revitalize *lo Andino* – a catchword which captures the long-dormant spirit of Andean culture and customs. Somewhat awkwardly translated from Spanish, the book was ably edited by Appfel-Marglin, associate professor

of anthropology at Smith College, who also wrote the introduction.

One of the essays discusses at some length the meaning and significance of specific Andean words, such as *pachamama* (mother earth), *chacra* (cultivated field) and *ayullau* (extended family). These and many similar words have no exact counterpart in any Indo-European language, as they are born of a very specific life experience and *Weltanschauung*, shaped over many millennia in a unique ecosystem (though in many ways similar to that of Tibet and Ladakh). Thus, for example, the word *ayullu* can mean a lot more than 'extended family'. It can include household goods, farm animals and fields; in its widest sense, *ayullu* can be said to represent a spiritual *ménage à trois* or triumvirate, consisting of *rumas* (people), *huacas* (deities) and *sallqas* (natural communities), co-existing "in a brotherly atmosphere of profound equivalency". Nor does the word *ruma* exactly match the Western concept of man. As the author explains: "Man in the West is not just another species; 'man' is a category that radically separates that species from all others." Or, as the Bible asserts, "created in the image of God".

At first glance, the comparison between Peru and Ladakh may seem far-fetched. But, notwithstanding Kipling's assertions to the contrary, East does meet West way up in the Andes. For the peoples who crossed the land bridge between Asia and Alaska some 20,000 years ago, and eventually found their way to the South American continent, have a close kinship with those of central Asia. Up to the time of Columbus's 'discovery', the Incas, in present-day Bolivia, Ecuador and Peru, were the only native Americans, besides the Aztecs and Maya, to develop agriculture.

Much of the thrust of PRATEC is directed toward a revival of ancient agricultural practices, which have been subordinated to the vagaries of a market economy, thus placing *los Andinos* in a precarious position of peonage. But its members are equally concerned with the regeneration of many ancient customs, social as well as spiritual, which define their traditional lifestyle. Whereas this has of necessity been greatly affected by Western influences over a period of five centuries, the changes are largely superficial. For the people of the high Andes have never been completely subjugated

or assimilated; rather *they* have assimilated into *their* culture that which appealed to them. Thus, many of the Catholic saints, as well as the infant Jesus and Virgin Mary, have simply been incorporated into their own pantheon of *huacas*.

Nothing is more abhorrent to the Andeans than the slavish conforming to Western archetypes. Memory is for them, as the Mexican Carlos Fuentes puts it, "the strength of the past in the present" (cf *Ancient Futures*). "This is contrary to the attitude of modern Western man, for whom utopia – the conceived reality, the longed-for future, the 'should-be' – is what guides his behaviour and is the aim of his life."

Another PRATEC contributor begins his essay with these words: "Western powers are used to presenting their dominant, expansionist and voracious mode of proceeding as if it were a cause for celebration, a catalogue of heroic deeds that reaffirm the excellence of their virtues. Such virtues logically entitle

"Western man cannot accept or even imagine that we continue to be as we always were, because that would mean admitting that he had failed in his 'civilizing' and christianizing mission Pope John Paul II, faced with the evident failure of his institution over the past five centuries, is currently trying for a second evangelization in the Andes. It is . . . evident that it is a vain attempt."

them to subjugate the rest of the world. Having done so, they aspire to impose on others this mode of evaluating their own actions as the only correct one." He goes on to compare the Spanish conquest with a virulent plague, that in a matter of decades wiped out 90 per cent of the Andean population, which only now has resumed its pre-colonial strength. But instead of blaming the conquerors for the iniquities heaped upon his countrymen, he takes the philosophical view that his own people must have done something wrong to deserve such a fate. At the same time, he adamantly denies that they have ever been truly vanquished. Drawing a parallel with Thomas Macaulay, governor of India, who vainly tried to imbue his colonial subjects with all the attributes of an Englishman, he reassures the reader that the Andeans are still Andino to the core. He

says that "Western man cannot accept or even imagine that we continue to be as we always were, because that would mean admitting that he had failed in his 'civilizing' and christianizing mission. Pope John Paul II, faced with the evident failure of his institution over the past five centuries, is currently trying for a second evangelization in the Andes. It is . . . evident that it is a vain attempt."

In a similar vein, the author compares modern cities with "cancerous tumours". But he saves his most scathing language for development, which he calls a recent "symptom of the senile dementia of the plague which has infected us for five hundred years and now finds itself in the last stages of its vital cycle. Because we are different we are classified as underdeveloped. In this madness which is development, it is forbidden to be different."

Another essay commiserates with "the profound anxiety of the Western world, which manifests itself in the massive and sustained consumption of

drugs" in its societies. The author laments the arrogance of the Judaeo-Christian 'creator-man' who does not accept the world . . . that his own God offers him. Quoting the philosopher Karel Kosik, the author goes on to say that "Western man tends to flee from the present to . . . live in the future, thus reducing his life to inauthenticity."

In a chapter on poverty, echoing the writings of Karl Marx, but also reminiscent of a memorable passage from Edward Goldsmith's *The Way* (" . . . by reducing a victim to

an object, one can face treating him in an inhuman way," [page 93]) the author writes that the development of capitalist production reduces the person "to a thing – something impersonal, insignificant and disposable. The human person, being reduced to an individual member of society, has been despoiled to the point of remaining in the most denigrating vacuity, in the most frightful impotence, in the most miserable solitude." If any fault is to be found with *The Spirit of Regeneration*, it is perhaps the excessive use of terms straight out of *Das Kapital* and the lexicon of Lenin (the word 'imperialist' appears no fewer than six times on a single page). But this should not detract from the important work of PRATEC – strengthening cultural and spiritual roots in the face of development.

Gard Binney

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Brave New World Delayed?

*Update of events for the second edition of
The Monsanto Files*

By Paul Kingsnorth and Zac Goldsmith

Events move quickly in the Brave New World of biotechnology; sometimes more quickly than its begetters would like. Since *The Monsanto Files* first appeared, in September 1998, genetic engineering has been thrown into the public spotlight world-wide – and the public has not liked what it's seen.

British Prime Minister Tony Blair said in February that “genetic modification in its various forms will be the revolutionary science of the 21st century, as important as the computer was for the late 20th century.”¹ Unfortunately for Blair, and his new-found chums in the Monsanto boardroom, the voters seem to have other ideas.

In the last few months, resistance to Blair's vision – of a future where Monsanto and its friends reinvent nature, patent it, then sell it back to us – has snowballed at surprising speed. That *The Ecologist* has already sold 20,000 copies of *The Monsanto Files*, plus 28,000 Spanish translations, and is now reprinting in response to continuing demand, is perhaps representative of how the subject has gripped the public imagination.

It sometimes seems that Monsanto have single-handedly managed to unite a divided social and environmental movement against biotechnology. Mainstream, otherwise apolitical people have joined up with radicals. The left is working with the right. Previously law-abiding citizens are showing a willingness to take direct action. Across the world, it seems, the biotechnology bubble may be about to burst.

The recent media frenzy in Britain is one example of this. The spotlight was first turned onto biotech when it emerged that Dr Arpad Pusztai, a scientist employed by the Rowett Institute in Aberdeen, had been pressured into retirement following research which showed genetically engineered potatoes had harmful effects on rats. The Rowett Institute claimed his research was flawed, but Dr Pusztai's findings were publicly backed up by 20 international scientists. When the *Daily Mail* revealed that the Institute had received a £140,000 grant from Monsanto, every newspaper in Britain threw itself with gusto into the GMO debate.

The result was startling. *The Guardian* discovered that David Sainsbury, Blair's unelected science minister, owns the patent

rights to a key gene used in the GM foods industry. And when it emerged that not only had Monsanto and Zeneca held 81 meetings with ministers over the last two years, but that the Labour government planned to give £1.5 million of taxpayers money to biotech firms, to “encourage investment” in Britain, the cosy links between the Labour government and the biotech industry were revealed.

Two weeks of front page media coverage followed. Three papers – the *Daily Mail*, *The Express* and the *Independent on Sunday* – began ‘Stop GM Foods’ campaigns. Unsurprisingly, the British public is now strongly opposed to the introduction of GM foods, and retailers have begun to bow to pressure by either banning GM foods, or insisting on clear labelling. The government and the biotech industry have been wrong-footed by the media blitz. And the blitz may return in May when, in the name of Free Trade, the WTO forces the EU to overturn its long-standing ban on Monsanto's Bovine Growth Hormone, which has been linked to cancer. [see Kingsnorth in this issue]

Tony Blair said in February that “genetic modification in its various forms will be the revolutionary science of the 21st century, as important as the computer was for the late 20th century. Unfortunately for Blair, and his new-found chums in the Monsanto boardroom, the voters seem to have other ideas.

Monsanto, though, may have been less surprised than Tony Blair by this press outcry. As *The Ecologist* reported in January, two leaked reports, prepared by Greenberg Research on behalf of Monsanto, warned – before the British media got its hooks in – of an “ongoing collapse of public support for biotechnology” in the UK, and a “maturing crisis” in Germany.

Both reports, one focusing on each country, are based on national surveys, polls and interviews. Both were intended to be a corporate secret, but were made public by Greenpeace. Their contents are revealing.

The first report, *The British Test*, is almost prophetic in the light of recent events. “Biotechnology and Monsanto face their toughest test in Britain,” it reads. “Over the past year, the situation has deteriorated steadily and perhaps at an accelerating pace. At each point in this project, we keep thinking we have reached the low

point, and that public thinking will stabilize, but we apparently have not reached that point." *The British Test* reports that Monsanto's 1998 newspaper advertising campaign seems to have had the opposite effect to that intended, with a third of the public now "extremely negative" about GMOs, up from only 20 per cent a year ago.

Germany: The Maturing Crisis, the second report, tells a similar tale: "On the general issue of food products improved with GM ingredients, just 16 per cent [of the German public] respond positively, but 81 per cent respond negatively (including 42 per cent who are very negative.)" *The Maturing Crisis* also notes, significantly, that the German public has moved on from the issue of food safety (which, post-BSE, has dominated the media debate in Britain) to the issue of corporate dominance of the food chain. "[German] opposition has begun to centre on... transnational corporate threats to the consumer, and on the role of Monsanto in particular," reads the report.

What characterizes both reports is the corporate arrogance for which Monsanto has become infamous. The report's explanation for Monsanto's failure to communicate with people centres not on its products, nor on its dominance of the world's food markets. Instead the problem is seen to be "immaturity" amongst European consumers. In Germany, Greenberg identified "an ideological opposition to 'processed foods', which are seen to not be real," while in the UK, the public are losing faith in "scientific progress" and are possibly, "the most sceptical in Europe."

It seems that Monsanto's purpose, in commissioning the two Greenberg reports, was to identify key areas of public hostility, and then work to manoeuvre around them. Hence, in any future UK publicity from Monsanto, we won't be hearing the term 'genetic modification' – apparently we don't like it. In Germany, meanwhile, Monsanto will focus on the economic arguments for biotechnology, as the report suggests focusing on environmental issues will win only hostility.

Most tellingly, and perhaps most pleasingly for Monsanto, the Greenberg reports highlight the fact that European consumers, whilst largely opposed to biotechnology, see its arrival as

In any future UK publicity from Monsanto, we won't be hearing the term 'genetic modification' – apparently we don't like it.

inevitable. In Germany, while 81 per cent of consumers are worried about the introduction of GM foods, 92 per cent believe their arrival is inevitable. Monsanto's response to this, suggests the report, should be to adopt a "low profile approach." In other words, don't waste corporate money talking to a sceptical public. Instead, concentrate on lobbying governments. Present GM foods as a fait accompli and the public, already feeling powerless, will shrug its shoulders and tuck in.

The message to opponents of biotechnology is clear: if enough people wake up to what is happening, the GM revolution might yet be nipped in the bud. Both Germany and Britain have a recent history of public activism against government projects that threaten the environment. Last year, for example, Germany witnessed what has been described as "one of the biggest shows of defiance to a European state by its own people," when 15,000 people united in protest against the transport of nuclear waste. In Britain, the

1990s have seen wave after wave of direct action anti-road protests, which succeeded in turning the public against the government's £23 billion road building scheme – most of which was scrapped ignominiously as a result, along with the government that thought it up. The lesson is crystal clear: whatever the odds, concerted public action can turn the tide.

Proof of this, if it were needed, can be found in India. Last November, a campaign labelled 'Operation Cremate Monsanto' began, when a group of farmers in the State of Karnataka uprooted one of Monsanto's first Indian test sites and set fire to the crops. The farmers' leader, Professor Nanjundaswamy, leader of the ten million-strong Karnataka State Farmers Association, declared, "we denounce the ignorance, incompetence and irresponsibility of the Union government, for allowing a corporate criminal like Monsanto to gamble with the future of Indian agriculture." Since November, angry farmers have torched a dozen more Monsanto test fields, and Operation Cremate Monsanto has spread like wildfire, as it were, across the country.

The tale of Monsanto's time in India is a depressingly familiar story: the corporation lied to, and attempted to fool, both India's peasant farmers and various State governments, in an attempt to sneak GM crops into the country by the backdoor. The first field that was burned, back in November, was owned by a farmer called Basanna Hunsale. He had been growing Monsanto's genetically modified 'bollgard' cotton – supposedly altered to prevent attacks from boll weevils – on his farm. He only found this out, however, when he heard Karnataka's Minister for Agriculture announce, on television, the location of Monsanto's test sites in the State.

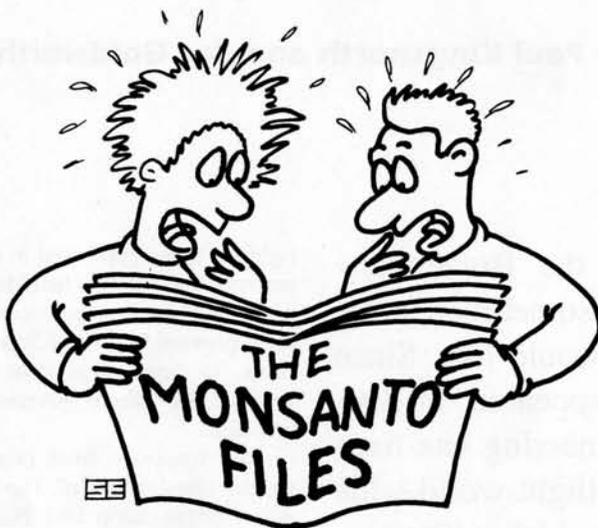
Monsanto, when selling Basanna the new strain of cottonseed, had 'omitted' to mention that it was genetically modified. As a result, Basanna's land, and that of his neighbours, was unknowingly polluted by an untested, genetically engineered crop. The crowning irony was that Monsanto's miracle cotton was not even weevil-proof. Basanna's entire crop grew to less than half the height of his traditional varieties. Monsanto was forced to issue a public apology to Basanna, but his case is by no means isolated. The government of Andhra Pradesh has already banned Monsanto trials from the state, citing similar deceptions as its reasons.

Meanwhile, another group of campaigners is trying to drive the corporation out of the subcontinent altogether. The 'Monsanto Quit India' campaign, launched on 9th August last year – the anniversary of the day that Gandhi famously told the British to 'Quit India' – has so far been responsible for ten thousand post-cards being sent to Monsanto's Illinois headquarters by concerned people all over India. And the campaigners expect many more to follow, as realisation of the havoc biotechnology could wreak on Indian agriculture begins to spread.

The biotech debate, then, is not going away. On the contrary, it is only just beginning to pick up steam. *The Monsanto Files* aims to inform people about what is really going on behind the smooth facade of the industry's major player. If, having read this issue, you decide that a future on Planet Monsanto is not for you, then make your voice heard. Because you can be sure that Monsanto will.

References

1. Jones, G., "Genetic Science Hailed by Blair," *Daily Telegraph*, February 20, 1999, p.1.



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DIARY DATES

14-5 September 1998: **European Environment Conference.** Clement House, London School of Economics. Enquiries to: ERP Environment, PO Box 75, Shipley, West Yorkshire BD17 6EZ, UK. Tel: +44(0)1274 530408; Fax: +44(0)1274 530409; EMail: <elaine@erpenv.demon.co.uk>

17-18 September 1998: **Business Strategy and the Environment.** University of Leeds. Contact ERP Environment (see above ad for details).

19 September 1998: **MAI-DAY Conference** Insurance Hall, 20 Aldermanbury, London EC2 Bringing together campaigners and activists from a wide range of backgrounds, to share information and ideas and organise a coordinated UK campaign to stop the MAI. For further information, contact Chris Keene, 90 The Parkway, Canvey Island SS8 0AE. Tel: 01268 682820; Fax: 01268 514164; EMail <chris.keene@which.net>

25 September 1998: **Foreign Direct Investment and Labour Standards in Developing Countries: the Effect of the MAI on Labour Standards.** The Lutheran Church, Spui 23-5, Amsterdam, THE NETHERLANDS (debate in English). For details, contact SOMO, Keizersgracht 132, 1015 CW Amsterdam, The Netherlands. Tel: +31 20 6391291; Fax: +31 20 6391321; EMail: <somo@xs4all.no>

4 October 1998: **CITY HARVEST.** A one-day edible bonanza celebrating the wealth of foods that London – and Londoners – produce. Including workshops, music, drama, food tasting and much more. Old Spitafields Market, 10am-5pm. For information, contact Victoria Williams, SAFE Alliance, 94 White Lion Street, London N1 9PF. Tel: 0171 837 8980; Fax: 0171 837 1141; EMail: <safe@gn.apc.org>

5 October 1998: David Suzuki (University of British Columbia, Canada) "**Humanity and the Earth System**", The Linnean Society, Burlington House, Piccadilly, London W1V 0LQ. 6-9pm. For details of this and other **Gaia** lectures, contact Philip George. Tel/Fax: 0181 849 3496; EMail: Gaia@uel.ac.uk>

24 October 1998:
Third World First SHARED PLANET '98. Warwick University. Diverse programme of workshops and speakers. For further information, contact Jo Polack, 4a East Ave., Oxford OX4 1XW; Tel: 01865 245678; Fax: 01865 200179; EMail: <twf@gn.apc.org>

6-8 November 1998: **MARINE CONSERVATION SOCIETY 21ST BIRTHDAY CONFERENCE.** The event of the marine conservation calendar, celebrating Year of the Ocean 1998! Boldrewood Conference Centre, University of Southampton. Open to members and non-members. Tickets can be booked for full weekend or part of it. For a full programme and booking form, send SAE to: Marine Conservation Society, 9 Gloucester Road, Ross-on-Wye, Herefordshire, HR9 5BU. Tel: 01989 566017; Fax: 01989 567816.

7-9 November 1998: **INTERNATIONAL CONFERENCE ON ALTERNATIVES TO GLOBALIZATION.** Tagaytay City, Philippines. For more information, contact IBON Foundation Inc., 3/F SCC Bldg., 4427 Interior Old Sta. Mesa, Manila, PHILIPPINES. Tel: +632 7132737; Fax: +632 7160108; EMail: <ibon@info.com.ph>

9-14 November 1998: 28th International Film Festival **NATURE, MAN AND HIS ENVIRONMENT.** For details, contact Liborio Rao, LA NATURA, L'UOMO E IL SUO AMBIENTE, Via di Villa Patrizi 10, 00161 Rome, ITALY.

2-3 December 1998: **GENETICALLY MODIFIED FOODS; FROM SEEDS TO SUPERMARKETS.** The Hilton on Park Lane, London. Providing a platform for those from all aspects of the industry to discuss the issues surrounding Genetically Modified Foods. For further information, contact Suzanne Mayhew, Tel: +44(0)171 793 4111; Fax: +44(0)171 793 4047; EMail: <Suzanne@access-conf.com>

COURSES

10-29 January 1999. "**In Search of Technological Responsibility: Agriculture, Biosafety and Democracy**". Taught by Christine von Weizsaecker, Tewolde Egziabher and Wes Jackson.

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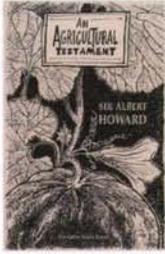
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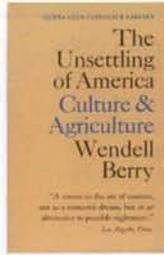
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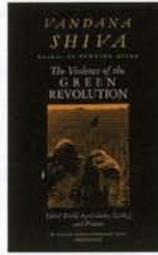
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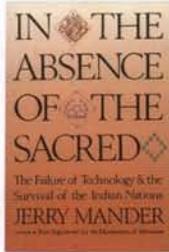


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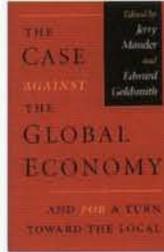


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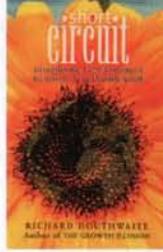
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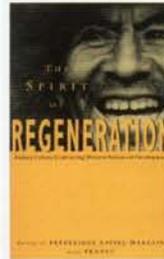


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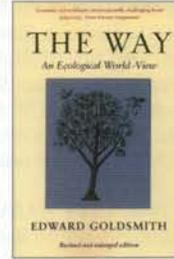
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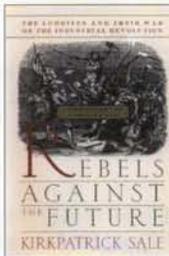


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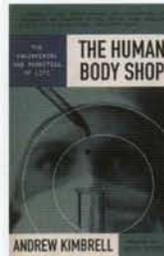


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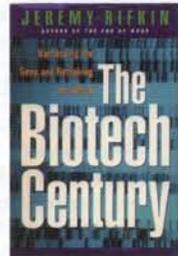
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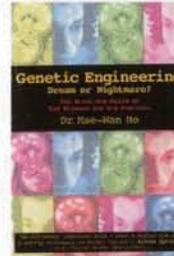
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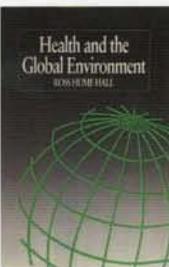


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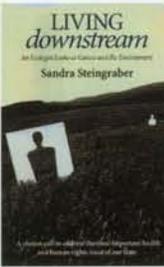


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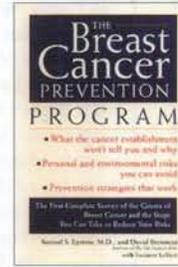
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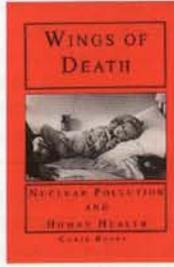
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