



SAFeAGE (South African Freeze Alliance on Genetic Engineering)

GMO's: THE SCIENCE... WHAT COULD GO WRONG?

The Issue

"In school you may have learned the basic components of a cell: the nucleus that contains genetic material, the energy-producing mitochondria, the protective membrane at the outside rim, and the cytoplasm in between. But within these anatomically simple-looking cells is a complex world; these smart cells employ technologies that scientists have yet fully to fathom."

GENETIC ENGINEERS ARE USING THEIR LIMITED KNOWLEDGE OF HOW CELLS FUNCTION AS THE BUILDING BLOCKS OF GENETIC ENGINEERING!!! THEY WORK ON THE PRESUMPTION THAT THEY HAVE CORRECT AND TRUSTED INFORMATION!!!

What is Genetic Engineering?

Every living thing; plant, animal or microbe, is made up of microscopic cells, in the centre of which is the nucleus, which controls size, shape & functions in each cell. Inside the nucleus are genes, tiny chemical structures that store instructions for each cell. Genes are made of DNA: the pattern and operating system for all living things.

Traditional plant and animal breeding mates selected individuals together, generation after generation, in the hope offspring will inherit genes for characteristics like high yield or resistance to disease. Only individuals of similar species can be successfully mated.

Genetic engineering (GE) short-circuits this process. Genes are physically transferred from one living thing into the nucleus of a cell from another. The genes may be of the same or unrelated species. In fact one can be an animal and the other a plant. This can never happen in nature.

The Concerns (the science is flawed/obsolete!)

The old theory of genetics asserted that each gene is coded for its own single unique protein. Biologists also estimated that the number of proteins in the human body was 100,000 or more. Thus they predicted that there would conveniently be about 100,000 genes in human DNA. When the number of human genes was ultimately tallied and reported on June 26, 2000, it shocked the scientific world: there were only about 30,000. This figure not only fails to account for the estimated number of proteins, it falls short of explaining the vast quantity of inheritable traits in the human body. Moreover there are weeds with as many as 26,000 genes. Given the one protein-one gene theory, shouldn't humans have far more genes than a weed? Something seemed terribly wrong. It turns out that the vast majority of genes do NOT encode for a unique protein. On the contrary, some genes can make many, many proteins. In fact, the current record is set by a single gene from a fruit fly, which can generate up to 38,016 different protein molecules.

In humans, nearly all genes are theoretically able to make two or more proteins. The number of human genes capable of coding for only a single trait can be counted on your hands.

The fact that a gene creates multiple proteins may explain some of the surprises that keep popping up for genetic engineers, and it is on our list of what could go wrong and why.

Some examples of what could go wrong and why

Horizontal Gene Transfer & Antibiotic Resistance

After the foreign genes are blasted into the cells, only a small percentage end up inside the DNA. To figure out which of the thousands of cells on the plate have the foreign gene in their DNA, scientists typically attach an Antibiotic Resistant Marker (ARM) gene to their foreign gene. If this gene package makes it into the DNA, the ARM gene will render that cell invincible to a normally deadly dose of antibiotics.

Thus after the genes are shot into the pile of cells, the cells are all doused with antibiotics. Those that survive got the genes in their DNA. Those that die did not. Only one in thousands survives.

Many scientists are concerned that when humans and animals eat GM food, the ARM genes will transfer into the bacteria found inside the digestive system. This process whereby genes travel from one species to another, is called "horizontal gene transfer". If the ARM gene moves between species it could result in new and dangerous antibiotic resistant diseases.

The biotech companies assure the public that ARM genes cannot be transferred between food and bacteria in the human gut. They refer to evidence... from animal studies in the 1970s and '80s that "failed to find evidence that DNA survived digestion." When detection techniques became more sensitive starting in the late 1980s, however, animal feeding studies confirmed that DNA not only survives, it is found in the blood, intestinal wall, liver, spleen, and faeces and even remains intact in the digestive system for more than five days. DNA can even travel via the placenta into unborn mice. More pertinent, however, is a 2002 study that was dubbed "the world's first known trial of GM foods on human volunteers."

Researchers used seven people whose large intestines had previously been removed. Their digestive systems were rerouted out of the body into colostomy bags. In their digestive material "a relatively large proportion of genetically modified DNA survived the passage through" the small intestine. Moreover, in three of the seven subjects, horizontal gene transfer did occur. Some of their digestive bacteria contained the herbicide-resistant gene used in soybeans. Since no increase in gene transfer was detected after subjects ate a meal with GM soy, researchers suggest that the transference might be related to long-term consumption.

"Everyone used to deny that this was possible... It suggests that you can get antibiotic marker genes spreading around the stomach which would compromise antibiotic resistance."

Bt corn contains an ARM gene that resists the commonly prescribed antibiotic, ampicillin. Scientists worry that this gene's widespread presence in human and animal food will render ampicillin useless in treating disease. The World Health Organisation, Britain's House of Lords, the American Medical Association, and even the Royal Society have all called for a phase-out of the use of ARM genes.

Code Scramblers

To make a protein, the DNA uses its unique genetic code to write a prescription for its chief assistant, RNA. The RNA fills the prescription by creating and assembling amino acids. The amino acids form the protein. But in some cases, before RNA fills the prescription for the





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GMOs: The Current South African Situation

Owing to the strong presence of multinational seed companies and strong export-oriented agriculture, South Africa is further down the GM road than any other country on the continent, and sixth biggest producer of GM crops in the world.

In 2006, 700,000 ha of GM crops were planted to Bt maize, Roundup Ready soybean and Bt cotton. Nearly all of the GM crops grown in South Africa are sown on large commercial farms, but South Africa is presented as a showcase of the benefits of GM cotton for small farmers, overlooking the fact that the debt problems experienced by small farmers growing Bt cotton are so bad that the firms managing the project withdrew.

There are no fresh GM fruit and vegetables on sale in South Africa. In spite of objections, GM Potatoes are currently undergoing field trials and will soon be on our supermarket shelves. A small quantity of yellow maize and soy-bean have been approved for animal feed.

The National Department of Agriculture has given approval for the planting of three GM crops: insect resistant cotton, herbicide resistant cotton and insect resistant maize. Currently the following GM crops are grown commercially in South Africa:

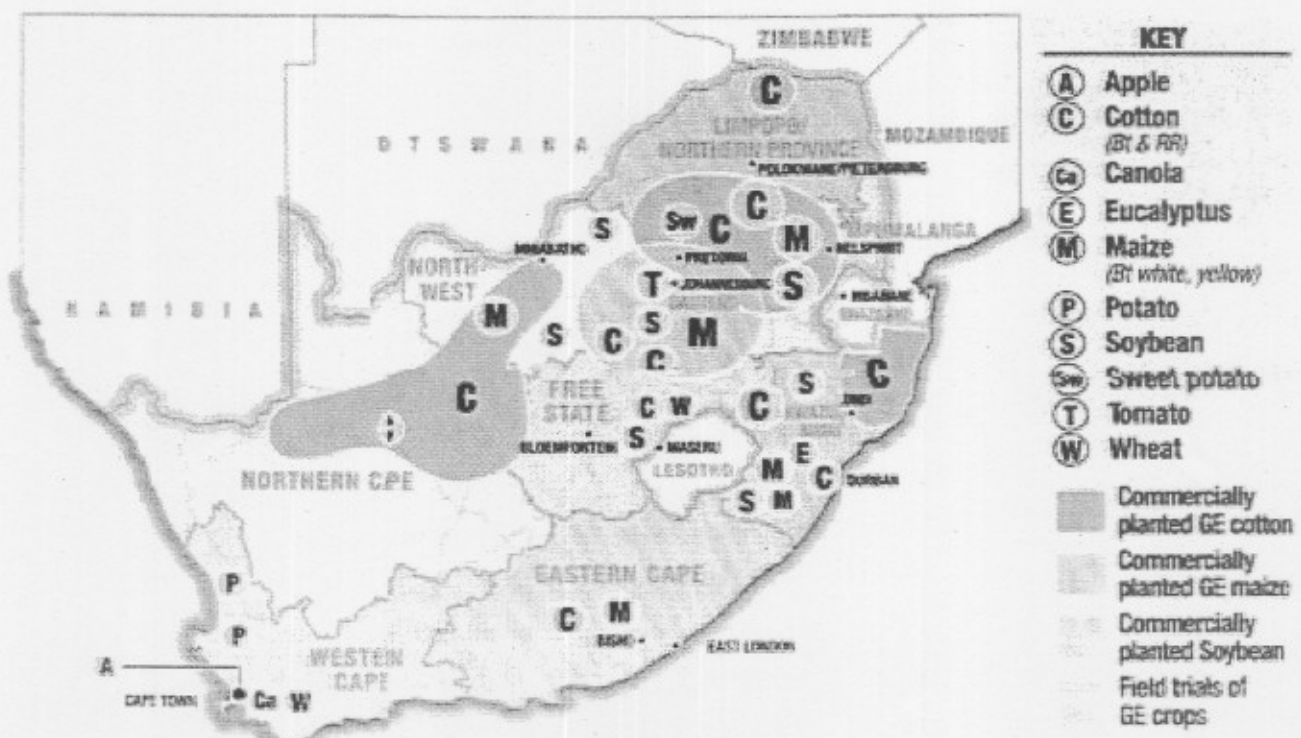
Yellow maize 44% is GM	White maize 10% is GM	Soya beans 70% is GM	Cotton 90% is GM
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In 2006, researchers randomly tested 58 food products found on South African supermarket shelves. They found that an average of 76% of foods on SA shelves contain GM material including many of our maize meal brands. Furthermore 14 products that were labeled GM free or organic also contained GMOs!

NEW GENETICALLY MODIFIED ORGANISMS...

Many experiments are being conducted internationally in laboratories and open field trials for a variety of GMOs including sorghum, millet, peanuts, lupin, tobacco, grapes, strawberries, potato, tomato, cassava, eucalyptus, pine, sugar cane, bananas, foot and mouth disease, Rift valley fever virus, African horse sickness, recombinant murine vaccine virus, recombinant E.coli, Bacillus, Lactobacillus, Rhizobium and transgenic mice, etc.

Where in South Africa are Genetically Modified crops growing?



Source: www.biorwatch.org.za (2006)

6

Is your food SAFE?



Biotechnology – the true facts

The safety of genetically modified food products through biotechnology remains a subject of uncertainty to many people, but after more than twenty years' research and ten years' commercial use, genetically modified grain products have been found to be just as **healthy, nutritious and safe** as normal products. All commercially approved grain products that have been genetically modified adhere to **strict food, feed and environmental safety guidelines** of regulatory authorities worldwide. This is one of the most **extensively tested and controlled** types of food, and **no negative reactions** have ever been reported. In fact, these innovative products also lead to food with **improved nutritional value**, which includes enhanced vitamin A, protein and antioxidant content, as well as **better food safety** through the removal of allergens and anti-nutrients. In short, you can use it with confidence!

Tested. Healthy. Nutritious. Safe.

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11

Annexure 3 (c)

**COMMENTARY ON THE REPORT ABOUT THE FEEDING OF RATS BY MONSANTO'S
GM RUSSET BURBANK Bt POTATOES**

I.V.Ermakova, Agrarian Russia, No 4, 2005, pp.62-64.

The Commentary is based upon an analysis of the following document:

((Medical-biological investigations of transgenic potatoes, resistant to the Colorado beetle (under agreement with Monsanto Co.) Russian Academy of Medical Sciences, Institute of Nutrition, Moscow, 1998. Signed off by V.A.Tutelian, Deputy Director. Physiological, biochemical and morphological investigations in rats. Full Report 275 pp, including raw data.))

This translation has been prepared by Ian Panton and Brian John of GM Free Cymru, in consultation with the author.

GENERAL CONCLUSION

The analysis of the relevant part of the Institute of Nutrition Report showed that the studies were not carried out according to the accepted protocols for the biomedical assessment of GM food and feed (1). Many of the conclusions drawn by the authors do not correspond to the obtained data and therefore they are incorrect.

Two types of Russet Burbank potatoes - the GM potatoes (GM-RB) and potatoes bred by traditional methods (RB) were sent to the Institute of Nutrition by Monsanto for feeding studies. Experiments were conducted only on small groups of animals: 10 rats in each group, which is absolutely inadequate for such vital studies. In the course of the experiments some rats perished, and the data were given only for the surviving groups of 8 and sometimes even of 6 animals. Serious morphological changes in internal organs were observed in rats when they were fed Russet Burbank potatoes (both the GM-RB and RB varieties), which were added to the ration of animals in boiled form. Changes in the liver, kidneys, and large gut; reduction in hemoglobin; strengthening diuresis; and changes in the mass of heart and prostate gland and others were observed. In the course of the first month of feeding, animals showed reduced body mass in comparison with the control group. The strongest changes in the organs were discovered in rats fed by the GM-RB potatoes. Both types of Russet Burbank potatoes (RB and GM-RB) were dangerous for animals. The genetically-modified potatoes GM-RB were especially toxic. However, the Institute of Nutrition concluded that "the studied types of potatoes can be used in human nourishment for the conduct of further epidemiological studies", i.e. during the study of the clinical picture of diseases and their distribution among the human population.

Data on pathological changes in the organs and biochemical parameters in the rats fed on Russet Burbank potatoes (RB and GM-RB), in comparison with the rats without potatoes in the control group, are given in the next section.

CONCLUSIONS

A number of Russian and foreign researchers have drawn conclusions about the imperfections of the biotechnological methods used for gene introduction into plants, and have drawn attention to the serious dangers presented by GM organisms and their containing products to man, animals and the environment. Plasmids and foreign GM-inserts can fall into the cells of different organs as a result of horizontal displacement, leading to pathologic changes in those who eat GM food.

Both types of Russet Burbank potatoes (fed to the RB and GM-RB groups of rats) lead to changes in the blood and internal organs of laboratory rats (in the liver, the kidneys, the large gut, a change of the dimensions of heart and prostate gland and others) and on the basis of this evidence they CANNOT be used in the nourishment of people. The genetically modified potatoes were most dangerous. Arpad Pusztai and Stanley Ewen demonstrated pathological changes in different organs (liver, spleen, kidneys, stomach, rectum and others) in rats which were fed on GM potatoes and GM corn (Pusztai, 1998, 2001; Ewen and Pusztai, 1999; see also the journal "Agrarian Russia" No1, 2005).

Further studies are necessary on a large number of animals (in each group there must be not less than 20 rats) in order to fully explain the reasons for the negative influence of the Russet Burbank potatoes (both GM and non-GM) and other GM cultures on the organism of animals. In this case it is necessary to compare the apparently damaging influence of GM-potatoes on animals as against traditional Russian varieties. It is possible that a sharp increase recently in Russia the number of oncological diseases, especially of intestinal tract and prostate gland, and of leukemia (according to data from the Medical Information Agency), is connected with the increasing use of GM-components, including GM-potatoes, in human food products.

This paper is published here by GM Free Cymru with the intention of increasing public awareness of important research work which has been kept out of the public domain. The Report in question has been suppressed for about 7 years, and has only recently come to light thanks to the efforts of Greenpeace Russia.

<http://www.netcomuk.co.uk/~brian/gm1.html>