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GM Food Hazards and the Science War

Consumer Choice Council, Seattle

Mae-Wan Ho
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Thank you very much for inviting me here and thank you all for being here. I am very honored, especially to be in a session moderated by Senator Dennis Kucinich who has introduced such an important bill for labeling genetic engineered foods to the US Congress. I am a senior academic in the Open University in UK, a geneticist and a biophysicist, also advisor to the TWN and other public interest organizations on biotechnology and biosafety since 1994. I have debated biotech issues in more than 20 countries and written a book, *Genetic Engineering Dream or Nightmare? The Brave New World of Bad Science and Big Business*.

I am here on behalf of more than 140 scientists from 27 countries to deliver an open letter to all government delegates at the WTO, calling for a moratorium on genetic engineered crops and products because they are dangerous, and for patents on life-forms and living processes to be revoked and banned because they are deeply immoral. As you have already heard, they give unaccountable corporations a monopoly on life and our life-support system.

There is a lot of misinformation and dis-information put out by the biotech industry and their suppporters including our governments. Only yesterday, US Senator Kit Bond gave a press conference in which four scientists, all biotechnologists and friendly to the industry, told reporters how,

- We absolutely need genetic engineered crops to feed the world. (You have just heard that myth soundly exploded by David Bryer of Oxfam.)

- The miracle crops are just around the corner. (We have been promised miracle crops that fix nitrogen, resist drought, tolerate salt, increase yield and so on for at least 30 years. They have not materialized. It has been a series of broken promises.)

- There is no difference between genetic engineering crops and conventional breeding, except it is much more precise. (That is not true, and I shall deal with that in detail.)

- Genetic engineered crops offer no new risks. (Again I shall deal with that in detail.)

- No one has died yet from eating genetic engineered foods. (Well, there has been no segregation, no labelling and no one has been looking!)

- Genetic engineered food is the most tightly regulated and scrutinized for safety than any other food. (I'll deal with that later too.)

Let me add that engineering crops to enhance nutrition ignores the root cause of malnutrition, which is the industrial monoculture crops that have led to a deterioration of the nutritional value of food within the past 50 years, and the destruction of natural and agricultural biodiversity on which a healthy balanced diet depends. We don't need vitamin A enhanced rice when we can eat carrots with our rice.

The latest surveys on genetic engineered crops in the US, the largest grower by far, showed no significant benefit. On the contrary, the most widely grown genetic engineered crops -- herbicide-tolerant soya beans -- yielded on average 6.7% *less* and required two to five times *more* herbicides than non-genetic engineered varieties.

Genetic engineering agriculture is a dangerous diversion and obstruction to the real tasks of providing food and health around the world. To put it bluntly: the existing technologies are crude, unreliable, uncontrollable and unpredictable, they don't qualify as technologies, let alone patentable inventions. And they are inherently hazardous. More so because are misguided by a scientific paradigm that is fundamentally flawed, out of date and in conflict with scientific findings. They call that sound science. It is really the ultimate phony science.

This was the ruling paradigm before genetic engineering really got underway 20 years ago. It offers a simplistic, reductionist view that ignores interconnections and complexity of real processes. That has no concept of the organism as a whole, nor of societies or ecosystems. Only individuals as isolated atoms each competing against all the rest. The organism is seen as a collection of traits each tied to specific genes which do not, by and large, interact with one another, nor with the environment, and these genes are passed on unchanged to the next generation except for very rare random mutations. If this were true then, genetic engineering

would be as precise and effective as is claimed.

Unfortunately, scientific findings within the past 20 years reveal an immense amount of cross-talk between genes which function in complex networks. Genes are nothing if not sensitive, dynamic and responsive, to other genes, to the cell or organism in which they find themselves and to the external environment. They can mutate, multiply, rearrange and jump around in responding. Genes may even jump out of one organism to infect another one. This is called ‘horizontal gene transfer’, the transfer of genetic material directly to unrelated species, to distinguish it from the vertical gene transfer from parent to offspring which happens in normal reproduction. (Horizontal gene transfer across species barriers is the process exploited by geneticists in genetic engineering.) The genetic material is so flexible and dynamic that geneticists have coined the phrase "the fluid genome" to describe the situation.

Genetics has changed out of all recognition. It is more accurate to see the genes as having a very complicated ecology, and that for genes and genomes to remain constant, you need a balanced ecology. So the new genetics is radically ecological and holistic.

Now, what is genetic engineering? You know the children’s joke of what do you get when you cross impossible things like a spider with a goat? Part of the joke is knowing you can’t because there are biological barriers between species which only allows one to cross closely related species, such as horse and donkey. There are good reasons for keeping species distinct, they have to do with the balance of the ecosystem. When viruses cross species barriers, for example, we have outbreaks of infectious diseases. Genetic engineering bypasses all species barriers, and it is not a joke anymore. Genes are being transferred in the laboratory between any and every species many of which would never interbreed in nature. Indeed, spider genes have been transferred into goats in an attempt to make the poor female goats produce silk in their milk, and human genes have been transferred into cows, sheep, mice, fish and bacteria.

The most immediate dangers are random and unpredictable, basically because the genetic engineer cannot control where and how the foreign genes are integrated into the genetic material of the organism. Genetic engineering animals are acts of cruelty, there are high failure rates and even the so-called successes are often monstrously deformed. Genetic engineered plants may end up having new toxins and allergens. Dr. Arpad Pusztai, an eminent scientist in the Rowett Institute of Scotland, lost his job when he released findings showing that two GM potato lines were unexpectedly toxic to young rats.

A more insidious danger is horizontal gene transfer. The genetic material, the DNA, can survive indefinitely in all environments after the organisms are dead. It can be taken up by other organisms and become incorporated into their genetic material. This has the potential to create new viruses and bacteria that cause diseases. Why?

In genetic engineering, new genes, many from viruses and bacteria, including antibiotic resistance genes that make infectious diseases untreatable, are introduced into our crops and livestock. They are combined in new combinations that have never existed, and introduced into organisms by invasive methods that make the foreign genes (or transgenic DNA) more unstable and more prone to transfer horizontally than the organism’s own genes which have

been adapted to stay together for hundreds of millions of years.

Another danger is that the transgenic DNA can jump into the genetic material of our cells and cause damages including cancer.

In its interim report (May 1999), the British Medical Association called for an indefinite moratorium on the release of GM crops pending further studies on new allergies, on the spread of antibiotic resistances and on the effects of transgenic DNA.

These hazards are acknowledged by sources within our Governments. UK scientists advising the Ministry of Agriculture Fisheries and Food are now calling attention to the same dangers.

Our regulatory system is still based on the old reductionist paradigm.

- They are in denial on the evidence accumulated over the past ten years that DNA survives in the environment and can be taken up by all cells. The UK Health and Safety Executive regards DNA as a chemical, and as it is in all organisms, it is not considered a hazardous chemical and therefore not subject to regulation. One of the scientists in Kit Bond's press conference yesterday even referred to genetic engineered crops as the ultimate organic crops, because it involves manipulating "the totally organic substance DNA".

- The reductionist paradigm of regulation means that insufficient attention is paid to unintended, unexpected effects.

- Because they assume there is no difference between genetic engineered crops and those obtained from traditional breeding, regulation is largely based on no need to look, so don't look, and you don't see anything.

- The principle of substantial equivalence on which risk assessment is based is a farce. Anything passed as substantially equivalent is supposed to be safe. But the genetic engineered variety can be compared with any and every variety within the species, it can even be compared to a collection of unrelated species. It is like saying that someone who does theoretic physics like Einstein and plays baseball like Mark Macguire is substantially equivalent to another who plays baseball like Einstein and does theoretic physics like Mark Macguire.

There is a science war on. It is between a reductionist, mechanistic science and an emerging holistic, organic science which is reaffirming and restoring the deep ecological perspectives of indigenous sciences around the world. Contrary to reductionist western science, these indigenous sciences have enabled people to live sustainably with nature for tens of thousands of years, but they are being destroyed and marginalized.

Intensive mechanised agriculture has taken the soul out of farming. It has turned farmers into tractor-drivers. Food is more than just the combination of proteins, carbohydrates and fats, or vitamins and other micronutrients. It is an emotional, aesthetic experience.

To really do us good, we have to know that our food is produced, not just without agrochemicals, but also without exploiting our fellow human beings, without cruelty to animals and without destroying the earth. Most of all, we want to know that it is produced with love and creativity of farmers who are poets and artists at heart, who know how to work with nature to make both human beings and nature prosper. That is the real agenda for civil society.

The Institute of Science in Society
PO Box 32097, London NW1 OXR
Tel: 44 -020-7380 0908