

Agrochemicals - the Silent Killers

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Case histories

JUSTIFICATION

The purpose of this document is to highlight the problems of the current and future use of agrochemical products, using a series of case studies. Have we forgotten Rachel Carson's Silent Spring from 1962? Many of these chemicals are far more toxic (and persistent) than DDT. They are the silent destroyers of human health and the environment.

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Summary of complaints to the Ombudsman 1360/2012/BEH about the EC and EFSA

CASE HISTORIES

Honeybees



Dead queens and workers. This is a photograph of a dead colony taken on December 11th 2010 by a Scottish beekeeper in the eastern half of Scotland who has kept bees since 1994. He says it is a typical dead colony from an area dominated by intensive arable crops, oilseed rape, wheat and barley, where first imidacloprid, and now clothianidin, is used. He said *“It is clear from the photos that there was plenty of sealed honey and pollen within easy reach of the bees. The reason they died was not from starvation; there were simply not enough bees to generate sufficient heat to keep the colony alive. This phenomenon is what beekeepers in the US had termed in 2006 ‘Fall Dwindling’ - when a colony that appears to have been fine during the summer, suddenly weakens and dies - largely because it stopped rearing brood in the Fall and as such did not have sufficient ‘winter bees’ to carry it through the winter.”*

In fact, this beekeeper has not harvested honey since 2006. He says: *“The result is that, like most British bee-keepers, I have lost from 30-50% of my hives every winter since 2005 - whereas from 1995 to 2005 I rarely, if ever, lost a single hive in winter.”* This year (2011-2012) his overwintering losses were close to 80%.

Supporting evidence. There was only one project (out of nine) funded by the £10 million Pollinator Initiative that was to study the effects of industrial chemicals on the learning capacity and performance of bees. Dr Chris Connolly, a neuroscientist (human) from Dundee, would, in addition to studying the brains of bees, in partnership with the Scottish Beekeepers’ Association (SBA), carry out a three year survey of the impact of chemicals on colony performance. Preliminary results from the first year have just been published in the Journal of the SBA. He said *“In summary, the presence of oil seed rape (OSR) correlated with a 2-fold increase in over-wintering failure in Scotland 2011-2012. This finding supports the hypothesis that neonicotinoid-treated OSR may be contributing to the honey bee decline in the UK.”* There was an east/west divide, with a clear increase in bee losses in the East (intensive agriculture). In fact Dr Connolly, being an honest scientist, excluded results from one beekeeper whose bees were in the non-OSR group who had no losses from 70 hives. Had he included it, the increase in over-wintering losses would have been 3-fold.

The first new paper the Austrian Ombudsman asked the EC to examine was published in Science by Henry *et al.* (2012): A common pesticide decreases foraging success and survival in honey bees. The French authors concluded that: *‘Non-lethal exposure of honey bees to thiamethoxam (neonicotinoid systemic pesticide) causes high mortality due to homing failure at levels that could put a colony at risk of collapse. Simulated exposure events on free-ranging foragers labelled with an RFID tag suggest that homing is impaired by thiamethoxam intoxication. These experiments offer new insights into the consequences of common neonicotinoid pesticides used.’*

Bumblebees.

We started this campaign against the neonicotinoid insecticides in December 2010, by widespread mailing of our photo-journal for 2010 (published on blurb.com); *The Year of the Bumblebee: Observations in a small nature reserve*, together with the conclusions from a book by an independent toxicologist from Holland, Henk Tennekes: *The systemic neonicotinoid insecticides: A disaster in the making*. Dr Tennekes says that his book: *“catalogues a tragedy of monumental proportions regarding the loss of invertebrates and subsequent losses of the insect-feeding (invertebrate-dependent) bird populations in all environments in the Netherlands. The disappearance can be related to agriculture in general, and to the neonicotinoid insecticide imidacloprid in particular, which is a major contaminant of Dutch surface water since 2004. The relationship exists because of crucial (and catastrophic) disadvantages of the neonicotinoid insecticides: the damage to the central nervous system of insects is virtually irreversible and cumulative. Tennekes showed that there is no safe level of exposure, and even minute quantities can have devastating effects in the long term. They leach into groundwater and contaminate surface water and persist in soil and water chronically exposing aquatic and terrestrial organisms to these insecticides. “So, what, in effect, is happening is that these insecticides are creating a toxic landscape, in which many beneficial organisms are killed off.”* Tennekes and Sánchez-Bayo in a more recent paper demonstrated that chemicals that bind irreversibly to specific receptors (neonicotinoids, genotoxic carcinogens and some metalloids) will produce toxic effects in a time-dependent manner, no matter how low the level of exposure.

Supporting evidence for bumblebee decline from UK researchers

The Stirling study on bumblebees (unfunded) by Whitehorn *et al.* 2012 was also published in Science at the same time: Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen Production. *“Treated colonies had a significantly reduced growth rate and suffered an 85% reduction in production of new queens compared to control colonies. Given the scale of use of neonicotinoids, we suggest that they may be having a considerable negative impact on wild bumble bee populations across the developed world.*

This was precisely what had been happening (and continues to happen). Massive declines in wild bumble bees in the US and Canada were reported in the late 1990s. In 2011 in the US, Cameron *et al.* said that: *“relative abundances of four species had declined historically by up to 96%. Geographical ranges had contracted by 23-87%, some within the past two decades. Those species that had declined had significantly higher infection levels of the pathogen Nosema bombi and had low genetic diversity compared with those that had not.”*

Case History: On the front cover of our book is a photograph of a pair of recently mated red-tailed bumblebees (*Bombus lapidarius*) taken in 2010. There were very many of them that year and: *“we have records of an almost complete cycle of how the species used our reserve”... “Apart from the common carder bee, it was probably the most numerous of the bees we saw foraging.”* Extracts about the Red-tailed bumblebee in 2010: *“The new workers*

seemed to be particularly attracted to blue/purple flowers. They monopolised the Cornflowers in the meadow and the Chicory flowers in the long strip parallel to the church wall. They started feeding on the Greater Knapweed plant in the top bed soon after the sun reached it; then they migrated round the field in a clockwise direction from patch to patch as the sun moved. In the afternoons large numbers could be found communally on the blooms of the final large clump of Knapweed low down by the church wall. Often they would continue feeding until late evening and a few even roosted there. The first worker with a pollen bag was seen on 29th June, the first male was found on a Scotch Thistle on 8th July and we noticed several new queens on the 23rd July.”



July 23rd 2010: That day I was lucky enough to photograph a pair of *B. lapidarius* mating on the tufted vetch. Well, they weren't exactly mating at that very moment because the active phase must have finished. The male was being carried around passively on the queen's back, looking like a small rucksack, whilst she continued to forage. In truth, I think that she must have got bored and forgotten he was there.

“The new queens were glorious to look at. The short, black hairs gave their coats a wonderful velvety sheen in contrast to their bright orange-red tails. They were in fact clothed as might befit a queen. Neither of us could stop taking photographs of them. When they first came out they were very slow-moving. At least I assumed they had only just emerged from their nests. On 29th July I found a new queen on her back on the path up the meadow; she struggled to right herself but then flew off. Occasionally I would find them late afternoon moving slowly round a thistle. Sometimes they would sit in a hypnotic trance, with tongue hanging out between the spikes, so we knew they weren't feeding. When they were in this torpid state you could touch a leg with a piece of grass and they would only make a slight response as if to say “go away”

This year, in August 2012, we have no red-tailed queens and no workers. One queen was found on the ground on 19th July. One male was recorded on 9th August. On 10th August I write: *“there seems to be collapse of the red-tailed colonies”* On 14th August: *“Still no red-tailed queens or workers, but curiously there are a few males.”* This morning, on 30th August 2012, the situation is the same.

In retrospect, the early spring numbers were reduced. On 26th February 2012 I found a red-tail sleeping in a crocus. I recorded some on 25th March, and on 26th March feeding on *Pulmonaria*. By 27th March I had stopped counting bumblebees individually and recorded: *“bumblebees uncountable”*. However, on 11th May I started individual recording again. Red-tail 7th May.

In 2009, Dandelions had played a significantly greater part in the early foraging of the red-tails. *“I can recall in 2009 trying to photograph red-tails in the sheep field in the late afternoons. They flew only a few cm above the ground in a zig-zag flight path from one Dandelion to the next, their tails glowing in the light of the low winter sun”*

I hope that I am wrong about the cause, but the paper from Stirling makes me pessimistic. If they fail to return to the reserve, these glorious creatures will remain only in our minds, and on the photographs we took in 2010.

Super-weeds

The EU Regulatory bodies are in denial about super-weeds arising from GM herbicide-tolerant crops, yet the evidence from the US is clear. GM scientists and Monsanto also claim that GE crops will reduce the amount of pesticides used and increase the yield in order to feed the world. So far, both of these claims have proved to be untrue.

Critical Issue Report: Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years November 2009. Charles Benbrook

http://www.organic-center.org/science.pest.php?action=view&report_id=159#10

In the US the farmers are trapped into a herbicide treadmill.

Extracts from preface: *“The dramatic increase in the volume of herbicides applied swamps the decrease in insecticide use attributable to GE corn and cotton, making the overall chemical footprint of today’s GE crops decidedly negative. The primary cause of the increase is the emergence of herbicide-resistant weeds. Weed control is now widely acknowledged as a serious management problem within GE cropping systems. Farmers and weed scientists across the heartland and cotton belt are now struggling to devise affordable and effective strategies to deal with the resistant weeds emerging in the wake of herbicide-tolerant crops. Herbicides and insecticides are potent environmental toxins. The USDA has been essentially silent on the impacts of GE crops on pesticide use for almost a decade. The vast majority of Glyphosate Resistant weed populations have emerged in Roundup Ready cropping systems.*



Northern Indiana. Giant Ragweed (3 m) resistant to glyphosate.

Farm workers have to weed it by hand. This is one of nine different weeds that commonly occur.

GM scientists in the UK, including some Fellows of the Royal Society (FRS), make the same claims as Monsanto. According to the Sense About Science website, of the 114 signatories to the Open letter asking the government to support GM research to The Right Honourable Tony Blair HM Government, on 30th October 2003, 28 were FRS.

In 2009 this registered Charity, Sense About Science, published a document to educate the general public called “Making sense of GM”. Eight of the 28 main authors were members of the John Innes Centre. Three were FRS and another two Fellows’ contributions were

acknowledged. The author of the introduction was Prof Jonathan Jones FRS (The Sainsbury Laboratory, John Innes Centre). Once again Prof Jones failed to declare his links with Monsanto: [In a statement to the Observer (18/07/2010), Prof Jones insisted: *"It is not true to suggest I have attempted to hide my role as co-founder and science advisory board member of Mendel Biotechnology, which has contracts with Monsanto, Bayer and BP. The information that I am co-founder... of Mendel has been in the public domain on the Mendel website for at least 10 years."*]

Other conflicts of interest of authors were also undeclared. Prof Vivian Moses was Chairman of CropGen. In addition, Private Eye (1232: 20/03-2/04/2009) had obtained a previous draft document in which a listed author was Andrew Cockburn, Monsanto's former Director of Scientific Affairs.

According to Making Sense of GM, the concept of super-weeds had been grossly exaggerated by the newspapers: *"they already occur in conventional agriculture."*

The controversial BBC Countryfile programme.

On the 15th July 2012, the BBC programme 'Countryfile' presented an in-depth investigation of GM crops (presumably in an attempt to change the public's mind about their attitude to GM crops and GM research) that was inaccurate, lacked impartiality and failed to declare conflicts of interest of some of the people interviewed.

When interviewed by the Countryfile journalist, the Chief Scientific Officer to the UK government said there were legitimate concerns about GM 10-12 years ago: *"because they were untested and not properly screened for human health. Individual companies were arguably the beneficiaries, not the world"*. He said: *"That has completely changed!"*

My complaint to the BBC elicited a long reply. It began: *"It is important to point out that the two-part film was specifically talking about the 'new wave' or 'new generation' of GM produce as exemplified by the work that is being carried out at the John Innes centre. This was stated in the introduction to both parts and re-iterated during the films themselves. This meant that we did not include a detailed appraisal of the original wave of GM crops which were brought in 10-15 years ago. However we did refer to this original wave in the film. In his interview the Chief Scientific Officer stated clearly that this original batch was not properly screened for human health or environmental effects – and that the beneficiaries were companies, something we reinforced in the script.* In that case, why have all these people with connections to Monsanto, Dow *etc.* been appointed to key posts in the UK, if it wasn't to benefit these corporations? The *'new wave of GMs'* are unlikely to be ready for many years, whereas Monsanto and Syngenta are hammering at the doors of Europe in order to have their herbicide-tolerant GM crops authorised. In fact, they have already broken down the door. On 22nd June 2012, EFSA gave a positive opinion for the cultivation of Monsanto's Roundup® Ready Soya and the EC authorised it on 9th August 2012. Monsanto only tests GM crops for 90 days, because there is no requirement specified in EU law.

But there was no answer to the question: who commissioned the ComRes opinion poll? This occurred 10 days after the programme, in which the journalist had said that 60% of the public in the UK were worried about GM ingredients in food and 71% thought it was important that retailers had policies not allowing GM ingredients. On 25th July, BBC Radio 4 Today Programme announced that a new poll had shown that *"Most Britons are in favour of GM crops."* It was on the front page of The Independent, with a Report page 6, from the Political Editor. Inside it said: *"Dramatic change as two-thirds now support GM crop testing"*. ComRes is a leading market research agency, undertaking polls for many corporations

including the BBC and HM Government. The wording of the question asked was both loaded and leading.

Question: Experiments to develop genetically-modified crops should be encouraged by the government so that farmers can reduce the amount of pesticides they use.

Results: Agree 64%; Disagree 27%; Don't know 9%.

As we have already stated, the current GM crops on the market in the US actually increase the amount of pesticides farmers use. The reply from Audience Services Unit pretended that it was something I had heard on Radio 4, so avoided the question. Some of the public were outraged by the BBC's pro-GM treatment of the subject. Another poll was put on the Countryfile website, this time to an unloaded question: *Should GM crop trials be allowed to go ahead?* The response from the public was vigorous. So far 7721 votes have been cast, of which 79% say NO. That is why it is so important to find out by whom it was commissioned.

Why are the European authorities determined to get GM crops into Europe?

Commissioner Dalli, Prof Anne Glover, the new CEO of the EC, the EC, EFSA and European Court of Justice have been quite clear about their aims; to get Monsanto and Syngenta's GM crops approved in Europe. The trials at Rothamsted Research and the Gates' donation to the John Innes Centre are just smokescreens, but even so they will contaminate conventional crops in the UK with GM material. As the US farmer said on this video: <http://vimeo.com/18994807> "buffer zones are a joke". The crops trials are smokescreens devised by the agrochemical industry with help from our "green" government.

Professor Maurice Moloney became Director and Chief Executive of Rothamsted Research on 15th April 2010. *"Before moving to Calgary, Professor Moloney led the Cell Biology group at Calgene Inc. in Davis, California, developing the world's first transgenic oilseeds, which resulted in RoundUp Ready® Canola and other novel crops. He was previously a Royal Society European Postdoctoral Fellow at the University of Lausanne, Switzerland. Professor Moloney is currently Chief Scientific Officer of SemBioSys Genetics Inc, based in Calgary, Canada. He founded the company in 1994 and has maintained this role alongside a successful academic career at the University of Calgary, where he serves as NSERC/Dow AgroSciences Industrial Research Professor of Plant Biotechnology."*

Prof Moloney was considered in Canada by his colleagues in genetics to be reckless with the environment. His company SemBioSys focused on producing pharmaceuticals in the oil crops canola (rapeseed) and safflower. One Canadian geneticist said: *"Currently safflower-grown human insulin has been open field tested in the state of Washington in a sagebrush wild area of the state which is the habitat for a number of threatened wild species that can be poisoned by ingesting insulin" ... "In Canada and the United States open field tests of crop bio- pharmaceuticals are undertaken with little or no respect for the environmental consequences of the open field releases."*

An item that appeared in Plant Science News, 16th Oct 2011 said: "Leading plant researchers call for science-based GM regulation."

"Why then is Europe regulating one part of the solution- GM (genetically modified) crops- as if they are a hazard? Forty one leading Swedish plant scientists have issued an important statement, expressing dismay, bewilderment and anger that legislation of GM crops in the EU is not based on science, ignores recent evidence, blocks opportunities to increase agricultural sustainability, and sustains the dominance of multinationals."

We undersigned British plant scientists endorse the assessment by our Swedish colleagues of the politics and science of GM crops. Irrational and unwarranted obstacles that obstruct the deployment of this useful technology retard innovations that will increase yields and reduce the environmental impact of agriculture. Irresponsible and perhaps well-meaning pressure groups, purporting to protect the environment, are preventing delivery of agrichemical-free solutions to crop pests and diseases. We call on these groups to cease and desist from blocking genetic solutions to crop problems, and on Europe to adopt science-based GM regulations.”

Signed: Jonathan Jones, Giles Oldroyd, Dale Sanders, Maurice Moloney, Sophien Kamoun, Tina Barsby, Wayne Powell. As you can see, amongst the signatories, Prof Jonathan Jones wasn't the only one who failed to declare his “*multinational*” connections. Prof Maurice Moloney, current Director of Rothamsted Research, was the other.

EFSA has recently given positive opinions on old herbicides at the request of industry

This is presumably in anticipation of GM technology coming to Europe, in order to increase the strategies for the inevitable development of herbicide (glyphosate) resistance in plants. (Pests can also develop resistance to insecticides too). The introduction of GMO herbicide-tolerant crops in the US in 1996 resulted in an increase of 383 million pounds of herbicide use in the first 13 years. This is as a result of the emergence of glyphosate-resistant (GR) weeds. The first GR weed population confirmed in the U.S. in 1998 was rigid ryegrass, (within 2 years) infesting several thousand acres in California almond orchards. Less than a decade later, GR biotypes of nine species are now found in the US and infest millions of acres of cropland in at least 22 States. Particularly troublesome are Pigweed, Horseweed and Giant Ragweed whose infestations can sometimes cause cropland to be abandoned. Each year more pesticides, or different or older ones, including paraquat, have to be applied. In 2005, the US EPA evaluated for re-registration 2,4-D, an old herbicide and a component of Agent Orange. The US EPA determined that 2,4-D was eligible for re-registration but required certain changes to uses on the label to mitigate risk. Weed scientists say that US farmers are locked in a ‘pesticide treadmill.’

Economics for US farmers: (written in 2009). *“The economic picture dramatically darkens for farmers combating resistant weeds under average soybean yields (36 bushels) and market prices (\$6.50 per bushel). Such average conditions would generate about \$234 in gross income per acre. The estimated \$80 increase in 2010 costs per acre of HT soybeans would then account for one-third of gross income per acre, and total cash operating costs would exceed \$200 per acre, leaving just \$34 to cover land, labor, management, debt, and all other fixed costs. Such a scenario leaves little or no room for profit at the farm level.”*

Similar figures were quoted from rural communities in Argentina. In 1996 they were spraying <2 litres/hectare of glyphosate; by 2010 glyphosate use had increased to 10 litres/hectare.

EFSA ‘positive opinion’ for new/old pesticides

2,4-D: (one half of the infamous Agent Orange, used as a defoliant during the Vietnam War). Its effects on human health are uncertain, but veterans exposed to this chemical had increased risk of non-Hodgkin’s lymphoma. The US EPA has suggested it has endocrine disruption potential in mammals. In the US, Dow has applied for a GMO corn that is tolerant to 2,4-D and glyphosate. 2,4-D was re-registered in the EU in 2002 and Greece is in the process of revising the existing MRLs in crops and in meat; many have been recommended for use (EFSA journal November 2011).

Quizalofop: a new herbicide, had its MRLs increased for use on sunflowers and cotton. EFSA Journal (Reasoned opinion October 2011). Little is known about it.

Dicamba: Syngenta Crop Protection asked for Dicamba (spray) to be approved as a herbicide on maize and pasture (Positive opinion, EFSA Journal December 2010).

Glufosinate: This is an old herbicide that was banned in several European Countries. Independent research shows that it is teratogenic in mice and rats and affects the glutamate receptors in the brains of immature or foetal rats. It is a suspected carcinogen which doubled the incidence of birth defects in children of pest applicators. In the EU it was included in Annex 1 on 1/10/2007 and Bayer CropScience submitted an updated doc in September 2009 which was evaluated in Sweden. Despite risks to non-target arthropods and small herbivorous mammals and a high long-term risk for mammals, EFSA gave a positive opinion (March 2012). Monsanto quotes its use as an alternative crop desiccant to glyphosate. ‘Review of the uses of glyphosate in Europe (Feb 2010).’

Another GM, herbicide-tolerant seed in the pipeline

In addition to Monsanto having been given authorisation by the EC (August 9 2012) for GE soybeans with stacked genes, Syngenta has made an application for its own GMO seeds. On request from the Competent Authority of the UK for an application (EFSA-GMO-UK-2008) submitted by Syngenta Seeds for placing on the market of genetically modified herbicide-tolerant maize GA21 for food and feed uses, import, processing and cultivation. EFSA gave a positive opinion in December 2011. Although EFSA had said in the Abstract that there were no effects on human or animal health or to the environment, in the main body of the document, they admitted to the problems of reduction in farmland biodiversity; selection of weed communities; selection of glyphosate resistant weeds and destruction of food webs and the ecological functions they provide. Nevertheless, EFSA still approved it, but covered itself by saying: *"The magnitude of these potential adverse environmental effects will depend on a series of factors including the specific herbicide and cultivation management applied at farm level, the crop rotation...etc.* and recommends: *"case-specific monitoring"*. The Head of Chemicals and Nanotechnologies at Defra had previously informed me that there were no applications from the UK for glyphosate-tolerant crops. When I challenged him about this, he said that it was nothing to do with Defra.

What is the role of the Commissioner of Health and Consumers Directorate?

From December 2010, we have sent petitions to all of the Commissioners about neonicotinoid insecticides and water contamination. But only John Dalli (usually, Michael Flüh on his behalf) has replied. Does his department divert all the correspondence addressed to Dacian Cialos and Janos Potocnik to Dalli? Commissioner Cialos (Agriculture) expressed doubts about GM crops at the Oxford Farming Conference in 2011. Commissioner Potocnik controls the Water-Frame Directorate. Is it possible that they have both been side-lined? In June 2012, Commissioner Dalli was interviewed by Rose O'Donovan, Editor of AGRA FACTS & AGRA FOCUS. She confronted him about the credibility of EFSA. He replied: *"What happened recently in the revolving door were very unfortunate, it was very frustrating for us because it is something we do not tolerate at all"*. When questioned about why the Commission was pushing GM Agriculture, he talked about: ‘science-based decisions’; ‘always seek scientific advice’; ‘insisting on independence for authorisations’; we have worked very hard with EFSA to improve procedures in selection’; we have taken severe steps’... However, when she challenged him on what he had said on his appointment about taking additional independent reviews, he stalled. That appeared to be a step too far.

Meanwhile, back in the US, where the GMOs have been grown since 1996, super-weeds that were resistant to 2,4-D-tolerant crops were reported on 15/08/2012.

<http://www.reuters.com/article/2012/08/15/us-usa-agriculture-weeds-idUSBRE87E13420120815>

The effects of GM crops on humans in Latin America

Monsanto's Mission Statement for its projects in Latin America (website)

"Monsanto is committed to helping improve lives – especially the lives of farmers in small rural communities around the world." Pablo Vaquero, Monsanto Latin America South corporate affairs director, said: *"Today, we are helping to change the lives of many individuals in remote and forgotten communities where opportunities are scarce. We are convinced that by helping with training and education, as a company, we are able to add value to people and their communities."*

Projects have been implemented in 14 provinces in Argentina (Buenos Aires, Santa Fe, Córdoba, La Pampa, San Luis, Santiago del Estero, Entre Ríos, Corrientes, Formosa, Misiones, Salta, Tucumán, Jujuy and Chaco) and one in the Republic of Paraguay. Many farmers and people know about Monsanto Company because of the Roundup Ready trait, which is a trait that gives in-plant tolerance to Roundup® agricultural herbicides. The trait was introduced to the market in 1996 and brought a whole new element to farmers. In 1996, farmers could now plant soybeans, spray the soybeans with Roundup, and poof- the weeds were gone and the soybeans were still as healthy as they were before they sprayed the field.

The remote communities from the above towns would not agree

Here are extracts (cut and pasted) directly from the Report from the 1st National Meeting of Physicians in the Crop-sprayed Towns, Faculty of Medical Sciences, National University of Córdoba, Argentina August 27th & 28th 2010.

INGLES-Report-from-the-1st-National-Meeting-Of-Physicians-In-The Crop-Sprayed-Towns.pdf

"For nearly 10 years, the residents of rural and periurban areas, where agricultural activities are carried out based on the current model of agro-industrial production, have been demanding to the political authorities, the courts of justice, and also protesting before the general public, because they feel that the health of their communities is being environmentally affected, mainly through sprayings of agrochemicals used for different types of agricultural crops, but also for the handling and storage of these chemicals in populated areas, the waste disposal, as well as the collection of grains soaked with chemicals within the towns. San Jorge in Santa Fe, San Nicolás in Buenos Aires, Ituzaingó neighborhood in Córdoba, and La Leonesa in Chaco, are only some of the places where the increased number of cancer cases, birth defects, reproductive and endocrine disorders, have been suffered and detected ever since systematic pesticide spraying has become commonplace. These claims from crop-sprayed towns were advocated many times by members of health teams, but responses from State Public Health areas, and the participation as well as the involvement of State Universities were very scarce and limited.

In the Province of Chaco, it is now officially recognized what the residents have been claiming for many years: That the work activity with agrochemicals or its residential exposure (by vicinity) is linked to reproductive problems, repeated miscarriages and serious birth defects, such as the series of birth defect cases where mothers have a history of direct exposure to pesticides, which were collected by Dr. Horacio Lucero, Head of the Molecular Biology Laboratory of the Institute of Regional Medicine of the Universidad Nacional del Nordeste (National Northeastern University), who has been registering and studying them for over 10 years. His observations have been completely confirmed. The rate of congenital birth defects in 10,000 live births showed a significant increase in recent years, as shown in Graph No. 1. [From approx. 15/10,000 live births in 1997 to approx. 82/10,000 live births in 2008] Birth defects per 10,000 live births in relation to the increase in Soy-growing area, Chaco [approx. 100,000 ha in 1997 to 7-800,000 ha in 2008]. In recent years, soybean planting has

been implemented in Chaco superseding other traditional activities of their regional economy.

In addition, when child cancer incidence was analyzed in the town most aggressively affected by agrochemicals (La Leonesa), and then compared to nearby towns moderately fumigated (Las Palmas), and not much fumigated (Puerto Bermejo), results strengthen the connection with higher levels of exposure to pesticides, as shown in graph No. 3 because incidence was three times greater in La Leonesa. It is important to highlight that there are few official epidemiological reports; according to what physicians themselves say, the only data they have was gathered by observation, as generally Public Health bodies have avoided checking alarming notes coming from healthcare professionals as well as people's complaints. Province of Chaco's report is almost the only report created interjurisdictionally by a public area. Other relevant testimonial was brought by Dr. Hugo Gomez Demaio, a Pediatric Surgeon specialized in Neurosurgery in Cleveland (USA). He is the Head of the Pediatrics Unit at Hospital de Posadas, Misiones, the only public hospital in the province with pediatric surgery service. All children needing this service are referred to this hospital. The Latin American Center for Congenital Birth defects Records (ECLAM, Centro Latinoamericano de Registro de Malformaciones Congénitas) reports that the Province of Misiones has a 0.1 /1000 live birth rate with neural tube defects; but Dr. Demaio has recorded in his hospital a 7.2/1000 rate (70 times more), which increases yearly. His team geolocated the origin of these families with severe and invalidating deficits and all families come from highly fumigated areas. Apart from that, it is likely that there are neurological development problems and psychological problems not being assessed. This suspicion grows in light of research performed in Colonia Alicia (Misiones) by Demaio's team. There, a neurocognitive development test was analyzed, yielding bad results in the population of children under 1 exposed to agrochemicals, compared to children in Hospital de Posadas who do not come from fumigated areas. (This healthcare team in Misiones suggests the iceberg model ranging from genome modification and learning disorders as the tip of the iceberg, to teratogenesis, carcinogenesis and toxicity below the water level).



A baby with a neural tube defect; this is a meningo-myelocoele. More extensive defects can occur. Hospital de Posadas, Misiones, Argentina. Photograph by kind permission of Dr Graciela Gomez.

UNL (Universidad Nacional del Litoral, National University of the Littoral): Dr. Maria Fernanda Simoniello, along with the team from the Toxicology, Pharmacology, and Legal Biochemistry Chairs of the Faculty of Biochemistry and Biology from the National University of the Littoral (Santa Fe), have studied the biomarkers of cellular reaction on people directly exposed to pesticides (fumigators), or indirectly exposed (non-fumigators living near crops),

and have published many papers on the subject. In this Meeting, she presented two investigations carried out with workers from the fruit and vegetable growing areas in Santa Fe, where the most widely used pesticides were Chlorpyrifos, Cypermethrin and Glyphosate; the first investigation was done between January and March 2007, and the second one several years later. Among other biomarkers, they use the Comet assay (a Single Cell Gel Electrophoresis assay), a very useful tool to investigate DNA damage and its possible correlation with repair mechanisms. By using human lymphocyte, in vivo as well as in vitro, it proved to be the technique of choice to monitor damages in genetic material in a population exposed to low levels of chemical agents. The results showed that both groups exposed to pesticides (occupational and residential) had a genetic damage rate statistically higher than the control group (not exposed to pesticides); an statistically significant difference also present in the genetic damage repair analysis.

Agricultural practices in this zone include, mainly, transgenic corn and soy crops. By frequency, the most widely used pesticides are: Glyphosate, Cypermethrin, 2.4D, Endosulfan, Atrazine and Chlorpyrifos, which are applied from October to March with an average of 18 times (with a range between 6 and 42 times) of spraying cycles per season.

Their results, as well as Simoniello's in Santa Fe, showed important differences in genotoxicity rates between exposed individuals, fumigators or not, and the members of the control group who do not live in a fumigated area. The evident genetic lesions in those groups exposed to pesticides were of a remarkably higher statistical significance, which reinforces the causal link with the exposition, and also shows a similarity with the animal testing carried out by the same group of scientists.

Dr. Sanborn at McMaster University (Canada) has also published a systematic revision about cancer and the use of pesticides. She found a strong and consistent link between lymphoma non-Hodgkin, leukemia in children, brain tumors, and prostate cancer in adults, and exposure to pesticides; moreover, a stronger link was found when exposures were longer and higher (doses/response). The study concluded that her results support attempts at reducing exposure to pesticides as a measure to prevent cancer.



Julieta, who died aged 7 months from multiple abnormalities in 2010, Bandera Sgo del Estero. Photograph by kind permission of Dr Graciela Gomez.

It is crucial to acknowledge the fact that, together with the increase in cancer and birth defect cases in the mentioned areas, the use of pesticides also increased exponentially since the introduction of transgenic crops. This type of crop requires the use of more and more pesticides. In 1990, 35 million liters were used during the crop year. In 1996, the

introduction of transgenic biotechnology accelerated the use of pesticides to the extent that 98 million liters were used, and in 2000, it increased to 145 million liters. Last year 292 million liters were used, and this year we will be spraying the fields with over 300 million liters of herbicides, insecticides, acaricides, defoliant and other poisonous substances (see Graph No. 12). 200 million liters of Glyphosate, a commonly used pesticide, may be sprayed this year. Nearly 4 million liters per year of Endosulfan, a poisonous insecticide, are sprayed each year.

Each year the amount of Glyphosate per hectare repeatedly sprayed on the same plot of land has increased. This is probably because weeds have become resistant. In 1996, the sprayings started at less than 2 liters per hectare, whereas today some areas are sprayed with 10 liters per hectare, and almost 20 liters per hectare in other areas. These poisonous substances are sprayed over extensive territories. Transgenic crops subject to systematic sprayings cover 22 million hectares located in the provinces of Buenos Aires, Santa Fe, Córdoba, Entre Ríos, Santiago del Estero, San Luis, Chaco, Salta, Jujuy, Tucumán, La Pampa and Corrientes. According to geographers from the UNC, at least 12 million people live in towns surrounded by crops that may be found in these vast territories, and that figure does not include the population from large cities in each of these provinces. Twelve million Argentineans are directly sprayed. This means that a sufficient amount of those 300 million liters of agrottoxics are sprayed on houses, schools, parks, water sources, sports fields, and work areas. In other words, on their lives. This population is treated by physicians working in the crop-sprayed towns, where we notice an alarming increase of cancer, birth defects and reproductive disorders which cannot be concealed anymore. The first recommendation is for the public and society to listen, recognize and acknowledge what health and science experts state - toxic pesticides are poisonous, and they are making us sick. The diseases that we are exposed to everyday are not random, and they are caused by the spraying of these pesticides. Crop-sprayed towns of Argentina are poisoned massively during at least 6 months each year, and three times per month. Sprayings carried out by airplanes or helicopters have shown to generate a "drift" of poisonous substances."

The research of Prof Andrés Carrasco, an embryologist from Buenos Aires, has shown that glyphosate, the herbicide used on genetically modified soy and rice in Argentina, causes birth defects in animal embryos at levels far below those frequently used in agricultural spraying. However, when he went to give a talk in August 2010 to residents and community activists in La Leonesa (the most heavily sprayed and worst affected of the towns) about his research, he was attacked by a violent mob. Three people were seriously injured and Carrasco and a colleague had to shut themselves in their car for 2 hours.

Glyphosate-Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signaling Alejandra Paganelli, Victoria Gnazzo, Helena Acosta, Silvia L. López, and Andrés E. Carrasco* *Laboratorio de Embriología Molecular, CONICET-UBA, Facultad de Medicina, Universidad de Buenos Aires, Paraguay 2155, 3° piso (1121), Ciudad Autónoma de Buenos Aires, Argentina.*

portal.fagro.edu.uy/phocadownload/taller.../anexo%201%20martinez.pdf

Clinical Approaches. In Argentina, the extension of soil devoted to transgenic soy reached 19 million hectares. Two hundred million liters of glyphosate-based herbicide is used for a production of 50 million tons of soy beans per year (96, 97). The intensive and extensive agricultural models based on the GMO technological package are currently applied without

critical evaluation, rigorous regulations, and adequate information about the impact of sublethal doses on human health and the environment, leading to a conflicting situation. In this work, we focused on sublethal doses of GBH to arrive at the thresholds for teratogenic phenotypes instead of lethality. In the last 10 years, several countries in Latin America have initiated studies about the environmental consequences of the use of herbicides and pesticides. In Paraguay, an epidemiological study in the offspring of women exposed during pregnancy to herbicides showed 52 cases of malformations (3), which strikingly resemble the wide spectrum phenotypes resulting from a dysfunctional RA or Shh signaling pathway. In Argentina, an increase in the incidence of congenital malformations began to be reported in the last few years (Dr. Hugo Lucero, Universidad Nacional del Nordeste, Chaco; personal communication). In Córdoba, several cases of malformations together with repeated spontaneous abortions were detected in the village of Ituzaingo´, which is surrounded by GMO-based agriculture. These findings were concentrated in families living a few meters from where the herbicides are regularly sprayed. All of this information is extremely worrying because the risk of environmentally-induced disruptions in human development is highest during the critical period of gestation (2 to 8 weeks) (98). Moreover, the mature human placenta has been shown to be permeable to glyphosate. After 2.5 h of perfusion, 15% of administered glyphosate is transferred to the fetal compartment (99).

A new book chapter by Prof Andrés Carrasco and colleagues in Argentina and Paraguay reviews the scientific literature on the health effects of the pesticides used in large amounts on GM soy and other GM crops: *Advances in Molecular Toxicology*, Vol. 6, published by Elsevier: ISSN 1872-0854

<http://www.amazon.com/Advances-Molecular-Toxicology-Volume-6/dp/0444593896>

Abstract: In South America, the incorporation of genetically modified organisms (GMO) engineered to be resistant to pesticides changed the agricultural model into one dependent on the massive use of agrochemicals. Different pesticides are used in response to the demands of the global consuming market to control weeds, herbivorous arthropods, and crop diseases. Here, we review their effects on humans and animal models, in terms of genotoxicity, teratogenicity, and cell damage. We also stress the importance of biomarkers for medical surveillance of populations at risk and propose the use of biosensors as sensitive resources to detect undesirable effects of new molecules and environmental pollutants. The compatibility of glyphosate, the most intensively used herbicide associated to GMO crops, with an integrated pest management for soybean crops, is also discussed.

Danish farmers report side effects with GM Soya fed to pigs

A Danish farming newspaper *Effektivt Landbrug* (Effective Agriculture) devoted a sizeable part of its 13 April 2012 edition to the discoveries by pig farmer Ib Borup Pedersen that GM soya has a damaging effect both on his animals and on his farming profitability. In the previous 2 years, the farm had experienced piglet diarrhoea and 35 sows had died of stomach problems. In the previous 9 months he had had 13 malformed, but live-born, piglets. Another colleague had experienced similar problems. In April 2011 Mr Pedersen changed to GM-free soya, without telling his stockman. Within days the stockman noticed that the piglet diarrhoea had stopped. The Danish Centre for Pig Research is beginning a trial later this year on pigs fed with GM Soya versus pigs fed with non-GMO soya. However, it is possible that Pedersen's pigs could be exposed to additional glyphosate from other sources, arising from a new farming practice, that of desiccation prior to harvest, that has crept in, unobserved by the public.



A deformed piglet; Siamese twins
 Photograph by kind permission
 of Ib Borup Pedersen.

Desiccation of crops with glyphosate (or another herbicide) to dry them

It was only when we studied the work of the Reasoned Opinion Group of EFSA which grants ‘modification’ (i.e. increases) of maximum residue limits (MRLs) in foods at the request of the pesticides industry “*in order to accommodate intended uses*” or “*to accommodate for the international trade*” that we first encountered the practice of ‘desiccation’. By this method, herbicides are sprayed shortly before harvest directly on the crops to be harvested, in order to dry them. In January 2012, Monsanto Europe asked EFSA to set the import tolerance for glyphosate in lentils “*in order to accommodate the authorised desiccation use of glyphosate in lentils in the US and Canada*” from 0.1 mg/kg to 10 mg/kg (i.e. 100 times). EFSA had granted similarly elevated MRLs for glyphosate on wheat and GM soya. Monsanto’s publication in 2010: ‘The agronomic benefits of glyphosate in Europe; Review of the benefits of glyphosate’ would appear to explain why the EU Commission has delayed the re-evaluation of glyphosate until 2015 (instead of 2012, when it should have been due).
 Chapter 7: Harvest management/crop desiccation in combinable crops.

Chapter 8: Crop desiccation in grain maize and sunflower.

According to Monsanto, benefits include; more reliable harvesting; reduced losses and drying costs; higher price for earlier quality harvest; earlier planting of the next crop. Aerial application has been recommended (and is approved in Hungary). The desirable degree of drying of the grain is achieved; at the same time it controls the weeds in preparation for the next crop.

Syngenta recommends herbicide spray on potatoes just before harvest to improve the strength of the shells. “*Use of a foliar desiccant spray usually means a 2 spray programme. The first spray takes the leaves off and the second then targets the stem.*” It is highly likely that animals are getting glyphosate not only from the soya feed, but also Roundup® residues on wheat and barley used in feed, and on barley straw used as bedding.

Scientists complain that the EC has ignored independent scientific advice about Roundup®

Roundup and birth defects. Is the public being kept in the dark? Michael Antoniou, Mohamed Ezz El-Din Mostafa Habib C. Vyvyan Howard, Richard C. Jennings, Carlo Leifert, Rubens Onofre Nodari, Claire Robinson, John Fagan (June 2011) Earth Open Source. Extracts: “*The European Commission has previously ignored or dismissed many other findings from the independent scientific literature showing that Roundup and glyphosate cause endocrine disruption, damage to DNA, reproductive and developmental toxicity, neurotoxicity, and cancer, as well as birth defects. Many of these effects are found at very low doses, comparable to levels of pesticide residues found in food and the environment.*”... “*This issue*

is of particular concern now that Monsanto and other producers of genetically modified seed are trying to get their glyphosate-tolerant crops approved for cultivation in Europe. If the EU Commission gives its approval, this will lead to a massive increase in the amount of glyphosate sprayed in the fields of EU member states, as has already happened in North and South America. Consequently, people's exposure to glyphosate will increase." All these concerns could be addressed by an objective review of Roundup and glyphosate in line with the more stringent new EU pesticide regulation due to come into force in June 2011. Just such a review was due to take place in 2012. However, shortly after the Commission was notified of the latest research showing that glyphosate and Roundup cause birth defects, it quietly passed a directive delaying the review of glyphosate and 38 other dangerous pesticides, until 2015. This delay is being challenged in a lawsuit brought against the Commission by Pesticides Action Network Europe and Greenpeace.

Prof Gilles-Eric Séralini working in Caen had already questioned the adequacy of Bayer's testing. "The industry has admitted that there has been no blood test more than three months to see how they affect the transgenic animals. This is a crime because all chronic diseases appear after that period." This paper published in 2012 shows that Roundup® has an endocrine impact at very low environmental doses: 'A glyphosate-based herbicide induces necrosis and apoptosis in mature rat testicular cells in vitro, and testosterone decrease at lower levels' Émilie Clair, Robin Mesnage, Carine Travert, Gilles-Éric Séralini, Université de Caen Basse-Normandie, EA2608, Institute of Biology, Esplanade de la Paix, 14032 Caen Cedex, France Université de Caen Basse-Normandie, Risk Pole MRSH-CNRS, and CRIIGEN, 40 rue de Monceau, 75008 Paris, France.

Abstract: The major herbicide used worldwide, Roundup®, is a glyphosate-based pesticide with adjuvants. Glyphosate, its active ingredient in plants and its main metabolite (AMPA) are among the first contaminants of surface waters. Roundup® is being used increasingly in particular on genetically modified plants grown for food and feed that contain its residues. Here we tested glyphosate and its formulation on mature rat fresh testicular cells from 1 to 10000 ppm, thus from the range in some human urine and in environment to agricultural levels. We show that from 1 to 48 h of Roundup® exposure Leydig cells are damaged. Within 24–48 h this formulation is also toxic on the other cells, mainly by necrosis, by contrast to glyphosate alone which is essentially toxic on Sertoli cells. Later, it also induces apoptosis at higher doses in germ cells and in Sertoli/germ cells co-cultures. At lower non-toxic concentrations of Roundup® and glyphosate (1 ppm), the main endocrine disruption is a testosterone decrease by 35%. The pesticide has thus an endocrine impact at very low environmental doses, but only a high contamination appears to provoke an acute rat testicular toxicity. This does not anticipate the chronic toxicity which is insufficiently tested and only with glyphosate in regulatory tests.

RMS (DAR) studies on glyphosate

Several malformations were found in rabbits and rats according to the industry's own teratogenicity studies submitted for the 2002 EU approval of the active ingredient glyphosate. The original industry studies are claimed to be commercially confidential. However, the said industry data were compiled from the 1998 draft assessment report (DAR) by the German government, since Germany has been the rapporteur member state for glyphosate and will remain in this role for the next review of glyphosate in 2015. Malformations include extra ribs, distortions affecting thoracic ribs, heart malformations, kidney agenesis, unossified sternbrae, reduced ossification of cranial centers and sacrocaudal vertebral arches, and also skeletal variations and major visceral malformations, which were unspecified in the DAR.

Other EFSA reasoned opinions for modification of MRLs in food

In a period of 4 months (from February 2012), EFSA approved 22 proposals by the Pesticides Industry to increase MRLs for pesticides in crops:

In the case of fluopicolide '*for radishes, onions, kale and potatoes*' in various countries Bayer CropScience was granted approval "to raise the existing MRLs" without even specifying the levels. Bayer had "carte blanche" approval.

Syngenta Crop Protection BV for thiamethoxam (clothianidin) asked EFSA to grant an increase of MRL on carrots (Approved February 2010)

Syngenta Agro SA asked for an increase in MRL of thiamethoxam (clothianidin) in strawberries and beans with pods from 0.05 mg/kg to 0.3 mg/kg (i.e. six times). (EFSA Journal, June 2010).

Lack of ecological knowledge in industry and governments

The lack of understanding of ecology and of environmental issues by industry scientists and their advisers has been lamentable and irresponsible. Since 1990, successive UK governments and Civil Servants have gradually eliminated all bodies with any environmental independence or expertise. In 2006, the then Parliamentary Under-secretary of State for with responsibility for Science and Innovation at the Department of Trade and Industry, together with Government Ministers and Civil Servants, closed many of the Wildlife Research Stations. The money was transferred into the universities to be used for "*hard science, not soft science.*" The Nature Conservancy Council (NCC), a statutory independent body, had been the thorn in the flesh of politicians both in England and Scotland. Undoubtedly Derek Ratcliffe, their Chief Scientist, was their most outspoken and troublesome Civil Servant. Within days of his retirement in 1989, Margaret Thatcher's then Environment Minister set about dismembering the NCC.

Major errors as a result of ignorance

In 2001, in response to claims in a pesticide fact sheet, Bayer experts from different scientific fields issued a 'position paper' on imidacloprid: "*The use of imidacloprid in agriculture does not entail unacceptable harmful effects for the environment as the substance will disappear under all circumstances from the compartments soil, water and air.*" "*Although the substance is stable in sterile water in the dark, it decomposes readily under the influence of light. Biotic processes under the influence of microbes present in natural water and its sediments present another mechanism for the elimination of imidacloprid.*"

No-one told the Bayer experts that microbes are invertebrates. They will be poisoned just as readily as the target organisms, non-target invertebrates (other pollinators) and the organisms that break down the soil, with disastrous effects on aquatic systems.

Most ecologists know that if you keep applying a pesticide or herbicide to the same pests and crops (or make a GMO seed herbicide-tolerant) you will soon have super-weeds or super-pests. Gradually they will develop a resistance. There are many instances of this. Wang in 2008 showed that *Nilaparvata lugens* (the brown planthopper, a pest on rice) was able to develop 1424-fold resistance to imidacloprid in the laboratory after the insect was selected with imidacloprid for 26 generations. Gao *et al.* 2012 reported similar problems with western flower thrips: "*insecticide resistance continues to be one of the most important issues facing agricultural production.*" In Australia, at the Australian Cotton Conference in August 2012, it was reported that the native *heliopsis* moth, whose larvae wreak havoc on cotton, have shown a "*prodigious ability to acquire resistance to everything that is thrown at them.*" Monsanto's GM trait on corn, the toxic gene of the pesticidal bacteria Bt, is beginning to lose

its effectiveness. So, Bt-resistant western rootworms are now plaguing Minnesota, Iowa and Illinois. This year's severe drought has made the problem worse. Bruce Potter, an entomologist, said at a workshop in Minnesota: *"In fields with a rootworm problem, the bug damages the cornstalk's ability to absorb water just when it is needed most. With the roots weakened, the plants can also be vulnerable to wind."*

Humans are bearing the brunt of these genotoxic chemicals and will do so even more
Whilst plants and invertebrates can develop resistance in a short time, humans cannot.

In 2000, the European Environment Agency published a document:
"Late lessons from early warnings. The precautionary principle" *"The growing innovative powers of science seem to be outstripping its ability to predict the consequences of its applications, whilst the scale of human interventions in nature increases the chances that any hazardous impacts may be serious and global. It is therefore important to take stock of past experiences, and learn how we can adapt to these changing circumstances, particularly in relation to the provision of information and the identification of early warnings. It concerns the gathering of information on the hazards of human economic activities and its use in taking action to protect both the environment and the health of the species and ecosystems that are dependent on it, and then living with the consequences."*

In 2011 a report from Canada showed the presence of GMO toxins in women and children. Aris A, Leblanc S. Maternal and fetal exposure to pesticides associated with genetically modified foods in Eastern Townships of Quebec, Canada. *Reproductive Toxicology* (2011), 31: 528-33. This study found Bt toxin in 80% of women and their unborn children tested in Canada. Long-term toxicology and health risk assessments on Bt in GM crops had not been done.

In 2011, the European Environment Agency (David Gee) presented a paper at the Children and Environmental Health Conference in Paris.
"Towards Realism and Precautions in Protecting Children's Health";

He said: Much harm from chemicals today will only impact on tomorrow's children.
He quoted Prof Carl Cranor's study: "Legally Poisoned: how the law puts us at risk from Toxicants", Harvard, 2010: *"Current post market laws in the US provide less protection from commercial chemicals than pre-1960s laws did from pharmaceuticals"*
30-100 k commercial chemicals with little or no pre-market testing.
287 toxics in cord blood samples.
212 toxics in > 90% US citizens.

The study of Epigenetics has emphasised that gene changes are more and more frequently being caused by environmental exposure.
Rather than being "caused" by single genes, heart disease, autism, schizophrenia or intelligence represent a network perturbation generated by small, almost imperceptible, changes in lots of genes.
Environments alter gene expression & imprinting.

The Faroes Statement: Human Health Effects of Developmental Exposure to Chemicals in Our Environment 2007

Extracts: The developing embryo and foetus are extraordinarily susceptible to perturbation of the intrauterine environment. Chemical exposures during prenatal and early postnatal life can

bring about important effects on gene expression, which may predispose to disease during adolescence and adult life. Some environmental chemicals can alter gene expression by DNA methylation and chromatin remodelling. These epigenetic changes can cause lasting functional changes in specific organs and tissues and increased susceptibility to disease that may even affect successive generations.

The immune system also undergoes crucial developmental maturation both before and after birth. New evidence suggests that a number of persistent and non-persistent environmental pollutants may alter the development of the immune system

Three aspects of children's health are important in conjunction with developmental toxicity risks. First, the mother's chemical body burden will be shared with her foetus or neonate, and the child may, in some instances, be exposed to larger doses relative to the body weight. Second, susceptibility to a wide range of adverse effects is increased during development, from preconception through adolescence, depending on the organ system. Third, developmental exposures to environmental chemicals can lead to life-long functional deficits and disease.

Risk assessment of environmental chemicals needs to take into account the susceptibility of early development and the long-term implications of adverse programming in a variety of organ systems. Although test protocols exist to assess reproductive toxicity, neurodevelopmental toxicity and immune toxicity, such tests are not routinely used, and the potential for such effects is, therefore, not necessarily considered in decisions on safety levels of environmental exposures.

The Permanent Peoples' Tribunal was held in Bangalore, December 3rd to 6th 2011.

The six multinational agrochemical companies stood accused of grossly violating human rights by promoting reliance on the sale and use of pesticides known to undermine internationally recognised rights to health, livelihood and life.

We submit a link to the evidence considered in the judgments against six Trans-National Corporations (TNCs) at the Permanent Peoples' Tribunal (PPT) held in Bangalore, December 3rd to 6th 2011 and the final verdict of the nine judges (which was broadcast live on the internet).

<http://www.agricorporateaccountability.net/en/page/ppt/167>

Pages 35-37 contain a synoptic list of the cases which were submitted to the PPT and pages 38-40 the Programme of Sessions. After hearing evidence from witnesses over three days, the nine judges in the Tribunal concluded that the TNCs are responsible for gross, widespread and systematic violations of the right to health and life, loss of biodiversity, degradation of ecosystems, economic, social and cultural rights, as well as of civil and political rights, and women and children's rights.

Peoples' Submission

In the case of the death of 11-year old Paraguayan Silvino Talavera who died January 7, 2003 because of exposure to glyphosate (Roundup® Ready) being applied to Monsanto's genetically engineered RR soybeans. Petrona Villasboa, the mother of Silvino Talavero said, "*We have proof that there was poison in his blood.*" "*We are trying to hold Monsanto accountable for the death of my son from pesticide poisoning*". The case of Silvino is an example of how children are more vulnerable to hazardous technologies. Today, RR soy is widely planted in the U.S. and Latin American countries, among the world's top exporters of soy.

We have heard the testimonies from Jayakumar, Dr Mohan Kumar and Dr Mohammed Asheel that endosulfan is an endocrine disruptor and highly toxic to humans and wildlife. The effects of endosulfan are most stark in Kasargod, Kerala, India where it was aerially sprayed from 1976 to 2002. Significant congenital, reproductive, neurological damage and other health effects have been observed in more than 9,000 villagers. Around 500 deaths in Kasargod are officially acknowledged to be caused by endosulfan poisoning; unofficial estimates are around 4,000. Jayakumar said, *“Bayer, India was culpable in these violations since they actively campaigned to stop the ban of endosulfan in Kerala”*.

Dr. Tyrone Hayes showed evidence on the endocrine disruption effects of atrazine (product of Syngenta) in not only frogs but also a wide range of animals and the effects on humans. He said, *“Atrazine feminizes male frogs, males mate with males and produce viable eggs”*.

Paraquat, manufactured by Syngenta, is the world’s most toxic herbicide. It is used by an estimated 30,000 mostly women workers in palm oil plantations in Malaysia. Women paraquat sprayers suffer from skin damage, burns, blindness, discolouration and loss of nails, nose bleeds, and respiratory problems. Nagama, a former plantation worker said, *“I had to resign my job when I was 45 years old because of ill health due to paraquat poisoning.”* She added, *“Paraquat is banned in Switzerland (Syngenta's home state), why then is it still sold and used in Malaysia?”*

In Africa, there are 100,000 tonnes of prohibited and obsolete pesticides. They are often stored in deteriorating and leaky containers without adequate safeguards. Dr. Abou Thiam said, *“Obsolete dumps in Africa are like ecological bombs waiting to go off.”*

In the U.S., many agricultural farms have been contaminated with genetically-engineered crops, and have lost significant access to traditional seeds. Yet, instead of recognizing that they have violated the farmers’ rights to reject GE crops, Monsanto has even sued these farmers for alleged *“seed piracy.”* Monsanto has taken these farmers to court for alleged intellectual property rights infringement, and forced them to pay the company millions of dollars. Farmer witness David Runyon testified that: Monsanto attorney had said: *“taking money from a farmer is like taking candy from a baby.”*

Javier Souza, Agronomist from Buenos Aires University said, *“The push of Monsanto's RR Soy into Argentina has led to the loss of livelihood and food democracy.”*

Graham White and Philip Mimkes described the drastic decline of bee populations across the world, which started in the mid-1990s. At the same period that Bayer introduced neonicotinoid pesticides in the market, honeybee populations started dying everywhere in Europe, US and in other countries. This has imperiled the livelihoods of thousands of beekeepers and compromised food security and jeopardizes the ecosystem.

In 2007, farmers and activists occupied a piece of land in Brazil where Syngenta was conducting illegal field experiments of GE soy and corn. Hours after the occupation, more than 30 heavily armed security guards arrived and fired at them. Valmir Mota, was killed with a point blank shot to the chest. The guards also shot another farmer in the head, which resulted in the loss of her one eye. Barbosa who survived, said *“We (Via Campesina) were protesting sterile seeds that would make us dependent on TNCs. We decided to occupy Syngenta's fields.”* He added that, *“the Swiss government publicly apologized for Syngenta's violence in Brazil”*. But Syngenta continues to expand its market with impunity.

Persistent Organic Pollutants (many produced by Syngenta, Bayer and Dow) travel northwards and accumulate in the environment contaminating the Arctic which had devastating effects on the way of life of the Arctic tribes. Vi Waghiyi, Yupik succinctly described it in her statement, *“The health and well-being of our Arctic Indigenous Peoples is connected intimately to the climate, wildlife, and the Arctic ecosystem spiritually, culturally and traditionally. The corporations are contaminating us without our consent and affecting our lands, our subsistence foods, the health and well-being of our people, our children and future generations, and our traditions and cultures. They must be held accountable and prevented from causing further harm.”*

Syngenta has harassed and attempted to discredit Dr Tyrone Hayes, scientist who exposed the negative impacts of Syngenta’s pesticide, Atrazine. Dr. Hayes said, *“Syngenta asked me to manipulate data, hide data or purchase my data. I refused.”* Scientists like Tyrone Hayes who speak the truth, lose their funding and are isolated from the rest of the scientific community.

The TNCs have influenced the focus and outcome of the research by donating research grants to Universities or funding research that is corporate owned especially when universities are vulnerable due to privatisation. As Dr Quijano said, *“Most toxicologists are in the employ of TNCs or TNC influenced institutions. Most scientific journals controlled or influenced by Big Corporations. UN bodies dealing with chemicals are highly influenced by big business or governments protecting big business.”*

Agrochemical TNCs have used the threats of and actual legal suits and counter suits to silence critics and tie activists for years in litigation.

In India, it is estimated that 169,900 children below 14 years old, mostly girls, work in cotton plantations. In exchange for lowly wages and bonded through family debts, child labourers are exposed to highly toxic pesticides such as endosulfan and monocrotophos for long periods of time. The testimonies from Ashwini and Shankar emphasised the impact of the pesticides and the inhumane work conditions including long hours and hazardous work with no form of protection and information.

In the case of paraquat, we have shown how governments repealed the ban to allow the continued use of paraquat due to a combination of pressure and public relations exercise by the Syngenta and the oil palm plantation industry.

In Indonesia, Monsanto bribed the government officials to allow the field testing of GE cotton.

The *“revolving door”* practice of placing agrochemical representatives in high government decision making positions and then slipping back to their corporate posts is common. While these agrochemical representatives are in high government positions they change or enact policies that are serve their corporate interests (*“former Monsanto Vice-President Michael R. Taylor's appointment by the Obama administration to the Food and Drug Administration (FDA) on July 7th 2009 sparked immediate debate and even outrage among many food and agriculture researchers, NGOs and activists.”*).

In the case of Liberty Link rice debacle, the USDA quickly registered the LLRice601 immediately after it was found that this had illegally contaminated the US rice production.

This was done very speedily without the necessary process. Bayer in arrogance claimed that it was an act of God.

The policies of the institutions such as World Bank/IMF and the WTO have aided the global strategy of multinational corporate hegemony, initially through SAP and the Green Revolution and now total trade liberalisation. In fact it is clear that the WB directly supported and facilitated the expansion of markets for the agrochemical TNCs in Africa as well as directly to the corporations by providing funds for the procurement of pesticides, seeds, and fertilizers to developing countries. The WTO's policies of liberalization and privatization particularly the TRIPs and AoA also allows the amassing of profits for these corporations.

These cases of violations are not isolated. The survivors from the Arctic to death of bees have shown very clearly widespread and systematic violations of people's rights to life and health and livelihoods. These violations impact on the economic, social and cultural rights, civil and political rights and in particular the rights of women and children. The onslaught of agrochemical TNCs and the monopoly control of the means of production particularly land, water, and seeds is evident. This monopoly control have devastated farmers, local small food producers and indigenous communities who are losing their basis of survival, their culture, and identity and their knowledge and skills

The legal and policies framework have made it impossible for communities and vulnerable groups that are the most affected to access to justice. They face huge obstacles to hold these TNCs, parent company and their agents who have contributed to death, ill health and environmental damage liable.

The lack of corporate accountability and remedy under international and local laws as well as the deliberate failure of these agrochemical TNCs to observe the customary rights and norms under international law, had devastating impact on people, livelihoods and environment. It has also been aggravated by the complicity of the States and their failure to protect their citizens from this onslaught. In spite of current existing international instruments such as Conventions that define rights it is not possible to make TNC accountable. At the global level there is lack of mechanisms for corporate accountability.

These agrochemical TNCs continue to escape liability for their unlawful and often lethal conduct outside of their host states. The United States, Germany, and Switzerland, where the headquarters of the six corporate defendants are located, bear not only responsibility but legal liability for their failure to regulate the export of dangerous agrochemicals and the genetic engineered seeds and crops that inflict great environmental harm and endanger the health and lives, both directly and indirectly.

For 27 years, the survivors of Bhopal have struggled for justice – and they are still waiting. The Indian courts have failed to bring justice while the US courts using the “forum non convenience” have absolved themselves from hearing the case in the courts.

The people's response in the face of the tremendous onslaught has been to continue strengthening the people's movements and consolidation of resistance against globalization and the tyranny of the agrochemical TNCs. We continue to assert our economic, social, cultural and political rights at all levels and realize our rights to food sovereignty, through

self-determination, and empowerment. However, a global mechanism is urgently needed to bring out justice.

The Verdict

“The last two days we have heard from 19 witnesses; 4 technical witnesses and 15 survivors who have vividly, through the experience and scientific research, compellingly substantiated the allegations made in the indictment.”

Summary of the Verdict by members of the Jury

Jury: Loss of biodiversity and degradation of ecosystems due to toxic pesticides have effect on life of indigenous peoples.

Jury: Loss of biodiversity and threats to indigenous peoples: undermines their way of life.

Jury: Threats and killings of public scientists and activists.

Dr Gianni Tognoni: Systemic toxicity and not isolated cases an expression of companies disregard to effects on populations.

Tognoni: There is a dramatic scarcity of independent research.

Jury: Pesticides and GMOs undermine communities.

Jury: Per toxicity of pesticides: there is structural bias in scientific literature pro-pesticides industry.

Juror Tognoni: No doubt there is proof of systemic toxicity and violation of human rights by agrochemical companies.

Elmar Altvater: Pesticide poisoning has been deregulated under neoliberal globalisation.

Altvater: Practices of agrochemical companies has led to economic/financial crises.

Altvater: Other consequences of agricultural TNCs are growing inequalities of hunger. Natural resources are being exhausted.

Paulo Ramazzotti: Pesticides and GMOs have social costs. Changes in traditions must be chosen by communities, not imposed by companies.

Jury: The key issue at stake is continuous generation of social costs; and lack of intervention by authorities.

Juror Ramazzotti: Agrochemical Companies treat people as expendable and dispensable forms of life, as mere commodities.

Jury: Pesticide corporations squelch information, prevent understanding and divide communities.

Juror Baxi says people should not be disregarded as factors of production or disposable. Dignity is key.

Chairman: Corporations have replaced responsibility with CSR – accountability to shareholders only.

Jury: Global Compact has produced little change and corporations can pick/choose human rights violations.

Jury: Agrochemical corporations are responsible for gross widespread violation of human rights.

Juries' recommendations: Governments to prosecute TNCs for criminal liability.

Jury recommends governments to take action to restructure criminal law to make them accountable, to legislate on the precautionary principle.

Jury recommends that patents should be secondary to human rights and protection of biodiversity.

From my study at home, we watched the verdict. It was broadcast live from Bangalore on the internet. It took about an hour to deliver. There were sometimes breaks in transmission, but there was a continuous summary on the screen of the points made by jurors. It was a deeply

moving experience, particularly the point at which the victims and survivors applauded the jury. Some might consider it a hollow victory, because, although invited to do so, none of the defendants were in attendance. (However, they must have been in the vicinity. The Indian Police raided the College the next day and demanded a list of attendees, particularly of those from PANAsia who had organised the Tribunal). But the people felt better. They had been able to voice their complaints and, most importantly, to have them documented for posterity.

But no criminal prosecutions will take place until governments wake up and discover that it is too late. The destruction of the environment and biodiversity will be complete.

Quien sabe que se comete un crimen y no lo denuncia es un CÓMPLICE (José Martí).
Translated: Whosoever knows that a crime was committed and denounces it not is an ACCOMPLICE.

Rosemary Mason, MB, ChB, FRCA

Palle Uhd Jepsen, former Conservation Adviser to the Danish Forest and Nature Agency

31 August 2012