HUMAN HEALTH AND GLOBAL BIODIVERSITY LIES IN THE HANDS OF THE PESTICIDES INDUSTRY

Rosemary Mason MB, ChB, FRCA and Palle Uhd Jepsen former Conservation Adviser to the Danish Forest and Nature Agency

The Silent Killers

CONTENTS

Introduction and Summary

This document provides evidence that, unwittingly or otherwise, a long-term strategy has existed with the aim of putting the pesticides industry in charge of human health and biodiversity. In 2008, under the Editorship of Eric Chivian MD and Aaron Bernstein MD (from the Center for Human Health and the Global Environment, Harvard Medical School) the book Sustaining Life. How human health depends on biodiversity was published by Oxford University Press. It won the award for best biology book of 2008. Sadly, it was already too late. Over the last 20 years or so, a series of new agrochemical compounds have been authorised by Regulatory Authorities around the world. Two in particular, the systemic neonicotinoid insecticides and genetically-engineered crops have caused gross contamination of the environment. These agrochemicals are the silent destroyers of human health and global biodiversity. GM crops are now being authorised at such a rate around the world that they cannot possibly have been adequately tested for their long-term effects. Independent scientists who have warned of the hazards of these chemicals have been completely ignored by governments. Those who reported inconvenient truths have lost their jobs, or had their departments closed down, or been publically vilified by the scientific community.

The systemic neonicotinoid insecticides

Dr Henk Tennekes, an independent Dutch toxicologist, first warned of the dangers of the systemic neonicotinoids in his book: *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 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.

Beneath the radar

We describe how and why these agrochemicals that have come to dominate world markets have managed to escape notice. They have been '*beneath the radar'*. Environment Agencies were not measuring levels in surface or ground water. They did not appear on the European Water Frame Directive's list of dangerous chemicals that required to be monitored. They did not feature in the 2009 US Geological Survey (USGS) National Water-Quality Assessment Program (NAWQA) Report: *Pesticide Trends in Corn Belt Streams and Rivers (1996-2006).* They were absent from the 2008 US study of pesticides in ground-water. The authors of the studies said: "*The results of this study are encouraging for the future state of the nation's ground-water quality with respect to pesticides…Despite sustained use of many popular pesticides and the introduction of new ones, results did not indicate increasing detection rates or concentrations in shallow drinking water resources over the 10 years studied."*

That was simply because they were only measuring the older pesticides that had been phased out. These had been replaced by the systemic neonicotinoid insecticides, which were absent from the pesticide lists.

Human health is deteriorating

In 2010: "*The usually cautious US President's Cancer Panel has reported that synthetic chemicals can cause grievous harm and that the number of cancers for which they are responsible had been grossly underestimated. The Standing Committee of European Doctors, including the BMA, added: "Chemical Pollution represents a serious threat to children, and to Man's survival."* In March 2009, the charity Brain Tumour UK reported that 40,000 brain tumour patients each year were missing from the official statistics. In May/June 2010 issue of *Oncology News*, Dr Colin Watts, a neurosurgeon from Cambridge, wrote a Report "*Brain Cancer: An Unrecognised Clinical Problem."* The Office of National Statistics figures for the UK showed that the number of children dying from brain tumour in 2007 was 33% higher than in 2001**;** in contrast, child deaths from leukaemia were 39% lower than in 2001. In fact, brain tumours have (in the UK and Canada at least) replaced leukaemia as the commonest cause of childhood death. In July 2010 Gwynne Lyons and Professor Andrew Watterson published the CHEM Trust Report: *A review of the rôle pesticides play in some cancers: children, farmers and pesticide users at risk?* In it, pesticide exposure of pregnant women is linked to childhood cancer. In the last 35 years; the incidence of non-Hodgkin's lymphoma has more than doubled; testicular cancer has doubled; breast cancer in women has increased by two thirds and in men has quadrupled; prostate cancer has tripled. It has been left to charities to undertake these studies but, as we noted above, the pesticide monitoring and information is 20 years out of date. In fact few doctors are even aware that the neonicotinoid insecticides exist. Attempts have been made to inform the British Medical Association.

There are many studies that suggest long-term side effects in humans and it is not just from exposure of the foetus in early pregnancy. Here are three. [For others see Appendix 1].
Baldi, I. *et al*. Neurobehavioral effects of long-term exposure to pesticides: results from the 4-year follow-up of the PHYTONER Study. *Occup. Environ. Med* **68**: 108-115 (2011).
The first study to provide prospective data on farmer workers in the Bordeaux area of France (1997-98 and 2001-03) suggested long-term cognitive effects of chronic exposure to pesticides and raised the issue of evolution towards dementia.
Landrigan, P.J, Benbrook, C.M. Symposium on Opportunities and Initiatives to Pesticides. AAAS, 2006 Annual Meeting: *In the US, prenatal and childhood exposure to pesticides have emerged as a significant risk factor for neurodevelopmental disorders, including learning disabilities, dyslexia, mental retardation, attention deficit disorder and autism, which are now affecting 5-10% of 4 million children.*
An IUCN Task Force on Systemic Pesticides was established in 2011 and on 02/09/2012 the Task Force met in Tokyo. Two of the presentations involved humans: 'Systemic Pesticides as a Causal Factor of Developmental Brain Disorders (ADHD, autism *etc.*)' and 'The Human Health Effect of Neonicotinoid Insecticides.' As Mary Ann Ogasawara, Organiser of the meeting observed last week: *"Many people wouldn't bat an eye for honeybees but if they find that it affects humans, it will be the wakeup call."*

Loss of biodiversity

By the late 1990s, emerging pathogens in wildlife had become an increasing cause for alarm; global populations of amphibians, honeybees, bats and birds had been wiped out by disease. Many scientists had written in increasingly desperate tones about these threats to animal, plant and ecosystem health that were destroying biodiversity. Articles in the journal Nature in

the last six months have appeared with such titles as: '*Biodiversity loss and the impact on humanity'* and *'Emerging fungal threats to animal, plant and ecosystem health'*. Authors of the latter made an appeal to scientists urgently to find: "*the elusive magic bullet*".
A paper in the first issue of the new Journal of Environmental Immunology and Toxicology (Sept/Oct 2012) suggests an alternative explanation to factors such as climate change, or increases in ultraviolet radiation, both of which have been proposed scientists.

'Immune suppression by neonicotinoid insecticides at the root of global wildlife declines'.
Abstract: '*Outbreaks of infectious diseases in honey bees, fish, amphibians, bats and birds in the past two decades have coincided with the increasing use of systemic insecticides, notably the neonicotinoids and fipronil. A link between insecticides and such diseases is hypothesised. Firstly, the disease outbreaks started in countries and regions where systemic insecticides were used for the first time, and later they spread to other countries. Secondly, recent evidence of immune suppression in bees and fish caused by neonicotinoids has provided an important clue to understand the sub-lethal impact of these insecticides not only on these organisms, but probably on other wildlife affected by infectious diseases. While this is occurring, environmental authorities in developed countries ignore the calls of apiarists (who are most affected) and do not target neonicotinoids in their regular monitoring schedules. Equally, scientists looking for answers to the problem are unaware of the new threat that systemic insecticides have introduced into terrestrial and aquatic ecosystems.'*

Genetically modified crops
January 2012. Frédérique Baudouin reported: *New indication of health risks on GE maize*. Independent researchers in France criigen@unicaen.fr and Germany info@testbiotech.org have recently called into question the safety of Insecticidal Bt toxins, such as those produced in genetically-engineered plants; for example GE maize MON810 can significantly impact the viability of human cells. The effects were observed with relatively high concentrations of toxin, nevertheless there is a cause for concern. According to companies like Monsanto, the toxins are supposed to be active only against particular insects and should have no effects on mammals and humans at all. These kinds of investigation are not a requirement for risk assessment in Europe. Another finding of these researchers concerns a herbicide formulation sold under the brand name Roundup®. Massive amounts of this herbicide are sprayed on GE soybean crops and residues can be found in food and feed. According to the new publication, even extremely low dosages of Roundup® (glyphosate formulation) can damage human cells. These findings are in accordance with several other investigations highlighting unexpected health risk associated with glyphosate preparations. *"We were very much surprised by our findings. Up until now it was thought almost impossible for Bt proteins to be toxic to human cells. Now further investigations have to be conducted to find out how these toxins impact the cell and if combinatorial effects with other compounds in the food and feed chain have to be taken into account"*, says Prof Gilles-Eric Séralini from the University of Caen. "*In conclusion, these experiments show that the risks of Bt toxins and Roundup® have been underestimated*" [see Appendices 2 & 4].
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.* [Opinion from an Obstetrics expert: "*this paper shows that this GM protein can survive extensive food processing to enter the diet. It can then survive human digestion to enter the blood of the person eating it and then cross the placenta to enter the fetus."*].

On 22/06/2012 European Food Safety Authority (EFSA) for the first time gave a positive opinion on the cultivation of GE soy in the EU. The applicant, US company Monsanto, wants to sell its seeds for herbicide-tolerant Roundup® Ready (RR) to European farmers. Currently RR soy can be imported, but not grown. On 09/08/2012 Monsanto was given final market authorisation by the European Commission for GE soybeans with stacked genes. However a new legal dossier challenging the EC has been prepared on behalf of Testbiotech. www.testbiotech.org

GMO crops cause super-weeds and super-pests necessitating application of larger doses of the same pesticide, or re-registration of older ones

Monsanto's GM herbicide-tolerant crops have been associated with a massive increase in pesticide use, primarily due to super-weeds. The EU Regulatory bodies are in denial about super-weeds, yet the evidence from the US is clear. Supporters of GM technology and Monsanto claim that GE crops will reduce the amount of pesticides used and increase the yield in order to feed the world. However, since 1996, the year in which GE crops were first planted in US and Latin America independent analyses have shown that both of these claims are false. The residues of these toxic chemicals appear in humans from food and via animal feed. Farmers have reported side effects with feeding animals GM soya. In the previous 2 years, a Danish Pig Farmer 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. It was only when we read about the practice of desiccation of crops did we realise that the glyphosate could be accumulating in animals from more than one source of feed. This ties in with serious diseases in entire herds of animals in northern Germany, in which glyphosate has repeatedly detected in urine, faeces, milk and animal feed [see below under glyphosate].

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

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."* Here we 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).

Glyphosate found in human urine samples with levels 5 to 20 times above legal limit

This report in January 2012 from the Ithaka Journal (Viticulture ecology climate-farming) used figures from an unnamed German University. *When testing for glyphosate contamination in an urban population, a German University found significant contamination in all urine samples with 5 to 20 times above the legal limit for drinking water*. If residues are appearing in urban populations, it suggests that glyphosate residues from multiple routes of exposure, including desiccation, are entering the food chain of animals and humans. *In search for the causes of serious diseases of entire herds of animals in Northern Germany, especially cattle, glyphosate has repeatedly been detected in the urine, faeces, milk and feed of the animals. Even more alarmingly, glyphosate was detected in the urine of the farmers*. This accords with the Danish report of side effects in pigs fed GM soya [see page 29].

Rejection of advice about GMOs from the Environmental Audit Committee
The UK Government's Foresight Future of Food and Farming Report wants GMOs.
This week, the UK Government has completely rejected the advice of the 11th Report of Session 2010-12 of the Environmental Audit Committee (30/04/2012) that the Government should not license the commercial use of GM crops in the UK nor promote its use overseas. The Government, in its rejection of the advice, claims that it: "*takes a science-led approach, and the protection of human health and the environment are our overriding priorities*".
This is the voice of a pesticides industry in control. For a number of years, the UK Government has been totally committed to the development of GMO crops in partnership with industry. It appointed two scientists with Monsanto connections into key posts in the UK. Syngenta has powerful influences and industry scientists sit on several Government Committees because Syngenta supports pollinator research.

Foresight Future of Food and Farming Report from the Government Office for Science. Lead Scientist Prof Charles Godfray (NERC) and Hope Professor of Entomology at Oxford.
Page 88: "Wheat is the most internationally-traded food crop and the single largest food import in low-income countries. A public-private partnership between Syngenta and the International Maize and Wheat Improvement Center (CIMMYT) will focus on the development and advancement of technology in wheat through joint research and development in the areas of native and GM traits, hybrid wheat and the combination of seeds and crop protection to accelerate plant yield performance. The partnership will leverage both Syngenta's genetic marker technology, advanced genetic traits platform and wheat-breeding for the high-income countries, as well as CIMMYT's access to wheat genetic diversity, global partnership network, and wheat-breeding programme targeted to the low-income countries."

A secret application by the UK and Syngenta for a GM herbicide-tolerant crop.
On the EFSA website, we discovered that: *"The UK Competent Authority and Syngenta had applied for placing on the market of a GM, herbicide tolerant (glyphosate) maize GA21 for food and feed uses, import, processing and cultivation."* It was adopted by EFSA on 16/12/2011. Although EFSA had said that there were no effects of human or animal health or the environment, in the body of the document, they admitted to the problems of reduction in farmland biodiversity, selection of weed communities and selection of glyphosate resistant weeds and destruction of food webs and the ecological functions they provide. Nevertheless, the EFSA 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*".

Syngenta found guilty in a court case involving deaths of cows in Germany and the US
Is the Government aware that Syngenta Germany was criminally charged with denying knowledge that its GM Bt 176 corn killed livestock? The German Head of Syngenta was charged for withholding knowledge from the judge, of a US feeding study which had resulted in four cows dying in 2 days. Gloecker, the German farmer took part in authorised field tests between 1997 and 2002. By 2000 his cows were fed exclusively on Bt 176 corn and began to be sick. Syngenta refused to admit that its GM corn was the cause and the civil lawsuit was dismissed. Gloecker has finally obtained justice. Syngenta was held liable for the destruction of the farmer's 65 cows. The fact that no long-term monitoring of GMOs is done before they

are authorised by the EC makes it easy for the industry to deny responsibility. The farmer has to prove it in court against the lawyers of a powerful industry.

The European Court of Justice has ruled in favour of the industry over GM maize
September 2012: In a dispute between the Italian Ministry of Agriculture (who refused to allow cultivation of GM maize) and a biotechnology company, the EU Court of Justice last week ruled in favour of the Industry. (The GM maize had previously been approved by the EU, so no individual country could opt out). The Court ruled: "*that a member state cannot prohibit in a general manner the cultivation on their territory of such GMOs pending the adoption of coexistence measures, citing legislation that made the use and marketing of GMOs under the jurisdiction of the EU, which approved the use of GM maize in 1997*."
The Court of Justice had previously ruled against the French Minister of Agriculture and in favour of Monsanto over France's attempted ban of GMO MON810.

The new science of Epigenetics
Humans are bearing the brunt of these ever increasing amounts of genotoxic chemicals to which they are being exposed. It is likely that levels in the environment will increase exponentially.as the agrochemical companies' battle to cope with resistant weeds and pests by spraying on more and more pesticides. Whilst plants and invertebrates can develop resistance in a relatively short time, humans cannot. This chemical contamination of the environment has spawned the relatively new science of epigenetics. The Faroes Statement: Human Health Effects of Developmental Exposure to Chemicals in Our Environment 2007, warned that: *'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.'*

Dr Don M. Huber, Emeritus Professor of Plant Pathology, Purdue University, US, speaking about GMO crops and glyphosate, said: "*Future historians may well look back upon our time and write, not about how many pounds of pesticide we did or didn't apply, but by how willing we are to sacrifice our children and future generations for this massive genetic engineering experiment that is based on flawed science and failed promises just to benefit the bottom line of a commercial enterprise."*

RAM
PUJ
18/09/2012

The scale of the problem of exposure and the public's lack of protection

This document analyses and constructs the evidence for our conclusion that the agrochemical industry is in control of human health and global biodiversity. The Environmental Protection Agencies around the world have repeatedly told the public (and us) that there is no evidence that the systemic neonicotinoid insecticides are harmful to bees, provided that they are used correctly.

The rôle of the UK Chemical Regulation Directorate (CRD)

The CRD response (24/12/2010) on behalf of The Right Hon James Paice MP, Minister of Agriculture to our letter (03/12/2010) stated: "*that the neonicotinoids are primarily used as commercial and horticultural pesticides and that the Directorate routinely restricts the ways in which products can be used (e.g. specifying dose rates, timing and place of application) to ensure protection of human health and the environment*. In an open letter to the CRD on 06/01/2011, we pointed out there were four different products on unrestricted sale to the public for use at home. Bayer Garden Products included Provado® Ultimate Bugkiller Concentrate (thiacloprid), Provado® Lawn Grub Killer (imidacloprid), Ultimate Bugkiller Ready to Use (thiacloprid) and Provado®Vine Weevil Killer (thiacloprid). We raised several questions, but received no answers (after our complaint to the Defra Chief Scientist we finally had one in July 2011, but by that time the CRD must have forgotten what the questions were).

If it is so important that they are applied correctly, who instructs the public on their use on garden plants, on lawns, in greenhouses, on golf courses, on sports fields, on amenity grasslands, on pets, and horticulturalists who apply it to plants and bulbs and some composts that are sold to our nurseries (but without being obliged to label that they are so treated)? Many people believe that if one unit of pesticide is good, two units will be twice as good. The Radio 4 Gardener's Question Time panel sometimes mentions pesticides but fails to emphasise the dangers. Only Monty Don stood up to the BBC by refusing to recommend chemicals. In Kew Gardens if one tries to find a bird or an insect it becomes apparent (and by admission of staff) that there is widespread use on trees and in greenhouses. The pesticides industry cooperates with agricultural colleges on research, so they able to influence farmers, horticulturalists and gardeners from the beginning of their careers. Knowledge learned as a student usually remains for the rest of one's life. Glyphosate (Roundup®) was marketed as harmless, and assumed to be so by the public, but independent studies have shown that it is toxic to humans in relatively small doses, and residues in food are increasing (vide infra).

Failure by the authorities to inform the public of risks

We have regularly found the Bayer Provado® range in garden stores and hardware shops, but have failed to find an informed amateur gardener who knows what the active ingredient is in a particular product. Even we, who knew what we were looking for, often found it difficult. On the Royal Horticultural Society website, members are told that it is safe to use pesticides, provided that the instructions are strictly followed. Are the public aware that every time they use lawn grub killer, they are killing most of the other non-target beneficial insects in their lawn, or weakening those such as earthworms so that they are vulnerable to predators? Do they know that it kills off the microbes that aerate and break down the soil, or those that are responsible for leaf litter decomposition? Are they aware that each time they use them in the garden, neonicotinoid residues persist and hence build up? The systemic neonicotinoids have been known to persist in the environment for some years now. Only if people are informed can they consider the risks, e.g. of multiple exposures in pregnancy and to young children. When a gardener uses pesticides, residues from lawns can be carried into the house on shoes.

A study by Kross *et al.* (1996) from the University of Iowa in the American Journal of Industrial Medicine on 618 golf superintendents and their workers who managed turf on golf courses in the US, showed that they died of cancer, sometimes of unusual types, more often than the general public. In 2008, the EU had announced its intention to ban the use of pesticides on golf courses, but such was the outcry from the powerful golf lobby that golf courses were made an exception. There were triumphant messages on their websites. Perhaps they would not have been quite so elated had they been aware that they were possibly exposing those of their staff who managed the turf to an increased risk of cancer.

The EU Directive (2009/128/EC) on the Sustainable Use of Pesticides and the UK Consultation and Government Decisions, published December 2010

The Consultation Summary was prepared by the Chemical Regulation Directorate of the Health and Safety Executive on behalf of Defra. It was published in a pdf file on the Defra website on 15/12/2010. The following statement was issued: *"As UK pesticides safety standards are already amongst the highest in Europe, only minor changes are necessary to meet the new requirements and no compelling evidence was provided in the responses to justify further extending existing regulations and voluntary controls".*

We wrote to CRD on 06/01/2011: "We have examined your response document closely and have discovered that, instead of strengthening the legislation, the responses of the UK government and the CRD have considerably weakened it. In the case of aerial spraying, you have opted for derogation. We also observe that whilst the general background is given, the specific points made in the EU Directive seem to have been omitted. We have thus presented the EU's specific points immediately before, so that it is possible to compare those with the Government responses.

Article 9 Aerial Spraying.

EU Directive Advice**:** *Aerial spraying of pesticides has the potential to cause significant adverse impacts on human health and the environment, in particular from spray drift. Therefore aerial spraying should generally be prohibited with derogations possible where it represents clear advantages in terms of reduced impacts on human health and the environment in comparison with other spraying methods, or where there are no viable alternatives, provided that the best available technology to reduce drift is used.*

Government Response**:** *We do not consider that responsible application of pesticides by aerial spraying poses an unacceptable risk to human health and the environment, and consequently we will use the derogation. We believe that the existing legislation control regime provides a basis for meeting the Directive and this will be adapted to ensure the continuation of properly regulated aerial applications through a consent-based approach.*

[NB Defra was as good as its word; there was no prohibition. On 03/07/2012 their website announced new information about how aerial spraying of pesticides would be undertaken. "*Further information will be added as procedures are developed."*]

Article 10 Protection of water

EU Directive Advice**:** *The aquatic environment is especially sensitive to pesticides. It is very necessary for particular attention to be paid to avoiding pollution of surface water and groundwater by taking appropriate measures such as the establishment of buffer and safeguard zones, or planting hedges along surface water to reduce exposure of water bodies to spray drift, drain flow and run-off. The dimensions of buffer zones should depend in particular pesticide properties, as well as agricultural characteristics of the areas concerned.*

Government Response: *Current statutory and voluntary controls related to pesticides and the protection of water, if followed, afford a high degree of protection to water courses and cover specific measures detailed in the Directive. The Government will primarily seek to work with the pesticides industry to enhance voluntary measures.*

Our comment: Protection of the aquatic environment is absolutely critical in the case of the Neonicotinoids, the undesirable properties of which the Dutch and US researchers have confirmed; their solubility that allows them to leach into surface water, the persistence of residues in aquatic environments, their acute risk to freshwater and benthic invertebrates.

Article 11 Use of pesticides in specific areas

EU Directive Advice: *Use of pesticides can be particularly dangerous in very sensitive areas such as Natura 2000 sites protected in accordance with Directives 79/409/EEC and 92/43/EEC. In other places such as public parks and garden, sports and recreation grounds, school grounds and children's play grounds, and in the close vicinity of healthcare facilities, the risks from exposure to pesticides is high. In these areas, the use of pesticides should be minimised or prohibited. When pesticides are used, appropriate risk management measures should be established and low-risk pesticides as well as biological control measures should be considered in the first place.*

Government Response**:** *We do not consider it necessary to prohibit the use of pesticides in public spaces or conservation areas or to impose new statutory controls on pesticide use in these areas. We believe that the UK can meet its obligations under the Directive through existing statutory and voluntary controls and develop additional voluntary measures.*

Plant Protection Products Regulation (PPP) *(EC) No 1107/2009)*

The consultation sought views on whether and how two specific provisions in the PPP Regulation should be implemented in the UK.

Article 31 which include an optional provision that could allow future product authorisations to include obligation to provide advance notice to any neighbours who could be exposed to the spray drift and who have requested to be informed.

Article 67 concerns the keeping of records of pesticides, by both manufacturers and sellers. These are to be made available to a 'competent party', from which a third party may obtain it on request.

The British Medical Association with regard to Article 31, wanted advance notification, so that vulnerable patients, such as those suffering from respiratory problems, may be alerted in advance of spraying.

Government Response: *We do not believe that it is appropriate to introduce a statutory requirement for operators to give advanced notice of planned spray operations to members of the public living adjacent to sprayed land. We will continue to encourage farmers and spray operators to develop good relations with their neighbours.*

We found another subject on which we could find no government comment; research programmes.

EU Directive Advice: *Research programmes aimed at determining the impacts of pesticide use on human health and the environment, including studies on high-risk groups, should be promoted.*

Our Comment: Large amounts of pesticides are reputed to be sprayed on US golf courses each year to remove any invertebrate that dares to spoil the greens. Presumably as the holder of the records of applications of pesticides on golf courses in the UK, the Chemical Regulation Directorate would be in an ideal position to conduct such a study themselves. This is particularly relevant to Dr Tennekes' observations that these chemicals are similar in their structure to known carcinogens. Unfortunately, the public has no direct access to records so any study must be undertaken from your records, and perhaps those of Defra.

CRD budget is paid, in part, by the industry. Is it a safety agency or a service agency?

Instead of employing independent scientists, it is presumably easier and cheaper for the UK Government to allow industry to pay a proportion of the Chemical Regulation Directorate's costs (about 60%). It is understandable therefore that the loyalty of the Defra/Fera staff lies

with the industry that pays them, rather than the protection of Human Health and the Environment. (Defra told us that the exact amount each year is based on a formula enshrined in the recent European Legislation on Plant Protection Products. It depends on work done). Extracts from the CRD Annual Report 2008/2009 *"This has been a very busy year in the approvals group. Applications for product approvals were 9% over business estimates with a total of 1,767 applications received and 1,622 applications completed this year, 96% of which were completed within published targets. Importantly 100% of 'fast track' applications identified by industry as high priority to their business needs were completed within published targets. Achieving this demanding target despite the increase in applications has required diligent application and commitment of evaluating staff and their managers and represents a significant achievement. We continue to support growers and we have completed the first stage of the conversion exercise for the 'Long Term Arrangements for Extension of Use' on non-edible crops. Of the 401 uses requested by growers, the 131 products containing active substances that have already been fully reviewed in the EU review programme, and included on Annex I of Council Directive 91/414/EEC have been completed. The remaining product/uses identified by growers will be automatically included in the on-going re-registration process minimising the impact on industry. We also assisted in the evaluation of new products by helping companies work towards the completion of appropriate dossiers through the provision of detailed advice. This advice has covered both chemical pesticides and biopesticides that we continue to support under our biopesticides scheme. We submitted completed evaluation reports for 5 new active substances where the UK was the EU Rapporteur Member State and issued 3 UK provisional authorisations in advance of Annex I inclusion. In addition we completed 8 'partial dossier' submissions.*

Has Defra forgotten its origins?

In 2001, under Tony Blair's government, the Department of the Environment was merged with the Ministry of Agriculture, Food and Fisheries (in England) to become 'Defra' the Department of the Environment, Farming and Rural Affairs, with obvious conflicting interests. Farming has won and the Environment has been wiped out. Defra appears to have appointed an army of website writers who, like *Araneus quadratus*, spin their webs only at night. Their aim is to disseminate good news and bury bad. They are reassuring the public that the Government doing a good job on its behalf. They are seriously committed to biodiversity. Just to make us think that the public know that it is essential to their decision-making process, they throw in a few questionnaires. The content of each page seems to change every few days, even the *About Defra* one. The amount of information is both overwhelming and confusing.

Prominent is Defra's 'Myth Busting' section, to cast ridicule on criticism in the media. January 2011. *US Study on neonicotinoids.* The myth: *The Independent claimed that the findings of an unpublished US Scientific Report suggested neonicotinoid pesticides could be killing bee colonies all over the world.* February 2011. *Bob Watson and the neonicotinoids.* The myth: *The Independent claimed that Defra's Chief Scientific Adviser had ordered a review of the evidence used to justify the safety of neonicotinoids to bees.* Update February 2011 from Fera: Neonicotinoids and honey bee: *"A recent US memo and various articles published in the UK media, on the risks of neonicotinoids, provide* **NO NEW EVIDENCE** (sic) *on this issue."* May 2012 The myth: *There have been recent reports that Defra is proposing to cull buzzards or is about to implement a new policy to control their numbers.* The truth: *Defra is absolutely not proposing to cull buzzards or any other raptors. We work on the basis of sound evidence*.

[Editor's note: this was half-truth: the project was planned (but rapidly abandoned in view of the public outcry) for six estates in Northumberland; but it would be Natural England, not Defra who would, under the law, be able to issue licences].
The UK National Ecosystem Assessment was published by Defra in June 2011. Page 8 of the Synthesis was entitled: "*Changes in the past 60 years*." Defra managed to rewrite the whole post-war history of the destruction of the countryside by industrial farming, without any mention of pesticides or herbicides.

The Government's Academic Adviser in Agriculture
Sean Rickard, a well-known economist from Cranfield University, wrote the present government's agricultural manifesto. He was an academic adviser to the government. His Report, *The Value of Crop Protection* (Dec 2010, commissioned by the Crop Protection Association) examines the economic benefits of Plant Protection Products (PPPs) to the food supply. His message was apocalyptic and it was widely reported in the press in similar terms. Sean Rickard warned that if the EU banned pesticides, food costs could soar up to 40% in the UK and could add £70 billion to the country's food bill. He had written a similar report in October 2008 *What Price Protection?* In his presentation of this to the All-Party Parliamentary Group on Science and Technology in Agriculture (appg-agscience.org.uk) on 28/10/2008, Sean Rickard issued a warning to the members of the group that the EU could ban up to 85% of pesticides. It has to be assumed that his report was influential in preventing any such ban being put on them in the EU. However, on page 34 of *The Value of Crop Protection*, in the section "The Contribution of Research and Development", he appears to condemn the use of neonicotinoid insecticides. In the middle section of the page he says that PPPs *should "meet modern safety and environmental standards" in not affecting non-target organisms and without persisting in the environment.* Had the industry kept him in the dark?

The rôle of the Advisory Committee on Pesticides (ACP)
The Advisory Committee of Pesticides (ACP) is an independent committee. Its terms of reference are that it: should give Ministers advice…and under the Food and Environment Protection Act 1985… "*to protect the health of human beings, creatures and plants… to safeguard the environment… with a view to making information about pesticides available to the public.*
On 08/03/2012 Defra announced a proposal that the ACP should be abolished and reconstituted as a new expert scientific committee. The Royal Commission on Environmental Pollution (created under Royal Warrant in 1970) had been abolished in April 2011. Why has this government disbanded all the public watchdogs?

It is impossible to avoid exposure, either as a beekeeper, or during early pregnancy
Neonicotinoid insecticides are so ubiquitous that beekeepers don't know how to avoid exposing their bees to them (there is no mitigation for systemic pesticides) because there is no difference between plants from pesticide-coated oil seed rape and uncoated (although the paucity of insects might suggest a difference). In *The Butterfly Isles*, by Patrick Barkham (2010), on page 68 he wrote the following, apparently unconnected (to the author, at least) observations. It was a hot day in late April 2009 and the author was admiring the field of yellow oilseed rape in full bloom. Further down the page, he says: *"it was 25 minutes before I saw any insects"*. No insects? On a hot day in late April? In our time, that would have been unimaginable. Just from that small incident, one can see how people's baselines only relate to how it was in their own childhood, until suddenly a time of plenty turns into a collapse.

Just as the beekeeper cannot protect his bees, how can the pregnant patient avoid exposure of her foetus to invertebrate-killing pesticides when the size of the foetal brain is no more than that of an insect?
A member of the British Beekeepers Association (BBKA) who had lost some hives recently suggested that farmers sowing seeds with systemic pesticides should report the location to Defra, who could map the area on a GPS (the same way as some police authorities can alert communities to the location of crimes in their area). This idea was rejected by Defra and the then Defra Minister Richard Benyon.

UK government scientists again refuse to ban clothianidin and thiamethoxam…
On 07/09/2012, it was reported that UK Government Scientists had decided that nerve agent pesticides, clothianidin and thiamethoxam: "*should not be banned despite four independent studies strongly linking them to sharp declines in bees around the world.*" The reports were reviewed by the Chemical Regulation Directorate and the Advisory Committee on Pesticides (ACP), the independent statutory body that advises ministers. Following the line taken by the European Food Safety Authority (EFSA), both bodies said that more research was needed.
http://ind.pn/Or3MLN

…the same day as Public Interest Groups in the US gave notice to sue the US EPA about these very chemicals endangering threatened wildlife…
http://bit.ly/OqpPCc
The same day, we received notification from our US colleagues that Environmental and Public Interest Groups were ready to take legal action against the US Environmental Protection Agency (US EPA) over its approval of pesticides which endanger wildlife. These were the very same pesticides that the European Commission (EC), EFSA and UK Scientists claimed "*needed more research*."
The 60 Day Notice of Intent to Sue follows a previous legal petition filed by several environmental organizations and many beekeepers, which demanded that EPA immediately suspend use of the pesticide clothianidin, which poses a grave threat to pollinators. The EPA refused to issue an immediate suspension of clothianidin, but did agree to open a public comment docket to review additional points raised in the legal petition.
In the legal petition in March 2012 Pesticide Action Network North America had presented the EPA with a State of Science document about the Systemic Insecticides.
http://www.panna.org/sites/default/files/CFS%20Petition%20App%20B_Science.pdf

US EPA has known that clothianidin was toxic to bees, birds and mammals since 2003
The communication continued: "*In the nine years since the US EPA conditionally registered clothianidin for use on corn and canola (oilseed rape), the agency has admitted to both the hazards of the insecticide and the need for compliance with the Endangered Species Act (ESA*). The EPA fact sheet on clothianidin reads as follows: *"Clothianidin is expected to present acute and/or chronic toxicity risk to endangered/ threatened birds and mammals via possible ingestion of treated corn and canola seeds. Endangered/ threatened non-target insects may be impacted via residue-laden pollen and nectar."* The potential use sites cover the entire U.S. because corn is grown in almost all U.S. states. The agency has also admitted that thiamethoxam poses similar toxic threats to the same range of species. "*Despite US EPA's recognition of the acute and chronic toxic risks which these chemicals pose to endangered species of birds, mammals and insects, from nearly a decade ago, the agency has continued to ignore concerns surrounding the effects on these critical species. Over the past twelve years, US EPA has approved a total of 86 pesticide-products containing clothianidin and thiamethoxam, allowing the use of these insecticides on more than 30 food-crops, as well*

as for gardening, turf-grass and building-applications." [They are used for termite control in the US].
This memo summarizes the Environmental Fate and Effects Division's (EFED) screening-level Environmental Risk Assessment for Clothianidin in 2005; for use on Potatoes and Grapes as a spray treatment and as a Seed Treatment for Sorghum and Cotton.
"Clothianidin is highly toxic to honey bees on an acute contact basis. It has the potential for toxic chronic exposure to honey bees, as well as other non-target pollinators, through the translocation of clothianidin residues in nectar and pollen. In honey bees, the effects of this toxic chronic exposure may include lethal and/or sub-lethal effects in the larvae and reproductive effects in the queen... this systemic insecticide is persistent and mobile, stable to hydrolysis, and has potential to leach to ground water, as well as runoff to surface waters."

Why are our Protection Agencies not measuring levels in ground and surface water?
For nearly 2 years we have written numerous letters to politicians, civil servants, members of the CRD, the ACP, the European Commission and the US EPA to inform them about the hazards of the neonicotinoid insecticides, their persistence in the environment and the fact that they were not being measured in surface and ground water. Later, we sent them our hypothesis that their use was related to global wildlife declines. When/if we had a response, the replies only addressed honeybees: "*there is no evidence that they are harmful to honey bees, if correctly used*" The few who replied to our hypothesis rejected it. No one mentioned water contamination.
European Union Committee 33rd Report: On 25/04/2012 a meeting was held in the EU. *'An indispensable resource: EU Freshwater Policy'*. The Chairman of the UK Environment Agency, members of Defra, CEH, and the Defra Minister were present at this meeting. All had been alerted to imidacloprid levels increasing in Dutch surface water and levels being inversely related to insect numbers. Dr Henk Tennekes had also shown that there were declines in insect-dependent birds throughout Holland, Germany, France and the UK.

According to the EC regulations on water quality: '*Priority substances are those identified as presenting a significant risk to or via the aquatic environment within the EU. These are listed in Annex X to the Water Framework Directive (WFD). Some substances are identified as priority hazardous substances, because they have "ubiquitous, persistent, bio-accumulative and toxic" properties. Bio-accumulation is the progressive increase in the amount of a substance in an organism or part of an organism which occurs because the rate of intake exceeds the organism's ability to remove the substance from the body'*. This is the EU definition of a priority substance that should be monitored. The chemical and ecological profiles are matched, very accurately, by the neonicotinoid insecticides. The dangerous substances that are being monitored include DDT, chlorpyrifos, aldrin and dieldrin; the majority of these should be obsolete. The insecticides whose sales now dominate the global market are absent from the list
http://ec.europa.eu/environment/water/water-dangersub/pdf/com_2011_876.pdf
.

Pesticide	®	utilisation	LD_{50} (ng/honeybee)	Toxicity index relative to DDT
DDT	Dinocide	insecticide	27 000	1
Amitraz	Apivar	insecticide / acaricide	12 000	2
Coumaphos	Perizin	insecticide / acaricide	3 000	9
Tau-fluvalinate	Apistan	insecticide / acaricide	2 000	13.5
Methiocarb	Mesurol	insecticide	230	117

Carbofuran	Curater	insecticide	160	169
Λ-cyhalothrin	Karate	insecticide	38	711
Deltamithrine	Decis	insecticide	10	2 700
Thiamethoxam	Cruise	insecticide	5	5 400
Fipronil	Regent	insecticide	4.2	6 475
Clothianidine	Poncho	insecticide	4.0	6 750
Imidacloprid	Gaucho	insecticide	3.7	7 297

Toxicity of insecticides to honeybees, compared to DDT. Median lethal dose (LD50) for honeybees is given in nanogram per honeybee. The final column expresses the toxicity relative to DDT (Source: Bonmatin, 2009).

http://ec.europa.eu/health/scientific_committees/environmental_risks/members_committee/index_en.htm The Health and Consumers Scientific Committee has three remits; on consumer safety, on health and environmental risk and on emerging and newly identified risk. Have they had nothing to say on the matter?

European Commission denied our claim that the registration of clothianidin was illegal
One of our complaints to the European Ombudsman (1089/2012/BEH) was that clothianidin had been registered illegally, since its half-life in a range of soils was an average of 545 days with a maximum of 1386 days (Source: Footprint Database). According to the Directive on Plant Protection Products (EC) 1107/2009; Annex II, page 43, persistence in the soil, approval should not be given if the half-life in soil is greater than 120 days ('based on half-life data collected under appropriate conditions, which shall be described by the applicant'). http://www.epa.gov/opprd001/factsheets/clothianidin.pdf is the US EPA conditional registration document for clothianidin issued to the applicant in 2003.
Michael Flüh, replied on behalf of Commissioner John Dalli, *"The allegation as regards the illegality of the registration of clothianidin is strongly rejected. The assessment of clothianidin, carried out by a Rapporteur Member State (RMS) and peer reviewed by experts from all Member States concluded that safe uses of this substance exist."*
Unfortunately, EFSA has charge of all these RMS documents; it is unlikely we will be able to obtain them because RMS permission is required and we understand that they are classified as 'commercially sensitive' documents.

Natural Environment Research Council closed the Wildlife Research Stations in 2006
In December 2005, NERC**,** in response to a budget deficit, announced a Consultation Plan to restructure CEH and reduce nine of their research sites to only four, which would be moved into Universities. This plan included the closure of three important, internationally-renowned Wildlife Research Stations at Monks Wood in Cambridgeshire, Banchory, near Aberdeen and the new laboratory at Winfrith (Dorset). The budget cuts would include the loss of 200 scientific staff, many of whom were experienced field scientists. Some of the scientific programmes would be impossible to continue. There was a massive outcry from the scientific, environmental and biological communities. English Nature, the Government's own statutory advisory body warned against the closure. In a leaked letter to Tony Blair, the junior Rural Affairs Minister said that closure of four eco-laboratories involved in Climate Change research: *"does not make sense either scientifically or economically*".
The so-called 'Public Consultation' by NERC elicited 1,327 'stakeholder' responses to the proposal, of which 99% questioned the wisdom and expense of the closure. In a debate forced in the House of Lords, the Parliamentary Under-secretary of State with responsibility for Science and Innovation at the Department of Trade and Industry (DTI) defended the closures. He claimed that the Government believed that *"decisions about its scientific programme should be taken by NERC's independent Council*." In fact, NERC was funded by the DTI and

appointments to its Council were made by the Secretary of State for the DTI. At that time, of the eighteen members of the NERC Council, most were based in physics and the physical sciences and eleven were University Professors or held senior University posts. There was one businessman, one business consultant, one administrator and (at that time) a single biologist (a botanist). The then Under-secretary of State praised NERC for "*grasping the nettle*". He said that NERC had seen a fall in contract research in recent years and the Wildlife Stations were not making enough money from getting private research contracts. "*In today's multidisciplinary world, basic research increasingly should be done in a multi-disciplinary environment like universities".*
Despite all this opposition, on 08/03/2006 the Council of NERC confirmed the plans to restructure CEH. In a letter to the staff dated 13th March Professor Alan Thorpe said: *"CEH will remain a science-driven, not a site-based organisation."* He anticipated that the cost of restructuring would be about £43 million over 4 years, but it would lower CEH operating costs by over £7 million per year. He said that the Council greatly regretted the impact on CEH staff, and made some concessions. Up to 40 of the 200 posts at risk could be saved. The letter from NERC seemed to be in accord with those who had said that it was an expensive cost-cutting exercise. Some academic scientists consider protection of the natural world to be "soft science" and therefore expendable when money is tight. But wildlife does not live in a laboratory. Monks Wood had proved that pesticides were killing peregrine falcons and that their residues were accumulating in the food chain (was that part of the reason?) Staff had shown that global warming had advanced spring events by about three weeks. Banchory was in the process of investigating the dramatic and sudden seabird breeding failure in Orkney, Shetland and the Northern Scottish Isles. Winfrith, set in the Dorset countryside with a huge diversity of plants and insects, was the laboratory from which ground-breaking studies of the rates of decline in British birds, butterflies and wild flowers were being made and they had brought the Large Blue butterfly back from extinction.
The Government had signed up to a global agreement to halt biodiversity losses by 2010, yet in a mere three months they had swept away Britain's ecological research base and squandered their experienced field scientists. [Coincidentally, NERC, who had been funding Dundee College of Life Sciences since 2000 for their Crops for the Future Project, in 2006 increased their budget by 50%.]
The End of Nature For conservationists in England, there was one final blow to come. In October 2006 English Nature became Natural England**.** Thus, over a period of 15 years, despite having signed up to all the UN Biodiversity commitments, a Conservative and a Labour government between them had finally managed to erase from their statutory environmental bodies any mention of unpalatable terms such as "*ecology*", "*wildlife*", "*conservancy*" and "*nature*". From henceforth they would be able legitimately to include recreational facilities. In fact the Chairman of Natural England is an industrial farmer.

Biological Records Centre – A major casualty of Governmental reorganisations.
The Biological Records Centre (BRC) was set up in 1964 and had developed from the *Atlas of British Flora* project. Biological recording has become the cornerstone of the monitoring of biodiversity. Studies of changes in species' distribution and density provide keys to understanding the mechanisms of global warming, monitoring species' decline and habitat loss. It is a fundamental tool in measuring the health of the planet. Ultimately, for us as a species, it is the *'canary in the* cage'. The BRC was originally based at the Nature Conservancy's newly-opened Monks Wood Experimental Station near Huntington. From 1973 onwards it became the Cinderella of every administrative reorganisation. Declines in funding were succeeded by a series of temporary contracts. For many years the future of the BRC was uncertain. Fortunately, climate change and biodiversity became increasingly

important issues. Information technology was advancing fast, improving data management and increasing the ability to data share. The National Biodiversity Network was born, initially as an informal alliance in 1997, then as a Trust in 2000. It is a collaborative partnership between more than 30 UK wildlife organisations; they share biological information and make it available via an innovative website known as the NBN Gateway. In a period of 40 years the Biological Records Centre had gone from data recording on record cards and punched cards to sharing National and International Computer Databases via the Internet.

NERC response to our letter about systemic neonicotinoid insecticides and the fact that imidacloprid had been contaminating surface waters in Holland since 2003.
On 17/02/2011, Prof Thorpe, the then CEO of NERC explained its rôle. *"By definition, we are a funder of research, not a Government regulatory body, and therefore our responsibility is to provide evidence that decision makers would use to design policy and implement it"*. He added: "*we are very excited about the recent launch of our new £10m Pollinator Initiative*". Except that only one project involved investigating the effect of sub-lethal exposure of industrial chemicals on the learning capacity and performance of bees; no mention of pesticides. (Dr Peter Campbell of Syngenta had given £1 million in 2009 to fund Warwick University and Rothampsted Research: *"to help to improve honeybee health"*, so he was a member of the Peer Review Panel for selecting the Pollinator projects). In addition, Syngenta had pioneered Operation Bumblebee in the UK and in 2010 announced expansion of programmes across Europe; up to €1 million over 5 years. Programmes included: *"What Operation Bumblebee can do for your golf course"* in conjunction with STRI, a leading Sports Turf Consultancy that runs training courses for turf managers for golf, football, rugby, cricket *etc*. Included in their armamentarium of treatments (and presumably recommended by them) was MeritTurf (imidacloprid, Bayer).

As an example of other projects funded by NERC, Professor Thorpe outlined the Environmental Change Network that monitored sites across the UK to "*specifically identify and quantify ecological responses to changes in our terrestrial and aquatic ecosystems"…"Obtaining these long-term datasets… is vital if we are to identify anthropogenic environmental change…*"
He appeared not to recognise the fact that the neurotoxic insecticides were accumulating in freshwater ecosystems and causing invertebrate declines, with a consequent effect on insect-dependent birds in Holland, Germany, France and the UK. These contaminants should have been of vital concern to NERC as a "*provider of evidence that decision makers would use"*. The neonicotinoids were producing the anthropogenic environmental changes the Network was trying to identify, and causing massive biodiversity losses.

NERC is funding other aquatic monitoring projects. In 2012 NERC proudly announced its GloboLakes project; the first satellite-based global lake surveillance system, to monitor how lakes and reservoirs are being affected by environmental change. The project leader, Dr. Andrew Tyler from Stirling, said: *"There are approximately 304 million lakes worldwide which are important for biodiversity and provide many ecological goods and services vital to human survival, such as the supply of fresh water, food and energy. Previous research has already shown how the ecological structure and function of lakes can be damaged by external changes such as the influx of certain nutrients, increased sediment load and climate change. Frequently the changes lead to algal blooms that can deplete oxygen concentrations and produce toxins that are harmful to human health* (no mention of pesticides, a taboo subject in scientific circles). How can one measure pesticide levels in aquatic systems, or

biodiversity declines, from space? A satellite is even more remote from the environment than population biologists making mathematical models on a computer instead of in the field.
This is the most recent example of an aquatic project funded by NERC. A team of 12 British scientists and engineers will embark on an ambitious 6-week drilling project through 3 km of Antarctic ice "*to search for microbial life forms*."
In a letter to The Independent on 10/09/2012: 'Let Antarctic be', the writer said: "*Another pristine environment is to be invaded by humans for their own benefit…Apparently polluting the seas, land and air is not enough for us…in fact in am pretty sure we'll end up doing damage, as we always do.*" The neonicotinoids insecticides are lethal to invertebrates, which is what a microbe is. These chemicals have sub-lethal effects. Tennekes showed that the neonicotinoids can produce effects at any concentration level provided the exposure time was sufficiently long. He and Sánchez-Bayo demonstrated that chemicals that bind irreversibly to specific receptors will produce toxic effects in a time-dependent manner, no matter how low the level of exposure. No-one has any idea what concentrations there are in the seas of the world after more than 20 years of intensive global use of these remarkably persistent and toxic neurochemicals. Instead of '*unlocking the hidden secrets of the past of Lake Ellsworth'*, this vastly expensive project which might have supported a dozen Wildlife Research Stations could end up contaminating the lake and killing any living organisms.

Defra/Fera Healthy Bees Plan Project Management Board working with the Science and Evidence Advisory Group (SEAG)

(The work of the SEAG included ensuring that honey bee health policy underpinned by sound science, translation of scientific developments into practical beekeeping to advance knowledge and skills and identify gaps in evidence base.)
The former had 10 meetings between 23/07/2009 and 10/03/2011.
The latter had five meetings between 12/02/2010 and 10/03/2011.
Neither of these Defra/Fera Committees mentioned neonicotinoid pesticides as a possible cause of bee declines, only the *Varroa* mite and how medicines for it could be expedited.
In fact, the Chief Bee Researcher at Fera, Dr. Helen Thompson, denied the existence of Colony Collapse Disorder on Channel 4 on 04/04/2011. However, the most recent Fera data on overwintering bee losses has only reached as far 2008.

Pollinator Initiative; a study of the effect of industrial chemicals on bee brains

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, decided to investigate pesticides. This change of target angered one committee member of the Scottish Beekeepers' Association (SBA), who was the Beekeeping Forum Administrator of the organisation which had agreed to supply three colonies of Scottish bees for Dr Connolly's research. He resigned from the Committee. In addition to studying the brains of bees, Chris Connolly, in partnership with the SBA, would carry out a three year survey of the impact of chemicals on colony performance in Scotland. Although the project is 3 months behind time (his bees were "rustled" from a secure area of Dundee University) 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 in the East of Scotland.

Beekeepers in the UK have overwintering hive losses

Graham White is a beekeeper and former Director of the Edinburgh Environment Centre which he founded and directed from 1980-2002. There he provided environmental education, nature conservation projects and outdoor education for all of the city's 200 schools and hundreds more community groups. He also created the John Muir Award for conservation effort - and they have just put their 120,000th person through the Award scheme since its inception in 1997. He created the first Urban Wildlife Group in Scotland and has produced many books including *The Scottish Environmental Handbook* and *The Nature of Scotland* and a collection of John Muir's writings. Since 2006 he has not harvested a single pound of honey, despite the fact that he now has ten hives rather than six; the reason is that his apiary stands in the centre of many square miles of arable crops - oilseed rape mainly - that have been treated with neonicotinoids. 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%.

Dead queens and workers. This is a photograph of a dead colony taken on December 11th 2010 by beekeeper Graham White, who lives in the eastern half of Scotland. He 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."*

The UK Government is committed to GMO Technology

The Foresight Future of Food and Farming Report

From the Government Office for Science; lead scientist Prof Charles Godfray (NERC), Hope Professor of Entomology at Oxford. (See page 88)

"Wheat is the most internationally-traded food crop and the single largest food import in low-income countries. A public-private partnership between Syngenta and the International Maize and Wheat Improvement Center (CIMMYT) will focus on the development and

advancement of technology in wheat through joint research and development in the areas of native and GM traits, hybrid wheat and the combination of seeds and crop protection to accelerate plant yield performance. The partnership will leverage both Syngenta's genetic marker technology, advanced genetic traits platform and wheat-breeding for the high-income countries, as well as CIMMYT's access to wheat genetic diversity, global partnership network, and wheat-breeding programme targeted to the low -income countries."

The UK government is totally committed to the development of GMO crops in partnership with industry. It has appointed two scientists with Monsanto connections into key posts in the UK and Syngenta has powerful influences on (and membership of) many of the Government Committees as a result of its funding of pollinator research in Europe.

Professor Maurice Moloney became Director and Chief Executive of Rothamsted Research on 15th April 2010. According to BBSRC: "*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, 16/10/2011 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. Amongst the signatories was Prof Jonathan Jones [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."] Prof Jones wasn't the only one who failed to declare his "*multinational*" connections. Prof Maurice Moloney, current Director of Rothamsted Research, was the other (See above). This week (mid-Sept 2012) Prof Jones announced the completion of the Crop Trial of GM-blight-resistant potatoes. The interviewer on Farming Today asked: "*Are there not plenty of non-GM potatoes that are resistant to blight?"*

Why is the Government not funding non-GM varieties of blight-resistant potatoes?
This morning we received an appeal to help raise funds for the UK's Sarvari Research Trust. This will assist this not-for-profit research trust continue its development of non-GM blight resistant potatoes.
https://www.buzzbnk.org/ProjectDetails.aspx?projectId=84

"The UK's John Innes Centre has received GBP1.7 million in public funding to develop GM blight resistant potatoes. By contrast, Sarvari have received absolutely nothing for its breeding work. This is typical of how innovative and successful non-GM breeding is so often starved of resources, while large amounts of money are wasted on far less successful GM projects for which there is no market! Although the Sarvari Research Trust has about 35 varieties in the pipeline that show promise against blight, they lack the income to develop them to the point of getting them on the National List. National Listing is a legal requirement before new varieties can enter the market.
That's the reason for the crowd sourcing. So please do what the UK Government is determined not to do - help Sarvari to demonstrate that the GM versions on which the Government has lavished public money are completely unnecessary."
Pete Riley of GM Freeze tells us, *"So far Sarvari has five varieties with very good resistance to the current strains of blight in the UK which are all prefixed with Sarpo (Mira, Axona, Shona, Una and Gwen). In the worst year in living memory for late blight, my three Sarpo varieties on my allotment - Mira, Axone and Shona - have come through and are still putting on leaf growth."*

Super-weeds increase the pesticide use
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 30/10/2003, 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 close links with Monsanto.

The controversial BBC Countryfile programme.
On 15/07/2012 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). It 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 has the Government appointed people with connections to Monsanto, Dow *etc.* 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 22/06/2012, EFSA gave a positive opinion for the cultivation of Monsanto's Roundup® Ready Soya and the EC authorised it on 09/08/2012. Monsanto only tests GM crops for 90 days, because there is no requirement specified in EU law.

But we had 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 25/07/2012, 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 Complaints 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.

Government rejects the recommendation of the Environmental Audit Committee on GMOs
http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenvaud/567/56704.htm

The Environmental Audit Committee recommendation:
Unless and until there is both clear public and political acceptance of GM, it is proven to be both beneficial to the environment and to producers, and evidence that demand for these products is based on understanding by consumers and transparent product labelling, the Government should not license its commercial use in the UK nor promote its use overseas. The Government must ensure that the public and Parliament is well informed on this issue. It should establish an independent body to research, evaluate and report on the potential impacts on the environment of GM crops, and their impacts on farming and on the global food system. An initial focus of such research should be on the scope for, and risks of, the co-existence of GM crops with conventional and organic farming regime(n)s. (Paragraph 28)

The Government Response:
The Government recognises that GM technology could deliver benefits providing it is used responsibly, in particular as one of a range of tools to address the longer term challenges of global food security, climate change and the need for more sustainable agricultural production. The Government therefore supports farmers having access to developments in new technology, including GM, and being able to choose whether or not to adopt them. The Government takes a science-led approach to GM, and the protection of human health and the environment are our overriding priorities. We will only agree to the planting of GM crops, the release of other types of GM organism or the marketing of GM food or feed products if a robust risk assessment that has taken full account of the scientific evidence indicates that it is safe. As far as licensing GM crops is concerned, decisions on the marketing of GM products, including seeds for cultivation are taken at European Union (EU) level. Two types of GM seed have received EU authorisation and have been grown in certain Member States. However, they are not being sold in the UK because they are not relevant or suitable for our conditions. GM crops are not expected to be grown here commercially for some years at least, but in principle the Government is open to this possibility, providing it is undertaken safely and responsibly.

European Commission controls the Rapporteur Member States

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 the UK government.
However, the recently appointed CEO to the European Commission Prof Anne Glover gave an interview to EurActiv: "*There is no substantiated case of any adverse impact on human health, animal health or environmental health, so that's pretty robust evidence, and I would be confident in saying that there is no more risk in eating GMO food than eating conventionally farmed food*," She said: *"the precautionary principle no longer applies as a result." "The evidence with which I work is independent; the evidence with which I work does not change according to political philosophy. And that should give people a lot of confidence."* Glover said that discomfort around the subject of GM crops in the 1980s and 1990s was: "*a generation ago, we've moved on and the challenges are completely different".* She said that the precautionary principle was appropriate when applied properly, but added: "*We should not … somehow tie our hands behind our back in such a way that we will be so precautionary that we will wait for everyone else to use our knowledge before we use it."*

What is the role of the Commissioner of Health and Consumers' Directorate?
From December 2010, we sent a number of letters 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? 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.

The Austrian Ombudsman Board challenges the European Commission about bees
With regard to honeybees and neonicotinoids, the Austrian Ombudsman has complained that the European Commission (EC) has not taken into account the new research on bees. The EC had to reply by 30/06/2012. EFSA published a Report: Scientific Opinion on the science behind the development of a risk assessment of Plant Protection Products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees) EFSA Panel on Plant Protection Products and their Residues (PPR) European Food Safety Authority (EFSA), Parma, Italy dated April 2012. An annexe about the new research was published 01/06/2012.
EFSA cannot be taken seriously as a scientific organisation when it has no knowledge of the baseline levels in soil, surface and ground-water with such a persistent chemical (half-life in soil up to 1386 days). We know that the toxins have been found in wild flowers foraged by bees. In addition, what genuine scientific document would have the following paragraph?

The final decision on protection goals needs to be taken by risk managers. There is a trade-off between plant protection and the protection of bees. The effects on pollinators need to be weighted against increase in crop yields due to better protection of crops against pests.

Presumably this was precisely why the US EPA Registration Division had over-ruled the scientific evidence in the case of clothianidin registration in 2003. Big money, economics and politics take priority over human health and biodiversity.

EFSA has recently given positive opinions on old herbicides at the request of industry
This was planned 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 (09/08/2012) 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. EFSA had said in the Abstract that there were no effects on human or animal health or to the environment, but 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.

Scientists complain that the EC has ignored independent scientific advice about Roundup® (for individual papers see Appendix 2)
Papers showing the toxicity of glyphosate/(Roundup®) have come from Carrasco's Unit in Argentina, Antoniuo and colleagues in London, Séralini and colleagues at Criigen, Caen, France, Then and colleagues at Testbiotech, Germany and Bellés team at Le Centre National de la Recherche Scientifique (CNRS) Roscoff.

In addition to these scientific papers, there is one in which glyphosate was measured in the urine of humans living in urban environments in Germany.
Brändli, D, Reinacher, S. Herbicides found in human urine. *Ithaka Journal* 1/2012: 270-272.
Abstract: *Glyphosate is the main active substance used in most commercial herbicides. It poisons not only plants, but also animals and humans. When testing for glyphosate contamination in an urban population, a German University found significant contamination in all urine samples with 5 to 20 times above the legal limit for drinking water*
Dr Graciela Gomez, the Argentinian lawyer, came to petition the European Commission on behalf of farmers in the Argentinian Crop Sprayed towns because of the birth defects, cancers, reproductive problems and laboratory evidence of genotoxicity from use of GMO Roundup®-ready Soy. But Commissioner Dalli refused to listen to her petition. He said that the Rapporteur Member State (Germany) did not find enough evidence to ban its use.

RMS (DAR) studies on glyphosate found teratogenicity in mammals
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 RMS for glyphosate and will remain in this rôle for the next review of glyphosate in 2015. Malformations include extra ribs, distortions affecting thoracic ribs, heart malformations, kidney agenesia, unossified sternebrae, reduced ossification of cranial centers and sacrocaudal vertebral arches, and also skeletal variations and major visceral malformations, which were unspecified in the DAR

Lawyer Dr Graciela Gomez has had small victories against glyphosate on behalf rural communities in Argentina
On 21/08/2012, judgement was announced in a court case in Argentina against GM soy producers and glyphosate. Sofica Gatica, who initiated her complaints in 2001, had two children with birth defects (one of whom died at birth without kidneys) and she made the first health survey in the neighbourhood of Ituzaingo, near Cordoba. "*Five hours after the initial time of the announcement, the verdict was in: one farmer was absolved due to lack of evidence, but the other farmer and the aviator were found guilty and sentenced to three years of jail. Well, actually, conditional jail. This means they can very much get out of doing any time, although they will be obliged to do social work.*"
"Reactions were a mix of indignation and hope, highlighting the ruling sets precedent since it was confirmed there was offense. Though considering the fact that the Argentine Agriculture Minister was congratulating Monsanto for a new transgenic soy seed this afternoon as judges were deliberating, I'm inclined to the first feeling."

Monsanto also convicted in Brazil for false advertising claims
"*In Brazil, Monsanto has been convicted by a court for false advertising claims that GM soy and the herbicide glyphosate, as used in the 'no-till with herbicides' model of cultivation, are beneficial to the environment.*
This is not the first time Monsanto has been convicted by a court for false advertising over claims that its glyphosate-based herbicides are safe and environmentally friendly.
Court rulings against Monsanto's misleading advertising of glyphosate herbicides as safe for human health and the environment date back to the 1990s":
http://bit.ly/OZ9icp
"*In spite of these rulings, politicians in the EU and elsewhere continue to approve glyphosate-sprayed soybeans for import - and recently the European Food Safety Authority,*

EFSA, issued a positive opinion on a Monsanto glyphosate-tolerant soy for cultivation."
http://www.testbiotech.de/en/node/675
"*The Brazilian word used to describe Monsanto's advertising in the article is "propaganda" and the word appears to mean much the same in Brazil as it does in English-speaking countries!*"

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 13/04/2012 edition to the discoveries by pig farmer lb Borup Pedersen that GM soy 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. Monsanto requested an increase in MRLs by EFSA, which was granted. Desiccation 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 per market use 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.

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 totally 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.
<u>Major errors as a result of ignorance of ecology</u>
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 1,424-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 heliothis 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."

The devastation of commercial beekeeping in the United States

In 2006, deaths and disappearances amongst managed bee colonies in the US had reached such epidemic proportions that the term 'Colony Collapse Disorder' (CCD) came into use. In fact high bee losses in the US had begun in 1995, when *Varroa* mites were first identified by beekeepers as a lethal threat to honeybee colonies. Although treatment for the mites was instituted, colony losses had continued to escalate. In January 2012, Steve Ellis, secretary of the US National Honey Bee Advisory Board and a beekeeper for 35 years said: "*We are inching our way towards a critical tipping point*." In 2011, he had so many abnormal bee die-offs that he will qualify for disaster relief from the US Department of Agriculture (USDA).

Tom Theobald is founder member of Boulder County Beekeepers, Niwot, Colorado: www.bouldercountybeekeepers.org but this year he will have to give up commercial beekeeping because he cannot keep up with overwintering bee losses. Tom became concerned that *clothianidin* sown on corn in 2007 on which his bees were feeding could be a possible cause of a break in the Fall (autumn) brood cycle he was seeing. In early 2008 he began examining the facts surrounding its approval, which he described in Bee Culture Magazine in July 2010. He was appalled. www.bcba2.bouldercountybeekeepers.org/wp-content/uploads/2010/07/PesticideBlowOut.pdf
Whilst Colony Collapse Disorder (CCD) in honey bees in the US was recognised in 2006, Tom knew that honey bee losses had started in 1995, with the sudden appearance of infections in honey bees with the *Varroa* mite. The first of the neonicotinoid insecticides, *Imidacloprid*, developed by Bayer, had been given conditional registration in the US in 1991 and in the UK in 1994. This led him to obtain documents for *Clothianidin* from the US EPA. These showed that conditional registration had been granted to Bayer by the US EPA Registration Division in 2003, despite knowing that the EPA scientists had shown that it was highly toxic to honey bees on an acute contact basis, and it had the potential for toxic chronic exposure to honey bees, as well as non-target pollinators. They knew it was persistent in soil and had the potential to leach into ground water and surface water. Since this discovery, he has campaigned tirelessly, but so far, unsuccessfully, for their suspension by the US EPA. Recently he persuaded Dan Rather, the veteran investigative journalist to do a programme on the US Environmental Protection Agency and Neonicotinoid Pesticides.
http://vimeo.com/29419200

US Environmental Protection Agency, like the EC, is in denial about clothianidin

We had correspondence with Ms Claire Gesalman, of the Communications Services Branch. On 22/03/2011 we sent the evidence about Dutch surface water and invertebrate declines to the US EPA, again with supporting evidence.
Ms Gesalman wrote on 15/04/2011: "*With regard to potential effects on non-target invertebrates and surface water contamination, EPA is not aware at this time of any data demonstrating an imminent hazard from clothianidin….. If you are aware of reliable data that demonstrate an imminent hazard as defined by federal pesticide law, please forward to me the author's name, publication name (peer-reviewed publications are preferred).*
We replied on 22/04/2011.
"Dear Ms Gesalman, You do not need science to see what is happening to the environment. Just stand in the middle of a field of oil-seed rape. Where are all the insects? Twenty years ago if you drove 200 miles in the UK you would have to stop to clean insects from your windscreen and headlights. In June 2004, 40,000 drivers found, using a device attached to

their number plates, there was just 1 insect per 5 miles. Probably, 7 years later, there are even fewer. Perhaps nobody cares much for insects? But there are other sinister events that signify that the environment is acutely sick; catastrophic (but little publicised) declines in a wide variety of species in the US (and later in Europe); honey bees, frogs, bats, bumblebees and birds."

Behind the scenes of the US EPA

In January 2011, on the US EPA Home Page, one of Administrator Lisa Jackson's mission statements was: "*We have greater opportunity to protect human health and the environment than before".* Yet, on 13/12/2010 her Office of Pesticide Programs had run a workshop: Streamlining the Risk Assessment Process. Robert Schulz had designed an electronic programme (e-Builder Dossier) to facilitate the registration of pesticides by the applicants. According to slide 18, the prime benefits were "*reduced cost to the EPA*", and "*quicker processing*". There was no mention of human health or the environment on any one of the 67 power point slides. On examining the SETAC website it became apparent that the relationship between US SETAC, the EPA OPP and the pesticides industry was unhealthily close. One Ralph.G.Stahl of USA DuPont heads the most important of the three work groups on SETAC's Ecological Risk Assessment branch, the EcoValuation group.

The significance of the Workshop on Pesticide Risk Assessment for Pollinators

With reference to the Executive Summary of the Workshop on Pesticide Risk Assessment for Pollinators January 15-21, 2011, SETAC, Pellston, Florida
Authors: David Fischer from Bayer CropScience and Thomas Moriarty from the US EPA Office of Pesticide Programs and Team Leader, US EPA Bee Unit set up on 22 June 2009.
http://www.setac.org/sites/default/files/executivesummarypollinators_20sep2011.pdf
This summary proves that the pesticides industry and all of the environmental protection agencies were aware of the following, which up until then, they had consistently denied:
a) That the systemic neonicotinoid pesticides are harmful to bees.
b) That the tests and protocols that had allowed registration of the systemic pesticides were not adapted to assess potential hazard and risk from this type of pesticide.
c) Despite knowing all this, the Protection Agencies have allowed the pesticides industry to keep neonicotinoids on the market.
d) That many of the projects suggested for the future have already been done by independent scientists (See page 39 under Research and Recommendations).
The crucial admission on Page 12 *"Many who are familiar with pesticide risk assessment recognize that the methodology and testing scheme for foliar application products (where exposure may be primarily through surface contact) is not adapted to assess potential hazard and risk from systemic pesticides".*

What is the ICPBR?

The majority of invited "world experts" to the SETAC Pollinator from Europe were members of the International Commission for Plant-Bee Relationships. The ICPBR appears to be self-appointed body. This International Commission was founded in 1950, by Anna Maurizio (Switzerland), during a Botanical Congress in Stockholm. It was named the International Commission for Bee Botany (I.C.B.B.). In 1985, the Commission was renewed and its name changed to The International Commission for Plant-Bee Relationships (I.C.P.B.R.). On closer examination it is clear that it represents the voices of the Pesticides Industry and the Crop Production Industry. At the 10th International Symposium of the ICPBR Bee Protection Group (2008), in his foreword, the Chairman, Dr Peter G Kevan (University of Guelph, Canada) said that *"for three decades it has provided an important forum for representatives*

from industry, national and international regulatory agencies, government and academic research bodies….divergent interests of crop production, etc." "Natural ecosystems" was the last to be mentioned. It was "sponsored by the pesticides industry". Many of the research presentations were headed by scientists from the industry. One paper: *The Proposal of the ICPBR Bee Brood Group for testing and assessing potential side effects from the use of plant protection products on honey bee brood* featured Roland Becker (BASF) Christian Maus (Bayer CS), Jens Pretorius (JKI), Ingo Tornier (Eurofins GAB). Authors of other papers included Mike Coulson (Syngenta) Mark Miles (Dow) Ed Pilling (Syngenta) and Dick Rogers (now working for Bayer CropScience US).
At the SETAC meeting, the UK was represented by Mark Clook (Chemical Regulation Directorate) and Helen Thompson (Food & Environment Research Agency, Fera). Helen Thompson had worked closely with three scientists from Bayer, Syngenta and Dow on the ICPBR Bee Protection Group (she became the Group's Secretary, now Chairman Nov 2011). The same three had also helped with the UK Defra Research SID5A (2007-2009) Systemic Pesticide Risk Assessment, which, incidentally, only got as far as protocols for Tier 1 tests. The conclusions of the ICPBR working group presenting at the Bucharest meeting in 2008 were that protocols for the second and higher tier (Tunnel Tests and Field Tests) were still to be developed. So, members of the ICPBR must have known for at least 3 years that the science underpinning protocols for risk assessment for systemic pesticides was inadequate. The ICPBR have 17 members on their three bee working groups. Seven are from the pesticides industry, some of whom service two groups. This may explain why the CRD, Fera, Defra and the AFSSA (French equivalent of Fera) have repeatedly advised UK and European Ministers and informed us, the public, that there was no evidence that the neonicotinoid pesticides are harmful to honey bees.
What is the significance of the name change of the ICPBR**?** In 2011 the name *"was amended to The International Commission for Plant-Pollinator Relationships (I.C.P.P.R.) which is better fitted to the objectives of the Commission."* Perhaps the Commission is looking towards a time when honeybees have been completely exterminated? There is evidence that scientists have already developed an almond tree that doesn't require pollination and they are working to produce a genetically-engineered bee. If this doesn't work, farmers will have to resort to hand-pollination, a task which the Chinese are already undertaking.

USDA and others funded a study on Golden Rice in Chinese Children in 2008
According to the China Daily on 12/09/2012 "*China's top health authority has ordered an investigation into an allegation that genetically modified golden rice was tested on Chinese schoolchildren in Hunan province in 2008 as part of a Sino-US research project. The environmental group Greenpeace broke the news of the controversial test in late August 2012, saying that the joint research involved feeding golden rice, which is genetically modified to be rich in beta-carotene, to 24 children. It cited a paper published in the August edition of The American Journal of Clinical Nutrition. The paper claimed that golden rice is effective in providing vitamin A to children. It said the partners in the study are the Zhejiang Academy of Medical Sciences, Tufts University in the US, the China CDC. A cartoon appeared on the website of the Chinese State news agency; it depicted a scientist wearing a tie emblazoned with the American flag, staring through a microscope while dropping unnaturally colored kernels of rice into a Chinese child's mouth. It ran with a story headlined: "More shameful than the experiment are the lies."*

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, but the claims have been suppressed by Monsanto, local officials and the Argentine Government
Report from the 1st National Meeting of Physicians in the Crop-sprayed Towns, Faculty of Medical Sciences, National University of Cordoba, Argentina August 27th & 28th 2010. INGLES-Report-from-the-1st-National-Meeting-Of-Physicians-In-The Crop-Sprayed-Towns.pdf [extracts in Appendix 2]
A brief analysis of 10 years plus of mainly GE corn and Roundup Ready Soya in agricultural towns of Argentina
Chaco Province RR Soya

1997-2008	100,000 ha	700,000 ha
Congenital Birth Defects/10,000 live births	15/10,000	82/10,000

Summary of medical problems
In the whole area there were increases of cancers, birth defects, reproductive and endocrine disorders. All children's birth defects involving neurosurgical operations (neural tube defects) were treated in one hospital therefore they had complete statistics. Those coming from heavily sprayed areas had a rate of birth defects 70 times greater than those in non-sprayed areas. There were also neurological developmental problems in children less than 1 year of age compared with non-sprayed.
Genetic tests showed DNA and genetic damage in those exposed to pesticides, compared with non-exposed.
Comparison: heavily sprayed (La Leonesa), with the moderately sprayed (Las Palmas) with the 'not much' sprayed (Puerto Bermejo) towns. The incidence of childhood cancers was three times greater in La Leonesa.

Increased use of pesticides
The introduction of transgenic biotechnology in 1996 accelerated the use of pesticides. 1996: 98 million liters. 2000: 145 million liters. 2009: 292 million liters. 2010: over 300 million liters of herbicides, insecticides, acaricides, defoliants and other poisonous substances.
Glyphosate: 1996: 2 liters/ha. 2009-2010: 10-20 liters/ha, for herbicide-resistant weeds.

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.

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. Lo´pez, and Andre´s E. Carrasco* *Laboratorio de Embriologı´a Molecular, CONICET-UBA, Facultad de Medicina, Uni*V*ersidad de Buenos Aires,Paraguay 2155, 3° piso (1121), Ciudad Auto´noma de Buenos Aires, Argentina.*

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

*<u>Clinical Approaches</u>**.** 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 Co´rdoba, 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.*

Super-weeds result in an increase in pesticide use
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.*

How does Monsanto manage to suppress the problems with GMOs?
http://www.huffingtonpost.com/elliott-negin/monsantos-great-expectati_b_1267494.html
Director of News and Commentary at the Union of Concerned Scientists wrote on 10/02/2012 about Monsanto's Great Expectations. *"Given the unvarnished facts, how has Monsanto been able to convince anyone that it is, according to its latest PR effort, "improving agriculture and improving lives"? In large part, by spending tens of millions of dollars annually on advertising, lobbying and campaign contributions. Last year, Monsanto spent $100 million on the ad campaign, down slightly from the $120 million it spent in 2010, according to Securities and Exchange Commission figures. The company also spent $6.37*

million on lobbying--more than any other agricultural company or trade group--and so far has contributed more than $170,000 to political campaigns in the 2011-2012 election cycle, the third highest in the agricultural sector."

The Permanent Peoples' Tribunal 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 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.
Witness statements to the PPT testify to other techniques used to suppress information
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."* 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.

Syngenta has harassed and attempted to discredit Dr Tyrone Hayes, the 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.
Open letter from GM-free Cymru on 26/01/2011 about suppression: "*For more than a decade now, scientists working in the GM field have mounted vicious personal attacks (sometimes politically rather than scientifically motivated) upon serious scientists who have had the temerity to discover 'uncomfortable things about GM crops and foods'. This trend started with the vitriolic treatment meted out (with the Royal Society in the vanguard) on Arpad Pusztai and Stanley Ewen a decade ago, and continued with the crucifixion of Ignacio Chapela and David Quist, Angelika Hilbeck, Mae-wan Ho, Judy Carman, Gilles-Eric Séralini, Andres Carrasco, Manuela Malatesta, Christian Velot, Irina Ermakova and many others. There has been a real and even accelerating conspiracy to silence "dissident voices"*

in the GM research field. Working scientists including Vivian Moses, Bruce Chassy, Adrian Dubock, Val Giddings, Alan McHughen, Henry Miller, and David Tribe have been prominent in these attacks, and even the supposedly respectable journal Nature Biotechnology was involved in the infamous 'dummy proof set-up' of Irina Ermakova (for which it had to apologise when GM-Free Cymru blew the story wide open)."

The Corporations suppress information, prevent understanding and divide communities. Individuals administering a beekeeping are employed to ridicule, bully, or write confusing information to counter attack comments by beekeepers. Bayer, Monsanto and Syngenta have formed partnerships with conservation organisations, or funded wildlife projects, as a guarantee that the organisation will remain silent.
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."*).

Major battles to come in the US in November over agrochemical industry power
http://www.gmeducation.org/home-page-top-story/p149615-the-monsanto-protection-act.html
"*The Monsanto Protection Act*" as it has been christened by GM opponents, is being introduced into the 2013 Agriculture Appropriations Bill by Republican Congressman Jack Kingston. If passed by the US Congress, the changes would outlaw any review of GM crop impacts under the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), or any other environmental law. No agency other than USDA – already fat with biotech industry insiders - would be allowed to provide analysis. Courts will be powerless against GM
An end to GM regulation in the US. The other big legal change, sponsored by house agriculture committee chair, Republican congressman Frank Lucas, is hidden in the 2012 Farm Bill. This hands big advantages to the biotech industry by changing the Plant Protection Act (PPA) to limit the time and scope of future GM crop environmental assessments.
As well as reducing evaluations, the measure requires the USDA to complete its environmental review in a year and a half - or else the GM crop is automatically approved. It also restricts the review's scope and forbids spending money on any broader environmental analysis of GM effects. The time limits proposed by Mr Lucas make speed the official policy of the USDA, and are aimed at silencing opposition to the biotech industry. Dave Murphy, executive director of "Food Democracy Now!" believes that the pro-biotech language hidden in the bill: "*will take the US regulatory scheme on GMs from farce to corporate fascism in one fell swoop*". More importantly, the courts will not be able to require more thorough environmental reviews, opening the door further to the wholesale introduction of new GM crops into the US food supply, farms, and the environment.
Republican Presidential candidate Mitt Romney has close relationships with Monsanto; in fact he was once employed by them. This is not well known.
Presumably, the Republicans have no idea that the passage of these bills will in fact destroy their children's health and the environment. Has Monsanto told them this? Perhaps Monsanto is not aware, since this proposal at the shareholders meeting in January 2012 was rejected.

"ST. LOUIS (AP) — Shareholders of Monsanto Co. on Tuesday 24th January 2012 voted down a proposed study of how the company's genetically engineered crops, or GMOs, may pose financial and legal risks to the seed giant. Harrington Investments CEO John Harrington, who had put up the vote, said in a statement that he is concerned about the possible environmental and economic impacts of Monsanto's engineered crops. St. Louis-based Monsanto had recommended shareholders defeat the proposal. The company said an additional report on that topic *would "be redundant and provide no meaningful additional information"* because Monsanto has already studied the issue extensively. Monsanto management also stated that: *"Farmers should have the freedom to choose which production method is best suited for their needs, whether organic, non-GM conventional or biotechnology traits. All of these systems can and do work effectively side by side…"* Shares of Monsanto rose 22 cents to close at $80.11, near its 52-week high of $81.43.

California's Right- to-Know ballot initiative (Prop 37) is the food fight to make labelling mandatory. This is a link to California's Secretary of State. On this page she has posted the money that the big corporations have thrown in the ring to stop it happening
http://cal-access.sos.ca.gov/Campaign/Committees/Detail.aspx?id=1344135&session=2011&view=late1
http://www.organicconsumers.org/bytes/ob339.htm
"As we have emphasized repeatedly, the November 6th Right-to-Know Ballot Initiative in California (Proposition 37) is the Food Fight of Our Lives. The popular Initiative, supported by the overwhelming majority of Californians, calls for mandatory labeling of genetically engineered foods and an end to the unethical practice, unfortunately common even in the alternative food sector, of marketing or labeling GMO-tainted food as "natural." Big Food understands quite well that once Proposition 37 passes in California it will likely become the law of the land in all 50 states and Canada. This is why Monsanto's powerful ally, the Grocery Manufacturers Association, has characterized Prop 37 as the "*most serious threat*" to agricultural biotechnology in history. So far over 621 organizations and businesses - including retail grocery stores, consumer, farmer, organic, natural health, environmental, farmworker, and labor groups and retail stores - have endorsed the California Initiative."
As a candidate, Barack Obama promised to label genetically engineered food; it is likely that Romney, as a Republican and a close friend of Monsanto, will not.

California gets tough in its environmental standards.
In March 2009 California's Department of Pesticide Regulation demanded re-evaluation of other uses of imidacloprid.
California reevaluates 282 Neonics - ca2009-02.pdf
Their data noted two critical findings. One, high levels of imidacloprid in leaves and blossoms of treated plants (residues in some plants measured higher than 4 ppm) and two, increases in residue levels over time so that significant residues from the previous season are available to the treated plants. California's DPR issued a further notice of demands for re-evaluation. The document shows that the US EPA knew about this on 17/12/2008.
Calif DPR Recall Status of California Pesticides ca2011-10.pdf
In January 2011, imidacloprid registrants voluntarily amended their labels removing their applications to almonds. Pesticide manufacturer Bayer has asked California regulators to limit the use of one of their most profitable products, imidacloprid. Rather than undergo the public scrutiny and cost involved in a state-mandated re-evaluation of the pesticide's impact on bees, emerging reports say the company has requested imidacloprid be restricted from use on almond crops, which honey bees are trucked in from around the country to pollinate each

February. They were aware that if they had to do residue studies, they would jeopardise the other nut trees and orchard crops, which would also have high residues.

New York State never registered clothianidin

The New York State Department of Environmental Conservation was demanding monitoring by Bayer, because it is protective of the aquifers in Nassau and Suffolk Counties. It did not register clothianidin and severely restricted the use of imidacloprid and thiamethoxam. In 2003, they wrote to Bayer CropScience, expressing concern about levels of imidacloprid found in clusters of private wells down gradient of farms (one contained 6 ppb imidacloprid), at a golf course monitoring well and at monitoring wells near trees that had been treated with imidacloprid injection.

http://pmep.cce.cornell.edu/profiles/insect-mite/fenitrothion-methylpara/imidacloprid/imidac_let_1003.html

http://pmep.cce.cornell.edu/profiles/insect-mite/fenitrothion-methylpara/imidacloprid/imidac_reg_1004.html

Australian Pesticides and Veterinary Medicines Authority (APVMA)

is in the hands of the Pesticides Industry

In 2011, Australia (New South Wales and Queensland) had disastrous floods. The Darling River area had suffered prolonged drought followed by heavy rain and flooding. On 11/03/2011 Bourke Township experienced a massive fish kill. An eye witness said: *"It was phenomenal; you couldn't see the water, there were carp gasping for breath and crayfish crawling onto the bank."* Counting the dead fish passing Bourke Weir at 100/sec. Geoff Wise estimated 8 million per day and the event continued for 5 days; 40 million dead fish was said to be an underestimate. It was described as a '*Black Water'* event and attributed to lack of oxygen from organic material being washed down the river following flooding of a plain. But beekeepers suspected otherwise: *"why were the crayfish trying to escape the water if it was only due to lack of oxygen?"* Agricultural land borders 2,500 km of the Darling River. Cotton is grown in the area; more than 95% was seed-treated GMO and 96% was *imidacloprid* treated. Two further ecological disasters have occurred down the Queensland Coast after the floods in December 2010 and January 2011. In July 2011 it was reported that *"the northern coast of Queensland has become littered with sick and dying turtles and dugongs (sea cows)."* It was attributed to run-off of nutrients into the ocean "*potentially killing the sea grass that both turtles and dugongs feed on.*" On 19/09/2011 in Gladstone Harbour, many sick fish were discovered; barramundi and bream were found with sores, skin rashes and infected eyes. Capricorn Conservation Council suspected industrial pollution, so fishing was prohibited.

According to beekeeping sources, Gladstone and the entire Queensland Coast above it are the biggest areas for sugar cane in Australia and *clothianidin* (Sumitomo Shield Systemic insecticide) has been granted registration for use on these very low-lying sugar cane farms. The agrochemical industry is irresponsible, advising farmers to apply neonicotinoid pesticides to seeds, or to spray in the vicinity of water.

http://www.apvma.gov.au/publications/gazette/2007/11/gazette_2007-11-06.pdf

There are clear warnings on the Australian Pesticides and Veterinary Medicines Authority (APVMA) website for *clothianidin*. *"This product is highly toxic to aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high-water mark"*. In fact, the conditional registration document for *clothianidin* in 2003 in the US EPA stated that it was: *"persistent and mobile,*

stable to hydrolysis, and has a potential to leach into ground water, as well as runoff to surface waters.].

On 23/10/2011, we sent information that linked the floods and neonicotinoid contamination of the water to wildlife declines to a series of Australian Ministers; The Premier of Queensland, the Environment and Agriculture Ministers, and later to Senator Joe Ludwig. In common with all the other Protection Agencies and politicians we had previously written to, Senator Ludwig ignored our points about water contamination and spoke only of Colony Collapse Disorder. "*Honey bees in the northern hemisphere that suffer from various pest problems that could result in CCD…However, neonicotinoids are widely used in Australia without experiencing colony collapse disorder".*
This phrase sounds remarkably similar to that of Bayer CropScience, who responded to the UK Sunday Times' article Bee colonies are diminishing...on 13/11/2011. Bayer said: *"Australian Bees are the healthiest in the world".*

Not according to beekeepers. They claim there is no evidence that the APVMA did field tests for bees under Australian weather conditions. In fact it appears that they were never consulted. Since the registration document said it was very highly toxic to bees, this seems to be a serious omission. In February 2009, Australian bee exporters had lucrative businesses. They were flying large packages of honey bees to the US to help with the Californian almond harvest. According to Dr Denis Anderson, who was in charge of biosecurity in CSIRO, Australia had no Colony Collapse Disorder and no V*arroa* mite at that time. By 2010 beekeepers were losing hives; by 2011 they had CCD. According to one beekeeper, agriculture has gone from using only small amounts of neonicotinoid insecticides to the current 85% on crops, in less than 12 years. He said that beekeepers in the past loved to put their hives on canola (oil seed rape); now there have been so many disasters with disappearing or dying bees, that many have taken their hives as far away as possible. One beekeeper said *"the last couple of years we have stayed away from canola and we've had the best bees for years".*
http://www.sumitomo-chem.com.au/sites/default/files/pdf/labels/shield_label.pdf

Queensland will monitor, but New South Wales lacks government funding.
The narrator of a film about the Great Barrier Reef in early 2012 commented on its deterioration possibly being due to pesticides applied to the sugar cane plantations on Australia's north eastern coast. A Reuters' correspondent wrote on 02/06/2012 that Australia's iconic Great Barrier Reef was under imminent threat. UNESCO will review next year whether it should have its World Heritage status withdrawn. UNESCO said: "*Key pressures on the reef include coastal development, ports and liquefied natural gas facilities, extreme weather, grounding of ships and poor water quality.*" As usual, there was not a word about pesticides. However, an ecotoxicologist colleague attended a conference in Brisbane July 2012. He said that: "*Queenslanders are taking monitoring of pesticides seriously". "Although they haven't targeted the neonicotinoids in their programs until now, they are going to do it from now onwards".*

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is promoted as Australia's pre-eminent public scientific research body. *"Although ostensibly 'publicly funded' CSIRO has, in reality, been encouraged to get 30% of its funding from business, with the CSIRO top management encouraging its staff to go to 40%".*
According to John Stocker, CSIRO's former chief executive: *"Working with the transnationals makes a lot of sense, in the context of market access. There are very*

few Australian companies that have developed market access in the United States, in Europe and in Japan, the world's major marketplaces. Yes, we do find that it is often the best strategy to get into bed with these companies." – Australian Broadcasting Commission, 1992.

CSIRO is manufacturing GMO wheat

Press Release 11/09/2012: *Expert scientists warn that genetically modified wheat may cause Glycogen Storage Disease IV, resulting in an enlarged liver, cirrhosis of the liver, and failure to thrive. Children born with this disease usually die at about the age of 5. Australia is on track to be the first country in the world to grow GM wheat commercially, and to test this in human feeding trials. Today in Melbourne molecular biologist and risk assessment researcher Professor Jack Heinemann of the University of Canterbury, NZ, and Associate Professor Judy Carman, a biochemist at Flinders University, will release expert scientific opinions on the safety of CSIRO's GM wheat. These opinions have been reviewed by Dr Michael Antoniou, reader in molecular genetics at King's College, London. Professor Heinemann's expert opinion outlining how CSIRO's GM wheat silencing technology could transfer to humans is believed to be a world-first, and has been reviewed by scientists in Australia, the UK and Austria.*

Australia is on track to be the first country in the world to allow the commercial growing of GM wheat. It is not yet grown anywhere else, nor is there any market worldwide that wants GM wheat. Current GM food crops, like canola and corn, are experiencing fierce resistance across the globe, and there is growing anger in the USA, the birthplace of GM food technology. Australia has been selected to lead the push for the acceptance of GM wheat and CSIRO is currently conducting field trials of GM wheat in WA, NSW, and the ACT. CSIRO says human feeding trials are planned. It is feared these may already be underway.

Professor Heinemann has studied the similarity in the DNA sequencing of the wheat branching enzyme which makes starch in wheat, and the human branching enzyme which produces glycogen. CSIRO's GM technology deliberately suppresses the wheat branching enzyme in GM wheat so there is less starch and the wheat has a lower glycaemic index.

Professor Heinemann says there is strong evidence that siRNA, a type of dsRNA – which is a form of ribonucleic acid, like DNA – when produced in wheat will transfer to humans through food. "There is strong evidence that siRNAs produced in the wheat will remain in a form that can transmit to humans even when the wheat has been cooked or processed for use in food.

Japan

One of the first countries to identify threats of neonicotinoids to humans

In Japan in 2004, as a result of species losses, a Butterfly Conservation Trust was founded. In 2011 the Trust reported that 15% of species were endangered and grassland butterflies were the most threatened. Japan Endocrine-disruptor Preventive Action (JEPA) wrote: The Threat of Neonicotinoid Pesticides on Honeybees, Ecosystems, and Humans in 2010. In 2011 and 2012, Japanese researchers published papers showing neurotoxicity (at various stages of development) to cerebellar neurons in neonatal rats similar to that produced by nicotine.

Kimura-Kuroda, J., Komuta, Y., Kuroda, Y., Hayashi, M., Kawano, H. Nicotine-like effects of the neonicotinoid insecticides acetamiprid and imidacloprid on cerebellar neurons from neonatal rats. *PLoS One*. 2012;7(2):e32432. Epub 2012 Feb 29.

Background:

Acetamiprid (ACE) and imidacloprid (IMI) belong to a new, widely used class of pesticide, the neonicotinoids. With similar chemical structures to nicotine, neonicotinoids also share agonist activity at nicotinic acetylcholine receptors (nAChRs). Although their toxicities

against insects are well established, their precise effects on mammalian nAChRs remain to be elucidated. Because of the importance of nAChRs for mammalian brain function, especially brain development, detailed investigation of the neonicotinoids is needed to protect the health of human children. We aimed to determine the effects of neonicotinoids on the nAChRs of developing mammalian neurons and compare their effects with nicotine, a neurotoxin of brain development.

Methodology/principal findings:

Primary cultures of cerebellar neurons from neonatal rats allow for examinations of the developmental neurotoxicity of chemicals because the various stages of neurodevelopment-including proliferation, migration, differentiation, and morphological and functional maturation-can be observed in vitro. Using these cultures, an excitatory Ca(2+)-influx assay was employed as an indicator of neural physiological activity. Significant excitatory Ca(2+) influxes were evoked by ACE, IMI, and nicotine at concentrations greater than 1 μM in small neurons in cerebellar cultures that expressed the mRNA of the α3, α4, and α7 nAChR subunits. The firing patterns, proportion of excited neurons, and peak excitatory Ca(2+) influxes induced by ACE and IMI showed differences from those induced by nicotine. However, ACE and IMI had greater effects on mammalian neurons than those previously reported in binding assay studies. Furthermore, the effects of the neonicotinoids were significantly inhibited by the nAChR antagonists mecamylamine, α-bungarotoxin, and dihydro-β-erythroidine.

Conclusions/significance:

This study is the first to show that acetamiprid and imidacloprid, and nicotine exert similar excitatory effects on mammalian nAChRs at concentrations greater than 1 μM. Therefore, the neonicotinoids may adversely affect human health, especially the developing brain.

An IUCN Task Force on Systemic Pesticides and human health

An IUCN Task Force was established in 2011 and on 02/09/2012, the Task Force met in Tokyo. Two of the presentations involved humans: Systemic Pesticides as a Causal Factor of Developmental Brain Disorders (ADHD, autism *etc*) and The Human Health Effect of Neonicotinoid Insecticides. As Mary Ann Ogasawara, the Organiser of the meeting said to me last week: *"Many people wouldn't bat an eye for honeybees but if they find that it affects humans, it will be the wakeup call."*

Ireland

Illegal GM maize found in Ireland

This was reported on 23/07/2010. The Irish Government had been accidentally growing GM maize on four of its own field trial sites, despite its own policy to ban field trials and commercial cultivation of GM crops in the Republic. The blunder was particularly embarrassing because the GM maize was an illegal variety that was not allowed for cultivation anywhere in the EU. The EPA says that Pioneer provided a "certificate of analysis" claiming the maize was GM-free. But random tests by DAFF found that 3 out of every 1,000 plants were contaminated by the illegal GM maize variety. GM-free Ireland spokesperson Michael O'Callaghan said "The Pioneer Company has provided false GM-free certificates for its GM seeds on at least two previous occasions.

Legal challenge to Irish EPA over GM potato trial

In July 2012, the EPA had given permission for a GM blight-resistant potato crop to be tested in County Carlow. A group opposed to this sought approval from the High Court to take a case on the basis of the Aarhus Convention. Article 9 of the Convention requires that people have the ability to challenge critical environmental decisions, without facing the threat of

large legal costs. Although the convention was said to have been ratified earlier this year by the Irish government, Mr Justice Gerard Hogan said he had no jurisdiction to make such an order because the Aarhus Convention had yet to be put into Irish law. Allegedly, he has refused to take the case.

Clothianidin neonicotinoid insecticide approved in 2008
Bayer's Redigo Deter seed treatment was licensed in Ireland (with *clothianidin*) for winter barley, wheat, oats, durum wheat, rye and triticale in April 2008. In addition, there are various sprays of fungicides, aphicides and insecticides you can spray throughout the year. There is a caveat at the end of the instructions: *"if you develop resistant diseases, Redigo Deter is unlikely to give you satisfaction!"*

Massive declines (with some extinction) in farmland birds in Ireland
Ireland has revealed that farmland bird populations in Ireland and across Europe are at their lowest levels since 1980. A new survey by researchers at University College Cork, in association with BirdWatch Ireland, has found that there are less than 200 pairs of breeding Curlew. Previously common farmland birds such as the Corncrake, Curlew and Yellowhammer are now perilously close to extinction in Ireland, according to a four-year (2007-2011) study of the island's bird populations. The Corncrake has seen its breeding population plummet by more than 80 per cent in the past 20 years alone. One farmland bird which has already become extinct is the Corn Bunting. "*Everything points to a decline which is truly catastrophic,"* said Anita Donaghy, who led a survey of Curlew numbers this spring. "*We could hardly believe the results we were getting."*
The breeding Curlew population in the whole of Ireland has declined by 96% in 20 years. In the last Breeding Atlas, 1988-1991, the Irish population as a whole was estimated at around 5,000 pairs.
Niall Hatch said: *"It also points to the fact that something is going wrong in the environment. When you see declines in big breeding numbers, something is going wrong in the whole eco-system."* Joe Barry*: 'Pesticides also harm beneficial insects and the birds that feed on them'*
.
In Al Gore's acceptance speech on 11/12/2007, when he received the Nobel Prize for his work on Climate Change, he said:

Make no mistake, the next generation will ask us one of two questions. Either they will ask: "What were you thinking; why didn't you act?"
Or they will ask instead: "How did you find the moral courage to rise and successfully resolve a crisis that so many said was impossible to solve?"

Unlike climate change, we suspect that this environmental chemical crisis, at least in some countries, is irreversible and insoluble.

Dr Graciela Gomez (lawyer and campaigner for the rights of rural communities in Argentina) has this quotation at the bottom of her website:

"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
Palle Uhd Jepsen 18/09/2012

Appendix 1

Effects of neonicotinoid insecticides on mammalian nicotinic acetylcholine receptors.

Tomizawa, M, Lee, D.L., Casida, J.E. Neonicotinoid insecticides: Molecular Features Conferring Selectivity for Insect versus Mammalian Nicotinic Receptors. *J. Agric. Food Chem*. **48** (12), 6016-6024 (2000). *These authors showed that neonicotinoids acted on mammalian nicotinic acetylcholine receptors as well, but considered that the selective nature of its binding (i.e. less affinity than in insects) made it safe for human exposure.*

Tennekes, H.A. The significance of the Druckrey-Küpfmuller equation for risk assessment – The toxicity of neonicotinoid insecticides to arthropods is reinforced by exposure time. *Toxicology* **276**, 1-4 (2010). *Tennekes was the first to prove that neonicotinoids can produce effects at any concentration level, provided the exposure time is sufficiently long.*

Tennekes, H.A., Sánchez-Bayo, F. Time-Dependent Toxicity of Neonicotinoids and Other Toxicants: Implications for a New Approach to Risk Assessment. *J. Environment. Analytic. Toxicol.* S4:001. doi:10.4172/2161-0525.S4-001 (2011). *Tennekes and Sánchez-Bayo demonstrated that chemicals that bind irreversibly to specific receptors (neonicotinoids, genotoxic carcinogens and some metals) will produce toxic effects in a time-dependent manner, no matter how low the level of exposure.*

Duzguner,V., Edogaan, S. Acute oxidant and inflammatory effects of *imidacloprid* on the mammalian central nervous system and liver in rats. *Pest. Biochem. Physiol.* **97**, 13-18 (2010). *Imidacloprid has acute oxidant and inflammatory effects on the mammalian CNS and liver.*

Kimura-Kuroda J., Hayashi, M., Kawano, H. Nicotine-like effects of neonicotinoids on rat cerebellar neurons. *Neuroscience Research*, **71**, suppl, (2011). [This is a study to determine to what extent the neonicotinoids imidacloprid and acetamiprid affected the nAChRs of rat cerebellar neurons and to compare their effects with nicotine by using in vitro excitatory Ca-influx assay. Although nicotine excited rather higher proportions of neurons and produced a higher peak of Ca-influx compared with the two neonicotinoids, both had higher binding to the neurons and were significantly inhibited with nAChR antagonists. The authors suggested that the neonicotinoids could have adverse effects on human health, especially in the developing foetus.]

Bal, R. *et al.* Insecticide imidacloprid induces morphological and DNA damage through oxidative toxicity on the reproductive organs of developing male rats. *Cell. Biochem. Funct.* (2012) DOI: 10.1002/cbf.2826. *The weights of the epididymis, vesicula seminalis, epididymal sperm concentration, body weight gain, testosterone and reduced glutathione values were lower in the imidacloprid-treated groups than that in the controls. All treated groups had increased lipid peroxidation, fatty acid concentrations and higher rates of abnormal sperm. Apoptosis and fragmentation of seminal DNA were higher in rats treated at the two higher doses of imidacloprid. These results show that imidacloprid has a negative effect on sperm and testis of rats.*

Bal, R. *et al*. Effects of clothianidin exposure on sperm quality, testicular apoptosis and fatty acid composition in developing male rats. *Cell. Biol. Toxicol.* DOI 10.1007/s10565-012-9215-0. *It is concluded that low doses of clothianidin exposure during critical stages of sexual maturation had moderate detrimental effects on reproductive organ system and more*

severe effects are likely to be observed at higher dose levels. In addition, the reproductive system may be more sensitive to exposure of clothianidin even earlier in development

Abou-Donia, M.B. *et al*. Imidacloprid induces neurobehavioral deficits and increases expression of glial fibrillary acidic protein in the motor cortex and hippocampus in offspring rats following in utero exposure. *J. Toxicol. Environ. Health A*. 2008; 71 (2) 119-130. *Gestational exposure to a single large, non-lethal, dose of imidacloprid produces significant neurobehavioral deficits an and increased expression of glial fibrillary acidic protein in several brain regions of the offspring on postnatal day 30, corresponding to human early adolescent age. These changes may have long-term adverse effects in the offspring.*

Li, P., Ann, J., Akk, G. Activation and Modulation of Human α4β2 Nicotinic Acetylcholine Receptors by the Neonicotinoids Clothianidin and Imidacloprid. *J. Neuroscience Research* DOI:10.1002/jnr.22644 (2011). *Since the clinical manifestations of neonicotinoid poisoning clearly involved the nicotinic receptors, studies of the effects of clothianidin and imidacloprid on human neuronal-type α4β2 nAChRs were undertaken. Both chemicals had effects on human receptors, but imidacloprid more so than clothianidin.*

Mondal, S., Ghosh, R.C., Mate, M.S., Karmakar, D.P. Effects of Acetamiprid on Immune System in Female Wistar Rats. *Proc. Zool. Soc*. **62** (2), 109-117 (2009).
A subacute toxicity study of acetamiprid was undertaken in 72 female wistar rats in four groups (18 each). Three different concentrations of acetamiprid (25, 100 and 200 mg/kg of body weight) were administered orally to rats. The results indicated that acetamiprid suppressed both CMI and antibody forming ability of lymphocytes.

Calderon-Segura, M.E. *et al.* Evaluation of Genotoxic and Cytotoxic Effects in Human Peripheral Blood Lymphocytes Exposed *in Vitro* to Neonicotinoid Insecticides *Journal of Toxicology* Volume 2012, Article ID 612647, doi:10.1155/2012/612647
Abstract: *Calypso (thiacloprid), Poncho (clothianidin), Gaucho (imidacloprid), and Jade (imidacloprid) are commercial neonicotinoid insecticides, a new class of agrochemicals in Mexico. However, genotoxic and cytotoxic studies have not been performed. In the present study, human peripheral blood lymphocytes (PBL) were exposed in vitro to different concentrations of the four insecticides. The genotoxic and cytotoxic effects were evaluated using the alkaline comet and trypan blue dye exclusion assays. DNA damage was evaluated using two genotoxicity parameters: tail length and comet frequency. Exposure to 9.5 $\times 10^{-6}$ to 5.7 $\times 10^{-5}$ M Jade; 2.8 $\times 10^{-4}$ to 1.7 $\times 10^{-3}$ M Gaucho; 0.6 $\times 10^{-1}$ to 1.4 $\times 10^{-1}$ M Calypso; 1.2 $\times 10^{-1}$ to 9.5 $\times 10^{-1}$ M Poncho for 2 h induced a significant increase DNA damage with a concentration-dependent relationship. Jade was the most genotoxic of the four insecticides studied. Cytotoxicity was observed in cells exposed to 18 $\times 10^{-3}$ M Jade, 2.0 $\times 10^{-3}$ M Gaucho, 2.0 $\times 10^{-1}$ M Calypso, 1.07M Poncho, and cell death occurred at 30 $\times 10^{-1}$ M Jade, 3.3 $\times 10^{-3}$ M Gaucho, 2.8 $\times 10^{-3}$ M Calypso, and 1.42M Poncho. This study provides the first report of genotoxic and cytotoxic effects in peripheral blood lymphocytes following in vitro exposure to commercial neonicotinoid insecticides.*

Cai, B., Deitch, E.A., Ulloa, L. Novel insights for systemic inflammation in sepsis and haemorrhage. *Mediators of Inflammation* 2010 ID 642462 (2010). *Human clinical studies in 2010 demonstrated a connection between the nAChRs and the immune system. In the process of trying to treat severe inflammatory responses in sepsis and haemorrhage (which are a major cause of death in patients in Critical Care), a specific anatomical and physiological*

connection was proved between the nicotinic acetylcholine anti-inflammatory receptors in the central nervous system, via the vagus nerve, to the innate immune system. This system protects humans against infection and tissue injury.

Baldi, I. *et al*. Neurobehavioral effects of long-term exposure to pesticides: results from the 4-year follow-up of the PHYTONER Study. *Occup. Environ. Med* **68**: 108-115 (2011).
The first study to provide prospective data on farmer workers in the Bordeaux area of France (1997-98 and 2001-03) suggested long-term cognitive effects of chronic exposure to pesticides and raised the issue of evolution towards dementia.

Dwyer, J. B., McQuown, S. C., Leslie, F.M. The Dynamic Effects of Nicotine on the Developing Brain. *Pharmacol Ther*. 2009 May; 122(2): 125–139. doi:10.1016/j.pharmthera.2009.02.003

Nicotinic acetylcholine receptors (nAChRs) regulate critical aspects of brain maturation during the prenatal, early postnatal, and adolescent periods. During these developmental windows, nAChRs are often transiently up-regulated or change subunit composition in those neural structures that are undergoing major phases of differentiation and synaptogenesis, and are sensitive to environmental stimuli. Nicotine exposure, most often via tobacco smoke, but increasingly via nicotine replacement therapy, has been shown to have unique effects on the developing human brain. Consistent with a dynamic developmental role for acetylcholine, exogenous nicotine produces effects that are unique to the period of exposure and that impact the developing structures regulated by acetylcholine at that time. Here we present a review of the evidence, available from both the clinical literature and preclinical animal models, which suggests that the diverse effects of nicotine exposure are best evaluated in the context of regional and temporal expression patterns of nAChRs during sensitive maturational periods, and disruption of the normal developmental influences of acetylcholine. We present evidence that nicotine interferes with catecholamine and brainstem autonomic nuclei development during the prenatal period of the rodent (equivalent to first and second trimester of the human), alters the neocortex, hippocampus, and cerebellum during the early postnatal period (third trimester of the human), and influences limbic system and late monoamine maturation during adolescence.
Conclusion:
nAChRs are present in the brain from the earliest phases of neural development through childhood and adolescence, and into adulthood. However, their patterns of expression are regionally and temporally heterogeneous and, in many cases, unique to the developmental period. The multitude of nAChR subunits, and the resulting range of pharmacological and physiological properties of the nAChR, allows the cholinergic system immense flexibility to regulate many aspects of brain development. The transient increases in nAChR expression within a given brain structure often coincide with the most crucial phases of its development. Thus, nAChRs critically regulate catecholamine and autonomic development in the prenatal period (see Figure 1), cortical, hippocampal, and cerebellar development during the early postnatal period (see Figure 2), and limbic and postnatal catecholamine development during the adolescent period (see Figure 3).
This exquisite regulation of nAChR expression during development predicts that exogenous nicotine exposure may produce a diverse array of functional consequences that depend critically on the timing of exposure. This prediction has been supported not only by studies in laboratory animals, but also by clinical observations. Prenatal nicotine exposure produces autonomic deficits, which may underlie the increased incidence of SIDS seen in the human literature. Nicotine exposure during this time also appears to alter developing catecholamine

systems, with particular vulnerability of the dopamine system. Prenatal nicotine-induced deficits reflective of altered dopaminergic processing appear later in life as these circuits undergo postnatal maturation, with children of mothers who smoked exhibiting increased incidence of ADHD and substance abuse during childhood and adolescence. Early postnatal nicotine exposure in rodents, or third trimester exposure in humans, appears to preferentially interfere with cortical development, with human newborns and children exhibiting long-lasting defects in auditory cognitive processing. Finally, exposure to nicotine during adolescence may preferentially interfere with limbic circuitry, producing enhanced vulnerability to nicotine addiction, increased impulsivity, and mood disorders.
Nicotine has dynamic effects on the developing brain, and continued exploration of the developmental patterns of nAChR expression and the impact of nicotine exposure is needed. Completing the characterization of the regional ontogeny of nAChRs, differentiating the effects of nicotine through activation versus desensitization, and better understanding the acute and long-term effects of nicotine at each age will allow better predictive power in the clinical setting and novel therapeutic approaches to nicotine-induced pathologies.

Appendix 2

Independent research on glyphosate

Paganelli, A. Gnazzo, V., Acosta, H., Lo´pez, S. L., Carrasco, A. E. Glyphosate-Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signaling. *Chem. Res. Toxic*. 10.1021/tx1001749 (2010).

Abstract: *The broad spectrum herbicide glyphosate is widely used in agriculture worldwide. There has been ongoing controversy regarding the possible adverse effects of glyphosate on the environment and on human health. Reports of neural defects and craniofacial malformations from regions where glyphosate-based herbicides (GBH) are used led us to undertake an embryological approach to explore the effects of low doses of glyphosate in development. Xenopus laeVis embryos were incubated with 1/5000 dilutions of a commercial GBH. The treated embryos were highly abnormal with marked alterations in cephalic and neural crest development and shortening of the anterior-posterior (A-P) axis. Alterations on neural crest markers were later correlated with deformities in the cranial cartilages at tadpole stages. Embryos injected with pure glyphosate showed very similar phenotypes. Moreover, GBH produced similar effects in chicken embryos, showing a gradual loss of rhombomere domains, reduction of the optic vesicles, and microcephaly. This suggests that glyphosate itself was responsible for the phenotypes observed, rather than a surfactant or other component of the commercial formulation. A reporter gene assay revealed that GBH treatment increased endogenous retinoic acid (RA) activity in Xenopus embryos and cotreatment with a RA antagonist rescued the teratogenic effects of the GBH. Therefore, we conclude that the phenotypes produced by GBH are mainly a consequence of the increase of endogenous retinoid activity. This is consistent with the decrease of Sonic hedgehog (Shh) signaling from the embryonic dorsal midline, with the inhibition of otx2 expression and with the disruption of cephalic neural crest development. The direct effect of glyphosate on early mechanisms of morphogenesis in vertebrate embryos opens concerns about the clinical findings from human offspring in populations exposed to GBH in agricultural fields.*
The broad-spectrum glyphosate based herbicides (GBHs) are widely used in agricultural practice, particularly in association with genetically modified organisms (GMO) engineered to be glyphosate resistant such as soy crops. Considering the wide use of GBH/GMO in agriculture, studies of the possible impacts of GBH on environmental and human health are timely and important.

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

Antoniou, M. *et al.* Roundup and birth defects. Is the public being kept in the dark? (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.*

Prof Gilles-Eric Séralini and colleagues at CRIIGEN in Caen had already questioned the adequacy of Monsanto's testing both for glyphosate and GM crops.
Séralini, G-E. *et al*. Genetically modified crops safety assessments: present limits and possible improvements *Environmental Sciences Europe* 2011, 2**3**:10 doi:10.1186/2190-4715-23-10. *The 90-day-long tests are insufficient to evaluate chronic toxicity, and the signs highlighted in the kidneys and livers could be the onset of chronic diseases. However, no minimal length for the tests is yet obligatory for any of the GMOs cultivated on a large scale, and this is socially unacceptable in terms of consumer health protection. We are suggesting that the studies should be improved and prolonged, as well as being made compulsory, and that the sexual hormones should be assessed too, and moreover, reproductive and multigenerational studies ought to be conducted too.*

Clair, É., Mesnage, R., Travert, C., Séralini, G-É. A glyphosate-based herbicide induces necrosis and apoptosis in mature rat testicular cells *in vitro*, and testosterone decrease at lower levels. *Toxicology in Vitro* **26** (2) 269-279 (2012).
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.*

Brändli, D, Reinacher, S. Herbicides found in human urine. *Ithaka Journal* 1/2012: 270-272. Abstract: *Glyphosate is the main active substance used in most commercial herbicides. It poisons not only plants, but also animals and humans. When testing for glyphosate contamination in an urban population, a German University found significant contamination in all urine samples with 5 to 20 times above the legal limit for drinking water*.

Marc, J., Bellé, R. Formulated Glyphosate Activates the DNA-Response Checkpoint of the Cell Cycle Leading to the Prevention of G2/M Transition 2004, *Toxicological Sciences:* **82,** (2) 436-442. Robert Bellé's team at Le Centre National de la Recherche Scientifique (CNRS) Roscoff, found that Formulated glyphosate, (Roundup®), activates what is called the checkpoint. Each cell has two checkpoints that are activated only when there are problems in cell division. *"This may reflect interference of the product at the DNA level, potentially leading to genetic instability which is recognized as one the main forces driving the onset and progression of carcinogenesis.*

Gasniera, C. *et al*, Glyphosate-based herbicides are toxic and endocrine disruptors in human cell lines. *Toxicology doi:10.1016/j.tox.2009.06.006.*
Extracts: *"We exposed human liver HepG2 cells, a well-known model to study xenobiotic toxicity, to four different formulations and to glyphosate, which is usually tested alone in chronic in vivo regulatory studies. We measured cytotoxicity with three assays (Alamar Blue®, MTT, ToxiLight®), plus genotoxicity (comet assay), anti-estrogenic (on ER_, ER_) and anti-androgenic effects (on AR) using gene reporter tests. We also checked androgen to estrogen conversion by aromatase activity and mRNA. All parameters were disrupted at sub-agricultural doses with all formulations within 24 h. Aromatase transcription and activity was disrupted from 10 ppm. Cytotoxic effects started at 10ppm with Alamar Blue assay (the most sensitive), and DNA damages at 5 ppm. A real cell impact of glyphosate-based herbicides residues in food, feed or in the environment has thus to be considered, and their classifications as carcinogens/mutagens/reprotoxics is discussed."*

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.*

Appendix 3

Extracts from the Report from the 1st National Meeting of Physicians in the Crop-sprayed Towns, Faculty of Medical Sciences, National University of Cordoba, Argentina August 27th & 28th 2010.

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

"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).

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.

Appendix 4

Independent research on Bt toxins

Modified Bt toxins are not inert on non-target human cells, but in combination with other pesticides may have side effects on humans.

Mesnage R., Clair E., Gress S., Then C., Székács A., Séralini G.-E., 2012, Cytotoxicity on human cells of Cry1Ab and Cry1Ac Bt insecticidal toxins alone or with a glyphosate-based herbicide. *Journal of Applied Toxicology* DOI: 10.1002/jat.2712 (2012)
Abstract: *The study of combined effects of pesticides represents a challenge for toxicology. In the case of the new growing generation of genetically modified (GM) plants with stacked traits, glyphosate-based herbicides (like Roundup) residues are present in the Roundup-tolerant edible plants (especially corns) and mixed with modified Bt insecticidal toxins that are produced by the GM plants themselves. The potential side effects of these combined pesticides on human cells are investigated in this work. Here we have tested for the very first time Cry1Ab and Cry1Ac Bt toxins (10 ppb to 100 ppm) on the human embryonic kidney cell line 293, as well as their combined actions with Roundup, within 24 h, on three biomarkers of cell death: measurements of mitochondrial succinate dehydrogenase, adenylate kinase release by membrane alterations and caspase 3/7 inductions. Cry1Ab caused cell death from 100 ppm. For Cry1Ac, under such conditions, no effects were detected. The Roundup tested alone from 1 to 20 000 ppm is necrotic and apoptotic from 50 ppm, far below agricultural dilutions (50% lethal concentration 57.5 ppm). The only measured significant combined effect was that Cry1Ab and Cry1Ac reduced caspases 3/7 activations induced by Roundup; this could delay the activation of apoptosis. There was the same tendency for the other markers. In these results, we argue that modified Bt toxins are not inert on nontarget human cells, and that they can present combined side-effects with other residues of pesticides specific to GM plants.*

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.

http://www.plosone.org/article/info:doi/10.1371/journal.pone.0011405
Zeller, S. L., O. Kalinina, et al. (2010). "Transgene x environment interactions in genetically modified wheat." PLoS ONE 5(7): e11405.
Background: *The introduction of transgenes into plants may cause unintended phenotypic effects which could have an impact on the plant itself and the environment. Little is published in the scientific literature about the interrelation of environmental factors and possible*

unintended effects in genetically modified (GM) plants.
Conclusions: *Our results demonstrate that, depending on the insertion event, a particular transgene can have large effects on the entire phenotype of a plant and that these effects can sometimes be reversed when plants are moved from the glasshouse to the field. However, it remains unclear which mechanisms underlie these effects and how they may affect concepts in molecular plant breeding and plant evolutionary ecology.*

Appendix 5

Research on Epigenetics. Gene changes caused by environmental exposure
Humans cannot escape these genotoxic chemicals. They will keep increasing.
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.
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.

Landrigan, P.J, Benbrook, C.M. Symposium on Opportunities and Initiatives to Pesticides. AAAS, 2006 Annual Meeting: *In the US, prenatal and childhood exposure to pesticides have emerged as a significant risk factor for neurodevelopmental disorders, including learning disabilities, dyslexia, mental retardation, attention deficit disorder and autism, which are now affecting 5-10% of 4 million children.*

An IUCN Task Force on Systemic Pesticides was established in 2011 and on 02/09/2012 the Task Force met in Tokyo. Two of the presentations involved humans: 'Systemic Pesticides as a Causal Factor of Developmental Brain Disorders (ADHD, autism *etc.*)' and 'The Human Health Effect of Neonicotinoid Insecticides.' As Mary Ann Ogasawara, the organiser of the meeting observed last week: *"Many people wouldn't bat an eye for honeybees but if they find that it affects humans, it will be the wakeup call."*

The study of Epigenetics has emphasised that gene changes are more and more frequently being caused by environmental exposure.

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.

Barouki,R., Gluckman,P.D., Grandjean,P., Hanson,M., Heindel,J. J. Developmental origins of non-communicable disease: Implications for research and public health. *Environmental Health* 2012, **11**:42.

Abstract: *This White Paper highlights the developmental period as a plastic phase, which allows the organism to adapt to changes in the environment to maintain or improve reproductive capability in part through sustained health. Plasticity is more prominent prenatally and during early postnatal life, i.e., during the time of cell differentiation and specific tissue formation. These developmental periods are highly sensitive to environmental factors, such as nutrients, environmental chemicals, drugs, infections and other stressors. Nutrient and toxicant effects share many of the same characteristics and reflect two sides of the same coin. In both cases, alterations in physiological functions can be induced and may lead to the development of non-communicable conditions. Many of the major diseases – and dysfunctions – that have increased substantially in prevalence over the last 40 years seem to be related in part to developmental factors associated with either nutritional imbalance or exposures to environmental chemicals. The Developmental Origins of Health and Disease*

(DOHaD) concept provides significant insight into new strategies for research and disease prevention and is sufficiently robust and repeatable across species, including humans, to require a policy and public health response. This White Paper therefore concludes that, as early development (in utero and during the first years of postnatal life) is particularly sensitive to developmental disruption by nutritional factors or environmental chemical exposures, with potentially adverse consequences for health later in life, both research and disease prevention strategies should focus more on these vulnerable life stages.