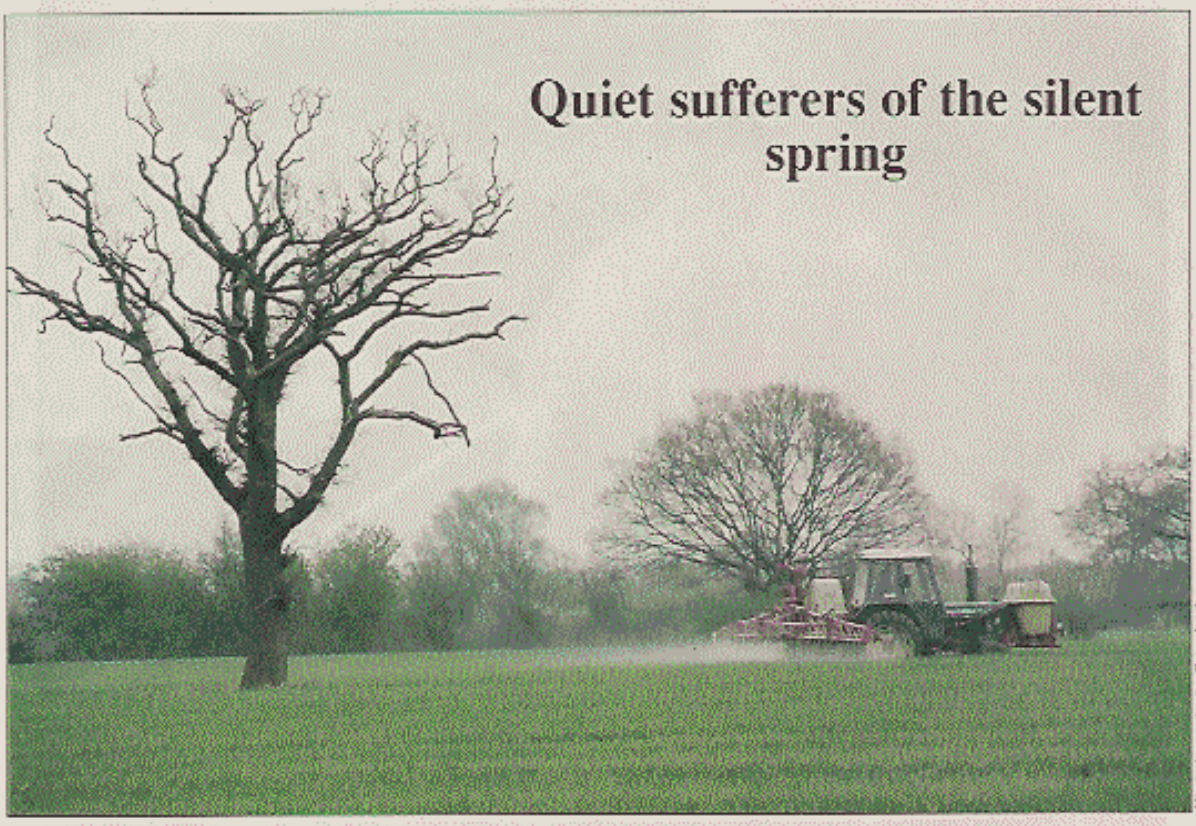
Quiet sufferers of the silent spring



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Every year people in Britain are made ill by exposure to organophosphate pesticides. Why do they find it so difficult to get anyone to take them seriously?

Hazel Bartle

NO ONE knows how many Britons are harmed by pesticides each year. There are no reliable figures because of the failure of a bureaucratic system of reporting exposure that operates through two vastly underfunded government services, the National Health Service and the Health and Safety Executive. As a result, almost 30 years after Rachel Carson prophesied pesticide disaster in her book *Silent Spring*, the silence of the human victims of pesticide poisoning is still profound. Over the past year I have contacted 46 victims and begun to listen to their stories.

Organophosphates have been in use since the Second World War. The chemicals were first developed as insecticides in 1937, then used in military research on chemical weapons. After the war, organophosphates were once again directed towards the control of insect pests as well as fungi and weeds. The agrochemical industry turned to the organophosphates, preferring them to organochlorines, such as the discredited DDT, because most degrade rapidly into other compounds in plants and in the soil.

The early organophosphates were very toxic to both insects and people, but chemists modified the compounds to make them much safer. There are important differences in the way that insects and humans handle these chemicals physiologically, which makes them more toxic to insects and much less so to people. Yet human nerve cells are not immune to their effects.

These insecticides work by interfering with the function of nerve cells. In a healthy nervous system, insect or human, an activated nerve cell stimulates the next in line by releasing the enzyme acetylcholine, which flows across the tiny gaps or synapses that separate nerve cells. Once the nerve impulse has passed across the synapse another enzyme, cholinesterase, acts to stop the message reverberating endlessly across the synapse.

Without the dampening effect of cholinesterase, which is unavailable because it is locked up in combination with the organophosphate, the nervous system goes "berserk". Alistair Hay, a chemical pathologist at the University of Leeds, likens the effect to being continuously "switched on". The voluntary muscles that we can move at will are affected. So too are the involuntary muscles that surround our vital organs such as the heart, lungs, stomach and uterus. Both voluntary and involuntary muscles can go into spasm in response to the absence of cholinesterase.

For those who survive exposure to organophosphates the impact on their lives and bodies is enormous. The unchecked nerve messages to the voluntary muscles result in tremors in all the muscles a person can think of moving. Hands tremble, feet shake, eyelids twitch or refuse to open, eyes roll, facial muscles twitch. Muscle pain and muscle wastage are common. The unchecked signals to the involuntary muscles can result in heart attacks, stomach cramps and vomiting, excessive menstruation and spontaneous abortion in women, impotence and sterility in men, loss of sphincter control, increasing excitement and fearfulness.

Many survivors are unable to work because they are permanently disabled. Muscle pain and muscle weakness mean most movements cannot be sustained for more than a few minutes. People who have been exposed to these pesticides,

Enfys Chapman is founder of the Pesticide Exposure Group of Sufferers, PEGS. She has been ill since 1977, when she was drenched with organophosphate pesticides sprayed from a helicopter

'What happened to me is irreversible. I just want to make things safe before I die.'

either through their work or simply by chance, include agricultural and horticultural workers, smallholders, caretakers, florists, secretaries, social workers, salespeople, translators and senior citizens. Those doing heavy agricultural work usually lose their livelihood and their homes. For anyone whose work requires fine manipulative skills, exposure spells the end of employment.

While not all organophosphates are equally toxic, everyone seems equally vulnerable to those that are. The poisoning effect, whether acute or chronic, is related simply to dose and duration. Those with prolonged, heavy exposure may be unable to leave the uncontaminated atmosphere of their homes. Others with a lower exposure may experience what seems rather like a common cold or a "stomach bug": the chronic symptoms of organophosphate poisoning are sore throat, runny nose, tremor, aches and pains in the limbs, headaches and stomach upsets. People who assume that they have a "summer cold" or "stomach bug" are unlikely to connect their symptoms with organophosphate poisoning unless they notice that their recurrent complaints coincide with repeated spraying. Yet exposure at this level may eventually result in serious illness.

In 1987, the House of Commons Agriculture Select Committee, chaired by Sir Richard Body, attempted to investigate the effects of pesticides on human health. The committee concluded that under-reporting is a serious problem, and pointed out that epidemiological studies would be unlikely to identify an increase in symptoms which mimic ailments as common as colds or flu.

Sufferers feel isolated because they have to avoid recontamination, with attendant convulsions, vomiting and breathing difficulties, by staying in their homes. They feel ill and tired most of the time. Some are barely able to regain their strength between attacks brought on by recontamination. Some suffer constant pain and restricted movement. Some are paralysed for years. Some lose their speech for a time, or retain only the vestiges of their sight and hearing. Some cannot keep their eyes still; others cannot keep them open. Skin ulcers, a common symptom of the poisoning, can make sufferers feel anxious about their appearance. And people exposed to the most toxic organophosphates rarely feel confident about the behaviour of their stomachs.

Poisoning events are under-reported, partly because many victims are just too ill to report to a baffling system. The reporting system has four disparate channels. Members of the public are supposed to report suspected poisonings and deaths to the Health and Safety Executive. Only doctors can report cases to the National Poisons Unit, based in Guy's Hospital, London. The Department of Trade and Industry operates the Home Accident Surveillance System; this draws its figures from 20 hospitals in England and Wales with a 24-hour emergency status. Hospital Inpatient Enquiry uses coroners' returns of deaths from a 10 per cent sample of hospitals.

The system is terribly unwieldy in operation. The various reporting agencies use different definitions of poisoning so their figures disagree. GPs are not trained to recognise poisoning, so make few referrals to the National Poisons Unit. Members of the public are unlikely to know that they should inform the Health and Safety Executive about a poisoning. Few victims in agricultural areas live close enough to be treated by one of the big hospitals offering round-the-clock emergency services.

In 1987, Body's report called for urgent changes to the system. In response, new regulations known as COSHH (Control of Substances Hazardous to Health) were introduced towards the end of 1989. The new regulations shift responsibility for assessment, monitoring and reporting of risk from the government to the employer, but so far have made little impact on the poison reporting scene. There is still no mechanism to

'In the summer I am a prisoner in my own home. Summer is a time to enjoy the country. The Health and Safety Executive recommended I wear this mask when hanging out the washing and collecting my son from school'

ensure the reporting of cases of poisoning that happen anywhere other than at work.

My research with organophosphate victims in England and Wales is an attempt to reach people who have been overlooked by this inadequate reporting system. A feature in *Woman* magazine last March invited victims to contact me. I interviewed people in their own homes in confidence, so that they could tell their stories despite disability and without fear of reprisals.

Most organophosphate victims have had no success in reporting to the official agencies. Respondents found it very difficult to pass on information about their exposure. Mr N., a horticultural labourer badly affected by working with pesticides, first tried the Citizens' Advice Bureau. Workers there said "they didn't know where to go with it". He then contacted the environmental health officers: "They didn't want to know. They said it was not their field." Mrs O., whose home and garden were drenched by a helicopter spraying pesticides, told of similar struggles to inform an appropriate service. "We were taken ill straight away but we don't call in our doctor very often. [So what I did was] I tried very hard to look in the telephone directory that evening, and my eyes had been so badly affected I could not read."

The next day Mrs O. tried again: "I managed to get someone from the council because I did not know what else to do. I reported it to him and he made very few local investigations. He did not give me any advice and I did not realise that the Health and Safety Executive should be involved. Maybe I was very naive."

Social and economic constraints can also block true reporting of what has happened. Mr N.'s wife explained how awkward it had been for them to make any complaint about Mr N.'s exposure because of the family's dependence on his employer: "He had to stop work because he kept collapsing. Mrs R. [the employer's wife] was asking what was wrong because he was so slow. Me and the kids were trying to do his work with the chickens and such. We didn't want to say anything until we'd got out of the tied cottage into the council house."

Mr J., a skilled agricultural labourer, changed doctors because the first one he consulted refused to entertain pesticide poisoning as a possible cause of his excruciating stomach pains. His wife told how awkward changing doctors had been in a small community where she met the doctor's family daily at school and their children played together at home. She said, "When we changed doctors his wife asked me what the problem was. The doctor felt he had worked very hard, going to the library and things like that. He was hurt."

People also found it difficult to pursue their own investigations into spraying accidents. Mrs M. contacted the Environmental Health Office about pesticide spray in her pond. An

Sheep farmers are at risk from organophosphate sheep-dips. But when Mr D. fell ill, officials at the Ministry of Agriculture said he was "oversensitive", telling him: "If you can't use OPs then you are not fit to keep sheep." Mrs D. says:

'The so-called brains of this country have been poisoning the rest of us'

official came to take her dead fish for testing—two weeks later. The Environmental Health Office reported back to Mrs M. that lime was spread on the field at the same time as the pesticides and would affect the water so there was no proof that pesticides had killed the fish. No reference was made to the fact that the fish had been dead two weeks before they were analysed.

In contrast, Mrs E., a smallholder, called in the local water board so that they could take her dead fish for analysis and prove the presence of the pesticide in her pond water. Two hours later officials from the board arrived, told her the fish had been "dead too long" and refused to take them away for examination. Neither woman knew what steps to take next.

Mr D., a sheep farmer, now distrusts the official government laboratories where he sent animals for postmortem examinations: "We don't get to hear of it if the results are odd. Only the company hears."

Lay people were aware, too, that although the pesticides may be safe when used in controlled "laboratory" conditions, these conditions do not prevail in real life. At work, the risks involved in handling the pesticides increase enormously. Mr J., who was college-trained in the use of pesticides for his work as an agricultural labourer, said: "The ruling is as long as you're wearing all the safety equipment when it's a concentrate then it's all right. But these are paper boiler suits. They are so torn there's nothing as protection."

Mr N., a professional gardener, was also distrustful of chemicals used in workplace conditions: "We used agricultural chemicals, not horticultural ones, because they're cheaper. There was a storage shed for the chemicals. They were locked up. But the glass front in the storage cupboard was broken anyway. When we found bottles with no labels the boss told us: 'Burn the stuff and dispose of it as best you can'."

The victims also questioned the use of scientific concepts such as "sensitivity" outside laboratory conditions, where livelihoods are at stake. Mrs D., whose husband became ill as a result of handling his sheep after they had had an organophosphate dip, said her husband's supposed oversensitivity was being blamed instead of the chemical. "MAFF [the Ministry of Agriculture, Fisheries and Food] said, 'If you can't use OPs then you're not fit people to keep sheep'," she said.

Some said they felt they had been experimented upon by an intellectual elite. Mrs D., exposed to sheep-dip as a farmer's wife, spoke angrily about professionals such as chemists, university professors and scientists: "The so-called 'brains' of this country have been poisoning the rest of us." Seventy-year-old Mrs H., protested against her involuntary exposure to pesticide sprays: "Scientists have been permitted to indulge in too many experiments. Guinea pigs, we are! Some of us object."

Not many exposure victims have the resources to fight their way into the reporting system. Enfys Chapman is one notable exception. Following the drenching of herself, her sons and employees, her home, her farm and her animals with the organophosphates triazophos and dimethoate from a helicopter on 14 July 1977, Mrs Chapman was admitted five days later to Addenbrooke's Hospital in Cambridge suffering muscular spasms so violent that they threw her from her bed. She experienced stroke-like paralysis of the left side of her body, suffered convulsions and agonising cramps, lost her memory and with that the use of her second language, English, and she was partially blind for four years. Fourteen years later, she has the use of only 20 per cent of the left side of her body, sees with only one eye, walks with the aid of a stick or must use a wheelchair to reduce the strain on her heart. Re-exposure is liable to bring about involuntary muscle spasms which could be fatal.

Trained as a botanist and nutritionist, Mrs Chapman guessed when the helicopter flew over the farm that the spray might threaten her health. She sent her sons to get the helicopter's number and made the operators tell her the names of the chemicals they had used. The Civil Aviation Authority (CAA) was informed of the helicopter's number. Advised by the Health and Safety Executive to keep everyone else away from the cattle because organophosphates could cause sterility in men and abortion in women, Mrs Chapman tended her sick cows herself, fearing she might be sued over the health threat to her employees.

A past president of the British Veterinary Association living opposite Mrs Chapman contacted Hoechst, the manufacturers of the pesticides, to find out how to help Mrs Chapman's pain-crazed cows. Although Hoechst's chemist rang the next day to tell her to wear protective gear and to get her eyes treated, five days later, when she was admitted to hospital, the Hoechst chemist could not be contacted by the hospital doctors.

Although very ill, Mrs Chapman had immediately contacted the CAA, the DHSS, the HSE, solicitors, MPs, the Minister of Agriculture, veterinary services, Hoechst Chemicals, Lloyds Insurance, the hospital and her GP. Her comprehensive and well-informed alerting of diverse authorities contrasts with most victims' muddle of indecision and ignorance.

Mrs Chapman's experience also contrasts with people who are exposed on a daily basis. Then there is no pinpointing of a single "poisoning event" which they suspect could cause

Mrs K. and her dogs were made extremely ill from pesticides used in potato planting in nearby fields. In the local school (background) Mr K. found old nature records describing frogs, skylarks, nightingales and primroses, all of which have now disappeared

'Farmers now insure against the risk of killing bees. The landscape is dying'

This boy was ill for two months after being sprayed with an organophosphate pesticide while riding his bicycle in the village. When asked to identify the chemical, the farmer said:

'You shouldn't live in the country if these sprays affect you'

problems later and which ought to be safeguarded against by informing the authorities. Mrs Chapman was paid £12 000 compensation in an out-of-court settlement with Hoechst. Despite all the people she had alerted, her solicitors advised her that she could not win and that she risked having to pay the agrochemicals company's legal costs.

In 1988 Mrs Chapman and two others set up the Pesticide Exposure Group of Sufferers (PEGS). She counsels other victims and campaigns for effective regulation. In 1989 she enlisted the help of the Centre for Science Studies and Science Policy at Lancaster University to survey pesticide victims. On 15 March 1990 Mrs Chapman organised a Parliamentary lobby and the signing of an Early Day Motion by hundreds of supportive MPs.

Why, despite such valiant campaign efforts, do the victims of pesticide poisoning continue to be ignored? And why do these incidents, recounted to me in such detail, fail to swell the numbers of registered poisonings in the official records? The victims' comments on their experiences reveal part of the answer. These show how social and official obstacles prevent the reporting of such incidents and how lay awareness of hazard is routinely undervalued.

The effects of the poison also help to mask the size of the problem. Death, illness, loss of fine motor skills, lack of concentration, inability to communicate, fatigue and depression all conspire against the reporting of organophosphate poisoning.

But the failure to register a poisoning may stem from factors other than illness. Some victims feel that, as lay people, they can do nothing when faced with technological failure. Residents near Three Mile Island in the US showed this response after the nuclear accident in 1979. The closer they were to the damaged reactor, the more powerless they felt. Psychologists have produced what may be analogous responses in laboratory animals given electric shocks or some other stress from which they are unable to escape. The animals become withdrawn and inactive, and seem to "give up". This so-called "learned helplessness" may explain some of the under-reporting and inactivity that surrounds organophosphate poisoning.

Some organophosphate exposure victims, however, are finding ways to achieve more of a sense of taking control. They feel that by recounting their experiences they can contribute to society's store of knowledge. Mrs Chapman had sufficient information, training and social contacts to avoid "learned helplessness".

The pesticide exposure victims' feeling that they were the unwitting subjects of large-scale experimentation ties in with an idea elaborated by Wolfgang Krohn and Johannes Weyer of Bielefeld University in Germany. Drawing largely on evidence from the nuclear industry, they suggest that research is unavoidably moving out of the laboratory and into society, taking research risks with it. Like the victims of poisoning, the researchers seek a redistribution of responsibility for the "scientific errors" which science used to "contain" within its own laboratories.

Organophosphate pesticides meet Krohn and Weyer's criteria for technologies involved in implicit large-scale trials. The impact of pesticides is not just confined to the laboratory; people in society have been affected. Nor is the discussion confined to scientists. It continues in every farming magazine, every advertisement for flea spray, every comment that feeding the world's population depends on killing agricultural pests with chemicals.

That people exposed to pesticides often see themselves as guinea pigs does not mean, of course, that they believe that the agrochemical industry has planned experiments. But they feel the effects are the same—except that their experiences, their "data", are not being used.

Having found what seem to be research risks in their every-

What are organophosphate pesticides?

THE group includes a large number of insecticides, herbicides and fungicides. They all contain phosphorus and an organic structure made up of carbon atoms arranged in a straight chain or ring. The group illustrates the great variety of structures among pesticides, with some members fitting equally well into other families such as the heterocyclics (compounds such as the pyridines which have carbon ring structures that include nitrogen atoms).

Insecticides. Among the group are such well-known members as **parathion**, which is no longer approved for use in the UK. It is a non specific insecticide that is highly toxic to mammals, and destroys birds and non-target insects such as bees.

Introducting chlorine atoms into this group reduced toxicity to mammals without affecting the insecticidal power. A series of such formulations appeared and was effective against insects which had become resistant to DDT. **Bromophos** is a contact insecticide against mites as well as caterpillars. It contains both chlorine and bromine and could also be included among the halogenated hydrocarbons.

A series including sulphur atoms sprang from demeton-S-methyl and includes **phorate**, a very toxic insecticide used against aphids and flies in crops such as carrots and parsnips, and **malathion**. Malathion is an important treatment for aphids, thrips and mites on a range of vegetables and fruits. A wide range of insects are susceptible and it has a low toxicity to mammals. It is a common ingredient in garden greenfly sprays.

Dichlorvos vaporises easily. It is used in household fly strips and has been used for flea collars. Its relatives, **chlorfenvinphos** and **tetrachlorvinphos**, **fenchlorophos** and **mevinphos**, are also nonspecific insecticides of varying toxicity. All act on contact in the insect's stomach. Dichlorvos and chlorfenvinphos are much more toxic to mammals than tetrachlo-rvinphos.

Dimethoate is an insecticide and acaricide used against mites, thrips and aphids on food crops. It persists longer on crops than does dichlorvos. Livestock should be kept out of sprayed fields for a week. Most sprayed crops cannot be harvested for seven days, but watercress must be left for 40 days.

Another group of organophosphates is based on heterocyclic structures such as the triazines and pyrimidines. **Azinphos-methyl** and **diazinon** are broad-spectrum insecticides. **Chloropyrifos** is a contact and stomach-acting insecticide with a wide range of victims and a persistence of two to three months. Although these three chemicals are widely used in the home and garden, all are dangerous if swallowed and can irritate the skin.

Fungicides and herbicides. **Wepsyn** was an early fungicide based on the triazole structure. Systemic fungicides were a great advantage against fungi that penetrate and grow within the host plant's tissues. They could permeate all tissues of the plant and kill growing fungal threads. **Pyrazophos**, an organophosphate based on a heterocyclic nitrogen structure, is an interesting combination of systemic fungicide and insecticide.

A well-known and widely used herbicide is **glyphosate**, which is a broad-spectrum, translocated herbicide active against couch grass as well as other perennial weeds and annuals.

Environmental effects. Most organophosphates do not persist long in the environment. Exceptions such as glyphosate and chlorfenvinphos are strongly bound to soil particles, where they break down over a year or more. This group is very toxic to fish, birds, earthworms and bees.

Carbamates were developed from organophosphate insecticides and also work by disrupting the nervous system through blocking the action of the enzyme cholinesterase. These compounds are now widely used as insecticides or herbicides. One of these, **aldicarb**, is one of the pesticides most toxic to people and other vertebrates. **Christopher Robbins**

This box is an edited extract from Robbins' book, *Poisoned Harvest: A Consumer's Guide to Pesticide Use and Abuse*, just published by Victor Gollancz, London.

Risky business: outside the laboratory it is difficult to handle pesticides safely

day lives, victims expect the experiment to be completed. Many are frustrated and angry when they realise that they cannot communicate their "results". The broken cycle of information appears to result from the failure of the reporting system. In a study carried out in 1983, for instance, only 1 in 25 poisoned farmers knew they should report such incidents to the Health and Safety Executive. The victims' comments demonstrate the social, official and physical difficulties which prevent victims' access to the agencies. So the agrochemicals industry remains deaf to the outpourings of the people exposed to pesticides.

But the information is not inevitably lost. Victims' data have been dispersed into several areas: veterinary science, medicine, sociology, neuropsychology, nutrition, the sufferers' group PEGS, alternative medicine institutions and farming magazines. People working in these fields are understandably unsure what to do with the seemingly anecdotal evidence about these poisons, because the data are so scattered. In 1962, Rachel Carson foresaw the communication problems inherent in increasing specialisations. She pictured an awful future: "an era of specialists, each of whom sees his own problem and is unaware of or intolerant of the larger frame into which it fits". Which field will collect the information from the people exposed to organophosphates, in order to construct Carson's "larger frame"?

We need to determine the relationship between the victims' information and the data reported to the agrochemicals industry. Would companies welcome improved feedback from victims? Do they want to hear the voice of the victims of pesticide poisoning who have suffered in silence for so long? Research with the agrochemicals industry and the reporting agencies is the next item on the agenda for investigation.

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