

# Organophosphate Report

## INTRODUCTION

Probably the most striking part of the OP (organophosphate) chemical saga is its relentless predictability. From the first warnings in 1951 about the dangers of OPs from Sir Solly Zuckerman right up to today's Gulf War inquiries in the United States and the UK, the pattern has been the same: warnings followed by more research leading to conclusions which beget more research and more warnings before the cycle begins again.

For those who have been poisoned and have lived with failing health for years and years, watching these events unfold must be like enduring a horrifying drama which had a beginning but which, as yet, has no end. They, like everyone else who has followed the drama, know that OP chemicals were formulated with one aim in mind: to poison by destroying the nervous system. It really shouldn't be a surprise to politicians and scientists anywhere where OPs are used that some people, for whatever reason, end up sick and crippled because they, quite innocently, came into contact with these highly dangerous chemicals. In the case of sheep farmers, the heartache and misery of their families is compounded by knowing that, for a time, Governments forced them to dip under the law.

Prove that OPs poison people, say the companies which manufacture these chemicals - and politicians often say the same thing. That is why there is so much research, revisiting the tiniest findings from previous work which might prove or disprove part of the drama. But why? If someone is shot, do scientists spend years trying to work out the trajectory of the bullet, the make of the weapon, or the circumstances in which the trigger was pulled rather than treating the wounded person and trying to prevent more fighting? Of course not, because no conflict would ever be resolved if they did.

The OP drama is another conflict, this time between the victims, those who make the chemicals and the politicians who have prevaricated in finding a resolution. No one knows how many have suffered, although the Government is now making some attempt to find out by examining the databases collected by the OP Information Network (OPIN) and others down the years. No one knows exactly how many tonnes of OP chemical are manufactured each year and released into our environment for use by unsuspecting farmers, workers, people in their homes and everyone else who may come into contact with them just by going to work – just by flying an aeroplane. What everyone involved in the conflict does know is that a number of people in the UK are now, while you are reading yet another report on the subject, suffering more and more pain after they were exposed to OPs.

There are some signs that this conflict may end. European Union legislation regulating chemicals may make it increasingly hard for chemical companies to market OP products. Some influential politicians such as Michael Meacher, the former environment Minister, want the chemicals banned. He is a member of the all party group of MPs working for a ban and led by Paul Tyler, the Liberal Democrat. Some doctors know there is an association between exposure to pesticides, including OPs, and a range of illnesses. More important than all these, perhaps, is that in the last few years, independent scientists have begun to argue,

with great courage, that the toxic mix of pesticides and other pollutants in our environment is leading to an increase in horrific diseases such as cancer.

The All Party OP Group of MPs has helped produce this report. Research and help from Elizabeth Sigmund, the founder of the OP Information Network, has been invaluable. My thanks are also due to Dr Sarah Myhill, Professor Malcolm Hooper and many others, most of whom are quoted below. The Joseph Rowntree Reform Trust Ltd are the sponsors. This is not an attempt to write a comprehensive history of OPs and their effects, because much of that has already been done. It is an attempt to bring the drama right up to date and present short, vivid accounts of those affected by OPs right across the UK population, whatever their occupation. This is the first time the information has been collected in one report, and it should help persuade those with the power to do something that the time is right for a ban on the use of OP chemicals in any occupation or environment.

## **THE EVIDENCE**

### *How many people have been poisoned?*

This is hard to say, because up to now no comprehensive epidemiological surveys have been done in the UK. Because of all the publicity about this group of chemicals, it would be easy to think that OPs are no longer widely used and the risks have reduced. But at least 16,000 farmers in the UK still hold certificates of competence in sheep dipping, and a recent Parliamentary question from Paul Tyler MP to rural affairs Minister Alun Michael showed how widespread OP use is. Mr Michael's answer was incomplete, because the Health and Safety Executive approves the use of industrial and domestic products containing OPs, with the exception of plant protection products.

Mr Michael said that for OP sheep dip, sales figures for 2003 showed that 54,000 kilograms of active ingredient were used, or about 1.5 grams on each sheep a year. These are licensed by the Veterinary Medicines Directorate (VMD), and there are currently two on the market. There are 38 other OP-based products licensed by the VMD, all of which are for treating ticks and fleas in cats and dogs, with the exception of Salmosan, a commercial fisheries product.

The Pesticides Safety Directorate (PSD) approves the use of OPs in agriculture and horticulture, and there are 59 of these currently on the market. Mr Michael's answer also excluded information about the use of OPs in medicinal products such as treatments for head lice, which mainly involves malathion.

### *What is the Government's attitude to OP poisoning?*

Successive Governments and Ministers have relied on advice from advisory committees that the products are safe until there is evidence which proves they are not. In the face of campaigns, Tory and Labour Ministers have repeated the mantra of more research. An extract from a debate on OP sheep dips in the House of Lords in December 1998 makes the point. The Countess of Mar, who was herself poisoned with OP dip and has championed the

cause of sufferers with Paul Tyler and others, asked the Government to reject a report which recommended unacceptable, conventional treatment for sufferers experiencing a range of OP poisoning symptoms which often baffle doctors. Answering for the Government, Baroness Hayman said there was little dispute that acute exposure to high levels of OP chemicals can cause ill health. But "...there is no widely accepted clinical syndrome associated with prolonged exposure to low levels of OPs. It is essential that we gain a clearer picture of exactly what the health risks might be from OPs." Baroness Hayman went on to outline how the latest research might provide that clearer picture.

Every time a Government requests more research like this, it ignores what has already been reported by previous research – most famously in 1951, when Professor Solly Zuckerman chaired a working party which produced a report for the agriculture Minister called "Toxic Chemicals in Agriculture." While discussing OP chemicals, Professor Zuckerman repeatedly warned that the main danger was from chronic effects. Professor Zuckerman wrote about how chronic effects could arise: "Successive small doses of parathion (an OP) may progressively lower the cholinesterase level without producing symptoms, but may render the individual increasingly susceptible to further doses." Professor Zuckerman asked for doctors and hospitals to be warned about any OP spraying in their area; OP containers should be labelled with the words "deadly poison"; and OP chemical formulations should be given a distinctive colour during manufacture. Even though Professor Zuckerman was the Government's chief scientific adviser, none of this has been done, and his warnings about the dangers of chronic effects went unheeded.

In 1981, a Health and Safety Executive guidance note called "Biological Monitoring of Workers Exposed to Organophosphorus Pesticides" (Medical Series 17) said that regular monitoring should be considered for anything more than occasional exposure to OP compounds such as use for gardening. This advice, too, was ignored. Further evidence was published by the Stockholm International Peace Research Institute (SIPRI) which found that: "All OP compounds (chemical weapons and pesticides) are structurally and functionally closely related to each other."

There are echoes of the Zuckerman report in the recent inquiries into illness suffered by United States and British veterans returning from the first Gulf War. Serving soldiers were exposed to OP chemicals, vaccines and other substances which produced a range of symptoms similar to those described by sheep farmers, pilots and others. Last year, Lord Lloyd's independent inquiry on Gulf War illnesses found that veterans were entitled to a clear recognition from the Ministry of Defence (MOD) that they are ill because they served in the Gulf. The inquiry also found that they were suffering from a range of illnesses which could not be caused by stress, but which should be called Gulf War Syndrome.

Lord Lloyd's finding on Gulf War Syndrome was almost identical to that of the Research Advisory Committee on Gulf War Veterans' Illnesses published last year in the United States. This said that: "A substantial proportion of Gulf War veterans are ill with multisymptom conditions not explained by wartime stress or psychiatric illness." Even the MOD website recognizes the potential dangers of OP chemicals in terms starkly reminiscent of Lord Zuckerman's report.

*Is there science linking sufferers with OP poisoning?*

From Zuckerman onwards, it has been widely acknowledged that death can be caused by a single, acute exposure to OPs. But, as Zuckerman put it, chronic toxicity is the main concern. There is agreement that some studies of people with long term (chronic), low level exposure to OPs have shown subclinical effects on the central and peripheral nervous system. This is acknowledged in the 1999 report on organophosphates published by the Committee on Toxicity (COT) and chaired by Professor Frank Woods. There are critics of this report, but it did point to one crucial area of research: whether or not there is a sub-group of people exposed to low levels of OPs who have an increased risk of neurological or neuropsychiatric disease. "If there were an excess risk," said the COT report, "it would be necessary to establish how far it is determined by direct toxicity and how far by psychological or other mechanisms." Now, in research which many in the field consider to have provided a big part of the answer to the question raised in the COT report, Professor Nicola Cherry and a team at Manchester University have shown that some individuals may be genetically predisposed to OP poisoning. In a letter to those taking part in their project, the Manchester scientists wrote: "The study shows that people who have dipped sheep and become ill are more likely to have a variant in their genes that makes them less able to break down organophosphates once they get into the body."

*If OPs cannot be broken down, what happens?*

In 1999, Stephen Hodges and others published research led by Cambridge University's department of medicine which looked at bone formation in 24 agricultural workers with chronic OP exposure: they found "significantly lower" bone formation at the cellular and tissue level in these workers compared with healthy, age-matched controls. The Government research programme continues: for example, DEFRA has funded the health of agricultural workers study (SHAW). The first phase has been completed, and 19,000 questionnaires have been sent out to farmers. Farmers and farmworkers exposed to OPs have been subjected to a large body of research down the years, and the number of papers published on pilots, soldiers and others poisoned by these products grows all the time.

Last year, the Royal Australian Air Force (RAAF) published a particularly forceful account of the effects of contaminants (one of which is the organophosphate tricresyl phosphate, used in engine lubricants) in aircraft cabin air which came to the same conclusion as many who have looked at OP use in farming. Dr Bhupi Singh, a senior research officer with the RAAF, wrote that "...there is some evidence that continued exposure to small amounts of certain contaminants may produce chronic, long term and irreversible damage to humans. Blood disorders and damage to lungs, liver and kidney may occur. Some toxins may be potentially carcinogenic."

Dr Singh continued by saying that the aircraft cabin and cockpit cannot be compared with industrial and other workplaces on the ground, and safe exposure limits for industrial workers were irrelevant. "Aircrew members are required to perform complex tasks requiring high level cognitive skills, which may be more sensitive to insult by hazardous contaminants in the smoke/fumes, such as (the OP) tricresyl phosphate (TCP)."

An inquiry into aircraft cabin air quality conducted by the Australian Senate Rural and Regional Affairs and Transport Legislation Committee in 2000 included the following recommendations: a specific national standard for checking and monitoring the engine seals and air quality in all passenger commercial jet aircraft should be established; development of an appropriate and accurate test for the presence of any chemical fumes in aircraft cabins is essential; and the potentially hazardous chemical components of Mobil Jet Oil II (the gas turbine engine lubricant) should be referred for review and assessment.

The report added that the ingredient of Mobil Jet Oil II identified as a possible source of neurotoxic effects is TCP. Mobil accepts that it has been known for many years that TCP contains neurotoxic components. Jet engine lubricants can typically contain up to 3% TCP as an anti-wear agent.

Research into Gulf War illnesses has reached similar conclusions. In 2002, Rogene Henderson at the Lovelace Respiratory Research Institute in New Mexico working with others published a paper in which they found that rats exposed to low levels of the nerve gas sarin – which is an OP compound – under heat stress caused delayed development of brain alterations which may be associated with memory loss and cognitive dysfunction. This was in addition to work by Professor Robert Haley at the University of Texas which demonstrated that long term low level exposure to nerve agents could cause progressive illness.

*Do doctors recognise OP poisoning and are treatments available?*

No. Unless a sufferer is lucky enough to be treated by someone sympathetic with their plight – such as Dr Sarah Myhill or the neurologist Dr Goran Jamal – the prevailing medical opinion is that published by the Department of Health. The standard text entitled “Pesticide Poisoning” is produced by the department and edited by Dr Alex Proudfoot. His attitude to OP poisoning can be gauged from comments he made in a speech to an OP seminar organized by the National Farmers Union in 1995. “I do not have to tell general practitioners that fatigue, depression and irritability, for example, are extremely common. The same holds in my clinic, but most of the patients have never been exposed to pesticides in any major way.

“It is serious that so many people in present day society have such symptoms but I would strongly suggest that they are not due to organophosphates.” Dr Proudfoot was then director of the Edinburgh Centre of the National Poisons Information Service (NPIS), which those poisoned by OPs might expect they could contact if they needed help.

Tony Grinnall was exposed to OPs and had all the classic symptoms of chronic poisoning – diarrhoea, shaking, severe headaches and is now officially classed as a type two diabetic. He is 58 and lives at Ombersley in Worcestershire. In May 2001, Mr Grinnall’s doctor wrote to the Birmingham Centre of the NPIS, asking if his patient could be examined. But the director, Dr J.A. Vale, wrote back saying he did not have time to see Mr Grinnall. “I have limited time available to assess patients such as your own and as these patients are time consuming, few patients can be seen.” Luckily, Mr Grinnall was part of the study run by Professor Nicola Cherry at Manchester University to see whether those with a certain genetic makeup were more likely to suffer OP poisoning. “I had the genetic damage,” said Mr

Grinnall. “In the end, Worcester health authority agreed to send me to Dr Sarah Myhill, and she did all the relevant tests and found I was suffering from the range of illnesses typical of those who served in the first Gulf War.” Mr Grinnall was exposed to OPs in a number of ways: in crops sprays, warblecides for cattle and dip for sheep on his parents’ holding; and as an engineer, he helped to make aircraft test beds which used phosphate ester oils with an OP plasticiser.

*Are coroners’ inquests returning verdicts of OP poisoning which could help sway medical opinion?*

On two occasions recently, inquests have come close to giving this kind of verdict. At the end of 2003, an inquest was held by Dr Elizabeth Earland, coroner for Devon, into the death of Kathleen Sutherland, a retired pig farmer who had used OP chemicals for the treatment of mange. She developed neurological symptoms which progressively worsened until her death in 2003. Although the coroner returned an open verdict, the cause of death was aspiration pneumonia, and, more significantly, multiple system atrophy. One study has shown an increased risk of multiple system atrophy among those exposed to pesticides and other substances.

In the case of Major Ian Hill, a veteran of the first Gulf War who was evacuated back to the UK and hospitalised after he became ill, the coroner referred to evidence from the Major’s GP up to the time he died. This described a “global illness syndrome” with a number of symptoms which were interrelated but hard to disentangle. But the two most important set of symptoms were respiratory and neurological. Major Hill was assessed by the neurologist Dr Goran Jamal. Professor Malcolm Hooper, emeritus professor of medicinal chemistry at Sunderland University, gave evidence that his symptoms were typical of Gulf War syndrome caused by his exposure to vaccines, medication and OP sprays. The coroner concluded that Major Hill had died of natural causes but his service in the 1991 Gulf campaign was a contributing factor.

In 2003, an inquest by Oxfordshire coroner Nicholas Gardiner said it was possible that OP sheep dip had caused the mental illness which led 33 year old James Moore to hang himself from the rafters of a barn.

*Is research into the links between pesticides and human health leading to a reduction in the use of these chemicals?*

Not yet, but the signs are promising. Last year, one of the most significant reports ever published on pesticides was signed by the Ontario College of Family Physicians. Their review found evidence of serious harmful effects from pesticides in several areas including cancer, reproductive effects and impacts on the nervous system. Perhaps the doctors knew about Professor Cherry’s work at Manchester University, for they also quoted a leukemia study showing that more than 40 per cent of children in the Montreal area had a genetic vulnerability which caused them to metabolise pesticides slowly.

The response to the Ontario paper by the Advisory Committee on Pesticides (ACP) is significant. The ACP advises Ministers about the safety of pesticides – including some OPs

– used in the UK. Some members of the ACP have criticised the Ontario paper in an official response, but others have accepted its main finding that there is an association between exposure to pesticides and a range of illnesses. They are said to be preparing a minority report.

One of those who is expected to sign the minority report is Dr Vyvyan Howard, an ACP member and senior lecturer at Liverpool University, where he is part of the Developmental Toxicology-Pathology Group. Dr Howard is also on a committee set up by the Co-Op supermarket which makes a comparative assessment of pesticides according to how big a toxicological hazard they represent. “If you look at 20 pesticides and they do the same job, we say ‘Let’s look at their properties, rank them numerically and see which are the least hazardous,’” said Dr Howard. The Co-Op has banned some pesticides under this procedure.

Dr Howard is now convinced that if other supermarkets follow suit, use of the most dangerous pesticides, including OPs, will decline with or without Government intervention. He is also persuaded that if pesticides are playing a part in the increase in the number of degenerative neurological diseases, then hard proof is impossible because of the complexity of human exposure. “Think of all the things which may contribute to an increase in the incidence of cancers. There are things in the diet and eating too much of them causes oxidative stress. Then there is a cocktail of chemicals in the environment, plus the change in the pattern of radiation which we have been exposed to over the last 50 years. We also know there are compounds which are carcinogenic in animals and others which are hormone disruptors. At the end of the day, you are only left with the precautionary principle which says that when something is a known hazard, you should not expose people to it unnecessarily.” The precautionary principle is supposed to be at the heart of European Union legislation: there are signs, particularly in the EU’s Thematic Strategy on the Sustainable Use of Pesticides, that a reduction in the use of pesticides will become part of the Sixth Environmental Action Programme.

Research is beginning to support Dr Howard’s view that pesticides with a cocktail of pollutants in the environment are causing a rise in serious diseases. During a conference organised by Pesticide Action Network (PAN) Europe in Copenhagen last year, Professor Dominique Belpomme, a medical oncologist from the University of Paris, estimated that between 70 and 80 per cent of cancers in France are now due to environmental pollution from chemicals such as polycyclic aromatic hydrocarbons, polyvinyl chloride, some heavy metals, nitrates, nitrites, dioxins, some food additives and pesticides. In 2003, scientists from Southampton University published a paper examining the changing pattern of neurological deaths in adults aged between 45 and 74 in the main Western countries between 1979 and 1997. They found the 1990s data showed a big increase compared with the 1970s data for the category “other neurological deaths,” especially amongst 65 to 74 year-olds. They also found rises in the category “mental disorder deaths” in 55 to 64 year-olds in five countries, including England, Wales and Germany. In a tentative explanation of their findings, the Southampton scientists reported “...a growing recognition that environmental factors can influence the course of some neurological disorders.”

## THE FARMER

Like so many farmers and farmworkers made ill by OPs, Francis Holmes was a strong man who never felt unwell. Last year, almost 20 years after he was exposed to the chemical in sheep dip, Francis Holmes died. His wife, Judith, is convinced that OPs killed her husband. "Before this, he never had a day's illness," said Mrs Holmes, who lives at Kennford near Exeter in Devon. "The only time he had off was to go to the Devon county show for one day each year."

Francis and Judith were married in 1972. They kept between 70 and 80 sheep which were dipped in OP chemicals twice a year without any noticeable effects. Francis worked as a butcher and slaughterman in his father's business. But his father broke a hip and the business was sold in 1984. Francis became self-employed, and in that same year, he dipped about 2,500 sheep belonging to other farmers in three weeks between September and October. His job was to hurl sheep into the dip, and his only protection was leggings to keep him dry. About three days after he began dipping, Francis developed flu like symptoms, one of the classic signs of OP poisoning. He was 35 years old.

"He thought he had heart trouble," Judith remembered. "He went for a drink, but couldn't take it. One day, he had a job to push tablets out of the packet. That night, he woke me up at five in the morning and couldn't move anything other than his head."

Francis was paralysed from the neck down. A doctor came and he was taken by ambulance to the Royal Devon and Exeter Hospital, where he was put on a heart ward. He stayed at the hospital from October 1984 until the following February. "A little movement came back," Judith said. "But I had to wash, dress and feed him." Although Francis was under Dr Christopher Gardner-Thorpe, consultant neurologist at the hospital, he lacked a firm diagnosis linking his experiences with OPs: Dr Gardner-Thorpe told him verbally that poison had affected his central nervous system.

Information about how OPs could affect farmers was not readily available 20 years ago, and doctors were even more unaware than they are today about the possible consequences of OP poisoning. "We could not prove anything," Judith said. Eventually, in 1997 or 1998, she wrote to the hospital and asked for Francis' records after he began to think that OPs might have caused his illness. "But I was told that because he had not been back to the hospital within ten years, his records had been destroyed."

From 1985 until he died, Francis was in a wheelchair. He went back to the hospital occasionally for physiotherapy during the following year. "After a few days of physio, he could move his big toe," Judith recalled. "Twenty four hours later, his other big toe moved." Some years later, his kidneys were troublesome, and a urologist at the hospital suggested fitting a catheter, which Francis endured for a few more years. His list of illnesses up to his death included septicemia, type two diabetes and MRSA (methicillin resistant staphylococcus aureus). His death certificate said Francis had died of renal failure aged 54.

"He was very young," Judith added. "Francis could never go anywhere near sheep which had been dipped because he was so sensitive to the chemicals. That is why we always thought that dipping with OPs had affected him. But no one will take responsibility for it."



The Holmes family still keeps a flock of pedigree Suffolk sheep, but they do not use OP dips any more.

## **THE DELIVERY MAN**

From the mid 1980s until 1995, John Ashenden delivered OP sheepdip in containers to farms in Devon from the Exeter base of TNT, the transport firm. Mr Ashenden and his colleagues were not warned about the hazards of coming into contact with concentrated OP dip. They had no training, no protective equipment and were refused gloves to handle the drums, which leaked. This happened often enough for some farms to refuse the delivery, leaving the drivers exposed to the vapour and liquid for anything up to nine hours at a time.

Mr Ashenden became ill, and in 1995 appealed to the Transport and General Workers Union (TGWU) for help after he learned from Dr Bob Davies, a consultant psychiatrist, that what he was suffering from could be related to his work delivering OP dip. After the union referred Mr Ashenden to a firm of solicitors in Exeter, a lawyer contacted Elizabeth Sigmund at the OP Information Network asking for advice about OP poisoning. As the case meandered, Mrs Sigmund and Mrs Linda Wilkinson, a senior officer with the Citizens Advice Bureau in Devon, wrote to MPs – including Paul Tyler and Michael Meacher – asking for help for someone who was very ill and had talked about suicide.

Two years after Mr Ashenden's original approach to the TGWU, Dr Goran Jamal, a neurologist with experience in investigating OP cases, wrote a report on John Ashenden's condition for the union. He said: "The main chronic symptoms and manifestations suffered by Mr Ashenden are those described as neurobehavioural, relating to changes in his personality, deterioration in his concentration, abnormalities of his short term memory, disorder of speech and writing... which, in my opinion, represents a long-term neuropsychiatric complication of chronic OP poisoning."

Although another report from one of Dr Jamal's colleagues detailing other findings was submitted to the same lawyer appointed by the union, the case seemed to make no headway. The lawyer later wrote to the TGWU about another TNT driver, Ian Ritchie.

In 1998, Mrs Sigmund was so disappointed by the lack of progress on Mr Ashenden's case in particular that she wrote to Bill Morris, the former TGWU general secretary. She reported that Mr Ashenden had been forced to go to another firm of solicitors in the hope that he would have legal aid and better treatment than he received from the TGWU's appointed solicitors. "(Mr Ashenden's experience) could have led to an important victory for the TGWU in successfully acting on behalf of yet another eminently winnable case." In the same year, following information supplied by Mrs Sigmund, the Health and Safety Executive (HSE) investigated the way in which the TNT depot operated. At the end of its inquiries, the HSE wrote to Mr Ashenden, saying ".....the HSE investigation has only been concerned with establishing whether TNT UK Ltd failed in its statutory duty: we have not been able to do that." At the end of this year (2004), Mrs Sigmund recorded that three of John Ashenden's fellow TNT drivers had died of heart attacks. John is still severely disabled.

## THE WORKER

This is an abridged version of an article written by Elizabeth Sigmund, founder of the OP Information Network.

Tom Griffiths was a toxic fitter doing maintenance work in a storage cubicle on March 31 1958 in the chemical defence research establishment plant at Nancekuke, Cornwall, a pilot production plant for sarin GB. He was working with another fitter. More than 20 years later, a medical tribunal which met in 1979 confirmed that Tom Griffiths had an illness resulting from his exposure to an organophosphorus compound. He was offered a pension for life plus a back payment of two thousand pounds for disability due to nerve poisoning.

What happened on that day in 1958 led to a chain of events in which politicians, medical experts, a trade union and lawyers played an all too familiar role of thwarting justice for those poisoned by OPs. Tom and his colleague had been told by a scientific officer that the cubicle was clean and they didn't need any protective clothing or gas masks. When Tom noticed a drop of liquid hanging from a pipe above their heads, he knew that it was sarin GB, a substance closely related to OP pesticides, and that there was a leak. He and his friend left the cubicle, but their eyesight was affected, their blood cholinesterase levels dropped and they were kept under observation at work for three weeks. No treatment was given.

Tom was now able to do only very limited work. But he was concerned about telling anyone else what had happened because he thought his work was covered by the Official Secrets Act. So neither his wife nor doctor knew about the events in the storage cubicle. But when news of Nancekuke's real function broke in 1969, Tom Griffiths' doctor was told for the first time that nerve gas was manufactured there and Tom's work would have brought him into direct contact with it. The doctor heard about Tom's accident and referred him to a consultant neurologist who found it was likely that Tom's prolonged illness was due to nerve gas. Tom's doctor certified him unfit for work because of sarin GB poisoning.

In 1971, six reports on Tom went before a Department of Health medical board, which advised making an interim disability award. But the Department of Health headquarters had the case assessed by Dr Patricia Bidstrup, an expert in anticholinesterase poisoning. It was her intervention which supported the actions of politicians and delayed any just settlement of Tom Griffiths' case for years.

On the basis of Dr Bidstrup's report, the health secretary Sir Keith Joseph appealed against the medical board's findings. Sir Keith later appealed again against another medical board, as did Barbara Castle when she became health secretary. Finally, in 1975, a medical tribunal dismissed the evidence from Tom Griffiths' own doctor and rejected an earlier suggestion that he should be awarded four hundred and sixty seven pounds compensation, reducing this to one pound seventy five pence for "lack of vision."

Tom Griffiths was a member of the Amalgamated Union of Engineering Workers (AUEW), and their conduct bears comparison with that of the Transport and General Workers Union (TGWU) in the case of John Ashenden described in this report. Between 1970 and 1974, the AUEW were preparing to take a high court action against the Ministry of Defence to prove negligence. Solicitors for the union had Tom examined by a doctor who said that, although the medical evidence was inconsistent, Tom's symptoms and disability were not caused by

exposure to nerve gas. Without any chance of expert medical opinion being substantiated in open court, the solicitors advised Tom Griffiths not to continue with the case. They wrote to him saying that if he wanted to pursue the case, he would have to do so through other solicitors. Of course, this would mean the AUEW would not pay the costs of any action. Tom Griffiths died two years ago.

## **THE POLITICIAN**

No politician has done more to advance the cause of those poisoned by OPs than Paul Tyler, Liberal Democrat MP for North Cornwall. Mr Tyler chairs the all party OP group of MPs. As Mr Tyler is standing down at the next election, this is an appropriate time to record his thoughts on what has happened since he first started questioning Ministers about OPs in the House of Commons.

Thirteen years ago when Mr Tyler began his campaign on the issue of OPs in sheep dip, farmers had to dip their sheep twice a year under the law. Farmers were told that the most effective treatment was the OP based products, and there were very few alternatives. “Subsequently, when the then agriculture Minister John Gummer admitted the dips were not very effective and compulsory dipping was reduced and eventually abolished in 1992, there was not so much usage,” said Mr Tyler. “Some manufacturers went out of the market. But at the same time there were all sorts of other uses: malathion was used for a time as a lotion for treating children with head lice, despite the fairly obvious dangers.” Other uses of OPs included horticulture, as a component of household fly papers, as a spray in the first Gulf War and as a lubricant in the jet engines of some passenger aircraft.

In a recent question, Mr Tyler found out exactly which products sold in the UK contain OPs and who manufactures them. But how much OP chemical, in terms of tonnes, is produced across the world, and for what purpose, remains a mystery. “There is evidence that where a product has caused official concern over its approval in the UK, Europe or the United States, manufacturers have switched their sales to other parts of the world. I would not like to think how many farmers in the developing countries are now having to be the unfortunate beneficiaries of our refusal to use these chemicals.”

Research which might halt the sale of these dangerous chemicals can be flawed by its links with the very companies making and selling the OP products, said Mr Tyler. “All too often now, the most effective research is done by those who have an interest in the product concerned – rather than being done by the regulatory, authorising or legislative authorities. So you reach the point where the Minister or civil servants in any western country – and particularly Britain – asking for advice about the scientific and medical background to a product or how it has been tested is dependent upon people who have or have had a commercial interest in that product. There is the Minister, the gamekeeper sitting at the table with an array of people with great expertise at poaching, and yet they are advising him. There’s the professor of poaching, the consultant in poaching, the part time scientific head of a laboratory whose main income is from the poaching fraternity – and so on. There is nobody who has the integrity and independence to be able to say to a Minister that he or she has absolutely no commercial interest in an OP product whatsoever but they are right up to date with the science and can say yes or no to the approval of that product.” As a result, the authorisation of OP products is left to the notion that those responsible are as expert as they

will ever be at checking their own products – which, said Mr Tyler, is far from satisfactory. The system by which the Pesticides Safety Directorate or the Veterinary Medicines Directorate examines data about pesticides and sheep dips on the basis of fees paid by the companies which manufacture those products goes back to Mrs Thatcher, who decreed that no near market research should be done by Government. “The product is only really checked before authorisation by those who have a commercial interest in it being successful,” Mr Tyler explained.

But why should this elaborate poaching matter if OP products have been passed by all the relevant authorities as being safe, of good quality and efficacious? Mr Tyler emphasized that his was a subjective, layman’s view based on years of professional interest in the subject. “I think there are a percentage of the population who are either genetically - or through their previous health history - especially susceptible to long term damage to their health from exposure, sometimes at very low levels, to OPs, notably, but not exclusively as aerosols. It might be someone in a greenhouse, someone in an aircraft cabin or someone doing sheep dipping as a contractor – all this people can undoubtedly suffer from long term, chronic illness. Sometimes it is significant neurological damage which is very difficult to cure. Sometimes it is just increased sensitivity to all sorts of chemicals including OPs themselves.”

## **THE HEAD LICE PATIENT**

Dr Sarah Myhill, who has much experience in treating people poisoned by OPs, wrote the following, a case history of a 46 year-old lady who presented to her with neurological symptoms and chronic fatigue syndrome.

She was completely fit and well, helping to run the family business, performing in evenings as a semi-professional dancer as well as caring for her two young children who were at primary school. Primary school children through out UK are regularly exposed to organophosphates through headlice treatments. Furthermore because headlice are so infectious the rest of the family also have to be treated. The OPs used are lipid soluble which means they are readily absorbed through the skin – this is particularly true of the lotion based preparations. This patient had four headlice treatments and on the fifth treatment she reacted. She became completely numb over the right side of her head, forehead and ear. She telephoned the local hospital who suggested she took antihistamines but these were ineffectual. The next day she continued to have numbness and increasing pain over the right side of her face, indeed she had difficulty opening her mouth because of this pain. She had a profound burnt sensation in her nose, throat, mouth and dryness of her eyes. She was also extremely thirsty. The numbness persisted for another week before gradually settling but the pain in her face and neck became worse, was associated with an ongoing burnt sensation in her throat after which she developed bilateral tinnitus, increase sensitivity to sounds and smells and a spreading of her pain into her neck and lower back.

These symptoms suggest local effects of OPs on the scalp since OPs are easily absorbed through skin and this is where the concentration would have been highest. The ENT (ear nose and throat) symptoms were probably caused by the solvents and OPs evaporating from the skin and being inhaled – anyone who has used headlice lotion knows that it has a strong smell.

When the patient came to see me she continued to have a constant sensation of burning, soreness and discomfort in the left side of her throat, a pressure sensation there and difficulty in swallowing. Her strength and stamina were much reduced, her muscle tired quickly, she suffered from muscle jerks, twitches, spasms and tremors which were worse at night. She used to be able to dance twice a week, but now she had great difficulty learning new steps – she used to be able to pick up a new dance routine very quickly but now she found this a huge mental effort. Furthermore all her energy levels were markedly depressed, all activities had to be carefully paced and if she overdid things on one day she paid for it the next. Indeed she functioned at about 50% of her normal levels. In parallel with all this she had ongoing malaise with chronic flu-like symptoms. Not unnaturally she was frustrated and irritated by her inability to do things, but there were no symptoms of depression or anxiety.

In addition to the above neurological symptoms and chronic fatigue syndrome, the patient also developed multiple chemical sensitivity (MCS). It is possible that MCS is a protective reflex against further chemical poisoning and there is no doubt that toxic chemicals (especially pesticides) are very good at switching on MCS. In this condition sufferers react allergically to tiny doses of chemical which would not normally cause harm, such as perfumes, hairsprays, hair dyes, cigarette smoke, air fresheners, cleaning fluids etc. Avoidance is the mainstay of treatment and this has a socially devastating effect because sufferers dare not stray into an uncontrolled environment for fear of getting serious reaction. These reactions can be as serious as anaphylaxis (serious life threatening allergy reaction) or even cardiovascular collapse requiring resuscitation. This sensitivity usually continues for life.

This patient also developed contact sensitivity to nickel and gets red rashes with contact. Again this sensitivity is likely to persist for life.

This is a typical history of OP poisoning with local symptoms in the scalp and ENT areas where the concentration of chemical is highest, followed by more systemic symptoms as the chemical spreads through the body.

The immune damage results in multiple chemical sensitivity. The biochemical damage results in chronic fatigue syndrome and muscle symptoms.

## **THE SOLDIER**

Charles Plumridge is 64 and was a combat medical technician in the first Gulf War. He was demobbed in 1981 and called up as a reservist in 1990, aged 50. He was a reception clerk in a main operating theatre, and part of his duties were to receive patients from the battlefield, strip them and document them before they went to the operating table. As well as Iraqi soldiers, Mr Plumridge had to deal with three seriously injured British soldiers from the infamous friendly fire incident. He is now national coordinator of the National Gulf Veterans and Families Association.

Mr Plumridge had first hand experience of the way in which OP insecticide sprays were used, who used them and where they were used.

Upon his arrival in the Gulf, he was billeted in a holding camp known as Camp Blackadder, and it was here he first encountered OP sprays. “I was billeted in a large tent along with 19 other servicemen,” said Mr Plumridge. “On three occasions when I was confined to my bed

after reacting to vaccines and having a chest infection, I was present when a local arab dressed in everyday clothes and wearing a large handkerchief over his nose and mouth came into our tent with a canister strapped to his back, and, using a pump action hand spray, sprayed all around the inside, regardless of who was in the tent. He then sprayed the outside.”

Afterwards, Mr Plumridge and other soldiers from the tent asked an officer why the sprays were being used and also questioned a warrant officer. They were told the spray was done to keep down insects in the area. “When we asked about the person doing the spraying, we were told he was a local employed for the work. There was never any mention that he was an operator who had been fully trained in the use of OPs and other sprays.”

This information and quotes come from a letter which Mr Plumridge wrote to Ivor Caplin, the Minister for Veterans Affairs, after the publication of Lord Lloyd’s independent inquiry into Gulf War illness. In the letter, Mr Plumridge challenged Mr Caplin’s evidence to the inquiry in which the Minister quoted from the MoD’s Organophosphate Pesticide Investigation Team (OPPIT) report. Mr Caplin said that OP pesticides were used properly by personnel who had been trained in the safe use of such products.

Mr Plumridge wrote to Mr Caplin in December saying that his evidence to Lord Lloyd’s inquiry did not give the whole truth about the use of OPs in the Gulf War.

After he left the holding camp, Mr Plumridge and his colleagues joined their unit, 32 Field Hospital at Hafer Al Batin. Again, they slept 20 to a tent. During this deployment, a Sergeant in the Territorial Army Reserve, Tony Delahunty, was one of those detailed to do the camp spraying. Neither he nor anyone else in the detail had experience of spraying OPs. “The only protective equipment he used was a paper face mask which he obtained after some days as he claimed the sprays left a funny taste in his mouth during spraying,” wrote Mr Plumridge.

On at least two occasions, Mr Plumridge and two or three others in his tent were in their sleeping bags whilst Sergeant Delahunty sprayed the inside. Again, Mr Plumridge and his colleagues asked questions about the spraying, but were told the sprays were safe. Later, though, they were told not to sleep in the tents during spraying.

In 1995, Sergeant Delahunty died aged 46, and the coroner’s report recorded his death was due to chemically induced leukaemia. Today, Mr Plumridge suffers from osteoarthritis in his lower limbs; a serious bowel disorder; tingling sensations which never leave his arms and fingers; a very depressed immune system so that he cannot shake off a cold, for example; and post traumatic stress disorder which requires constant psychiatric treatment. “OPs have to be part of the cause,” said Mr Plumridge, who, like other veterans, is still fighting for an adequate war pension. “They were used without warning just like a household aerosol spray. They were bought locally and most of the instructions were in Arabic so noone could understand them.” Some years ago, Mr Plumridge had a quadruple bypass operation which, he said, had nothing to do with his service in the Gulf.

## THE AIRLINE PASSENGER

On their return flight from Florida in October, the Coomber family felt terrible and people round them began retching and being sick. “It was awful – a completely disgusting experience,” said Gary Coomber, a farmer near Headcorn in Kent. Mr Coomber and his wife Melissa are now anxious to trace other passengers on the flight so they can share their experiences and help the pilots, soldiers, farmers and others who want OPs banned.

Mr Coomber had already been poisoned by OPs, and what happened to him on flight BYO88B was typical of other sufferers who are sensitized by the chemicals and then find that any future contact brings a sudden return of a bewildering array of symptoms. Mr Coomber dipped his own sheep in OP chemicals until 1992 when he had a cardiac arrest. He stopped using the chemicals, but in 1994, Mr Coomber had another heart attack whilst walking through a field grazed by another farmer’s sheep which had been dipped in OP chemicals. Mr Coomber was referred to Professor William McKenna, now at the National Heart Hospital in London, who gave a written diagnosis linking the heart attacks with OP exposure. Professor McKenna supported Mr Coomber in his attempt to sue the companies which manufactured sheep dip OPs, but the case never came to court.

Because of his previous experiences, Mr Coomber already had the 1992 publication by Marrs and Ballantine called “Clinical and Experimental Toxicology of Organophosphates and Carbamates.” On page 394, there is a description of how OPs are used in aircraft systems. “They are added as anti-wear additives and to prevent interaction of the lubricant with engine surfaces,” say the authors. Tricresyl phosphate (TCP) is one OP added to aircraft oils.

Mr Coomber also checked the Boeing website, where there is a description of how the cabin air system operates by reclaiming heat from the engine. “Interestingly, they have done studies to say how safe this is,” said Mr Coomber. There is then a description of the symptoms suffered by the Coomber family – such as fatigue, headaches and nausea – but Boeing put this down to other causes such as low humidity and cabin altitude effects.

In recent articles published by the *Daily Mail* newspaper about OPs and aircraft, Mr Coomber has had some of his suspicions about the risks from OP use in aircraft systems confirmed. “There is nothing else which could explain my family’s illness,” said Mr Coomber. “The only way to resolve these incidents is by a thorough examination of everyone who was on that ‘plane. As a result of what happened, I will never fly again if I can help it.”

## THE PILOT

If it hadn’t been for an extraordinary coincidence, Captain Julian Soddy might never have thought that his illness could have been caused by OPs. It was during a visit to his doctor in 2000 that Captain Soddy – a former test pilot who had also done service with the RAF and flown civilian airliners – that he realised for the first time what had happened. His doctor’s father, a sheep farmer in Wales, had been affected by OPs used to dip his flock. “He told me it looked as though I had almost the same thing as his father suffered from,” said Mr Soddy,

who has now retired from flying and lives some of the time in Norfolk. “That was the first time I thought I had OP poisoning.”

By another stroke of good fortune, Captain Soddy was referred by his doctor to Dr Goran Jamal, a pioneer in the treatment and diagnosis of OP poisoning. Dr Jamal examined Captain Soddy and found he was almost certainly suffering from the long term effects of exposure to OPs.

Before this, Captain Soddy had been grounded for about three months and his health was reviewed every four weeks. “I wanted to return to flying. The chief medical officer of the Civil Aviation Authority (CAA) is a friend of mine, and I told him I wanted to fly. The airline bent over backwards to help, and I went back to flying with a colleague. But after about eight weeks, the same symptoms came back and I was almost in a vegetable type state.” After seeing his local doctor and Dr Jamal, Captain Soddy was grounded for good.

As a senior, highly experienced pilot, Captain Soddy had been earning about one hundred thousand pounds a year. He estimates he lost about half a million pounds in salary because he had to stop flying before retirement age. “I had a one off payment of fifty thousand pounds which was insurance for the loss of my flying licence, and I have a pension which is about a third of what I was earning.” In the middle of January, Captain Soddy was considering making a formal “intention to claim” compensation from British Aerospace, manufacturers of the BA 146 jet which he and other pilots exposed to OPs flew. “I went back to flying the 146 in 1995 and frequently when we started the engines up from cold in the morning the auxiliary power units would belch out smoke into the cockpit. We just turned the air conditioning up to maximum to try to burn off the oil.” It was this oil, leaking from engine seals, which produced the smoke containing OPs.

“My view is that this is an insidious, long term effect which creeps up on you over time.” CAA advice at the time was to put on oxygen masks, but Captain Soddy thought this was not the answer. “I had severe flu like symptoms every time I flew and they just became worse,” he remembered. “As we climbed through about 10,000 feet, my head would be bunged up, I had headaches and shortness of breath. In the end, I had to go back to the toilet and breath deeply to bring myself back round.” Captain Soddy was a fit man and keen sportsman, but found he could not play his usual game of squash after he had been exposed to contaminated fumes.

Captain Soddy thinks that the BA146 was more susceptible to fume events than some other aircraft. “The space within the aeroplane made it difficult to put in the recycling type of air filters and so air filtration was very poor. In addition, the auxiliary power units were difficult to maintain.” He has similar concerns about the Boeing 757, but he flew the Boeing 737 series and found it was a clean aircraft. “The only fumes in the 737 were from de-icing fluid sprayed on to the aircraft which got into the jet intakes.” As to the number of air crew affected by OP contamination, Mr Soddy said evidence so far was just scratching the surface. “There are more pilots around than there are jobs, so people are not keen to talk. But I think this is a much bigger issue than people realize.” (See page 5 for information about cabin air quality).



## THE DOCTOR

This study, which asks how common pesticide poisoning is in the community, was submitted by a doctor who has asked to remain anonymous.

For ten years I worked in General Practice in a rural village on the Welsh Borders. This is a largely farming community covering approximately 200 square miles with considerable overlap with other practices. The practice population was stable and averaged 1800 patients during the time that I was there. I have a particular interest in environmental medicine – this is all about looking for causes of illness such as diet, micronutrient deficiencies and toxic stress. During my time at the practice I became increasingly aware that many of the health problems suffered by farmers were related to occupational exposure to pesticides. I have listed the farmers who I believe had pesticide related problems. It is always difficult to be sure that pesticides are a problem, but in the absence of any other explanation, they must be a possible cause.

I have only included those cases in which:

- there was substantial exposure to pesticides
- the severity of the illness was such that the patient was forced to give up or substantially reduce their work load in order to manage their ill health
- the illness had a clear pathological association with pesticide exposure
- there were no other predisposing factors or risk factors which could otherwise account for this disease.
- or there was a serious diagnosis which threatened to shorten their life

I have excluded patients who moved to the practice because they knew I had a particular interest in treating pesticide related problems.

The problems I saw which I believe were exclusively pesticide-related include:

Chronic fatigue syndrome and MCS	9	farmers or farm workers
Heart disease	2	serious disease in men in fifties with no risk factors
Psychiatric disorder	2	one suicide, one severe emotional disturbance
Birth defects	2	
Neurological disease	3	Parkinson's, multiple sclerosis, benign intracranial hypertension
Cancer	2	young men, both extensively exposed to pesticides, with tumours with a recognised association with pesticides

Many of these farmers had more than one problem as exemplified by one who had CFS, heart disease and osteoporosis, but I've only counted them once.

There were other patients whose illness could be accounted for by pesticides which I have not included because they continued to work at a normal level although they suffered many symptoms.

These figures suggest that in a rural community, occupational exposure to pesticides is likely to account for 1% of health problems which are sufficiently severe to shorten or seriously impair life.

## **THE GUINEA PIG**

Alan Care, legal executive in the toxics personal injury unit at solicitors Thomson Snell and Passmore, Tunbridge Wells, Kent wrote this article about the recent inquest into the death of Ronald Maddison. Mr Care acted for Mr Maddison's sister.

This extraordinary and wholly exceptional inquest lasted from May to October last year and considered the circumstances of the death of Ronald Maddison at the hands of the State. The inquest followed on from media reports over many years and calls by the family to be properly informed. The original inquest (a verdict of misadventure) and Court of Inquiry (a finding of "idiosyncrasy") in 1953 were held in secret for reasons at the time of "national security", and allegations of a "cover up" abounded.

Using the popular US expression, "closure" was called for. HM Coroner for Wiltshire David Masters made an application to the High Court and the original inquest verdict was quashed by Lord Chief Justice Woolf. On the 15<sup>th</sup> November 2004 the jury decided unanimously that Ronald Maddison had died as a result of 1(a) respiratory failure due to 1(b) Sarin GB toxicity at 11am on 6<sup>th</sup> May 1953 at the Chemical Defence Experimental Station, Porton Down, Salisbury, Wiltshire and that the cause of death was the application of a chemical warfare nerve agent in a non-therapeutic experiment and that he was unlawfully killed.

On the 6th May 1953, 20 year-old LAC Ronald Maddison attended at Porton Down and died after 20 drops (200mg) of sarin GB, a chemical warfare nerve agent, were dripped onto his arm. He was "subject number 745". Sarin GB was even then known to be the most toxic of poisons having been bought back to the UK from Nazi Germany. He was taking part in a series of experiments with human "volunteers".

The overriding question for the jury at the inquest was to determine by their verdict whether or not Ronald Maddison was unlawfully killed at Porton Down, his death undeniably being "at the hands of the State".

Two verdicts as to unlawful killing were to be left open to the inquest jury to consider: unlawful act manslaughter or gross negligence manslaughter plus misadventure and open verdict. Gross negligence manslaughter would in essence be dependent upon the jury's straightforward consideration of all the factual evidence leading up to his death and was "supremely a jury question".

What lessons should be learnt from the unlawful killing of Ronald Maddison at "the hands of the state"? Clearly, that before ever embarking upon any experiment where there is more

than a trivial risk of harm, fundamental studies must be carried out. According to Professor Sir Ian Kennedy such matters must be “bottomed out”. In the case of the death of Ronald Maddison perhaps the major factors leading to his death were:

- Exploring the bounds of science by applying sarin GB upon servicemen and failing to control risks whilst “pushing at the envelope” of what is acceptable in a civilised society
- Failure to recognise the importance of human variability and susceptibility
- Failure to develop a fail safe pipette incapable of exceeding a safe dose and to complete animal studies before moving on to human studies

Again, in the wider context over many years, veteran observer/volunteers have constantly made calls for a public inquiry. Some 20,000 have attended experimental trials since 1914. It is absolutely clear, given the evidence at this inquest, that their plea is justified in all the circumstances.

## **CONCLUSION**

This report shows that the causal link between exposure to OPs and ill-health has been demonstrated by research. It may not be absolute proof, but that kind of evidence is not possible in research involving humans. It is now time for the Government to put a greater emphasis on helping the victims of OP poisoning.

20 January 2004