

The top secret world of  
germ and chemical warfare

# THE KILLING FACTORY

JOHN PARKER





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Within the perimeter of Britain's top-secret chemical and biological research establishment at Porton Down in Wiltshire and other international centres are some of the world's best kept secrets, to which John Parker has gained access. From thousands of documents and many first-hand accounts, he has amassed a wealth of detail from the controversial arena of gas and germ warfare.

Parker portrays a relentless international quest, often terrifying and brutal, for the most effective chemical and biological weapons and defence agents. The 'live' trials of biological agents in the London Underground and heavily populated areas of America. The dark humour in his account of 29 women from Unilever factories recruited to put anthrax spores into five million cattle cakes to be dropped over Germany. The graphic testimony from recent human volunteers used in Porton experiments. The on-going stomach-churning experiments on many thousands of animals.

This truly appalling account is capped, ultimately, with Britain and the United States supplying chemicals and anthrax to Saddam Hussein for an armoury that he eventually turned against their own troops. And Parker investigates how the cocktail of chemicals given to American and British soldiers to protect them from Hussein's weapons is leading thousands of soldiers, their wives and children to the courts to claim compensation for the dreadful consequences of the Gulf War.

The vast scale of development and manufacture is chillingly uncovered by the author. In the United States more than 3000 scientists are currently engaged exclusively on what it terms

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SMITH GRYPHON  
PUBLISHERS



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First published in Great Britain in 1996 by  
SMITH GRYPHON LIMITED  
12 Bridge Wharf, 156 Caledonian Road  
London N1 9UU

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A CIP catalogue record for this book is available from  
the British Library

ISBN 0 85685 121 4

Typeset by Computerset, Harmondsworth  
Printed in Great Britain by Butler & Tanner Ltd, Frome



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# CONTENTS

ACKNOWLEDGEMENTS	vii
PROLOGUE	1
1 THE HAUNTED GARDEN	11
2 THE HUMANE KILLER	27
3 HITLER'S SECRET AGENT	38
4 A MILLION TONS OF MUSTARD	48
5 KILLING THEM SOFTLY	58
6 THE UNFOUGHT BATTLE	69
7 SPOILS OF WAR	80
8 THE VOLUNTEERS	90
9 IT WOULD'T HURT A MOUSE	104
10 TESTING BUGS ON THE MASSES	115
11 AN EYEFUL OF CS GAS	125
12 SACRIFICIAL SLAUGHTER	135
13 THE ARMING OF SADDAM	149
14 A DEADLY CHRISTMAS COCKTAIL	161
15 ATMOSPHERIC OVERLOAD	175
16 STILLBIRTHS, MISCARRIAGES, DEFORMITIES	189
17 FORGOTTEN HEROES	198
CHAPTER NOTES	209
BIBLIOGRAPHY	220
INDEX	223







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## ACKNOWLEDGEMENTS

**I**T WILL BE be evident from the text that many people have given time and effort to the author with interviews and the provision of archive material, along with many others whose request for anonymity has been respected. A special note of appreciation is due to Mr Michael Roche, founder of the Porton Down Volunteers Association (PDVA), and his various members who agreed to be interviewed for this book, and recount their experiences. Thanks are also due to Mr Alan Care of the London firm of solicitors Leigh, Day & Co., representing the PDVA, and Ms Hilary Meredith of Donn & Co., Manchester, a leading member of the group of lawyers representing Gulf War Veterans. Thanks are also due to the staff and information desk at the Public Record Office at Kew in guiding the author towards relevant material and retrieving it rapidly from the archives during searches over many days, and to the Crown Copyright Department at the PRO for permission to reprint extracts from selected documents. Also great appreciation is due to Senator Donald Riegle, who headed the Senate Committee on Bank, Housing and Urban Affairs, and particularly for the efforts and assistance of his chief investigator, Mr James Tuite; the reports of both men were invaluable to this work. Many other sources in Britain and the US were readily forthcoming and are listed in the chapter notes and bibliography.

Photographs: cover, Associated Press; inside section provided by Associated Press, Yardley Collection, Foto Germany, Public Record Office, London, *Daily Mirror* and the photograph of Jayce Hanson, Derek Hudson, Paris.







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# PROLOGUE

'GAS. It's gas . . . Level Four. Level Four. Not a Drill, repeat NOT a drill.' The words were shouted often as thousands of chemical detectors and alarm systems positioned across the Saudi Arabian desert among the tented cities of the Coalition forces screamed the alert and sent troops diving for cover. Sweating buckets in their protective suits, drugged to the eyeballs with a cocktail of 13 separate vaccines and tablets, breathing air heavily polluted by sand, dust, diesel fumes, jet fuel, pesticides, bug sprays and depleted uranium tips of armour-piercing shells, the massed armies of Desert Storm were on the very edge of their nerves.

Saddam Hussein's expected chemical blitz would surely come. The fear of it, as one Gulf War military commander recalled, was worse than the sound of the howling big guns or the barrage of Saddam's Scud missiles. Mustard gas, phosgene, nerve gas, anthrax, cholera, bubonic plague . . . any one of a dozen lethal man-made horrors whose basic ingredients were shipped to Iraq from the West before the war, could have been loaded into the Scud warheads. There had been so much talk of it, so much preparation, the tension could be sliced with a blunt bayonet. Saddam's Scud attacks were launched on 19 January 1991 in response to the start of the Coalition heavy bombardment of Baghdad. Every Scud attack was met with a 20-minute wait while the air was tested. Sirens were sounding. The cry would go up: 'Level Four, Level Four.' And the troops pulled on their



gas masks, buttoned down their protective suits and found cover where they could, sometimes for up to eight hours at a time.

The insidious nature of Chemical and Biological (CB) weapons and the vivid memories of Saddam Hussein's trial run with chemical attacks, which killed up to 7,000 of his own Kurdish people in 1988, ensured a built-in scare factor that some who experienced it would say was far greater than that for conventional hardware.

They need not have worried.

There was no gas.

Nor were there any of those deadly germs loaded into Saddam's warheads. There was none blowing down on the wind from the bombed Iraqi CB plants, either.

Or, at least, not according to the official history of the Gulf War written by the British and American defence administrations. They repeatedly insisted that 'no chemical or biological agents were found within the theatre of operations.' There are many who beg to differ.

Dale Glover was a Staff Sergeant with the US 1165th Military Police Company who made a report which was logged by a senior officer in charge of recording all such incidents: 'I was awakened at 3:30 on the morning of January 20 by the noise of a sonic boom. The Battalion NCO was announcing that we were under chemical attack. I went out to check the M43 detector for signs of chemicals and found the visual display was blinking. I knew there were several possible causes that could have set off the alarm, like a sonic boom, pesticides or even strong vehicle exhaust fumes. The Battalion NCO and myself conducted tests with a standard Army issue 256 A1 detector kit. Both received a positive pale red colour on the nerve agent test spot. The NCO ordered a Level Four – and we took cover for four hours.'

Richard Turnbull, RAF corporal, based at Dhara, Saudi Arabia: 'I was in a nuclear and biological cell, building shelters and training others in the use of protective gear and instruments, such as the Nerve Agent Infantry Advanced Detectors (NAIAD) and Chemical Agent Monitors (CAM). On 20 January, there was a Scud attack around 8pm. It landed on the airfield and within seconds every NAIAD and CAM blasted off chemical warnings. We were placed on the highest alert. We all had to put on our masks and protective clothing, literally thousands of us. Afterwards, we were told not to worry. The alarms had gone off, they said, because of unburnt fuel from aircraft taking off. But, as we all knew, aircraft were taking off all the time. There were two other Scud attacks that night. One at Al-Jubayl and one at Tabuk. The alarms went off at three units. The nerve gases tabun and



sarin were among the chemicals detected by French and Czech units that night. I'm pretty sure they've affected me.'

Harold Jerome Edwards was the US chemical NCO in charge of the NBC team (Nuclear, Biological and Chemical unit) for the Naval Mobile Construction Battalion 24 Air Detachment at the King Abdul Aziz Naval Air Station: 'I conducted three M256 tests for chemical agents on the evening of January 20 after an Iraqi Scud raid. Two of the three tests conducted were positive for chemical blister agents. The negative test was taken in an area in between a number of rows of tents. I reported this information to my unit commander. One member of the unit, Tom Muse, blistered in the area under his watch. Eventually, the all-clear was given from a higher command.'

Fred Willoughby of Columbus, Georgia, who was with the Naval Mobile Construction Battalion: 'At about three in the morning, I was hanging out outside my tent when I heard a long, loud explosion. Shortly afterwards, the siren sounded and I went to get my gas mask. By the time I came out, people were yelling, "Level 4, not a drill." Immediately, my mouth, lips, and face became numb all over, a sensation like Novocain at the dentist's. I stayed in the bunker for about an hour or an hour and a half. When I came out I and others in my unit were told by the officers that what they had heard was just a sonic boom. The next day, the unit was told not to talk about it; at the same time the unit's protective gear was collected and replaced.'

Roy Morrow of Phoenix City, Alabama, assigned to the Air Detachment, King Abdul Aziz Stadium: 'I heard two explosions between 3:00 and 3:30am. We went to the bunker for 25 to 30 minutes until the all-clear was given. When I came out, there were Marines running and screaming, "Level 4." The siren sounded again. As I started to run for cover, I began to feel a burning sensation on my arms, legs, the back of my neck, ears and face. My lips felt numb. Next day, the head of the decontamination team came round. He told us that the two explosions were sonic booms, nothing more, and we were ordered not to talk about it. All of our chemical protection gear was collected and replaced with new equipment.'

William Brady, Battalion Logistics NCO with the US 217th Maintenance Battalion: 'There was a deafening sound, a flash of light, everything shook. I checked the chemical litmus paper in my contamination kit; it had turned red and I got a positive reading from an M256 kit. My nose began to run. I smelled and tasted sulphur and I began coughing up blood a couple of days after the attack.'

The area from which most of these reports emanated was outside



the range of all Iraqi delivery systems except for Scuds. On 20 January four Scuds landed near Al-Jubayl, two of them about 35 miles away and two about 58 miles away. Another 'live' find was confirmed in the official records of the US Marines, detailing its involvement in the Gulf War, published in 1993 by its History and Museums Division. One item related to a discovery in February 1991: 'At approximately 0656, the FOX chemical reconnaissance vehicle at Red 1 detected a trace of mustard gas, originally thought to be from a chemical mine. The alarm was quickly spread throughout the division. Since everyone had been told to don his protective outer garments and boots the previous evening it was only necessary to hurriedly pull on a gas-mask and protective gloves to attain Level 4 protection. A second FOX vehicle was sent to the area, and confirmed the presence of an agent . . . it was still sufficiently strong to cause blistering on the exposed arms of two AAV crewmen. Work continued on the clearance of the lanes, and the protection alert was reduced to Level 2 after about a half-hour.' The chemicals were found in an area not occupied by the Iraqis until after August 1990.

Then there is the mystery of the contents of a large storage tank that a British Army unit tested positive for mustard gas. The reports of its commanding officer remain classified in the UK but copies were obtained in the US. The tank had been sited by Iraqi troops in the grounds of a girls' school in south-eastern Kuwait, well inside the Kuwaiti theatre of operations and eventually occupied by US and British forces. By then the tank was riddled with bullet holes and was leaking a brown oily substance. Lieutenant Colonel Saleh Al Ostath of the Kuwaiti Army reported it to an officer of the Royal Ordnance Corps.

British Army Major John Watkinson was ordered to take his unit, the 21st Explosive Ordnance Disposal Squadron, 33 Royal Engineers, to the site of the Sabahiyah High School for Girls to examine the tank, which had a capacity of approximately 2,000 litres. Watkinson immediately ordered all personnel to move up wind, and after putting on his three-layered rubber chemical protective clothing, approached the container and tested the liquid with a chemical agent monitor. It gave a reading of eight bars on H, for mustard agent – a maximum reading indicating a highly concentrated agent – and no bars on G, indicating no nerve agent was present. Watkinson made two further tests and both readings gave positive for mustard gas. On a second visit, he inserted a wire into one of the bullet holes, and according to his report, wiped the oily substance on the wire on two types of



detector paper and again achieved a positive reading.

He sealed the holes with masking tape and left to fetch an M18A2 chemical detector kit. He tested again, and achieved a total of ten positive readings for mustard. The bullet holes were resealed using industrial silicone filler and plaster of Paris bandages and guards placed around the area.

Now the Americans became involved. The Commander of the 11th Armoured Cavalry Regiment was ordered to send two FOX chemical reconnaissance vehicles to the site. Since this was a joint and combined live-agent chemical-detection mission, involving both US and British forces, detailed rehearsals were carried out to ensure that no accidents occurred. One FOX team moved to the area near the container and began to insert a detection probe fitted to the FOX vehicle into the ground to a depth of about 4cm. The mass spectrometer showed chemical mustard agent in the ground. A second collection team in full heavy-duty protective clothing, covering them from head to toe, walked to the container, estimated to contain between 800 and 1000 litres, or about 250 gallons, of liquid carrying assorted detection equipment. They removed the storage container's seals and there was a discharge of pressurized vapour into the air.

Captain Michael Johnson, one of the US team, said in his report of the incident that he saw amber-coloured vapour escaping from the hole. The chemical agent monitor again registered eight bars, confirming highly concentrated mustard agent. Captain Johnson's unit pushed a medical syringe with a catheter tube into the tank to extract liquid for testing. Johnson reported that each of the mass spectrometer analyses confirmed mustard gas and further analysis by the system also showed traces of phosgene. In all, 21 tests conducted by Watkinson and Johnson showed the presence of mustard gas.

When the unit began to prepare for the removal of the tank and its contents, a member of the British team was injured when some of the liquid dropped on his left wrist. Johnson reported: 'The soldier suffered immediate pain and was believed to be going into shock.' He was quickly taken to a decontamination site and cut out of his chemical protective clothing. The medical team doused the soldier with a decontamination solution. Within one minute, a small blister was observed forming on his left arm, the size of a pinhead. About five minutes later, the blister had already reached 2in across and he was sent to the field hospital for further treatment. The soldier was one of Watkinson's men, Lance Corporal Robert Jones. An eye witness to the whole incident was another British soldier, James Alan McQuoid from



Birmingham, who was a sergeant in the 21st Squadron until he left the Army in 1992, with a letter from the Queen and a British Empire Medal citing him as a resolute leader in dangerous situations.

Given the opportunity, McQuoid would testify on oath in a court of law that the liquid that burned its way through Jones's three-layered rubber protective suit was mustard gas. 'Everything pointed to it – the machines identified it, the litmus test confirmed it, the oily consistency of it told us.'

It was also McQuoid who cut Jones from the protective suit. He is adamant that the suit was thrown to the ground and later burned for safety reasons, along with everything else that had been contaminated. 'I would have known if the suit had been retained or asked for,' he said. Yet when the British Ministry of Defence was approached about the incident – still classified in their eyes – they claimed that the protective suit had been collected up and taken to the Chemical and Biological Defence Establishment (CBDE) at Porton Down for tests. No gas agents were found, and the suit was subsequently burned there. Almost five years later, a British Commons Select Committee accepted a letter from Porton Down stating that the suit was contaminated by nitric acid – not mustard gas.

This view became the official line, repeated by the British MoD and the US Department of Defense: it was nitric acid, not mustard gas. The men were mistaken. The equipment must have been faulty. By then, other evidence had vanished. After completing their testing, the US FOX team leaders were ordered to remove the tapes from the mass spectrometer of the FOX vehicles by Lieutenant Colonel Killgore, the chemical officer for Task Force Victory. The tapes were the paper records of the chemical breakdown of the liquid or vapours, produced by the mobile mass spectrometer in the FOX vehicle. They were handed to personnel who 'suddenly appeared from nowhere' wearing desert camouflage uniforms with no rank or distinguishing patches.

Captain Johnson does not know what happened to the tapes or samples. He was ordered from the scene after his unit's mission was completed. From that moment, both the British and the US defence departments appeared to want to keep this discovery under wraps. A team of United Nations observers assigned to the area were informed that it was in the hands of scientists under the supervision of Porton Down. The UN could produce no written records of their findings at the site.

While the US Department of Defense and the British were denying the presence of chemical agents in Kuwait, the Kuwaiti, US



and British governments all received classified reports on this recovery of bulk chemical agents. Yet the MoD and the DoD consistently maintained that no chemical agents were located in areas occupied by Coalition forces.

A contrasting view would eventually be available from an unusual source – in a recommendation for an Army Commendation Medal presented to Sergeant James Warren Tucker for ‘participating in the mission that located stores of chemical agents’. Tucker was in a unit commanded by Captain Johnson who was awarded a Meritorious Service Medal for his actions. Two soldiers and as many as six others from the 54th Chemical Troop of the United States Army’s 11th Armoured Cavalry Regiment were given Army medals for ‘the positive identification of suspected chemical agents’ – which was the citation presented to Captain Johnson.

Reports retrieved from two separate NATO countries that were Coalition members during the Gulf War contained a detailed analysis of the discovery of the chemical agents, along with the testimony of nuclear, biological and chemical officers who were there. Still further evidence would eventually come from the records of a Czech military chemical decontamination unit, which had been flown in specifically to assist the under-staffed Saudi Arabian Army. The 180-strong unit was placed under the direct command of His Royal Highness General Khaled, a nephew of King Fahd, Commander of the Joint Forces and Theatre of Operation.

Long after the end of the war, and as hundreds of Gulf War veterans began to fall ill, the Czech Minister of Defence announced that its chemical decontamination unit had detected the nerve gas sarin in areas of northern Saudi Arabia during the early phases of the Gulf War. They had attributed the detection to fall-out from Coalition bombing of Iraqi chemical-warfare factories. The US Department of Defense publicly poured scorn on the findings, supported by the British MoD, and insisted that there was no evidence that troops were exposed to chemical-warfare agents.

However, after a visit to the Czech capital by an American investigations team, led by a US senator, a senior DoD medical officer admitted that chemical and biological exposure had not been explored ‘because it was the position of military intelligence that such exposures never occurred’. Finally, on 10 November 1993, the Pentagon acknowledged that the Czech government did detect chemical agents. But after analysing the results of the Czech report, the Department of Defense concluded that the detection was unrelated to the ‘mysterious



health problems suffered by some of our veterans’.

For that conclusion, the Pentagon clearly placed great score by views of British scientists attached to Porton Down. A Pentagon memo, viewed for this work, used the words of Dr Graham Pearson, director of Porton Down CBDE, to support its own rejection of a chemical presence. The memo read:

‘Dr Pearson, head of the British Nuclear, Biological and Chemical [NBC] labs and the foremost expert on chemical agents . . . has said there was no evidence to validate positive chemical detection incidents . . . monitors gave some alarms which resulted in the use of more capable detectors . . . all of the monitor alarms were ruled to be false alarms as the detectors never produced a positive reading.’ Yet one further mystery came up. During the hearings of a US Senate Committee of inquiry, its chairman Senator Donald Riegle discovered that chemical agent detectors used by US forces during the Gulf War were not sufficiently sensitive to detect sustained low levels of chemical agent and to monitor personnel for contamination.

It was admitted that the levels for the alarms were set at a rate 1,000 times greater than the minimum at which exposure was considered in ‘US safety regulations to be hazardous to people if exposed over a long period of time. Riegle also uncovered one other glaring miscalculation: that the US did not possess effective biological agent detectors. The military commanders had ruled out any exposure to biological weapons (BW). Yet when Riegle collected up samples of equipment from veterans themselves and had them independently analysed by a leading US research institute, traces of BW agents were found in gas-masks.

Riegle, whose staff interviewed hundreds of veterans and war commanders, was angrily explicit in his assessment. He said:

‘The information provided by the veterans indicated that exposure to chemical and possibly biological agents was widespread – widespread! Detections were confirmed by chemical specialists deployed in Saudi Arabia, in Kuwait and in Iraq.’ The chemical alarms went off so frequently, it was reported, that some were even turned off. They were activated by small amounts of nerve agents released by the bombings of Iraqi chemical facilities, storage depots and bunkers, but troops were often told that there was no danger.

One more piece of evidence was turned up by the Senate Committee’s chief investigator, James Tuite. He discovered that the US Department of Veteran Affairs had conducted a confidential survey of CB specialists with the 1st Marine Division. They were asked specifi-



cally if they had encountered any CB munitions during the Gulf War. Out of the experts questioned, 71 said no, 32 said yes and 9 declined to answer.

Meanwhile, the British and the Americans continued to assert that no troops were exposed to any CB agents in the war theatre – a claim that, as will be seen in ensuing chapters, is vehemently challenged. Not least by the 45,000 Gulf War veterans who registered some form of post-war illness in themselves or their families. As those numbers began to mount, and devastating effects appeared among troops and in the deformities of many of their children, the Pentagon memo once again deferred to Porton for blunt rejection of such claims:

‘Dr Pearson says British studies determined that there are no long-term effects from small doses of chemical agents. American studies agree. Therefore it is not useful to worry if Allied forces ever encountered chemical agents . . . the British reject the idea of a new disease. The military actually suffered fewer health problems during the war . . . much of this is attributable to the reduced consumption of alcohol . . . thus the British conclude that it would not be useful to investigate more deeply reports of a new Gulf War disease.’

The British word on such matters is the one that few are prepared to challenge. ‘When you are talking CB technology,’ said a source for this work, ‘all roads lead to Porton Down. It is a miniscule operation compared with what the Americans and the Russians have, but Porton has consistently led the field. They wrote the gospel in terms of CB technology and the Americans treat them with great respect.’

It goes much deeper than that. As will be seen in the ensuing pages, Britain and America have maintained an active partnership in their CB research, dating from the first use of gas by the Germans in 1915. The links were formalized at the end of World War II when joint Anglo/US teams swept through Germany and the Far East gathering up the spoils of war. They brought home mountains of research documents, photographs, laboratory samples of animal and human organs, along with tons of equipment plundered from the Nazi and Japanese CB installations, concentration camps and PoW compounds. And many senior Axis scientists were granted immunity in exchange for their knowledge.

From the late 1940s, the partnership developed, with a constant interchange of information and staff, predominantly to develop Hitler’s secret nerve gas and Japanese biological weapons, which Allied intelligence feared had also fallen into Russian hands. The association has continued throughout the second half of the century to



match the Russians. They have co-operated on many joint missions: while the US biological chemists were spraying bacteria over San Francisco to test its spread, Britain equipped two special ships to float hundreds of animals tethered on rafts in the waters off the Bahamas to test more virulent agents. When US scientists spread bacteria through the New York City subway, Britain did the same in the London Underground. Controversial 'mind-control' experiments with LSD, which so occupied the CIA in 1960s, were pursued in Britain on a mass basis, using detachments of soldiers. Results of horrific experiments on animals routinely carried out at Porton produced vital research data used by their US counterparts.

When the British government halted the stockpiling of nerve gas, America carried on, using Porton-developed gas of the highest potency. The American military was conducting aerial tests with that very strain when in 1968 they released a cloud of it across the Great Salt Lake Desert in western Utah and killed 6,000 sheep.

When the use of human volunteers to test nerve gas was banned in the US in the 1970s, British researchers continued to herd up to 200 men a year into Porton laboratories, for which it re-equipped itself with a new £3.5 million gas chamber complex, opened in 1996. It does so in spite of a mounting toll of ill health among many earlier volunteers who have provided personal testimony for this work.

They tested suits and medication that would be used in the Gulf War – for which the combined expertise of the US and British CB experts was marshalled once again, both in Allied efforts to protect Coalition forces from Saddam Hussein's much-feared CB attack, and in playing down the consequences.



# THE HAUNTED GARDEN

**I**T IS PERHAPS the absolute paradox that the place that for eight decades has experimented with some of the most deadly poisons known to man is to be found within one of Britain's most coveted and protected nature reserves. 'It is,' said Richard Harvey, a local activist and former peace campaigner who has lived beside it for most of his adult life, 'a Jekyll and Hyde of a place – sinister, compellingly so, and yet engulfed in a natural beauty that is rarely surpassed anywhere in Britain.'

That is why the Ministry of Defence calls it 'The Jewel in our Crown', which is a reference both to its 80-year record in contributing to the defence capabilities of the British armed forces against chemical and biological attack, and to the environs and habitat in which it is situated.

Porton Down has been the home of the Chemical and Biological Defence Establishment (CBDE) since it was hurriedly founded to combat a German gas attack in World War I. It is set within 7,000 acres of the glorious, rolling countryside of Wiltshire. It is also one of the most secretive and sensitive installations anywhere in the United Kingdom and although its presence becomes immediately obvious to visitors who flock to this region to enjoy the tranquil beauty of its villages and the unspoiled charm of its towns, few have any real idea of what goes on inside. High fences topped with barbed wire protect much of its perimeter. The landscape is dotted with the tall, white



painted flagpoles carrying pennants of Red for Danger. 'Keep Out' notices are displayed in profusion.

The area is kept under constant surveillance, electronically and manually, by patrols of police and security guards and plain-clothed officers. Helicopters and low-flying aircraft are often in the air above it. Anyone stopping on the country lanes that criss-cross the open areas of the Porton landscape can expect an inquisitive guard to swoop in from nowhere. 'It has always been that way,' said Richard Harvey, 'to the point of being a nuisance, a fear and at times a threat to local residents. There has always been an air of paranoia about Porton – less so now than when the militant animal-rights campaigners were at the peak of their extremism, blowing up members of staff and sending threatening letters to others. It's understandable, I suppose, that the Porton staff should be protected almost as prodigiously as the secret projects they are working on. But for those of us who regard the use of animals for experimental purposes as abominable – though do not resort to extremist methods to make the point – Porton Down is a place haunted by the ghosts of the millions of creatures who have been, to use the term of the scientists themselves, sacrificed there.'

It is precisely because of the activities within the complex that the estate became the so-called 'jewel'. The security cordon protected it from the trampling of the masses, and it was left untouched by the vagaries of modern land management and, ironically, completely free of the pesticides that have been the subject of great scrutiny by the scientists who work there. Large areas of the site have been left the way nature had perfected them, with archaeological monuments that date from the early Neolithic period.

In 1977, Porton Down was scheduled by the Nature Conservancy Council as a Site of Special Scientific Interest and, in 1992, English Nature signed a management plan with CBDE to ensure the future preservation of about half the Porton site. It is a massive garden of unspoiled natural beauty, with tree-lined lanes and lush pastures containing relics and sites of prehistoric man which until recent times have received few visitors from the outside world. Recently, however, the establishment has been listed as a Special Protection Area under the European Commission Directive on conservation and is playing host to visits by natural history groups from all over Britain, with limited access, of course, to the Porton estate – but well away from the test sites and laboratories.

It is a fascinating place. More than 200 sites of archaeological relics dating from early prehistory have been recorded. Some have been



excavated but most remain undisturbed. They include cemeteries, flint mines and 100 mineshafts, which provide an unrivalled example of Neolithic life and industry, dating to around 3300 BC. There are 115 round barrows of the Bronze Age, 2300 BC, including the largest bell barrow known in Wiltshire, over 15km of late Bronze Age linear earthworks, Celtic field systems from the early Iron Age, around 1200 BC, and sites of pit cremations from 1740 BC.

Many of the areas of downland have never been tilled and the lack of any chemicals has resulted in a rich and diverse growth of chalk grasslands where flora and fauna of a kind that has long become extinct elsewhere in the British Isles are found in profusion. It has become, for example, the most important site for juniper, with more than 18,000 bushes, 20 per cent of the juniper population of southern England. Fifteen different species of wild orchid have been recorded there, along with rare continental species of candytuft originating from the Iberian peninsula. Many varieties of fungi and lichens, which have disappeared elsewhere, are thriving.

The plant life has provided a haven for five significant communities of invertebrates, four of which have been listed as being of national importance. It supports a population of yellow ants estimated at around three million in mounds that are up to 100 years old. It has the largest spider community of any similar site in Britain, containing 194 different species, including some of the rarest ever found in the British Isles.

Over the years, 87 per cent of all British butterfly species have been recorded at Porton. It has the largest colonies of both the Silver Spotted Skipper and the Dark Green Fritillary, of which there were about a million. There are nationally important colonies of the Marsh Fritillary, the Duke of Burgundy and the Adonis Blue.

The wildlife population provides an equally exciting list of inhabitants: 96 different species of birds including the endangered stone curlew, which here enjoys one of its last remaining breeding habitats, along with deer, badgers, rabbits and squirrels.

It is here, too, that experiments have been conducted on hundreds of thousands of animals of many species – and humans. The figures are beyond estimation but approaching three million since Porton was first opened, as its scientists sought to create, test and perfect some of the deadliest weapons known to man; where enough supplies of a biological agent capable of wiping out the entire nation can be stored in an exceedingly small jar.

Since its inception, Porton has been surrounded by the most



secure measures of confidentiality, especially over its use of animals and humans in experiments. They have become an integral part of its history, creating a moral dilemma that, in a way, has been fundamentally overwhelmed by the place itself. It is steadfastly proud, almost arrogantly so, that it was charged with first creating, and then spear-heading a defence against, CB weapons capable of far greater devastation even than was ever imagined at the height of the nuclear age.

It all began at a place that was the Kuwait of the World War I, the little town of Ypres, in Belgium – the town that died twice as Germans and the Allies fought ferocious battles in the early months of the Great War. It lay in a small pocket on the Flanders plain three miles inside German lines and became a citadel of courageous resistance, known to all as ‘Wipers’. Its strategic location as the gateway to the Channel ports meant that Ypres was under constant attack.

The first Battle of Ypres raged through the autumn of 1914. British, French, and Belgian troops, heavily outnumbered, resisted a German offensive aimed at the French ports of Calais and Dunkirk on the English Channel. After 34 days of fighting, thousands lay dead in the Flanders mud. Ypres was mercilessly bombarded, yet as the troops went to ground during the dreadful winter of 1914/15, its people drifted back as the battlefield around them fell temporarily silent, with the Germans preoccupied at Neuve-Chappelle and Champagne.

The Allies held the front but Flanders was devastated, a sea of mud as the shelling broke down the natural drainage of the land. The dead of the previous autumn lay still unburied between the lines on the thin strip of No Man’s Land, just a few hundred yards wide. ‘An acrid smell of death infected the air, which even the chloride of lime failed to make endurable,’ records an official British history. Even so, life began again among the wreckage of the town, in the cellars and the bombed-out buildings. The soldiers drank vin rouge as the bistros reopened and lorries were soon rumbling through the cobbled streets once again. The respite was briefly taken, and on 17 April 1915 the second Battle of Ypres began when the British Royal West Kents captured what was known as Hill 60 and occupied the German trenches.

Their success was short lived. The German High Command furiously ordered an immediate counter-attack and within three days Hill 60 had become a mound of shell craters strewn with bodies. Next,



the offensive was turned once again to Ypres, upon which the Germans rained a heavy attack of Jack Johnsons – the 17in howitzer shells fired in pairs every 20 minutes.

Ypres was crushed for the second time and the surviving civilians fled once more, leaving the soldiers to battle it out. What followed was, in the words of Sir John French, commander of the British Expeditionary Force, ‘practically indescribable’. Thursday, 22 April was a glorious spring day and the hedgerows of Northern France were beginning to glisten with the white of blossoms, and in the fields wild flowers bloomed around the crater scars. The day had passed relatively quietly, but just before 5pm the Germans began their bombardment again. Heavy mortar fire pummelled Ypres and the villages in front of it.

Then, the French territorial and coloured colonial troops on the northern shoulder of the salient heard what they would describe as a ‘loud hissing sound’ coming from the German lines. A cloud of whitish vapour appeared along the German front. It was, as Beatrix Potter wrote in *The Battle Book of Ypres*, an uncanny vision. The hissing continued for about ten minutes and the whitish vapours seemed to change colour. To some, it was a bluish-white mist; others saw it as a greenish-yellow cloud, which gathered to the height of three men and rolled along the ground towards them, propelled on a gentle breeze.

The cloud increased in intensity until it was estimated to be at least five miles wide and half a mile in depth, a massive man-made fog of poisonous fumes, heading inexorably towards the unsuspecting troops. In the first ever use of poisonous gas in war, the Germans had placed 5,730 cylinders containing 160 tons of chlorine along a four-mile stretch of the front. It was a devastating chemical that attacked the lungs of its victims, producing an instant accumulation of liquid in the windpipe, frothing into the mouth and blocking the lungs so that the casualties actually drowned in their own fluids.

On the northern flank of the Allies’ Ypres salient, the 45th Algerian Division and the 87th French Territorials were the first to be enveloped by the poisonous shroud, with catastrophic results. Their eyes began streaming uncontrollably and then the soldiers were choking and coughing, spitting blood and retching in agony. Dozens died where they fell. Others who dared to stand on the parapets escaped the worst effects, for the greatest concentration of the gas was at ground level and in the trenches.

As the cloud began to knock down the enemy, German infantry,



faces masked with moist gauze tied across mouths and noses, advanced firing at will, but even they were shocked by the scenes of sheer horror that confronted them. Bodies littered the battlefield. Men with faces of tortured agony had collapsed gasping for air. Those who were still alive were heaving up the terrible yellow fluid from their lungs. Their weapons, the metal buttons on their uniforms and even their watches had turned green.

The attack led to an immediate rout of the French. In his account of the resultant battlefield mayhem, Colonel E.D. Swinton wrote: 'Behind the wall of poisonous vapour which had swept across fields, through woods, came the German firing line . . . allowing sufficient time for the fumes to take full effect, the Germans charged forward over a practically unresisting enemy and, penetrating the gap thus created, pressed on silently and swiftly south and west . . . and then when their infantry had reached well behind the enemy lines, the Germans opened hot artillery fire with a bombardment of high explosive shell and shrapnel of various calibres and also with projectiles containing more asphyxiating gas.'

The French colonial soldiers who had taken the brunt of the gas attack were, Swinton wrote, confused and mortified. Those still able to move, many of them already blue with cyanosis fled, crying, 'Gaz!' Some did not stop running until they reached a town six miles away, and all around was 'wild confusion' as panicking soldiers and civilian refugees swarmed along the roads.

Medical teams with their wagons began collecting up the survivors and bringing them to the field hospitals. 'Soldiers lying on the floors with faces of a blue or ghastly green colour, gasping for air in their struggles with death . . . with the faintly metallic smell of chlorine everywhere,' wrote one American surgeon, Harvey Cushing, serving with the American Ambulance Service. He recorded that of 1,000 men of the Bataillon d'Afrique only 60 had escaped. One of his colleagues, William Boyd, wrote in his diary: 'I saw a sight which for sheer ghastliness equals anything . . . in a courtyard were 200 men on stretchers. Some were in a state of stupor, flies buzzing around their faces; some were sitting up gasping for breath with hands and faces of a deep dusky hue. A few had fallen back and with gurglings in the back of the throat were passing away into the undiscovered country. They were the first gas cases from Ypres.'

It was many hours before the Allied commanders were able to assess the scale of the disaster that had overwhelmed them. Even the German commanders who had ordered its use as an experiment had



no real idea of the outcome. It was a battlefield try-out and they had no reserve supplies immediately available to exploit the attack. Even so, the gas had scorched a four-mile-hole in the Allied lines.

Sir John French, the British commander, wrote: 'It was impossible to realize what had actually happened. Fumes and smoke obscured everything and within an hour of it being launched the whole position had to be abandoned along with 50 guns.' Casualties were officially put at 15,000 of whom 5,000 were dead, though in reality the figure was far higher. French immediately telegraphed the War Department in London, urging 'immediate steps be taken to supply similar means of most effective kind for use by our troops . . . Also essential that our troops should be supplied with adequate protection.'

French also called for the immediate despatch of scientific advisers to suggest temporary solutions to the gas. The contingent arrived at the front on 27 April, and among them was Professor John Scott Haldane, the Scottish physiologist who was to play a major part in the inauguration of the Allied response to the German gas. The scientists, like the military, could offer no immediate solution. All the men could do was to hold moistened cloth over their faces during a gas attack. In the trenches, soldiers had to urinate on socks, handkerchiefs or any other pieces of material they could rip from their battledress to tie around their faces.

The Germans, buoyant with their success, began planning a new onslaught. Within 36 hours, they were ready to attack the Allied lines held by the Canadian divisions. As the official Canadian Record Officer noted in his account of the battles: 'On Saturday morning just before dawn a German airship appeared in the sky to the east of our line and at this point dropped four red star flares which floated downwards for some distance before they died out. When our men, whose eyes had not unnaturally been fixed on this display of pyrotechnics, again turned to their front it was to find the German trenches rendered invisible by a wall of greenish-yellow vapour which was bearing down upon them on the breeze, travelling at perhaps seven or eight miles an hour. Through this, the German started shooting. The stupefying gas was launched on several occasions on that day, but the attack was not pursued very quickly. The reason given by a German prisoner is that many of the enemy's own infantry were also so affected by the fumes that they could not advance.'

With officers shouting 'Stand Firm' the men held moistened cloth over their faces and watched the coloured mist rolling towards them. 'We waited until the vapour reached our trenches,' the Canadian



account goes on, 'and then we charged through it and met the advancing Germans with the bayonet as they swarmed over the parapets.'

Canada, the record officer wrote, had a 'large graveyard in Flanders, very large'. The combined gas, artillery and infantry attacks killed 5,000 men. Among them was the first casualty on whom a post mortem examination was conducted, one Sergeant Grindley of the Canadian 15th Battalion, whose body was to provide the doctors with their first insight into how to treat gassed soldiers. The report, by Lieutenant McNee of the Royal Army Medical Corps, lodged in the Public Record Office at Kew, read: 'On opening the chest, the two lungs bulged forward. On removing the lungs there exuded a considerable amount of frothy light yellow fluid, evidently highly albuminous, as slight beating was sufficient to solidify it like the white of an egg. The veins on the surface of the brain were greatly congested.'

The first British troops to face the gas on 1 May were from the 1st Dorset Regiment. By then, military commanders were desperately pleading with their war offices and scientists for protection. The gas attacks continued on May 6, 10 and 24. Yet five more weeks of fighting around Ypres secured no breakthrough. A stalemate had been reached and the Germans brought the battle to an end. German losses totalled 35,000 officers and men; Allied casualties were about 60,000. In those five weeks around Ypres, the Germans had released 500 tons of chlorine from 20,000 canisters. As the Second Battle of Ypres was being left for historians to record and assess, the first chapter in the history of chemical warfare had been written.

It had started two years earlier, when the 'fathers' of modern chemical warfare, Professor Fritz Haber of the Kaiser Wilhelm Institute and Professor Walther Nernst of the University of Berlin, were conducting experiments for the use of gas on the battlefield. The German High Command was half-hearted about using gas. Haber, a 40-year-old chemist and, incredibly, a future Nobel Prize Winner, persisted even after losing his assistant, Professor Sachur, who was blown up in an early laboratory experiment. And it was Haber who brought to fruition the threat that had lingered for centuries – that some time, some where chemicals would be used in war.

There was nothing new in the concept. Incendiary weapons were originally invented by the Greeks, Hannibal used to hurl bottles of poisonous snakes on to the ships of his enemies, the Spartans burnt sulphur and pitch to produce sulphur dioxide, a gas that hit the throat and lungs. Even Napoleon envisaged the use of a crude form of germ



warfare when he flooded the ground around Mantua to try to spread malaria. Toxic gases were more seriously proposed during the American War of Independence and the Crimean War.

In fact the French were the first to use chemicals in World War I, when they fired tear gas at the Germans in August 1914, though without great effect, and the Allied generals ridiculed the idea. Now, it was a reality. Germany had done what no one believed any nation would do and there was uproar, panic and a massive outcry of moral indignation among the Allied nations. Even Professor Haber's wife pleaded with him to give up his work. He refused and was already experimenting with a new gas, phosgene, to be unleashed on the Eastern front in the summer of 1915. On the night he left to oversee the new attack, she committed suicide.

The Allies, meantime, were desperately attempting to form a response and a defence to the Germans' new weapons. It would be almost a year before the British were able to manufacture crude protective helmets and respirators and many of those were ineffective, as the Germans had already discovered to their cost. Dozens of German corpses, soldiers who had died from the effects of gas, still in their respirator hoods littered the battlefields. In this mêlée of anger and confusion, the first moves were made towards the birth of Porton Down chemical experimental station, as the British led the Allied nations into efforts to match the Germans gas capability.

The War Office gathered all available experts from the military and the chemicals industry. A scientific advisory committee was set up to supervise the production of a suitable gas, hampered though it was by the lack of industrial capability and a suitable testing site, not to mention ignorance. It became a matter of supreme urgency, according to War Office documents of the day, to set up a 'ground for experimental purposes'. Several sights were visited, in Dorset, Hampshire and Wiltshire before they settled on Porton, then a tiny village close to Salisbury Plain.

Scientists were co-opted by the War Office and were placed under the charge of the Royal Engineers to create, amid great secrecy, Britain's first chemical warfare unit. RE Major Charles Foulkes was promoted to the rank of Lieutenant Colonel and given the title of Gas Advisor to the Commander in Chief of the British Expeditionary Force. Foulkes was already a legendary figure in the British Army, in which he had served for 23 of his 40 years, with battle-zone experience in various parts of the world. His appearance bore the marks of a fighter; his mud-stained uniform torn and dishevelled and his cap split by shrapnel.



He was sent immediately to London to liaise with the scientific committee and returned to France with orders to form Special Companies – so called to conceal their purpose – each with two officers and 80 men. By early July 1915 four companies of soldiers with scientific experience or qualifications had been gathered. The mystery surrounding them was further enhanced when they were eventually posted to the front, identifiable only by their brassards of pink, white and green – colours that were to be incorporated in the Porton Down mess tie.

They began work at an experimental site at Helfaut in France; while in Britain chemical and engineering factories were working around the clock to produce chlorine gas and cylinders to carry it. By August, the first of the stockpile of gas-filled cylinders was on its way to France and by mid-September Britain's retaliatory effort was being demonstrated to the British commanders, five months to the day after the first German attack.

Needless to say, there were problems, not to mention great indifference – and fear – among many of the military commanders, and their men of all ranks. The first British gas attack was directed from the battle headquarters. By then, Foulkes had amassed a force of 1,400 in his Special Companies and by mid-September they had placed 5,500 gas canisters containing 130 tons of chlorine along the Western Front.

After several delays and anxious reports about wind changes, the attack was finally given the go-ahead for 5am on 25 September 1915, but even then all did not go according to plan. On one section of the front, the gas company discovered they had the wrong-sized spanners and could not release the nuts on their canisters. On another section, one of the officers refused to give the order to open the cylinders because of wind change. He was ordered to obey the command immediately, and the gas blew straight back into the faces of the British troops.

The Germans, realizing that Allies were launching gas, opened fire on the emplacements and several canisters were hit and the gas spread through the British trenches. Several men of the Special Companies died from their own chemicals. Those mishaps apart, the bulk of Britain's gas stock was released, the hissing cloud sent forwards, the men watching it roll steadily towards the German lines. There was more than a touch of fiasco, resentment and fear in the British act – as vividly recalled by Robert Graves in *Goodbye to All That*.

The British Trench Warfare Department was pushing ahead with plans for its new experimental station at Porton Down and by the



winter had acquired an initial 2,886 acres there, to which a further 4,000 acres would be added. A distinguished chemist and academic, Arthur Crossley, a professor of organic chemistry at King's College, London, was appointed to the role of commandant and superintendent of operations, for which he was given the rank of Lieutenant Colonel.

After spending some time at the front in France, he arrived at Porton to discover that his new base consisted of two Army huts, which had no running water, no electricity and no roads. In a copse nearby – later to be nicknamed by the locals as Gas Wood – lay the first consignment of 116 industrial cylinders containing hydrogen chloride, which had been prepared at Oldbury, Birmingham. Each one was 5ft 8in long and weighed 30lb, and had been sent by rail and moved from Porton station by local labour. A civilian watchman had been hired to stand guard until Crossley and his military back-up team arrived.

Sergeant Major Dobbs of the Royal Engineers reported for duty on 11 April. He was given the task of recruiting 13 civilian workmen and training them for gas experiments in the Porton countryside. Another six civilians from a mine rescue team, trained in the use of breathing sets, arrived at Porton to act as 'samplers' who would go into the gas clouds as they were released for testing. This contingent represented the first of many thousands of servicemen who would become human guinea-pigs in the decades of experiments using humans that followed at Porton. Within a month of his arrival, Crossley had set up his laboratory, and his first experiments began with gas cylinders set up in a mock war front. A system of trenches had been dug, into which were placed dozens of rats in cages.

The field trial viewed by the new Chemical Advisory Committee of scientists and military experts was judged to be 'highly successful'. Unfortunately for the British, the Germans were already one step ahead. Professor Haber had perfected the new and deadlier phosgene gas and was experimenting with shells instead of canisters, so that the gas could be fired directly into enemy lines.

Phosgene introduced a new level of fear for the Allied troops. It was, first of all, almost 20 times as powerful as chlorine and far less easy to detect. Troops were not immediately struck down by it; the effects might not become apparent for 24 hours or more. A victim of severe gassing would just collapse and die without warning; for others it was a slow and painful death, with men evacuating up to half a gallon of foul, yellow liquid uncontrollably from their mouths every



hour. On the first day it was used, more than 1,000 men were gassed, of whom 116 died within 48 hours. The survivors would suffer the consequences for years to come.

The British, once again in haste, switched to phosgene and launched their first massive attack with the new gas at the Battle of the Somme. The huge cloud, released among the Allied front of almost 20 miles, rose 60 feet in the air and travelled on the breeze, reaching the German lines a dozen miles beyond, killing all wildlife that came in its path. 'Birds were falling from the trees,' contemporary news reports stated, 'and hundreds of dead rats are found in the trenches after each attack.'

Germany was extending its trials on shell-delivered gas, for greater accuracy. Porton experiments, on the other hand, still concentrated on gas from cylinders, an aspect that detained its scientists for far too long, although one of the Special Company commanders, Captain Livens, had invented a projectile, which was first tested on the Porton ranges in the early months of 1917.

In his report on the effectiveness of his canister-firing projectile, Livens clinically estimated that the device was so simple it could be manufactured by mass production so that 'the cost of killing Germans would be reduced to sixteen shillings each'. The Livens projectile and the small gas canisters it would fire went into immediate production and they were first used in the Battle of Arran in April 1917.

In his book *Gas: The Story of the Special Brigade*, published in 1936, Charles Foulkes recalled: 'there was a muffled roar as 2,340 of these sinister projectiles hurtled through the air . . . twenty seconds later they landed in masses in the German positions and after a brief pause the steel cases were burst open by the explosive charges and nearly fifty tons of liquid phosgene were liberated which vaporized instantly and formed a cloud so dense that Livens who watched the discharge from an aeroplane noticed it still so thick as to be visible as it floated over Vimy and Bailleul villages.'

Quite apart from the fear that the exploding canisters brought to the German lines, one of the other unexpected side effects was that the gas cloud killed or disabled hundreds of the horses and mules that were dragging the German supply carts to the front. Their soldiers soon began to run out of ammunition and while the gassing of troops on both sides of the infamous No Man's Land produced the most terrifying experiences, it must be said that conventional heavy metal continued to incur by far the most devastation.

At least, that was certainly the case until the Germans unleashed



one final escalation in the chemical battle. Like Britain, they had been experimenting with many new agents such as phosgene and arsenal smoke and harassing chemicals. By the summer of 1917 they had perfected another calamitous new gas – what became known among the troops as HS – Hun Stuff or Yellow Cross, from the marking on its shells – otherwise known as mustard gas.

It was judged by German scientists to be a ‘highly efficient’ weapon not because of its mortality rate – only 2 per cent of those affected died immediately – but because it could injure men even if they were wearing respirators. It was also noticed that because mustard gas had little immediate effect and was so insidious in its approach, inexperienced troops paid little heed to it, and died as a result.

Within an hour or two, eyes were streaming and were subsequently blinded with painful conjunctivitis, the throat became sore as severe laryngitis set in, followed by vomiting and then breathing difficulties. After the first attack using mustard gas, once again at Ypres, it became common to see files of men, being led through the battlefields to the medical station, each with one hand on the shoulders of the man in front.

The casualties would be covered by severe blistering and skin burns, fluid from which soaked their clothes. In the worst cases, the effects on the soldier’s breathing would subside into a fatal attack of bronchopneumonia. As the Germans had said, it was a most effective weapon and the Allies hurriedly sought to match it.

In February 1917, the nucleus of what was to become the Porton Battery of the Royal Artillery arrived with the two-fold task of firing experimental trials and proving Britain’s own gas shells. Laboratories were operating around the clock to perfect the most effective form of chemical weapons and, secondly, to design efficient protective suits and respirators for both military and civilian use.

The British government, fearing an aerial attack over London, had ordered the mass manufacture of gas-masks developed through Porton trials. The entire output of a dozen factories had been turned over to their production. They were produced in vast quantities, and by the beginning of 1918 respirators and hexane helmets were made under special contract by factories in London and Nottingham.

Porton Down had, in the meantime, taken on the appearance of a small village with more than 1,000 servicemen and women and 500 civilians working inside its perimeters. Lines of barrack huts had been built, along with a new research block. The station’s work was already forming a pattern that would continue for the remainder of this



century. In his reports on Porton's activities, camp commandant Arthur Crossley recorded that civilian 'workmen were used extensively for experimental work' – in other words, they were the human guinea-pigs. Tests were also performed on a variety of animals, but particularly on goats, whose respiratory volume was similar to that of humans. Demand for experimental animals – at a time when food was in short supply – meant that Porton had to acquire its own farm, with the dual role of making the unit self-sufficient and breeding enough animals for research purposes.

For that, the nearby 314-acre Arundel Farm was commandeered. While all the usual farm animals were raised for food, goats were required on a daily basis; 600 were bred and housed at the farm as experiments in medical and toxicological research became increasingly important to the war effort. The first strains of Porton white mice, rats, guinea-pigs and rabbits were also introduced. Early Porton Down research documents, classified until the late 1950s, set out the theories that would become the blueprint for the future – that experiments using animals and humans were vital in assessing the 'lethality of gas in both concentration and period of exposure and [were] critical to a proper understanding of gas poisoning and its treatment'.

The story of gas and chemical warfare of that era – on all sides – was set against a background of uncertainty, crudely assembled laboratories and research teams with inadequate knowledge, certainly in Britain. Those days and nights of tired, weary scientists with the ever-anxious military machine breathing down their necks for answers produced the basis of the future of chemical warfare the world over. In the remaining two years of the war, Porton scientists tested 147 separate toxic substances for possible use.

By then, running in tandem with the chemical labs, the first physiological laboratory was set up in 1917 to monitor experimental animals and to report on the clinical effects and pathology of gas. Much use, according to the declassified documents, was also made of 'the human observer who was unmasked but with his respirator at the ready to act as the ultimate sensor and recorder of the effects on man'.

A true estimate of how many of those 'observers' died in later life as a result of that exposure is beyond calculation. At the time, the health of volunteers who might be permanently damaged was hardly one that could be allowed to stand in the way of science, considering the thousands of lives that were at stake. There is little or no evidence in the available reports of that period of even a shadow of doubt in the minds of those working on the various chemical projects that the



discomfort and injury to personnel and animals caused in the testing was a matter for serious contemplation.

The Porton documents merely record 'the nation's great appreciation to these men whose courage enabled the country to meet the German gas threat'. In this reaction to chemical warfare, the British had been joined by the Americans, who entered World War I in June 1917. The American military set up its own chemical warfare establishment at Edgewood Arsenal, Maryland, towards the end of 1917 and were producing vast quantities of gas and researching new forms of weaponry.

As the Americans began their own research, in close co-operation with the British, the Germans had already perfected the delivery of the liquid mustard gas by shells, achieving incredible accuracy and producing a long-lasting poison that lay in pools on the ground and contaminated huge areas. The Germans had saved their major attack with mustard gas for 1917 until they had amassed a stockpile of more than a million shells. There were so many casualties that the field hospitals were simply unable to cope.

In the last months of the war, a quarter of all shells were being loaded with the Hun Stuff. Porton did not perfect its own brand of mustard gas until the late summer of 1918, by which time the hostilities were almost over. The Allies did not go short of their own poison bombs, however. In the final battles, with their troops under increasing bombardment after the Germans had made peace with the Russians, the Americans' production of chemical weapons was fully operational at Edgewood, which produced 100,000 bombs a day.

Those final months of the Great War saw a tally of horrifying statistics. Mustard gas, phosgene, chlorine and many other substances had taken their place in the arms race, and many nations would seek to include them in their chemical armoury. In all, 54 separate substances had been tested on the battlefield by both sides by the end of the war. Around 130,000 tons of gas and other chemicals had been dispersed by the two sides, using about 20,000 specially trained troops.

The final toll of casualties would show that 1,250,000 men were victims of gas attacks; a tenth of them were killed and an unknown but large percentage of the remainder would spend their lives fighting debilitating illness. Mustard gas, deemed to be five times as effective as either high explosives or shrapnel, accounted for 400,000 casualties alone and was placed at the top of the shopping list of the major nations, now alerted to the effects of chemical warfare.



In the longer term, beyond this war, which had wiped out a generation of young men in Europe, lay the result of Germany's decision to disregard the international Hague Convention of 1889: a dash to chemical armament. If there was a moment of particular poignancy at Porton, it came on the day of the Armistice, when, according to the unpublished memoirs of one of Porton's leading scientists, the men in charge of the experimental animals released 'a considerable number of monkeys' into the Wiltshire countryside. They mistakenly believed the animals would never be needed again.

There was one other vision totally contrary to those optimistic ideals that peace had come at last and never again would there be such a war. Among the battle-weary and humiliated enemy troops heading back towards their homeland was a 29-year-old corporal in the Bavarian reserve infantry, who, temporarily blinded by chemical gas, was vowing revenge for the stinging wounds: Adolf Hitler.



# THE HUMANE KILLER

**P**UBLIC REACTION TO the sheer scale and horror of gas casualties was, for a time, judged to be sufficient to bring warring nations to their senses – and pledge that never again would such weapons be used. It was, ran the famous phrase, the war to end all wars. Porton, singled out for a particular recognition of its wartime work with a visit from King George V, was left with a ‘sense of anti-climax’. For a while it seemed that the place might be shut, or at least scaled down. The Germans had been defeated and there were international moves to ensure that the signatories of the Hague Convention on chemical warfare reverted to their pre-war position.

The reality was exactly the reverse. While Allied nations on the one hand joined as one to decry Germany for starting the chemical conflagration, ambitions ran high among the military men to go on producing chemical weapons. They were supported by a growing body of scientists promoting the remarkable theory that chemical weapons were actually more humane than conventional arms. Figures produced by an international study group claimed that, apart from deaths during the early gas attacks and those among unprotected troops, the mortality rate was far lower than could be expected from conventional hardware.

It became a particularly emotive issue, especially among those who had experienced gas in the trenches, hundreds of whom would be



scarred and incapacitated for life. The scientists answer to that was: 'Well, at least you are still alive.' That, in a nutshell, was the theme of a report to the British Cabinet in May 1919, which charted the possibilities resulting from the continued chemical threat in the future – a prospect that was comparable in its significance then as was the nuclear threat left hanging over from World War II.

The post-war exodus of personnel from Porton was immediately halted. In 1920, pending a decision by the League of Nations on disarmament, the British Cabinet approved plans to proceed with an expansion of the Porton establishment, and the Americans did the same at Edgewood. In that year, the future of chemical warfare research was set in stone. The Edgewood plant, built in two years at a cost of the then astronomical sum of \$47 million, made the British equivalent look like a Boy Scout operation.

Scientific and military journals and even newspapers carried recruitment advertisements, extolling the virtues of the US Chemical Warfare Service 'located at Edgewood on the beautiful Chesapeake Bay in Maryland'.

Some of the best scientific brains in the US were enlisted to join a research and technical team of 1,200 and almost 1,000 support staff, assembled by the early 1920s. Edgewood mushroomed, with more than 200 buildings, in which hundreds of new chemical substances were being researched. Inside its perimeters were 30 miles of railway and 15 miles of roads, the largest capital investment on any military project in the US until the arrival of the rocket and nuclear technology towards the end of World War II.

Today it remains a monument to the first chemical war in history and, almost 80 years on, its self-promoting literature still portrays it, like Porton in Britain, as one of the jewels of the American defence network. The French also built their own chemical facility, centred mainly at the Atelier de Pyrotechnie de Bouchet, near Paris. The Italians had their Servizio Chemico Militare, north of Milan. The Japanese put their research into chemical weapons in the hands of the military scientific group under the control of the Japanese Navy and the Russians, latecomers to the race because of their own turmoil following the 1917 Revolution, founded the Military Chemical Division of the Red Army at the beginning of 1924.

Archive documents, so secret that they came into public view only in recent years, provide an insight into the early research work of these establishments. What stands out is the scientists' pride in their work, a significant and familiar aspect of those engaged in the development



of Chemical and Biological Warfare (CB.W) down the years. The cost in terms of the massive use of animals and the hefty reliance on human 'observers' for testing was invariably swept aside, was barely a consideration. Unlike the hardware, where the effectiveness of explosives and gun carriers could be tested and monitored from a safe distance, virtually every aspect of chemical development needed to be tried out on some form of living being. The scientists would say there were no alternatives.

Almost bankrupted by the war, Britain had little money to spare. Even so, a gradual programme of new building at Porton was begun almost immediately. Those who doubted the efficacy of this development were merely pointed towards the same arguments as applied during the nuclear age of the 1950s and 1960s – that possession was also a form of deterrent. Among those early supporters was Winston Churchill, who had visited the front at the height of the gassing in France and had expressed himself to be 'exceedingly impressed' by the British effort. He would be joined by many eminent people in both political and scientific circles, as was evident from the membership list of Britain's Chemical Warfare Committee and the later Chemical Defence Committee that would oversee the development of Porton.

The list of those associated with the early development of Porton reads like a Who's Who of the world of science and medicine; many were household names of the day. Among them was the German-born physicist Professor Frederick Lindemann (later to become Lord Cherwell), who was the wartime director of the Royal Flying Corps Experimental Physics Station at Farnborough. An early pioneer of experiments on atomic heat at the Sorbonne, his work had attracted international acclaim. He was in no doubt of the importance of the chemical defence strategy, a view shared by his close friend Winston Churchill, who made him his personal scientific adviser in World War II.

Another was Professor John Scott Haldane, the Scottish physiologist, one of the early advisers on the British chemical response. His two children were also to make a name for themselves, in other ways. His daughter was the author Naomi Mitchison and his Oxford-educated son, John Burdon Sanderson Haldane, was among eminent scholars who were prepared to argue publicly the case for chemical weapons as against conventional warfare.

J.B.S. Haldane had become an atheist during the war and later was a committed Marxist and a director of the Communist newspaper, the *Daily Worker*. He would write many books in his distinguished career, among them (with J.A.S. Huxley) *Animal Biology*. In 1924, Haldane,



then a reader in biochemistry at Cambridge conducting research into enzymes, published a work entitled *Callinicus: A Defence of Chemical Warfare*. He argued that: 'future wars being accepted as inevitable, I am in favour of anything which will impose the will upon the enemy speedily without taking his life or injuring him permanently.'

Apparently primed by several military scientists, Haldane argued that if wars were conducted with the use of chemical weapons, properly protected troops would suffer far less in terms of fatal casualties. The same applied to civilian populations under attack. The wholesale issue of gas-masks and other protection in towns and cities would save many thousands of lives. He wrote: 'In London, for example, high explosives and incendiary bombs dropped from aeroplanes would do far more harm than gas bombs. Houses are far more vulnerable to explosives and do far more damage to their occupants in collapsing, besides being inflammable. On the other hand they contain far more refuges that could be made gas proof.'

He noted that on the nights of 11 to 14 March 1918, the Germans fired 150,000 mustard gas shells into villages and valleys in the Cambrian salient, causing 4,500 casualties, of whom only 50 died, all because they took off their respirators.

Though controversial, Haldane's views were widely supported among leading military and political figures of the day, although the long-term effects of gas poisoning were then unknown, as was the fact that in thousands of cases it would cause long and lingering deaths to dozens of victims through cancer and other chemical-induced illnesses. His battle rules for the future called for the banning of the conventional hardware and its replacement with shells containing only chemicals and a small bursting charge. He concluded:

'Until 1915, the soldier's business was to push and throw pieces of metal at the enemy. Various devices were employed for throwing them fast and far, thanks in the main to the genius of the unforgotten Major General Shrapnel. The future is in the hands of the chemists.'

Perhaps the most incredible of his recommendations came from his case studies, which he maintained had shown that certain men were immune to the effects of blistering agents in mustard gas attacks. His assessment was accepted with rather less of an outcry than would be the case later in this century. It was discovered, he said, that 20 per cent of white men and a remarkable 80 per cent of black men were shown to be resistant to mustard gas burns – just as they might be to sunburn. 'It looks, therefore, as if after a slight preliminary test it should be possible to obtain enough coloured troops who would be



resistant to gas blistering in concentrations harmful to most white men. Enough whites ought to be available to officer them.'

Gas was the 'humane killer' said Haldane, a weapon that would win battles in which many will be incapacitated but few slain. Such was the ignorance abroad at the time. Even so, Haldane's thesis was never dismissed, and certainly not by the scientists at Porton Down and Edgewood as they assembled in the 1920s to satisfy the military's continuing fascination with chemical weaponry, not to mention their own.

Against that thesis was an equally strong body of international anti-CW campaigners who were seemingly rewarded in 1925 when 38 major nations signed the Geneva Protocol, acknowledging that the use of poisonous gases in war had justly been condemned by public opinion in the Western world. Nations who signed the treaty would accept the prohibition of the use of such chemicals. In reality it wasn't worth the paper it was written on. Fifty years would pass before Japan and America even ratified the protocol and, in any event, most of the major nations around the world – Britain, America, France, Italy, Japan – were as deeply committed to chemical research as ever.

In Britain, the anti-gas lobby generally led public opinion and the government's intentions for Porton were largely unknown to the outside world. A self-contained scientific village was emerging within a closed-off region of Wiltshire countryside. New laboratories were built, including three huge gas chambers, and an extended farm breeding unit was added to provide an ever increasing need for animals.

Civilian staff numbers were doubled in five years, and doubled again by the end of the 1920s as the station grew in importance. Work on mustard gas, temporarily lapsed at the end of the war, was resumed and volunteers had to be found to expose their skin 'fearlessly in the gas chamber tests'. The reports of Porton scientists of that era clearly recognized that the task was unpleasant and dangerous.

Experiments with mustard gas and protective measures against it had been stepped up, more or less in line with J.B.S. Haldane's theories. It was widely considered in that secret world that sufficient stocks of both the gas itself and respirators to supply to large civilian populations should be available to meet the threat of a new chemical war. The post-war upsurge in the aircraft industry had added a new dimension to these possibilities.

One of the first tasks of the new Porton Down Chemical Defence Establishment was to test the nation's complete stock of gas-masks and



respirators, which had lain largely unused since they were turned out in their millions at the height of the World War I. A large number of human 'volunteers' recruited from the services to test a sample selection of approximately 100,000 respirators was sent to Porton. The only way of proving their effectiveness, according to Porton's official history, was to use 'the human experience' as had been the case from the beginning and, on occasions, Porton's scientists led from the front in that respect.

One famous incident is recorded in previously classified documents at the Public Record Office. The Quarterly Reports to the War Office from the Commandant of Porton (September, 1928) carries an account of an experiment conducted personally by Sir Joseph Barcroft, head of the physiology department at Porton, to resolve a dispute between his own team and their counterparts in France over the effectiveness of hydrogen cyanide (HCN), a particularly awful poison. The French had tested the gas on dogs, all of which had died. Porton tried it on goats, which survived.

Late one evening after everyone else had left, Barcroft decided to test it on himself. With an army corporal as a witness, he took a dog into a gas chamber and, without masking himself, released a 1 in 2,000 concentration of hydrogen cyanide. This is his account of what happened:

'I remained standing and took a few steps from time to time while I was in the chamber. In about thirty seconds the dog began to get unsteady, and in 55 seconds it dropped on the floor and commenced characteristic distressing respiration which heralds death from cyanide poisoning. One minute thirty seconds after the commencement the animal's body was carried out, respiration having ceased and the dog being apparently dead. I then left the chamber. As regards the result upon myself, the only real effect was a momentary giddiness when I turned my head quickly. This lasted about a year and then vanished. For some time it was difficult to concentrate on anything for any length of time.'

What became known as the Barcroft Dog Incident was brought to the attention of Prime Minister, Lloyd George, who, upon hearing it, immediately dictated a memo congratulating him on his 'gallantry and devotion . . . which obtained information of quite exceptional value'. Brave, perhaps, but also foolhardy and an action with little perception of what possible reaction he might sustain in the future; research into the long-term effects of gassing was then virtually non-existent and a fascination with cyanide, like Barcroft's, would remain one of the



features of Porton experiments for years to come.

Safety boundaries were pushed to the very edge of acceptable risk and occasionally beyond as Britain sought to match the German capability. Two Porton-linked colonels died conducting experiments on themselves and, as the Porton history records, 'sufferings were endured in a manner which was only possible by men of high morale under the urge of war'. Hundreds of men submitted themselves for testing purposes in an atmosphere of trial and error in the early days. One set of experiments was to test the limits of tolerance to an arsenic gas: 'twenty men were placed in the chamber for ten minutes . . . they [experienced] dull aching at the roots of the teeth . . . gnawing pain at the back of the face, numbness, cold of fingers, dryness of throat, retching and nausea . . . the men feel definitely ill . . . they lie down, sigh and roll about . . . keep moving in attempt to find relief.'

In the post-war era, testing of the nation's stock of respirators was no riskless task, either. The volunteers wearing the masks were sent into gas chambers filled with irritant arsenical smoke. The shock came when many of the respirators were found to be at the very least, 'penetrable'. The result was, says the Porton history with some resignation, that many of those involved in the tests were subjected to 'some physical and physiological strain'.

The tests proved that much of the national stock of gas-masks was useless. There were calls by the services for replacements, with specialist designs to cover all eventualities. Porton developed a general-purpose respirator for the services, which went into production in 1926, and between then and the end of World War II, more than 25 million were made. The government-sponsored Chemical Defence Committee also pressed for new designs for civilians, on which Porton began working at the same time, as the possibilities of aerial bombing of cities grew with each passing year.

Within a few years, a design was perfected at Porton which would be used to produce military and civilian gas-masks. The continued strength of the chemical-war lobby was sufficient for the British and Americans to redouble their efforts, literally, and this was done on the single-sentence pretext – the same one that is widely used today – which, in a nutshell, states that all possible chemical permutations have to be trialed and tested in order to develop an efficient defence.

It was only towards the end of the 1920s that the hidden implications of chemical experiments began to come home to roost. Ten years after the end of the war, the first assessments were made of the many thousands of veterans who were by then drawing disability pensions



directly as a result of wartime gassing. Porton was called upon to investigate and concluded that the prognosis for the gas victims was poor: virtually without exception they suffered from lung diseases, pneumonia, impaired vision – all of which would ‘gradually get worse . . . it is only a matter of time before a cardiac condition develops.’

The Porton report, now in War Office documents at the Public Record Office, added: ‘the evidence suggesting mustard gas is the cause appears to be conclusive’. One year later, a further 70 men were examined by Porton physiologists and were found to be suffering from a list of half a dozen illnesses – all apparently resulting from mustard gas poisoning. These conclusions and statistics were not for public consumption, nor would they be for a further 50 years.

Contemporary newspaper reports claiming the permanent disability of gas attack victims were widely dismissed by government health ministry officials as scaremongering. However, a World Health Organization study years later would discover what the British knew but refused to admit – that as of 1 January 1930, 80 per cent of the surviving veterans who had been exposed to mustard gas poisoning in the war were suffering from chronic respiratory problems, and many subsequently died from lung cancer.

The truth about the long-term effects of gas was finally dawning. Just as ‘top secret’ then, as now, were the statistics concerning the use of animals. In 1982, the first details of some of those early experiments were finally revealed among 9,000 documents released for historical assessment into the Public Record Office, covering the period to 1929. They showed that virtually every kind of animal available to British scientists was used in experiments whose descriptions make upsetting reading for those concerned with animal welfare. As ever, they carried the preamble that it was done in the name of science, in order to make life less hazardous for troops and civilians alike who might one day face these chemicals in reality.

Even then, in the early days, although Porton’s animals were considered vital to their work, J.B.S. Haldane noted that many of the soldiers who worked at the station had an exceedingly strained relationship with the physiologists because they ‘objected so strongly’ to the experiments on animals. Monkeys and baboons, especially, were used for studying the effects of gas on the skin.

They had chemicals squirted into their eyes, noses and ears, rubbed into shaven areas of skin, smeared over their genitalia. Goats, sheep, cats and dogs, along with countless thousands of rats, mice and guinea-pigs, were tethered or caged in the Porton ranges to test gas in



the trenches, or inside in the gas chambers. Others were subjected to research designed to aid the treatment of soldiers wounded by conventional weapons. Larger animals were regularly subjected to the 'firing squad' to receive varying degrees of bodily damage, ranging from mere gashes in their flesh to traumatic and eventually fatal wounds.

The blanket of security surrounding this activity, which had attracted the attention of anti-vivisectionists and animal-welfare groups, naturally had an effect on those involved in the work. To some degree, they were to become excluded from the rest of society, and inside the Porton compound itself a quite remarkable lifestyle developed as the inmates settled down to their various tasks, increasing in numbers through the decade of the 1920s and on into the 1930s.

The Porton station became an area prohibited to the public. All who had access to it were diligently vetted and sworn to uphold the Official Secrets Act. Everyone who worked there in whatever capacity was left in no doubt that the Act would be rigorously applied and pursued through the courts. 'Secrecy in all that we do' became the official motto of the establishment and every written contact with the outside world was subject to security checks.

Virtually all government reports that included mention of chemical defence were immediately given a 'classified' rating and very little of Porton's own documentation escaped into the public domain until well into the second half of the century. Much of it is still regarded as being too sensitive to release and will not be available until well into the next century – if ever.

The obsessional regard for secrecy was taken to extreme lengths. Even a rather parochial history of Porton, written by Lieutenant Colonel A.E. Kent, who had served in the Special Brigade Royal Engineers in the 1914–18 war, and had worked there as a civilian until 1956, did not see the light of day for nearly 30 years. Kent had kept a diary of his work with the unit for many years and wanted to write his memoirs, or a book on Porton. Permission was refused.

In 1961, however, he was paid a modest £250 to write an authorized version and 'a brief history' was published for limited circulation within the defence community. It remained a 'classified document' until 1987, long after Kent's death. The larger history that he had intended for the general public was barred from publication and the original typescript he presented for approval remains to this day filed away at the establishment.

From Kent's accounts of Porton, relatively innocuous after



screening by the security staff, and from other unpublished records, it is possible to glimpse the fascinating, if worrying, style of life that gradually built up within its fenced perimeters. It was from the beginning a closed society, in almost every respect. Barrack-style accommodation was available for single technicians while the staff in married quarters had more space. They were allotted a small garden and allowed to keep poultry. All food, bread, meat, disinfectants and general groceries could be drawn from the Barrack Services and Supplies store.

The Portonians, as they called themselves (and thus, those who left were Old Portonians), had their own church and camp padre, staged their own entertainment through the Porton Musical and Drama Society and, of course, had their own cricket team, which was kept with a busy fixture list by the chairman of the, by now, many sub-committees of the controlling Chemical Warfare Committee that had developed by the early 1930s.

Later they would get their own cinema, which was also used by the scientists to run film of their experiments. There were occasional incidents of black humour such as the time the married quarters were accidentally sprayed with a dye during an aerial bombing simulation, resulting in the discovery of pink-spotted babies left outside in their prams and pink-spotted washing.

The main thrust of their work remained as serious as ever and in that the British government, like most others, was quite cynically prepared to disguise the fact that, on the one hand, it had approved the Geneva Protocol of 1925 but, on the other, it was working away to improve its own chemical defence strategy. As the Porton documents from the era acknowledged, development of weapons had to be 'done under the rose'. The language and description of its work was altered to provide some form of recognition of the Convention. The term chemical warfare was, as a matter of policy, deleted from the public pronouncements and substituted with 'chemical defence'.

In reality, it was business as usual. The only difference was that the whole operation was now paraded under the heading of defensive rather than offensive necessity. Field trials became renowned among visiting top brass from the military. Its official history boasts that during the inter-war years, 'the anti-gas defence of the United Kingdom and its forces had been brought to a level which was superior to that of any other nation'. Experiments simulating virtually every scenario of gas attack had been acted out around the Porton ranges.

They had Vickers tanks for testing – with volunteers – the vulner-



ability of tank crews. Light aircraft were used to spray coloured simulants on marching troops to discover the strength of chemicals as droplets reached the ground. Porton tested attacks of mustard gas at high altitudes, when wearing respirators would not be practicable. It researched dozens of items of clothing and protective shields for both soldiers and horses – ranging from an anti-gas oilskin cape, protective dubbin for boots, a sleeve detector for the presence of chemicals, gas identification sets and, for the animals, anti-gas covers for horses, mules and war dogs. Even a prototype gas-mask for horses was produced. All these inventions were proved and tested in the Porton chambers and on the ranges to make British troops, says the Porton history, better equipped in anti-gas protection than any force in the world.

In the chemical labs, research work concentrated on discovering new CW agents and perfecting defences against them. Scientists there were also experimenting with riot-control gases for use by British police and military forces in various parts of the British Empire where unrest occasionally flared.

No large stockpiles of any gas were maintained in Britain. Elsewhere, the build-up was blatant. America, Russia, Japan and Italy were already heavily committed to CW production, building large stocks of mustard gas and lewisite. As one military analyst described it, chemical warfare had become a huge slumbering giant, growing fat and expansive, protected by politicians and fed by scientists. One day, it might explode.



# HITLER'S SECRET AGENT

**T**HE GIANT BEGAN to stir in the early 1930s and with it came a new threat: biological warfare. The Russians led the way, and Japan was close behind. Britain would soon join the race. Crude experiments with germ-carrying containers were already being tested by Soviet scientists in the Siberian waste. What horrors were perpetrated on human guinea-pigs under the Stalin regime will never be known but many hundreds are thought to have died in experiments. Put in its simplest form, germ warfare was a way of overcoming enemy troops and civilian resistance by spreading killer diseases such as anthrax, cholera, typhoid, tetanus and a host of others, even syphilis. The idea, like gas, had been around for centuries, dating from the earliest recorded history of war when soldiers used to poison the water of their enemies by throwing human bodies and dead animals into their wells.

In this century, the first attempts at primitive forms of biological attack were made by Germany during World War I, when it attempted to halt the Allies by killing their horses with a highly infectious disease called glanders, which would also transfer to man. At the same time, Germany had accused the Russians of attempting to spread plague bacteria across the German lines in 1916. After that, little was heard of biological attack; the scientists were too busy discovering new forms of chemical weapons.

However, the use of bacteria to spread fatal and quick-acting



disease came back to the international warfare agenda in the late 1920s. Poland, aware of experiments being conducted across the border in the USSR, had successfully proposed that 'bacterial warfare' should be included in the 1925 Geneva Protocol although at the time there was very little research – and even less knowledge – in the West of how biological agents might be used.

Japan's interest, as documents retrieved after World War II would show, became almost an obsession after its own troops had fallen victim to what was in effect the world's first major attack using BW agents. Captured Japanese General Shiro Ishii claimed that five Russian spies were arrested by the Japanese military in southern China in the early 1930s. They were part of a well-trained sabotage unit, armed with ampoules containing cholera and anthrax. Under interrogation they had admitted they had already carried out attacks near Shanghai, which – according to the Japanese general – resulted in the deaths of 5,000 Japanese troops from cholera and 2,000 horses from anthrax.

Ishii himself, then a 40-year-old military scientist with the rank of major, was dispatched on a secret mission to Europe, touring the capitals of the West in an attempt to discover the extent of BW research. He returned in 1934, convinced that biological weapons held 'the greatest promise' in future wars.

Ishii became, according to a post-war intelligence assessment produced by the Americans, the most dominant force in the development of the Japanese BW capability. He promoted his theories in government circles and finally won approval to establish a germ warfare research centre at a military hospital at Pingfan, 50 miles from Harbin, in south Manchuria. It was initially conducted under the guise of a water-purification plant. Though some regarded his work as unimportant, his military masters became intrigued by his theories for the production of an anthrax-filled bomb that could wipe out an entire city without structural damage. He also drew up models for sabotage techniques, using specially trained units to go behind enemy lines spreading disease and poisoning water supplies.

The Japanese began pouring money into his research programme, and by 1939 when the research centre was completed, they had installed a detachment of 3,000 troops, scientists and laboratory workers – capable of producing several tons of bacteria a month. It was there, as will be seen in future chapters, that Ishii tested his research on British, Australian and American prisoners of war.

Early intelligence reports of Japanese activity in this field began to



surface in the West in the mid-1930s and prompted a response in Britain. The potential threat of BW was first discussed among Chiefs of Staff in the autumn of 1933. At another CoS meeting on 12 February 1934, Sir Maurice Hankey, one of the nation's most powerful mandarins, was ordered to begin 'very secret' inquiries among the scientific community about the possibilities of this kind of warfare.

Hankey, a dour, intense man of 57, was secretary to both the Cabinet and the Committee for Imperial Defence. He had an extensive knowledge across the whole spectrum of Britain's military and defence policy and his advice was highly regarded. The Cabinet was informed of his informal soundings and gave its approval. Outside Whitehall, however, he found less than an enthusiastic response, especially from the Medical Research Council, whose secretary, Edward Mellanby, issued a point-blank refusal to co-operate with any such project.

One ally did emerge, however, in the shape of Dr Paul Fildes, the dictatorial head of the council's Bacterial Metabolic Unit, who agreed to assist Hankey in compiling a report on the practicalities of BW and why Britain should work on counter-measures. The upshot was that Hankey went back to the Chiefs of Staff fully convinced that BW research was 'a priority for Britain'. The Committee for Imperial Defence gave the go-ahead for the creation of a Microbiological Warfare Committee with Hankey as its chairman. In its first report, the committee concluded that immediate steps should be taken to create a defence against possible attacks using bacteria such as plague, anthrax and foot-and-mouth disease.

After a long series of consultations with leading scientists, the Medical Research Council and directors and deans of leading medical faculties, the British government formally and secretly authorized work on biological research in Britain by a small group of experts, to be based at Porton Down.

Results of that work, and its implications, lay in the future. Like the Japanese and the Russians, Porton had to build its experimental research base, and that would take several years. For the time being, the bulk of its effort continued to be focused on chemical weaponry, which had once again become an area of intense activity. Japan was moving rapidly on that front. In 1932, it had opened the Army Chemical Warfare School at Narashimo, near Tokyo, specifically to train its young scientists and army specialists. By the end of the decade, the centre had produced 3,200 experts who were given jobs in the burgeoning Japanese chemical plants with more than a dozen



factories sited around the country, primed to produce mustard gas and phosgene while continuing experiments with other forms of chemical attack weapons. The stockpiles being mounted were to be trialed extensively in Japan's war with China, from 1937.

The surprise event among this renewed thrust came from the Italians. Although a signatory to the Geneva Convention of 1925, Mussolini had been quietly producing large stocks of mustard gas and phosgene as he prepared his expansionist plans for the revival of an Italian Empire. On 3 October 1935, his long-expected invasion of Abyssinia began when thousands of young Italian troops charged across the border from Eritrea. Italian bombing planes roared overhead, unleashing their loads on the border towns as the ground troops began their march inland.

With the courageous Abyssinians digging in on terrain that was unfamiliar to Italian soldiers, Mussolini's invasion did not proceed as rapidly as he had hoped. Towards the end of the year, he ordered 1,000 tons of mustard gas to be shipped to the Italian bases. Soon bombs filled with the gas were being rained down indiscriminately on the unsuspecting Abyssinians. In January 1936, the Italians began using an aerial spray-bomb to achieve greater effectiveness. The gas was put into 500lb bombs equipped with a bursting charge timed to explode when each bomb reached 200 or 300 feet from the ground, causing the liquid gas to spray over a wide area.

Emperor Haile Selassie sought shelter in the West and at a meeting of the League of Nations international statesmen sat silent and glum as he made an emotional speech describing the attacks. The aircraft came in groups, one after the other, he said, spraying the liquid over the countryside. The liquid formed into a continuous fog enveloping all below it – men, women, children, animals – as well as polluting the rivers and lakes.

International news media reacted with horror. Reporters were soon describing scenes reminiscent of World War I. Hundreds of people were left to their own devices, too ill to walk, and miles from hospital facilities. The *New York Times* spoke of children screaming with agony through terrible injuries, their skin peeled away and hanging from their bodies, exposing blood-red tissue. Many were blinded. Men who had merely touched bushes carrying lingering mustard gas found their legs and genital areas burning with pain and the burned skin dropping away. There were at least 20,000 casualties of the Italian gas bombs, though the true number was never known. Many died later through gangrene and progressive wounds.



Chemical warfare was back on the international agenda. In America production at Edgewood was stepped up by a third. During that year of the Italian gas onslaught, the French opened a new phosgene-producing factory at Clamercy to add to two already geared for production. Stalin, already handsomely equipped and building a massive chemical armoury, ordered three more factories into production at Kuibyshev, Karaganda and Brandyuzhsky. The British government, which in theory had renounced its intention to accumulate stockpiles of gas, began building a new factory at Sutton Oak, Lancashire, and had plans prepared for two others.

A flurry of alarming intelligence reports detailed the known upsurge of CW research, with scientists and military advisers across the world feverishly working on gas warfare projects. Typically Porton Down became a place of high drama. Many field trials were started and realistic scenarios invented, which included 'the exposure of volunteers' to chemicals to test the performance, for example, of gun crews in conditions of war. On the Porton ranges, animals continued to be tethered in trenches and in the open as the Porton teams worked to perfect the most effective form of gas and its delivery to targets.

In other tests, mustard gas was being tested deep in the heart of Hampshire, at Tipner Pond, where its lingering effects on the qualities of sand and shingle were observed – experiments that would have particular relevance in the early months of World War II when Winston Churchill came to the very brink of ordering British beaches to be drenched with liquid mustard gas at the time of the threatened German invasion.

And Germany, in 1936, was the most worrying country of all to other European governments. While international attention was diverted by the Italian invasion of Abyssinia, Hitler invaded the Rhineland in March of that year, confirming what many had been warning for months. Germany's CW capacity was believed to be well beyond that of any other European nation, and matched only by the Soviets. It had at least six operational stations working on CB research and production, and was said to be heavily engaged in trial bombing sorties using low-flying aircraft to disseminate gas clouds.

British scientists had already observed that reports and analyses of many laboratory studies had disappeared from the pages of recently published scientific journals, normally the fount of all new knowledge. The true reason was missed by British and American intelligence, although it was picked up by the Soviets. In 1934, a team of German scientists had published a report of important work with organophos-



phorus compounds for use as a pesticide. It would turn out to be the precursor to what was singularly the most important discovery in the field of chemical warfare – one that would concentrate the minds of CW scientists for the rest of the century.

A year or so after the study had been published, commercial biochemist Dr Gerhard Schrader was using it as a model for his own work on a new pesticide for his employers, IG Farben. He was testing various combinations of chemicals to find a formula to kill leaf lice. He mixed minute concentrations of his liquid for spraying infected specimens. It was at that point he found it had some nasty side effects, on both himself and an assistant. First his eyesight began to deteriorate and a few days later he began to experience breathing difficulties. Within a week, both he and his aide were suffering from spasms and slight paralysis of the arm muscles. They could not work for nearly a month. Almost by accident, Professor Schrader had discovered what would become known as the nerve gas tabun.

Schrader wrote up a report on his findings, and the assessment of the substance reached higher ranks – and was eventually noticed by scientists running Germany's CW programme under the control of the Wehrmacht. He was called to Berlin to give an account of what he had found. Tests were ordered immediately, using a dozen assorted animals. They were dosed with minute quantities of the compound and fascinated observers watched in stunned silence as the animals dropped, one by one. Within half an hour, they were all dead.

The Wehrmacht commanders ordered a new series of tests using monkeys and baboons. Without exception, the animals lost control of their bodily movements and functions, excreting uncontrollably, vomiting, foaming at the mouth. Finally, they went into convulsive fits and died, all within 15 minutes of being administered droplets of Schrader's organophosphate. Its potential as a CW agent was quickly recognized. Wehrmacht scientists reported that it apparently had significant 'advantages' over the well-tried and tested mustard and phosgene gases.

It had virtually no smell, was colourless and, most important of all – as Schrader had personally discovered to his cost – its poisonous qualities were effective by mere contact with the skin, making it an ideal substance for aerial spraying. It was so strong that the corrosive effect on any metal container was found to be immediate.

Schrader was moved from his place of work to secret laboratories in the north to continue his research, with the oversight of leading figures in the German CW hierarchy. Within a year, he had made a



further discovery, a compound related to tabun but that was found in tests on animals to be a dozen times more powerful in its effects. This, he called sarin – a name he made up by taking letters from the surnames of the four men who had worked on its discovery, himself and three others.

Another year of proving the substance finally convinced the Wehrmacht leaders of its lethal potential. Hitler was informed and he gave the go-ahead to the director of the Wehrmacht's Chemical Research headquarters at Spandau to build new laboratories to perfect the substance, for which animals by the score and eventually male prisoners from concentration camps were brought in and fell victim to the trials.

What the German scientists discovered was frightening – those working on the project described it in their notes as 'astonishing'. Little more than 1/1000 of a gram inhaled in one breath could kill a man in under 30 minutes. It was an agonizing death that resulted from chemical interference with the way the nerves transmit messages to the muscles of the body – hence the title of Nerve Gas. The whole muscular system of the body went into a state of irreversible vibration, even those muscles that controlled breathing and excretion, until the victim fell dead.

Germany, for the second time in a mere 30 years, had become the proud possessor of the most virulent chemical threat known to mankind. By the time Hitler ordered the invasion of Poland, sufficient stocks of sarin had been manufactured to be used in the attack if the military commanders so desired. The rout of Poland was so unhindered, however, that it did not become necessary. For the time being, sarin would remain Hitler's secret weapon and one that he merely hinted at in speeches he knew were being monitored by the British.

He ordered the building of a new German chemical factory that would be capable of producing upwards of 1,000 tons of nerve gas a month, miles away from the German population, in Silesia, western Poland. Its Wehrmacht code-name was 'Hochwerk', and to avoid any immediate clues to its true purpose even funds for its building and staffing were channelled through existing German chemical companies.

All of this remained beyond the knowledge of British intelligence. However, they were already alerted to Germany's expansion of its chemical facilities, especially in what the British believed was their development of arsenic-based gas, in which they had historically shown a keen interest. Their CW experts were reported to have a



particular liking for arsine, or arseniuretted hydrogen (code-named 'Arthur' by Porton), which was an especially lethal agent capable of destroying the red blood cells of its victims.

In the two years before the outbreak of war, British intelligence had submitted a report on its concern that Germany was buying up all available arsenic on the world metal markets. A new respirator for use by its troops, produced as early as 1936, was also known to give particular protection against arsenical agents, and against the chemical particularly favoured by Russian scientists, hydrogen cyanide.

The Porton teams rushed ahead with research into the arsenic threat and produced what became known as Detector Paper Type A, which reacted to arsenic gas. Ironically, however, the intelligence reports of Germany's new weapon were well wide of the mark. Their cornering of the world arsenic market had been intended largely to meet their industrial use. But as soon as the German's learned that Porton had developed a detector paper for that chemical, its scientists assumed that this gas must have become a major part of the British chemical armoury – and they then rushed an arsenic gas into production.

Porton Down, like most chemical installations around the world, was now operating on an 'emergency' alert pretty well across all fronts of its operations. By the end of 1936, the British government had authorized the manufacture and issue of enough gas-masks for every member of the British public, a task that deeply involved Porton's proving expertise.

Although Porton's official history boasts that it had prepared a more efficient defence against chemical attack than any other similar centre in the world – at least as far as known weapons were concerned – this preparedness was not shared by the military. The Army's instruction literature and handbooks were so out of date that they still spoke of gas attacks being delivered by cylinders, as in World War I, rather than from bombs, aerial spraying and shell fire, as would now be the case.

Porton itself assessed that 'had Germany initiated chemical warfare at the outbreak, the immediate ability of the United Kingdom to retaliate in kind would have been negligible'. There were a few 250lb mustard gas bombs for the RAF and some spray tanks. Britain's total stockpile of mustard gas at that point was around 500 tons and about 5 tons of tear gas – a minuscule total compared with that available in Germany.

This state of affairs, Britain's almost total lack of capability to



‘retaliate in kind’, was being emphasized by military intelligence long before the war became a reality. In May 1939 intelligence reports drawn up to assess the CW preparedness of potential enemies proved devastating reading; it concluded with ominous forecast that if Hitler deemed it expedient to ‘introduce gas warfare it will be pursued with the characteristic vigour, ingenuity and ruthlessness’.

The British and the French immediately began to discuss a joint effort, to pool their expertise and plan a collaborative effort on chemical warfare, but it was barely under way when Prime Minister Neville Chamberlain declared that Britain was at war with Germany. Two days later, the command team and intelligence unit of the Chemical Defence Research Department was moved *en bloc* from its headquarters in Grosvenor Gardens, London, to the Porton establishment. Leading scientists and academics were co-opted to the Chemical Defence Committee. Once again, some of the most distinguished scientists of the day were enlisted to head the various Porton research teams.

They included Professor (later Sir) Roy Cameron, the famed pathologist; Professor Sam Sugden, the English chemist and professor at Birkbeck College, London, and the University College of London, known for his outstanding work on molecular volumes; Sir Joseph Barcroft, the Irish-born professor of physiology at Cambridge and director of animal physiology for the Agricultural Research Council noted for devising appliances for blood-gas analysis; along with a host of other senior figures in the world of science, pathology and medicine.

Within a matter of weeks, both civilian and military personnel were piling into the Porton confines. The proverbial ring of steel was thrown around its perimeters and guards posted on its ‘closed area’ where secret experiments were performed. The Territorial Army sent an anti-aircraft gun battery and manned the perimeters with 24-hour patrols. Teams of men began camouflaging the buildings with paint and netting. Lines of new huts were appearing overnight to provide barracks and mess facilities for the influx of arrivals, and air-raid drill was performed as an almost daily task for the newcomers because of the fear that Porton would become an early target for German bombers.

All available factory production for military respirators and civilian gas-masks was working around the clock to meet the ‘fully anticipated’ fear that British Expeditionary Forces would be confronted by gas attacks in Europe and British cities would be



subject to airborne gas bombing. Millions had already been manufactured to Porton-proved specifications. Up to and during World War II, 100 million gas-masks would be produced in Britain alone.

As in the World War I, there would be many false alarms, which Porton staff would be called upon to test out. Among the earliest was a mysterious, airborne cobweb-like substance, which was being reported by Home Guard and ARP wardens in various parts of the country, who saw it floating down into the countryside. The alert went up immediately, the theory being that the Germans had produced some unknown form of carrier for the mass poisoning of civilian populations. Porton scientists were drafted to collect samples, but it turned out to be no more sinister than a rare natural phenomenon, first identified in 1741 by the English clergyman and naturalist Gilbert White. He described a similar outbreak of 'airborne gossamer' in his *Natural History and Antiquities of Selborne* (1789), which, based upon a collection of letters, became an English classic.

Discovery of this past evidence of the suspected new weapon inspired a poem written by an unidentified member of the GHQ Home Forces in 1940:

Security of home and health were shaking in their pants  
Till Colville quoted a piece from White of Selborne Hants.  
They sent it out on all the wires 'This matter's quite alright'  
For any references see letters, Gilbert White.

By the mid-1940s Porton was fully manned, running extensive field trials and overseeing the build-up of hefty stocks of the three major gases, mustard, phosgene and the tear gas, BBC (bromobenzyl cyanide), which were being produced at chemical factories commandeered by the Ministry of Supply under 'conditions of extreme secrecy and urgency'.

This hurried preparation was exacerbated by the fall of France and the threat of a German invasion of Britain, a possibility that moved Winston Churchill's War Cabinet to make one of the most significant decisions in the history of chemical warfare – that Britain would, in certain circumstances, be prepared to make the first strike with gas.



# A MILLION TONS OF MUSTARD

**I**N JUNE 1940, with the Enigma decryption warning that Hitler's preparations for the invasion were actively under way, Winston Churchill urgently called for an assessment of defensive measures along all sections of the British coast through which a German invasion might be attempted. Seven weeks earlier, the very first letter he had received when he became prime minister was from the German-born physicist Professor Frederick Lindemann, the former director of the Royal Flying Corps Experimental Physics Station at Farnborough and one of the most senior advisers on gas warfare in 1914–18.

Twenty-two years on, he was personally still in no doubt of the importance of the chemical defence strategy and had written to Churchill on the subject of a Nazi invasion. Having experienced trench warfare first hand, he suggested in his letter of 12 May 1940 that enemy parachutists could not make a safe landing unless they were rapidly re-inforced with ground troops, whose arrival on British shores the parachutists would initially guard. Lindemann suggested that trenches should be dug across all potential landing areas, which would delay the German troops sufficiently until a British force arrived to 'deal with them'.

As the threat of invasion neared, Churchill asked Lindemann to draw up a draft proposal for the digging of trenches by voluntary labour, drawn from local communities. No mention is made in these



early exchanges of any position on defensive gas, but very soon Lindemann would be appointed personal scientific adviser to Churchill. By 30 June 1940 it was being openly discussed at Cabinet level. Churchill's papers and those of his aide, Sir John Colville, record the sequence of events that put gas on the immediate agenda.

Churchill instructed General Hastings Ismay, head of his Defence Office, to report at once on the amount of mustard gas 'or other variants' in store. He also wanted to know Britain's capability of making airborne attacks with bombs charged with mustard gas as well as artillery. Whatever the output, Churchill added, it should be 'speeded up'.

He theorized on a possible scenario: 'Supposing lodgements were effected on our coast, there could be no better points for application of mustard gas than these beaches. In my view there would be no need to wait for the enemy to adopt such methods (i.e. their own use of gas). He will certainly adopt them if he thinks it will pay.' To Major-General Andrew Thorne, who was lunching with him that day, Churchill said of this prospect: 'I have no scruples, except not to do anything dishonourable.'

Churchill insisted: 'Everything should be brought to the highest pitch of readiness . . . but the actual deployment must be studied by the Cabinet.' The following day, as the Colville papers record, Churchill was actively considering the proposal that 'we must consider drenching the beaches with mustard gas if the enemy attempts a landing. In that event gas warfare would be entirely justified.'

Three days later, a reply from the War Office landed on his desk confirming that 'it is desirable to have Britain's preparations complete so that we may retaliate' against a gas attack or if the War Cabinet decided to initiate gas warfare. The new impetus towards building the gas stockpile was to begin at once, although when Herbert Morrison, the Minister of Supply, raised the question of purchasing large stocks of chemicals from America, Churchill replied it would be 'better to leave the United States out of this particular line . . . Press on here.'

Britain, in the summer of 1940, was ready to bombard the invaders with its new gas-loaded weapons. The British Expeditionary Force in France also remained on full gas alert, especially when it was learned by British intelligence that the Axis had perfected the use of 'Substance S', a most deadly new form of nitrogen/mustard gas, although the Allies were still not aware of Germany's top-secret experiments with nerve gas.

As Britain's readiness to meet this threat became paramount in the



eyes of both government and military commanders, Porton was at the forefront of the war strategy. From previously classified documents, it can be seen that 3,394,093 Porton-designed shells charged with mustard gas were produced in Britain between 1939 and 1945.

For the RAF, 1,862,643 bombs filled with mustard gas or phosgene and ranging from 30lb to 500lb were produced. And in accordance with Churchill's instructions to increase stocks to the maximum level, a total of 40,719 tons of mustard gas, charged into weapons or held in bulk storage, were manufactured, along with 14,042 tons of phosgene and tear gas at a cost of £24 million. In addition, chemical weapons for use by the Army and RAF and shells for naval guns were designed and tested. Substantial stockpiles of the shells charged with phosgene were laid in shore depots, though none was ever carried on active duty. They were to be reserved for 'naval use in bombardment of land targets before or in support of landings'.

These totals were frightening enough but they were a mere fraction of the stocks of chemical weaponry being prepared by the fighting nations in the early years of the war. A seemingly incalculable doomsday industry was growing, virtually out of control, a massive world-wide collection of often untried and unstable weaponry that the war lords and the politicians were preparing to hurl at each other if and when the need arose.

Undoubtedly, the Germans, by the mid-1940s, were the leaders of the race. They were pouring millions of reichmarks into a dozen chemical factories. The nerve gas factory in Silesia, manufacturing sarin and tabun, was one of the largest. Its covered production area alone was now over a mile long and half a mile wide above ground and below a massive underground network of separate units was being built to fill shells with the gas that was to be manufactured above. Vast areas of forest were cleared to make way for the barracks to house 3,000 workers engaged at the site. The manufacturing capability of this plant alone would account for the production of more than 3,000 tons of nerve agent a month.

It was daunted by problems, not least in the human cost. The manufacture of a gas whose effects were so insidious and that was lethal to the mere touch or airborne whiff brought many casualties. More than 1,000 workers at the plant suffered dire effects. Even those who were not directly exposed to the gas could not escape its effects. German documents captured after the war would show that there were few 'members of staff who were ever free from the effects . . . they could easily be recognized because of the contracted condition of their eyes.'



America had also begun its own substantial commitment to chemical weaponry, and suffered similar manufacturing problems. In April 1941, seven months before the US entered the war, the Army was given the go-ahead to build a new chemical warfare manufacturing plant, with a budget of \$32 million. This decision was made a full month before President Franklin D. Roosevelt issued his historic proclamation 'declaring the existence of a state of unlimited emergency'. The Army Ordnance Department was ordered to expand its facilities in order to assure adequate 'production of ammunition in keeping with the time-objective requirements of the General Staff . . . and an immediate building of a chemical shell assembly plant'.

Until then, the Edgewood Arsenal, set up in 1917 in Maryland, was the only chemical manufacturing installation in America. About 30,000 acres of land were needed for the new plant. The location had to be inland, far enough from the seacoast to provide sufficient protection but with adequate access to rail, water, power and highways. On 24 July 1941, the War Department settled on Huntsville, Alabama, where by the end of the year, it began building stockpiles of mustard gas, phosgene, lewisite, white phosphorous, carbonyl iron and tear gas.

The now famous Redstone Arsenal, based at Huntsville, opens its official history by recording its initiation into chemical warfare as 'extremely important . . . marking the beginning of the arsenal's modern mission'. The Huntsville complex, once in full production, became the sole manufacturer of coloured smoke munitions and was 'noted' for gargantuan supplies of bombs charged with mustard and phosgene. 'During WWII more than 27 million items of chemical munitions, with a total value of more than \$134.5 million, were produced,' the Redstone history proudly proclaims; 'Huntsville won the Army-Navy "E" Award four different times for their outstanding production record.'

In total, 45.2 million units of ammunition were loaded and assembled at Redstone – quite apart from production at Edgewood. The work included the arming and storage of mustard gas produced from five separate plants at the complex, which had caused some consternation among the local communities, not to mention the several thousand workers living or working at the site. The heavy output of M-16 coloured smoke grenades, which, at full capacity, Huntsville was turning out at the rate of 15,000 an hour, also caused problems.

The dye used in the grenades coloured workers' clothing and



stained their skin. 'It was common,' says the Redstone history somewhat casually, 'to see people of rainbow hues in the Huntsville area.' As at most other chemical-producing plants operating in various parts of the world by the mid-1940s, there were many accidents and injuries to personnel. Several explosions occurred at Huntsville mustard gas factories, resulting in the death of four people. The manufacture of a new drying and chlorinating agent used in the treatment of crude lewisite was considered so dangerous that it was discontinued within six months.

Behind this rush of chemical development, mirrored at similar plants built by the Soviet Union and Japan, lay another story, too; tales of horrific experiments on prisoners of war and concentration camp inmates would emerge at the end of the war.

Britain and America relied on 'volunteers' many of whom in later years fell victim to a variety of debilitating and sometimes fatal illnesses. Wartime experiments using human guinea-pigs began at Porton in 1940. By the following year, a series of tests was under way in which dozens of animals and a large number of humans were being used in trials. Many of the volunteers stepped forward simply for the honour of aiding king and country. Others saw it a chance for special leave; some were merely dispatched from the lines by an Army sergeant on a 'You, you and you!' basis. Most would later claim they were never made fully aware of the implications.

In the experimental laboratories and gas chambers of Porton, as in Edgewood in the US, men were being subjected to tests to study both their own bodily reactions to gas exposure and to the viability of protective gear. Reports of the first tests at Porton using humans are contained in scientific archives. They all emphasize that this was a very necessary step, because all data relating to the effects of mustard gas on the human body related to World War I, and were out of date.

Before the tests began, Porton scientists went back to the records of known cases of survivors injured by mustard gas in 1914–18. They called on hospitals to supply details of those recently treated and discovered 89 existing cases of delayed mustard gas injury. Their case histories were delivered to Porton ahead of the start of its own experiments using humans in 1939. It was clear from the records that there had been many severe cases of delayed reaction, resulting in chronic illness. Many of the men were totally disabled and receiving a modest pension. Even so, new trials were considered so vital that the War Office gave its unequivocal approval, regardless of the risks.

The first major batch of trials began in the spring of 1940 to 'assess



the casualty producing value' of clouds of mustard gas. 'Men and animals were exposed to the artificially produced vapour to demonstrate the effects on man of transient clouds of minute droplets of mustard gas under temperate conditions,' the Porton reports relate, 'which showed that the effects on eyes were severe.'

Later, a Porton team travelled to India where tests were carried out by initiating '70 individual exposures on human subjects, both British and Indian' to varying concentrations of mustard gas in a hot climate. The reports of these experiments, now at the Public Record Office at Kew, gave no details of the ultimate effects. Another station was set up in Alberta, Canada, where similar tests were carried out.

Typical of research at Porton was a series of tests on men and rabbits to ascertain the recuperative period for damage to eyes through mustard gas exposure. In one series of tests in 1941, 64 rabbits had liquid mustard gas dropped into their eyes by scientists seeking to ascertain the level of permanent damage. A number of male volunteers underwent similar experiments, and their eyes were photographed at the various stages of recovery over a period of several weeks.

The report concluded: 'Exposure to mustard gas in the eyes produced no immediate sensation. Within two to six hours, there was a burning sensation . . . blood supply to eyes damaged . . . bleeding occurs . . . at eight hours, the eyes closed . . . unable to open them voluntarily . . . remained closed for period of minimum of five days . . . in very severe cases, the eyes remained closed for seven weeks . . . recurrent ulceration would occur.'

Porton also studied the case of sixteen men who were drenched with mustard gas during a training accident. The way in which the accident occurred is not recorded. Two men had both eyes splashed. One died the day after the accident; another would be blinded in one eye. Four men had one eye contaminated. Of the remaining ten, six had symptoms or signs of vapour burns of the eyes. They were all given treatment using an saline eyewash, but 'it was obviously impossible to irrigate 32 eyes sufficiently in the usually accepted period of three minutes.'

Following the accident, Porton conducted 43 separate sequences of experiments to test the effects of mustard gas on eyes, using human volunteers and rabbits. There were to be many similar tests, in relation to bodily effects, on the efficiency of protective gear. For many years, these experiments remained a closed book to the outside world.

Although Allied use of human trials was mild in comparison to



what would be discovered in Germany and Japan, the denial of any long-term effects would cause considerable stress to many who took part. One of these World War II service volunteers, Harry Hogg, from Dumfermline, did not speak publicly of his experiences for almost 50 years until the 1990s when Gulf War Syndrome made the headlines. He began to consider that years of illness might have been caused by his wartime experiences at Porton.

Mr Hogg said he was sent to Porton in 1942 for what he thought was a training course in the use of chemical weapons. He recalled: 'I was put in a gas chamber along with several others. There was no ventilation . . . no windows, just a small light in the ceiling. And a thick door, of course, with a peep hole. I can't remember if it was an officer or not but he just put this canister on the floor and told us that no man would be let out until everyone was on his hands and knees.'

Hogg said the supervisor opened the canister and left the chamber as gas began to be released. He and the other men began choking. They were quickly reduced to a 'horrendous' state, distressed and with their lungs bursting. 'We were scrambling about on the floor with our heads at the door trying to get air. It seemed like an eternity.' Finally, the officer opened the door and the men 'just tumbled out . . . oh dear God, just tumbled out. One man in particular . . . was behaving like an animal, out of his mind.'

Harry Hogg suffered bouts of severe illness in the aftermath. There were many like him, and many more would follow with similar stories to tell. Much of his statement is borne out by Porton documents and contemporary classified reports on experiments using volunteers in that era, documents that dispassionately and clinically described the assessments by scientists of men's ability to withstand mustard gas in conditions of war. They wanted to know, for example, if a man would still be able to hold down a defensive position behind a machine gun, even though he might not be able to walk.

In America's twin establishment to Porton, the same tests were a daily occurrence. One young conscript, Russel O'Berry, claimed an officer had threatened him with imprisonment if he refused to take part in mustard gas tests. He said he was told it was merely a training exercise in the use of gas-masks. O'Berry, too, spoke of being herded with others into a little chamber, which he said terrified him. It was hot and crowded with a dozen 'volunteers' who all wore gas-masks.

He said he 'began to burn almost immediately' and felt sick. Some of the men vomited into their masks. He vomited as soon as he left the chamber. The tests were repeated every day for four days. On the last



day, blisters appeared around his right eye and around his chest and genital area. Some years later, he lost the sight in that right eye, and during the 40 years after his gas chamber experience he suffered a number of skin cancers, had 40 separate growths removed from his colon, had more than half of one lung removed and was told by a specialist that the lower parts of his lungs were 'like stone – resulting from the mustard gas'. For years, O'Berry sought to get access to his military records; he was told repeatedly none existed and the burden of proof for any possible injury while in service fell upon himself. Unlike sufferers in Britain, he was able to use the Freedom of Information Act and, eventually, he was able to get the documents relating to the tests. 'I knew as soon as I saw them, I had a case,' he said. The battle for a pension would take years, as we will see in later chapters.

Nathan Schnurman from Charles City, Virginia, was a young US Navy rating when he volunteered for what he was told were experiments to test summer clothing at Edgewood. Instead, he was ordered into a gas chamber.

'I went in every day for six days, along with others. We were exposed to a mixture of mustard gas and lewisite while wearing gas-masks. On the sixth day, I just passed out. They carried me from the chamber and I was left unconscious at the side of the road. I was choking when I came to. I had thrown up inside my mask and I tried to remove it. They then carried me into a hut and took off my contaminated clothing. My nose and my eyes were burning. My throat was burning. I was throwing up, retching violently. I heard someone in the room ask the officer if they should call an ambulance. He replied, "No, let's wait and see what happens." Anyhow, I recovered slightly and the next day I was virtually carried to the rail station, put on a train and sent home.'

Schnurman finished his war in the Pacific. He had recurring bouts of illness but when he reported sick to the naval medical unit, he 'was accused of being a malinger'. In civilian life, he made many visits to his family doctor. He was told repeatedly that he appeared to have been poisoned but it was not until 1975 that he finally confided to his doctor that he had taken part in wartime tests. Almost 50 years after joining the tests, as we will see in the last chapter of this story, he finally won compensation.

There is a multitude of such wartime stories and testimony to draw upon, and many that Britain and the US would have preferred remained secret. Documents declassified in 1989 in Australia, but



whose release in Britain is – in 1996 – still forbidden, show that between 1942 and 1945, British, American and Australian soldiers were used as guinea-pigs in a sustained programme of chemical warfare experiments in northern Queensland.

In 1943, a team of eleven scientists and two service officers were sent from Porton to conduct trials of mustard gas exposure in a hot climate and to test soldiers' ability to endure and withstand Japanese chemical attacks, thought to be imminent in Far Eastern positions. The researchers on this occasion went to great lengths to explain to volunteers why the experiments were necessary. The scientists believed that mustard gas of the potency that the Japanese were known to possess was thought to be up to ten times more effective in tropical climates than in the European war theatre.

One unit of 438 Australian volunteers was used in a series of tests for Porton-directed research on Brook Island, near Innisfail, Queensland, where their mock battlefield was bombed with mustard gas. Men were required to walk through the bush wearing anti-gas clothing. It was found to be defective, and many of them suffered immediate burns to the skin, some so severely that their skin simply peeled off. Other symptoms were very similar to those reported by other volunteers exposed to gas – vomiting, loss of appetite, confusion and a general malaise.

One of the veterans of that incident was a young Australian commando named Tommy Mitchell. He recalled: 'It was in December 1943, and the weather was scorching hot. We were decked out in heavy gas-protective clothing and masks and set off through the dusk. Six US aircraft, B-24 liberators, dropped bombs with mustard gas on Brook Island. Ten minutes later, we were charging through the bush in our sampling equipment. Several of us fell sick. Anyway, a few hours later, me and another soldier were ordered back on to the island, this time stripped of our respirators and protective clothing. We were forced to camp on the island from dusk till dawn. When they came and picked us up, the other soldier was badly burned. I don't know whether he lived or not. I had a burned face, burned hands and lungs full of gas.'

Porton documents set out the findings of the researchers testing mustard gas on humans, in cold, clinical terms. In one case the report stated: 'Seven hours after exposure there was severe nausea. At 24 hours, general erythema of the whole body. The penis, scrotum and popliteal fossae were oedematus. He was unable to walk because of pain in the scrotum ... by day 17, complete destruction of the



epithelium over the whole organ – thin greyish sloughs over the foreskin and glands.’

In defence of such experiments, the experts would insist that because it was war-time, and extreme situations not only seemed possible but highly probable as well, the discomfort and possible suffering of the few would in the fullness of time be of great benefit to the many. Indeed, a large number of the volunteers put themselves forward for that very reason.

There is no shortage of medical and scientific experts today, in analysing that situation, who agree that it would have been virtually impossible in the 1940s to predict what likely effects the exposure to gas and other chemicals might have on these men, other than the assessment that had been gleaned from gas victims of World War I. Some go as far as to say that at least the worst-case scenario ought to have been laid out before them – to prepare for the suffering that was to be endured by many veterans who willingly, and some not so willingly, gave their bodies for live experiments. Many survivors of those secret experiments, which, in Britain, if the Ministry of Defence had its way we could still not discuss, suffered debilitating illnesses in later life, including skin cancers, leukaemia, heart disease and respiratory problems.

As ever, ‘necessity in time of war’ underpinned the acceptability of such experiments. Whatever cost in terms of injury to personnel, or the suffering and ‘sacrifice’ of many thousands of animals, as the Allies strove to equip themselves with what they considered an adequate chemical and biological armoury to respond to whatever the Axis powers might have up their sleeves, the experiments would be excused away: the military wanted that capability, the government ordered it, and the scientists and chemists made it possible. But it was only part of the story.



# KILLING THEM SOFTLY

**R**UNNING PARALLEL WITH the race for chemical supremacy was another quest that perhaps held far greater implications in its capacity for mass destruction: germ warfare. Dramatic discoveries on weaponry so insidiously devastating that their secrets were to be guarded by the Allies for decades to come were made by the Japanese under the guiding hand of General Shiro Ishii whose work was kept secret even from Emperor Hirohito. As the war approached, Western intelligence was alerted to BW work in south Manchuria where Ishii's experimental complex had grown to a large garrison of military technicians, with numerous offshoots in other establishments. They were producing vaccines for mass inoculation against a full range of diseases from typhoid to cholera as well as assembling a stockpile of bacteria for the Japanese offensive weapons programme.

The scale of it was only apparent to the West after the war. Ishii's plant at Pingfan was estimated to be capable of manufacturing 8 tons of bacteria a month. The key project, however, was his development of a bomb delivering anthrax, which Ishii had concluded was the most effective killer because of the agent's lingering qualities. He calculated that carefully targeted bombs could easily achieve a 90 per cent mortality rate in a town of 50,000. By the end of 1939, Pingfan had produced and stockpiled 4,000 anthrax bombs; each Japanese bomber could carry a payload of 12. The effectiveness had been meticulously



worked out by bombing runs over isolated tracts of Manchurian countryside; 400 horses, 500 sheep and several thousand rats and mice were killed in the process.

Next, Japan was reported to have conducted bombing trials over China. A very large file of eye-witness accounts now lies in the Public Record Office. They give graphic descriptions of how a single light aircraft arrived over the town of Ch'angte, home for 50,000 people. It came in low and was seen to drop rice and wheat grain over fields and in the town. Within seven days, the town's rat population was dying in large numbers and soon its people were falling ill with the plague. Ninety deaths were recorded and the local Presbyterian Hospital was filled with victims. At least two other bombings were reported, with similar results, followed by an outbreak of plague in two separate Chinese provinces, affecting 600 people. There were suggestions that the reports were put out by the Chinese as a propaganda attack against its Japanese invaders. Winston Churchill, by all accounts, did not agree.

Britain's own move into biological warfare had taken on a note of urgency in the face of intelligence from Japan, Germany and Italy. In 1938, Sir Maurice Hankey's warnings were still tinged with restraint – that Britain should prepare a defence, work on the production of vaccines against disease and examine a defence system against sabotage, such as the poisoning of reservoirs.

Within a matter of months, however, the tone had changed. Hankey, by then a peer of the realm with the title of Minister without Portfolio, was given Cabinet approval to form what was initially called the Emergency Bacteriological Service, a name that in itself gave a clue to the fears of those who had proposed it – so much so that it was thought too 'disturbing' for public consumption. It was immediately changed to the Emergency Public Health Laboratory, a title that hid its true role – and the fact that it was under military control. And so Porton added another string to its bow.

In 1940, as reports of the Japanese raids in China intensified, along with intelligence assessments handed to the Chiefs of Staff that Germany itself 'would not be beyond deliberate and indiscriminate' use of bacteria, Britain was ready to move. Spearhead research was to be led by an anonymous group of less than a dozen men – eventually extending to around 50 – known collectively as the 'Biology Department'.

Arriving at Porton in October that year, the group was surrounded by what must have seemed like impenetrable security arrangements;



their mission was one of the most highly guarded secrets of Porton's already very secret war. Even their association with the Porton establishment was masked by the fact that their salaries were paid through the British Medical Research Council who were in turn reimbursed by the group's ultimate employers, the Ministry of Supply and the Chiefs of Staff Sub-Committee on Biological Warfare.

The team's key links to Churchill's War Cabinet, however, were Hankey himself and Duff Cooper, Chancellor of the Duchy of Lancaster. The team itself was led by Dr Paul Fildes, the strong-willed and autocratic surgeon who had risen to become director of the Medical Research Unit in Bacterial Chemistry at the Bland Sutton Institute of Pathology at Middlesex Hospital. Fildes, son of the Victorian artist Sir Luke Fildes, was a lifelong bachelor and wealthy in his own right. He did not take kindly to the 'fools in authority' and from the outset ran his operation in dictatorial style. Staff recruited from various universities and medical establishments were soon to be joined by a number of American and Canadian experts in the field of bacteriology to form a joint Allied investigation into the manufacture of vaccines and biological weapons.

From his first report to his superiors, Fildes' intentions were clear. His team would focus their experiments on airborne weapons and sprays as a means of releasing micro-organisms against the enemy. This, he argued, was the most effective form of attack. Biological agents could be 'carried through the air and thence deep into the lungs' if released from bursting munitions or by sprays. The research was on very similar lines to the work already proved to be effective by General Ishii in Manchuria.

The first step, according to Porton documents, was to identify the infectious diseases that were most suitable for disseminating in this manner and a series of experiments was carried out by the team, which had set up shop close to the Porton animal house. Using various kinds of animals for their tests, the BDP unit, as it was known, found most success with the use of anthrax, the highly contagious disease that kills animals, especially cattle and sheep, and is also fatal to man, in whom it develops as a hideous-looking cancer.

The team's early experiments discovered that several species of animal were rapidly and fatally infected with anthrax spores by inhalation but a larger test site was needed to calculate effective methods of disseminating the anthrax over potential enemy targets, in other words, German cities. The BDP unit began scouring the nation for a suitable site for tests, since it was far too dangerous to explode



anthrax-charged munitions anywhere near a civilian population.

As most members of the team cautiously admitted, they were literally stepping into the unknown. No one could be certain of the ultimate effects. One small-scale trial was launched at an isolated cove, Penclawdd, on the Gower Coast but the major test site was to be the now infamous Gruinard Island, off the coast of Ross and Cromarty.

The story of Gruinard has gone into history, but a good deal of the background activity surrounding the poisoning of its landscape remains in the classified archives. Using simulants, the BDP team had calculated that anthrax spores could be delivered in aerosol particles from bomblets. They estimated that all animals and human beings within a range of 200 yards of the explosion of the bomblets would be infected, and would die. Those within 400 yards of the release of the aerosol particle would be 'seriously at risk' of fatal infection.

The most significant figures in the BDP reports, however, lay in the comparison with chemical weapons. On a weight-to-weight calculation, anthrax was up to 1,000 times more effective than any known chemical agent. All these theories needed to be tested, and the test site would be Gruinard, requisitioned by the Ministry of Supply in 1942 as the BDP team hurried towards the creation of the West's first biological weapon capable of mass killing.

Gruinard had been uninhabited since the deaths of the last crofters, although sheep farmers on the mainland community used to graze animals there in summer. The privately owned sheep were cleared off and forbidding notices were erected. Soon afterwards, Porton scientists arrived on the bleak and rugged island with its heather-covered cliffs dropping down to long beaches fronting Gruinard Bay, with a backdrop of the north-west Highlands and the shrouded hills of the Summer Isles.

Paul Fildes himself led the Porton team. They were billeted in Nissen huts at Mongasdale Farm on the mainland and their presence was the cause of much speculation, especially as they acquired their own animals, which they transported to this remote piece of British soil, now code-named 'X-Base'. Their mission was to put on trial prototypes for their projected 500lb cluster bombs, each carrying one hundred 4lb bomblets filled with anthrax spores. The security code-name for the BDP was 'N' and so the bomb would later be ascribed the title of the N-bomb – and early precursor of a far more devastating weapon of the same name.

Shepherd Kenneth MacLeod, who lived across the water at Little Gruinard and who used to go there before the arrival of the Porton



scientists, kept a forbidden watch on the events there through a telescope he used to track his sheep. 'I saw them tethering sheep to posts on the slope beneath the black rock at the western end,' he would recall. 'When I looked again, there were rows of carcasses on the ground, and some were washed away on the tide and later reached the mainland.' A small outbreak of anthrax in the area followed, and it was the first real clue that the locals had of what might be going on at Gruinard.

Another contemporary observer was a local GP, Dr James Hunter, whose practice included the region of Gruinard Bay. 'There were a lot of explosions on the island at the time. We knew nothing then of what they were doing. Military exercises were the nearest we could guess at. It was all kept very secret, even from the likes of myself who were involved in community health and welfare. With the benefit of hindsight, we can conjecture that the bombing was to disseminate anthrax. They tried to bury the infected sheep carcasses by blasting rock on top of them. They didn't make a very good job of it. When the dead sheep were washed ashore, a horse and some farm animals became infected and died. The crofters linked the deaths to the goings-on over on the island and wrote to the Admiralty complaining. We were all astonished when they received compensation.'

The Ministry of Defence, in its eagerness to silence the complainants as quickly as possible, paid up virtually by return of post. The results of the Gruinard tests were judged 'highly promising'. The Porton team's findings were relayed to their opposite numbers in America and Canada who had joined them in the Allied programme to 'discover a retaliatory biological capability', which seemed to indicate it should only be used if Hitler himself brought CB weapons into play. Details of the Allied proposals remain classified, but the censors appeared to have overlooked an appendix attached to a report presented to the Joint Technical Warfare Committee at the end of the war, entitled 'Potentialities of Biological Warfare during the next ten years'.

The appendix contained the calculations prepared by Dr Fildes for an effective anthrax strike against Germany, apparently written in 1942. The anthrax bomb proposed was a 500lb 'cluster projectile' containing 106 bomblets of 4lbs. One of these bombs had been shown to produce contamination of more than 100 acres. Fildes estimated that 250,000 square metres of German countryside could be infected, or 50,000 square metres of populated area. Unprotected civilians who were unfortunate enough to be beneath the aerosol cloud of anthrax



particles stood a 50 per cent chance of death, although the figures were soon revised drastically – to nearer 100 per cent. In typical precise and clinical manner, Fildes estimated that to achieve this ‘kill rate’ against the city of Stuttgart, which covered 53 square miles, the Allies would need to employ 268 Lincoln bombers loaded with approximately 4,000 cluster bombs. He pursued his theories to include six major German cities, for which the assumed area covered 538 square miles: 40,350 cluster bombs carried by 2,690 aircraft would be needed to make an ‘effective strike’. The result of this bombing mission, he concluded, would mean that the German cities would be ‘contaminated for many years to come and the danger from skin infection would enforce total evacuation’. Even Fildes admitted, however, that the weapons were so contrary to normal practice that ‘appreciation may be liable to great error’.

Even so, the Allies put them into production. Britain had no factories or laboratories capable of large-scale production of anthrax spores, and it was planned that this should be done in America where a special factory was to be built by the US Chemical Warfare Service with the same urgency as those that went up at Huntsville. By the end of the war, America had built four biological plants under the command of its principal BW research unit at Camp Detrick, an hour’s drive from Washington.

The field trials of anthrax-charged cluster bombs were to be conducted in a remote region of Canada, although, in the event, the war ended before the American plant had produced the large stocks needed to fulfill Fildes’ strike force calculations. Assembling them, according to the Fildes appendix, had proved to be a ‘major problem’.

Gruinard Island, of course, remained poisoned and contaminated and out of bounds to the public for decades. There was great fear in Scotland that birds would spread the organisms to the mainland. Indeed, many blamed Gruinard for three minor outbreaks of anthrax in 1954, 1961 and 1965.

The extent of the Gruinard problem could hardly have been predicted by the Porton research team and it remained with them for years to come. Reluctant Porton scientists, clad in protective clothing and masks, made irregular inspection visits to test the island for contamination levels. By 1978 there was still no sign of anthrax spores diminishing. Various ways of dealing with the contamination would be experimented with over the years, but it was not until 1986 that a suitable chemical was found to kill off the anthrax.

It was sprayed over the affected area in the summer of 1986 and a



year later only a few pockets of anthrax were found to remain. After further treatment and new tests, sheep were moved on to Gruinard in 1987 and in May 1990 the island was finally returned by the Ministry of Defence to the heirs of the original owners – almost 50 years since it was originally taken over.

The use of anthrax had remained, almost to the last, a strong possibility with the Allies who were certain that Japan and Germany had greater capability. In fact, another more imaginative delivery plan had already been devised before the Gruinard trials were completed, to create ‘mayhem among the enemy in the shortest possible time’. It was dreamed up specifically as a ‘stopgap measure’ until the anthrax bombs were built and perfected.

With Churchill’s personal approval, the BDP team’s work arose out of a memo from Lord Hankey to Winston Churchill outlining Porton’s view that if ‘we should desire for the purposes of retaliation, to take offensive action, the only method feasible at the moment would be the use of anthrax against cattle’. Hankey’s close confidant, Dr Fildes, and his team devised a plan that would, as can now be seen with the benefit of hindsight, have devastated the German countryside, just as it had done at Gruinard.

It called for the manufacture of millions of cattle cakes, which were to be infected with anthrax spores. It was planned that these would be dropped by bombers over German fields to strike an ‘effective blow at Germany’s already weak agricultural sector’ – not to mention its civilian population. A general outline of the plan was presented, and the entire operation was tested using dummy runs with uninfected cattle cakes over the British landscape, to determine weight, aircraft speed and height from which they should be dropped.

In his report submitted to the Chiefs of Staffs, entitled ‘Distribution of Infected Cattle Tablets by Aircraft’, Dr Fildes wrote: ‘The object of this contemplated operation is to infect and kill the largest number of cattle as possible in enemy territory in a single effort by means of infected cattle cakes dropped from the air. From Ministry of Agriculture Records, the concentration of cattle per square kilometre has been obtained for Germany. The province of Oldenburgh is the most important district and contains 35 cattle per square kilometre. The most suitable cattle grazing areas would appear from a cursory glance to exist in the area bounded by a line joining Hamburg to Hanover in the east and the River Ems in the west.’

Dr Fildes and his team calculated that, assuming the cattle would



be fairly evenly dispersed over the selected areas, 20 acres containing an estimated ten cattle could be targeted by bombers travelling at 200 miles an hour. The cakes would be packed in boxes of 400 tablets, which could be distributed every two minutes. Fildes continued: 'It is assumed that a stock of five million tablets contained in 12,500 boxes each weighing eight pounds three ounces can be carried as a supplementary weapon and disposed of to the best advantage during routine bombing operations beyond Oldenburgh. Maximum damage to cattle and complete dislocation of the enemy veterinary services may result from one single effort.'

The military commanders and the War Cabinet agreed that it was an 'entirely feasible' project and Operation Vegetarian swung into action. After several unsuccessful attempts at placing the contract through usual manufacturers, Fildes eventually reached agreement with the soap producers Lever Brothers and Unilever and production of the cattle cakes was assigned to one of its factories, Atkinsons of Bermondsey. They were supplied to Porton at the rate of 250,000 a week.

Meanwhile, creative technicians at the station had built a simple machine capable of charging and sealing the cattle cakes with their deadly poison. They estimated, with familiar scientific precision, that a team of 15 ladies could perform the task and pack them into boxes at the rate of 12,800 cakes a day.

Next, Fildes had to find the labour to perform this operation. Once again he turned to Unilever. He contacted one of the company's directors, Mr G. Hansard, to appeal for help in the project and suggested that the women might be sold the idea by treating it as a 'holiday'. In a letter to Hansard on 6 May 1942, Fildes wrote:

'The idea is that the girls would live in the camp. They would have a building which would be fixed up. There is already a sitting room in the camp. There are considerable social amenities, including cinema performances and so forth several times a week. There is a bus service to Salisbury and the local entertainment. They will be fed in the canteen situated in the camp. The work done will be in the closed area for which they will be provided with necessary security passes. I should think that if the project is looked upon as a holiday camp, it might be quite reasonably attractive for a few months.'

Fildes also emphasized that the whole project was to be regarded as 'top secret' and virtually no details of the work were to be discussed publicly. In fact, the soap company was given no more than a brief description of the work the women would be required to do. Anyhow, Hansard agreed to help and made inquiries in his factories for suitable



volunteers. Shortly afterwards, he wrote back to Fildes to confirm the details:

We are able to provide one supervisor and 25 girls. These will be employees of our soap factories in the London and Bristol areas. They will be girls who are reported upon by the managers as being reliable and it will be emphasized to them that they must not discuss this work outside of the station. We cannot of course give any further guarantee than this but we would do our best to choose reliable girls. They would be paid their present remuneration plus five shillings a week. This will cost approximately £2.10s and £2.15s per head and the supervisor £3.10s. In addition they should be provided with free board, this is to say accommodation in the building you described and free meals in the canteen. Working Hours: We understand they will be required to work from approximately 9 to 6 for five days a week and a half day on Saturday. For anything in excess of this overtime will have to be paid at the rate of time and a quarter for the first two hours and time and a half thereafter. Period of service: not to exceed three months. Travelling expenses will be paid for travel, third class, from their homes to the station. I understand you will provide us with a letter stating that this work is in the national interest and the Ministry of Labour are recommended by you to permit the transfer.

Unilever subsequently supplied a list of twenty-nine names – eight girls and a supervisor from Atkinsons, Bermondsey, ten girls from Christopher Thomas, Bristol, and ten girls from John Knights, Silvertown. He also arranged a reserve of seven girls. They would be sent to Porton on a rota basis, the first to arrive in the late summer. Hansard listed the twenty-nine names and, unknown to all concerned, they were immediately passed to Porton's security department and then on for vetting to the chief constables of the areas where the girls lived.

Any who were found to have dubious connections were to be rejected. In fact, all were approved although two subsequently dropped out; one discovered she was pregnant and another, by then already working at Porton, was found to be suffering from Scabies. Atkinsons began supplying the cattle cakes at the rate of 250,000 a week. The first batch of girls arrived in the late summer of 1942 to begin the task about which they still had little knowledge; nor did they appreciate that the end result would be the destruction of thousands of German cattle.



Travelling by rail from London and Bristol, they arrived nervous and chattering to be welcomed by the senior technicians who would oversee them and, once they had settled into the 'holiday camp' that would be their home for the next three months, they were given a security briefing.

There were a number of minor incidents. On one occasion the girls complained they had nowhere to hang their coats after walking in the rain between huts. The lack was immediately rectified with a row of hangers. One early problem among the chattering group was security. They were obviously being kept under observation when they travelled into Salisbury on their days off. An internal Porton memo from head of security to their unit chief reported that one of them 'has been heard talking about her work while travelling on a bus into Salisbury . . . she was overhead saying she had been burned by mustard . . . would you please address this problem.'

The memo seems to indicate that the girls believed they were probably working with a mustard gas product – not anthrax. Their work, however, was judged to be 'entirely satisfactory' and they were contaminating the cattle cakes at the required daily rate. Dr Fildes was so pleased that he recommended that the girls' supervisor, a Miss F.I. Hazell from Herne Hill, should be rewarded for her outstanding efforts. She was given an extra 5s above her special allowance.

The stockpile of five million cattle cakes was completed by April 1943 and Dr Fildes recorded his personal observation of the project. 'It was,' he wrote, 'developed as the quickest way in which we could make some retaliation at short notice.' The efforts of the soap factory women proved to be in vain. Operation Vegetarian was aborted. There are no documents in the files so far released that explain why it was called off, but by then the results of early tests on the use of anthrax by the Porton team were becoming known, proving the devastating possibilities of biological weapons.

Furthermore, in the year since the project was first discussed, masses of intelligence reports were being accumulated by the Allies on CB.W experiments in Germany, Italy and Japan. The British War Cabinet had authorized the cattle cake plan on the understanding that it would not be activated without their final approval. A first strike at a time when the Allies were already planning their invasion of Italy, through the Sicilian landings, may well have proved too risky.

The boxes of cattle cakes remained at Porton until the end of the war, when all but a few samples retained for the Porton archives were destroyed. The exercise was judged, however, to have been a total



success and formed part of what Porton's official history would applaud: 'The apotheosis of research at BDP was to demonstrate the feasibility of biological warfare by all means short of actual use . . . besides these notable achievements, BDP pioneered several unique fields, notably in experimental airborne infection, biotechnology and aerobiology . . . in the future, successors to BDP were to become acknowledged leaders in such fields.'

And the soap-factory girls went away, unaware they had contributed to one of the most remarkable experiments in the annals of biological warfare.



# THE UNFOUGHT BATTLE

AS THE WAR swung in favour of the Allies, the possibility that the Axis powers might yet unleash their CB weapons in a desperate bid to regain the initiative was constantly under review by the Allied Chiefs of Staff. A veritable mountain of intelligence reports, gathering up every snippet of information that might give a clue to the Axis intentions, was gathered and analysed. In readiness, the Allies had long before begun moving thousands of tons of chemical weapons by sea and air to strategic points of the war theatres both in Europe and the Pacific. The Axis did likewise. There was, to some degree, an element of cat and mouse, since both sides had an intelligence cover on the movement of arms.

At the end of October 1943, after the successful Allied landings in Italy through the island of Sicily, the US merchant vessel SS *John Harvey* pulled into Baltimore to take on a secret cargo. Under the supervision of First Lieutenant Howard Beckstrom, of the 701st Chemical Maintenance Company, 100 tons of mustard gas bombs were loaded aboard and the ship left immediately for Europe, with Beckstrom and a detachment from the Chemical Warfare Service. Their destination was southern Italy where the Allied armies had taken control. The mustard bombs were being sent as retaliatory back-up in the event that the Italian population and German troops retreating to the north resorted to chemical attacks in a last-ditch effort to halt the Allied advance through Italy.



The *John Harvey* reached its destination of Bari, towards the heel of the boot of Italy, at the end of November. The harbour was so heavily congested with Allied ships that the captain took orders to tie up at Pier 29 and wait for further instruction for unloading. They had been in the harbour for 48 hours when, on the night of 2 December, the air raid sirens sounded and the German bombers came roaring in from the north to inflict the worst sea damage the Americans had suffered since Pearl Harbour. Within half an hour, the Luftwaffe had sunk 17 ships, largely carrying supplies and equipment for the Allies, and another 8 ships were badly hit. Explosion after explosion ripped through the harbour as first a fuel tanker and then the *John Harvey* blew up with such force that buildings in the harbour 7 miles away shattered.

The disaster, bad enough, was heightened by the fact that no one knew what the *John Harvey* was carrying because Beckstrom and his party were travelling under orders of secrecy and they had all been killed. As the ship went down, the liquid mustard leaked out into the sea and mingled with oil from the fuel ship. Hundreds of sailors were in the water, some in lifeboats, clutching the sides, others swimming frantically. They all became engulfed by mustard fumes and many were completely immersed in the liquid gas itself. At least 1,000 men had been killed in the attack, and as the medical units ashore were inundated they simply did not know that hundreds of the wounded brought in had been contaminated by mustard gas. It was a chaotic catastrophe. By morning, the extent of the disaster had become very evident: many of the men were blinded, others badly burned; some had lost some 80 per cent of their skin, which hung from them in loose layers.

In the town itself, the effects of the mustard gas cloud were already appearing. At least 1,000 civilians were killed by the blast itself. Hundreds more were literally falling down, choking. General Eisenhower initially ordered a news black-out on the disaster, but it was too big to keep secret and, in any event, thousands of Italians fled in panic and confusion, claiming that their town had been hit by an enormous gas bomb attack. The deaths directly from mustard gas poisoning soon began to mount. Combined scientific teams from Porton and Edgewood were dashing to the scene to collect and record as much data as they could. The Bari explosion was the nearest they could possibly get to a true chemical warfare battle. The scientists selected 40 bodies; 20 were taken back to Porton Down and 20 to Edgewood Arsenal for post mortem examination and eventually dissection and microscopic investigation. The relatives were never



told; they were merely informed that their menfolk had been killed in enemy action.

Later, in reflecting upon the situation and realizing the sensitivity of the gas issue, Eisenhower proposed that the death descriptions of the victims should be adjusted so that the classic symptoms of mustard gas poisoning – blocked windpipes – became ‘bronchitis’, and burns and eye injuries were ascribed to ‘enemy action’. His ‘most secret and most urgent’ telegram, logged in War Office files, suggested that these descriptions would ‘adequately support future claims by those injured for disability pensions’.

The Bari incident raised even further the massive anxiety about a chemical flare-up, apparently shared by Germans who believed that the Bari ship had been brought specifically to feed supplies for a CW attack. For months, intelligence reports had flooded in to both sides. The Allied sources seemed convinced that Hitler was on the brink of ordering both chemical and bacterial attacks on British cities – to such an extent in fact that on 15 June 1943 the Chiefs of Staff ordered a ‘complete evaluation of the most significant readings to attempt to establish enemy intentions’. Examples from that evaluation, released into the public domain in Britain in 1996, reveal a series of seemingly trustworthy intelligence reports from both British agents and the US Office of Strategic Services (OSS) reports filed to London from the Pentagon. From among these the following digests have been made:

3 July 1943: ‘Top secret’ report from Tunisia describes the capture of a German army medical captain who had given first intimation of Hitler’s experimental new gas, tabun, which could kill its victims in half an hour. He gave full description of a colourless gas and substantial clues as to the chemical compounds from which it was derived. The prisoner was interviewed several times and report was sent to Chiefs of Staff and to Porton.

11 December 1943: British intelligence reports the conversation with a senior Panzer general captured recently. He said he could not understand why the Germans, with all their talk of a new secret weapon, did not use it when ‘everything is being smashed up nightly’. Germany had once initially held the advantage over its enemies in chemical weapons but she had lost it largely because senior scientists who had developed it, such as at Haber Laboratory in central Germany, ‘are now in England’.

6 December 1943, Stockholm: A German naval officer reported that the Germans intended to spread disease in Britain with bacteria by dropping infected mice, rats and rabbits into the countryside and



in the cities. A relative of his in the Luftwaffe said he had dropped a quantity of rodents on several trips to England. This was in line with reports from scientists captured during the invasion of Italy, indicating that the Germans had perfected large cages that would open automatically when dropped by parachute over southern England, releasing 250,000 infected rodents 'sufficient to start an uncontrollable epidemic' of plague and typhus.

20 December 1943: The Dutch intelligence service had received several reports that the Germans were planning to attack Britain with airborne biological weapons 'out of sheer despair and revenge'.

March 1944: An OSS cable from Berne suggested that a Doctor Briault of the Pasteur Institute had received the following information from a German source: that the Germans were preparing a bacteriological mixture of which the largest element by percentage would be typhus, contained in breakable glass tubes, which will be dropped over Britain shortly. The Swiss press are full of speculation about Germany's secret weapon.

25 April 1944: 'Definite confirmation' of BW research at five named German medical research units.

3 July 1944: Report from the head of the Chemical Warfare Service, Intelligence Branch, Porton Down, on enemy intentions: 'Hitler's domination of the German High Command means that the use of BW becomes an imminent possibility. Although his aircraft have been neutralized, the use of robot bombers makes it possible to deliver chemical and biological weaponry to the heart of our cities . . . a leading scientist now in Allied territory personally heard Hitler state: "A nation which is denied the right to live has the right to use the most extreme methods of destruction, including germ warfare."'

10 July 1944: From OSS Technical Intelligence, Pentagon: 'The Germans carried out experiments with bacterial weapons which they intend to use against Great Britain. The main purpose was to establish the degree of efficiency and the size of the area which can be infected by a two ton missile projected by means of a rocket.'

Faced with this mountain of paper, from which the above is a small sample, Winston Churchill found himself confronted by having to make decisions on British intentions. In July 1944 Churchill made it plain that he would be prepared to order the use of chemical and biological weapons against Germany if two criteria were met: 1) that it was a life or death situation for Britain; or 2) that it would shorten the war by a year. On 3 July 1944 he dictated a memo for his Chiefs of Staff after they had told him they were against the use of the chemical bomb:



‘I want you to think very seriously over this question. It is absurd to consider morality when everybody used it in the last war; on the other hand the bombing of open cities was regarded as forbidden. Now everybody does it as a matter of course.’

Churchill demanded that his military commanders made a ‘cold-blooded calculation’ as to how it would pay the Allies to use ‘poison gas, by which I principally mean mustard. We want to gain more ground in Normandy . . . we could probably deliver twenty tons to their one.’ He went on to ponder the mystery that had grown more puzzling to the war councils of the West as each year passed: Why had the Germans themselves not used it – especially then, as they began daily V-rocket attacks, firing 2,000 on London in the first two weeks of June 1944?

‘Not certainly out of moral scruples or affection for us,’ Churchill memoed.

They have not used it because it does not pay them. The greatest temptation ever offered to them was the beaches of Normandy. That they thought about this is certain and that they prepared against our use of gas is also certain. But the only reason they have not used it against us is that they fear the retaliation. What is to their detriment is to our advantage. Although one sees how unpleasant it is to receive poison gas attacks from which *nearly everyone recovers* [author’s italics] it is useless to protest that an equal amount of HE [mustard gas] will not inflict greater cruelties and sufferings on troops or civilians. One really must not be bound within silly conventions of mind whether they be those that ruled the last war or those in reverse which rule this.

It is an interesting side-element to the discussion that Churchill followed the notion put forward in the wake of the previous hostilities that chemical warfare did not necessarily cause lasting damage to those who were attacked by it – a theory that today finds few supporters. At the height of war, however, it was one that was readily, perhaps eagerly, grasped at as justification for the use of gas, demonstrated in the later paragraphs of Churchill’s memo:

If the bombardment of London really became a serious nuisance and great rockets with far-reaching and devastating effect fall on many centres of Government and labour, I should be prepared to do anything that would hit the enemy in a murderous place. I may certainly have to ask you to support me in the use of poison gas. We could drench the cities of the Ruhr and many other cities



in Germany in such a way that most of the population would be requiring constant medical attention. We could stop all work at the flying bomb points. I do not see why we should always have all the disadvantages of being the gentlemen while they have all the advantages of being the cad. There are times when this may be so but not now.

Churchill was forthright in the final instructions to his commanders. He told them that if in the near or more distant future he gave instructions to use poison gas against Germany, it would have to be done wholeheartedly. Meanwhile, he wanted the whole matter considered sensibly and dispassionately, as befitted a serious question that could only be rejected for equally serious reasons. He added that he would have to get Stalin's acquiescence.

Ten days later, his initiative in the use of gas moved on, although by then one more element had been added, that of germ warfare, namely the use of anthrax. On 16 July the Joint Planning Staffs were issued with Churchill's personal directive, to undertake 'a comprehensive examination . . . of the military implications of an all-out use of gas, principally mustard, or any other method of warfare which we have hitherto refrained from using against the Germans'. And in the final paragraph of the directive, the issue was moved specifically a stage further, calling for the examination to include 'the use of biological warfare by us or by the enemy. It should take the form of a thorough and practical examination of the military factors involved and should ignore ethical and political considerations.'

Almost three weeks passed and Churchill had not received a reply. On 25 July, angry at not having had a response, he fired off another memo: 'I asked for a dispassionate report on the military aspects of threatening to use lethal gases on the enemy if they do not stop indiscriminate bombing . . . I now request this report within three days.'

Forty-eight hours later, the document that had the potential of adding a totally new dimension to the war, and especially to the way in which the attacks were delivered to cities on both sides, was presented to the War Cabinet.

The Joint Planning Staffs produced their assessment in a 14-page report. If chemicals were to be used, they said, they should be part of a combined, concerted attack by British and American bombers carrying a bomb cargo made up of 25 per cent high explosives, which would cause major damage to buildings and spread panic. The remainder would be made up of mustard gas and phosgene gas. There



were sufficient stocks of mustard to bomb 1,500 tactical targets or 60 cities – and the 60 ‘most favourable’ were listed.

There was sufficient phosgene to hit 1,000 targets or 20 cities. The likely effect would be to cause vapour burns ‘on such a scale as to necessitate the wholesale evacuation thus paving the way to a subsequent incendiary attack. Speedy wholesale evacuation might well be impossible, in which case large casualties would follow.’

The war planners added a note of caution to Churchill in regard to his theory that gas attacks would speed up the Allied move through France. It might, they said, provide decisive local results ‘allowing us to break through the German defences on a large scale’ but warned that, on the other hand, ‘gas on an unprotected population in the battle area would hamper operations . . . and might seriously impair our relations with the civilian populations.’

Above all, the planners said, there was little doubt that if the Allies used gas against the Japanese or the Germans they would undoubtedly retaliate in kind and added, with the classic understatement that regularly attaches itself to projections about chemical and biological warfare, that the public at large ‘might be resentful’ if they felt it could have been avoided.

As to biological weapons, the British strategists were less emphatic, indeed they seemed to favour their use over chemicals – although at the same time they were aware that the anthrax-charged N-bomb tested by Porton Down on Gruinard Island could still not be produced in sufficient quantities. Nevertheless, the report noted: ‘The indications are that . . . “N” [the anthrax bomb] used on a large scale might have major effect on the course of the war . . . If extreme pressure were applied to the US enough “N” bombs might be accumulated towards the end of the year to make a very few token or demonstration attacks on selected objectives.’

The war planners’ report made stark reading. There were sufficient stocks of chemicals for a massive and sustained attack against the Germans, though it would be several months before the biological warheads could be produced for an effective strike. On 28 July, the Chiefs of Staffs trooped into a meeting to discuss its contents and make their observations. They came out firmly against what they assessed would lead to a major chemical offensive by both sides – largely on the grounds of public opinion. They concluded that the British were capable of ‘drenching the big German cities with an immeasurably greater weight of gas than the Germans could put down in this country’.



There was no reason to believe, however, that the German High Command would have 'any greater difficulty in holding down the cowed population if they were subjected to gas than they had during the past months of intensive high explosive and incendiary bombing . . . the same cannot be said for our own people who are in no such inarticulate condition.'

Churchill was still not persuaded, but with additional restraining pressure from Eisenhower and President Roosevelt, he grudgingly drew back, damning the report as 'negative' and adding: 'Clearly I cannot make head against the parsons and the warriors at the same time.'

At almost exactly the same time, similar discussions were taking place in Germany. The Nazis had already carried out a successful series of tests, charging their flying bombs and rockets with poison gas, just as Churchill had surmised. General Hermann Ochsner, commander of the Wehrmacht chemical division, presented a detailed report to the German High Command, recommending the immediate use of gas in bombing raids on British cities. It should be targeted at large industrial areas and at the major cities.

He painted a scenario that was almost identical to that put forward by the British war planners: 'There is no doubt that a city like London would be plunged into a state of unbearable turmoil which would bring enormous pressure to bear on the enemy Government.' With the V-rockets being despatched at the rate of 250 a day, Ochsner had the means to deliver swift and devastating attacks. As the Allies would later discover, his unit was ordered to prepare for the arming of V-rockets with both phosgene and the nerve gas, tabun. But, like their opposite numbers in Britain, the top brass held back from giving the 'Go' command.

The world was saved by a whisker from a chemical and biological bombardment on a scale largely incalculable at the time, but evident now with the benefit of hindsight. Apart from the mass killing and injuring of many thousand civilians and military personnel – bad enough with conventional bombing – biological weapons would have contaminated massive areas of both countries with disease and bacteria that would have taken decades to eliminate. Proof that that would have happened lay like a time bomb ticking away on Gruinard Island.

For all their knowledge and experiments, the scientists had been unable to predict such long-lasting effects. Nowhere in the archive reports is that possibility even discussed, and in many respects the outcome could have been almost as bad as that suffered by Japan after the dropping of the atom bombs on Hiroshima and Nagasaki in



August 1945. There was yet one further significant discovery, however, that would leave the British military commanders, and their scientific advisers, breathing a great sigh of relief that they had not launched an all-out attack against Germany. It came in the late spring of 1945. The war in Europe was virtually at an end. Staff at Porton Down were being stood down.

There was still the possibility of gas or germ attacks. Intelligence reports from France suggested that Germany had sent a detachment of agents to Paris to ensure one final strike against the city as its troops pulled out – by spreading thousands of glass containers filled with bacteria in the Metro. In the Far East, some isolated Pacific outposts of Japanese forces used chemicals. But, by and large, the threat was over.

Some of Porton's leading scientists and chemists were already drifting back to their pre-war jobs in the universities and medical faculties. Even the future of Porton itself was being discussed, amid speculation that the whole chemical and biological research effort might be scaled down to a minimal level.

That possibility was to be quickly dispelled.

On 25 March, the Allied armies thrust deep into the Ruhr, the industrial heart of Germany, after their stunning crossing of the Rhine and the capture of Cologne. To the north, Montgomery put up a massive smoke screen – another pioneering project from Porton Down – to move his huge assembly and troops, stores and munitions forward. It was during these advances that on 16 April 1945 British troops from the 21st Army, mopping up behind the advancing heavy guns, discovered a German munitions dump that contained shells marked with a white ring, previously identified by the Allies as being charged with chemicals. There were other shells, which carried green and yellow rings, a marking unknown to the explosives experts. Further investigation led them to one of the Germans' largest chemical warfare stations at Raubkammer bei Munster. There, 105 shells marked with green rings were discovered.

The shells were cautiously examined by a joint Porton and US team at a field laboratory. The white-ringed shells were found to contain a mustard gas mixture. The others carried a chemical that had never been previously identified. A report on the discovery states that 'the shells were found to contain a remarkably potent and hitherto unknown organophosphorus nerve agent' similar to a secret formula Porton was working at the time, codenamed 'PF3'.

The British had accidentally stumbled across the secret weapon



that Hitler had never used – Dr Schrader's nerve gas. The shells were hastily transported back to England. That the Porton staff were 'open-mouthed and incredulous' at the potency of the chemical charging was putting it mildly. Immediate assessments were called for. A Porton report on the examination and tests on animals reported that the gas was 'rapidly toxic through skin or eye absorption . . . lethal dose of five grams through skin . . . lethal concentration by inhalation of same order and by injection . . . was ten times more toxic than PF3. On small animals after injection, death was rapid following tremors, convulsions and respiratory failure.'

Was it possible that Hitler had produced large stocks of this new and as yet unidentified gas? And if so, why had he not used it?

The answer to the latter question was now academic; the war with Germany was won, and it would be surmised later that the German High Command held back on blitzing London with its lethal new gas for exactly the same reasons that the British Chiefs of Staffs had rejected an all-out chemical attack on German cities: they were afraid of the consequences. Just as the development of nerve gas had remained unknown to the Allies, the Nazis themselves could never be certain whether or not the Allies themselves had similar weaponry among their chemical armoury and would retaliate in kind.

The same, incidentally, applied to the USSR. After the war, a defecting Soviet colonel confirmed that the Red Army had chemical weapons strategically placed ready for use, but Stalin had refused to agree to a wholesale attack on the Germans for fear of retaliation in kind. As to the question of stocks, that would remain for some months a mystery to all – all, that is, except the Soviets who, by then, were hurriedly transporting samples of the nerve agents sarin and tabun back to Moscow.

Unknown to the Allies in April 1945, the Soviet Army advancing south through Poland had discovered, and taken possession of, the largest of the German nerve gas production and scientific plants, the massive purpose-built compound in the Silesia region of Poland, forty miles from Breslau. They also found a new factory still being built at Falkenhagen. Between them, those two plants were capable of producing more than 10,000 tons of nerve gas a month. Even as the Soviet troops approached, the German High Command had given orders for everything at the plant to be destroyed but by then the Red Army had moved in, although most senior German scientists at the plant had fled.

Porton scientists had completed their analysis and tests on their



sample of German shells and dramatic reports of the chemical potency were floated up the chain of command. With the help of a German scientist co-operating with the British, it was identified as tabun, or Trilon 83, one of the series of nerve gases that had evolved from Dr Schrader's initial experiments and code-named by the Germans as 'G-agents'. Although Germany was no longer a threat, the very discovery stirred considerable excitement in the Porton ranks and even its rather staid formal history records:

Concern about possible chemical warfare in the Far East was immediately relegated and almost the whole of Porton activity was directed towards an investigation of the Germans' capability . . . a vast programme of work on the nerve agents was mounted, both within Porton and extramurally at the University of Cambridge.

Fifty years later it was still going on.



# SPOILS OF WAR

AS THE MILITARY established its command across the defeated nation, it was followed by a smaller army of specialist personnel who, as we now know, were charged with identifying, assessing and evacuating the spoils of war. Hundreds of tons of documents and plans covering virtually every aspect of the Nazi regime, from foreign policy to industrial and scientific research, were captured and transported back to Britain and America and the USSR. The Soviets were doing the same in the sectors under their control and it had become clear to Western intelligence that the Red Army had, in one fell swoop, gathered up the secrets of the nerve gas factories. Fortunately for Porton, there were others in the territories that fell under British and American control, and the West also pulled off a significant coup by rounding up a greater number of scientists who would be prepared to co-operate. The renowned US Naval Technical Mission swept across Europe in search of every scrap of industrial material and scientific data that could be garnered from the fallen Reich. This mission set the stage for the wholesale importation of more than 600 top Nazi scientists under the auspices of Project Paperclip, which the CIA supervised during the early years of the Cold War.

Dozens were already in the US and Britain before the war ended, but by the same token the Soviets had gathered up their own quota of people and documents from which the secrets of sarin could be extracted. Even before Germany surrendered and, as the horrors of



the concentration camps came tumbling forth, several scientific teams left England to join their US colleagues in pursuit of scientists and scientific records. Of particular early interest to Porton were the records at Natzweiler Concentration Camp, where allegations of experiments conducted on inmates by Professor Karl Wimmer, of Strasbourg University, and other leading chemists were to be studied under the direction of the Combined Intelligence Objectives Sub-Committee.

The camp was first inspected by a Porton-linked team of Captains W.J. Cromartie and Carlo Henze who had been assigned to examine the records of medical institutions in Strasbourg and in turn visited Natzweiler, one of the first Nazi concentration camps to be liberated. On 2 January 1945, Cromartie filed his first report to the head of intelligence at Porton:

‘On the suggestion of an informant at the Institute of Hygiene in Strasbourg . . . visited Natzweiler Concentration camp . . . it is of the usual hutted style, surrounded by a barbed wire fence, electrically charged, with guard towers and powerful lighting. At the time, the camp was under the command of the French Army who were using it for the internment of German nationals rounded up in the Strasbourg area. As we were escorted through the camp, many stories of atrocities allegedly committed by the SS were recited . . . informant volunteered the information that doctors from medical research institutes in [Germany] had visited the camp in connection with experimental work on prisoners.’

The report, accompanied by a selection of photographs taken at the site, went on to describe in detail gas chambers, a morgue, autopsy room, incineration plant and associated installations. Outside, they made an inspection of a large dumping ground for ashes. There was also a collection of earthenware urns that were supposedly used by guards to sell ashes to relatives of camp victims, gassed and cremated.

The report inspired a further inspection, this time by another of the Porton team, Major D.C. Evans, who had been attached to the chemical and biological unit throughout the war. He was assigned the task of examining the gas chambers of the concentration camps, though not for any humanitarian reasons. His was a particular mission: to collect details of the gas used by the Nazis in their extermination programme, Zyklon B, cyanide gas.

One report on his findings noted in icily clinical terms that a great deal of time was spent ‘trying to discover reliable data to calculate what concentrations of Zyklon were used for the extermination of



victims. It would appear, however, that no controlled experiments were carried out on a scientific basis. The chief object was to kill the victims as quickly as possible so as to make room for the next batch.'

Major Evans, confronted by this disappointing lack of scientific data, tried to make his own calculations. His report to Porton recorded: 'Several witnesses have given measurements of the size of the gas chambers with which they were acquainted whilst others have stated the approximate numbers of Zyklon B canisters required for the extermination of given numbers of victims. Unfortunately, there were three sizes of Zyklon tins.'

Major Evans and others from Porton, along with many teams from the US, were also trying to retrieve as much information as possible on the nerve gas experiments, as well as the general chemical and biological weaponry developed by Germany during the war years. The pressure, according to one source at Porton, to bridge the gap in the knowledge of the Western Allies was intense and came from 'on high'. Evans was asked to examine the possibility that nerve gas had been tested using human guinea-pigs from the concentration camps.

His report spelled out unequivocally the intent: 'It is thought highly probable that such experiments have been carried out . . . and the results might provide invaluable data as to the lethal concentrations for man.'

Thousands of files on human experiments had already been destroyed by the Germans themselves in the last few months of the war. There was still enough to show that there had been masses of experiments on human beings in the cause of medical, scientific and chemical warfare research. At Natzweiler itself there were numerous experiments, on 'habitual criminals' interned there, into the lethal concentrations of mustard gas and nerve gas. Evans had several names on his file of scientists who had conducted experiments on humans, including Professor Karl Wimmer.

As soon as Wimmer was located, Evans contacted the military police and asked for him to be arrested at once. The major said in his report: 'He could be well worth interrogating . . . [he] is one of the few surviving individuals who might be able to provide such information.'

Wimmer was duly taken into custody – and then promptly disappeared. What happened to him thereafter remains a mystery. He was never summoned before any war crimes tribunal and there is no trace of his name in the British archives, at least not in those that have come into the public domain. If he was arrested and co-operated with Evans either in Germany or back at Porton, it remains classified information.



Other documents from Nazi sources, however, would confirm the fears of the Porton scientists of the mass suffering that a full-scale attack with sarin or tabun would have wrought on British cities. Among files in the hands of the Combined Intelligence Objectives Sub-Committee was a report retrieved from Spandau concerning industrial accidents at the Dyhernfurth plant where there had been at least 300 mishaps and a dozen deaths in under 24 months. In the worst case, seven men were squirted in the face with liquid tabun. Although they were all wearing masks, they fell ill instantly. The files described how they became giddy and began vomiting, so they removed their respirators only to inhale more gas. They all fell into a coma, their bodies convulsing violently even when unconscious. Their pulses became feeble, they had nasal discharge, contracted pupils and struggled to breathe. Involuntary urination and diarrhoea occurred. In spite of immediate injections of atropine and other drugs, along with artificial respiration and heart massage, only two of the seven survived. Even then, as they came out of the coma, they both suffered severe convulsions and had to be sedated for ten hours.

The bodies of the others were subjected to a rigorous post mortem. Their brains and lungs were so badly damaged and congested that the organs were despatched to Berlin for inspection by medical teams. This was the kind of evidence the British, the American and the Soviets were competing for in the months after the war. It made grim reading, but in many respects its importance seemed to have been superseded when the Americans unleashed the next generation of high explosives with their A-bomb attacks on Japan.

That, alone, was considered by some at the time to be sufficient to conclude all experiments on chemical and biological warfare – they should be scaled down to the point of snuffing them out. What was the use of anthrax and nerve gas now that one single bomb could wipe out a whole city?

That, however, could never become the rationale for the future. The Soviets had The Bomb, too. They also had possession of Germany's landmark nerve gas plant in Silesia and were the first to capture General Ishii's Japanese biological warfare stations in Manchuria. The huge Allied intelligence activity and a massive traffic, stunning in its quantity, in 'top secret' reports running to thousands of pages from every major centre of the war theatre, covering even the minutiae of chemical and biological discoveries, demonstrated an air of desperation.

A directive from the Pentagon, and matched by a similar edict



from London, ensured that all available evidence would be collected up. At every location, any sign, any mention of chemicals and bacteria had to be pursued, and mere rumours from captives and prisoners of war would be followed up. Page upon page, file after file, poured into the various centres of CB technology for dissemination by a special assessment panel set up in 1945.

When Churchill made his famous Iron Curtain speech a year later, it merely confirmed the very obvious fears of the military establishment, that the Soviets had replaced the Germans and the Japanese as a future threat. Chemical and biological warfare was on the threshold of a new era, based to a large extent on Hitler's unused secret weapon – nerve gas – and the British and Japanese trials of bacteria-carrying bombs.

That probability was spelled out in an upwardly directed memo from Commanding Officer No. 1 Chemical Warfare Investigations Detachment, Porton, 13 October 1945: 'The chief IG chemists associated with sarin are now in British, American or French hands. They have talked freely on the subject and it is probable that any other chemists in Russian hands would talk as freely . . . much of the documentation on sarin had been stored at Spandau and was not thought to have fallen into Russian hands. However, a number of Spandau personnel have not been located in the West and can therefore be presumed to have been captured by the Russians. In conclusion, it would appear that it is more than probable that the Russians have followed up developments in this field. If they are producing tabun or sarin, or compounds very similar to them already, they have now probably learned enough about them in Germany to produce them in the near future.'

The scene was set . . . and as Porton's own history records: 'There was very little of the uncertainty about the future that had been evident at Porton after the Great War.' None, indeed. As the Porton records bluntly admit the post-war exploitation of German chemical weapons was 'particularly important'. Those engaged in CB research were placed on a new red alert – 'Red' being the operative word. The Soviets, it was commonly and correctly assumed, had equipped themselves with German knowledge. British and American teams spent months analysing every scrap of documentation relating to Nazi and Japanese research they could lay their hands on, along with a vast hoard of specimens, preserved organs, gas samples and thousands of photographs of experiments conducted on humans and animals. Leading scientists from both nations had been spirited away to secret



hideaways in the West on the promise of immunity in exchange for their knowledge.

It was only then that the extent of the Japanese programme into biological research began to emerge. The pieces of the jigsaw were eventually put together from the interrogation of prisoners of war and Japanese scientists, along with a substantial cache of documents. They told a story that the Japanese themselves made attempts to hide in the last months of the war.

As the Soviet Army neared the Japanese biological plant at Pingfan in 1945, the military detachment within the institute's compound was ordered to begin a systematic destruction of everything of an incriminating nature – including all records of experiments, laboratory equipment and the contents of almost 1,000 tanks in which tons of bacteria had been stored. Its founder and the chief proponent of the Japanese BW capacity, General Shiro Ishii, was arrested five months later by the Americans and was imprisoned in Tokyo, where Allied intelligence officers, aided by scientists, began their interrogation.

For a long time Ishii simply denied all knowledge of the BW experiments. During the next 18 months, the Americans tried in vain to get him to talk about the work that the Japanese had attempted to eradicate from their history. Towards the beginning of 1946, a flurry of intelligence memos between the Pentagon in Washington and the Chiefs of Staff in London portrayed an air of high drama following the discovery that Ishii's BW plants in Manchuria had fallen into the hands of the USSR. Had the Soviets managed to retrieve all of the research material, accumulated over a dozen years, into biological weapons?

The question became a matter of top priority and the need to 'neutralize' any gains made by the Soviets in that respect became one of 'paramount importance'. In 1947 Ishii had been in the hands of the Allies for almost two years and was still refusing to confirm any details of the now notorious Unit 731 of the Japanese Army, which he controlled. In May that year, he apparently changed his mind after the Soviets had made a formal request to interview him, ostensibly to confirm claims that the Japanese had used biological weapons against China and the USSR.

Ishii, fearing he would be handed over, began to talk to the Americans. Two senior figures in the American BW team at Camp Detrick, Dr Edwin Hill and Dr Joe Victor, were despatched to Tokyo to assess the extent of Ishii's information. The evidence they collated had such implications as to inspire an immediate, panic-stricken



security clampdown. Nothing from Ishii's interrogation should be allowed to leak out. Nor would it – and in the intervening years, very little has filtered into the public domain. Half a century later the reasons would become clear.

Classified US files pointed to the fact that the Americans wanted to mop up the Ishii intelligence and take it home, in part to deny the Soviets the key to the material they had already gathered in Manchuria, but more specifically to provide scientists in the West with an insight into Japanese research. The files provide graphic accounts alleging that Japanese doctors and scientists conducted experiments on prisoners at the Mukden PoW camp, located in Manchuria, about 300 miles south of the Pingfan BW institute.

The camp housed US, British and Australian PoWs as well as captives from regions in the Far East. The reports were suppressed as the US military officers arranged a secret deal granting certain Japanese immunity from prosecution in exchange for tissue samples and reports on experiments that might help give the US a germ warfare advantage over the USSR.

A 137-page counter-intelligence file, known as the Mukden Report, focused specifically on the operations of Unit 731 of the Japanese Imperial Army, which some historians have linked to the killing of 200,000 Chinese soldiers and civilians in 'field tests' of germ warfare. These included giving children chocolate laced with anthrax. Test subjects were injected with bubonic plague, typhoid, cholera, syphilis and other diseases. It has been claimed that some prisoners were dissected alive, after heavy injections of morphine, to see the effect of the diseases on their vital organs.

Both the US and Japanese governments have maintained there is no evidence to support the allegations or that there was any 'secret deal', a position they maintain today. Campaigners for relatives of the victims, however, claim that the files from the military's counter-intelligence corps of the Supreme Commander of the Allied Powers, headed by General Douglas MacArthur, confirm that US intelligence covered up war crimes against Western soldiers and gave safe-haven to General Ishii.

The Mukden files emanate in part from the findings of a counter-intelligence corps, which prepared a report on Ishii, just before the arrival of the Camp Detrick team in October 1947. Colonel Philip Bethune, a senior officer in US military intelligence, commandeered the report and declared that it was a 'top secret matter' on which nothing further should be written. The counter-intelligence officer, identified in



the files only by the initials WSC, noted: 'Col Bethune desires no further action be taken in this case. No further action was taken.'

The colonel was merely following orders. On 17 April 1947, General MacArthur's headquarters, which was handling the investigation of Unit 731, issued a directive: 'The utmost secrecy is essential in order to protect the interests of the United States and to guard against embarrassment.'

Nor did the Americans give up Ishii for a 1949 war crimes trial in the USSR, in which 12 Japanese prisoners of war were sentenced to various terms of imprisonment for being involved with germ warfare against China. In typical propaganda, though it was undoubtedly true, the Soviets claimed that Americans were protecting Japanese war criminals to reap the benefits of their research. A clue to the Allies' dilemma over the Ishii material eventually emerged in 1985 when Dr Murray Sanders, who was enlisted as a lieutenant colonel to become BW adviser to General MacArthur, made a public confession. He claimed that the US military under personal orders from MacArthur agreed to exchange immunity to leaders of Unit 731 in exchange for details of their biological experiments.

Sanders, then 75 and with not long to live, admitted to newspaper reporters that he did not know at the time that the Japanese had experimented on humans. 'I feel terrible about it, that it should have been covered up all these years,' he admitted. His revelations were treated with scepticism in establishment quarters. Almost a decade later, they were to be confirmed in the Mukden files.

One of the PoWs, Greg Rodriguez, age 72, from Henryetta, Oklahoma, remembers how a Japanese doctor at the camp had passed a feather under his nose, which was a regular way of causing the inhalation of germs. Few years have passed since then when Rodriguez has not had to visit hospital with unidentifiable fevers. Ten years ago, he finally learned of his condition from a privately consulted doctor. He told him he had excessive levels of typhoid bacilli in his blood. Many similar stories are today emerging from survivors of Japanese PoW camps. And while few are now able to prove a direct link between illnesses in later life and what happened in the Japanese camps, suspicions remain. In 1986, a US House of Representatives sub-committee hearing was set up ostensibly to investigate the claims of Dr Sanders and others.

The only Mukden survivor to testify, Frank James, a Lockheed employee from Redwood, was able to give specific dates about his own experiences. He reported that captured American, British and



Australian soldiers in Mukden were examined on 11 November 1942 by a Japanese medical team, all wearing facial masks. Liquid was sprayed into the prisoners' faces and they were given injections.

James said that within 60 days, 200 or 300 had died and their bodies had been thrown outside, where they froze in the low winter temperatures, to be stacked 'like cordwood'. In the spring, said James, prisoners were ordered to bury some of them in a roughly hewn mass grave. The rest were allowed to thaw, and were then taken inside the laboratories for dissection. Their organs were placed in boxes, James testified, and each one was clearly labelled with PoW numbers, as if it had particular significance. Each of the bodies was photographed.

His claims are confirmed by other secret documents not produced at the hearing. They were part of a detailed report prepared by the Chief of the US Chemicals Corps, written on 17 December 1947. Headed 'Summary Report on BW Investigations', it concerned the examination of a number of bodies exhumed from mass graves. The report concluded that the remains showed that 31 deaths were due to anthrax, 60 to cholera, 12 from dysentery, 20 from mustard gas, 16 from tetanus, 106 from bubonic plague, 22 to typhoid, 41 to tuberculosis and 9 to typhus.

In 1996, there were an estimated 200 Mukden survivors in the US alone and several have come forward to make allegations of germ-warfare experiments. One remembers that he and his colleagues, skeletal from starvation and some on the brink of death, were made to brush their teeth every day with a particular powder. Another recalls how a group of them had to line up every day to get oranges from the guards.

'They had a ledger with all the PoW numbers, and when you got your orange they checked it off,' said Jack Campbell, 75, a retired machinist from Rockwall, Texas. 'You just know there were germs in those oranges.' About a week later, he and eight of the camp's healthiest prisoners were put in a special ward where they were tended by a team from outside the camp. For three months, each was given an injection every third day. 'They told us it was horse urine that was high in vitamin B,' said Campbell.

In spite of known intelligence reports circulating in April 1945 alleging that the Japanese were experimenting on Allied and Chinese prisoners, both the British and the US authorities kept the lid firmly on General Ishii's activities for almost five decades. At least a dozen files in the British archives related to the Japanese experiments remain closed. Even the 1986 congressional committee to which Frank James



gave evidence failed to unearth the truth. Indeed, it seemed to James that the intention was that it should not.

James was the only Mukden survivor called to testify and he was warned in advance that there were still matters of state secrecy, including references to General MacArthur, to which he could not refer. The US Army sent its chief archivist, John Hatcher, to say that there were no records proving that Americans had been the victims of wartime experiments. All relevant documents had been returned to the Japanese in 1959 and no copies had been kept in the US. The 'inquiry' lasted just four hours, and nothing more was heard of it.

Like Britain, Japan does not have a Freedom of Information Act, and in any event several leading scientists who had worked with Ishii became leading figures in the business, scientific and academic life of post-war Japan, including the founder of one of its largest pharmaceutical companies.

As for the Mukden files, there is one other reason why the Allies were reluctant to reveal their own hand. The British and Americans were well advanced in their own BW research, and they knew for certain that the Soviets now had the technology for developing two of the major CB elements – anthrax and nerve gas. That alone would ensure continued research on both sides of the Iron Curtain for the rest of the century.



# THE VOLUNTEERS

**P**ORTON'S OWN HISTORIANS admit frankly that there was among the military and scientific communities alike a 'desperate preoccupation' with nerve gas immediately after the war. Apart from their efforts to exploit the knowledge gleaned from German and Japanese sources by producing their own hoard of nerve gas and potential biological agents, Porton also began work 'as a matter of urgency' on producing the prototypes for new civilian and military gas-masks to protect against any possible attack using sarin or tabun. British and American factories that produced them were soon working flat out to fulfill the multi-million dollar orders.

The dash to re-arm and re-equip would lead to a massive new programme of experiments. In 1946, Sir Henry Tizard, charged with assessing the 'future potentialities' of weapons of war on behalf of the Chiefs of Staff, concluded that biological weapons would have little scope in future wars. Civilian populations could simply be vaccinated against them, although he conceded that the same could not be said of chemicals.

Meanwhile, Dr (now Sir) Paul Fildes, who had led the Porton BW team throughout the war and had been knighted as a reward, angrily defended the case for continued research on all fronts. In typically robust response, he insisted that Britain had to build and maintain an adequate defence against the possible future use of CB weapons – a view that was shared by many senior military figures, and certainly by



the US top brass. Mass inoculations were impossible, said Fildes.

'Future possibilities' in CB.W were now so vast in potential that they could not be ignored. Fildes and his US counterparts were at one in maintaining that the only defence was to research and develop a comprehensive CB programme, both as a deterrent and as an offensive capability, should it be necessary. The question was quickly resolved. Research would go ahead. The Chiefs of Staff accepted Fildes' opinion on biological weaponry, just as they had on the development of chemical weapons on which the British, the Americans and the Canadians were already co-operating.

In 1947 the three nations concluded their Tripartite Agreement for joint research – scientists from each country would show the others everything they had, and go forward on co-operative research. Canada eventually dropped out, with its decision in 1950 to concentrate on defensive research. From the British standpoint, co-operation with the US was especially welcome because Porton, starved of cash, continued to operate among its dated surroundings.

The Americans had the modern facilities of the Edgewood Arsenal with 3,000 men employed in chemical research, along with the biological study areas of Camp Detrick and its associated laboratories. There would be a frequent exchange of both personnel and research.

Chemical research centred predominantly on the 'G-agents', or nerve gas. Porton was by then under the control of its first ever civilian director, A.E. Childs, a physical chemist who had held senior posts at the station successively since 1920. Dr J.M. Barnes, who had worked with Fildes' team with the rank of major during the war, and was among those assigned to inspect Nazi concentration camps, was promoted to head the physiological section. They had a combined staff of around 800 personnel, all working on a range of top-secret experiments ranging from potential weaponry to investigating new insecticides, the latter operating under the newly formed Colonial Office Pesticide Unit. Field trials began in Africa with eight Anson aircraft spraying pesticides across the Tanganyika landscape.

The sheer scale of the work at Porton required an equally massive inventory of suitable subjects on which the gas itself, antidotes to it and the newly ordered masks and protective clothing might be tested. By the end of the 1940s, extensive experiments with living creatures became a daily requirement. The problem confronting Porton, as identified and admitted in its own contemporary reports, was 'that unprotected men could not be put through gas chambers or allowed to see if nerve agents could be decontaminated swiftly from their skin'.



In spite that admission, it would not be long before men were being ushered through the security controlled gates of Porton (and the Edgewood Arsenal) by the lorry load. Initially, the bulk of the experimental work was done using animals, literally thousands of them. For this, the first major post-war animal-supply unit was set up. Its sole reason for being was to breed or obtain from other sources a large and continuous supply of animals, ranging from apes to mice. In wartime, the supply of animals over and above those self-bred at the establishment fell to the Royal Army Veterinary Corps. In 1949, this task was exclusively turned over to Porton's Orwellian-sounding 'Animal Farm'. In 1954, it became known rather more respectably as Allington Farm, which ran a complete agricultural operation, raising cereals, sheep and cattle.

Its brief was to handle the supply of animals for Porton Down and its brand new Cornwall outpost, Nancekuke, which became a prime centre for the production and storage of nerve gas during the next three decades. The place was carefully selected. It was set in beautiful countryside, like Porton, on the Cornish coast, well away from build-up areas and close enough to the sea so that any possible leaking gas would be carried away from the civilian population. It was to the remote Nancekuke site, surrounded by 9ft high perimeter fencing, that many pieces of plant and machinery stripped from German installations were brought in absolute secrecy.

At that time, there was virtually no public knowledge of the work, and the non-scientific labour employed to build the Nancekuke plant were not told of its intended use. Cornwall engineer Tom Griffiths, who began work at the plant in 1951 and remained there until 1965, recalled, 'They just told us it would be varied and interesting work in engineering. So I and my colleagues began building the nerve gas plant without the slightest knowledge of what it was for. We did not know for a long time what was going on there. It must have been one of the best kept secrets in the country, although the Americans knew, because their technicians were collaborating with the British. They were coming and going all the time.'

Nancekuke became Britain's first, and only, pilot plant for the production of nerve gas, a fact that remained another of the most closely guarded secrets within the nation's defence establishment. Porton's administrators viewed it as a sister plant under the control of their scientists. It was during this period of development of the British chemical capability and its defensive capacity that the demand for many species of animals was increased by the week: goats, sheep, pigs,



rats, mice, rabbits, guinea-pigs, hamsters, primates, far more than Porton could breed itself.

Many were of a kind that could only be found in the tropics. Navy ships carrying supplies of animals, especially monkeys and apes, from the wilds of Africa and elsewhere were unloaded at the Portland naval dockyard and the animals were carried in special containers for delivery to Porton. Apart from laboratory experiments on thousands of rats, mice, guinea-pigs and rabbits, other animals would be tethered on the Porton ranges for open-air tests. Chimpanzees, goats, dogs tied to stakes and many smaller animals in cages would be placed outside while nerve gas shells were fired towards them, and above them to form gas clouds. They were then collected up and brought back inside for dissection. Most were already dead; the larger animals and those that did not get a heavy dose of the gas were kept alive to observe the effects of the chemicals on their bodies, their ears and eyes.

In many of the experiments, however, there could be no substitute for human guinea-pigs, and from the late 1940s onwards Porton began seeking an increasing number of volunteers from the three armed services on whom various tests were to be carried out. Most of the papers relating to human experiments are still secret today, and will remain so until well into the next century.

However, a number agreed to be interviewed for this book and their experiences are recounted in this and ensuing chapters. They are among approximately 3,000 men who volunteered in the decade of the 1950s for the most vital and early tests on sarin and its associated products. Gerald Beach, who now lives near Chester, was among the first exposed to nerve gas. Beach had been a regular serviceman in the RAF since 1946, having enlisted when he was 18. He explained:

In 1950, I was an aircraft fitter stationed at RAF Valley, North Wales. I was 22 years old at the time. One morning, on parade, they asked for volunteers to take part in testing procedures at Porton Down research station. It was explained that a new chemical, a gas, was being studied and something similar was already in the hands of the Russians. They needed volunteers to take parts in experiments to discover an antidote. The experiments, they said, would be harmless and we would be paid one shilling – 5p in today's money – for each experiment we took part in. I stepped forward, obviously not for the money but simply because I felt I might be doing some good. No other reason than that. The way it was put, it sounded as if they needed help. So off I went to Porton.



I was alone; there were no others from my unit. I was given a rail warrant to Salisbury where I was met by an Army truck. There were several others already there waiting to be picked up. When we arrived we were shown our billet, which was with the Army unit permanently stationed inside the Porton compound. It was explained that we would be there for a week. We could enjoy the facilities of the place, and would be required to take part in a few experiments. We were put in groups of ten.

When we first went to the laboratories, they put a rubber patch on our arms. They said it was to test gas-mask rubber. Whether it was or not, I don't know, but it was to stay there for the whole week; we were not to remove it.

Although it is impossible to clarify the reason for the patch from such a distance in time, it is now known that many volunteers from this period had the liquid nerve agent, known through its code-name of 'GB', and antidotes to it applied in patches to test skin reaction. Other patches were indeed sited to test the strength of a particular fabric, or the protective powers of older suits that had already been worn. Beach continued:

On the Tuesday, they called us to the laboratories where it was explained that we were required to go inside a gas chamber in which we would be exposed to a very mild dose of gas. They told us to just breathe normally and assured us there would be no ill effects. At the time, I noticed they were preparing dozens of rabbits. They had the fur shaved from their backs and there were patches of what looked like clay on them, through which they were giving them injections. It was all a bit puzzling to us laymen.

Anyhow, that mystery would soon be resolved. When they asked us to go forward to the gas chamber, we were all given cages containing the rabbits to take in with us. Between us we must have taken in about 30 of these white rabbits. The senior man in charge, the laboratory supervisor, came in with us. He explained that the gas would be sprayed in through an electric fan on the far side, where there was also a glass partition through which we would be observed by the technicians in the laboratory.

The supervisor stayed inside the chamber with us, but as soon as they closed the doors, he put on his gas-mask and stood right at the back. After a few seconds, the people on the other side of the glass window sprayed the gas, a liquid, from a large hypodermic needle into the fan, which in turn sprayed it into the



chamber. We were inside the chamber for about ten minutes. We didn't seem to suffer any ill effects at the time. We were all examined when we came out and they told us that we would be required again in a couple of days' time.

The following day we were not required but on the Thursday we were called again to go through the same process. This time, before we went in they examined our eyes and measured the pupils. Then we were taken back into the chamber carrying the rabbits with their shaven backs. The time we were in there was about the same as before, but I think they must have given us a larger dose. You could feel something happening to your eyes, almost straight away. I began to get really nervous when the rabbits started dying. When we came out, they were all dead. Not just from our group, either. I saw them bringing rabbits out by the score, all dead.

After that test, they examined us and paid special attention to our eyes. Everyone of us had trouble. We couldn't see in daylight for a good 48 hours, virtually blinded. The pupils of our eyes had gone right down to pinpoints. Throughout that day, our sight got worse. You couldn't see anything, because you had this kind of black blob in front of you. Oddly enough, at night you could see perfectly well. That condition lasted all Friday and although I could see pretty well on the Saturday, when I went home my wife said, 'You're eyes are like little spots.' By the evening, they were more or less back to normal.

I went back to camp on the Monday and not long afterwards I began to get spasms of breathlessness and reported sick. I reported to Doc Mason, the camp medic, who said I was probably suffering from asthma, which I had never had in my entire life, and he began treating me for that. But then I was walking around in a trance and could not do my work. So he gave me another drug to counteract the first one. After a few more visits, he downgraded my medical rating to A1G4. I was flying at the time, too, but this meant that although I was fit for aircrew, I could not go abroad because of my breathing difficulties.

I stayed at A1G4 for the rest of my service. The trouble seemed to clear up but about 18 months later, when I had been posted to Scotland, I had another attack; very bad this time. I just couldn't breathe. I reported sick and they put me into the sick bay. Again, they said it was asthma. I was in hospital for about a week and it cleared up and I was OK for the rest of my service.



Not long after I left the RAF [1967], I had another attack and eventually had to go to see my own doctor. Now, the thing was, I could not tell her exactly what had happened because I had signed a declaration under the Official Secrets Act. Anyway, after two or three visits, I was given a complete check-up, at the end of which my doctor told me that I had damage to my lungs; my breathing capacity was down by a third and there was very little they could do. The condition was irreversible. It was quite debilitating; when I couldn't get the air I needed, I would sweat profusely and go dizzy.

That's the way it has been ever since, year in, year out. When I left the RAF I worked as a fitter at a power station and for the last ten years before retiring early I took a desk job. My breathing never improved; I still have the problems and I know they date back to the time I went to Porton. In 1994, I wrote to the Ministry of Defence to inquire if I was eligible for any kind of pension. It took them 18 months to reply. They said my records had been lost in a fire at Porton and, as far as they were concerned, my presence there in 1950 could not be traced. They added that further inquiries were being made, and I would be contacted again in due course . . . I am still waiting.

Another RAF serviceman, Gerry Ashton, of Preston, Lancashire, had a similar experience. He was 20 when he went to Porton Down as a volunteer in the early 1950s, and he too was exposed to nerve gas. 'I went into the gas chamber and was told to breathe normally. Then after a few minutes, I was let out and told to go back to my billet. By the time I got there, I was almost blind. Everything was like . . . shadows.'

Ashton said he was 'just groping around' and was told by Porton staff that 'it would pass'. It took three days before he could see normally, and observed that the pupils of his eyes had become 'kidney shaped', rather than round. It was explained to him that he had been given a very mild dose of gas – although as far as he could remember, he was never told it was nerve gas. When he became ill, Ashton told his doctor about his experiences and asked him to write to the Ministry of Defence for his medical records. In their first reply, the MoD said they could find no record that Ashton had ever been to Porton. Ashton insisted that he had. His doctor wrote again, and the reply this time admitted he had taken part in experiments – but 'they were of a very innocuous nature'. In other words, they did



not accept any responsibility for his condition and did not consider that it could have been caused by any exposure he had received there. And, they refused to deliver to Ashton's GP any of his medical records.

Some volunteers like Ashton and Beach were filmed while the experiments took place. A Ministry of Defence training film, shot in 1952 and entitled *Nerve Gas*, carried a commentary that described the situation the volunteers faced. 'We have a volunteer here to show you the effects of a mild trace of nerve gas . . . now this man is showing mild effects, tightness of the chest and throat and having a great deal of difficulty breathing.'

Next the film explained the results of a heavy exposure. 'You've seen the effects of a mild dose,' the commentary continued, and went on to describe the effects of a more severe dose. The casualty would suffer muscular twitching, followed by severe convulsions. After the convulsions, paralysis would begin in most of the muscles throughout the body. The breathing would stop. Shortly after, the heart would stop.

Part of the Porton experiments at the time involved the testing of an antidote to the nerve gas, called atropine. Although antidote tablets were to be produced later, at the time of the experiments the antidote was injected by syringe straight into a muscle.

One of those from that era who was treated with the antidote and exposed to two specific experiments was George Abbot (not his real name), who was coming up to 60 when interviewed for this book. He still lives near Salisbury, about 20 miles from Porton. At the very outset of the interview, he corrected the implication that he was a volunteer. 'It was Porton or guard duty – straightforward as that,' said Mr Abbot.

He is a game keeper by profession and in 1953 began his two years' obligatory National Service, as a regimental signaller with the Wiltshire, stationed at Warminster:

No, I did not volunteer to go to Porton in the strict sense of the word. It was a case of 'Well, you can do this . . . or guard duty.' Plus, of course, we were offered a bribe of £1 and a 72-hour pass, which meant quite a lot to National Service conscripts, bearing in mind we only received about £1 a week and would jump at any chance to get home. So, off I went to Porton. There were quite a few of us, a lorry load at least. I had heard about the place, of course, because I was born and bred in the area – at the address I live at now. But there was never much written about it in those days. Nobody really knew what went on there. It was seen locally



as some kind of Army camp and frankly I hadn't taken much interest.

We weren't told very much about what was going to happen. But anyway, in the first experiment we were to be put into a cage where we would be exposed to gas. We were told we would suffer no lasting ill effects. Some of us were to be treated with antidotes, others weren't. I was one of those who had the antidote. After they gassed us, I did not feel anything or smell anything, and I seemed to suffer no ill effects, not straight away. Several of those who were not given the antidote suffered very, very severe problems with their eyes. Some of them were hospitalized and when they came back four days later they looked really terrible.

In the second experiment we were each given a gas-mask and taken out to the Porton ranges. There we were told to run as fast as we could for about a quarter of a mile or so. We were told that if we felt ill, we had to get under a lorry on the way. I did actually feel rough then. I had trouble breathing in the gas-mask and I was going to take cover under the lorry when we came to it, but they told me to keep going, to go a bit further. They didn't take any notice of me.

This part of the experiment may well have been set up to test the efficiency of gas-masks under a light spraying of gas, although Abbot and his comrades did not know it at the time.

'We were never told quite what we were being exposed to, although I do remember the name sarin cropped up. I had no idea what it was. When it was all over, we went back to the camp and that was that.'

Mr Abbot had already left the Army and returned to civilian life when he began to suffer the first of a long sequence of health problems, starting with his hearing. He continued his story:

It was about two years later when I first started having difficulties, not hearing very well. It progressively got worse, and eventually extremely painful. The pains got really bad; lasting half an hour and in ever increasing frequency; I just couldn't do anything. In the next four years, I saw seven different doctors and specialists, but none of them could find what exactly was wrong. Four of them said specifically it was a 'nerves' problem and I used to get annoyed with that. It was ridiculous. I had no problems in that direction at all. Once we were on holiday in



Jersey and the pain was so bad my wife called the doctor there. He too told me it was a nerve problem.

What was happening, as was discovered later, was that my ear was totally dry, rotting away inside. By the early 1960s, I was beginning to get quite ill, and very weak, and my boss telephoned a doctor. He took one look at me and sent me to hospital immediately and I had an operation the following day. He said that had it not been caught then, it could have gone to my brain and killed me. Even so, I lost my hearing totally in that ear.

Mr Abbot's ear problems were similar to the troubles experienced by many of the veterans of the Gulf War who, in their thousands, were to complain of a variety of unexplained illnesses. They, like him, had been injected with the antidote atropine. Ear problems were also one of the most common disabilities among the many children of Gulf War veterans born with deformities, a fact that has some significance. He continued his story:

I did improve after that, but over the years I have had so many problems, little things which were alien to me, such as when the skin came off my genital area. Five years ago, I began to have breathing problems. I had a respiratory attack and couldn't breathe. I was rushed into hospital and went through various tests, but the doctors told my wife that they just could not identify what was the matter with me and they didn't know what to treat me for; they took blood samples and then the hospital doctor came to my bed side and asked me if I had come into contact with organophosphates, of the kind that they put in sheep dip. I hadn't. I knew that, but they had obviously found traces of something in my blood that made them think of organophosphates. That night I became worse and went into a coma; at 3.20 in the morning the ward orderly was checking me and found my heart had stopped.

They pumped drugs into me and resuscitated me. They telephoned my wife and told her to prepare for the worst. If I survived, I might have brain damage. Fortunately, I was OK when I came round. I remained in hospital for two weeks, being treated with steroids and eventually it passed. Two years later, I collapsed with chest pains. They said the muscles around my heart were not working properly. I had to have a heart bypass . . . all of this and I had barely reached my mid-fifties. So many things, often little, mysterious illnesses. Looking back, I am



certain that the start of my troubles was being gassed at Porton Down. They simply did not know what long-lasting effects it might have, I am sure.

I have two children who were fine, although my two grandsons have both had problems. The eldest, a very bright lad, had serious ear problems and is very short-sighted. My youngest grandson was born with a slight ear defect. Obviously, there is nothing to link that to my experiences . . . but you can't help wondering, can you?

Abbot remains convinced that the experiments he joined at Porton were responsible for his own health problems. Certainly, he and many others like him, would not have gone there at all if the true facts about another of their number had been fully revealed at the time, instead of being covered by a blanket of secrecy.

The files on Leading Aircraftsman Ronald Maddison have never been made public, apart from scant records from an inquest in 1953, recording a verdict of accidental death. A bright, quiet 20 year old from Consett, Co. Durham, Maddison volunteered to go to Porton quite simply because he was homesick. He was serving in Northern Ireland at the time. He and others in his unit were told they would be awarded a 72-hour leave after the experiments – and Ronald stepped forward, apparently believing he would take part in medical tests related to influenza.

However, documents viewed from this book show that soon after his arrival at Porton, Ronnie Maddison took part in an experiment conducted to discover the evaporation rate of the nerve agent 'GB' when applied to the skin. A droplet of the liquid, said to be around 200mg, was applied on a patch to his forearm. He began suffering acute symptoms – similar to those described in the 1952 MoD training film – very quickly. Porton doctors, obviously shocked by the speed with which the nerve agent affected him, rushed to his aid. Four senior members of staff made desperate efforts to save him, giving him injections of antidote. They failed. Ronnie Maddison died an agonizing, convulsing death.

The blanket of secrecy thrown around the Maddison case prevented the publication of any real detail of what exactly happened. Senior officers from the Ministry of Defence descended upon Salisbury. The Wiltshire coroner charged with conducting the inquest into the death was informed that matters of 'national security' were involved and he took the highly unusual step of ordering a hearing 'in



camera'. Only Ronnie's father was allowed to attend, and was sworn to secrecy. The press and public were excluded.

The death certificate, which even the MoD could not have hidden away, stated that he died from blockage of the bronchial passage, though did not add that this was a well-known symptom of nerve gas poisoning. The death was sufficient, however, to raise concern about the experiments. A formal MoD inquiry into Maddison's death agreed with Porton Down submissions that he was unusually sensitive to the liquid nerve gas. It recommended, however, that in future no more than 5mm, a fraction of the dose given to Maddison, should be applied in skin tests.

Today, many leading experts look back with horror upon these early trials and are mystified that in the mid-1990s it is thought necessary for them to continue in some form. Dr Alistair Hay, a leading chemical pathologist at Leeds University, went forcefully on record to say: 'A dreadful state of affairs . . . I think if you're asking someone to take part in a study that involves an agent that we know is lethal and could kill them, they have to be told.'

Concerns would also be expressed in many quarters about the possible long-term effects of exposure to Porton gases. The many volunteers from that period, interviewed for this book, all told a similar story. Those who have come forward suffered illnesses in later life, ranging from severe asthma to cancer. The response of the Ministry of Defence is, by and large, to deny that the Porton tests were in any way responsible.

Much the same attitude was adopted in cases of men who claimed to have been exposed to nerve gas while working at the Nancekuke manufacturing plant. At least two were to suffer serious repercussions, with illnesses and symptoms almost identical to those claimed by the volunteers, and incidentally quite similar to the accident recorded in Nazi documents relating to their gas plant in Poland.

Engineer Tom Griffiths' employment at Nancekuke, it will be recalled, dated to the time when the plant was first being built. For a long while afterwards he had no real idea of what it was they were actually producing, other than the notion that it was some kind of experimental chemical product. He discovered the secret first hand: in his case, the exposure was during the course of his work.

He had been called to check a cubicle in one of the Nancekuke bays. He says a technician told him it wasn't necessary to wear protective clothing because the cubicle had not been in use for a week. Then, Tom noticed a drop of liquid leaking from between two flanges,



and almost immediately he had an uncontrollable coughing fit. He also noticed a damp area on the floor, where the pipe had been leaking. The technician told him 'to get out quick'.

'I could hardly breathe. My eyesight was badly affected. The pupils shut down to pinpoints,' Griffiths recalled. Outside, he recovered quite quickly, or so he thought. That night, at home in his modest council house, he became violently sick and his wife, Eileen, was preparing to call the doctor. Griffiths, an intensely patriotic and forthright man, stopped her. He said she would have to call the Medical Officer at Nancekuke, though did not say why. It would be another ten years before she learned the truth of his work at the plant, and that he was bound by the Official Secrets Act not to reveal the nature of his employment to anyone – including his wife.

Tom received treatment during the next few weeks and his condition seemed to improve. It was a mere respite from what would follow. His wife noticed the deterioration more than he did. He began to suffer breathing difficulties and fainting fits. He had muscle spasms and occasional lapses of memory. His condition became so bad that he was spending weeks off sick until finally, just before his 40th birthday, he was declared unfit to work. In effect, Tom Griffiths' working life was over, but the Ministry of Defence disclaimed any responsibility for that. They rejected out of hand his claims for compensation and it was 20 years from the time of the accident before he was finally awarded a modest disability pension.

Yet for his part, Tom Griffiths loyally maintained his commitment to the secrecy oath he had sworn when he joined the Nancekuke workforce. It would be 12 years before he even told his wife of the accident at work, a fact that she had difficulty in accepting.

'I couldn't understand it,' she would say. 'He was always so open and upstanding . . . yet he kept a secret like that from me for 12 years.' But Griffiths, like others who had sworn that oath, was even reluctant to tell his doctor what had happened at work and did not do so for many years.

An almost identical situation occurred with another Nancekuke fitter, Trevor Martin. His problems began in 1961 when he was ordered to dismantle a rusting old condenser, 5ft long. It was one of the spoils of war, brought back from a Nazi chemical plant in 1945. The condenser carried a label declaring it clean and so he wore no mask when he began the task of taking it apart, unbolting the flanges, which had asbestos seals. That evening, at home and after his meal, he went outside work on his car. It was then that he began to get his first



attacks of dizziness and a tightening across his chest. His speech was also affected.

Within a week, he had suffered paralysis down the right side of his face and his body was subject to spasms, and a continual twitch in his right leg. A year later, Trevor Martin's working life was also at an end. At the age of 37, he began a long round of visits to doctors and hospitals for a succession of neuro-related illnesses, breathlessness and poor vision. He qualified for a modest pension but a 20-year campaign to achieve recognition that he had suffered nerve gas poisoning fell upon deaf ears at the MoD. As ever, the co-operation between the British and Americans in their efforts to maintain the utmost secrecy over their post-war dash to achieve world supremacy in chemical warfare remained an unassailable barrier to anyone and everyone who attempted to penetrate their clandestine domain and officialdom.



# IT WOULDN'T HURT A MOUSE

OFFICIALLY, BRITAIN WAS no longer supporting a programme of offensive chemical weaponry. At the beginning of the 1960s all research, still extensive in its scope, was to be conducted in the name of defence and the protection of the civilian population and military personnel. It was, according to Porton's own directive – repeated by successive Defence Ministry spokesmen and politicians – ‘in the business of saving lives’. The new direction barely had any effect on the work of Porton Down. The place continued just as before, inventing, testing, experimenting to provide a defence against every possible permutation of CB weaponry that any potential enemy might possess – and a good few others, besides.

Steps towards this worthy undertaking of ‘saving lives’ and withdrawing Britain from the chemical and biological arms race were begun in 1956. A year later, the Conservative Government of Harold Macmillan announced its decision to ‘abandon all research on chemical and biological weapons for an offensive capacity’. This appeared to be a distinct change of government policy and although the Cabinet documents relating to all decisions concerning it are still unavailable for public inspection, it is now clear that it was never quite the magnanimous gesture towards saving mankind as it first appeared. The American government had made no such concession and the Porton team continued to maintain close links with its US counter-



parts, who were supervising the manufacture of very substantial stocks of everything.

While the British were said to be abandoning their offensive capability, the US was taking up a brand new and hugely more potent form of nerve gas: one more top-secret weapon, known as the 'V-agent', invented in Britain, pioneered by Porton and eventually manufactured in very substantial quantities in the United States. The V-agent, first discovered in the early 1950s, was so strong that one minute droplet absorbed through the skin could kill a man in minutes. First details of it were placed before the Offensive Evaluation Committee after proving trials at Porton. These confirmed that the V-agent showed 'considerable promise in the attack of personnel in the open, or in open trenches and for ground contamination'.

Further, those who might face it would require total head-to-toe protection, not just gas-masks. That requirement alone set Porton once again off into the realms of new discoveries and prototypes for combat suits that would provide the ultimate in protective battledress – research, it must be said, that would lead to the creation of the ultra-protective gear that was supplied to troops as they faced a possible chemical onslaught from Saddam Hussein's armies in the Gulf War.

Even as Britain publicly withdrew from its offensive position, Porton was already working on the next generation of the deadly V-agent. At the dawn of the 1960s, the research station came up with a far more potent version, coded as 'VX', which had the advantage of 'being absorbed more quickly through the skin'. Porton scientists took samples to their American colleagues at Edgewood where its significance was immediately recognized. Mass production was ordered by the top brass in the US military. Thousands of tons would soon be added to the vast stockpiles of CW agents.

Porton was, according to documents relating to the Offensive Evaluation Committee, also working on 'other variants' as well as the VX-agent, and there was no let-up in research into the destructive qualities of the gas, and consequently the protection against these agents in the form of clothing and antidotes. The need for human guinea-pigs remained a priority, as it would down the remainder of this century, and among the new recruits for experiments was a then 24-year-old corporal in the Royal Engineers, Michael Roche.

Porton had taken steps to improve its relationship with volunteers and, in 1960, produced a recruitment film to persuade servicemen to come forward – once again propagating what amounted to the same 'holiday camp' theme that was so long before suggested by Dr Paul



Fildes when he sought to enlist girls from the soap factories for his anthrax project. The payment had also been increased from 1s per experiment to 2s 6d.

Roche was quite impressed, although not by the money, which was not a consideration for him. 'I volunteered out of – dare I say it? – patriotism. I remembered as a boy seeing grandfather slowly dying from the effects of gas in his war, and my father contracted pulmonary tuberculosis from exposure to asbestos. I did it because I wanted to help; it was as simple as that. And at the time, I was as strong as an ox. I could carry two bags of cement around on my shoulders. Now, I couldn't even lift two bags of sugar,' he recalled in 1996.

Roche volunteered twice. His first experience in 1962 threw up no particular problems for him, and he went again the following year:

I didn't find the place particularly intimidating. Our quarters were very pleasant compared to army barracks. There was a club to relax in, with billiards and table tennis, and we were allowed to make trips into Salisbury to experience the nightlife. On arrival and leaving, all volunteers were given a cursory medical examination. I took part in about six tests on each visit. The first test was to establish if the gas protection suits in use at the time offered sufficient protection against chemical agents in liquid or droplet form. Various suits, having been worn for several days and subjected to wear and tear, were used. The most badly affected areas of the gear were those covering the elbows and the knees. These suspect sections were cut into one-inch squares and taped to the forearms of the volunteers. Each had three squares. We were then strapped in chairs with our forearms facing upwards and a small amount of a chemical agent was applied to each of the squares, which were left in place for six to eight hours, in a small, unventilated room exposed to mustard fumes.

On removal, the skin was examined. If penetration had occurred, the amount of blistering or irritated skin was recorded.

On the second occasion, I was exposed to nerve gas by inhalation. I was assured that the amount used would be minute and would not harm a mouse. We entered an airtight glass-partitioned cubicle, containing a face-mask similar to an oxygen mask. The mask was placed in position, the fitting being carefully checked by a technician, and the chamber was then sealed. A loudspeaker informed us that the dosage was about to be administered and to inhale normally. The immediate reaction was a tightening of the muscles and the lungs. For some volunteers, this



lasted several seconds; others experienced it for several minutes. These symptoms quickly wore off and for the next 24 hours blood samples were taken hourly. From conversations and correspondence with others who attended Porton Down, many recall similar experiences and procedures, and, like so many others, I began to suffer ill health in later life.

I was in my 40s when I developed extremely high blood pressure and breathing problems. My doctor, one day, casually inquired if I had ever been exposed to dangerous chemicals. I told him of my experiences at Porton Down and he remarked that it would be extremely useful to discover exactly what I had been exposed to, so that he could work out the best form of treatment.

It was at this point that Roche and his doctor ran up against the proverbial brick wall. Countless letters written to the MoD and Porton Down itself failed to produce any meaningful response. He says it took eight years just to get the details his doctor wanted. When his file was eventually retrieved, it carried the official stamp of secrecy, with the added instruction: 'Not to be shown to the patient'.

In effect, the instructions for confidentiality barred him from seeking assistance or advice from anyone other than the doctor to whom the file had been sent. For him, it was the beginning of a ten-year battle to achieve recognition of his increasingly debilitating health problems. He would come to discover there were many others in the same situation as himself, with a list of symptoms and health problems that was, he said, 'quite horrendous': severe headaches, skin and eye cancers, brain tumours, partial or full paralysis either temporary or permanent, severe respiratory difficulties, chronic bronchitis, asthma, nervous disorders, blistering; complaints involving ears, eyes and nose were especially common.

Another common thread among all of them was the persistent stone-walling of the Ministry of Defence. The high-handed tone of MoD correspondence was particularly galling to these men, just as it would be years later to Gulf War veterans. They were, without exception, made to feel guilty, as if they were malingerers or opportunists, and that they were the guilty ones. In many cases, volunteers were never allowed to see their medical records, and some were even told they had been lost or destroyed. Single-handedly, Roche began to put together his data, correlating all the information he could obtain. He planned to make it available to doctors or specialists as he



campaigned to achieve an admission that exposure to chemicals at Porton Down may have seriously damaged the health of many of those involved.

He began lobbying for a long-term MoD study on the effects of chemical exposure on Porton volunteers. But Roche, as we will see in later chapters, was in for a long haul. The MoD and successive British governments refused even to acknowledge that a problem existed. This virtual blanket rejection of the volunteers' claims was in spite of the knowledge of numerous recorded cases of accidents and ill-health, even death.

The experiments, of course, were not merely limited to gas and gear tests. Porton conducted a wide range of trials on everything from poison techniques for the modern spy to experiments with LSD. Some of the files on its experiments with LSD were released into the Public Record Office in 1996 – 30 years after they had taken place. Although Porton's mandate was for 'defensive purposes only', the documents open with the proposals that the LSD tests were to discover the suitability of the drug to 'incapacitate a potential enemy'. What is equally interesting is that the Porton experiments on the manipulation of personnel with drugs ran alongside extensive research in America, often at Fort Detrick, on behalf of the CIA's so-called mind-control programme, which began under the code-name 'MKUltra' in 1951.

When details of the Porton LSD experiments were released in 1996 – or, at least, those that the MoD was prepared for the public to know about – they were treated rather light-heartedly in some sections of the media. It seemed, on the face of it, a huge joke that at the height of the Swinging Sixties, whole units of the British Army should be fed LSD tabs to go on hallucinatory trips – on the orders of Her Majesty's Government. The reality was rather different.

What Porton scientists, and the MoD, also knew very well at the time was that the substance had been extensively used in experiments under the guidance of their opposite numbers at Fort Detrick for the CIA – with fatal results. Once again, the LSD experiments were inspired by the fear that the Soviets were also testing the drug. It was likely, the CIA surmised, that they too had obtained data on similar studies found in captured German documents. The joint intelligence forces of Britain and the US had studied reports of mind-control experiments carried out on inmates of Dachau Concentration Camp. Nazi doctors had used mescaline as an interrogation agent. After administering the hallucinogen to 30 prisoners, the Nazis concluded that it was 'impossible to impose one's will on another person as in



hypnosis even when the strongest dose of mescaline had been given'. But the drug still afforded certain advantages to SS interrogators, who were consistently able to draw 'even the most intimate secrets from the [subject] when questions were cleverly put'.

The mescaline experiments at Dachau were described in documents gathered up by the US Naval Intelligence Technical Mission after the war and were closely studied by the CIA when it launched its own intensive research on interrogation techniques that involved inducing a subject into a state of trance.

The CIA memorandum was precise in its intentions: 'Newer or more subtle techniques may be considered . . . a) psychosurgery, a surgical separation of the frontal lobes of the brain, b) shock method: electrical; drug (metrazol, cannabis, indica, insulin, cocaine); psychoanalysis, narcoanalysis or a combination of the foregoing'. It launched MKUltra, a multi-faceted project that was defined as 'The CIA's Program of Research into Behavioral Modifications', co-ordinated by Dr Sidney Gottlieb, then deputy head of the CIA Technical Services Staff. The project moved into a wide range of sub-projects involving a variety of drugs, poisons and biological agents for which Gottlieb enlisted the aid of Porton's good friends, the Army Chemical Corps, Special Operations Division at Fort Detrick.

Described in CIA documents as 'the twilight zone', LSD induced an ideal state for interrogation according to scientists. As in Britain, human guinea-pigs were used. Dr Harris Isbell, head of a drug treatment unit in Lexington, Kentucky, agreed to test various substances supplied by the CIA on addict patients – though he was careful to ensure they were informed of the risks and signed consent forms. The drug most widely used, on the instructions of the CIA, was LSD. Dr Isbell kept seven men tripping for 77 days while the CIA and Fort Detrick scientists maintained a check on this long-term high, regardless of the fact that they knew nothing about any residual effects the drug might have. They were, as the CIA documents clearly admit, venturing into the unknown.

In another series of tests, 12 men of 'limited intelligence' were used. They were given doses of between 100 and 150 micrograms, less than was used in later experiments at Porton.

The special interrogation research was strongly endorsed by Agency officials. A CIA document announced: 'We're now convinced that we can maintain a subject in a controlled state for a much longer period of time than we heretofore had believed possible. Furthermore, we feel that by use of certain chemicals or combinations, we can, in a



very high percentage of cases, produce relevant information.'

The CIA brought the LSD trials together under the codename 'BLUEBIRD'. It was such a sensitive operation that details were withheld from the usual channels and approval came directly from Director Roscoe Hillenkoetter who authorized the use of undisclosed funds to finance it. The CIA's Office of Scientific Intelligence prepared a long thesis on the 'Potential New Agent for Unconventional Warfare'. It said LSD was useful 'for eliciting true and accurate statements from subjects under its influence during interrogation'. Even more promising was the fact that LSD might help in reviving memories of past experiences.

The CIA hierarchy concluded that at last they had found a drug that was capable of achieving all that they wanted from a subject, of unearthing secrets from the mind *and* causing amnesia during the effective period. Words like 'incredible' and 'astounding' were being bandied about. As one of their number put it, 'We truly believed we had found a drug that was going to unlock the universe.' The uses were seen as being universal. Apart from its value in interrogation, there were obvious advantages in the reverse situation. If CIA agents fell into enemy hands, they could simply swallow a minute acid tab and go off on a bizarre trip, leaving their interrogators mystified.

The CIA directorate wanted to know urgently if the Soviets had found the magical qualities of LSD. Almost certainly, came the reply. Its Officer of Scientific Intelligence discovered that the fungus from which LSD was derived flourished in the Soviet Union, yet there was no trade in it in the Eastern Bloc. This could only mean one thing: the Soviets, and probably Red China too, must be stockpiling LSD. The officer added in formal, scary language: 'It must be assumed that the scientists of the USSR are thoroughly cognizant of the strategic importance of this powerful new drug and are capable of producing it at any time.'

The CIA, by then under the direction of Allen Dulles, poured millions of dollars into research and into building its own LSD mountain – even after things started to go wrong. A temporary setback occurred when Dr Gottlieb took two of his CIA aides and seven scientists from Fort Detrick working on the MKUltra and other US Army Chemical Corps projects to a log cabin in the Appalachians for an informal review of their work. During the evening, after their meal, Gottlieb produced some LSD and put a small dose into a bottle of Cointreau to experiment on themselves. At least, that was the official story. A CIA inquiry into the incident after one of them had committed



suicide recorded that there had existed, 'a conflict with respect to the administering of the LSD since a memorandum written by the then Inspector General of the Agency indicates that the individuals present were not told that the drug was LSD until 20 minutes after ingestion . . . when the group became boisterous and "happy". The civilian employed by the Army who later committed suicide complained of wakefulness that evening.'

The civilian was Frank Olson, a senior scientist working at Fort Detrick on Army and CIA biological projects. In the weeks following the experiment, he appeared depressed and his family complained of a personality change. Gottlieb had kept them all under surveillance and realized there was something wrong with Olson. He arranged for him to travel to New York in the company of a CIA operative for psychiatric examination by an agency doctor. The psychiatrist was so concerned that he saw him six times in the course of a week. At that point he arranged for him to be admitted to a psychiatric ward at Rockville, Maryland.

Olson and the CIA man were staying at the Statler Hotel in New York, sharing a room on the tenth floor. At 3.20am, during the night before they were due to leave, Olson hurled himself at the closed window of his hotel room with such force that he crashed through the glass and fell to his death on the pavement below. The CIA man who was with him awoke only in time to see Olson's departure. Allen Dulles was immediately informed and, anticipating trouble, ordered an inquiry by his inspector general, Lyman Kirkpatrick. His report was highly critical, though for the wrong reasons:

'It is apparent that there is a strong possibility that the use of LSD was a trigger mechanism precipitating Olson's suicide. Uncontrolled experiments such as these could seriously affect the record and reputation of the agency . . . the Deputy Chief TSS [Gottlieb] should be reprimanded for his poor judgement . . . the Chief TSS should be admonished to exercise tighter supervision and control of the use of this drug.'

The inspector general's report was never published, and Allen Dulles merely sent Gottlieb a letter of reprimand. Olson was the first known case of LSD causing death, although there were many rumours that CIA double agents who had been given massive doses of it, and other substances to discover the extent of their treachery, had died during experiments.

Gottlieb himself turned up in Africa seven years later, on a CIA mission to poison the Communist-inclined Congolese leader, Patrice



Lumumba, with a bacterium that would cause a fatal disease, again courtesy of Fort Detrick. Rebels beat him to it. The CIA officer was also involved in plots to assassinate Fidel Castro by having his food poisoned and to murder an Iraqi colonel with a germ-impregnated handkerchief.

By then, the CIA's enthusiasm for LSD had waned. They discovered that individuals tested had a distorted view of time, place, and body image, and suffered bizarre hallucinations. Self-administration would be even more precarious, it was discovered, because subjects simply could not remember exactly what they had said or done while high on LSD, at least not with accuracy. While the memory was not totally gone, it was distorted.

The CIA was steadily researching into other drugs and poisons in support of their various assassination plots to kill troublesome foreign leaders, which was itself the subject of a Senate Inquiry chaired by Senator Frank Church in 1975. He concluded that although the agency never actually killed any government head, it wasn't for the want of trying. 'It represented failure rather than a change of mind,' Church said.

So much effort had gone into the LSD project that the CIA would not give up. Their experiments extended over a decade. The military was still interested in LSD as an incapacitating agent and counter-intelligence wanted the experiments pursued as a defensive measure against possible LSD use by terrorists or saboteurs. A CIA officer who was involved in the LSD experiments testified at a secret government investigation into the MKUltra Project: 'It is awfully hard . . . to reproduce how frightening all of this was to us at the time, particularly after the drug scene became widespread. But we were literally terrified, because this was the one material of a kind that we had never been able to locate that really had potentially fantastic possibilities if used wrongly.'

Olson's death occurred in 1954. There is no doubt Porton knew about it, and all the other rumours swirling around the Maryland CB.W community. Even so, like the CIA and the US Chemical Corps, it continued its own experiments with LSD, using mass trials, which, incidentally, the CIA could no longer do, because of their mishaps.

Porton's own experiments using human guinea-pigs overlapped those of the CIA. The Porton volunteers were typically given 200 micrograms, whereas normal dosage is 50 to 100 micrograms.

The Porton files show that experiments did indeed prove that LSD could incapacitate normally fit and healthy men, in fact a whole detachment of highly disciplined soldiers. The tests involved each



group of soldiers being put through routine drills and attack exercises after they had been administered LSD tablets. The 11 files described three operations, codenamed 'Moneybags', 'Recount' and 'Small Change'. None of the volunteers was told what drugs were being given, although they all received medical and psychiatric screening before the tests began. The men were placed in mocked-up surroundings and administered the LSD and other hallucinatory drugs.

Operation Recount was staged in September 1966 – 12 years after the death of Olson. Sixteen men from the 37th Heavy Air Defence Regiment were engaged for the experiment that involved an hallucinatory drug called 'T3456'. Half the men were given the drug, half were not. The trial was intended to assess the interaction between the two groups. The drugged soldiers became totally disorganized, and consumed with frequent bouts of uncontrollable laughter. The unit's commanding officer complained that one of his drugged men laughed even more wildly whenever he approached. The report stated: 'The officer found difficulty in controlling an entirely unjustified hilarity in spite of the presence of his commanding officer.'

The battery sergeant-major was so severely relaxed that after the exercise he removed most of his clothes and sat on his bed 'wearing only his underclothes and a seraphic smile'. Two-and-a-half hours later he complained of feeling tense and was sent to see a psychiatrist. The tests actually proved very little – except what Porton already knew from earlier trials: that the drug was a 'powerful incapacitator'.

Some of the tests, experimenting with LSD administered by aerosol sprays, were patently unsuccessful because of the low absorption rate. When only small doses of LSD were given, the soldiers were able to maintain reasonable discipline, although exposure over several days to low dosages gradually reduced their capabilities. With a dose of 200 micrograms, on the other hand, the soldiers became 'chaotic'. During one test, a drugged troop commander who was laughing and retching accused a radio operator of insubordination because he was talking gibberish and whistling down the handset – not realizing that the soldier's behaviour was due to the drugs. The commander cried out: 'This is getting too much. Why doesn't somebody who's sober take charge?'

In another sequence of tests, in November 1965, 13 Royal Marine commandos who, again, were given doses of 200 micrograms of LSD, were noticeably affected by it within three or four minutes. They became progressively more disorientated and refused to respond to orders.



Major J.L. Rickford, who monitored the exercise, reported that the whole unit would have been wiped out by modest enemy action within an hour. The men, he said, were 'out of touch' and unable to use equipment. They walked around aimlessly during exercises and, when given orders, could not remember what they were minutes later. The reports conclude that most men returned to normal within 48 hours. Many admitted to periods of depression but there had been 'no lasting damage' to any of the volunteers.

That, according to Porton, remains the case, although former Army corporal Bob Clarke, who took part in the LSD tests, will disagree. 'About two years after the tests,' he said, 'I began getting bad dreams and, during the day, these sort of flashbacks in my mind. I also suffered a lot with depression, which is really not me at all. I have had a good many problems in that regard and when I told my specialist about them, he more or less said right away that it was the cause of my troubles. We tried to get a more complete history of the dosages, but were told that individual records were no longer maintained for this experiment. But my doctor said that if, as he understood it, I had received particularly high doses of any hallucinatory drug, it had been known to cause long-term psychological effects.'

The irony was that these Porton tests, in the end, proved fairly worthless although they were no doubt part of a more diverse programme of research, which remains classified. It is known that both MI5 and MI6 explored the use of drugs and unidentifiable poisons for counter-intelligence missions from sabotage to assassination. The CIA, by the end of the 1970s, had stockpiled its own armoury of biological mini-weapons invented with the aid of Fort Detrick scientists under another code-named project, MKNaomi. The task of this project was to 'evaluate and obtain severely incapacitating and lethal materials for use by the TSD' – the Technical Services Division, which had been charged with assassinations and other deeply covert operations.

The interest in LSD continued throughout the decade, to the extent that it merited a particular mention in an important 1970 World Health Organization report by a panel of eminent scientists, warning of the potency of LSD and its particular dangers in the wrong hands. By then a whole generation of flower-power children could have told them that for nothing.



# TESTING BUGS ON THE MASSES

THE LSD EXPERIENCE was just one of many excursions into the unknown being conducted in the name of the defence of mankind, but perhaps the most remarkable of all was a series of tests, also spanning more than a decade, conducted simultaneously on mass populations in Britain and America. Some were decidedly more risky to the health and wellbeing of tens of thousands of people unwittingly exposed to CB agents than anyone cared to admit at the time. They began as the Cold War slithered into deep-freeze. Intelligence models had been produced on both sides of the Atlantic on the possibility of a germ warfare attack on cities, that is by the Soviets, and by smaller clandestine saboteur or terrorist groups. Both scenarios had prompted much closed-door discussion among Western governments. NATO analysts conducted a number of studies, the Chiefs of Staff of Britain and the US kept the possibility of germ warfare under constant review and it was the subject of investigation by the World Health Organization.

One of the most likely targets of saboteurs was considered to be the underground rail systems of major cities, in which bacteria could be dispersed quite simply in the tunnels from the windows of a train and cause a huge death toll. This theory had been around for a long time. The Nazis had conducted trials with relatively harmless bacteria in the Paris Metro in 1943 and there had also been rumours that German agents planned to scatter glass tubes of cholera and anthrax



in the underground system before they pulled out of the French capital and scampered back to Berlin.

A number of plans to test these theories in the London Underground were submitted to Britain's Biological Research Advisory Board by a joint committee of MI5 and military intelligence but the idea of conducting experiments on the public at large, without its knowledge, was obviously such a sensitive issue that five years of protracted discussion took place before it was approved. The board itself came out strongly against spreading live organisms in such confined public areas. One leading scientist on the panel went so far as to insist that the sabotage theory was 'a trivial hazard adequately predictable from existing knowledge'. Similar disquiet was heard in Washington when trials on the New York Subway were being discussed by the US Army in conjunction with the Chemical Corps and Fort Detrick staff.

London Transport was consulted on this 'most secret' matter and was given assurances that no harm would come to its passengers. The LT executive seemed more concerned about 'a suitable cover story to allay possible public suspicion'.

In fact, that was one of the main issues when the plan was finally presented to the British Cabinet for approval. The Secretary of State for War, John Profumo, spoke against it, although, according to the minutes of the Biological Research Advisory Board, he was more concerned about public reaction to the tests than any possible danger to health. This, ministers were assured, did not represent a great threat. Finally, the Cabinet gave the go-ahead. Porton Down biological experts were already standing by with supplies of bacillus *globigii*, a bacterium that they said would not cause disease, food spoilage or 'possess any other undesirable qualities'.

Preliminary tests were carried out in London Post Office cable tunnels. Then, during a busy lunchtime on 26 July 1963, the test controller boarded a London tube train on the Northern Line at Colliers Wood, carrying with him a small face powder tin, filled with the bacteria. At a point midway between Colliers Wood and Tooting Broadway, he opened the train window and dropped the tin on the track. The object was to discover how far the bugs could travel, so that estimates could be made of the number of people who might be affected by even this small container of bacteria, concealed virtually in one hand. During the next two weeks, Porton technicians examined air samples taken from the tunnels, the stations and from inside the actual trains. The results astounded even the battle-hardened BW



experts of Porton. The bugs had travelled as far as ten miles north, with positive readings at Camden Town. The Porton report also said that trains became 'heavily contaminated internally'.

Based upon this information, a new set of tests was ordered using bacteria that more closely resembled pathogens, or disease-carrying bugs. The results of those are unknown. All documents relating to them remained classified when the 30-year rule expired, and so it is unlikely that they will be released for many years, if ever.

The same applies in America. There, the tests were conducted by the US Army, using a bacillus dispersed through the New York City Subway. They lasted for five days and, like those in London, were carried out at peak travel times. Scientists at Fort Detrick had filled ordinary light bulbs with bacteria, which were released into the subway system when the bulbs smashed as they were dropped from the train – exactly as the Nazis had planned to do when they left Paris. The dissemination rate was then measured in a series of air-sampling tests. The test results remain classified, although one source did comment that it was 'not considered necessary' to monitor any reactions among the travelling public to the bugs. 'We were assured there would be none,' he said, 'but we never really followed up on that.' As later tests would show, however, some members of the public did complain of health problems.

The experiments took place in an atmosphere of concern about biological warfare that verged on paranoia. Both the British and the Americans – matched as ever by the Soviets – earmarked a huge financial commitment to BW research. Although Britain dropped out of its 'offensive' work in the early 1960s, it was involved in a major testing programme through Porton and, of course, remained in partnership with America when the first production line of biological weapons was begun at a \$100 million factory, built in a converted wartime arsenal of ten storeys, with three below ground, at Pine Bluff, Arkansas.

There were many on both sides of the Atlantic who supported the theory of Sir Owen Wansbrough Jones, a member of both the British Biological Research Advisory Board and the Chemical Defence Advisory Board, who maintained that within a decade biological weapons would be '100 times more powerful than now'.

The scientific community seemed intent on ensuring that that prediction was reached. A BW research programme started of such enormity and so potentially dangerous that human volunteers could not be allowed anywhere near it. Field trials had to be conducted well



away from any population – even the already heavily polluted Gruinard Island, scene of the wartime anthrax trials, was now considered to be unsuitable for safety reasons, notably because of ‘wind direction and its close proximity to the mainland’.

A search was made for another suitable island around the British coast, but finally it was decided to conduct the trials at sea, enlisting the aid of the Royal Navy in an operation generally code-named ‘Pandora’, although each specific ‘field’ trial was given its own title. They were to be conducted from floating laboratories, and for this two 4,000-ton tank landing ships – HMS *Ben Lomond* and HMS *Narvik* – were converted to house the Porton staff and fitted out with all necessary equipment required for a series of experiments over the next seven years. Apart from the crew, the scientists and technicians, the ships took on board a large stock of animals.

At the time, it was widely believed that the trials were a mere simulation to assess Britain’s vulnerability to biological attack. Vague and unspecific press releases put out by Whitehall to ward off media inquiries gave no clue as to their real purpose, significance or scope.

Precise details are still classified, but information now to hand shows that after initial ‘practicality’ tests, real germs were used, including anthrax, brucellosis and tularaemia (a severe infectious disease). According to Porton’s own reports, the trials were primarily aimed at perfecting methods of disseminating bacteria from bursting munitions and spraying equipment. They also had to establish whether the bacteria might be diminished by natural conditions, such as bright sunlight ‘destroying infectivity’.

To achieve their assessments, the scientists devised a plan whereby bacteria would be released up-wind of an arc of dinghies and rafts. The dinghies would carry air-sampling devices to record the strength of infectivity. The animals, including goats, rabbits, rats and mice tethered or in cages on the rafts, were there to test ‘inhalation and mortality factors’.

On board ship, the scientists and sailors would watch through binoculars as the bacteria was sprayed or exploded over the floating test equipment and livestock. Eventually the dinghies and rafts would be hauled in for data to be retrieved from the air samplers and for the animals to be dissected. Those not already dead were sacrificed and their carcasses were burned at sea.

These techniques were employed more or less throughout the seven-year period of the trials, which went under five separate codenames:



*Operation Harness* was conducted in waters off the Bahamas to 'determine the practicality of sea trials' using three bacterial agents, apart from anthrax.

*Operation Cauldron* was held off Stornaway in the Isles of Lewis with the 'aim of consolidating data from Operation Harness and to assess the use of a further bacterium'.

*Operation Hesperus*, also in Scottish waters, was to test, compare and report on the efficiency of 'several munitions, sprays and aerosols'.

*Operation Ozone*, a name that in itself held sinister implications, took the scientists back to a site 20 miles from Nassau, Bahamas, 'to acquire more data on spraying agents and, for the first time, on a virus'.

*Operation Negation*, also off the coast of the Bahamas in 1955, was staged 'to compare the loss of viability of three bacterial agents sprayed by aerosol – and a second virus'.

When the trials were completed, the two tank ships could not be used for any other purpose and were taken to a naval dockyard and broken up. The magnitude of these trials was such that the Porton hierarchy recorded it was 'very proud' that it had increased the establishment's 'international status not only in the biological warfare community, but as a centre of excellence in several areas of microbiology and allied disciplines'.

After almost a decade of intensive experiments in Porton labs and at sea, its scientists had determined 'the infectious levels of 15 species of micro-organisms' and made great advances in the discovery of 'the mechanisms of inhalation infection' and methods of airborne attack using germ-filled munitions and spraying devices. The sea trials, combined with many other simulated and live experiments with bacteria, demonstrated that while the pursuit of chemical technology had, on Porton's own admission, become a 'desperate preoccupation', the biological programme might be termed a dangerous obsession.

The same fear already gripped both the imagination and ambitions of military leaders in the US as they mapped out their own BW programme, which dwarfed the British trials. The CIA and military intelligence had already produced dozens of 'models' of possible attacks – such the New York city Subway experiment – by the Soviet Union against major US cities or by small terrorist groups, poisoning water, crops and animals. The Pentagon authorized a series of experiments that were to continue over the next 15 years.

One was to test the theory that a Soviet submarine could reach New York Harbor undetected and released a bacterial cloud, and then



vanish before anyone knew it had happened. It proved to be a very viable idea. In another trial, two US Navy ships conducted six mock attacks on San Francisco, using what was said to be a harmless bacterium called *Serratia marcescens*, developed at Porton during the war.

Though secret at the time, reports filtered out years later that Fort Detrick scientists who monitored the mock attacks discovered that 117 square miles of the city had been contaminated by the bacteria, and it was estimated that at least 800,000 people had inhaled it. In 1977, the Archives of Internal Medicine noted the unusually high incidence of *serratia pneumonia* around the time of the attacks, from which one victim died. His relatives, on learning of this fact, unsuccessfully attempted to sue the US government. But the San Francisco experiment was only one of dozens carried out in the US, as the CIA and the Pentagon lobbied repeatedly for a viable capacity for both defence and attack, and of course for possible counter-measures in Vietnam.

There was, for example, the 'Mosquito Plan' – a scheme to breed a new strain of mosquitoes infected with yellow fever. The insects would then be installed in bursting air bombs for delivery into enemy lines. There, the mosquitoes would attack the opposing forces and they would all very quickly become infected; literally dropping like flies. The plan, worked out to the nth detail by Fort Detrick scientists, actually won approval from the military hierarchy, for a series of tests was carried out over an Army bombing range in Florida. Results of the tests, now hidden away in the archives of the US Army Chemical Centre in Maryland, record that within a day of the bombing mission, swarms of mosquitoes had spread up to two miles from the bombing run. 'Many people' were bitten and some fell ill. After each test, US Army personnel posing as public health officials photographed and tested the victims. The operation was judged so successful that the military placed an order with Fort Detrick: it should gear up to produce 100 million mosquitoes a month. The plant was built and there were later rumours – always denied – that the mosquitoes were used in US campaigns in the Far East, and in other irritating problem areas closer to home.

An outbreak of dengue haemorrhagic fever that afflicted 300,000 Cubans was linked to those experiments in an investigation by the magazine *Covert Action Information Bulletin*, which tracked the workings of intelligence agencies around the world. The magazine suggested that this outbreak was the result of a release of mosquitoes by



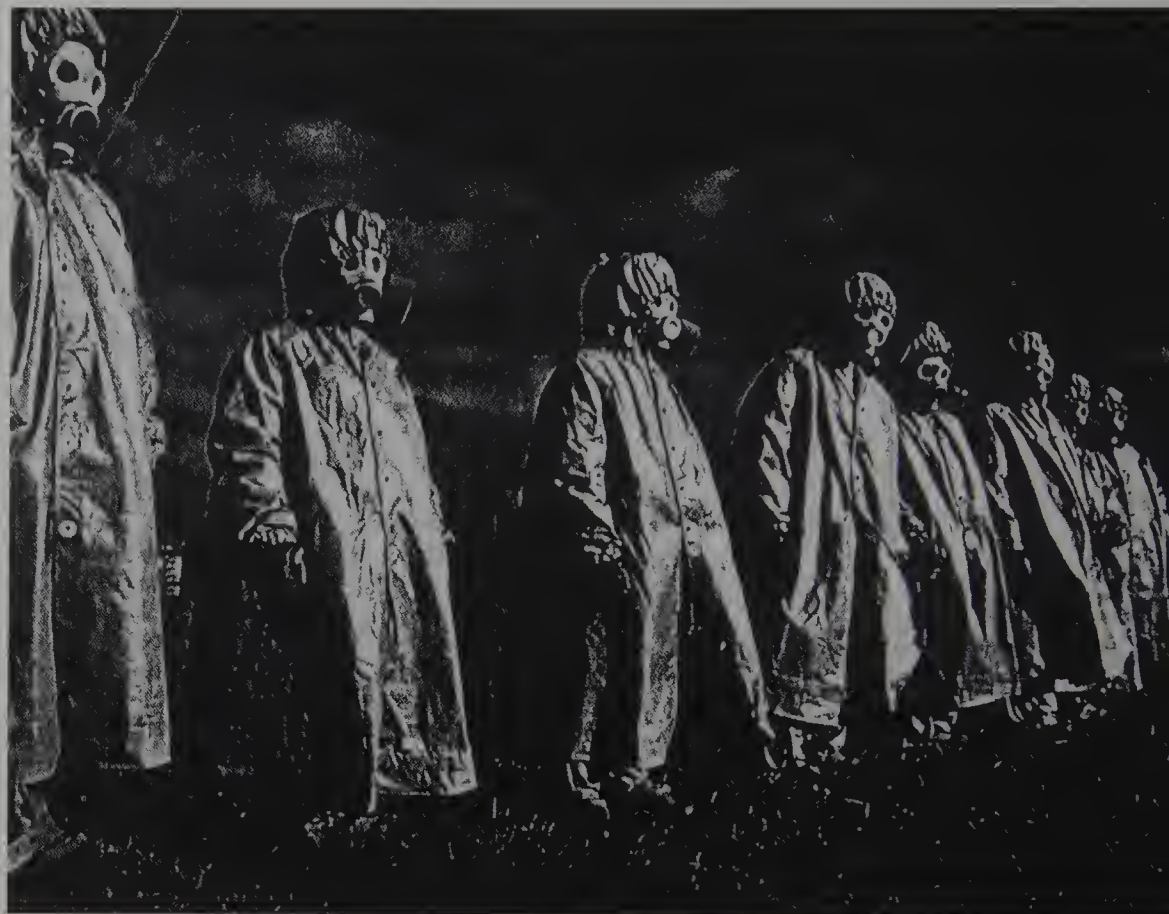


**Above:** A mother and baby lie where they fell during the gas attack on a Kurdish village by Saddam Hussein's air force in 1988. Up to 7000 died in agony; yet the international community took no action and continued to supply Saddam with arms.



**Left:** The US Army released a cloud of nerve gas during tests over the Utah desert; the lethal poison drifted on the wind towards the grasslands: 6000 sheep were killed.





**Top:** Eerie vision of the future if advanced Russian technology on genetically engineered anthrax weapons escapes into terrorist hands. These are Russian soldiers on a biological-warfare exercise.

**Above:** Proof of the devastating effects of anthrax lay on the remote Scottish island of Gruinard, bombed during Porton trials in 1942 to perfect an anthrax-charged weapon of war. It remained poisoned and unapproachable until Porton scientists finally succeeded in its decontamination in 1987.





Overleaf: Jayce Hanson, son of a US army sergeant, and one of the many children of Gulf War veterans born with severe handicaps.

Left: The skull and cross-bones says it all – British troops drive into the smoke, fumes and chemical pollutants that filled the air in Kuwait.

Below: Coalition troops are unprotected from the poisoned atmosphere.











The scenes of battle are 75 years apart, but the enemy is the same – mustard gas

Above: Coalition troops in the Gulf War are masked up, ready for a possible chemical onslaught.

Below: An American soldier rips off his flimsy mask and collapses choking from the German gas fumes in World War I.







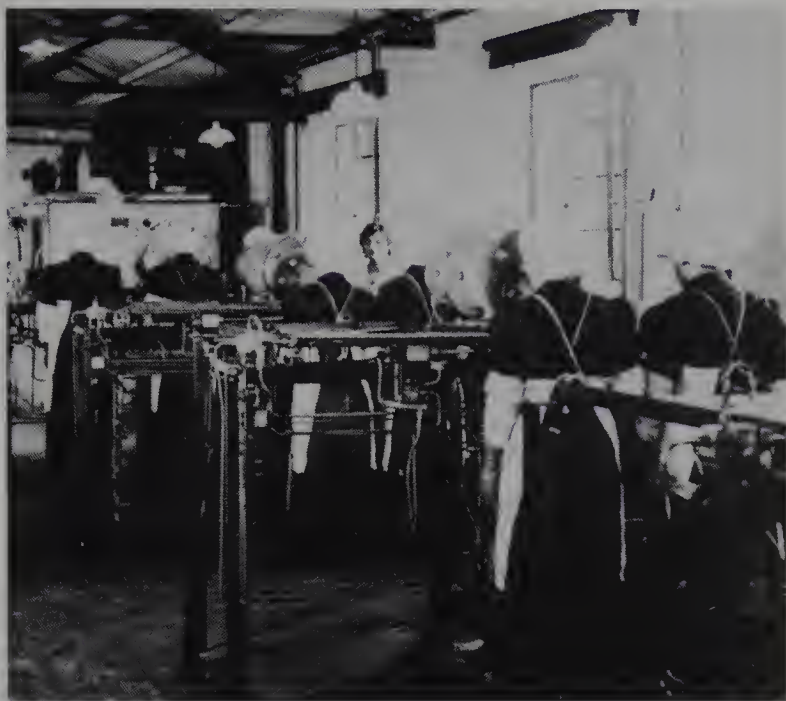
## Images of two conflicts

Above: World War I troops blinded by the 'Hun Stuff' – mustard gas – are led away from the medical tents.

Right: A German school had its picture taken for posterity, preparing for the Allied bombers to come at the beginning of World War II.







Above: The secret army of soap-factory girls was co-opted to Porton Down Chemical Defence Establishment in 1942 to pack five million cattle cakes into boxes. The cakes

contained anthrax, which was to be dropped over German pastures.

Below: The RAF makes a dummy run over England







Emotive pictures of animal experiments have, over the years, drawn great protests and anguish over the dilemma posed by the needs of science. These scenes were pictured in a German laboratory. Porton carried out many experiments with monkeys; in one, 20 rhesus monkeys had their heads clamped, and they were then shot with metal balls to observe the damage.



Cuban counter-revolutionaries, masterminded by the CIA. During the last 30 years, Cuba has been subjected to a large number of human and crop diseases that are difficult to attribute to purely natural causes.

Coincidentally, an outbreak of dengue fever also hit Nicaragua in the 1980s. Observers said it came shortly after an increase in US aerial reconnaissance missions. Nearly half of the capital city's population was stricken with the disease, and several deaths have been attributed to the outbreak. The US vehemently denies any suggestion that it was involved.

By the turn of the 1970s, the Americans had produced no less than 35 'viable' and lethal combinations of BW agents and, like Porton, had advanced their work to produce antibiotic resistant types of pathogens capable of inducing diseases for which treatment was pretty well beyond hope. They were the first results of what would become a prime area of research in BW labs – genetically engineered strains of disease that would be completely untreatable by any known medicine, antibiotic or antidote.

Much of the work in this area centred around anthrax (fatal within 24 hours if it attacks the lungs), tularaemia, cholera and bubonic plague. Other less virulent but debilitating diseases investigated included Q-fever, brucellosis and even common influenza.

One of the most controversial tests among the US programme came to light when Dr D.M. McArthur, then Deputy Director of Research and Technology for the Department of Defense, appeared before the House Sub-Committee on Appropriations in 1969. He was seeking funding and approval for a research project 'to produce a synthetic biological agent, one that does not naturally exist and for which humans have no natural immunity'.

Dr McArthur won a \$10 million grant for the study, lasting between five and ten years, at Fort Detrick. Congressional Records show that the most important characteristic of the research would be to attempt to invent a new infective micro-organism 'that might be refractory [resistant] to the immunological and therapeutic processes upon which we depend to maintain our relative freedom from infectious disease'.

Ten years after the study began, the first signs of the AIDS epidemic began to appear and the fact that the Pentagon had requested permission to research a synthetic AIDS-like virus in 1969 would become the subject of much speculation. This was advanced further when the respected East German scientist Professor Jakob Segal published a thesis suggesting that AIDS may have originated in



a US biological warfare research laboratory. The theory was widely rejected, of course.

There was one devastating event, however, for which there was no doubt whatsoever that the US military had been the perpetrator. Aerial bombing trials using a highly toxic Porton-developed nerve agent had been conducted at the Dugway Proving Grounds, the main weapons testing centre for America's CB.W programme.

It was one of the most isolated of military bases ever built in the US: a million acres spreading across the Great Salt Lake Desert in western Utah. The only way to reach it was via an 80-mile drive from Salt Lake City through mountain ranges. The region was virtually uninhabited, except by sheep – run by ranchers controlling vast acreages.

Unlike the Nevada testing grounds for US atom-bomb research, few Americans even knew of the presence of the Dugway project, although it had been in existence since the mid-1940s. On Wednesday 13 March 1968, at 5.30 in the afternoon, a US Air Force jet swooped low over the most remote area of Dugway, spraying a colourless liquid as it went. The purpose of the flight was to test the effectiveness of a new high-pressure gas dispenser, which had been developed at Edgewood. The trial was 'live' and the contents of the chemical tanks on board the aircraft was the highly persistent VX nerve gas, which was held in large stockpiles at Edgewood Arsenal.

Military scientists had selected the site carefully, about 30 miles west from the nearest sheep-grazing land and about 35 miles south of the main autoroute linking the Midwest to California, the US40. With a multi-million investment at Dugway in wind gauges, meteorological equipment and air sampling devices the scientists believed that they could accurately calculate the dispersal area of gases discharged from aircraft, even on windy days. They had done it a thousand times.

On this occasion, something went wrong. Within 24 hours of the test flight with the VX agent, ranchers found that their sheep were in distress, coughing loudly and collapsing. By nightfall, they were going into convulsions, and dying by the hundred. The ranchers dashed to the military compound at Dugway and demanded to know what was happening. The Army sent in an emergency contingent of vets to begin inoculating the sheep with antidotes but they seemed to have little effect.

By Sunday morning, 17 March, the ranchers had counted 6,000 sheep dead, many put to death by the vets because they were so severely affected by the gas. The ranchers were told they would be



fully compensated for the loss and implored them not to speak publicly about what had happened. The demise of 6,000 animals, however, was not something that would stay secret for long. The following week the Salt Lake City newspaper published a story about the mysterious death of sheep, linked to a poison of some kind.

A military spokesman at Dugway was quoted in the report as denying that there had been any tests at the base that could be linked to the death of the sheep. The Army spent three weeks repudiating the charge. Finally, on 18 April, after independent tests had shown the deaths were linked to organophosphates, the Army conceded 'a possible connection'. Pressure was brought to bear in the right places and the Utah sheep deaths passed into history without great public outcry. Nor were the exact details of another accident involving VX made public that year, 1968.

It was one that would prove beyond doubt that the American Chiefs of Staffs had already ordered stocks of the gas to be dispersed to strategic positions around the world – and in this particular case it was discovered at the vast US military base on Okinawa. A training accident led to a number of US troops being exposed to the gas and 23 were admitted to hospital. The lethal possibilities of VX were never revealed then, nor would they be for many years. The public would be given only scant details of 'this unfortunate occurrence'. The damage-limitation exercise was successfully completed, in accord with the established practice that was operated on both sides of the Atlantic.

By then it was known that at least a dozen other countries apart from the Soviet Union, the US and Britain were developing biological and chemical arsenals. They included Communist China, Nationalist China, France, West Germany, Poland, Sweden, Egypt, Cuba, Israel and South Africa.

America itself had still not ratified the 1925 Geneva Convention on CB.W, and Defence chief, Cyrus Vance, was unequivocal when questioned by a Senate Committee on Disarmament: 'As long as other nations, such as the Soviet Union, maintain large programmes, we believe we must maintain our defensive and retaliatory capability.' Britain concurred in terms of defence, and from its point of view America's non-ratification of the Geneva Convention meant that its foremost ally could continue to build hefty stocks of CB.W, while Porton itself went about its normal business under the banner of maintaining only a defensive role.

It was the syndrome of the vicious circle, as was pointed out in a report compiled for the World Health Organization in 1970 by 18



scientists from 11 countries, including two Nobel Prize winners, Professor J. Lederberg from the Stanford University School of Medicine and Professor A.M. Wolff, director of the Institute of Scientific Research on Cancer, Villejuif, France.

It was a damning report that condemned outright the continued research on CB.W, even for defensive purposes, and made particular mention of the wall of secrecy that surrounded the research itself. Even so, the report said, the fact that the panel had been unable to consult classified documents relating to experiments did not stop them from making 'realistic' assessments of the likely consequences of the use of CB.W. The WHO panel estimated that in a chemical attack, if 4 tons of the Porton-developed VX nerve gas was efficiently dispersed over a city,

'casualties of even a small attack in favourable conditions would affect an area about six square kilometres and cause anywhere between 50,000 and 180,000 deaths . . . but if a suitably stabilized fine aerosol of VX were developed, and four tons of VX employed, several hundred thousand deaths could result.'

A similar attack using biological weapons, weighing much less, could be even more devastating. The team suggested that:

'if a biological agent such as anthrax were used in an attack on a city by even a single aircraft disseminating just 50 kilograms of the dried agent in aerosol form . . . it would affect an area of 20 square kilometres, resulting in hundreds of thousands of deaths.'

Those calculations, the team pointed out, were based on small and limited attacks well 'within the capability of a number of nations'. And yet, for all that, those 18 most distinguished international scientists, in not so many words, concluded that the madness appeared unstoppable: 'With the real possibility of developing new and even more dangerous weapons, it is imperative to find ways of abolishing any presumed need for this military orientated research as soon as possible.'

With a forecast that would have particular relevance years later when the Gulf War troops returned home, the WHO team also added a gloomy forecast concerning experiments on gas and bacteria. The long-term risks of cancer, in some exposures, was high and there was clear evidence from breeding with rats and mice exposed to those chemicals that offspring were born with deformities.



# AN EYEFUL OF CS GAS

A DECADE OF madcap schemes and experiments was followed, as the 1970s dawned, with an announcement by President Richard Nixon that he was planning to abandon the United States biological weapons offensive capability. He made bold statements decrying the 'massive, unpredictable and potentially uncontrollable consequences' of BW and there was plenty of evidence to back up that statement in the secret files of research establishments the world over. He planned, at last, to submit the Geneva Protocol for ratification by the US Senate, almost half a century after it was first adopted by most other leading nations, albeit without great regard.

All was not as rosy as first appeared. Waiting in the wings was another huge report resulting from a monumental study of CB.W launched by the Stockholm International Peace Research Institute. It would be published in six volumes, charting every development since the turn of the century. Not least among its contents would be some modern findings – the first precise details of some specific chemical weapons, harassing agents such as CS gas and anti-defoliants used by the American military during the Vietnam war. There was particular reference to defoliants, and the revelation that between September 1962 and March 1969 the US sprayed 13.8 million gallons of plant destruction agents over South Vietnam, covering around ten per cent of the surface of the country.

There would also be graphic accounts of the massive use of



harassing agents, CS, CN and DM gases, fired from 'a fantastic range of weapons'. Large quantities of tear gases were used to fire into the Vietcong system of underground shelters and tunnels where the US Army employed its 'normal procedure of blocking up all vents and exits' to achieve high levels of concentration. Reports of deaths from overdoses of tear gas were common. One claimed that '20 women and children did not make it out of the cave.'

Those stories would become more familiar in the years to come, as more of the American secret war in Vietnam became known. Nixon made his pronouncement of the abandonment of biological warfare ahead of them – and for all the wrong reasons. G.B. Carter's history of Porton reflected the anger and derision with which the Nixon statement was soon to be viewed, and exposed as something of a confidence trick. Porton apparently believed it was a political manoeuvre to draw attention away from the longer established and proven chemical capability recently displayed in Vietnam, to placate congressional, national and international concern, which, according to Carter, was 'a false rationale'. And the Nixon ban applied only to the production of biological weapons – not to the continued research into them, or indeed into the research and manufacture of chemical weapons.

The Portonian view of Nixon's statement, tempered as it was with anger and vested interest, was an interesting side element. Carter concluded that because of it, biological warfare became unmentionable and, as a threat, almost invisible, and he bemoaned the fact that 'this dangerous lack of perception' was almost fatal for the biological defence research programmes in several nations.

However, the whole Vietnam crisis and critical reaction to the methods employed by the American military turned the spotlight towards another controversial issue – CS gas, which had recently been accepted by the British government for use as a military training aid and for riot control by police as a replacement for some of the older forms of tear gas.

CS was first developed in America in 1928 and was used extensively by the Allies in World War II, but it did not fall into the domain of Porton scientists until the mid-1950s when the military began looking for a more modern tear gas. Porton began testing CS on volunteers and production studies began at Nancekuke in 1958. A decade later, after dozens of studies and reports, a British inquiry on the poisonous consequences of the gas vindicated the government's decision to adopt it for use in riot situations, notably and later in Northern Ireland.



The opposers claimed that CS gas came within the 1925 Geneva Protocol, which Britain had signed, preventing the 'use in war of asphyxiating, poisonous or other gases'. Ironically, however, the clause did not specifically preclude its use against a nation's own civilians or against individuals in a nation with whom she is not technically at war. Nixon had in fact deliberately excluded short-term harassing agents such as tear gas, herbicides and defoliants from the self-imposed restrictions on CB.W the US was prepared to adopt.

All of this flew in the face of the 1970 report by the World Health Organization's panel of experts, who were equally damning in their views on the over-zealous use of riot-control gases. It was clear, they said, that CN gas could cause serious lung damage when exposure occurred in enclosed spaces, and a number of deaths had been reported. CS gas was also known to be particularly harmful to people suffering from bronchial complaints. The controversy ran for many years and provided Porton and its US counterparts with hundreds of man-hours of study and experimentation.

At Porton, many human guinea-pigs and animals were used for trials of CS gas, and at the very time the controversy flared, a new version of the gas was being tested there. Among a group of servicemen who went to the research station for the trials was 23-year-old Able Seaman John Longden, from Lincoln, who was serving on HMS *Intrepid*.

In the summer of 1969, his ship was in dry-dock at Plymouth and Longden decided to apply to go on a course to achieve promotion. Initially, his request was refused, but he was told that if he volunteered for experiments at Porton, it would be reviewed. Longden agreed and checked into the research station for a two-week stay. Interviewed for this book, he gave this account of the experience:

It was during Wimbledon fortnight, marked by the rare event of a British woman, Ann Jones, winning the ladies singles. I arrived at Porton along with a group of ten or twelve others. They allowed us to settle in, showed us around the social areas and explained that we could go into Salisbury in the evenings if we felt like it. They also gave us a briefing about the types of experiments we were to participate in and were quite open about the fact that we would be involved in tests for CS gas. There would be several experiments, averaging one a day I suppose. First of all, we went out on the Porton ranges where we did various exercises under gas conditions. We would have to fire a rifle, run for 100 yards or so through a light mist of CS gas, then fire again. It was



presumably to test reactions of soldiers or police in attack situations where CS was used. We also had patch tests on our arms.

Then there were a number of laboratory experiments. They described briefly what they entailed, that we would have gas sprayed towards our faces; but we needn't worry, they said, apart from an initial discomfort, there would be no ill effects. There would be doctors on hand for immediate treatment with antidotes. And, incidentally, the payment for each of these experiments was to be doubled to £2, although that was not a real consideration.

On the first day, we were taken from our barracks and led into the lab section where we lined up in the corridor and I noticed that they were closing all the connecting doors. When my turn came, I was led into a fairly ordinary room and found myself surrounded by chemists and doctors in white coats. I only began to get nervous when I saw the solitary piece of equipment – I can only describe it as resembling the electric chair you see in a James Cagney film.

It was exactly like that. I was strapped in, with my arms and legs buckled down and my head pushed back. Then a syringe, held by one of the technicians I think, came into view and liquid splashed into my face. I realized then why I had been tied down. I just had the urge to get up and claw myself out. A minute later, the syringe appeared again and the liquid was squirted directly into my right eye. The pain was excruciating. I shouted out, but of course at the same time you are thinking to yourself, don't let them see you are scared. It was absolutely traumatic.

They unstrapped me very quickly. The pain was bad, and my head was swirling. I could hardly walk, and certainly couldn't see properly. A doctor and a nurse helped me out and I was led down the corridor to a room where another doctor was waiting with what they said was the antidote. They looked at me and I can only describe their reaction as one of panic. They threw cold water straight on to my face and eyes. My face was red and burning, my right eye was completely closed and they had to sluice it out. They put a bandage over it and said it would have to stay on for a couple of days.

I wasn't alone in that, of course. At the billet, most of them that night were walking around with bandages over one eye. That night leave was cancelled. We were not supposed to leave the camp. We were told we would not be required the following day, and to rest. The pain and discomfort lasted a good two days, but



the effects began to wear off and we went back on the ranges. At the end of the two weeks, I returned to my ship and went on my course.

My right eye occasionally gave me trouble, watering and so on. But it was not until some years later, after I had left the Navy and was working in the Middle East, as an electronics tutor in a university in Oman, when I consulted a doctor. She said my right eye was a good deal weaker than my left.

I had various eye tests over the years, intermittently during stays in Britain where I worked as a teacher and then a computer technician. In 1991, I finally wrote to the Ministry of Defence to raise the issue of compensation. It was my understanding that the tear gas used on me was one called Dibezoxa zepine and was of a type used in Northern Ireland but was later withdrawn.

The MoD reaction was, in a nutshell, to go away. As far as they were concerned, Porton Down did not exist. After various letters and contact with my local MP who also got nowhere, and incidentally didn't seem to care, I was eventually called to a medical at the Ministry of Defence. The upshot was that they wrote to say they could find nothing wrong with me. My claim was rejected. Which is where it still stands in 1996.

Today, CS remains one of the major tools of riot control the world over and was transferred to civilian production in the West in the 1980s. Back in 1969, when John Longden tested CS gas, it remained among the controversial elements of chemical weaponry, largely because of its visibility – in Vietnam, Northern Ireland, Paris . . . anywhere there was a riot.

It added to the growing unease. America had an appalling record of deploying chemicals in Vietnam, most notoriously Agent Orange. The chemical was a mixture of herbicides used between 1963 and 1971 and named for the orange-striped containers in which it was stored. It was employed to defoliate forest trees and destroy the enemy's crops. Agent Orange contained two highly potent herbicides: 2, 4, 5-T and 2, 4-D, which had first been used in the United States in the mid-1940s to control weeds in cereal fields, pastures, and turf.

By the mid-1970s, there was mounting concern over its use after the massive destruction caused in Vietnam, and amid public outcry Agent Orange and its associated civilian products were banned in 1983. Thousands of US military veterans who had been exposed to it were suffering the dire effects – a range of illnesses, and a large



number had cancer. In what can now be seen as a preview for the veterans suffering from Gulf War Syndrome, they battled for years for compensation while long-term studies were ordered to discover whether they had a higher incidence of cancer than would be expected. They were in for a long wait.

The USSR faced similar accusations in the Yellow Rain saga. America, in the midst of the bad press over Agent Orange, openly accused the Soviets of supplying the fungal toxins for offensive use against the H'Mong tribes in Laos, and later in Kampuchea. The Soviets denied it. Eventually, environmental samples from the reported attack zones were retrieved and taken to Porton for analysis. The tests proved negative, but its scientists concluded that 'the epidemiological evidence led to the view that chemical attacks had occurred, albeit that the agent or agents used were unidentified'.

All this activity was against a backdrop of continuing negotiations around the Geneva Convention and international moves to reduce the world's stock of CB weaponry. America began its programme of unilaterally destroying its chemical arsenal – 7,000 tons of nerve gas alone during the next 15 years, although it still had ample stocks and an ever ready production capacity to turn Moscow into a massive graveyard if it felt so inclined.

The USSR also agreed to begin destruction of its chemical stockpile, although that was halted within a few years, allegedly and, if true, paradoxically, because of protests by environmentalists who accused the government of poisoning land and seas.

Britain meanwhile dumped its stocks of gas in the North Sea and the Atlantic, and trimmed back on research, especially on biological weapons. The old BW team was disbanded and a smaller unit remained under the direction of the more senior Chemical Defence Administration. A separate organization was formed for civilian research under the title of the Centre for Applied Microbiology and Research, answerable to the Ministry of Health, although some staff would retain links to defence projects.

For a time it seemed that the CB.W industry was in decline. But as on so many occasions in the past, it was a false dawn, a mirage. Very soon the whole Catch-22 of the international race once again moved back into top gear. Intelligence reports from the Soviet Union, reaching the ears of both British MI6 and the American CIA in the mid-1970s, suggested that far from halting its research in offensive BW, the Soviets had covertly stepped it up. Combined MI6/CIA reports confidently claimed that genetically engineered weapons were



being researched in top-secret laboratories in the Soviet Union.

It would take more than 15 years before the claims could be proved, when two Porton intelligence experts finally gained access to a BW chamber of horrors. It was hidden deep in a pine forest 60 miles south of Moscow. With a single hand-held flashlight, they saw for themselves what had been built after the 1972 Convention was signed – a place to test a modern version of General Ishii's anthrax bomb and the Porton N-Bomb.

The story goes back to 1973. In that year, the USSR opened a brand new facility with the grand name of the All-Union Research Institute of Applied Microbiology at Obolensk, which was the newest of a network of supposedly civilian research institutes known as the Biopreparat. The truth, as would be revealed by a defector in the 1980s, was that Biopreparat was merely a cover for military work dating back to 1950. It employed 25,000 people at 18 separate active plants, had six mothballed production plants and a major storage facility deep in Siberia.

The work focused directly on the aims of its military masters: to create the ultimate doomsday weapon using genetically engineered agents that would be resistant to all Western antidotes. Work began in the autumn of 1973, bringing together all the previous research on bacteria-charged weaponry. A test chamber was built deep in the Obolensk compound. It would be one of the largest experimental chambers ever built: a cubed structure around 50 feet on each side with walls of steel and a viewing panel of bombproof glass. Most of the tests would be by aerosol dissemination.

Animals were tethered in its centre while a fine jet of bacteria-carrying mists would be sprayed through ceiling vents, which were then immediately sealed. All the diseases favoured by BW specialists, such as anthrax, various forms of plague, yellow fever and so on, were tried. Built-in sensors monitored the density of the deadly mist, and the animals were wired to machines recording their respiratory and heart rate as they sank slowly towards agonising death.

In 1979, a hushed-up explosion at the Institute of Microbiology and Biology near Sverdlovsk brought devastation to 200 square kilometres around the site. In the weeks following, more than 100 people died and many more fell ill. The Soviets blamed contaminated meat. The CIA and MI6 were quite certain of the cause: a release of a small quantity of anthrax spores carried upwind of the building and into the town. Although they were now convinced of the existence of an offensive germ warfare programme in violation of the 1972 accord,



neither the Americans nor the British raised the issue through diplomatic channels through fear of revealing their intelligence sources.

There it rested in a kind of checkmate. In 1987, as peace gathered in the arms limitation talks between President Reagan and Mikhail Gorbachev, the Soviets made their first unequivocal admission that they possessed chemical weapons and were prepared to provide details to the international community. Still no mention was made of any biological weapons.

In June 1988, a party of MoD officials and scientists from Porton flew to the USSR to inspect its chemical plant at Shikhany and a return party of Soviets came to Porton. It was all very cosy, but not particularly revealing. There was no evidence of the feared biological bomb. Final proof of its existence did not emerge until 1989 when a senior Russian microbiologist, Vladimir Pasechnik, defected to the West, bringing with him first-hand knowledge of the Soviet BW work.

He confirmed the 'worst-case scenario' that the CIA and MI6 had suspected. Work on the super-generation of genetically engineered germs had been given 'top-priority' status by the mid-1980s. Scientists were working to a model predicting that if a single anthrax bomb were dropped on a city of 100,000, at least half the population would be wiped out. It was just as the WHO panel had predicted in 1970. By 1988 the Obolensk team had perfected strains of bacteria that were resistant to at least a dozen major antibiotics used in the West.

The information was of such quality that hotline telephone conversations buzzed between British Prime Minister Margaret Thatcher and US President George Bush. A new and delicate situation now existed. Mikhail Gorbachev was facing internal opposition to his moves for reform; Glasnost was under threat and Thatcher and Bush had no wish to disturb it further. On 11 April 1990, they quietly forced Gorbachev's hand by presenting a joint demand that he should end any remaining offensive BW research. Gorbachev's response was no more than a promise to investigate and question those at the helm. Bush was not satisfied.

In July, US Secretary of State James Baker met the Soviet Foreign Minister Eduard Shevardnadze and once again insisted upon assurances that the programme would be shut down. To back up his demands, Baker presented him with a 30-page report compiled by the joint MI6/CIA team, setting out chapter and verse of their knowledge of the Biopreparat programme and the work at Obolensk. Gorbachev's response came a month later. It was a virtual rejection of the intelligence claims. There was no current research and devel-



opment on biological weapons (quite ignoring the previous two decades of work), and so the charges were groundless. The Soviets pointed to the fact that they had fully supported a new Chemical Weapons Convention and that exchange visits between scientists from the USSR chemical warfare facility at Shikhany and Britain's CDE at Porton Down had taken place in 1988.

The British MI6 knew that claims that the work had ceased were not true, and American intelligence agents with Pasechnik's help, were able to follow the Biopreparat's activities. Bush was furious that on the one hand the Soviets were attempting to finalize the START treaty on weapon controls and a new CW convention, while at the same time senior figures were 'lying through their teeth' about BW.

The USSR insisted that work had stopped and was prepared to allow a joint Anglo-America team of scientists to tour its establishments to prove it. The team was made up of seven US members and five from Britain; both parties included intelligence experts doubling as biochemists and Porton staff were also among the British contingent. The Soviets placed the visiting inspection team under the supervision of senior officials of the Foreign Ministry. They packed in a busy tour with several site visits, so many in fact that it was possible to stay only a short time at any one site. They were shown what appeared to be industrial and commercial chemical plants, along with a large number of 'not very active labs', according to one source who was on the trip. He recalled: 'We saw a few women messing around with beakers and bottles, but otherwise there was little sign of higher scientific work. Nor were we able to get any clue as to what biological material was being produced,' the source said.

One clue, however, came during a visit to the Obolensk facility. They were taken into a dimly lit labyrinth, which was clearly a test area. Two members of the British team, both linked to intelligence, stepped boldly inside a chamber where there were no lights at all; it was pitch black. One of them took a flashlight from his pockets and quickly trained it over the steel walls and the equipment inside. One of the Soviet officials intervened. 'Switch off the light,' he demanded. 'Or I will have to confiscate it. You agreed – no electronics.'

Those few seconds were sufficient for the British experts to identify the room as an aerosol chamber, the very heart of the biological experimental area on which so many intelligence reports had been centred. Other than that discovery, the Western investigation team came back with virtually no new information. Even so, they continued to pressurize Gorbachev on germ warfare, to the point that



at a private meeting with him, following the 1991 G-7 summit in London, Major raised the issue again. He was angry, 'almost shouting', according to a US intelligence source who had seen a briefing report on the meeting. Major demanded that the programme be shut down. Four weeks later, he was told via the British Ambassador in Moscow that BW research would be halted. Gorbachev himself was on the verge of departure. Boris Yeltsin took over. The continuing priority that the West gave to the Russian BW capability, however, is demonstrated by the fact that it was among the topics raised by George Bush when Yeltsin visited the White House in February 1992.

At last it was admitted that the BW programme was indeed continuing. Yeltsin said: 'Some of our experts have done everything possible to hide the truth.' He promised to sign a decree to shut down the research, which he did in April 1992. In the mass of other problems that confronted him, it was one that would not command priority. The West remained unsure that the threat had been eliminated, and was even less convinced by Russian claims that it had made any great inroads into its CW capacity. Its experts had claimed, during the verification talks, that it had only 50,000 tons of chemical agents. Western intelligence believed the figure was nearer 300,000 tons, and there was no real evidence that the massive investment into plants during the late 1980s had been halted.

Worse still, as the military and scientific structures of the Russian hierarchy began to collapse in the economic reforms that Yeltsin imposed, wholesale leakage of technology and chemical weapons to smaller nations, notably Libya, was already under way.



# SACRIFICIAL SLAUGHTER

**M**OUNTING INTERNATIONAL TENSIONS and local unease combined to turn an unprecedented spotlight on the activities of Porton Down, which came under closer public scrutiny than ever before as activists on several fronts were determinedly asking: 'What the hell is going on in that place?' Peace campaigners and animal rights activists joined forces to mount demonstrations outside the gates of the research centre.

The protests were ignored. Porton reacted with the words that there was 'undue concern' about the possible effects on adjacent villages of the release of chemicals or micro-organisms if there were to be an air crash on the Porton campus. Accidents and fatalities had always exacerbated public unease, wrote G.B. Carter with familiar understatement, and added: 'Suspicion and opprobrium . . . was of little concern to most at Porton. The tradition of heaping abuse on Porton and Portonians was after all well established; the press was an ever-ready means.'

Another accident added to the disquiet, even though full details of it were not revealed at the time. Porton was conducting experiments on the deadly 'Hot Zone' virus, ebola, shortly after its first recorded outbreak in Africa. It was untreatable and had the effect of turning human organs into liquid. The death rate was 80 per cent of those affected. Vivid proof of its continuing potential came in 1995 when it re-emerged in Zaire in February 1995, killing 200 people. Porton was,



and remains, one of only a handful of laboratories in the world able safely to handle the virus.

The panic button was hit when, in 1976, Geoffrey Platt, then a 42-year-old laboratory technician in the microbiology unit, became accidentally exposed to the bug. He was working on a new exploratory research programme on ebola at the time, and was injecting guinea-pigs with the virus. He accidentally pricked his left thumb with a syringe as he was passing the samples from one animal to another. Mr Platt recalled: 'I knew straight away what the consequences could be but it was such a minute cut I hoped I had got away with it.' He quickly washed his thumb with disinfectant and squeezed the wound to make it bleed before reporting the accident to the Porton medical officer.

He was advised to check his temperature each day and call back if he began to feel ill. 'Five days later I had a temperature,' said Platt. 'I was vomiting and felt very much as if I had influenza. At the back of my mind I feared it could be ebola but I clung on to the hope that it was just a dose of flu.' He was taken to an isolation hospital in north London. All the other patients in rooms around him were evacuated. When tests showed he had ebola, he was moved to an isolation tent where he stayed alone for 40 days. More than 50 people with whom he had been in recent contact, including his wife Eileen and sons Richard and Graham, were put into quarantine. Platt, who retired from Porton Down in 1992 after 27 years' service, said: 'Fortunately, I had suffered only a mild attack. I lost a lot of hair but I was able to go back to work about three months later.'

In the aftermath of Platt's accident, the MoD held a formal inquiry into how it had occurred. The inquiry's findings were not revealed until almost a year after the accident. It recommended a tightening of laboratory procedures and the formalising of liaison between Porton medical staff and local public health officials. Locally, there was talk of a cover-up and some weight was added to that theory when the *Western Daily Press* revealed, in what it described as an 'exclusive' story, that Porton scientists were working on top-secret research into superbugs and genetic engineering.

The item was based upon information given by 'a senior scientist' at Porton, although the story had as much to do with scientists' fears of the future of biological research at Porton as with revealing the extent of recent discoveries. In his efforts to draw attention to the possible cutbacks in Porton's biological research and the fears about redundancy of his colleagues, the anonymous scientist revealed



publicly for the first time details of the secret research work sanctioned by the government two years earlier.

It had given the go-ahead to work on the production of superbugs and genetic engineering. The link between civilian research and BW defence experiments was known only to those at the highest level. Certainly, too, a local reporter on the *Western Daily Press* would have no knowledge of the coincidental fact that government approval for the Porton superbug work came at a time when jointly the CIA and MI6 were receiving voluminous reports on the Soviets' genetic engineering project at Obolensk, which aimed at producing their bacteria bomb.

It was a highly sensitive issue. The *Western Daily Press* informant revealed to reporter David Humphrey that Porton scientists were on the verge of 'terrifying breakthroughs in the science-fiction world of gene manipulation and the creation of weird new life forms'. These included, said the informant, such bizarre hybrids as grass-eating lions and meat-eating cows. 'Anything is possible,' the scientist told Humphrey. 'These experiments could prove more dangerous than splitting the atom. We are in a minefield and sometimes we do not know what we are producing. These are totally new creations, hitherto unknown to man.'

In a follow-up article, Humphrey spelled out the dilemma facing scientists raised by new discoveries. He wrote:

'On the one hand they could be used to eliminate hereditary disease, prevent congenital deformities in babies and make common bacteria turn out insulin for diabetes. On the other hand, as many scientists have warned, if a bug escaped from a laboratory it might sweep the world, killing millions of people who would have no natural protection to it.'

The article, clearly from the mouth of the senior Porton scientist, brought swift results. The Porton establishment was so concerned at the leak that its security staff called in Scotland Yard's Special Branch to attempt to find the source. It also fuelled local concern about what was going on inside the establishment.

There had long been rumours of research work on animals that had produced some horrific results among Porton-bred specimens. One source interviewed for this book alleged that 'some terrible mutations were achieved. Animals were born with some pretty awful defects, peculiar bone structures and so on. I heard the usual horror stories – you know, a sheep with two heads, chickens with four legs – though I never saw the evidence myself. But in any event, there was a



lot of stuff going on that was quite frankly stomach-churning, especially when these animals were kept alive for lab tests.'

That the Porton scientists required many animals for their experiments represented one of the great moral dilemmas of the age – sacrificing them in the name of science and the future protection of servicemen. Its 'own brand' of white rabbits, rats and mice were recognised as superior for experimental purposes.

Like laboratories the world over, Porton needed a continuous supply. This well-known and well-established practice was intermittently highlighted by newspaper exposés such as the Scandal of the Smoking Beagles, which revealed how laboratory dogs were being killed for research into the effects of cigarette smoke. The animal welfare organizations began marshalling their troops. The National Anti-Vivisection Society (NAVS) called a public meeting at Salisbury. Its then chairman, John Evans, described Porton as the 'sinister fringe on this beautiful city'. The NAVS produced a number of speakers in its campaign to outlaw vivisection and its demands for a government inquiry into the increasingly widespread use of animals for laboratory work. Porton itself, according to the NAVS' figures, had carried out an average of 200,00 experiments a year on animals in the 1970s. In the United Kingdom as a whole the total was peaking at around 5.5 million, in universities, medical and veterinary faculties, health laboratories and commercial research facilities for trials on a vast range of products ranging from cosmetics to flea collars for cats.

Yet, hundreds of thousands of people would not be alive today, says the Animals in Medicine Research Information Centre, without modern medicines, vaccines and treatments developed from research using animals. Set against those defenders of the practice are scores of animal welfare groups who can produce scientists and medical evidence to prove that there are alternatives, and to deplore the practice in modern society. The debate goes on.

Porton scientists have always attempted to distance themselves from the animal rights issue; they were special, a community apart. It is a view they have asserted, some would say, with a forthrightness that verges on arrogance. They were special inasmuch that for long periods of Porton's eight decades of history, they were inspired, promoted and defended by the *sotto* advisers of government: the counsellors of war, the Chiefs of Staff and the ambitions of the military. They had powerful, distinguished allies behind them and from the very beginning were surrounded by the protective arm of the security services, ever present to repel all attempted incursions into their



secrecy. So 'suspicion and opprobrium . . . was of little concern to most at Porton'.

The anger of the animal welfare groups was further aroused when planning approval was sought to build four monkey breeding units at Porton's Allington Farm. Dennis Hobbs, in charge of procuring animals for the unit, was summoned by the local planning committee to explain the request. He said that monkeys had previously been imported from South East Asia, but increasingly they were disease ridden when they arrived and 30 per cent of an imported batch might die. The number of monkeys used in total by the Health Service had dropped from 20,000 a year in the 1960s to around 800 a year.

'The whole operation has sinister connotations,' said one councillor, Austin Underwood, who generally made a point of attempting to air Porton's secrets in the public sessions of his council. The word 'sinister' in connection with Porton had become common local usage, inspired by rumour and emotion. Occasionally, glimpses of the work could be gleaned from scientific journals and the writings of Portonians anxious, like all scientists, to have details of their research published. A large number of reports, routinely produced on a daily basis, have been viewed for this work and, as always, they highlight the difficulty in coming to terms with animal suffering in the face of the claimed benefits to mankind, especially as the latter do not always follow on specifically from any one set of particular experiments.

There are dozens of reports, running to thousands of pages, detailing decades of work. A brief excursion through them provides an adequate insight into both the nature of the work and the attitude of the scientists themselves. The more detailed scientific data and calculations will be omitted in the interests of brevity, and simplicity.

Typical in the mid-1970s were experiments at Porton on the discovery of pre-treatment antidotes for nerve gas. A number of trials had been conducted using guinea-pigs, dogs, rabbits, rats and mice, which were inconclusive in assessing their potential for use by man.

Female guinea-pigs were used as subjects in one series of tests. They were grouped into batches of six for trials to discover the level of protection from a combination of treatments both before and after poisoning, compared with animals that had been given no protection. The nerve agents used were sarin, soman and tabun at 95 per cent pure strength and VX at 90 per cent pure.

First, the pre-treatment drug being tested was injected into the right limb of each animal 30 minutes before the organophosphate was



administered into the right groin. At the sign of the poison taking effect – when the animals began experiencing muscular convulsions and breathing difficulties – the antidote, atropine – later to be given extensively to Gulf War Troops – was injected into the right limbs of selected animals, and a further batch also received injections of diazepam into their left limbs.

This procedure was repeated for each of the four agents to test the effectiveness of the treatments. The results showed protection against sarin and VX, but overall the tests were inconclusive and were done again using different doses of the drug combinations. Even so, no precise comparison between the possible treatment of animals and of humans for protection against nerve agents was proved by the tests.

However, the results of another series of experiments were detailed in a report for the Procurement Executive of the MoD at Porton, this time using 28 rhesus monkeys and 15 marmosets. All the monkeys were tranquillized to enable easy handling while initial experiments were conducted. They were then injected with a pre-poisoning protective chemical, each was subjected to varying degrees of soman poisoning, and then given doses of the antidote atropine.

Under the heading 'Signs of poisoning produced under treatment', the report concluded that in low doses of soman, no deaths occurred; with medium doses, the death rate was 50 per cent and for high doses, 100 per cent. The following observations were made as the experiments proceeded:

*Low doses:* Signs of poisoning occurred within one to four minutes. The animals became prostrate with brief episodes of convulsions. They did not completely lose consciousness and only a low rate of respiratory depression occurred. After 15 minutes, the convulsions stopped, and the animals began to sit up about an hour after poisoning and were eating and drinking within 48 hours. During the period up to three days after poisoning, movements were co-ordinated but slow. All animals recovered after 3 to 4 days.

*Medium doses:* Animals became prostrate with violent convulsions within one minute and lost consciousness within ten minutes. Respiration became slow, shallow and laboured and the animals appeared close to death. The breathing of animals surviving at this stage gradually improved and they returned to consciousness within 30 minutes of poisoning. Within four hours, some were able to crawl about their cages but quickly showed signs of fatigue after a small amount of exertion. Some relapsed, but all the surviving 50 per cent of those tested at the medium dose recovered within four days.



*High dose:* All the animals collapsed into unconsciousness within one minute of soman poisoning, and all suffered violent convulsions. Those animals which survived this stage of the tests returned to consciousness within 30 minutes of poisoning and made attempts to crawl about their cages. Within one hour, all relapsed and subsequently died. 'It is worthy of note,' the report states, 'that 3 out of 4 animals regained consciousness and lived for 1–2 hours after poisoning.'

The test proved, said the scientists, that 'pretreatment with pyridostigmine combined with atropine therapeutically affords a high degree of protection in rhesus monkeys and marmosets poisoned with soman'.

A long series of experiments was conducted at Porton on a number of species to discover the effects on the eyes and respiratory tracts of gases, smoke and chemicals applied both directly to the pupils and through the bloodstream. The description of these experiments is long and complicated and can barely be reproduced in precis form for the purposes of a lay work. The preamble to the test reports, however, gives some notion of the form the experiments take and the imaginable consequences.

The tests were carried out using groups of six animals that had been allowed to acclimatize to their surroundings and permitted full recovery from the stress of travelling. They were housed in cages with wire mesh floors to make sure that particles such as wood chippings or sawdust did not accidentally enter the eyes. The day before the test both eyes of each animal were examined to ensure they were normal.

Next, the irritant materials were introduced directly to the eye by 'gently holding the lower eyelid away from the eyeball and dropping material into the sac, after which the lids were held together for a few seconds'. Liquids were introduced easily by automatic dispenser while solids were weighed and blown into the eye sac with a rubber teat. One eye for each animal was treated; the other eye remained unaffected for comparison. In some cases, it was important to know whether immediate irrigation of the eye a few minutes after contamination by the irritant was beneficial or – as in some cases – detrimental, and in those cases tapwater was sprayed into the eye. After the material had been introduced the animals were inspected several times during the first day of the test and daily thereafter. The process continued for one week, when the full effects of the irritant were apparent.

One important sequence of experiments was conducted by five senior Porton scientists to discover the effects of CS gas on laboratory



animals. The experiments were clearly aimed at adding to international discussion on the effects that CS might have on humans. The scientists noted the warning about the use of the gas given by the 1970 report of a panel of experts commissioned by the World Health Organization.

This Porton report was significant in that it gave some clue as to the findings of experiments using humans in 1972 – information that has been repeatedly denied to those who have sought compensation. There were no ‘authenticated’ reports of death due to CS, it stated, and exposure of human volunteers to CS aerosols under controlled conditions produced ‘no clinically significant changes in the electrocardiogram, chest radiograph or vital capacity that could be put down to CS’. However, there were notable rises in blood pressures and the report concluded that the use of CS in confined spaces might lead to prolonged and possibly damaging consequences.

Records concerning the use of CS in Northern Ireland were consulted for the tests. The Porton report drew from statistical evidence from Londonderry that had ‘failed to show any evidence of association between CS gas and abortions, stillbirths or congenital abnormality in pregnancy’ but pointed out ‘long term animal tests are still the only ones capable of providing evidence’ of the potential for cancer.

The team therefore began repeated-dose treatment to monitor the effects of CS aerosols on laboratory animals, using 300 mice, 200 rats and 200 guinea-pigs. The description of the experiments was similar to those recounted by human volunteers. The aerosol was directed through a glass entry port into a chamber 10 metres square with a small fan to ensure dispersal. Groups of animals were exposed to three different concentrations of CS for an hour each day. They were then removed to ‘special accommodation next to the inhalation unit’. The experiments, however, produced results that evidently surprised the researchers.

Exposures to the mice in the two groups receiving lower concentrations of CS continued five days a week until they had received 55 exposures. Tests on the high-dose groups were stopped after only three exposures because of the large number of animals that ‘succumbed’. The same happened with experiments using rats and guinea-pigs. Those in the two groups exposed to lower concentrations survived 120 exposures, while the high-concentration groups received only five exposures because of the large number of deaths among the guinea-pigs.



Surviving animals were examined daily to test the levels of toxicity and, the report added, 'debilitated animals were sacrificed' using nembutal. One of several problems encountered by the team was the high level of cannibalism, especially among mice. Another was the suddenness of the deaths of many of the animals – they collapsed often without warning at a time when toxic signs were not apparent. This was especially so among the guinea-pigs. During the first month of the tests, almost half of the high-dose groups had perished.

The surviving animals were kept under observation for six months following the completion of the exposure programme. All animals still live at the end of that period were killed with an injection of nembutal and dissected. Every one of their organs was then taken and fixed in a saline solution before being sectioned and examined independently by two pathologists.

The conclusion of this year-long study that had claimed the attention of some of Porton's leading scientific minds and the lives of 700 animals was a single sentence that recorded: 'Our findings suggest that inhaled CS is not harmful to the male mouse, rat or guinea-pig when the period of exposure is one hour per day for 120 days providing that the concentration is below [a given] level . . . somewhat more than eight times the concentration found to be intolerable to 50 per cent of an exposed population within one minute of the start of exposure.'

There would undoubtedly have been uproar outside the gates of Porton if the animal welfare activists had known about experiments on six dogs, poisoned with hydrogen cyanide (HCN) to test antidotes for this most lethal substance, which is a modern favourite of many chemical warfare experts, especially in Iraq and Libya. The work was a follow-up to several earlier studies elsewhere on the topic of discovering effective antidotes for the poison. Those already in existence had side effects that themselves could be life threatening.

The Porton tests were, for the specific purposes of this controlled experiment, conducted on nine Beagle bitches, bred at its own farm. In some earlier tests, a range of other dogs had been used, with varying results. The Beagles were considered to provide a more accurate test species.

The nine dogs were all injected with hydrogen cyanide over 20 seconds through the jugular vein. Six were protected by antidotes; three were not. They were kept under constant observation until 'death or recovery' and notes made of every visible reaction. If symptoms of poisoning were still evident after 210 minutes from the



injection of the cyanide, the animal would be sacrificed by injection of a further chemical to prevent suffering.

The three unprotected dogs suffered spasms almost from the moment the injection was completed: 'respiration and pulse ceased within one and half minutes'. The six protected dogs appeared to be recovering from the injection. One of them, however, suffered two seizures and was 'terminated' by injection. Another died 44 minutes after the cyanide injection. The researchers saw the positive side of even this latter demise – that death was postponed for 44 minutes, which would have enabled other treatment to be tried out.

The scientists admitted that relating the findings to cyanide poisoning in humans was difficult because the antidote doses given to the Beagles had been carefully and individually tailored to each animal – which would be 'extremely inconvenient' if not near impossible for the treatment of humans.

Even a layman can spot the inadequacies, and many of those who press for an alternative to animals experiments believe that these tests, taking months of research at considerable cost, both financial and in animal life, are really not worth the paper they are written on. Not only do many of them duplicate earlier work dating back many years, and to which references are constantly made, but they often provide little data that is new enough and substantive enough to be worthy of the effort and pain that goes into the studies.

The view that results of experiments on animals cannot be universally applied to humans has been attracting increasing support in recent years. Comments typical of this view came in a paper produced jointly by Dr Howard Rogers, a senior lecturer in clinical pharmacology, and Professor Roy Spector, professor in applied pharmacology at Guy's Hospital, London.

Their doubts over the total reliance on animal experiments, so disastrously evident from the Thalidomide catastrophe of 1960, were pointedly demonstrated: 'Modern drug regulatory organizations demand that large numbers of tests be made on animals to predict the efficacy of new drugs in man. The drug industry is therefore required to kill many thousands of animals to submit "scientific" evidence. In practice, these tests have poor predictive value . . . many of the adverse drug reactions occurring in man have no animal counterpart.'

It was not an uncommon view, and one that would become all too relevant when the Gulf War troops arrived home after being given an array of drugs, some unlicensed. Other experiments – perhaps the most dramatic ever staged at Porton – had nothing to do with drugs.



They were set up to assess the damage likely to be caused to the human body by a range of modern weapons. The injuries were to be studied to provide insight into survival times, treatment and helmet designs.

A series of experiments was required, and were run by Ingrid V. Allen, of the Department of Pathology, Queen's University, Belfast, Colonel Robert Scott, a professor of military surgery at the Royal Army Medical College, and J.A. Tanner, a leading member of the Chemical Defence Establishment.

For tests under the heading 'Experimental High-Velocity Missile Head Injury', 29 rhesus monkeys were used as 'patients'. All the animals were anaesthetized with intravenous injection. Twenty were each clamped into a frame and shot in the head with steel balls to discover the damage caused by high-velocity rifle fire on the brain and skull. Five were used as control subjects for comparison and four were set aside for biochemical tests.

The test report describes the results: 'In the 20 experimental animals, a penetrating injury was inflicted by a steel ball of diameter 3.2mm, fired at a range of five and ten metres with an estimated impact velocity of 1,000 metres per second. The lesion was left-to-right trans-frontal wound, the head being held upright and the ball fired at the temple region.'

The test report goes on to explain the nature of the wounds and other experiments carried out on the 29 animals and includes a detailed assessment of the survival time of the shot monkeys. They remained alive for periods ranging from 2 to 169 minutes. The remaining 9 animals were destroyed separately, as part of the same controlled experiment. Brain sections were cut and photographed and other organs examined.

Other experiments by Colonel Scott were set up to compare the effect of bullet calibre using four standard types: a Lee Enfield 303, NATO 7.62mm, Russian 7.62mm and American 7.62mm. Two sheep were used to test each type of bullet. They were anaesthetized and then shot in the shaven upper parts of their back legs from a range between 13.7 and 18 metres. In each case, the femoral bone was shattered and the size of the wound varied according to the bullet used. The report concluded that hitting the bone greatly increased the destructiveness of the bullet, 'an effect which has long been described when animals were hit in the chest or pelvis'.

Two sheep were allowed to recover from wounds caused by standard NATO bullets fired from 13.7 metres to study healing. The



experiment was to determine whether there were any blood-born indicators of the severity of the wounding. There were not. 'The animals were obviously not inaccommodated by this injury and quickly returned to grazing,' said Scott.

The potential for the wounding of living tissue from bullets fired at a particular distance from the target was also studied. Once again sheep were used for these trials. They were anaesthetized, shot in the thigh, the wounds were photographed, and then the sheep were injected by humane killer within one hour of being shot. The limbs were removed and deep frozen for 24 hours, before being sliced for sectional examination.

Pigs were used in another sequence of tests to find 'the effect of bullet velocity on living tissue'. Each pig was shot in the stomach 'from close range'. The pigs remained alive after the shooting. They were cut open and the damaged organs studied and photographed. On completion of the tests the pigs were put to death by humane injection. These kinds of experiments are justified, in Porton's own documented assessment, as offering 'now considerable and valuable contributions to the treatment of British casualties – notably in Northern Ireland, during the Falklands War and elsewhere'.

Such self-congratulatory expressions were not, however, wholly supported by medical opinion. There are, for example, thousands of published papers on the treatment of contemporary war injuries, especially from the Vietnam era when more than 150,000 American troops were wounded. Britain, with its recent Falklands war and experiences in Northern Ireland, had also conducted many studies. As a senior professor of medicine in Belfast said: 'If they want to study bullet wounds, they should have come here. We have hundreds of real-life case histories. Today, there can be no justification for shooting animals; they aren't the same as humans, either in bone or tissue structure. Nothing they could have learned at Porton Down would help us here, in Belfast. Of that I am convinced.'

The tests continue, even as these words are being written, and almost 80 years after the invention of mustard gas, Porton is still testing its effects. It would seem that pigs will be in great demand there for the future. In the latest available annual report from the CBDE to the Ministry of Defence (for 1995), its director, Dr Graham Pearson, makes reference to the latest techniques for the treatment of mustard gas burns. The experiments are part of an on-going series over many years, but which were stepped up when casualties from the Iran/Iraq war, examined by Porton staff, were found to have large pendulous,



fluid-filled blisters, which were difficult to heal. Porton experimented with many animals in an attempt to find the one that produced a wounding reaction closest to that of the human body. This entailed exposing animals to mustard gas, monitoring the effects and allowing the subjects to heal. They discovered a human likeness in a specially bred type of miniature pig. Dr Pearson explained:

‘Research into mustard burns has been hampered by the absence of an appropriate animal model which reacts in the same way as human skin. Fur bearing animals do not blister . . . however research at the CBDE has successfully used mustard burns on the miniature pigs to develop and improve healing procedures. The burns develop rapidly . . . healing was slow and was not complete even at eight weeks after exposure. This is similar to injuries in man and suggests that the pig can be used to model aspects of human vesicant exposure.’

Research on the pigs enabled Porton scientists to develop a new form of battlefield treatment. They produced a hand-held cordless drill and grinding stone to remove the pendulous dead skin from the animals. They discovered that the technique, known as dermabrasion, reduced the healing time by up to two-thirds compared to the control group of mustard-burned pigs who were not treated in that way. The more rapid healing also reduced the threat of infection. The experiments, applauded by the Porton hierarchy, have been met with some scepticism out in the real world of daily hospital activity. Nicholas Parkhouse, director of the burns and plastic surgery unit at the Queen Victoria Hospital, East Grinstead, Britain’s largest, commented: ‘I don’t think there is anyone in conventional burns practice who would use the dermabrasion technique. It is very messy.’

Pigs were also used in other recent experiments to find ways of protecting troops from the blast waves following explosions. While protection from missiles and heat was well advanced, conventional body-armour offered no protection against blast waves, which could travel, like sound, through most materials.

The blast wave, Dr Pearson explained, would normally result in limb fractures, head injuries, amputations and, most probably, death. Experiments were conducted on anaesthetized pigs. They were placed at varying distances from the site of an explosion to test the pressure of the waves as they entered the body. Those animals that were not killed by the blast were sacrificed without being allowed to recover.

There was one slight consolation to be gained from these particular experiments. It enabled technicians to construct computerised models, which will reduce the number of animals required. In



the main, however, the slaughter – or ‘sacrifice’ as they call it – at Porton goes on. In the last available set of figures, for 1995, Porton claimed its use of animals had been ‘reduced’ to less than half of one per cent of the national total. It was using between 10,000 and 15,000 animals a year, although even that is not a true reflection, since a great deal of Porton’s experimental work in recent years has been contracted out to universities. The true figure could be double Porton’s own on-site tally.



# THE ARMING OF SADDAM

**P**RESIDENT RONALD REAGAN'S sabre-rattling defence policy and his futuristic and, ultimately unachievable, Star Wars extravaganza brought a state of siege to Porton Down as peace campaigners surrounded sensitive defence installations in Britain. Reagan's 1984 defence budget included a \$1 billion spend on chemical weapons. It included, specifically, \$100 million for a new generation of nerve gas weapons – all of which appeared under the heading of 'defensive measures'. The knock-on effect in Britain was to trigger a new commitment to Porton. In the summer of 1983, a wide-ranging assessment of chemical warfare potential was presented to the British Cabinet.

Based upon MI6 reports, it listed specifically the chemical capability of more than a dozen nations, and another ten with embryo CB ambitions. Apart from the USSR, it focused particularly on the emerging 'new growth' chemical plants among nations in the most volatile regions, such as Iraq, Iran, Syria, Libya, North Korea, Taiwan, Burma and Israel.

Saddam Hussein was known, even then, to be building the largest and most sophisticated CW plant at the ancient city of Samarra, and intelligence reports identified at least four others. As early as 1975, he approached a New York company to build a factory to make pesticides – in other words, chemical weapons. The initial approach was for a small factory. When the company's architects arrived in Iraq, however,



the Iraqis showed them plans for a plant capable of producing 1,200 tons of toxic material a year. The US company backed off, and diligently informed the CIA.

Iraq canvassed many other major companies including Britain's ICI before it turned to continental European companies in West Germany, Holland, Belgium and Italy. They were not so reticent, and the West German contact sold them the nucleus plant, which, as everyone well knew, was for CW manufacture. In 1983, a Belgium subsidiary of Phillipos Petroleum shipped 500 tons of thiodiglycol, a key component of mustard gas, to Iraq but became suspicious when Saddam ordered another 500 tons the following year and pulled back. But it was already too late. With supplies from various undercover deals throughout Europe, Iraq was by the mid-1980s capable of producing 100 tons of nerve gas and 760 tons of mustard gas a year, along with its own brand of nerve gases from a new factory in the Baghdad suburb of Salman Park.

More worrying to the Americans were the intentions of Colonel Gaddafi. He was building a massive complex at Rabta, a desert location 50 miles south-west of Tripoli. More than half the site was to be devoted to chemical warfare research. The contract to build it was won by a Frankfurt-based company whose ultimate ownership could be traced back to an Iraqi-born civil engineer who had been living in Chelsea, London, since 1978, Dr Ibsen Barbouti, a gruff, mysterious multi-millionaire.

He ran a network of companies operating from London, Switzerland, Japan, West Germany and the United States. He introduced around 25 German-based firms to equip the centre with its infrastructure. Gaddafi's Rabta project occupied the minds of American intelligence for many months. The CIA produced a model scenario for the Pentagon. It would be possible, they said, for him to equip Russian-built Scud missiles with chemical warheads, capable of a range of at least 600 miles, well within reach of Middle Eastern cities as well as Europe. Political analysts added their conclusions: that Gaddafi might allow terrorist groups access to chemical weapons in the same way that he was known to be sending arms and explosives to the IRA.

But, as everyone now knows, the West should have been paying more attention to Saddam. The first real warning came with the discovery that led an American intelligence expert to coin the phrase: 'The genie is out of the bottle.' In March 1984, reports of the Iran-Iraq war had produced some intriguing developments for



Western analysts to mull over. Iranian troops had been making steady advances through Iraqi-held territory, effectively cutting a path through minefields and forcing an Iraqi retreat on two separate fronts. Suddenly, the Iranian forces began to scatter in panic. The reason would soon become clear. Saddam Hussein had ordered a chemical attack – bombarding and spraying his enemy with mustard gas.

Thousands of casualties were taken from the war zones to military hospitals. America gathered up its intelligence reports and physical evidence, some of which was sent to Porton for examination. These developments in the Middle East, along with the flurry of intelligence reports confirming Soviet work on genetically engineered anthrax, heightened anxieties in the West. As Porton's scientists recorded, the scene was set for yet another re-appraisal by Western military analysts. The new fear was that DNA-linked techniques and the latest advances in biotechnology would be 'misused to obtain an almost quantum leap in biological warfare'. The two elements of chemical and biological weaponry could no longer be viewed as separate entities. In all the latest assessments, they were being spoken of as forming a combined hazard representing a 'continuous spectre of proliferation'.

Largely in response to the Soviet threat, the British and Americans had secretly initiated a complete reversal of their BW defence policy. Less than five years after disbanding Porton's old Microbiological Research Establishment and turning it over to the Health Ministry, biological warfare research was resumed – for defensive purposes – and then 'energetically pursued'. A team of additional scientists was recruited to Porton to begin DNA-linked research. Although the exact nature of their work remains secret, it is possible through the US Freedom of Information Act to glean clues of the nature of British and American research, which was put in progress as 'a matter of priority'.

In 1984, America's premier BW team at Fort Detrick was working on isolating particular genes of *bacillus anthracis*, the anthrax organism that the Russians were researching. Officially, the explanation for the research was to discover a vaccine to be used in the event of a possible enemy attack. Three separate teams of researchers at the Walter Reed US Army Research Unit were working on the genes of trypanosomes (which cause sleeping sickness), and of the carriers of typhus and gonorrhoea, again with the stated role of discovering effective vaccines.

The US Defense Department had also contracted out a number of projects to universities for work on isolating the genes of a variety of lethal organisms. Porton was working along on similar lines. All the



research had dual-use applications, for civilian protection by way of vaccines and for the military in the creation of defensive equipment, protective clothing, monitors and detectors for use in any theatre of war.

This rush of new activity in CB.W research can be judged from a few statistical facts. In the early 1980s, Porton recruited the largest number of human volunteers for almost a decade. Between 1980 and 1985, a total of 1,293 men from the three services took part in experiments, usually staying in the compound for a full two weeks. For that, they were paid up to £80, before tax. All, said Porton director Dr Graham Pearson, were 'carefully designed and controlled and great care was taken to ensure the health and wellbeing of the volunteers'.

The establishment was on the brink of one of the most vital eras of its existence and certainly the most controversial. The CB.W threat had never been higher. Dr Gordon Oehler, director of the Nonproliferation Centre of the CIA in Washington, has confirmed that by the mid-1980s the alarm bells were already ringing as far as Saddam Hussein was concerned. He had an aggressive chemical and biological programme. And, of course, the European nations were literally falling over themselves to sell their wares in the Baghdad market place – everything from chemicals to machine tools, with the full knowledge and absolute approval of their governments. Dr Oehler confirmed:

Iraq's CB.W programme was developed gradually over the course of the 1980s, beginning from the time Israel bombed its nuclear plant. By the time of the invasion of Kuwait it had become deeply entrenched, flexible, and well orchestrated. Project managers for the weapons of mass destruction programmes went directly to European suppliers for the majority of their needs. Throughout the 1980s, German companies headed the list of preferred suppliers for machinery, technology, and chemical precursors.

German construction companies usually won the contracts to build the CW facilities in Iraq and Iraqi procurement agents were sophisticated in exploiting local export laws by targeting countries for substances and technologies that were not locally controlled. In the pre-Gulf War years, the dual-use nature of many of these products made it easier for Iraq to claim that the chemical precursors, for example, were intended for agricultural industries. European firms, arguing that the facilities in Iraq were for the production of pesticides, built a chemical plant, including six separate chemical weapons manufacturing lines between



1983 and 1986. We were tracking it, even then, and these developments would have been reported also to the President, to the Secretary of Defense, and the Secretary of State as a matter of course.

European middlemen brokered chemical deals for Iraq under the pretext that the materials were intended for pesticide plants. A Dutch firm purchased supplies from major chemical firms around the world, supplying the Chemical Importation and Distribution State Enterprise in Baghdad in the 1970s, and in the 1980s supplying the Iraqi State Establishment for Pesticide Production, both cover names for the CW programme.

When the Iraqis requested phosphorous oxychloride, a nerve agent used for sarin, banned for export under Dutch law without explicit permission, the supplier balked. He drew this request to the attention of Dutch authorities. Subsequent Dutch investigations found that two other Dutch firms were involved in brokering purchases of chemicals. Iraq exploited businessmen and consortia willing to violate the export laws of their own countries. The Consen Group, a consortium of European missile designers, engineers, and businessmen, established a network of front companies to cover its role as project director of an Argentine, Egyptian, Iraqi sponsored Condor II ballistic missile programme.

By then, the Iraqis were already manufacturing their own Scud missile warheads. They had quite a missile refurbishment extension plant where they took the Scuds and added in extra lengths and the fuel tanks, changed the warheads to accommodate chemical or biological agents. The CIA [and MI6] was tracking this in real time as it was happening and had a great concern about it. In the US, the only concern was about the possibility of equipment being diverted to the Soviet Union or other communist countries. However, after evidence mounted in the mid-1980s about the use of chemical warfare in the Iran–Iraq war, the United States began to put into effect unilateral controls on exports of chemical precursors to Iraq and other countries suspected of having chemical warfare programmes. The US and several other industrialized nations joined what is called the Australia Group to establish more uniform licensing controls for the export of several chemical weapons precursors.

We saw Saddam Hussein, in a sense, go underground with some of his activities and the CIA predicted a real problem long



before the outbreak of the Gulf War. We had it as a well-documented fact that Saddam had an advanced and dangerous CB.W capability underway and our intelligence reports increasingly pointed to the fact that he might use it.

That prophecy came disastrously true in March 1988 when Saddam Hussein launched his infamous genocidal assault on the unsuspecting Kurdish villages near the Iranian border and finally made the world realize the global threat in Iraq's recurrent breaches of international agreements against the use of chemical weapons. Soon, too, the world would see the horrific photographs resulting from the attack in which 4,000 men, women and children were killed by chemical weapons released in bombing raids by Iraqi aircraft. The weapons consisted of mustard gas, phosgene, nerve gas and hydrogen cyanide (HCN), a highly refined form of gas known in the trade as 'duty mustard'.

Survivors spoke of the foul-smelling yellow-grey cloud. First, the birds and the animals began dying, dropping from trees and falling dead in the fields. Then the villagers began screaming from the burning effects of the gas. Hundreds simply died where they stood, sat or lay. Others suffered a slow agonising death. Village streets were cluttered with corpses with blackened skin and with blood-tinged fluid oozing from noses and mouths – like a modern Pompeii without the volcano but just as catastrophic.

Fifty thousands Kurds fled into Turkish and Iranian refugee camps, leaving the bodies where they lay. Many thousands suffered eye problems, respiratory pain on breathing, blistering skin and persistent vomiting – all the signs well known to CB.W experts. By the time a United Nations investigations team arrived, the death toll had reached 5,500 and a further 7,000 were suffering dire effects from the gas, many with very visible signs of huge ulcerated blisters, muscle spasms, vomiting and diarrhoea.

Yet, as would be made clear in the worldwide protests that followed, Iraq had been able to carry out the attacks on its Kurdish minority with impunity. For all the professed outrage, there was no action taken against Saddam Hussein by the West. The British, a few weeks later, approved new trade credits that would build upon the £400 million a year in exports to Iraq from a dozen household-name companies. The French, one of Iraq's principal suppliers of arms after the Soviet Union, began 'friendly' talks over the re-scheduling of Iraq's £2.4 billion debt with them. It wasn't that the French especially



wanted their money back – they wanted a repayment schedule in place so that the government could continue with its export guarantees and allow the military aircraft manufacturers to compete for an order for aircraft and supply 50 Mirage fighters worth 22 billion French francs.

The Italians were swimming around in even murkier waters after the discovery of a \$3 billion loan to Iraq, mysteriously supplied by one of its leading banks, Banca Nazionale del Lavoro, through a branch in Atlanta, Georgia. The US meanwhile continued to allow its own trading position with Iraq to continue.

In spite of the vivid proof that Saddam possessed chemical horrors and was prepared to use them – now appallingly evident for all to see – weapons that had been looked at, inquired into and warned about by countless humanitarian groups, which pleaded for action to halt Saddam, it was by and large business as usual. Quite apart from international outrage and the investigations of the UN, ample evidence of the effects of the attack on the Kurds was presented in a report by the Physicians for Human Rights (PHR). In October 1988, the group dispatched a medical fact-finding mission to refugee camps in Turkish Kurdistan and produced a graphic summary of the effects of the attack in a report entitled ‘Winds of Death’.

Copies were sent to all Western governments, underscoring the global threat in Iraq’s recurrent breach of international agreements against the use of chemical weapons. In February 1989, the evidence collected by this fact-finding mission was submitted to a US Senate Committee on Governmental Affairs, at which the PHR called for immediate action to stop the ‘development, manufacture, deployment and use of chemical and biological weapons’. They urged all Western governments to apply immediate sanctions against Iraq for its ‘assault on our common humanity’.

Nothing happened.

Impassioned though they were, the PHR team and other groups like Amnesty International presented nothing that Western intelligence, the military and the scientific community at large did not already know. Saddam Hussein had become the harbinger of the reality of CB.W – acting out the scenario forewarned in a thousand intelligence files. Yet, in the final days of the Reagan administration, the Pentagon still seemed more concerned about the connections of Colonel Gaddafi than the threat of Saddam Hussein.

Gaddafi’s own Rabta industrial complex was always at the top of the White House worry list, to the point that Reagan and his advisers actually considered a bombing mission to destroy it. Their continuing



ambivalence towards Saddam Hussein's expansive activities was matched by London where, as the Scott Report would reveal in 1996, the rules concerning exports were bent, twisted and modified with the full knowledge of government and with a deep involvement of MI6 agents. Dual-use material and equipment, which could ultimately be employed for the manufacture of weapons, continued to flow from factories in the West in the competitive dash for exports.

What amounted to a virtual blind-eye policy in dealings with Iraq continued after the departures of Ronald Reagan and Margaret Thatcher and into the administrations of George Bush and John Major. An abundance, mountains, of evidence of Saddam's acquisitions was piled high. As the CIA's Dr Oehler identified, the Iraqis had covertly bought their way into trading companies across the world, to ensure supplies of chemicals for Saddam's embryonic nuclear programme and for his notorious Supergun – all under the watchful eye of British and American intelligence.

Into the spotlight of this world stage, once again, stepped the ubiquitous Dr Ibsen Barbouti who, as was also well known, was the main contractor for Gaddafi's Rabta plant. In the autumn of 1988, the Reagan administration began feeding to the media reports about Gaddafi's efforts to acquire chemical supplies. They named names, companies in the West that had assisted him. The seemingly obsessive concern over Gaddafi was heightened by the December 1988 Lockerbie bomb disaster, for which they held him responsible.

The following month, January 1989, Dr Ibsen Barbouti was publicly named in one of the last proclamations of the Reagan administration as the man who had built Gaddafi's chemical warfare plant. No mention was made of the fact that Barbouti had established strong ties with Iraq. The CIA directorate was furious. By drawing attention to Barbouti, the Reagan administration had put at risk an 'asset' in the Iraqi/Libyan trading relationship – perhaps Barbouti himself.

By then Barbouti, who still lived in Britain, had extended his global network of companies into the US. Between 1986 and 1989, he had channelled \$100 million into 50 holding companies based in America, with apparent access to funds that were certainly beyond even his well-endowed bank balances. They were a diversity of interests, but mostly dealing with dual-use products.

The CIA was well aware of Barbouti's interest in American companies. So was MI6. He was under constant surveillance from the early 1980s. In 1987, an executive of an Oklahoma-based chemical



company reported to the CIA that Barbouti wanted to buy into his company. He said Barbouti had talked openly about his dealings in the Middle East, and that Gaddafi was mad and wanted to build an atom bomb, sail it into New York on a civilian vessel and detonate it by remote control.

That prospect, incidentally, was not as far-fetched as it sounded. It was one of the very models of possible nuclear attack by an enemy or terrorist group that the Pentagon had explored years earlier and it remains 'live' to this day in the contingency plans that are constantly reviewed and updated. The Oklahoma executive was requested to keep the CIA informed of his contacts with Barbouti, which he did on an almost daily basis. It merely added to the CIA profile.

Barbouti's activities continued unassailed, even as one of his many partners in the Rabta project, Jurgen Hippenstiel-Imhausen of the German firm Imhausen-Chemie, had been arrested. He confessed to helping to build the Libyan chemical plant and at his trial in 1990 was sentenced to five years in jail.

But according to the CIA there were overriding reasons why Barbouti was not apprehended and questioned and, like many others, he was allowed to continue with dubious dual-use export deals. The reason was explained by Dr Oehler:

In disseminating our intelligence, one of our primary duties is to protect the sources of the intelligence and the methods by which it was collected. Sources are most at risk when intelligence information is made public. The compromise of sources results in a diminished capacity to collect intelligence for the future. The most dramatic consequences of a compromise of intelligence information is the threat of the life of an asset [an informer or spy] but there are other significant consequences.

For example, if we have intelligence indicating that a particular overseas company is actually, say a Libyan front company, we can often watch that company to learn more about Libya's programmes and its acquisition network. US Government action that publicly identifies the company will often result in the company shutting down and reopening elsewhere under a different name. Identifying this new company can be difficult. Meanwhile, we have lost a window.

I'm not saying intelligence should dictate US Government action. But we have to stay flexible. And in some cases this may mean holding off on Government actions to protect sources. That is why sanctions became a difficult issue – nothing was that



straightforward before the Gulf War. There was so much going on, that we had to let it run.

So the knowledge was there and the intelligence community was still tracking Barbouti – some say funding – when he began a new business operation from a nondescript, two-storey factory near Boca Raton, Florida, run under the name of Product Ingredient Technology in the autumn of 1988. It was supposedly the brainchild of one Louis Champon, inventor of a process for manufacturing natural food flavourings produced directly from fruit. He advertized for investors and Barbouti arrived, waving his cheque book. What was ostensibly an innocent-looking food additives plant had the potential for something much more sinister. The natural fruit flavouring process gave up a very useful by-product – hydrogen cyanide. Saddam was desperate for that particular chemical. Within a year, the factory was producing thousands of gallons of the stuff.

If there were any doubts about Barbouti's plans for the plant, they could have been intensified by the general atmosphere at the factory. He installed expensive security procedures, threw a 24-hour security patrol around the perimeters and installed electronic surveillance. Barbouti executives and personal aides came and went, driven in Jaguars and protected by armed bodyguards.

The CIA knew about that too. In the spring of 1989, they were contacted by a security consultant who told them he had been asked to quote for the installation of a system of video cameras, microphones and a cyanide detection system at the factory. Champon would tell investigators that he believed most of the cyanide was poured away.

It wasn't.

Barrels of it were loaded on to specially equipped lorries and transported through the night to Houston, Texas. There, they were crated and given a new identity and driven to Baltimore for shipment to Aqaba in Jordan and finally by road to Baghdad. The route was established and the export of cyanide to the Iraqis was running.

On 1 July 1990, however, Barbouti was found dead. The official cause of death was given as natural causes, from heart trouble. He was buried in a black marble tomb at the cemetery near his home in Brookwood, Woking, in Surrey, surrounded in death as in life by strong security in the shape of a large brick wall.

His death remains as mysterious as some aspects of his life. Rumours abound among his business associates, of whom there are still many around the world. One has claimed he had dealings with



MI6 and the CIA at the time of his death. Others say he was assassinated by Mossad, the Israeli intelligence service, which was also tracking him. There was an alternative theory that he did not die at all; that he faked his death with a substitute corpse because Saddam had discovered he had intelligence connections.

None of those possibilities should be discounted. A string of strange deaths and covered-up shenanigans among both intelligence and political circles was rife during those months and years immediately prior to the onset of the Gulf War. Dr Gerald Bull, inventor of the Supergun, was assassinated in Belgium in March 1990, probably by Mossad. British journalist Jonathan Moyle, editor of *Defence Helicopter World*, was murdered in his hotel room in Chile in the same month when he began asking too many questions about arms procurement for Iraq. Farzad Bazoft, a journalist working for *The Observer*, was arrested and executed in Iraq for spying – for revealing details of Saddam's nuclear weapons programme.

There was undisputed MI6 involvement with executives of the British engineering company Matrix Churchill, which had been taken over by an Iraqi front company with the full knowledge of the British government. The resultant inquiry, which saw ministers squirming their way through the howls of media derision, provided a view through a half-opened window on a particularly distasteful era in British politics, which has never been satisfactorily explained or resolved.

Edwin Dorn, Under-Secretary of Defense for Personnel and Readiness at the Department of Defense in Washington, explained with familiar understatement: 'Iraq clearly represented a case in which past efforts to prevent the proliferation of weapons of mass destruction had not been effective. We halted the Argentine Condor Programme that was aiding Iraq's weapons of mass destruction programme. And we spearheaded the effort to prevent Iraq from acquiring a more capable missile than the Scud. But it has to be remembered that all exports made to Iraq in the 1980s were completely consistent with the laws at that time, and Iraq was not considered a hostile country.'

Thus, most of the deals that Saddam Hussein had set up around the world had two things in common: they were, by and large, done with the full knowledge of the intelligence community and, second, with the exception of the Supergun confiscated by the British as it was about to be loaded on to a ship bound for the Middle East, and the shut-down of nuclear-linked technology from Argentina by the US,



few of his arms and chemical deals were stopped before supplies reached Iraq.

By the summer of 1990, the importance of that truth was to concentrate the minds of Western political and military leaders like no other. On 2 August 1990 Iraq invaded Kuwait and, in the words of Senator Donald W. Riegle, who chaired a 1994 Senate Committee investigating pre-Gulf War exports to Iraq from the US, panic suddenly gripped those nations that had kept up their trade with Saddam Hussein virtually to the day of the invasion.

As Riegle recalled, a letter, which had a 'little bit of a frantic tone' to it, was sent from Secretary of State James Baker in the Bush administration. It demanded, said the senator, that the US immediately stop the shipments to Iraq of 'these kinds of items, things that could be either used in chemical weapons or biological weapons or nuclear weapons'. Riegle declared: 'Suddenly it dawned on people that we were going to have a real problem facing off against weapons that we had inadvertently, one presumes, helped create . . . because [Saddam Hussein] had not been on the bad guy list at the time.'

By then it was too late.



# A DEADLY CHRISTMAS COCKTAIL

**I**N THAT SUMMER of the invasion of Kuwait, Michael Roche, the former Porton volunteer who stepped forward in 1963 to take part in nerve gas experiments for the future benefit of his colleagues in the British Armed Forces, was unemployable and unable to walk more than a few paces without pausing for breath. He was in a bad way. Nearly 30 years after he had allowed himself to become a human guinea-pig, the Ministry of Defence continued to deny any responsibility for him or his condition. His lonely campaign was slowly gathering weight and attention – not merely for himself, but also for the many like him who were beginning to believe that their declining health was linked to experiments at Porton all those years ago.

Roche's struggle had been so uphill that lesser men would have given up years before, which is obviously what the Ministry of Defence hoped would happen. Perhaps this nuisance of a man would eventually go away – or die. He spent eight years badgering them for his medical records and when he finally received them, discovered there was absolutely no mention of the two occasions he had attended Porton Down.

He spent another four years applying for – and being refused – the medical and laboratory records of those two visits to Porton. Finally, in 1989 he travelled from his home in Rochdale and staged a hunger strike outside the Porton compound. The media attention he received



moved the MoD into action. Within four days, he was contacted and told the information he required would be released to his doctor.

It was a hollow victory. When the records finally arrived, they were incomplete and marked strictly private and confidential – for the doctor's eyes only, which meant Roche could not even see his own records. He began again. He launched an appeal for further information but, like most of the dozens of letters he had written in the past, it fell upon those well-known deaf ears. And, anyhow, events in Kuwait brought forth a state of siege at Porton that was impenetrable, certainly to the lone, unimportant figure of Michael Roche.

Wars and the threat of them have, over the years, kept Porton Down in business. Those periodic campaigners to have the place obliterated from the Wiltshire countryside have always been overshadowed by the reality that weapons of mass destruction, so easily made and readily available to even the small nations, were piled high in foreign lands.

In the early months of 1990, there had been a revival of the 'Stop Porton' campaign stirred in part by the attention Roche's hunger strike had brought. Conservative MP for Salisbury, Robert Key, reacted in his usual ardently supportive manner: 'Work at Porton is now more crucial than ever,' he announced in a public statement. 'When we are actually working towards international verification treaties designed to prevent the spread and use of chemical weapons, it would be ludicrous to call for the phasing out of Porton. We are still a long way from that position. The work must go on, and sadly animals continue to be a necessary part of achieving an effective defence.'

With spectacularly bad timing, extremist members of the Animal Liberation Front responded by launching a renewed terror campaign. They attempted to blow up one of Porton's senior veterinary officers, Margaret Baskerville. A bomb attached to her car exploded as she set off for work one morning in June 1990. Although the vehicle was wrecked, she escaped with minor injuries, though deeply shocked. Several of her colleagues and animal experiment researchers from other facilities were also known to be targets of the extremists. Security at Porton was stepped up. Every member of staff received warnings of possible attacks and senior members of the establishment were given added protection. Dr Graham Pearson was moved to write to the local newspaper: 'I wish to make clear that . . . the purposes, objectives and the benefits sought in animal experimentation must be fully justified. We only use animals when no effective alternative exists. Experiments are carried out by a few scientists who hold personal



licences and Project Licences issued by the Home Office . . . it is a means of protecting life. The role of the CBDE is to protect the lives of our servicemen and women against the threat of chemical or biological weapons which might be used against them.'

Less than a month later, that threat finally presented itself, for the first time in almost half a century, when Saddam Hussein invaded Kuwait. Porton staff, along with their US colleagues, were placed on a new red alert. Ill-judged assessments by the CIA that Saddam would not invade, or, if he did, it would be a temporary incursion, proved disastrously wrong. President Bush was woken at 5am to sign orders freezing Iraq's assets in the US and, at last, banning all exports. Margaret Thatcher did the same in London. President Mitterand in France stated he would join them with comprehensive sanctions. West Germany, which had been the source of much of Iraq's CW technology, would agree only to control military exports and Japan, another major trading partner of Saddam, showed no immediate willingness to move towards any strong action.

US Defence Secretary Dick Cheney laid out the problems for the Western Allies if they were to move to free Kuwait. Saddam had one of the world's largest armies, although its fighting power was grossly exaggerated before the war by Saddam and after it by the Americans. He was also handsomely equipped, courtesy of the Russians and the West. Within the week, Bush flew to meet Margaret Thatcher at Aspen, Colorado, where she was delivering a lecture.

Predictably supportive, she promised that Britain would stand side by side with the US and called for a co-operative international action to get Iraq out of Kuwait. Pentagon military planners had already produced a stark assessment of the problems confronting them. They were presented to a meeting of the US National Security Council (NSC) when Bush returned to Washington. William Webster, director of the CIA, said the situation looked grim: 'The Iraqis are within eight-tenths of a mile of the Saudi border. If Saddam stays where he is, he'll own 20 per cent of the world's oil reserves, and he's within a few miles of seizing another 20 per cent. Jordan and Yemen will probably tilt towards him. We can expect Arab states to start cutting deals. Iran will be at Iraq's feet. Israel will be threatened.'

Mere sanctions against Iraq were unlikely to move Saddam Hussein. Nor was an immediate response-attack by bombing raids, similar to that on Libya during the Reagan administration, likely to succeed. There were also hundreds of Western expatriates living and working in Iraq and Kuwait – who in due course Saddam would



infamously use as a human shield. Then, there were the wider implications of a possible Iraqi attack against Israel and the threat of an all-out explosion of hostilities in the Gulf. Even so, for the time being, Bush was telling his people, 'We're not discussing intervention.'

That position changed virtually overnight. The NSC reconvened at Camp David. On his return to Washington, Bush gave a running press conference as he made his way from his helicopter to the White House. With a delivery that General Colin Powell, chairman of his Chiefs of Staff, described as 'very Thatcher-esque', Bush declared that Saddam's invasion of Kuwait 'will not stand'. Jabbing the air with his finger, he repeated, 'This aggression against Kuwait will not stand.'

From not even discussing intervention, Bush had made what Powell himself declared was a 'giant leap' towards sending a Falklands-style task force to the Middle East. At Camp David, the Pentagon analysts ran down their checklist of options and Saddam's ability to defend himself against a US attacking force. It was then that the question of Iraq's chemical and biological arsenal suddenly became one of the most contentious issues of the whole situation. The air began to turn blue as the Defense Intelligence Agency and the CIA laid out the realities of Iraq's CB.W potential. One source described the reaction of Bush and his advisers as one of astonishment, punctuated with 'a good many anguished expressions beginning with "What the . . . ?" and "How the . . . ?" and "Who the . . . ?" The realisation was upon them that the West had equipped this modern-day Hitler with an armoury for armageddon.'

As Senator Donald Riegle identified, quite apart from Saddam's massive array of conventional hardware, the knowledge and fear of his CB.W stockpile became the immediate focus of the American and British Chiefs of Staff when the prospect of Allied action loomed before them. With the benefit of hindsight, Riegle surmised: 'Now just think about this and think about it logically – 13,000 155-millimeter shells loaded with mustard gas; 6,200 rockets loaded with nerve agent; 800 nerve agent aerial bombs; 28 Scud warheads loaded with sarin; 75 tons of nerve agent sarin – that's what UN investigators recovered AFTER the war. There's no telling how much more was destroyed, or what was the total quantity of CB weapons of mass destruction that Saddam had squirrelled away.'

A United Nations investigation team later found more of it – stockpiles of 5,000 tons of chemical agents, 46,000 filled munitions and 30 chemical warheads for ballistic missiles, not counting some that had been buried during the bombing raids and were too dangerous to



evacuate. Since the British MoD maintains its traditional stance of total secrecy on its pre-war assessments, even after the event, we must defer to sources in the US for a picture of what confronted political leaders and chiefs of staff that summer as they pondered the possibilities if they sent in the troops to 'face him down'.

According to Dr Gordon Oehler, the CIA had fairly accurately calculated that Iraq's main chemical plant was capable of producing more than 2,000 tons of mustard gas and sarin a year. They were also certain that Iraq had a stockpile of at least one metric ton of biological warfare agents, including anthrax and botulinum toxin. There were others, perhaps even more deadly. The CIA knew that, too.

As Senator Riegle himself was to reveal, the US had licensed the export of bacterial materials capable of being used to create genetically altered biological warfare agents to the Iraqi Atomic Energy Commission – the Iraqi governmental agency that conducted biological warfare-related research – prior to the war. One method of creating these genetically altered micro-organisms is by exposing them to radiation. The US had also licensed the export of several species of *Brucella* to Iraqi governmental agencies.

Bush wanted to know 'how in God's name' Saddam had managed to get his hands on American biological agents, which now might be used against their own troops. The Department of Defense could only excuse itself by saying: 'We're not a licensing agency. That responsibility falls on the Department of Commerce.' Records on the ultimate destination of dual-use biological, chemical, nuclear, or missile technology-related licenses were all issued by the Commerce Department. An inter-agency Subgroup on Nuclear Export Controls, which was in operation throughout the 1980s, kept close scrutiny for nuclear-related dual-use technology. As the Defense Department's Edwin Dorn described, it intervened only in certain dubious dual-use deals that had nuclear connections, but it claimed to have no jurisdiction over chemical or biological material until the invasion of Kuwait.

Lax laws and a general eagerness to trade with Iraq meant that few nations who would be called upon to support the Coalition action against Iraq could claim that they had not helped in some way or another to bolster the dictator's military strength; certainly, America was not alone in its embarrassment.

The question was what to do about it. Edwin Dorn recalled: 'I can tell you that American policymakers and military commanders were very concerned that Iraq would use chemical and/or biological



weapons. We had the hard evidence that they had acquired a BW capability as well. From the outset, it became vital to find ways to protect our personnel against such weapons, through immunisation, through special training, equipment, and detection. The tension surrounding the possible use of CB.W was very evident.' Bush's defence secretary, Dick Cheney, flew to Saudi Arabia for talks with King Fahd. Bush wanted the ruler's co-operation and permission to base the invasion force in his country. At 3 in the afternoon of 6 August, Cheney called Colin Powell from Jidda: 'We've got his approval . . . start moving them out.'

Margaret Thatcher reaffirmed British support and a Coalition of Western military began moving tenuously towards its foundation under phase one of the operation, code-named 'Desert Shield', to establish a force in the Gulf to prevent any further advances by Iraq. Phase two would be 'Desert Storm' – to come into effect as and when Saddam Hussein refused to submit to United Nations' demands for withdrawal from Kuwait.

In London, the Chiefs of Staff mounted their own Operation Granby, a name that mystified the Americans. They were not familiar with that 18th-century piece of British history when the Marquess of Granby led the 'Battle of Minden' during the Seven Years War. The name was among the operational titles reserved on the MoD computer for the next major troop movement. In this instance, according to the Thatcher Cabinet, Operation Granby was being launched as a deterrent to war, rather than to start one.

Porton scientists were at the forefront of the British effort from the beginning. A month before Margaret Thatcher's Cabinet agreed to dispatch the 7th Armoured Brigade to Saudi Arabia on 15 September, a team of its scientists was summoned to the Ministry of Defence to join discussions initiated by the Chiefs of Staff. They were required to provide a complete interpretation of intelligence reports on Iraq's CB capability. Armed with this appraisal, a British team of chemical warfare experts from the defence advisory establishment flew to the Gulf for on-the-spot briefings with their American counterparts, now gathering in Saudi Arabia in vast numbers.

General Norman Schwarzkopf, the US Commander-in-Chief, had already installed himself in the Ministry of Defence building in Riyadh, from which base the Saudis were themselves already preparing for the distribution of thousands of civilian gas-masks and protective suits. Schwarzkopf and Powell were more or less in agreement that although a chemical attack would be a public relations nightmare it was judged to



be 'manageable' on the battlefield. 'What to do about Iraq's biological capability remained a more troubling question,' Powell admitted.

This particular aspect had caused something of a panic among the Americans. As a post-war assessment of the US defence capability by the Edgewood Arsenal revealed, major gaps existed. They were particularly lacking in the means of detection of CB agents in the climatic conditions within which they would have to operate. Porton faced similar demands. Towards the end of the summer, and with tens of thousands of troops already moving into the Gulf, two-thirds of Porton Down's senior staff were working around the clock to devise, test and perfect additional equipment and protective gear that would be necessary for those conditions.

Just as Edgewood claimed its own efficiency in meeting the challenge, Porton's readiness to react was pronounced in terms verging on Churchill's 'finest hour': an emergency in which years of work in troop protection would finally be put to the test. It provided, they would say, vindication of everything for which they had been criticized and villified in the past.

Dr Graham Pearson boasted that almost 75 years of research and development by the establishment's multi-disciplined teams provided the springboard for an immediate response. 'We are the experts,' Pearson declared. 'And priority was given to a number of questions raised by the Iraqi situation.'

The scientists produced a summary of the damage potential of Iraqi weapons based upon intelligence estimates of the CB stockpiles and the nature of agents most likely to be used. According to a Porton source, the military planners posed a great number of questions as they mapped out their strategy in the event of a war. The most crucial of them emphasized the planners' fears. They called for:

- 1) A complete scenario giving precise indications of the persistency of CB agents in the climatic conditions of the Gulf, based upon attacks at a number of fixed sites where troops might be deployed, and in mobile operations. It was known, for example, that the potency of mustard gas could increase dramatically in hot conditions and that all agents could penetrate a sweaty skin far more rapidly than a relatively dry skin.

- 2) The likely distance hazard to troops and civilian resulting from Allied attacks on Iraqi chemical and biological installations, many of which were already known by the intelligence communities and sited on the planners' maps. The planners had to be assured that by bombing BW installations they would not be unleashing, rather than



preventing, a catastrophe. That key question could not easily be resolved; the risks were virtually incalculable.

3) Estimates of the casualty potential of CB warheads delivered by Scud missiles, and the 'fall-out' possibilities that could result from Patriot interception of the Scuds, which were again 'desperately difficult' to forecast. High casualty figures were certain, especially if the Scuds landed in the highly populated areas of Saudi Arabia and Israel.

4) With the protection of troops to such attacks being of paramount importance, the military required confirmation that existing protective suits and clothing were adequate for anything that Saddam Hussein might throw at them.

5) Urgent trials were begun to evaluate the physical impact upon the soldiers themselves of wearing the protective gear in the extreme heat, or conversely the cold, in the Gulf and for the scientists to give an accurate calculation of the effects of the burden of protective clothing upon the fighting ability of the men who wore it.

6) While it would be intended that all troops posted to the Gulf would carry at least some form of external protection, a list of drugs and antidotes to combat any exposure to CB.W was required, and immediate steps should be taken to ensure that there were adequate supplies of those medicines by way of pills and injections, which it was planned to have available for every member of the task force.

7) Porton should advise on medical countermeasures for immediate treatment of troops injured by CB.W attacks in the field of operations. Porton should also advise on surgical techniques to increase the healing rate of wounds inflicted by chemical agents that were known to be particularly slow to heal, and to provide assistance and advice on the management of CB.W casualties in field hospitals, hospital ships and at civilian hospitals in the Gulf and in Britain.

8) It was necessary to consider the methods of warning of CB attacks and the detection of agents in the vicinity of troop positions. Urgent production of detectors and monitors was required to augment those already in service and an 'interim system' for the detection of biological agent aerosols was required immediately and teams trained in its use.

That equipment was designed, developed and dispatched to the Gulf within three months, along with service personnel hastily trained at Porton to use the BW detectors. Similarly, there had been no system in place for battlezone collection of samples in order to identify particular agents that might be dispersed, so that suitable treatment



could be administered. Field laboratories were designed and ready for action by the time the war became a reality.

All these aspects were occupying the Porton establishment – and parallel teams in the US – as the prospect of a fight edged closer. There were endless meetings between military planners, medical faculties and drug producers and staff from Porton Down as new scenarios and possibilities emerged. General Sir Peter de la Billiere, who was appointed Commander of the British Forces in the Middle East, was among the military leaders who concluded that, even if the Iraqis' technology were primitive – and the CIA and MI6 knew it wasn't – it would have been quite possible for them to drop canisters upwind of troops in the desert, or even for them to drive a truck through Riyadh with an aerosol container spraying germs out of the back. 'All these probabilities were studied,' Sir Peter recalled. 'Far-fetched though it may sound, the possibility was a thoroughly uncomfortable one to have hanging over us. Because one of the simplest methods of delivering gas or biological agents was from the air.'

British troops were actually better off than the Americans in terms of protective gear. The British had more protective suits available per man than the Americans. Though they were immensely uncomfortable and psychologically caused the troops a good deal of worry, they provided excellent protection. Antitoxins against chemical or biological attack were, as General de la Billiere says, a 'more vexed question'. Large stocks of vaccines and tablets as pre-treatment and antidotes to gas and BW attack were produced for mass distribution. 'It seemed possible that Saddam might use anthrax,' Sir Peter wrote in his autobiography. 'My view was that if we had the vaccine, we should use it: to suffer casualties through not using it would have been quite wrong. Nevertheless, the issue raised a range of awkward and sensitive political questions. The decision to use the vaccine would also cause problems in the UK; in spite of our efforts to keep the matter quiet, the press were bound to get hold of it.'

The sensitivity towards public reaction indicated the concern among the generals about the extent and the volatile nature of some of the drugs that were to be prescribed. This one issue with its unpleasant overtones, said Sir Peter, gave rise to 'protracted discussion and debate'.

The reasons for their concerns were to become very evident. First, it was known that the drugs could have very unpleasant side-effects, which might affect the ability of the troops. More precisely, however, worries centred on the sheer scale of the programme. Never in any



previous military action had such a large quantity of pre-treatment medicines been recommended for so many troops. There were acknowledged gaps in research on the combined effects of the drugs. And there were concerns that two of the treatments had received no formal licensing from the regulating authorities of either Britain or the US. Nonetheless, as war threatened, the Pentagon persuaded the US Food and Drug Administration (FDA) to waive its prohibition on testing a drug for new purposes without the subjects' 'informed consent'. FDA deputy commissioner Mary Pendergast defended that ruling: 'You can't have your troops being the ones to decide whether they'll take some step to keep themselves healthy.' Senator Alfonse D'Amato unearthed the use of unlicensed drugs while studying reports to the Riegle Senate Committee enquiry in Washington in May 1994. The discovery raised a number of issues:

'It is very illuminating . . . it takes us to the issue of the question of the effectiveness of the drugs that were administered to the veterans in an attempt to immunise them against possible CB attacks – and, of course, the long-term impact. Some of these drugs have not received the full approval of the FDA. How many and how often were these drugs used? Which of them were experimental in nature? What have we done in ascertaining the impact of the administration of these drugs on our veterans? Have we made or begun to make the kinds of studies that can lead us to the information and facts necessary?'

These were exactly the questions that faced the politicians and the military in the build-up to the war; in 1996 many of them remained unanswered and there was still grave disquiet about the possible side-effects, which, as thousands of troops fell ill, became one of the most contentious issues in the post-war debate. Only under pressure from action groups in the US would the Department of Defense and the Ministry of Defence in London finally reveal their cocktail of medicines. They had vaccines against: tetanus, malaria, hepatitis B, cholera, meningitis, yellow fever, two types of anthrax, bubonic plague, botulinus toxin, polio, typhoid and whooping cough. That against bubonic plague had not been licensed.

Then there were the pre-treatment tablets to combat the effects of CB agents. They were the NAPS (Nerve Anti Pre-treatment Sets) and BATS (Biological Agent Treatment Sets). The NAPS tablets, pyridostigmine bromide (PB), to counteract the effects of nerve gas, were also unlicensed. They were administered to nearly all US troops and to most UK service people. Doses of 30mg taken three times daily were considered to offer sufficient protection to troops against nerve gas



when taken with the antidote atropine and 2-Pam chloride, which was to be administered immediately after a chemical attack.

Side-effects from PB caused the military most concern. Tests on civilians had shown that it could result in a neuromuscular disorder and a US medical investigation Task Force would later admit the likelihood of side-effects at the level of 1 per 1000 of those exposed to the drug but added that 'this hypothetical concern should be weighed against the hazards of unprotected exposure to chemical attack.'

The concern was hardly 'hypothetical'. A former senior scientific officer at Porton described the prospect of prolonged use of NAPS tablets as 'terrifying'. No one knew what happened when the drug was administered at low levels over a long period because there had been no such tests, but according to the Countess of Mar, the House of Lords campaigner against organophosphates in pesticides, it was 'suspected that the neuromuscular functions become modified and do not return to normal when the drug is no longer taken'.

Most of the troops took NAPS on a regular basis for around two months, although some members of the Coalition force, such as the Royal Fleet Auxiliary Services who arrived in the Gulf in September 1990, took them for much longer. Other warnings about the potency of NAPS were already in place. Senior officers across the whole spectrum of the Gulf Operations were in regular contact with medical authorities asking for advice. They received very little, simply because there was none to offer, said the Countess of Mar.

She maintains that no research had ever been conducted on the effects on the neurological and immune systems of the combination of NAPS and the vaccines administered. As the war edged closer, the Ministry of Defence was scrambling around for medical advice. Buried away in the files of the Department of Health is a document issued by the Royal College of Physicians, adding supplementary advice to the Gulf Contingency Planning, issued in February 1991, two weeks after the war began. It gave a clear warning in its detailed summary of the treatment of nerve agents:

'Experience . . . has shown that after apparently successful initial treatment, patients may deteriorate rapidly at any time . . . further respiratory failure, insomnia, psychiatric and myocardial problems may occur. These effects are not likely to be amenable to treatment with the combination of atropine and oxime and these drugs should not be given without the clearest clinical indication.'

The advice concludes with the following: 'Long term effects: muscle weakness, paraesthesiae, sensory loss, motor loss, tremors,



glaucoma, depression, headaches, and ataxia have all been reported following organophosphate pesticide exposure . . . it *is not known* [author's italics] but believed unlikely that long term effects follow nerve agent poisoning.'

The same concerns applied to the effects of the anthrax vaccine widely given to troops in the war theatre, and the vaccine for botulinus, given to a lesser number who were considered most at risk. The vaccines were generally administered 'under orders'. This in itself raised another critical issue. The Countess of Mar said: 'I understand that fully informed consent was not obtained from the troops prior to the administration of the medication and that they were given no opportunity to refuse. They were simply marched into a room and ordered to roll up their sleeves. They were aware that refusal would result in disciplinary action.'

This was confirmed by a US military staff report prepared for a US Senate Committee on Veterans' Affairs after the war. It concluded that 'Gulf veterans were . . . ordered under threat of Article 15 for court-martial to take the treatment, to discuss their vaccinations with no one, not even with any medical professionals needing the information to treat adverse reactions from the vaccine.'

A survey of veterans who had taken the anthrax vaccine showed 85 per cent were told they could not refuse it, and 43 per cent experienced immediate side-effects. Only a quarter of the women to whom it was administered were warned of any risks to pregnancy. Of all surveyed personnel who had taken the antbotulism medicine, 88 per cent were told not to turn it down and 35 per cent suffered side-effects. 'Anthrax vaccine should continue to be considered as a potential cause of undiagnosed illnesses in military personnel,' said the US report, adding: 'The botulism vaccine's safety remains unknown.'

The US military was known to have been particularly deficient in antibodies for *botulinus*, which the CIA had noted was among Saddam's other likely biological weapons. Their production of a vaccine to counteract the lethal paralytic effects of *botulinus* had been largely derived, literally, from one old horse named First Flight stabled at the Veterinary College of Minnesota.

He alone had produced in total 300 litres of antibody plasma but it was a drop in the ocean compared to the amount needed for the mass inoculation of US troops. That, as it turned out, was one more gap in America's state of preparedness for BW attacks on its troops, and further heated exchanges ensued. General Colin Powell's head of CW defence, and in this instance aptly named, Brigadier General



Johnny Jumper, recruited the services of an additional 100 horses from which the antibody plasma was taken.

While many troops were already taking NAPS tablets, still no decision had been taken in London and Washington with regard to widespread inoculation of troops. Tension was mounting. Newspapers and television were full of stories of impending disaster. Casualties in a ground war had been estimated by the Pentagon planners as possibly reaching as many as 40,000. The field hospitals were in place; the ships and aircraft to carry casualties home were standing by; major hospitals throughout the United Kingdom were on alert.

Even the two key commanders in the Gulf, Generals Sir Peter de la Billiere and Norman Schwarzkopf, 'could not agree' when or where the anti-BW vaccines should be used. Sir Peter said he remained convinced that they would be 'entirely blameworthy' if they did not use the vaccine and then Saddam attacked with biological weapons. Some of their advisers felt that if Saddam did resort to a biological strike, he would most likely aim it at Riyadh to cause maximum panic. Others felt he would not deliver it directly into the Arab world but would hit the front-line of mainly US and British troops.

Eventually, word came down from on high. The risk of such an attack outweighed all other considerations. Soon after Christmas, thousands of doses were administered to troops, boosted by shots of whooping cough vaccine to make them work faster. The 700,000 men who had been kicking their heels in the heat and taking part in manoeuvres and training exercises since their arrival were already tense and bored. Now, many thousands of them would have the added discomfort of the side-effects of the jabs and pills.

As predicted, the jabs made them feel 'extremely ill', General Sir Peter de la Billiere would recall, and were one more cause of stress. Already, they were taking the anti-gas tablets, which gave many people diarrhoea, and even more worrying was the discovery that the NAPS were 85 per cent bromide. They were also given the biological vaccination at the same time as the whooping cough vaccine, which knocked them out for 24 hours. Then, it was widely rumoured they were going to be immunized against the plague, which no one had heard of since the Dark Ages. 'It was all too much,' wrote Sir Peter.

Meanwhile, General Colin Powell was agonising with his advisers over the two other key issues: 1) The consequences of Iraqi attacks using CB weapons and 2) the consequences of bombing Iraq's CB.W plants. Powell said he remained 'less concerned' over the chemical threat because his troops were relatively well protected and many



would be in fast-moving shield vehicles. 'But the biologicals worried me,' he recalled, 'and the impact on the public the first time the first casualty keeled over to germ warfare would be terrifying.'

On the day the deadline for Saddam to quit Kuwait was due to expire, Powell sat in his office in the Pentagon drawing up a personal message to Saddam Hussein stating that as far as the Coalition was concerned, only conventional weapons would be used, in strict observance of the Geneva Convention. If Iraq, on the other hand, used chemical or biological weapons in violation of the treaty, they would have to suffer 'horrendous consequences'. The message was never sent. By the time it had passed through the Pentagon channels, war was a reality – and so was the need to decide on whether Iraqi CB.W plants should be bombed.

On that very day, Powell's opposite number in London, Sir David Craig, chairman of the British Chiefs of Staff, telephoned Powell and asked if he intended to bomb the chemical and biological installations. Powell said it was a gamble and admitted there was uncertainty as to whether the bombing would actually destroy any disease agents present or merely release them into the air. The decision was passed up the line to the President himself. The bombings would go ahead.



# ATMOSPHERIC OVERLOAD

THE PSYCHOLOGICAL EFFECTS of the chemical threat on troops and civilians in the Gulf was immense when Saddam Hussein began firing his dreaded Scud missiles. Yards of speculation would be written: Would Saddam Hussein release the gas and the 'biologicals'? Yes, was the expert opinion of many observers. He had passed the psychological barrier with his gas attacks on the Iranians and the Kurds. Nothing would stop him now . . . especially if he were staring defeat in the face. And what of Israel? If the Scuds began exploding CB warheads over Tel Aviv, could the Israelis really be stopped from responding in kind? The possibilities were all too horrendous to contemplate as the Coalition launched its massive aerial bombardment of Iraq with high-tech missiles of extraordinary power and accuracy, viewed by hundreds of millions of armchair observers watching their television sets around the world. Tension among the troops mounted as they waited for Saddam's response.

When the Scuds started coming, all military and ancillary personnel within range were wearing their protective suits, gas-masks and respirators as a matter of course. After every raid, there was a 20-minute wait that seemed like a lifetime as detection teams checked the atmosphere with their sensors. Thousands of sensors and automatically activated alarm systems were in place to monitor possible CB attacks. The Americans alone had 14,000 alarms sited, most of which



had to be tested at least twice a day. There were hundreds of occasions when they went off for reasons other than official tests.

General Sir Peter de la Billiere recounted one such scare that he himself witnessed on the very first night of the Scud attacks. As the second missile exploded, the sensors detected the presence of a chemical agent, but it was explained that it was merely 'a reaction to chemicals released by high explosive rather than to poison gas'. The progress and outcome of the war have now gone into history, and according to the official version the threat of widespread attacks using gas and biological agents did not materialize. That was the line adopted at the end of the war, and still aggressively maintained by the respective defence administrations in Britain and America as these words are being written in 1996:

'There is no evidence in any reports, classified or unclassified, that either chemical or biological agents were deployed at any level in the theatre of war or that there was any exposure of service members to chemical or biological warfare agents.'

Apart from the experiences of the thousands of Gulf War veterans who would claim differently, that statement can be actively challenged from the evidence of a large number of military and ancillary personnel who made on-the-spot reports of experiencing a chemical presence in the war zone, filed at the time with their operational NCOs and, in several cases, recounted under oath for the US Senate hearing chaired by Donald Riegle, 1992-4, and outlined at the beginning of this work. But quite apart from the claims and denials of the presence of chemical or biological agents in the battle zone, there were many other lethal pollutants around, which, combined with the effects of the anti-CB drugs, presented what has been admitted as an incalculable hazard to the troops.

Poisons of all kinds filled the air.

Gusting winds across the deserts of southern Iraq, through Kuwait and into Saudi Arabia carried literally dozens of other unknown and unseen dangers, swirling among the tents, through the bunkers, and across the troop emplacements and the medical villages.

According to a 1994 report by the US General Accounting Office, Gulf War troops were exposed to 21 potential 'reproductive toxicants', any of which might have harmed them as well as their future children. Similarly, another US report identified two dozen separate agents, micro-organisms and pollutants, which carried the potential for creating reproductive disorders. One investigations officer interviewed for this book described it as an atmospheric



overload. 'The fumes and chemicals in an area intensely populated by troops began from day one of the build-up of the Coalition response force as they prepared for what Saddam Hussein promised would be the Mother of All Battles – and it just went on from there, uncontrollable, largely unaccountable . . . we were quite literally advancing into the unknown.'

The skies were filled with hundreds of aircraft, from the nimble jet fighters to the huge troop and equipment transporters, flying in and out, day and night, leaving their vapour trails behind them wafting down upon the troops below. On the ground were thousands of vehicles and hundreds of thousands of tons of diesel, which, apart from being used to fuel the hardware, was also spread on the ground to keep down sand. Lubricants and solvents along with the whole inventory of war weaponry all produced their own additives to the dusty, swirling air.

There was also widespread handling of a nerve-gas decontaminant, ethylene glycol monomethyl ether. As soon as equipment began arriving, highly toxic chemical agent resistant coating (CARC) was used to paint hundreds of combat vehicles and equipment. Post-war US investigations would show that civilian workers and several support units may have completed the painting without wearing the necessary respiratory protection.

This was confirmed by British Army corporal Robert Lake, who was 22 when he went to the Gulf. Five years later, he was bedridden, one of the thousands said to be suffering from Gulf War Syndrome. Lake had, like his colleagues, taken the full range of injections and tablets and, like many, had suffered bad reactions. He collapsed and fell into unconsciousness. When he came round, he recovered sufficiently for the medics to declare him fit for work. He was repairing chemical detection equipment. 'No one told me about the dangers. No one said anything about wearing gloves.' Today, Lake's life is hell: headaches, chest pains, continual vomiting and permanent fatigue. His marriage broke up and he now lives with his parents.

Another potential danger to troops lay in the chemicals used to control troublesome local insects and rodents. Common pesticides and organophosphates were used, including DEET, most of which contain elements that, in humans, cause headache, diarrhoea, dizziness, blurred vision, weakness, nausea, cramps, discomfort in the chest, nervousness, sweating, miosis (pinpoint pupils), salivation, pulmonary oedema, uncontrollable muscle twitches, convulsions, coma, and loss of reflexes and sphincter control.



There were virtually no serious, or at least public, studies in Britain of these additional chemical hazards by 1996, but a good deal of research was carried out in America. Studies by a US Medical Task Force concluded that in areas of high concentrations of troops, many may have suffered exposure to pesticides, although there were no reports of acute pesticide poisoning during the war itself. Again unlike the British, the US authorities would set up continued monitoring among veterans to establish the extent of neurophysical disorders, in spite of an apparent reluctance by certain government departments to do so.

James Moss, a scientist with the US Department of Agriculture, found that when cockroaches were exposed to the nerve gas pre-treatment, PB, with a common insect repellent containing DEET, the toxicity of both chemicals multiplied. Moss claimed he pursued his experiments in spite of orders to stop. His contract wasn't renewed when it expired in 1994 and he claims he was kicked out of the department for conducting the research. Since Moss's study, two others – one by the Pentagon itself, the second by Duke University – discovered neural damage in rats and chickens exposed to another chemical cocktail, this one a mixture of PB, DEET and permethrin, an insecticide.

Infectious diseases spread by insects, parasites and rodents were another hazard faced by the troops. Casualties were low but one insect-borne disease, leishmaniasis, was identified as a potential cause in later development of chronic illness. The leishmania species causes skin infections, severe visceral disease and chronic spreading infection that produces no outward signs of its potent effects.

Thirty-one cases of leishmaniasis were recorded by the end of the war. Many more suspected cases followed, but doctors found difficulty in identifying it. The reason, as US Army medical teams discovered in a later study, was that they were effected by a new and virulent strain of leishmania. The investigators noted this 'was a surprising new observation . . . and that there may be many additional cases of cryptic infections causing chronic illness that cannot be diagnosed by current parasite isolation methods'.

The admission gave rise to rumours that the new strain may have been part of Iraq's biological effort, producing a new strain of germ that caused potentially fatal internal infections that were not only difficult to diagnose but also virtually untreatable by known medicines. After preliminary clinical studies, the US team concluded that 'more sensitive and less invasive diagnostic methods' were



necessary to discover whether or not leishmaniasis was a significant contributor to the chronic unexplained illnesses suffered by many veterans.

With so many troops on the ground, water- and food-borne infections were anticipated to be high. Contaminated lettuce from local vendors, for example, was described as having led to outbreaks of severe diarrhoea. It was also caused by contaminated water, foods or utensils. In addition there were many cases of respiratory ailments that had begun with, or had been aggravated by, the living and working conditions for troops in Saudi Arabia.

Wind-blown sand embedding itself in respiratory tracts and lungs was a major cause. There were others. In one instance, troops occupying a long-vacant Saudi housing area in Al Eskan experienced 'significant rates' of respiratory disease due to the fine sand and dust from accumulated pigeon droppings.

As the war developed, other pollutants came into play. Not the least among them, said the US report, was flying steel, shrapnel and blast overpressures from conventional warfare munitions. But one of the most dangerous exposures came from extensive troop contact with depleted uranium (DU). Operation Desert Storm saw the first-ever battlefield use of armour-piercing weapons tipped with DU.

Munitions fired from tanks and A-10 aircraft consisted of DU kinetic energy penetrators, enabling US forces to 'engage and kill enemy vehicles at standoff ranges that enhanced their own safety'. Post-war concern centred around the possibility that expended DU projectiles, or the dust and fragments from them, posed a potential danger, a lingering hazard to troops on the battlefield. A number of Coalition soldiers came into direct contact with exploded DU shells when their vehicles were hit by friendly fire, resulting in DU shrapnel wounds. Nine soldiers in a British unit were killed in one such strike by a US A-10.

In other friendly fire incidents, 15 Bradley Fighting Vehicles and 9 Abrams tanks were mistakenly attacked and struck by DU munitions. Crew members who survived sustained wounds and retained fragments of presumed DU shrapnel. An initial survey by the Army Office of the Surgeon General revealed that 22 soldiers had imbedded fragments of DU.

Another 27 were given first aid for minor wounds in the battlefield and may also have experienced DU contamination of wounds. All the survivors were to become subject to a long-term follow-up study, to examine possible chronic effects from embedded DU fragments.



All these hazards were combined with the effects of the indisputable wind-borne fall-out from the bombing of Saddam's chemical and biological factories, for which clear evidence has been provided from numerous sources. Unlike the British, who continued to deny there was any such dangerous fall-out, this was finally accepted by the US Department of Defense after studying reports from a 180-strong Czech decontamination team, brought to the Gulf to aid Saudi Arabia.

To this huge array of poisons were added the airborne effects of the two ultimate catastrophes brought about as the war ended. Astonished television viewers across the world watched with horror as Iraqi troops made one last defiant gesture as they fled – setting fire to 700 Kuwaiti oil wells and sending choking smoke, flames and fumes into the air.

And then came the last great turkey-shoot of the war, as Allied aircraft bombed and shot up the thousands of lorries, cars and military wagons stolen and commandeered by panic-stricken Iraqi soldiers, a scene that remains one of the most vivid memories of Desert Storm. The incredible carnage of Matla Ridge added its own highly toxic pollutants to the already heavily laden air.

These final acts of the war merely augmented the vast array of harmful chemicals, fumes and naturally produced health hazards that had confronted the Coalition troops, and especially the British and American contingents, from the day they began arriving. Evidence of their effects on animal life lay all around, with thousands of dead birds and rodents, many camels and donkeys. Porton Down scientists know very well what dangers the troops faced by the simple act of breathing in during those months of build-up and in the aftermath of the war.

Along with their American counterparts, British scientists arranged for the collection of planeloads of material for testing. They included air sample test results, captured and discarded equipment, protective gear used by both Iraqi and Coalition forces – and even dead animals. In fact, anything from the war that would provide useful research data was gathered up and sent home. This detritus would form the basis of a wide-ranging programme of tests and experiments, combined with the need to find clues about what Saddam Hussein actually possessed, and may have used, in the way of CB weaponry. The hoard collected by the Porton-linked teams, moving anonymously among the carnage and the troop emplacements in unmarked desert suits, was flown back to Wiltshire for months of tests and experiments. The results remain secret in Britain.



Again, detailed analysis is only available in the US, where many separate studies were begun as the troops stood down and began to return home, bringing with them a host of mysterious ailments and chronic illnesses, the extent of which would take years to materialize. By then, it was abundantly clear that a large proportion of the Coalition troops had, from almost the very beginning, been encapsulated in an environmental nightmare, exposed daily to a diversity of pollutants that were, either individually or in combination with others, as lethal as any weapon and far more insidious.

As many have been heard to say: 'At least with a wound – you can see what the problem is.' Their wounds were not always visible, although they were not long in knocking down their victims, first with a trickle of reported 'unexplained' illness among veterans, building into a massive crescendo of complaints.

In the beginning, they were largely dismissed by the military and their examiners in the medical profession. It was probably some form of Desert Fever, they said, linked to exhaustion, psychological problems and even, in some cases, sheer malingering. Soon, the collective of illnesses would become universally known under the all-embracing and often misleading term of Gulf War Syndrome. The common thread that linked the veterans was denial by officialdom and authority that their troubles emanated from the war.

The many tragic case histories recorded in Britain and the US speak for themselves, and perhaps the only truth that the spokespersons for the various military authorities and government departments on both sides of the Atlantic continued to utter like a record stuck in a groove was that there was 'no single, identifiable disease that can be discerned among Gulf War veterans'.

That statement itself may be considered ridiculously immature, naive in the extreme, arrogant and irresponsible. All those words, punctuated with expletives born out of rage, would be used by the crippled and suffering multitude to describe the reaction of those in authority.

Insensitive comments from Britain's portly Armed Forces Minister, Nicholas Soames, would cause perhaps the greatest antagonism among sufferers. Without a hint of compassion, he declared, and repeated time and again, that the veterans' claims amounted to no more than a 'mixture of unsubstantiated rumour [and] incorrect information . . . there is no evidence of any medical condition peculiar to service in the Gulf.'

He deftly avoided the crucial issue. There was no single illness,



simply because there could not be. The range of poisons, chemicals and drugs to which veterans were subjected made that virtually impossible. According to distinguished medical opinion emerging in the United States, these ailments resulted from a combination of pollutants and chemicals whose effects required precise medical study. It was not only a nonsense to dismiss them as a potential cause of illness, it was an insult to the sufferers to do so.

Hilary Jones was able to take a more precise view of her ailments than most. She had spent 16 years in the Queen Alexandra Royal Nursing Corps before she retired in 1988 at the age of 37 with the rank of major. Three years later, she volunteered to return to service when the Gulf War looked imminent. Her knowledge was welcomed. In the final days of her service she had been researching a manual for nursing aides in modern warfare situations. The reality, as she discovered on her arrival in the Gulf in January 1991, barely approached a 'modern' scenario. The British field hospital and medical facilities were old fashioned and out of date. Some of the beds had been saved from World War I and she had been given no prior warning that the facilities for treating casualties were woefully inadequate.

Like the others, she lined up for the course of injections against anthrax, hepatitis B, yellow fever and the rest and wondered how her immune system would cope with this onslaught. The vaccines were administered in a fairly haphazard way, and there was no question of 'informed consent'. Very soon there were queues of soldiers who were suffering from flu-like symptoms, high temperatures, headaches, chest infections and so on. 'It could have been a viral infection,' Major Jones concluded, 'or reaction to the injections, or even the result of biological agents released by Saddam Hussein.'

She suffered the effects herself. She was ill from the very first week of her arrival and her malaise never cleared up during the whole time she was there, which was for the duration. When she came home, she had a severe cough, which she couldn't shift. Within weeks, the effects became more severe. She began to suffer sleeplessness, and then slowly her general stamina grew weaker and weaker. The chest infection became worse, and she developed thrush, which she had never had before. Then, her speech became affected, and she developed a stammer. The fevers and the severe headaches came next; it was getting worse.

'I knew there was something wrong,' she said, 'and I got angry when my GP asked me if I had menopausal problems – a woman of a certain age. Eventually, he took some blood samples and discovered



my white cells showed my immune system was reacting to something unknown.'

Worse, her whole life was falling apart. Her relationship with her boyfriend broke up. She was suffering memory lapses and taking time off work. Then the college where she taught made her redundant and she faced the prospect of perhaps never being able to work again. Her mortgage and the rest of her bills still needed paying and gradually, as her condition deteriorated, she cashed in most of her financial assets, such as several life assurance policies, simply to exist.

Within two years of her return from the Gulf, Hilary Jones was a virtual cripple, struck down by sheer fatigue. Even the daily household chores became a major undertaking. 'For a woman who was always bursting with energy and now supposedly at the prime of life, it was absolute hell. The utter bone-aching exhaustion left me no choice but to stay in bed days on end.'

The Ministry of Defence showed little sympathy, or even belief in her condition. She was undoubtedly assigned to the ranks of the Yuppie 'flu brigade about whom there had been so much misplaced malignity. For two years, she faced the brick-wall intransigence of the Ministry of Defence, and listened furiously to the repeated declarations of the Armed Forces Minister Nicholas Soames that there was no evidence of any such malady as Gulf War Syndrome.

In 1995, and by then confined to a wheelchair, she faced financially dire prospects, having cashed in her last insurance policy. She gave evidence to the first – and, to that point, the only – British government inquiry into Gulf War Syndrome, an all-party Defence Select Committee. Her articulate and moving speech convinced several among the inquiry team who admitted they had been sceptical about the claims of Major Jones and others like her. They were in agreement that the attitude of Mr Soames's ministry had been appalling, incredible and grossly inadequate. Major Jones, retiring to the privacy of the home that has become a virtual prison, was able to put it more succinctly: 'They are absolute bastards.'

Such words seemed to have little effect on Mr Soames and his colleagues at the MoD. Not long after the stinging reaction of the all-party committee, in November 1995, he continued to ignore the anger and the incredulity when he responded to a question in the House of Commons by Labour MP Angela Eagle. She had asked him why he had done nothing to counter criticism levelled at his ministry. He replied with a typically fatuous comment, aimed at scoring a party political point, which has made Gulf War victims spit with rage at the



very mention of his name: 'The Honourable Lady is making mischief when she alleges in any way that there is any such thing as Gulf War Syndrome.'

Nigel Thompson, unlike some, could not exclaim his anger in loud voice. In fact, four years after completing his service in the Gulf he could not speak at all. At the time of the war, he fitted the 'average combatant' profile exactly when he went out there as a helicopter weapons officer with the Fleet Air Arm. He was fit, healthy, 34 years old – the average age of the 700,000 force – and eager to serve his country. Like most, doing his duty came above all else. He was in the Gulf for the duration, serving initially in Saudi Arabia and, after the Coalition offensive to reclaim Kuwait, saw service pretty well all over the theatre of operations.

He had all the jabs and as a weapons officer was in close contact with all the facets of the war. He returned home in the summer of 1991 and began complaining about problems down the left side of his body. He was seen by a Royal Navy doctor who could not pinpoint a specific illness. As the months passed, his condition deteriorated. He had difficulty in walking, suffered memory loss and soon signs of speech difficulties began to appear.

Almost two years after his service in the Gulf, he was diagnosed as suffering from motor neurone disease, after specialists examined him in January 1993. Within a year, he was virtually immobile without help, bound to a wheelchair and facing the agonising trauma of this progressive disease, which leads to chronic degeneration of muscle co-ordination. By the end of the year, his voice had gone completely. He had to substitute the act of speaking with a voice synthesizer, using a keyboard to activate the Americanised electronic speech.

By then his wife, Samantha, had given birth to their daughter Hannah who appears to be normal; stories of defects among Gulf War babies were just beginning to emerge. 'We had long ago decided we could not take the risk of having any more children,' says Samantha. 'The fact is, I know Nigel is going to die. We have been told that he cannot expect to survive more than two years. It is very traumatic for both of us to see him wasting away, especially when I remember how he was – a fine, active and handsome boy.'

As in the case of so many others, the MoD refused to accept that Nigel Thompson's condition was related to the Gulf War. The same applied to Edward Blench, who was a healthy 29-year-old physical training instructor and veteran of the Falklands War and of service in Northern Ireland. When he was shipped out to the Gulf, he was a



lance corporal in the First Armoured Division HG. He had the jabs, and then became one of the team that did the jabbing.

He estimated he must have injected 25,000 troops for bubonic plague and anthrax, working 18 hours a day and travelling out to the encampments. He was told he might witness a few minor reactions, flu-like symptoms. In fact, he saw a great many bad reactions, with men collapsing and being evacuated as casualties.

Apart from his own responses to the NAPS and the local fumes, especially from the petro-chemical fires, Blench suffered an accident two days before he was due to leave the Gulf. He was burning some rubbish when it suddenly exploded. He was temporarily blinded and taken to hospital. Although his sight returned, he never fully recovered. He saw three specialists, one Norwegian, one American and one British. They all suggested that his eyes had been damaged by some form of toxin. When he came home, the breathlessness and respiratory problems began.

Asthma was diagnosed, although he had never suffered from it in his life. He failed the basic fitness test to be a physical training instructor. Blisters had begun appearing on his scalp, he experienced terrible perspiration, particularly at night, he lost the feeling in his legs. 'I began to get severe mood swings,' said Blench, 'and became aggressive. My family has to bear the brunt of that. I put it down to the NAPS, the vaccinations and the petro-chemical fires. I am also convinced that, in spite of MoD denials, Saddam used chemical warfare – that the Scud warheads were full of it.' Blench left the army and his £300-a-week job. He found himself to be virtually unemployable, and was reduced to delivering newspapers to make ends meet. In October 1993, he applied for a war pension. Two and a half years later, he was still awaiting a decision.

Paul Ash, who was with the Royal Fusiliers in the Gulf, read of Edward Blench's troubles in a newspaper. His own symptoms were very similar to Blench's and those of others he had heard about. He suffered joint pains, stomach problems, constant nausea, exhaustion. His wife complained he had become aggressive and forgetful. He was not the man he had been. Ash telephoned Eddie Blench and they had a long discussion. The upshot was that they formed the Gulf War Veterans Association and began to achieve increasing media interest until finally they were able to arrange a national conference in 1994. 'We received an enormous response,' said Blench. 'We had men and women from across the board – officers to privates – asking us for help. As we studied their symptoms, we discovered we all had at least



three which were common to all of us, sometimes more. Above all, though, was the sheer anger at the way we had been subjected to all those drugs they pumped into us, often without telling the men what they were and, in the end, just ignored the very obvious effects. There have been many deaths among veterans, and suicides. I know of seven. But no follow-up studies were even contemplated in Britain – absolutely nothing. What it boiled down to was this: The Gulf War was a balls-up because we poisoned our own troops.'

In the early years after the war, individual cases of Gulf War Syndrome threw up a diversity of ailments. One of the first group studies to formulate some kind of pattern was conducted at the Veterans' Affairs Hospital in Allen Park, Michigan. There, doctors treating patients from a nearby military base began to discover many similarities among veterans and produced the most comprehensive findings to that point. Between them hospital doctors examined 250 Gulf veterans. More than half had muscular pain; skin rashes; and respiratory problems. A third had persistent diarrhoea, loss of memory, night sweats and many had lost their hair.

There was another aspect of the Michigan study. Military Police veterans had come into close contact with Iraqi troops, in addition to being exposed to oil-fire smoke and other chemical hazards. For four months, they had searched and herded thousands of Iraqi PoWs, hand-patting each up and down the trouser legs and across the back and sides. They escorted convoys of Iraqi prisoners from the front lines back 50 miles to a processing compound dubbed Log Base Nellie. The 1776th MP sometimes rounded up Iraqi stragglers behind the lines and flushed hold-outs from bunkers.

The prisoners were put into a barbed-wire compound and fed. Company medical officer Curtis Seaborn treated the sick among them. 'Many hadn't eaten for days,' he recalled. 'They had all kinds of ailments and were riddled with infestations like lice and fleas and rashes. Some clearly had nervous system problems before we got them. Some had hallucinations. Some twitched and shook. Others would go into convulsions.'

After treatment they would be sent to another camp at Hafr al Battin in Saudi Arabia, a tent-city three-quarters of a mile wide and a mile long, operated in part by the 301st MPs, housing almost 20,000 PoWs. Staff Sgt Bill Lickman often broke up fights between prisoners scrabbling for food. 'Every day, I had some type of physical contact,' said Lickman who, on his return to the US erupted in chronic skin rashes and diarrhoea.



The camp was also less than an hour downwind of the Kuwaiti oil fires and of bombed Iraqi chemical plants. Captain Tom Howko, the former commanding officer of the 1776th, recalls that after oil clouds had hung over Hafr al Battin for a day, oil began dripping from the lamp posts on the town's main street. On some days, the sun was completely obliterated and temperatures fell from 103°F to the 70s in minutes.

Sergeant Jim Combs of the same company said that when he landed back in Indiana in May 1991, he checked into a hotel in Indianapolis and he had to take three baths before he got clean. His wife, Kathleen, had to call room service to get the tub scrubbed out because black oil tar kept coming out of his pores and leaving a black film on the tub.

The Michigan study also revealed an increase in aggressive behaviour among returning veterans. One of them, John Copeman, who was living with his girlfriend, attacked her parents and beat them to death with a baseball bat at their home in South Rockwood, Michigan. Copeman then set the house on fire and ran from police. He got as far as the Ambassador Bridge. He jumped from the span into the freezing waters of Detroit River but survived when he was picked up by a passing mail boat. He is now serving life in prison for murder. 'When we talk about it, we talk about not wanting to do "The Copeman Thing",' Seaborn said.

By mid-1995, there were 30 separate studies under way in America, with teams of researchers looking into the effects of the pollutants of the Gulf War on the troops. In Britain, there was only one: a limited pilot study, funded by charity and initiated by Dr Goran Jamal, consultant at the Institute of Neurological Sciences at the Southern General Hospital, Glasgow. His team examined what he admitted was a small sample of 14 veterans, 12 men and 2 women, randomly selected from a computerized list of veterans from all over Britain.

In his first report, published in April 1996, Dr Jamal supported the view of researchers in America who had discovered that giving pyridostigmine bromide (PB) at the dose equivalent to that which the Gulf soldiers had been given had caused a breakdown of skeletal muscles after exercise in rats. Furthermore, although the toxic and biological effects of pesticides and other substances to which troops were exposed were well known, their combined effects were not.

The results of Dr Jamal's tests on the 14 veterans were compared with the results of tests on a control group of 13 healthy civilians.



Established procedures for assessing nerve function in the limbs, muscles, brain and spinal chord were carried out. In each of the 14 veterans, Dr Jamal's team discovered problems and dysfunction in the nervous system, particularly in the arms and legs. The results were more than adequate to provide the basis for 'urgent research' in a larger group of veterans.



# STILLBIRTHS, MISCARRIAGES, DEFORMITIES

**T**HOUSANDS OF GULF War veterans were falling ill and their medical ailments received widespread publicity. The authorities continued to dismiss them as unfortunate but coincidental to the war, even as more disturbing trends began to appear: sickness among the families of the veterans – their wives and then their children. Among those affected was Christine Turnbull whose husband, Richie, was an RAF corporal with 17 years' service behind him. He volunteered to go to the Gulf because he believed in the cause. He had three previous commendations to his credit. He was posted to Dhara in Saudi Arabia and joined the queue for the jabs and the tablets. He had both the NAPS and BATS, which he described as 'massive doses of antibiotics'.

He took the NAPS every 6 hours for 47 days, and he was 'totally shocked' when he heard Nicholas Soames admit to the House of Commons that they weren't even licensed. He wasn't sure of the complete list of vaccines that went into his arm; he knew they included vaccines for anthrax, bubonic plague and whooping cough. Dosage was supposed to depend on weight – except that he was never weighed. Nor was there informed consent. The reaction was immediate and it lasted ten days – fever and breathing difficulties.

Turnbull recalls vividly a Scud attack on the night of 20 January 1991 when the alarms for chemical agents went off. He is convinced the Scuds carried a chemical warhead. Soon after he returned from the



Gulf, he began getting chest infections, one after the other, accompanied by severe bouts of coughing. Then came short-term memory loss, and allergies to petrol fumes, brandy and perfume – most strong-smelling items. He was prescribed an inhaler permanently and can no longer swim one length of a swimming pool whereas once he used to complete a great number a day.

But then Richie's wife, Christine, became distressed. She discovered a lump in her armpit and though tests for breast cancer proved negative, the lump remained. It is caused by a swollen lymph gland, which doctors put down to some form of infection. Her periods began to become erratic and her ovulation became impaired. She was not alone in her experiences. Many others wives in Britain experienced the same problems and formed themselves into a support group.

Christine and Richard Turnbull were among three British couples who were included in a survey of Gulf War veterans and their partners by Dr Edward Hyman from New Orleans. Five hundred couples were studied. In almost all the cases, problems had arisen among the wives, many reporting excruciatingly painful vaginal infections. Case histories in America reported by specialists who have treated Gulf veterans put the cause of the passed-on problems to a general overload of chemical pollutants, that the men's bodily fluids were actually toxic.

Several wives had complained that their husbands' semen caused their skin to blister. The study by Dr Hyman also identified abnormal bacteria in the urinary tracts of a large number of the veterans he studied. Similar findings have become widespread among the veteran community, said Dr Charles Jackson, staff physician for the Veterans Administration Medical Centre in Tuskegee, Alabama. There was also a large number of wives with mirror-image complaints of those of their husbands, such as fatigue and respiratory problems.

A high incidence of miscarried pregnancies and several stillbirths were recorded and then there began emerging one more terrible trend. Even as these studies on couples were beginning, children of the Gulf War veterans were being born with devastating and tragic deformities.

In the first major inquiry into the unexplained illnesses of Gulf War Veterans set up in 1993 by US Senator Donald Riegle for his Senate committee, his staff sent out questionnaires to a large number of US veterans. One question asked if there were any signs of birth defects among children born to veterans since the war. Of those who responded and had had children after the hostilities, a remarkable 65 per cent confirmed some form of birth defect or problems with their children's immune systems.



No similar inquiry had even been considered in Britain at that time. Instead the MoD was still adamant in its denial of pretty well anything and everything connected with Gulf War Syndrome, and this attitude was maintained even as the stories of severe birth defects and deformities, of stillbirths and miscarriages began to appear.

Kathryn and John Elliot had two children born after the war; both developed heart defects and suffer other problems. John, a corporal in the Royal Logistics Corps, was among the first to go to the Gulf. He arrived there in October 1990 and did not set foot back on British soil until the end of May 1991. What ill-effects he suffered from the vaccines and tablets were soon shrugged off and a year after his return Kathryn became pregnant. The birth of their daughter, Rebecca, was normal but at five weeks she began to have breathing problems.

Doctors diagnosed a hole in the heart and predicted that it would close. It did not. Rebecca's lungs also gave cause for concern, one of them persistently filling with fluid. Before she was a year old, she was operated on for the heart condition. It was then that Kathryn realized she was pregnant again. She was told she was having twins but one week after being given what should have been joyous news, she miscarried and lost one of them. The other survived and Jessica was born in 1994. Just before her birth, Rebecca fell ill again, and was rushed to hospital for an emergency operation for the removal of part of her bowel.

Jessica was quite jaundiced when she was born – 'very yellow,' said Kathryn. But she and John were told not to worry because Rebecca's condition was a one-in-a-million situation, which would never happen again in the same family. Sadly, that proved not to be the case. Jessica's yellow pigment did not decrease and she was admitted to hospital. Local doctors in Glasgow seemed unsure of what was wrong and she was taken to a specialist paediatric unit for a scan. The million-to-one chance that couldn't happen again, had happened again. Jessica had a hole in the heart and a narrowing of the main artery to the lungs. They operated immediately and Kathryn and John feared they were going to lose her.

Kathryn and John were both given blood tests but they were told their blood showed no abnormalities. They looked at the family history; nothing like it had occurred anywhere. Immediate relations had almost 20 children between them without defect. Kathryn has her own very positive theory: 'While Jessica was in hospital a young man approached me in the ward. He had a child in the same hospital. His baby had a heart condition similar to ours. He, it transpired, was also



a soldier who had served in the Gulf. I am convinced there is a link. Definitely.'

Like many other veteran couples, Kathryn and John have decided to have no more children. To be certain of that, John has had a vasectomy. 'I don't think he will ever come to terms with what has happened,' said Kathryn.

Baby Kennedy Clark was born without a thyroid and without daily treatment of hormones would die. She was also seriously disfigured by another congenital condition called hemangiomas, benign tumors made of tangled blood vessels. They began appearing within a few weeks of her birth . . . on her face, in her throat and spinal canal; her speech was impaired and her life threatened. There is no permanent treatment for her condition. Laser surgery disposes of them temporarily but they grow back. What is worse, they attract the unwanted stares of strangers, some of whom stop and ask what is wrong.

Neither her mother Shana nor her father Darrell can answer that question.

Their baby was conceived after Darrell returned from the Gulf where he served as a US paratrooper. He came back with Gulf 'flu', which never went away. He has asthma and recurring pneumonia. He tested positive to radiation exposure, from the DU missile tips, but, like other parents, Shana and Darrell were told that there was no proof that their baby's defects are linked to Darrell's service in the Gulf. 'I know in my heart that was the cause of it,' said Darrell.

Support groups were soon being founded and what researchers call 'clusters' were being discovered. Melanie Ayers, 30, from Fort Bragg, North Carolina, started one informal group at the US Army base there when her five-month-old son, Michael, died of congestive heart failure in November 1993. Michael was conceived after his father, Glenn, returned from action as a battery commander in the Gulf. One night, the child woke screaming, his arms and legs ice-cold. He was found to be suffering from a mitral-valve defect.

Melanie soon began to learn of many other parents whose post-Gulf War children had been born with abnormalities; all were desperate for information and, crucially, wanted advice on whether they should ever again dare risk pregnancy. With Kim Sullivan, an artillery captain's wife whose infant son, Matthew, had died of a rare liver cancer, Melanie founded a group for fellow sufferers.

Among the many who joined was Connie Hanson, wife of an Army sergeant, Paul Hanson, also from Fort Bragg. Their son, Jayce, was an



especially tragic case. He was born with multiple deformities: his hands were attached to his shoulders and his legs were deformed and twisted. he had a hole in the heart, ear problems and a blood condition similar to haemophilia. For all his problems, Jayce grew into a cheerful boy with a cherubic face and lively personality; but he required a daunting array of medical treatments.

In 1995, soon after Jayce's third birthday, his team of doctors decided that in order for him to walk, both his legs would have to be amputated so that they could fit artificial limbs. It was an agonising decision, but one for which there was virtually no alternative. The operation went ahead and within a few weeks Jayce was walking on his prosthetics. 'I think,' said Connie, 'the double amputation was the worst part of this nightmare that has befallen us. Afterwards he had night terrors and we wondered what would become of us all. But he pulled through it.'

Now, Jayce and his family face the years of agony that lie ahead, and the bitterness of it all comes in waves of indignation, especially when they hear people in authority denying that there is a connection between deformities in children and the Gulf War. Sergeant Hanson has no doubt that there is. He has his own problems, firstly from taking the NAPS tablets, which caused him severe headaches. He was also in the area of the oil fires. 'I still have my own troubles, with joint pains, bleeding gums and headaches. But my main concern is not for me but to discover what caused those terrible things in our son. I am sure it was because of the war. Whoever is at fault should at least accept the responsibility and make it right.'

Studies of clustering have produced strong evidence of previously rare illnesses and deformities among the children of Gulf War parents. One of the studies was undertaken by the Association of Birth Defect Children, which found many similarities among the children's deformities, especially among heart defects. Another was the very rare Goldenhar's Syndrome, a birth defect of internal organs that usually strikes 1 in 26,000. Two cases were found in Britain and 12 in America among the children of Gulf War veterans. The Association's study began tracking possible clusters and its director Betty Mekdeci found it significant that not one of the parents in the survey had a family history of those types of birth defects.

By mid-1995, the many studies of ailments affecting Gulf War veterans, their wives and their children under way in America were producing alarming data. The first one to report was that of the Senate Committee under the chairmanship of Donald Riegle, in 1994. His



inquiry lasted almost two years, during which his team interviewed 600 veterans and called military and intelligence chiefs before them.

At the end of it, Riegle pulled no punches. His summary of the findings was music to the ears of veterans in Britain, America, Canada and France who had faced government stone-walling since Gulf War Syndrome first began to emerge. And while Britain, even then, continued to respond to the veterans with the same 'no evidence' reply, it is worth recording a few of Riegle's points, especially as there was no similar voice in Britain able to speak with the same informed authority.

My inquiry began when a number of veterans contacted my office to complain that they were not receiving adequate attention to the myriad of medical symptoms that they were suffering from. Many of them were being treated symptomatically, with no long-lasting, positive effects on their health. Others were being referred for psychiatric evaluation because personnel in the Department of Veterans' Affairs were at a loss to explain their physical symptoms. These Gulf War veterans are reporting muscle and joint pain, memory loss, intestinal and heart problems, fatigue, nasal congestion, urinary urgency, diarrhoea, twitching, rashes, sores, and a number of other symptoms. They began experiencing these multiple symptoms during and after, often many months after, their tour of duty in the Gulf.

I might say that, in virtually every case, these veterans were in excellent physical condition when they went over to the Gulf. In fact, under the voluntary Army arrangements, you have to be in exceptionally good condition today just to qualify for service in the Armed Forces, and that was particularly true for many who were asked to serve in the Gulf War. So we're talking about people with exceptionally strong health profiles before their service in the Gulf.

Riegle went on to explain how the Department of Defense, when first approached by his committee's investigators, contended that there was no evidence that forces were exposed to chemical warfare agents. However, on 7 September 1993, a Defense Department medical official admitted to Riegle's chief investigator, James Tuite, that the issue of CB.W agent exposure had not been explored because it was the position of 'military intelligence' that such exposures never occurred.

It was then they learned that the Pentagon had secretly accepted a



report that a Czech chemical decontamination unit had detected the nerve gas sarin in areas of northern Saudi Arabia during the early phases of the Gulf War. They had attributed the detections to fall-out from Coalition bombing of Iraqi chemical warfare agent production facilities. After analysing the results of the Czech report, the Department of Defense concluded that the detections were unrelated to the mysterious health problems and produced a supporting view from Dr Graham Pearson, director of Porton Down, identified by the DoD as the 'world's leading authority' on chemical warfare. Riegle went on:

We established that, contrary to the Department of Defense assertions, there is clear evidence that the chemical agents were detected at sufficient levels to harm troops. Second, the chemical agent detectors used by forces during the Gulf War were not sufficiently sensitive to detect sustained low levels of chemical agent and to monitor personnel for contamination.

US Army Material Safety Data Sheets, called MSDS, indicate that chronic exposure to levels of over 1/10,000th milligram per cubic meter of sarin is hazardous and requires the use of protective equipment. The minimum amount of chemical agent required to activate the automatic chemical agent detection alarm that was commonly used during the war was 1,000 times greater than this amount.

In other words, the levels for the alarms used in the war were set at a rate 1,000 times greater than the actual level that we know from other military records to be damaging and hazardous to people if they are exposed to them over a period of time. Next, we had detailed weather reports and information from satellite imagery which confirmed that during much of the war, the smoke plumes from the Coalition bombings were moving directly over troop positions.

Our inquiries also revealed that the United States did not have effective biological agent detectors deployed with the capability to confirm whether or not troops were being exposed to biological agents. In response to direct questioning, a DoD official said that the department was withholding classified information on the exposure of forces to biological materials. We also discovered evidence that the United States shipped biological materials to Iraq which contributed to the Iraqi biological warfare programme.



Riegle uncovered other evidence that the Pentagon and the British MoD had not cared to make public at the time. In addition to the tens of thousands of other chemical munitions discovered by UN inspectors after the war, 28 Scud chemical warheads containing the chemical nerve agent sarin were found and destroyed. According to a Department of Defense official, these warheads had been obtained from the former Soviet Union.

With all the evidence that his investigators uncovered, and the testimony of veterans and defence chiefs, Riegle said there was an emerging pattern of information that required an 'immediate additional investigative effort' – especially on behalf of the thousands of veterans and their families who had suffered dire consequences from the war. Riegle called for the immediate release of all classified information relating to Iraqi chemical and biological warfare programmes and to the detection or discovery of chemical, chemical precursor, or biological warfare-related materials. 'It's time to put it all out into the light of day, make a thorough and detailed study on all Gulf War veterans – on all of them – to determine the origins and causes of the illnesses and the reports of transmission of the syndromes to family members. We have not had a situation like this before. We cannot have a situation where veterans, who have served their country, have come home and who are sick, and watch the military establishment, in effect, walk away from them. The story was always the same – veterans were challenged about their mental state. This is not a mental problem with the veterans. It may be a mental problem over at the Defense Department. It is not a mental problem with the veterans.'

By the time Riegle had concluded his investigation, more than 45,000 American veterans had come forward. The Clinton administration adopted most of his recommendations. They put up millions of dollars to fund research, ordered a full epidemiological study and set up helplines, support groups and therapy. Congress voted a system of *ex-gratia* payments in cases of hardship, pending the results of a full investigation. Meanwhile, teams of lawyers are preparing a mass of civil actions.

In Britain, the response was woefully tardy. Close to 1,500 veterans registered with lawyers as having had personal or family-related illness – including 40 cases of children born with defects. A group of British solicitors was formed to handle their cases, and pursue the Ministry of Defence and others for pensions and compensation. Hilary Meredith, from the Manchester solicitors involved in the bulk of the cases, made regular television appearances as the campaign for recognition



progressed – yet seemingly failed to deflect the denials of Minister Soames and his department. Almost two years would pass from the time of Riegle's onslaught against the Pentagon before the British government reacted to stinging criticism from its own Commons sub-committee high level medical opinion. In February 1996, they announced a formal inquiry into 'so-called' Gulf War Syndrome – but it would be three years before any conclusions were to be reached.

What haunts the campaigners is the spectre of the Agent Orange. Litigation for compensation took almost ten years to come to court, and \$184 million was won by the claimants, largely ex-servicemen, but the long-term health studies continued for more than two decades. Some observers concluded that the military on both sides of the Atlantic had no intention of making life easy for the present-day campaigners.

Pentagon reaction to Senator Riegle's demand for the de-classification of secret documents, for example, was somewhat cynical. It announced it was screening some 15.9 million pages of DoD documents and 2 million pages of intelligence reports to see what could be released. Of that number, the Pentagon estimated that around 1 million pages would eventually be released. But if the first 7,000 sheets posted by the beginning of 1996, and scanned for this book, are anything to go by it will be a fatuous exercise. Most of them amounted to nothing more significant than a note to the milkman.

Similarly, any British inquiry is unlikely to get access to secret documents, or the even more secret findings of Porton Down studies. As Hilary Meredith pointed out: 'It should not be allowed to drag on. Our people have already put up with years of anguish and pain. Some will not live to see the outcome. We have already had several deaths, and a suicide. The evidence is all around us. Deformed babies, a dozen reported miscarriages, two stillbirths that we know of in Britain.'

A central plank of any legal action the Gulf War veterans may take would be medical and scientific opinion as well as what happened in the theatre of operations. Porton Down's Dr Graham Pearson's view had already been made clear in a Department of Defense memo, that it was 'not useful to worry if Allied forces ever encountered chemical agents . . . because even if they did, such exposure would not have produced Gulf War disease.' The words 'no evidence' were repeated often by Pearson and others and angered the sick veterans like nothing else.



# FORGOTTEN HEROES

**T**HE BREATHLESS, SPLUTTERING voice on the answering machine that greets telephone callers to the home of Michael Roche, formerly of the Royal Engineers and now in ill-health and unemployed, is one of ironic, black humour: 'This is the Porton Down Division of British gas. Please leave a message . . . but don't make it too long, I might not last.' The words are tinged with bitterness.

As first reports of Gulf War Syndrome began to emerge, Roche was himself still fighting for Ministry of Defence recognition that he had been permanently disabled by the experiments he joined at Porton Down almost 30 years earlier. He noticed there were many similarities among the symptoms described by soldiers returning from the Gulf and those who had been exposed to chemicals at Porton and elsewhere. Apart from running his personal campaign, he had built up an archive on other examples.

By coincidence, the whole question of human guinea-pigs had come to public attention a year before the Gulf War began, when a hard-hitting documentary film, *Keen As Mustard*, was shown in Australia (but not in Britain, where documents relating to the incident are still classified). It focused on the Allied mustard gas trials on Brook Island, near Innisfail, Queensland, in December 1943, conducted by Allied scientists from Porton Down and Edgewood. As we have seen, Australian soldiers were recruited as 'observers' – as they were then



called – to test respirators, protective clothing and ointments as the Allies prepared for the Nazi gas bombardment that never materialized.

One of those soldiers was Tommy Mitchell, the young commando who was in the Aussie unit sent back on to the island without masks and protective clothing a few hours after six American B-24 Liberators had dropped bombs charged with mustard gas. Years later, he began to suffer severe lung problems and then heart trouble. In 1981, Mitchell and a number of his surviving colleagues launched a series of claims for compensation against the Australian government. It took almost nine years to win their battle, aided by the prodding of the television documentary researchers.

In March 1989, Australia filed a little-noticed document at the Conference on Disarmament in Geneva, at which nations had been asked to declare their stocks of chemical weapons. The Australian government, though never a CW manufacturer, was forced to admit that it had 'become aware of a small stock of chemical weapons' in Central Queensland, which had been left over from World War II. Almost immediately, the government ordered its lawyers to settle the outstanding compensation claims by World War II veterans, including that of Tommy Mitchell, who received a payment of £18,000. The Australian government also relaxed its rules for all other claims. The Director of Compensation for the Department of Veteran Affairs announced that the burden of proof would fall on the department to disprove any claim, rather than the other way about.

Around the same time, the issue was raised by veterans in Canada who had taken part in similar experiments in that country – again, linked to Porton Down. Canada's stance was the same as that of Britain. Veterans who could demonstrate that they had been exposed to chemical weapons during tests and had become incapacitated as a result could claim disability benefit – but not compensation. They still had to prove they were involved in the tests and therein lay the problem – and the get-out clause for the authorities. Because they were conducted in secret, records had either not been kept or had been destroyed. And so it was virtually impossible for veterans to establish their claims.

The same applied in America, until four World War II veterans in Florida read of the Australian case and launched their own legal action. The response was predictably the same as it had been for the previous 50 years: no documents, no proof, no cash. They took their case to Congressman Porter Goss, of Florida. He attempted to introduce private legislation on behalf of the four veterans, and in the



wake of the publicity many more who had remained silent began to come forward.

In June 1991, the US Department of Veterans' Affairs announced it would relax the burden of proof for certain conditions, including respiratory problems, chronic bronchitis, emphysema, asthma and various eye complaints. By then, the first indications of Gulf War Syndrome were already beginning, and the fight of the ageing US veterans was far from over. Still obstructed by the fence of secrecy and the lack of documentary evidence, they battled on. The National Academy of Sciences (NAS) took up their cause and investigated. A panel of eminent scientists produced a hard-hitting report castigating the Veterans' Affairs Department for dragging its heels, taking almost 50 years to acknowledge the problem even existed, failing to anticipate long-term health problems, and for ruthlessly threatening imprisonment to any one of them who broke the rule of secrecy.

The NAS report called on the US government to track down survivors of the thousands of men who had been exposed to chemical weapons from World War II and in post-war experiments, give each a medical assessment and pay compensation and benefits where necessary.

Not a lot happened until former Navy test veteran Nathan Schnurman from Charles City, Virginia, who had volunteered for six days of experiments with mustard gas in 1944, began his quest to find the records relating to his case. Until then, as required by his secrecy commitment, he had remained silent about the tests that brought him so much health trouble in later life.

At first, the Veterans' Affairs Department said they could not find any records relating to him. He went to the Department of Defense who offered to let him search their files provided he met the retrieval expenses of \$25,000. He could not pay, and they offered him access to other documents in the Maryland National Archive collection. He agreed, gave 24 hours' notice of his arrival, as required, and when he turned up at the centre to examine the files, was told by a mystified clerk. 'That's odd. Those records are just being moved to Edgewood.'

Schnurman went to a national television programme, *60 Minutes*, which began making its own inquiries. Three days before he was due to appear on the show, he received a letter from the Department of Veteran Affairs stating he would be granted a full disability pension. Later that year, the Americans announced a benefits package for survivors of chemical weapon exposure. The NAS also continued its battle to discover the extent of experiments and was forced to use the



terms of the US Freedom of Information Act. Even then, few documents were forthcoming and it was unable to establish a precise number of men who might have suffered long-term effects.

At best, the NAS could only estimate that 60,000 servicemen were exposed to mustard gas, lewisite and phosgene and perhaps as many as 90,000 military and civilian workers at chemical sites such as Edgewood might have been exposed to toxic fumes during its manufacture. The NAS tried one more assault on the attitude of the military, which has obvious relevance to the British experience with its demands that: 'Surviving family members of these veterans deserve to know about those testing programmes, the exposures and the potential damage they caused. For those veterans still living, diseases such as skin and lung cancer may still appear. Treating these ailments with the full knowledge of the likely causes should be the responsibility of the VA, and may be life-saving.'

Michael Roche could not agree more. While other nations were beginning to make amends to its CW victims, the British government remained steadfastly and resolutely unmoved.

Roche had made little headway. By 1993 he was severely restricted by his breathing difficulties, unable to work, unable to walk far and living from hand to mouth. Then he heard of Nathan Schnurman's similar battle in America, recounted on *60 Minutes*. He decided to attempt to contact other veterans in Britain, targeting specifically those like himself who had taken part in experiments at Porton. In January 1994, Roche formed the Porton Down Volunteers Association. Within a matter of months, he had been contacted by 250 other volunteers, and the widows of several others, all of whom had stories to tell of health problems. Nor could these be attributed to old age. Many ex-volunteers were still in their 40s and 50s.

Going through the returned questionnaires Roche had sent out to his members, he found the list of ailments was all too familiar to anyone who had been researching CB.W exposure for so long: throat and lung cancers, brain tumours, heart, asthma and other respiratory complaints, skin eruptions, nervous disorders, memory loss, eye and hearing failure, muscular and joint problems.

As Roche points out, he had reached out to a small percentage of potential victims in Britain. His membership was directed exclusively towards Porton Down volunteers, whereas experience in the US and Australia indicated that there might be many thousands of others who had suffered by some form of exposure in World War II. Even with the mass of new evidence obtained from his members, and the



knowledge of a change of heart in Australia and America, all Roche's efforts still found no hint of any change in British policy.

The response of the Ministry of Defence and Porton executives remained the same: 'There has been no evidence available to suggest that service volunteers who participated in human studies at CBDE, Porton Down have suffered any long-term effects.'

Dr Graham Pearson, director of CBDE, added his own personal assessment in response to the mounting interest of the media and members of Parliament: 'There is no evidence to suggest that there is a need to call back volunteers on a regular basis . . . in addition, over the past 40 years there is no evidence that service volunteers have had any deterioration in their health as a result of their participating as a volunteer in a study at CBDE.'

The phrase 'no evidence' was as laughable to Roche as it was to Gulf War veterans, particularly in view of the recent acceptance by Australia of the Toyber dictum: 'Absence of evidence is not evidence of absence.' Undaunted by the continuing refusal to acknowledge any suffering among past volunteers, Michael Roche, now with the support of 250 others behind him, pressed on with his campaign and received backing from an influential source. The Countess of Mar had been a long-time campaigner in the House of Lords for action to limit the use of organophosphates in pesticides following deaths and injury to workers, especially farmers using sheep dip.

She began investigating Roche's situation, allied to that of the Gulf War veterans, and established one surprising association between the pesticides and nerve gas, apart from the fact that both were derived from the organophosphate group of chemicals. The only tests on the effects on humans of organophosphates had been carried out at the CBDE at Porton, using Service volunteers. Manufacturers of organophosphate pesticides regarded tests on humans as simply 'too dangerous'.

The Porton tests were classed as 'biomedical research' and they were ethically conducted. That in itself, for the countess, raised another vital issue: the probability that the British government had broken 'at least four' of the ten principles of the Nuremberg Code, cornerstone of the Helsinki Declaration on Human Rights. She said:

'After the discovery of the horrific experiments conducted by German physicians and professors during the Nazi regime, and the doctors' trial at Nuremberg, the judges, concerned that never again should humans endure such suffering in the name of science, wrote the code into their final judgement. I have established that the



Government accepts all of the principles . . . and that the scientists at Porton Down are bound by them . . . or are they?’

The countess contends that four of those principles were consistently broken:

- 1) that no medical research may be carried out without the informed, free, express and specific consent of the person undergoing it;
- 2) that each person should be given full information on the reason for the research and told of any foreseeable risks and inconvenience;
- 3) that those undergoing research should not be offered any inducement that compromises free consent; and
- 4) that volunteers or their dependants should be compensated for injury or loss caused by medical research.

There was no scope for doubt that all of those principles had been violated and that, said the countess, was the foundation of her concern: ‘The organophosphates used in agriculture were developed first by the Germans prior to and during the war and later by the British and other nations for chemical warfare as nerve gases. These were tested on human volunteers at Porton Down. Some were exposed directly and others through protective clothing. There is a group of 300 men who underwent these experiments . . . some of whom had never volunteered, all were offered financial inducements very tempting to poorly paid Service conscripts . . . and many were misled to the extent that they believed they were merely testing a cure for the common cold and that any effects would be temporary and minor. In retrospect, many believe they have suffered the acute effects of exposure to nerve gas . . . in some cases, severe and prolonged. Yet not one of these men has been followed up by Porton Down or the Ministry of Defence and when they ask for help the shutters come down – as if they had never been to Porton. To me, there is no doubt that these men are chronically sick. And now we have another very large group of men and women from the Gulf War who are receiving very short shrift from the Ministry of Defence.’

Nor would there be any change in the policy of using human volunteers. In 1992 – the year in which the Gulf War Syndrome was becoming widely recognized – Porton more than doubled the number of service recruits used in experiments, compared with 1991. It continues today, and the tally since the end of the war now exceeds 12,000 men. The number of animals used in experiments, according to Porton’s own figures, had been ‘reduced’ to less than half of one per cent of the national total – between 12,000 and 15,000 a year. Overall, however, Ministry of Defence experiments using animals increased by



51 per cent in 1994, compared with a general fall of 10 per cent in Britain as a whole.

Meanwhile the Porton establishment continues to advertize for volunteers in the Service journals in these terms: 'Volunteers for studies at Chemical and Biological Defence Establishment Porton Down – Volunteers could earn up to £250 (less tax) or in special cases more for a 3 week study and proportionately less for shorter studies.'

There is no mention in the advertisements that men are needed for tests in the £3.5 million containment building at Porton, opened in 1995, which houses a brand new gas chamber where the next generation of nerve agents and other insidious chemicals will be tested 'for defensive purposes', notwithstanding the fact that America banned nerve gas experiments on humans 20 years earlier. The new complex was built to replace four existing buildings consisting of two gas chambers, a respirator fitting and testing unit and bathhouse and store. Two of the buildings dated back to 1918, the others were built during World War II and it would have been too expensive to refurbish them.

The continuing need for these experiments was explained by Dr Graham Pearson in his last annual report, which he presented to the MoD before his retirement in 1995. Although the tone was one of haughty weariness at having to explain to the critics for the umpteenth time Porton's reason for existing, it highlighted the dilemma of scientists and the military. Porton's key aim was to ensure that British troops possessed the best possible protection against CB attack. That, said Pearson, could only be achieved by experimenting and modernizing, and that involved humans and animals, under the watchful eye of an independent Ethics Committee.

Over and above that, Pearson insisted, they had to scour the world, watch the marketplace, to make sure that no chemical or biological agents were developed by a potential aggressor that was beyond the scope of present protective equipment and drugs. The 1993 International Chemical Weapons Convention, which prohibits the development, production, stockpiling and use of chemical weapons, signed by 159 nations (but ratified by only 27), provided 'no grounds for complacency'.

Organophosphorus nerve agents, which Pearson described as the 'most potent of the classical CW agents', still represented the greatest threat. It remained the case – as Saddam Hussein, Colonel Gaddafi and the leaders of a host of other volatile nations have proved – that any despot legitimately acquiring chemicals for pesticide production



could easily turn them into an effective chemical armoury. Porton's secret war was no longer about advising on a defence against nations building huge stockpiles of chemical weapons. Long storage life was no longer the main criterion.

Weapons could be created fast and effectively, especially by small terrorist units styled on the lines of the wartime Japanese saboteur groups. The Japanese religious fanatics demonstrated the simplicity of such a terrorist operation in the Tokyo underground in 1995. For the price of a few barrels of organophosphate compound and with the co-operation of a scientist with reasonable knowledge, anyone could make a bomb capable of killing thousands. The Tokyo subway attack with home-made sarin killed eight people and injured several thousand others.

More worrying to Porton's military masters, however, were apparently deliberate attempts by the Russians to find a loophole in the Chemical Weapons Convention. Pearson made an oblique reference to it in his final report. Recent intelligence, confirmed by two Russian scientists interviewed in the West, showed that Russia had developed three new nerve agents involving precursors not listed in the Chemical Convention schedules. One of them was similar to the Porton-developed VX agent. The other two were more disturbing. They were known to be five to eight times more effective than VX as a battlefield weapon.

Meanwhile, the Russian BW teams still maintained their research on genetically engineered biological agents, primarily using the military men's old favourite, anthrax – in spite of earlier undertakings to Western leaders. A meeting of 160 international scientists at St Alfred's College, Winchester, in September 1995 was told that the Russians had finally perfected their genetically engineered variation of the anthrax toxin, for which there was no known antidote. It is totally resistant to all known antibiotics. This merely confirmed what MI6 and CIA observers already knew. 'That one development alone is sufficient to create the absolute doomsday scenario,' said one intelligence source interviewed for this work, 'and the people at Porton know it only too well. They have been studying it themselves, just as they have in the US. The calculations of its effect speak for themselves. In theory, a thimbleful would be more than adequate to decimate the population of a city of a million people. In the wrong hands or with some madman in control . . . well, you can paint your own picture.'

Advanced Russian knowledge is already reaching those wrong hands. Tracking the leakage of nuclear and CB technology from the



former Soviet Union has become one of the main pre-occupations of the intelligence community and the FBI. Hard-up or redundant scientists from its crumbling state enterprises are an easy target for those with foreign money. Former Soviet technology – and stolen equipment – is appearing in many parts of the Third World. China has a large commitment to CB research. So does North Korea. The CIA, however, has once again focused on Libya as one of the principal recipients of Soviet materials and knowledge.

In 1993, it discovered that Gaddafi was building a massive new underground factory carved out of the mountains at Tarhunah, 40 miles south of Tripoli. It acquired copies of the plans of the building, which covered a 6-acre land area and was estimated to be costing around \$500 million. It was judged to be capable of producing 2,500 tons of chemical agents a year, sufficient for Gaddafi to go into the wholesaling business supplying stocks to his close allies.

In December 1995 a combined US intelligence assessment was presented to President Clinton, expressing fears that the old adversary who had haunted the Reagan administration had managed to build a plant that the US would find virtually impossible to ‘neutralize’ by bombing, should it become necessary. Work on the underground construction had begun alongside a fresh-water project Gaddafi’s civil engineers had designed to divert river water to the desert. The complex included steel shelters supplied by Russia, making the site fairly impregnable, certainly by an aerial attack.

With their penchant for unveiling a model plan for every eventuality, US military intelligence had devised what they considered the only practicable way of knocking out the plant – a commando assault force. But the risks are so great that no such attack stands a chance of presidential approval. MI6 also pulled off something of a coup in 1996 when it blocked Gaddafi from obtaining biological technology from South Africa, though that news was offset by intelligence that Saddam Hussein was already rebuilding his BW plant, hidden away in a deep underground complex, 30 miles from Baghdad. In March 1996, six Gulf Arab states ended a two-day conference in Dubai with a communique accusing Iraq of resuming its production of germ and chemical warfare weapons and urged the world to keep the pressure up on Baghdad to comply fully with UN disarmament resolutions.

And so it goes on.

Critics of continued British and American counter-offensive research into CB.W are easily matched in number and in argument by those who support it. If Lady Thatcher is proved right in her warnings



of impending doomsday, which she made in a speech at the beginning of 1996, CB warfare represents one of the greatest threats to world peace in the foreseeable future, quite simply because it is increasingly being seen as the poor man's answer to nuclear technology.

Porton Down CBDE, nurtured through eight decades by the military and successive governments of every political party, used and protected by the intelligence community, acquired a certain arrogance that was for years so evident among its senior staff. They were, and still are, The Untouchables of the Ministry of Defence, the Jewel in the Crown. Any hopes that its importance to the nation's defence strategy was being downgraded were ruled out in 1995, when it was relaunched as a subdivided government agency, retaining its title of Chemical and Biological Defence Establishment, but part of a wider group to be known as the Defence Evaluation and Research Agency. By the very nature of its business, its future is assured.

Michael Roche does not argue about the defence needs of the nation. What does concern him and his colleagues is the appalling, dismissive treatment that they – and many Gulf War veterans – have received. From Porton's claim that no long-term contact with volunteers was necessary, to what amounted to the brush-off from the minor tin gods who populate the corridors of the Ministry of Defence, and from ministers themselves, they have received no official recognition of their contribution to research. 'Many of the volunteers were frightened of ever mentioning the name of Porton Down,' said Roche. 'But I think the time has come to come out and say, "Look this happened to me, and these are the effects. Investigate please." Is that asking too much?'

Few in the seat of government have bothered with them or their health, although ten months after the Countess of Mar took up her cause in the House of Lords, Roche finally had some good news. On 3 August 1995, he received a letter signed by the Minister of State at the Department of Social Security. It read: 'Insofar as the personal injury of former Sapper Thomas Michael Roche of the Royal Corps of Engineers is due to anything suffered by him as a result of his service in the Army between February 16 1952 and April 2 1968, I hereby certify that his suffering that thing has been treated as attributable to service for the purpose of entitlement to an award under the Naval, Military and Air Forces Service Pension Order 1983.'

His disability had finally been recognized. The irony was that nothing had changed since he began his campaign – except that his condition had grown steadily worse. Lawyers see Roche's victory,



modest though it is in financial terms, as a significant step as they begin to put together a case for the volunteers who have joined Roche's association. Alan Care, of the London firm Leigh, Day & Co. who have previously had dealings with Porton Down, launched an action against the MoD on behalf of six sample volunteers who have a long history of medical complaints. His quest was not dissimilar to that of Hilary Meredith as she pursued the Ministry on behalf of the Gulf War veterans. Care said: 'There is, finally, an admission in the case of Michael Roche that he was incapacitated by his experiences at Porton. There are many like him. They deserve recognition for the way they have suffered in performing what, after all, was a selfless act.'

As the lawyers gather for their separate confrontation with officialdom for what is expected to be a long battle to find justice, much will be made on behalf of both the Gulf War veterans and the Porton volunteers of article 3.1 of the Nuremberg Code, which declares that no medical research shall be carried out without the informed, free and specific consent of the person undergoing it.

Michael Roche will undoubtedly remind them of the second article of the code too: 'the interest and wellbeing of the person undergoing medical research must always prevail over the interests of science and society.'

In spite of their personal bitterness, however, Roche and his colleagues do not deny the importance of safeguarding troops and civilian populations from any chemical and biological incident. In a way, he says, they are living proof of the effects of even limited exposure and that the possibility of attacks on a mass scale are too horrific to contemplate. The threat is alive and well, and in the hands of a few unstable governments and dictators. The upsurge in terrorist activity in the 1990s has also reaffirmed a strong belief among the intelligence community that it is only a matter of time before chemical weapons, now so readily and cheaply manufactured, could enter this arena, too. That prospect was extensively explored at the G7 summit of leading industrial nations in Paris in July 1996, and one that was placed high on the agenda of new initiatives to counter such attacks.

If it ever happened, research from those simulated attacks on cities and underground rail networks, the years of study on protective and defensive measures, the search for antidotes and effective treatments, would all come into play. As ever in this highly emotive and exceedingly lethal issue, the moral dilemma becomes more complex with each passing year.



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# CHAPTER NOTES

## Prologue

Descriptions of scenes in the theatre of operations as the Coalition forces switched from Desert Shield to Desert Storm, along with reports of suspected CB.W content of Iraqi Scud, and evidence of airborne agents from Iraqi chemical installations bombed by Allied aircraft, were drawn from personal interviews and the testimony of 600 servicemen to the US Senate Committee on Bank, Housing and Urban Affairs hearings 1992/94. The inquiry was set up under the chairmanship of Senator Donald Riegle to investigate the dual-use weapons exported to Iraq prior to the Gulf War and extended to the impact on the health of GW veterans.

The recollections of Dale Glover, Harold Edwards, Fred Willoughby, Roy Morrow, William Brady were taken from sworn testimony to the senate committee or members of its staff; also *US Marines in the Persian Gulf, 1990–1991*, an official report published in 1993 by the History and Museums Division, Headquarters, United States Marine Corps, Washington, DC, and Richard Turnbull, in an interview, 1995, and quoted in *The Independent on Sunday*, 12 February 1995. Other sources: principally, ‘The Tuite Reports’ 1993–5, by James Tuite, chief investigator for Senator Riegle; Report of the Defense Science Board Task Force on Persian Gulf War Health Effects, Office of the Under-secretary of Defense for Acquisition and Technology (Washington, DC: DoD, June 1994); and DoD Press Release, June 23, 1994; suspect storage tank report prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordnance, August 7 1991, classified in Britain but the contents of which were publicly revealed at the US Senate

Committee hearings staged by Donald Riegle; along with the report of Captain Michael Johnson, of US Chemical Munitions and NBC units, 4 January 1994. Other references were to be found in a memorandum to Lt Col. Vicki Merriman, Office of the Deputy Assistant to the Secretary of Defense for Chemical and Biological Matters, from Dr Graham S. Pearson, CBDE, Porton Down.

Czech Chemical Decontamination Unit reports of chemical detection in the theatre of operations, originally filed to the Saudi Arabian Defence Ministry, March 1991, and subsequently to the US Department of Defense in June 1993. DoD attempts to downplay the Czech report, quoting the view of CBDE director Graham Pearson, contained in DoD file No. 68360155.94d, headed ‘British position on chemical agents in the Persian Gulf’; ‘Tests on biological agents in samples from the Gulf’, report to Senator Riegle, by the Lawrence Livermore National Laboratory Forensic Science Center, 15 April 1994. Sources for the summary of events in this preface are contained in notes to later chapters where these topics are dealt with in full.

## Chapter One: The Haunted Garden

Life beside the Porton establishment was recalled in interviews with local residents, including former CND activist Richard Harvey, who also joined local archaeologists on a visit to the establishment. Porton’s own literature catalogues the wealth of flora and fauna and sites of particular archaeological interest and it is also in G.B. Carter’s *Porton: 75 Years of Chemical and Biological Research*. Early development of Porton as a research establishment was drawn from the reports of Lt Col.



Arthur Crossley, professor of organic chemistry at King's College London, secretary of the Scientific Advisory Committee of the Ministry of Munitions in 1916 and Porton commandant, who was a prolific writer on his establishment's early work. His 1919 account, known as 'The Crossley Report', was not released into the Public Record Office (WO142/265), along with an anonymous brief history of Porton (WO188/785), until 1981.

The description of the first use of gas in World War I was drawn principally from the accounts of Sir John French, Col. E.D. Swinton, and the Canadian Record Officer, which appear in *World's War Events*, Vols 1–3, and the archives of the British Trench Warfare Department, along with a vast collection of other files at the PRO, in WO142 series, WO35/5185 and Gas Shell Bombardment of Ypres, 12–13 July 1917, in WO32/5176. The diary of American surgeon Harvey Cushing is recorded in 'Gas: The Cry of Ypres' by Hanson W. Baldwin, *New York Times Magazine*, 18 April 1965.

The post mortem report by Lt McNee is in WO142/99. The story of the nucleus of experts is from *Gas: The Story of the Special Brigade* by Charles Foulkes and Robert Graves, *Goodbye to All That*, London, 1929.

## Chapter Two: The Humane Killer

Early development of Porton is described in 'A history of Porton' by Lt Col. A.E. Kent, written in 1960, but which remained a restricted document for in-house use only until it was declassified in 1987. A vast collection of files amounting to several thousand pages relating to Porton work between 1916 and 1929, detailing experiments and trials, was lodged at the Public Record Office for viewing by historians between 1981 and 1987, along with the annual reports of the Chemical Warfare

Research Department, under WO33/1014 through to WO233/1231. They contain the most detailed view of Porton's research and attitudes. J.B.S. Haldane's *Callinicus: A Defence of Chemical Warfare*, London, 1924, and a review in the *London Illustrated News* in the same year, underpins the 1920s' view of the pro-gas lobby that chemical warfare was the way of the future.

The experiment with cyanide gas by Sir Joseph Barcroft and the dog is described in WO188/373. Porton studies on delayed effects of WWI gassing, are in WO188/265 and also in the World Health Organization Report, 1970 (see bibliography).

## Chapter Three: Hitler's Secret Agent

The initiation of the Japanese germ warfare project in south Manchuria after its invasion of that region in November 1929 is drawn from numerous reports and files from various sites, including more than a dozen at the PRO in the WO188 series and PREM 3/65 relating to suspected trial bombing raids on China using BW agents and from Combined Intelligence Operations papers, 1945–6, notably in the British Intelligence Objectives Sub-Committee (BIOS) reports Vols II–V; and Mukden files, National Archives, Washington.

The 'emergency' response to the threat of BW in Britain, led by Sir Maurice (later Lord) Hankey, is described in G.B. Carter's *Porton Down: 75 Years of Chemical and Biological Research*. Also consulted: *Hankey: Man of Secrets* by Stephen Roskill, London, 1974; and specifically the 1937 Committee for Imperial Defence reports, PRO CAB4/26.

Descriptions of the Italian gassing of Abyssinia were drawn from contemporary reports. The discovery of nerve gas by Professor Gerhard Schrader and discussion is contained variously in several files in the WO188 series, with



precise details in Combined Intelligence Objectives Sub-committee reports Nos 30 and 31. The progressive development of Germany's overall CB.W capability is contained in numerous reports compiled after the war, notably from interviews with German scientific personalities, contained in BIOS reports Nos 9, 41, 138, and 542.

#### Chapter Four: A Million Tons of Mustard

Professor Frederick Lindemann, later Viscount Cherwell, was one of Winston Churchill's closest friends and wartime advisers on the use of poison gas. According to Martin Gilbert in *Finest Hour* (p. 593), he saw most confidential documents and many of his draft letters to Churchill were circulated unaltered above the premier's signature. His theories on anti-invasion plans were included in a letter to Churchill on 12 May 1940. Churchill himself began contemplation of drenching British beaches with mustard gas: 'I have no scruples, except not to do anything dishonourable,' from the Colville Papers, 1 July 1940, quoted by Gilbert (p. 618). His demand for a full state of chemical readiness is in PRO PREM 3/88/3, folio 250, and regarding involving the United States in PREM 3/88/1, folio 241. Stocks of CW weapons are listed in G.B. Carter's history of Porton, while the American output is contained in *The Redstone Complex: The Pre-missile Era* (1941-3), produced by the Redstone Arsenal, Maryland.

The sequence of experiments on humans, recounted by Harry Hogg, Russel O'Berry and Nathan Schnurman in interviews, 1994/95, with the author, newspaper articles in the US, Australia and Canada (see bibliography) and principally in two television programmes, *60 Minutes* in the US and the British Network First documentary,

*The Secrets of Porton Down* (Observer Films in association with Ray Fitzwalter Associates, a Granada Television presentation for ITV, 1994). The Australian experiments were first revealed in the Australian television documentary *Keen as Mustard*, 1989, and subsequently in testimony by Tom Mitchell and others in claims for compensation. Confirmation of experiments in India, Canada and Porton, and descriptions of the latter, are contained in 29 PRO separate files relating to the human experience and experiments with animals in the WO188/189 series.

#### Chapter Five: Killing them Softly

A large number of eye-witness accounts of Japanese bombing raids over China, alleging the dropping of plague-infected rice and the Ch'angte incident are recorded in the PRO WO188/189 files. More precise details of General Ishii's Pingfan biological research station are included in a mass of intelligence documents, placed under the same reference at the PRO, and more extensively in the National Archives, Washington, and in the British Intelligence Objectives Sub-Committee *Scientific Intelligence Survey*, Vol. V, September 1945. Although most of the wartime documents on British experiments in biological warfare remain classified, details of the initial preparations to build an anthrax bomb seem to have been inadvertently attached as an appendix to a 1945 report to the Joint Technical Warfare Committee entitled 'Potentialities of Biological Warfare during the next ten years' (PRO DEFE2/1252). This related specifically to the calculations for a BW attack on German cities, leading to trials on Guinard Island and the calamitous poisoning of its soil for almost half a century. Accounts of local reaction were taken from a *Daily Telegraph* report, 22 March 1967.



Original proposals to drop infected cattle cakes over Germany were drafted in a 'most secret' memo to Winston Churchill from Lord Hankey, dated 6 December 1941 (PRO/CAB120/782). A reply authorizing a more detailed projection demanding total secrecy is under the same reference. Details of the final plan, as delivered by Dr Paul Fildes, and his exchanges with Unilever, along with the selection of 29 soap factory workers, are contained in the WO188 lists. The conclusion of this story and an account of the decontamination of Gruinard Island is included in G.B. Carter's history of Porton.

### Chapter Six: The Unfought Battle

In spite of a flurry of rumours, the Bari explosion of the US gas-carrying ship SS *John Harvey* (WO193/712): 'Most secret' report: 'Toxic Gas Burns Sustained in Bari Harbour Catastrophe' was kept under wraps for almost two months, which is why Eisenhower, in an attempt to halt news leaking, suggested 'coded' descriptions of the cause of death to be given to relatives (WO193/712 January 2 1944). It was not merely public sensitivity that the Chiefs of Staffs were concerned about (CAB79/77) but the German misreading of the gas being brought into the heart of operations. The rash of intelligence reports that followed, listed in this chapter, demonstrated the heightening tensions of a possible attack (WO188/189), culminating in Churchill's demand for consideration by the CoS for proposals for the use of CB weapons. The episode that followed and brought Churchill into conflict with his commanders and President Roosevelt, who urged him not to push for a chemical attack, are contained in PRO CAB84/64 and PREM 3/89. Germany's preparedness for CB attacks is covered in numerous files in the PRO WO188/189 series and in the BIOS final

report on 'The Interrogation of Certain German Personalities Connected with Chemical Warfare', No. 542. The discovery of the nerve gas shells is also in WO188 and the impact of it in SIPRI, *The Rise of CB Weapons*, and G.B. Carter's history of Porton.

### Chapter Seven: Spoils of War

Many tons of documents, photographs, laboratory samples and equipment were gathered up by Allied recovery missions in Europe and the Far East as the war ended, and a great deal of it was so sensitive that it was never released into the public domain. A number of specific missions by senior Porton officers, including those of the Captains W.J. Cromartie and Carlo Henze and Major Evans, and their visits to Natzweiler Concentration Camp are, however, recorded in WO188 files, which also include various photographs taken by the officers concerned. Other material on their discoveries was to be found in Report No. 30 of the Combined Intelligence Objectives Sub-Committee and the BIOS reports on the interrogation of personnel at German CW installations, and from files recovered from Spandau. The work of Major Barnes is also referred to in G.B. Carter's history of Porton. Many documents relating to General Ishii's experiments at Pingfan and the operations of the notorious Unit 731 of the Japanese Army remained classified until the 1990s.

The so-called Mukden files, counter-intelligence reports relating to the capture and interrogation of Ishii by General MacArthur, and experiments on Japanese prisoners of war were quietly released to a Japanese historian in 1994, and subsequently viewed at the National Archives by Washington-based researcher Greg Rodriguez, jnr, whose father was among the Mukden prisoners who had, for four decades, been suffering



ill health. He had been campaigning for many years for information about the alleged atrocities at the Mukden PoW camp, which the Japanese and the US had always denied. The evidence of former PoW Frank James is included in a report of a House of Representatives Sub-Committee, 1986, in the National Archives, Washington, which was quietly dropped by the Reagan Administration and only brought into the public domain by persistent pressure from the US-based Alliance for the Preservation of Truth of the Sino-Japanese War.

In Britain, further insight was obtained from the BIOS Report on Scientific Intelligence Survey in Japan, Vol. V ('Biological Warfare', September 1945) and intelligence documents that flowed to Porton, located in PRO WO188/189.

### Chapter Eight: The Volunteers

The post-war statement of intent to rush ahead with gas and germ warfare, in spite of the many causes for concern that had become evident in recent months, was demonstrated in the readiness of the Chiefs of Staff to accept without challenge the report of Sir Henry Tizard ('Future Developments in Weapons and Methods of War': PRO/COS [45]402 and WO189/2587). Chemical weaponry was on the agenda of the British government's military advisers almost continuously for the next decade (notable in COS/DEFE2-24; 2-433, 4-3 and onwards). The commitment of the US to its Edgewood and Fort Detrick establishments, with massive investment that had been ploughed into the American CB effort during the war, was in no way curtailed in the aftermath, in view of fears that the Soviets had acquired the same Nazi and Japanese technology in nerve gas and germ warfare. The 'desperate preoccupation' with nerve gas is admitted by G.B. Carter's history of Porton (p. 56) and, in

the same discussion, is the difficulty of experimenting with 'unprotected men'. But men were used, as confirmed by the testimony in this chapter of two of the early volunteers to Porton's programme of testing agents and protective measures on servicemen. The descriptions of Gerald Beach and George Abbot were taped by the author in February 1996. For an account of the experiences of Tom Griffiths and the Nancekuke plant, the author is grateful to Elizabeth Sigmund whose own book, *Rage Against Dying*, was published in 1980 (pp. 28-40) and whose knowledge of CB.W admirably equipped her for a 1990s' role as adviser to the Gulf War Veteran Association. Trevor Martin told his story to the *Sunday Times*, 7 December 1969. The cloak of silence surrounding the Ronnie Maddison case has been maintained to this day; no documents relating to it have been published. Various contemporary newspaper accounts were consulted along with references in *A Higher Form of Killing* by Harris and Paxman.

### Chapter Nine: It Wouldn't Hurt a Mouse

Michael Roche provided his extensive recollections of his visits to Porton for the author along with a good deal of his other personal research that appears at various points in this work, leading ultimately to his formation of the Porton Down Volunteers Association (detailed in the final chapter). Though much of the documentation on the CIA's LSD experiments remains classified, some details have emerged from various government inquiries over the past 20 years. The first real intimation of their scale came during the 1975 Church Senate Committee hearings on Alleged Assassination Plots Involving Foreign Leaders.

Among all the CIA's dirty linen that Senator Church hung out was an uncon-



firmed report that the President of Egypt Gamal Nasser was among the CIA targets, specifically at the request of British Prime Minister Sir Anthony Eden after the Suez crisis. It was also during these hearings that relatives of Frank Olson first discovered that his suicide came after he had taken LSD at Dr Gottlieb's behest – a fact that had remained secret for 20 years. Although his widow, Alice, had been receiving a full pension since he died, lawyers took up the case and very quickly obtained \$700,000 compensation from the government and a letter of personal apology from President Ford. Fuller details, though by no means all, of the projects that covered experiments with LSD emerged during 1976 joint Senate hearings before a Select Committee on Intelligence and a Sub-committee on Health and Scientific Research. Its report of the First Session, *Project MKUltra: The CIA's Program of Research in Behavioral Modification*, was published by the US Govt Printing Office, 1977 (pp. 122–6). The report also covered another CIA project, MKNaomi (in pp. 68–70), the object of which was to 'stockpile severely incapacitating and lethal materials for use by the TSD (Technical Services Division)'. Further references are to be found in John Ranelagh's *The Agency*.

The programme was halted in 1970 after President Nixon announced a ban on the use by any US agency and military of biological weapons that kill or incapacitate. The 11 files on Porton's experiments with LSD were contained in the 1996 new release folders at the Public Record Office, pending allocation to the usual class lists.

### Chapter Ten: Testing Bugs on the Masses

The spreading of bacteria on the London Underground was first revealed in a brief summary of the experiments in

PRO files opened under the 30-years rule in the DEFE class lists, although further releases of tests foreshadowed in the 1963 reports have not, at the time of writing, been made public. Similarly, the US Army tests on the New York City Subway remained classified, although the Pentagon has admitted that seven or eight such experiments were carried out. Details of the Porton experiments conducted at sea also remained restricted, and scant detail had been released into the public domain. They were first mentioned in *A Higher Form of Killing* by Harris and Paxman (pp. 155, 169). A brief summary was also included in G.B. Carter's history of Porton (pp. 65–6) and additional information has been obtained by the author from private sources. No full accounts of the San Francisco trials have been made public, either. However, doctors who treated a number of patients for serraria in an outbreak at the time the city was sprayed (1977), felt it was such a rare occurrence they prepared an article for the *Archives of Internal Medicine*. They named one victim who died, one Edward Nevin who had gone into hospital for a routine prostate operation, then suddenly fell ill and died. He had the same organism that the US scientists had used in their spraying. Documents later unearthed by the *Washington Post*, in 1979, estimated 800,000 people had been sprayed with the bacteria. A young lawyer from San Francisco read of the story, and was amazed to discover that the Edward Nevin who died was his grandfather. The Nevin family sued the US government for compensation. The case was thrown out within two months, not because the government denied the experiments had been carried out, but because the judge ruled it was impossible to prove the basic elements of cause and effect after 27 years. Even so, one of the authors of the original report on the strange outbreak of illness in San



Francisco in the year of the US tests, Doctor Richard Wheat, remained adamant that the spraying of the bacteria on a mass population was 'not without some risk'. Meanwhile, the results of the mosquito experiments are contained in the archives of the US Army Chemical Center at Maryland.

### Chapter Eleven: An Eyeful of CS Gas

Two major reports at the start of the 1970s highlighted the alarming spread of CB weaponry and the increased potency of a range of chemical and biological agents now proliferating around the world. The vastness of the two studies provided for the author a wealth of detail for this chapter and, indeed, the whole of this work. The first was the World Health Organization's report, *Health Aspects of Chemical and Biological Weapons* (1970), produced by a panel of international scientists of the highest calibre. As is detailed in this and other chapters, the panel was damning in its assessments of the continued race for CB supremacy by the major powers, and warned of the dangers of these new weapons reaching the hands of terrorists. More specifically, however, the WHO report concentrated on a seemingly appalling disregard for the human populations who might be subjected to CB agents, either accidentally or by intent. More wide-ranging was the series of volumes produced by the Stockholm International Peace Research Institute. The first, *The Problem of Chemical and Biological Warfare*, was a 361-page history of CB.W prepared by the British chemist Julian Perry Robinson, today one of the world's foremost authorities on the topic. His wealth of statistics noted that since 1914 there had been 23 conflicts in which chemicals had been used and 13 using biological weapons. Both the SIPRI and WHO reports made particular reference to the increasing use

of anti-personnel agents, such as CS gas.

John Longden provided the author with his personal account of that material. His experiences as a Porton volunteer were described in a taped interview in February 1996. Details of the research and development of genetically engineered biological weapons is contained in a number of reports in the National Archives, Washington, and from the author's own research and interviews with private sources. See also 'Planning a Plague?' by John Barry, *Newsweek*, 1 February 1993, and 'The Red Death' by James Adams, *Sunday Times*, 23 February 1994.

### Chapter Twelve: Sacrificial Slaughter

Porton's dismissal of public concern, suspicion and opprobrium is recorded by G.B. Carter (pp. 70–71), while details at last of Geoffrey Platt's accidental infection with the deadly virus ebola were revealed after the 1994 outbreak of the disease in Africa. Mr Platt, by then retired, had permission to speak about his own traumas at the time. Meanwhile, the public concern that Porton largely ignored was aroused by the series of articles leaked in the *Western Daily Press* on 'terrifying breakthroughs' in work behind the closed doors of the Porton experimental labs. The author was given excellent co-operation at the local offices of the WDP and the *Salisbury Journal*, which has dutifully kept its readers informed of Porton activities evidently without fear of upsetting the establishment, even if on occasions their stories have attracted the interest of the Special Branch.

The National Anti-Vivisection Society (NAVS) had increased its monitoring of Porton around this time, along with other animal welfare groups following the local rumours of quite terrifying experiments. Ongoing publicity concerning the role of Porton Down produced a reaction in the House of Commons on 23 March 1984,



in answer to a written question by Mr Robert Key, Conservative MP for Salisbury, in the wake of protest demonstrations by the combined forces of peace campaigners and animal welfare groups. Mr Key asked the Secretary of State for Defence to make a statement on the 'particular contribution made by experiments involving animals and by service volunteers'. The long reply by the Defence Minister referred specifically to the wounding experiments on animals. He said that in 1983, 51 animals were used in wounding studies, but the work was vital to 'increase knowledge of the effects of wounds, contributing to the improvement of treatment'. CS gas experiments were staged to 'limit' the risk to humans in riot situations, and the use of service volunteers was required to ensure standards of protection for troops. They 'freely volunteered' and were well briefed. It was, however, impossible to give precise details of experiments and species of animals used because it would 'enable an informed observer to gain a useful insight into the scope of the establishment's work ... which must be protected in the interests of national security'.

Details of them could be obtained elsewhere. The series of experiments outlined in this chapter were to be found from the following sources: 'The Protection of Primates Against Soman Poisoning by Pretreatment with Pyridostigmine', *Journal of Pharmacology and Pharmacology*, Vol. 31, pp. 295-9; 'The Efficacy of Bispyridinium Derivatives in the Treatment of Organophosphate Poisoning in the Guinea Pig', *Journal of Pharmacology and Pharmacology*, Vol. 35 (pp. 427-33); 'Repeated Dose Study of the Toxicity of Inhaled 2-Chlorobenzylidene Malononitrile (CS) Aerosol in Three Species of Laboratory Animals', *Archives of Toxicology*, Vol. 52 (pp. 183-98); 'The Effect of Prior Treatment with 4-Dimethylaminophenol [DMAP] on Animals Experimentally Poisoned with

Hydrogen Cyanide', *Archives of Toxicology*, Vol. 51 (pp. 247-53); 'Experimental High-Velocity Missile Head Injury', *Injury*, Vol. 14 (pp. 183-93); 'The use of miniature pigs to determine treatment in humans of mustard gas burns', and 'The use of pigs in the calculation of injury from blast waves', from statement by Dr Graham Pearson, director, in the 1995 annual report of the Chemical and Biological Defence Establishment.

### Chapter Thirteen: The Arming of Saddam

Details of the activities of Dr Barbouti were obtained from intelligence sources and from contemporary reports (*Sunday Times*, *The Observer*, *New York Times*, variously published between 1985 and 1989). This information was further supplemented by the testimony of Dr Gordon Oehler, director of the Nonproliferation Centre of the CIA, who set out precise details of the CB material and installations acquired by Iraq and Libya in a long statement to the Senate Committee on Bank, Housing and Urban Affairs hearings, 1992/94. Also consulted for this chapter were the reports of the 1988 Report of Physicians for Human Rights on the massacre of the Kurds, and 'Abuse of Iraqi Children by Security Forces', a report by Amnesty International, 14 March 1989. Dr Barbouti's purchase of the Florida 'cyanide' factory was first reported in the *Financial Times* after a joint investigation with ABS's *News Nightline* in America, July 1991, and supplemented here with additional detail from intelligence sources interviewed for this work, and with Dr Oehler's own evidence on protecting intelligence 'assets'.

Secretary of State James Baker's frantic letter concerning exports to Iraq was revealed in evidence to the Senate Committee of Inquiry, and highlighted by the chairman, Senator Riegle.



### Chapter Fourteen: A Deadly Christmas Cocktail

CIA assessments of Saddam Hussein's CB.W capability were provided by Dr Gordon Oehler, with additional information on the export of American and European products to Iraq in the years before the Gulf War from Edwin Dorn, of the US Department of Defense. His testimony to the Senate Committee on exports confirmed the tensions that existed within the Pentagon at the time troops were ordered to the Gulf. A fuller version of the US DoD/CIA calculations referring to what exactly Saddam Hussein possessed in both CB and conventional weaponry, along with the assessments of a possible 40,000 casualties in a ground war, were in the first 7,000 pages of documents declassified by the DoD in February 1996. The memoirs of four leading figures in the campaign were consulted: General Sir Peter de La Billiere, Commander of the British force, General Norman Schwarzkopf, overall Commander, General Colin Powell, chairman of the US Chiefs of Staff and HRH General Khaled Bin Sultan, Commander of Joint Forces and Theatre of Operations (see bibliography). Although their reflections on the extent of the CB.W threat are scant, they portray a pre-war scenario of uncertainty, anguish, delays, political considerations and high-level disagreements over the extensive use of pre-treatment vaccines and tablets among the Coalition forces. All carefully avoid the emotive issues of Gulf War Syndrome.

The preparedness of the Porton establishment to meet the challenge of the Gulf War was confirmed by Dr Graham Pearson in a statement to the *Salisbury Journal* in September 1990. Details of the vaccines and pre-treatment tablets against nerve gas attacks were contained in a report of the US Department of Defense Medical Task Force to the Pentagon, August

1994, and to the House of Commons Select Committee in Britain; confirmation that two of them were unlicensed was provided in evidence to both of those bodies. That point was also taken up by the Countess of Mar in a speech to the House of Lords, October 1994, when she asked the government to state 'whether the principles of the Nuremberg Code and the Declaration of Helsinki, 1964, have all been accepted by the Government of the United Kingdom, and whether these principles applied to members of HM Forces volunteers as well as civilian volunteers for research'. The answer from the government benches was, in a word: 'Yes.'

The warnings regarding nerve gas treatment were contained in a Royal College of Physicians report to the Health Minister, and for onward transmission to Gulf War medical officers in February 1991. The US deficiency in anti-bodies for botulinum toxin was mentioned in passing by General Colin Powell in his memoirs (pp. 494, 505 and 507) and confirmed during the Riegle Senate Committee hearings, while Sir Peter de la Billiere recalled the debilitating effect of the vaccines on his men (*Storm Command*, p. 174).

### Chapter Fifteen: Atmospheric Overload

Details of the 'poisoned air' theme of this chapter were gleaned from numerous sources: from the statements and evidence of 600 Gulf War veterans interviewed by the staff of Senator Riegle and published in the final report of the committee in May 1994; from the report of James Tuite, chief investigator for the Riegle Committee, 'When science and politics collide', 1995; from the report of the US DoD Science Board Medical Task Force set up to investigate Gulf War Syndrome, published June 1994; from research completed by the



US General Accounting Office, reported upon in August 1995; from the report of James Moss, scientific researcher for the US Department of Agriculture, 1994; from a survey into injuries of Gulf War personnel involving fragments of depleted uranium by the Army Office of the Surgeon General, 1994; from the report of the Czech Chemical Decontamination Unit, presented to the US DoD and Porton Down in June 1993. The account of Corporal Robert Lake was given wide coverage after the War Pensions Agency recognized his condition and awarded him a small pension (see the *Guardian Weekend*, 27 May 1995, and *The Independent on Sunday*, 12 February 1995). The recollections of Nigel Thompson, Colin Blench and Paul Ash also received media attention, notably 'Something Nasty in the Gulf?' in *The Independent on Sunday* and 'MoD Insensitive Over Gulf Sickness', *Daily Telegraph* (see bibliography).

### **Chapter Sixteen: Stillbirths, Miscarriages, Deformities**

In the absence of any major studies in Britain at time of writing, research on Gulf War Syndrome and its associated aspects was obtained almost entirely in America. Richard and Christine Turnbull were among the British couples who took part in the survey by Dr Edward Hyman, from New Orleans (see also *The Guardian*, 4 December 1995). Richard Turnbull also revealed his personal experiences in the Gulf (*Independent on Sunday*, 12 February 1995, and elsewhere). Other accounts recorded in this chapter are from interviews with the author, from evidence given to the Riegle hearing and collated published material (see bibliography).

Official reports consulted included: US Department of Health, 'Clinical Evaluation Programme for Gulf War Veterans'; 'Comprehensive Clinical

Evaluation for Gulf War Victims', August 1995; 'Federal Activities Related to Gulf War Veterans', Department of Veterans' Affairs, June 1994; 'Unexplained Illnesses Among Desert Storm Victims', August 1994; investigations into Gulf War Syndrome by the staff of the Veterans' Affairs, Hospital, Allen Park, Michigan, 1994; Presidential Advisory Committee on Gulf War Veterans' Illnesses, and Declassification Briefing, October 1995; the report of the solitary British medical inquiry conducted by Dr Goran Jamal, at the Institute of Neurological Sciences of the Southern General Hospital Glasgow, published in the *Journal of Neurology, Neurosurgery and Psychiatry*, March 1996; interviews and assistance rendered to the author by Hilary Meredith, of the solicitors Donn & Co., Manchester, representing more than 1,000 Gulf War veterans and their families; from many personal accounts to the author, published interviews and from privately obtained information. The comments of Senator Riegle are included in the final report of his committee hearings, published in 1994.

### **Chapter Seventeen: Forgotten Heroes**

The archives of Michael Roche, founder of the Porton Down Volunteers Association, provided much information, and interview with Alan Care, of Leigh, Day & Co., London, representing the volunteers in possible action against the Ministry of Defence. Statistics on the successful actions for compensation by former human guinea-pigs to World War II experiments with mustard gas in Australia were provided for Derek Fatchett, Labour MP for Leeds Central, by the International Affairs and Defence Section of the House of Commons Library. Other successful claims by WWII veterans obtained from reports and interviews with subjects in the US. Nathan Schnurman recounted his experiences on the US television



programme *60 Minutes*, in 1993. (See also *The Bulletin of Economic Scientists*, March 1993, by Karen Freeman, assistant professor of Pennsylvania State University, report headed: 'The VA's Sorry, The Army's Silent'). The questions raised by the Countess of Mar in the House of Lords are taken from 'Parliamentary Question for Written Answer', House of Lords (1993/94) and her own comments and the subsequent debate appear in *Hansard* (pp. 1154–64).

Post-war estimates of the number of human volunteers used by Porton were contained in a letter from its former director Dr Graham Pearson, dated 20 March 1995, in response to a Commons question by Mr Fatchett. Latest statistics on animal experiments are contained in the 1995 Annual Report of the Director of Porton CBDE to the Ministry of Defence, and more detailed figures of general experiments in Britain from the annual tally prepared by the Department of Health.



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# INDEX

- Abbot, George, nerve gas tested on 79–100
- Abyssinia, Italian use of mustard gas 41
- Agent Orange 129  
litigation for compensation 197
- AIDS, origination associated with US  
biological research 121–2
- Allington Farm 92
- American accounts of chemical attacks  
in Gulf War 1–4
- Animal Liberation Front 162
- animal welfare groups 35, 139
- animals  
anthrax experiments 60–1, 131  
biological trials 118  
CS gas experiments 127, 141  
experiments on 24, 34–5, 91–2, 135–48  
gas masks 37  
mutations 137–8  
nerve gas experiments 139  
number used in experiments 203  
sheep killed in nerve gas incident 122–3  
wounds experiments 144–6
- anthrax 58–68, 118, 121, 151  
animals experiments 60–1, 131  
bomb developed in Japan 58–9  
bombing strike against Germany 62–8  
cattle cake 64–8  
dissemination 124  
effects of vaccine 172  
experiments in USSR 131–2  
field trials in Canada 63  
Gruinard Island tests 61–4, 118  
used on Japanese 39
- anti-gas lobby 31
- anti-vivisectionists 35
- antitoxins 169
- Argentina, Condor missile programme 153, 159
- arsenic gas 33, 44
- arsine 45
- Arundel Farm 24
- Ash, Paul, Gulf War Syndrome 184–5
- Ashton, Gerry, nerve gas tested on 96–7
- Association of Birth Defect Children 193
- atropine 97, 99
- Australia  
mustard gas experiments on soldiers 56, 198–9  
settles compensation claims 199
- Australia Group 153
- Ayers, Melanie and Glenn, child born  
with deformities 192
- bacteria 38–9
- Baker, James 132, 160
- Barbouti, Dr Ibsen 150, 156–9
- Barcroft Dog Incident 32
- Barcroft, Sir Joseph 46  
experiment on self 32
- Bari Harbour, explosion of mustard gas cargo 70
- Barnes, Dr J.M. 91
- Baskerville, Margaret 162
- Battle of Arran, gas attacks 22
- Battle of the Somme, gas attacks 22
- Bazoft, Farzad 159
- Beach, Gerald, sarin tested on 93–6
- Beckstrom, First Lieutenant Howard 69
- Bethune, Colonel Philip 86–7
- biological agent detectors 8, 168
- Biological Research Advisory Board 116, 117
- biological warfare 38–40, 58–68  
*see also* germ warfare  
Germany 38, 71–2  
research 63, 91, 108, 117–18
- Biopreparat 131–3
- birth defects 190–2
- Blench, Edward, Gulf War Syndrome 184–5
- bombing of Iraqi chemical warfare  
agent factories 195
- bombs  
anthrax 58–9  
mustard gas 50, 69
- botulinus, effects of vaccine 172
- Boyd, William, gas attack at Ypres 16



- Brady, William, account of chemical attacks in Gulf War 3
- brucellosis 118, 121
- bubonic plague 121
- Bull, Dr Gerald 159
- Burma, chemical plants 149
- Bush, George 132–4, 156, 163
- CAM 2
- Cameron, Roy 46
- Campbell, Jack, experimented on by Japanese 88
- Canada
- anthrax field trials 63
  - disability claims allowed 199
  - mustard gas experiments on humans 53
- Care, Alan 208
- cattle cakes poisoned 65–8
- Centre for Applied Microbiology and Research, UK 130
- Chamberlain, Neville 46
- Champon, Louis 158
- Chemical Agent Monitors *see* CAM
- chemical agent resistant coating 177
- chemical agents in Gulf War 1–10
- chemical defence 36
- Chemical Defence Advisory Board 117
- Chemical Defence Committee 29, 33, 36
- Chemical Defence Research Department 46
- chemical warfare
- campaigners against 31
  - chemical defence 36
  - effects of pre-treatment 170–2
  - future 203–8
  - Germany 42, 76
  - human guinea pigs 52–7
  - international research 28, 42
  - long-lasting effects 76, 201
  - used in WWI 18–26
  - the way of the future 27–31
  - WWII production figures 50–1
- Chemical Warfare Committee 29
- Chemical Warfare Service 69, 72
- Chemical Weapons Convention 204
- Cheney, Dick 163, 166
- Cherwell, Lord, *see* Professor Frederick Lindemann
- children born with deformities 190–2
- Childs, A.E. 91
- China
- chemical/biological research 123, 206
  - plague bombs dropped by Japan 59
  - chlorine gas attacks in WWI 15–18, 25
  - cholera 121
    - used on Japanese 39
- Churchill, Winston
- gas warfare justified 48–9
  - support of chemical warfare 29, 72–6
  - use of liquid mustard gas 42
- CIA
- assassination plots 111–12
  - attack on New York Harbor 119
  - germ attack on San Francisco 120
  - intelligence gathering 157
  - mind-control experiments with LSD 108–12
- Clark, Shana and Darrell, child born with deformities 192
- clothing 37
- Colville, Sir John 49
- combat suits 105
- Combs, Sergeant Jim, contaminated with oil 187
- Condor missile programme 153, 159
- Cooper, Duff 60
- Copeman, John, committed murder 187
- Craig, Sir David 174
- Cromartie, Captain W.J. 81
- Crossley, Lieutenant Colonel Arthur 21, 24
- CS gas 126–34
- experiments on animals 127, 141
  - experiments on humans 142
- Cuba
- biological and chemical arsenals 123
  - infected with dengue fever 120–1
- Cushing, Harvey, gas attack at Ypres 16
- cyanide gas used by Nazis 81–2
- Czech Chemical Decontamination Unit in Saudi Arabia 7
- de la Billiere, General Sir Peter 169, 173
- Defence and Research Agency 207
- Defence Select Committee inquiry into Gulf War Syndrome 183
- defoliants 125
- dengue fever 120–1
- Department of Defense
- see also* United States
  - denies CB attacks in Iraq 176
  - denies chemical agents in Gulf War 2, 6–9
  - denies exposure to chemical warfare agents 194–5
  - release of documents 197
- depleted uranium 179
- Desert Shield 166



- Desert Storm 166
  - depleted uranium 179
- Detector Paper Type A 45
- detectors
  - of biological agents 8, 168
  - of chemical agents 2
  - levels set too low 8, 195
  - of nerve agents 2
- Dobbs, Sergeant Major 21
- Dorn, Edwin 159, 165
- Dugway Proving Grounds, weapons
  - testing centre 122
- Dulles, Allan 110
- Eagle, Angela, MP 183
- ebola 135–6
- Edgewood Arsenal 25, 28
  - chemical research 91
  - human experiments 52
- Edwards, Harold Jerome, account of
  - chemical attacks in Gulf War 3
- Egypt, biological and chemical arsenals 123
- Eisenhower, General, Bari Harbour catastrophe 70
- Elliott, Kathryn and John, children
  - born with deformities 191–2
- Emergency Public Health Laboratory 59
- Evans, Major D.C. 81–2
- Fildes, Dr Paul 60–2
  - anthrax strike against Germany
    - proposed 62–8
  - biological warfare 40
  - biological weaponry research 90–1
- Fort Detrick
  - anthrax research 151
  - biological research 63, 91, 108
  - LSD experiments 108–12
- Foulkes, Major Charles 19–20, 22
- France
  - biological and chemical arsenals 123
  - research in chemical warfare 28, 42
- French, Sir John, gas attacks 15, 17
- friendly fire incidents 179
- G-agents, *see* nerve gas
- Gaddafi, Col 150
  - chemical warfare plant 155–6
- gas attacks in WWI 14–26
  - casualties 25
  - chlorine gas 15–18, 25
  - mustard gas 23, 25
  - phosgene 19, 21–2, 25
  - tear gas 19
- gas chambers
  - cyanide gas used in 81–2
  - Porton Down 10, 31, 204
- gas masks 23, 45, 46–7
  - against sarin or tabun 90
  - for animals 37
  - testing 31–3
- gas poisoning
  - effect on WWI veterans 33–4
  - long-term effects unknown 30, 32, 76
  - symptoms 107
- gas-protection suits, tested 106
- genetic engineering 136–7
- Geneva Protocol 31, 39, 125
- germ warfare 58–68, 115–24
  - see also* biological warfare
  - germs released in underground railways 77, 115–17
  - research in Soviet Union 131–3
- Germany
  - anthrax strike proposed by allies 62–8
  - atrocities in WWII 81–2
  - biological warfare 38, 71–2
  - chemical warfare research 42
  - chemical warfare used 71–2, 76
  - human experiments in WWII 81–2
  - Nazi scientists 80–4
  - nerve gas development 44–5, 77–9
  - nerve gas production in WWII 50
  - poisoned gas in WWI 9, 14–17, 25
  - Substance S 49
- Glover, Dale, account of chemical attacks in Gulf War 2
- Gorbachev, Mikhail 132, 134
- Goss, Porter 199
- Gottlieb, Dr Sidney 109–11
- Griffiths, Tom, nerve gas tested on 92, 101–2
- Gruinard Island, anthrax trials 61–4, 118
- Gulf War
  - chemical agents detected 195
  - chemical attacks 1–10
  - chemical attacks denied 176
  - chemical hazards 177–8
  - depleted uranium 179
  - friendly fire incidents 179
  - infectious diseases 178
  - mustard gas 4–6
  - no biological agent detectors 195
  - pesticides 177–8
  - preparedness by Western powers 166–9
  - Scud missile attacks 175–6
  - troops exposure to toxicants 176–7



- Gulf War disease 9  
 Gulf War Syndrome 177, 181  
     children born with deformities 190–2  
     Defence Select Committee inquiry 183  
     infectious diseases 178  
     innoculation of troops 170–4  
     litigation for compensation 198–208  
     troops ordered to take vaccinations 172  
     UK inquiry 197  
     veterans illnesses 181–8  
 Gulf War Veterans Association 185
- Haber, Professor Fritz 18  
 Hague Convention 26, 27  
 Haldane, John Burdon Sanderson,  
     support of chemical weapons 29, 34  
 Haldane, Professor John Scott 17  
     support of chemical warfare 29–31  
 Hankey, Sir Maurice 59, 60  
     biological warfare 40  
 Hansard, G. 65  
 Hanson, Connie and Paul, child born  
     with deformities 192–3  
 Harvey, Richard 11  
 Hatcher, John 89  
 Hay, Dr Alistair 101  
 Henze, Captain Carlo 81  
 herbicides 129  
 Hill, Dr Edwin 85  
 Hitler, Adolf 26  
     sarin research 44  
 Hobbs, Dennis 139  
 Hogg, Harry, mustard gas experiments  
     on 54  
 Holland, supply of chemicals to Iraq  
     153  
 Howko, Captain Tom 187  
 human guinea-pigs 21, 52–7  
     arsenic gas 33  
     CS gas trials 127  
     experiments in Australia 56, 198–9  
     experiments by Nazis 81–2  
     long lasting effects 34, 76, 201  
     LSD 112–14  
     nerve gas 90–103  
     volunteers 10, 142, 152  
 Humphrey, David 137  
 Hunter, Dr James 62  
 Hussein, Saddam  
     arming of Iraq 149–60  
     rebuilding biological warfare plant 206  
 hydrogen chloride 21  
 hydrogen cyanide 32, 45, 158  
 Hyman, Dr Edward 190
- India, mustard gas experiments on  
     humans 53  
 infectious diseases, research into  
     dissemination 60–1  
 Institute of Applied Microbiology,  
     USSR 131  
 Iran  
     chemical plants 149  
     troops attacked with mustard gas by  
         Iraq 151  
 Iran–Iraq war 150–1  
 Iraq  
     chemical/biological programme  
         149–54  
     chemical/biological warfare  
         capability 164–5  
     cyanide imported from US 158  
     gas attack on Iranian troops 151  
     gas attacks on Kurds 154–5  
     germ and chemical warfare  
         production resumed 206  
     Kuwait invaded 160, 163  
     Kuwait oil wells set on fire 180  
     mustard gas manufacture 150  
     nerve gas manufacture 150  
     nuclear-related technology 165  
     Scud missile warheads manufacture  
         153  
 Isbell, Dr Harris 109  
 Ishii, General Shiro  
     biological warfare 39, 58  
     interrogation 85–8  
 Ismay, General Hastings 49  
 Israel, biological and chemical arsenals  
     123, 149  
 Italy  
     chemical warfare research 28, 37  
     mustard gas cargo explodes 70  
     mustard gas used in Abyssinia 41
- Jackson, Dr Charles 10  
 Jamal, Dr Goran 187  
 James, Frank, experimented on by  
     Japanese 87–9  
 Japan  
     biological development 39–41, 85–6  
     chemical warfare research 28, 37  
     germ warfare 58–9  
     human experiments 39–40, 86–9  
     mustard gas 41  
     phosgene 41  
     plague bombs dropped on China 59  
 Japanese Army, Unit 731 85–9



- Johnson, Captain Michael, mustard gas storage tank 5–6
- Jones, Hilary, Gulf War Syndrome 182–3
- Jones, Lance Corporal Robert, effects of mustard gas 5–6
- Jones, Sir Owen Wansborough 117
- Jumper, Brigadier General Johnny 173
- Key, Robert 162
- Khaled, General 7
- Killgore, Lieutenant Colonel, tests for mustard gas 6
- Kurds, gas attacks by Iraq 154–5
- Kuwait  
invaded by Iraq 160, 163  
mustard gas storage tank 4–6  
oil wells set on fire by Iraqis 180
- Lake, Corporal Robert, Gulf War Syndrome 177
- Lederberg, Professor J. 124
- Leigh, Day & Co 208
- leishmaniasis 178–9
- Lever Brothers 65
- lewisite 37, 52
- Libya  
chemical plants 149  
chemical warfare project at Rabta 150, 155, 156  
chemical/biological research 206  
CW technology 134  
Lickman, Bill, contact with Iraqi troops 186
- Lindemann, Professor Frederick  
chemical defence strategy 48–9  
support of chemical warfare 29
- litigation for compensation 197–208
- Livens, Captain 22
- London Underground, release of bugs 116–17
- long-term effects of gas 30, 32, 34, 76  
denied 198–208
- Longden, Able Seaman John,  
experimented on with CS gas 127–9
- LSD experiments 108–10
- McArthur, Dr D.M., associated with origins of AIDS 121–2
- MacArthur, General, immunity for Japanese scientists 86–7
- MacLeod, Kenneth 61
- McNee, Lieutenant, autopsy report 18
- McQuoid, James Alan, effects of mustard gas 5–6
- Maddison, Ronald, nerve agent GB tested on 100–1
- Major, John 134, 156
- Manchuria, germ warfare research centre 39, 58–9
- Mar, Countess of 171–2, 202
- Martin, Trevor, exposure to nerve gas 102–3
- Matrix Churchill 159
- Medical Research Council, biological warfare 40
- Mekdeci, Betty 193
- Mellanby, Edward, biological warfare 40
- Meredith, Hilary 196, 197
- mescaline experiments 108–9
- Microbiological Warfare Committee 40
- mind control experiments 10, 108–10
- Ministry of Defence  
*see also* Porton Down; United Kingdom  
denies CB attacks in Gulf War 176  
denies chemical agents in Gulf War 6–9  
denies experiments 62, 107, 161, 202  
denies Gulf War Syndrome 181–4  
denies long-term effects 202
- miscarriages 190
- Mitchell, Tommy, mustard gas experiments on 56, 199
- MKUltra 108–9
- Morrison, Herbert 49
- Morrow, Roy, account of chemical attacks in Gulf War 3
- Mosquito Plan 120
- Mossad 159
- Moyle, Jonathan 159
- Mukden Report 86
- mustard gas  
at high altitude 37  
attack on Iran by Iraq 151  
blistering agents 30  
burns 146–7  
delivery 25  
effects on eyes 53  
effects of poisoning 33–4  
effects on protective suit 6  
effects on troops 23  
experiments in Australia 56, 198–9  
human guinea-pigs 31, 52–7  
Japan 41  
manufactured in Iraq 150  
stock piling 37  
storage tank in Kuwait 4–6  
tests 42  
used by Italy in Abyssinia 41



- World War I 23, 25
- World War II 45, 47, 50
- NAIAD 2
- Nancekuke 92, 101, 126
  - CS gas 126
- NAPS tablets 170–1, 173
- National Academy of Sciences 200–1
- National Anti-Vivisection Society 138
- Natweiler Concentration Camp, human experiments 81–2
- Nazis
  - cyanide gas in gas chambers 81–2
  - mescaline experiments 108–9
  - scientists 80–4
- Nernst, Professor Walther 18
- Nerve Agency Infantry Advanced Detectors, *see* NAIAD
- nerve gas 44, 78, 202
  - see also* sarin; tabun
  - aerial tests 122–3
  - animal experiments 139
  - decontaminant 177
  - effects of exposure to 94–103, 107
  - effects of pre-treatment tablets 170–2
  - experiments in WWII 81–2
  - G-agents 79
  - Germany 44–5, 50, 77–9
  - human volunteers banned 10
  - manufactured in Iraq 150
  - stocks destroyed 130
  - V agent 105, 122, 124
- New York Subway, release of bacillus 116, 117
- Nicaragua, infected with dengue fever 121
- Nixon, Richard 125
- North Korea
  - chemical plants 149
  - chemical/biological research 206
- Nuremberg Code 202–3, 208
- O'Berry, Russel, mustard gas experiments on 54–5
- Oehler, Dr Gordon 152, 156, 165
- Office of Strategic Services, intelligence reports 71–2
- oil wells set on fire in Kuwait 180
- Olson, Frank 111
- Operation Vegetarian 65–8
- organophosphorus 42–3; *see also* tabun
- Paris Metro, bacteria trials 115
- Pasechnik, Vladimir 132–3
- Pearson, Dr Graham
  - animal experimentation 162
  - chemical agents in the Persian Gulf 8–9, 195, 197
  - defence of Porton Down 204
  - human volunteers 202
  - mustard gas burns 146
- pesticides 43, 91
  - no human guinea-pigs tested 202
  - used in Gulf War 177–8
- phosgene
  - effects on troops 21–2
  - French factory 42
  - in Gulf War 5
  - World War I 19, 21–2, 25
  - World War II 47, 50
- Physicians for Human Rights 155
- plague 38
  - bombs dropped on China by Japan 59
- Platt, Geoffrey, infected with ebola 136
- poisons in the air 176–7
- Poland, biological and chemical arsenals 123
- Porton Down 11–14
  - see also* Allington Farm; Arundel Farm
  - animals experimented on 12, 92–3, 137–8
  - biological research 40
  - biological warfare sea trials 117–19
  - Biology Department 59–60
  - birth 19–21
  - Chemical and Biological Defence Establishment 11
  - CS gas trials 127
  - development 23–4
  - DNA-linked research 151
  - ebola 135–6
  - experiments 14, 24
  - gas chambers 10, 31, 52, 204
  - Gulf War evidence of pollutants 180
  - human experiments 21, 24–5, 52–7, 93, 203–4
  - Iraq chemical/biological capability appraised 166
  - LSD experiments 108, 112–13
  - mustard gas experiments on humans 52–7
  - mustard gas tests on protective suit 6
  - natural history 12–13
  - nerve gas research 90–1
  - preparedness for Gulf War 166–9
  - protective gear 168
  - protesters 135
  - research and development expanded 28, 29, 46–7
  - secrecy 35–6, 103



- security 162
- Porton Down Volunteers Association 201
- Portonians 36
- Powell, General Colin 164, 166–7, 173
- pre-treatment tablets 170–1
- Product Ingredient Technology 158
- Profumo, John 116
- Project Paperclip 80
- protective clothing 168, 169
- pyridostigmine bromide 170–1, 173, 187
- Reagan, Ronald 149, 156
- Redstone Arsenal, chemical munitions production in WWII 50–1
- Rickford, Major J.L. 114
- Riegle, Senator Donald 8, 160, 164, 176, 193–5
- riot-control gases 37
- Roche, Michael, experimented on 105–7, 161–2, 198, 201–2, 208
- Rodriguez, Greg, experimented on by Japanese 87
- Rogers, Dr Howard 144
- Roosevelt, President 76
- Royal Army Veterinary Corps 92
- Russia, *see* Soviet Union
- Sanders, Dr Murray 87
- sarin 2, 44, 78, 80
  - detected in Saudi Arabia 7, 195
  - supply for Iraq 153
  - tested on human guinea-pigs 93–103
- Saudi Arabia, chemical attack 2
- Schnurman, Nathan, mustard gas experiments on 55, 200
- Schrader, Dr Gerhard
  - sarin discovered 44
  - tabun discovered 43
- Schwarkopf, General Norman 166, 173
- Scott Report 156
- Scud missiles
  - attacks 1–5, 175–6
  - chemical warheads obtained from Soviet Union 196
  - warheads manufacture by Iraq 153
- Segal, Professor Jakob 121–2
- Shevardnadze, Eduard 132
- smoke grenades 51–2
- Soames, Nicholas 181, 183
- source protection 157
- South Africa, biological and chemical arsenals 123
- Soviet Union
  - anthrax research 205
  - anthrax technology 89, 131–2
  - biological warfare 38, 84, 131–3
    - research continuing 131–4
    - station in Manchuria 83
  - biological warfare research 205
  - chemical plants 149
  - chemical warfare research 28, 37, 42
  - germ attacks on Japan 39
  - germ warfare research 131–3
  - LSD 110
  - nerve gas
    - factories in Silesia 78, 80, 83
    - technology 80, 89
  - Yellow Rain 130
- Spector, Professor Roy 144
- Star Wars 149
- stillbirths 190
- Stockholm International Peace Research Institute 125
- Sugden, Professor Sam 46
- Sullivan, Kim 192
- Supergun 156, 159
- Sutton Oak factory 42
- Sweden, biological and chemical arsenals 123
- Swinton, Colonel E.D. 16
- Syria, chemical plants 149
- tabun 2, 43, 71, 77–9
  - effects on humans 83
- Taiwan, chemical plants 149
- tear gas 19
  - stocks in WWII 45, 47, 50
- Vietnam War 126
- Thatcher, Margaret 132, 156, 163, 166
- Thompson, Nigel, Gulf War Syndrome 184
- Thorne, Major-General Andrew 49
- Tipner Pond, mustard gas tests 42
- Tizard, Sir Henry 90
- Tokyo, sarin attack in subway 205
- Trilon 83, 79
- Tucker, Sergeant, James Warren, located chemical agents 7
- Tuite, James 8, 194
  - CB agents in Gulf War 8
- tularaemia 118, 121
- Turnbull, Christine, vaginal problems 190
- Turnbull, Richie, Gulf War Syndrome 2, 189
- ultra-protective gear 105
- underground railways, release of germs 115–16
- Underwood, Austin 139



- Unilever 65
- United Kingdom
  - see also* Ministry of Defence
  - biological warfare sea trials 117–19
  - biological weapons assessed 75
  - chemical warfare
    - military objections to 74–5
    - proposals for use of 73–5
    - state of preparedness 45–7
  - co-operation with US in chemical research 91–2
  - gas warfare justified 49, 73–4
  - germs released in underground railways 115–17
  - inquiry into Gulf War Syndrome 197
  - intelligence reports on German CW intentions 71–2
  - nerve gas production 92
  - nerve gas stocks destroyed 130
- United States
  - see also* Department of Defense
  - anthrax production 63
  - biological agents shipped to Iraq 195
  - biological research associated with origins of AIDS 121–2
  - biological warfare, anthrax 151
  - biological warfare abandoned 125–6
  - biological warfare research 119–20
  - bombings of chemical plants 174
  - chemical warfare establishment 25
  - chemical warfare research 37
  - chemical weaponry production in WWII 50
  - CIA attack on New York Harbor 119
  - CIA germ attack on San Francisco 120
  - co-operation with UK in chemical research 91–2
  - germs released in subway 117
  - Iraq supplied with
    - chemical/biological agents 165
  - mustard gas bombs shipped to Italy 69–70
  - mustard gas experiments on soldiers 54–5
  - nerve agent kills sheep 122–3
  - nerve gas stocks destroyed 130
  - research in chemical warfare, *see* Edgewood; Fort Detrick
- Senate Committee of Inquiry, *see* Riegle inquiry
- Star Wars 149
- stockpiles of CW agents 104–5
- V-agent manufacture 105
- veterans support 196
- VX-agent manufacture 105
- unprotected men 91
- V-agent, *see* nerve gas
- Vance, Cyrus 123
- Veterans' Affairs Department 200
- Veterans' Affairs Hospital, Michigan 186
- Victor, Dr Edwin 85
- Vietnam War
  - Agent Orange 129
  - defoliants 125
  - harassing agents 126
  - tear gas 126
- VX agent, developed in Soviet Union 205
- VX nerve agent kills sheep 122–3
- VX nerve gas incidents 122–3
- Watkinson, Major John, mustard gas storage tank 4–6
- Webster, William 163
- West Germany, biological and chemical arsenals 123
- Willoughby, Fred, account of chemical attacks in Gulf War 3
- Wimmer, Professor Karl 81, 82
- Wolff, Professor A.M. 124
- World Health Organization report on CB.W research 123–4, 127, 132
- World War I, gas attacks 14–26
- wounds experiments 144–6
- Yellow Rain 130
- Yeltsin, Boris 134
- Ypres, gas attacks 14–18, 23
- Zyklon B 81–2



















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Jacket Design: Hammond Hammond  
Front jacket photograph: Associated Press

ISBN 1 85685 121 4

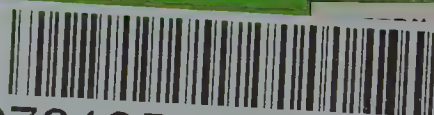
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