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**Britain, Australia, the United States and Agent Orange in the Indochina Wars:
Re-defining Chemical-Biological Warfare**

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"Only We Can Prevent Food"

6 March 2015



[US-troops-spray-Agent-Orange-from-riverboat-Vietnam.ogv](http://commons.wikimedia.org/w/index.php?title=File%3AUS-troops-spray-Agent-Orange-from-riverboat-Vietnam.ogv)

<http://commons.wikimedia.org/w/index.php?title=File%3AUS-troops-spray-Agent-Orange-from-riverboat-Vietnam.ogv>

Introduction – is there a Problem?

This article re-examines the sanitised history of Agent Orange and other defoliants used in the Indochina War between 1961 and 1974. It begins by reviewing the incomplete and misleading narratives regarding the use of these chemicals, which have occupied and confused the public imagination and the official record. For this purpose, I highlight the Australian public narrative notable for its disinformation and insufficient appreciation of these chemicals in historical context. The anomalous assumptions of the public record merited renewed inter-disciplinary scholarly examination.

Defoliants were an instrument of imperial power, sophisticated chemical technology applied to peasant societies without risk of retaliation. Given global censure of chemical warfare from World War I forward, they necessitated a distancing of decision-makers from responsibility for ‘others’ who were the weapon’s anticipated target. They were both defoliants for jungle clearing and herbicides, an instrument of food denial; but they could also be used as a toxic chemical weapon. I begin with some of the inaccuracies and omissions in the public record. There was the unmentioned intention of crop destruction;

the forgotten British Origin of these chemicals; and the actuality that Agent Orange was not the only chemical to be problematic for its persistence, toxicity and teratogenicity. Governments and contracting manufacturers claimed that they did not know the chemicals were toxic. It was falsely claimed that the use of defoliants was legal under international law. Several government inquiries concluded that Australians were only incidentally involved with Agent Orange use. This included the unsustainable claim that Phước Tuy Province, Việt Nam had not been sprayed, in spite of official records, maps and veterans' accounts showing that the province was the first to be used in a trial, then repeatedly sprayed.

Defoliants originated in British laboratories during World War II and were first used in Malaya from 1952 till 1954, as illustrated by this December 1951 Memorandum to Cabinet on Malaya by Oliver Lyttelton.[1] US forces are alleged in a May 2011 South Korean newspaper article to have used them in 1955 on the Korean Demilitarized Zone (DMZ) [2] These chemicals were then employed in huge volumes in Indochina between 1961 and 1971. In spite of mounting evidence of harm, continued use was made of some of the existing stocks in Laos and in other locations. This included the spraying of illegal poppy crops belonging to the USA's Hmong allies in 1971. This operation was described by Grant Evans on page 152, continued till 1973:

“In 1971, under pressure from the US government, the RLG declared opium illegal. Suddenly the Hmong poppy growers who had been assisted in their trade by Air America and had helped line the pockets of the corrupt lowland Lao elite, found themselves on the other side of the law.” [3]

Former US Master Sergeant, Kurt Priessman, also documented this continued use around the perimeters of US bases in Thailand, which continued after the ban had been ordered. [4] Jon Mitchell and others have progressively revealed the storage, testing and dumping of defoliants in Okinawa, Japan.[5-9]

1. Crop destruction

The primary narrative is that defoliants were principally used to clear forests in order to reveal the disposition of the opposing forces and for clearing fire-base perimeters for line of sight. In fact, defoliants were found, in the case of preventing road-side ambushes, to have done this less well than bulldozing with a romo plow. [10] This was partly true and was justified by military strategists on the grounds that defoliation saved the lives of US and allied soldiers. The principal purpose of defoliants, however, was crop destruction, and that was seldom mentioned. As Wil D. Verwey explains in his very detailed 1977 account, a conscious high-level decision was made at an early point in the defoliation programme to de-emphasise crop destruction and focus attention on forest cover. In fact, from the

beginning in 1961-62, crop destruction was a major priority. Verwey sets out in pages 110-116 how anti-crop spraying in Việt Nam were concealed from the US and world publics from 1962 till 1965. He also details how acreages, regions, types of crop, which defoliant was used, spray concentrations, spray drift and duplications. [10]

On page 113, Verwey quotes Seymour Hersh, who observes that:

"by the end of 1966 more than half of the C-123 missions were admittedly targeted for crops and it is probable that any effort at a trebling of capacity in 1967 was aimed not at the jungles of South Vietnam but at its arable cropland." [10]

US military spokesman, Major General Davison, stated in 1966 that areas where crops were destroyed were remote and said that "great care has been taken to select areas in which most harm would be done to the Viet Cong and least harm to the local population." This was not borne out by statistical evidence. [10]

As a 1967 contracted research team from Rand Corporation discovered, however, destruction of crops allegedly intended for feeding the Viet Cong were actually producing famine in the Việt Nam countryside whilst the guerrillas remained well-fed. [11] The official US narrative that only Viet Cong food was being destroyed was untrue. The real intention was to coerce the population to flee, and thus create "free-fire" zones. Forcing the rural population to evacuate their traditional farms by means of food denial was a military objective. Peasants would then be re-located to what were termed "protected villages" and made entirely dependent on US-supplied rations. [10]

An early assessment of the agricultural destruction in Indochina was carried out by Japanese researchers. Howard Edenberg et al., scientists from the Stanford Biology Study Group reported, "a 1967 report of the Agronomy section of the Japan Science Council claimed that "anti-crop attacks have ruined 3,800,000 acres of arable land in South Vietnam ... Because of official U.S. secrecy, the true figures are not known." The authors listed the crops that had been destroyed, which, in addition to rice, included "Sugar cane, manioc, tomato, beans, papaya, coconut, sweet potato, fig, cassava and mango . . . all sensitive to the herbicides and the various yields have decreased from 10 to 40 per cent." They also mentioned the destruction of valuable commercial rubber plantations. "In 1959, South Vietnam - the 'Rice Bowl' of Asia - exported 246,000 tons of rice. In 1968, 850,000 tons had to be imported, over 90 per cent of it from the United States." [12] These statistics did not include the use of defoliants over large tracts of Cambodia and in Laos, targeted mainly along the Hồ Chí Minh Trail.

This strategy of attrition through food denial minimally affected the fighters of the opposing forces, but mainly led to civilian food deprivation due to significantly diminished crop yields with the likelihood of prolonged hardship, as poisoned soils could not sustain a crop for at least the next growing season. The results include the raising of stunted

children, who in time become weak and sickly adults. These long-term effects proved to be serious, together with other teratogenic effects on health and the unborn, as described below. The Rand Corporation Memorandum reported exactly this in 1967:

(xii) “destroying a farmer's source of sustenance is not a way to make friends”
... (xiii) “the crop destruction effort may be counterproductive. The VC continue to feed themselves while the peasant bears the brunt of the deprivation, and he doesn't like it.” [11]

Australians were engaged in crop destruction, as demonstrated by the Australian War Memorial's photographic evidence, preserved on two Australian government web sites. Several 1968 images show an Australian Iroquois helicopter in flight over what is unquestionably agricultural land, "A spray boom for defoliant extends from the helicopter beneath the machine gunner, who is on the right of the image. Defoliant was loaded onto helicopters in 30-gallon tanks... [A M P01733.006]"[13]

Paul Ham quoted former Australian soldier, Fred Ball, who disclosed that Australians were required to perform the same type of work as their allies with the same purpose: “We sprayed the bloody place with Agent Orange ... It wasn't just the bloody jungles; it was used on bloody paddy fields. It killed everything, not only the vegetation; it killed animals ... Defoliation was simply a routine part of the war”. [14]

2. British Origin

The second narrative makes no mention of the decades of research and development of these chemicals, which originated in British laboratories. In the public imagination these substances simply arrived in Indochina without provenance. Judith Perera and Andy Thomas in *New Scientist* on 18 April 1985 set out the full chronology of Britain's role in the development of herbicides and defoliants. They established from archival documents that herbicides “would also be useful “for purposes of internal security within the Empire”, namely, “for the destruction of food supplies of dissident tribes”. Most of the specifics referred to in this article were verified by this author from documents in the British National Archives at Kew, formerly the Public Records Office. [15]

The history of modern defoliants, termed “Midspectrum Anticrop Agents” began during the 1930s, as explained on page 221 of a study by Simon Whitby in *Anti-Crop Biological Weapons Programmes*, when it was discovered that, “chemical plant growth regulators, which mimic the effect of plant hormones” could be mass-produced and could have military applications, as Perera and Thomas documented. [15, 16] “From collaborative arrangements between the UK and the US in the early 1940s” grew the widespread use of these chemicals in counterinsurgency warfare in South East Asia during the 1960s,

following successful earlier British tests in Malaya and at Camp Drum, New York, USA in 1958. [1, 17, 18] 1959, using Agent Purple. [19]

Perera and Thomas further documented that between 1927 and 1935, Geoffrey Emett Blackman, and his botany section at Jealott's Hill Research Station, UK, made the early scientific breakthroughs for Imperial Chemical Industries (ICI). In the course of World War II further work was done in Britain, with isopropyl phenyl carbamate (code-named 1313), which was being identified as a possible weed killer. The chemical destruction of crops in Germany and later in Japan were considered but not prioritised at the time. Winston Churchill, then British Prime Minister, defunded the research and field trials in September 1942, believing that it was too expensive and that the time-line to manufacture was too long. [15] By this time Blackman was receiving funds from Britain's Agricultural Research Council (ARC). Scientists from ICI, ARC and Ministry of Agriculture met at Rothamsted experimental station where field trials were conducted, establishing that "2,4-D (dichlorophenoxyacetic acid, code named 1414B) and MCPA (2-methyl 4-chlorophenoxyacetic acid, code-named 1414A) ... [were] potential anti-crop weapons." [15]

As Perera and Thomas detailed, "The formal channels of cooperation were the Inter-Service Chemical Warfare Committees in Washington and London" and research outcomes on 1313 and 1414 were shared across the Atlantic, "with flowsheets and designs for production plants drawn up by ICI", and suggestions as to how it could be used on Japan's rice crops. [15] "The US began full-scale production of 2,4-D and would have used it against Japan in 1946 if the war had continued." "Britain had passed on details of 300 other potential anti-crop agents, leaving the US to do most of the testing, development and production." [15] Forerunners of Agent Orange and similar defoliants were developed soon after 1945, "Chemically, the product was a 50/50 mix of two herbicides, 2,4,-D (2,4,dichlorophenoxyacetic acid) and 2,4,5-T (2,4,5 trichlorophenoxyacetic acid)." Much of the scientific work and product development was also carried out in Britain, and as these authors noted, "without early British research and testing, there might have been no Agent Orange ready for use in Vietnam." This research was shared with US colleagues. [15]

In 1950 Blackman, then heading the Weed Research Organisation, Oxford University, arranged for scientific agricultural officers throughout the British colonies, notably in all tropical areas, to test a range of defoliation agents on a wide range of local plants and crops. One of the experiments was designed to test the effectiveness of these agents in the destruction of crops, which, as discussed with military advisors, would be useful in fighting an insurgency war in a tropical location. [20]

These events were also documented by Perera and Thomas. In the same year, some of the British government's own agricultural scientists in overseas colonial posts replied to Blackman saying that they were puzzled as to why they were asked to conduct these tests.

Their letters were also on file in Kew. These scientists were probably unaware of Blackman's links with Britain's chemical weapons experimentation centre at Porton Down, Wiltshire. Blackman, meanwhile, was commenting on the toxicity of these defoliants, making comparisons with Mustard Gas and Lewisite, which were found to be toxic to human beings but not crops. [20] There was US collaboration in the tests too, as mentioned above. [2] The archival record confirmed that defoliants were intended to cause starvation. It is significant for victims of these weapons that the toxic effects of dioxins and other ingredients were also known to science at this time. [20]

To quote from this 1950 archival literature, in "*Informal Notes for feasibility study on defoliation*", AWH Wardrop wrote:

“The U.S. are, in fact, spending two million dollars on defoliation, of which \$30,000 goes to their “in house” programme ... This is just the sort of work at which British scientists excel, and would be a much better start for us than an ad hoc screening programme, trivial in its output as compared with the U.S. effort, and somewhat unimaginative in outlook”. [20]

A Memorandum was presented to the British Cabinet with a long list of recommendations for conducting the Malayan Emergency, dated 21 December 1951. It was authored by Secretary of State for the Colonies, Oliver Lyttelton, who became 1st Viscount Chandos of Aldershot in 1954. Appendix VII to this document, entitled *Chemical Defoliation of Roadside Jungle* detailed the development of the military use of defoliants and the various tasks that could most effectively be accomplished with its use. Cost was a major consideration and defoliants were found to be significantly less expensive and longer-lasting than manual slashing of vegetation.

Paragraph 2 described the chemicals as “recently discovered hormone weed killers (2,4-D and 2,4,5-T) with Sodium trichloroacetate in various combinations.” This was effectively a forerunner of Agent Orange and its siblings. Paragraph 7 (c) referred to the “destruction of crops grown by, or for, the bandits in remote jungle areas.” The use of the qualifying term “remote jungle areas” was not defined, though the submission described most of Malaya as dense jungle and therefore remote. More specific detail would not have concerned members of Cabinet. This was a politically palatable account of operations in the field. [1]

Reference was also made in this section to the use of Auster light aircraft, which would open many other possibilities for defoliant use. The spray rigs were at an early stage of development in coping with the viscosity of the product, which tended to emulsify in the tropical climate. The chemical supplier was ICI (Malaya) Ltd, with further testing and development by ICI Ltd and Plant Protection Ltd in Britain. Delivery by air was planned to take place in February or March 1952. [1]

Food denial and induced hunger were also used against compulsorily resettled ethnic Chinese villagers, of whom there were eventually around 500,000 detained in camps, and others to ensure their cooperation with British authorities or to punish them for suspected food supply to the Min Yuen (Communist) guerrillas. As Herbert A. Friedman explained, [British High Commissioner in Malaya, General Sir Gerald] “Templer immediately punished the nearest town. He imposed a 22-hour curfew, cut the rice ration in half and closed the schools.” [21] This was achievable because his forces had effective control over food supplies and had the capacity to apply pressure by denial of food, having created the situation in which they could not grow their own food and were entirely dependent on British supplies. Neither David Ucko nor Gavin Bulloch mentioned defoliants in their scholarly writings on counterinsurgency warfare in the Malayan Emergency. [22, 23] However, Colonel JP Cross, who served as a British officer in Malaya, used the term “crop spraying” to describe the use of herbicides during the Malayan Emergency, stating forthrightly that the intent of the spraying was the destruction of food. [24]

By 1963 the plan to use defoliants as weapons of war had been established in Britain’s War Office, and in 1965 it was formulated into General Staff Target (GST) 3138: defoliant system. [25-28] By 1968 defoliant use had become a “defoliant system” and an issue of interest for *Naval, Ground and Air Staff Target (NGAST) 3138: requirement for defoliant; study by the Weed Research Organisation, Oxford*, which was the division in which Blackman and his colleagues worked. [29]

The Harvard molecular biologist, Matthew Meselson wrote in 1990 in respect to Malaya:

“The first time that Agent Orange was used in war was in Malaya by British forces mainly to destroy food crops being grown by peasants for their own consumption but which were being taken by Communist insurgents.” [30]

Whitby conclusively situated this argument in the title of his chapter, *Anti-Crop Biological Weapons Programmes*. On page 213, he stated that "the development of plant pathogens as weapons... certain chemical anticrop plant growth regulators... [were] an integral and important component of North Atlantic collaboration between the UK and US in the postwar period." The Anglosphere collaboration on chemical weapons can be traced back to 1917. The agreement included Canada from 1947 and included Australia after 1964. [16]

Their use commenced in South Việt Nam in December 1961 “under a Directive issued by President Kennedy”. As Whitby stated on page 223, "Approximately 84 percent of agents were disseminated for defoliation and approximately 14 percent for use in the destruction of food crops." [16] This ratio varied in different regions of the country and may have reflected the extensive range of dense forests and the repetitive clearing of fire-base perimeters, but nevertheless represent significant crop destruction. Verwey, however,

documents the Pentagon's contradictory and misleading statistics (page 106), showing the crop destruction component to be far higher than this. [10]

As Whitby explained the structure of the US Army's crop destruction programme:

"US Army Chemical Corps anticrop warfare activities were organized under the four constituent parts of the Crops Division: the Chemistry Branch, the Biology Branch, the Plant Physiology Branch, and the Operational Requirements Branch. The remit of the Chemistry Branch centered on the development of a universal anticrop chemical ... effective in reducing the yields of both narrow- and broad-leafed crops. " [16]

On 27 January 1966, the British Labour MP for Barking, Tom Driberg, wrote to the then Secretary of State for Foreign Affairs, Michael Stewart, seeking an explanation from the Minister for the actions of US forces in Việt Nam and Indochina, as the "American are spraying the rice-fields – presumably with poison – in order to create starvation". The Minister tabled this letter and his own explanatory letter of reply in the Parliament on 28 February.

Stewart's reply read in part:

"I understand that measures are taken to destroy rice crops or rice stores which are known to support the Viet Cong in South Vietnam. The aim is certainly not to create starvation amongst the people, but to cut off the supplies which sustain the Viet Cong guerrillas. I understand too that the spray is designed to kill the rice but is not poisonous: it is equivalent to burning or blowing up a store of rice once collected and held for Viet Cong supplies". (Hansard, 1965-66, Volume 725, 28 February 1966, Written Answers 175-176)

An opinion could be formed that Michael Stewart's advisors, who crafted that letter, may have known, and should have known, that nothing in this Minister's statement was factually correct. Ultimately, under the Westminster system of government, the Minister is responsible for words spoken in Parliament.

3. Agent Orange was the only problem

Often Agent Orange has been discussed without mention of the several other similar agents that are referred to here as 'siblings'. A sound scientific explanation was written in 1971 by Edenberg et al. This study discussed only the three most-used of seven herbicides, Agents Orange, White, and Blue. An abridged description, it mentioned that all of these chemicals were toxicologically problematic, not only Agent Orange.

Agent Orange "is a mixture of 2,4-D (n-butyl-dichlorophenoxyacetate) and 2,4,5-T (n-butyl-2,3,4-trichlorophenoxyacetate)." (This study will say much more about 2,3,7,8-

tetrachlorodibenzo-p-dioxin, known as TCCD, the most toxic form of dioxin, and its intergenerational teratogenic effects); Agent White ... “primarily used near populated areas ... is, however, soluble in water... [It contains] Picloram, a major component... [which] has been called "the most active herbicide yet discovered." (This study notes the persistent toxic effects, but does not go into further detail); and Agent Blue "... more toxic to grasses than to broad-leaved plants and is mainly used to destroy rice crops. Cacodylic acid, a major component of Blue, is 54 per cent arsenic... [and] may pose a long-term danger.” (This study notes the persistent toxic effects, but does not go into further detail) [12]

4. They didn't know it was toxic

This particular misconception has clouded the issues of claims for veterans' compensation for health problems and has prevented legal claims and health assistance for civilian forestry, agricultural and local government workers and most severely affected Indochinese peasants.

Government scientists in Britain and the US who worked closely with one another within the programme from the mid-1930s onward, understood the toxicity of the chemicals they were handling, especially after the discovery of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) at the time they began work on defoliants and that establishments like Porton Down had instituted procedures for the safe production, storage and handling of these substances was described in RM Oliver's 1975 paper describing the “trivial” exposure of three British scientists which resulted in severe chloracne. [31]

The scientists and process workers took precautions, used fume cupboards, protective clothing and respirators when handling these materials, unlike the poorly-informed soldiers who stood shirtless and without breathing apparatus in tropical conditions spraying as though putting out a fire. US soldiers applied defoliants with their faces, arms, torsos, and legs splashed and sprayed by each gust of wind. Government agencies had a duty of care to notify military end-users, the contracting manufacturers as suppliers of these materials at the time of their appointment. Government specifications for product quality would have been strictly adhered to, except when these companies found it quicker and cheaper to manufacture at higher temperatures, which produced greater TCCD dioxin contamination in the finished product. This is explained below via correspondence between Dow and German competitors, C.H. Boehringer Sohn. [32, 33]

Workplace accidents were inevitable and occurred in a number of locations and in various companies. When these incidents occurred, they caused a range of injuries and led to an assortment of company responses. There were efforts to reduce the TCDD contamination; but also efforts to prevent news of dioxin's toxicity reaching the US government's health officials and the media and public. Christopher Joyce wrote two articles for *New Scientist* published on 4 August 1983. [32, 33] In the first of these he detailed a number of memos

and items of correspondence that had been made available to the New York Eastern District Court through a veterans' class action case against the chemical companies. His findings were based on discovered documents, proving the authenticity of both the existence and contents of these documents. The documents also captured Dow referring to TCDD in a letter to their Canadian plant stating that "this material is exceptionally toxic, it has tremendous potential for producing chloracne and systemic injury." [32, 34]

Dow produced "an article published in 1941 by V.K. Rowe, Dow's expert on the dioxin problem. It describes Rowe's work in detecting acne-forming "exciters" that contaminate chlorophenol chemicals used in making herbicides". The toxicity of dioxin was known at least as early as 1941 and "... in 1944 a laboratory worker at Dow contracted a severe case of chloracne from trichloro-phenol, a chemical involved in the process." Another accident occurred at Monsanto's plant in Nitro, West Virginia in 1949, when "...an explosion rocked the company's plant ... and dozens of workers contracted the ailment...Chloracne... [and suffered] other symptoms, such as tiredness, nausea and listlessness." This study did not include an examination of legal records pertaining to these incidents. [32]

A 1957 accident at the German company, C.H. Boehringer Sohn at Ingelheim am Rhein, injured a number of workers. The Germans wrote to all of their competitors warning of the toxicity problem and recommending a process that they pioneered designed to reduce TCDD contamination. Letters produced in court showed a letter from Boehringer referring to "our 1955 correspondence" on the subject. It offered detailed instructions on how to minimise contamination of 2,4,5-T with dioxin... Dow replied with a letter of thanks. The letter notes that on 27 January, 1955, Dow wrote to Boehringer describing "the hazards due to toxicity and precautions for safe handling and use of 2,4,5-T..." Boehringer recommended they work at a lower temperature. All of these parties were discussing a matter with which they were mutually familiar; it was integral to their business. Joyce further described that, "In 1964 ...an accident at Dow ... [affected] some 60 workers [who] contracted chloracne. Dow then began to take the lead in what the veterans' lawyers call the "conspiracy of silence"." [32] Further details regarding the 1964 incident at Dow were available from a 2005 article by David L. Linhardt. [35]

Peter H Schuck provided the definitive account about the progress of the veterans' class action case, begun in 1978, against the major defoliant manufacturers, principally Dow and Monsanto, but others too, explaining that (page 87) "...the German firm from which Dow had obtained its dioxin testing process for only \$35,000. It thus had an important stake in distancing itself from laggard competitors." On page 99, Schuck explained that the awareness of toxicity included the US government, thereby revealing their complicity in using claims of ignorance regarding toxicity to deny compensation and benefits to US and allied veterans and Vietnamese citizens:

"the government's relative knowledge: notably, its knowledge of the chloracne outbreaks during the 1950s, among German workers exposed to TCP, a precursor chemical of 2,4,5-T; the 1959 Hoffman Report, containing "startling information" about dioxin's toxicity; testing at Edgewood Arsenal during the early 1960s...." [36]

Robert Baughman and Matthew Meselson published an article in September 1973, explained the lethal dose (LD50) in parts per trillion (ppt) for various small rodents and primates; described it as "an extraordinarily toxic substance..." Since TCDD was found to be lipophilic, they developed a methodology for its detection in samples of fish tissue (mainly oily-fleshed, bottom-feeding fish like carp and catfish reared in ponds by peasants), human adipose tissue and breast-milk from Việt Nam. In their conclusions, these authors notably stated that, "TCDD seems to be particularly toxic to proliferating tissues, as suggested by its effects on spermatogenesis and hematopoiesis and its apparent toxicity to the intestinal epithelium..." [37]

In Joyce's second *New Scientist* article of 4 August 1983 he reported on a panel of world experts that met in Cincinnati under the auspices of the US Environmental Protection Agency (EPA). Their conclusions dispelled any remaining doubts that "Dioxin probably causes cancer in humans, according to 34 of the world's experts on the chemical." These experts categorised TCDD as:

the third most toxic substance known to man ... no completely safe "threshold" ... even minute exposure over long periods raises potentially new risks... 100 million times as potent as vinyl chloride ..." [whilst] "... noting that: "because TCDD is almost always found in association with other materials (e.g. chlorophenols, combustion products, etc.), it may never be possible to evaluate the carcinogenicity of TCDD by itself in humans. [33]

The crucial research into possible toxic and teratogenic effects proved to be alarming and the results were withheld from publication till 1969, when "Matthew Meselson, a Harvard scientist and opponent of the defoliation program" leaked the report and "persuaded Lee Alvin DuBridge, President Nixon's science advisor..." to expedite the ending of the defoliant programme, as Schuck explained:

"In 1965 the National Cancer Institute had contracted with the Bionetics Research Laboratories to study the possible toxicity of a number of herbicides and pesticides, including 2,4-D and 2,4,5-T. Somewhat unexpectedly, a preliminary report on the research in 1966 had indicated that 2,4,5-T caused many birth defects in mice and rats whose mothers had been exposed to relatively high levels (up to 30ppm) of dioxin and that 2,4-D was also potentially teratogenic." [36]

Howard Edenberg expressed his concern more vehemently than some other authors:

“During the time the report was inexplicably suppressed by our government, millions of pounds of 2,4,5-T were used in Vietnam - and, incidentally, in the United States as well.” [12]

Edenberg and colleagues visited Việt Nam and reported that:

"In late 1967... Saigon newspapers began carrying front-page stories of a novel and increasingly common birth defect described as "egg-bundle-like fetus. Some newspapers ... questioned whether the defoliation might be causing this. These papers were closed by the Thieu government." (Nguyễn Văn Thiệu) [12]

The Australian War Memorial stated that, "...the first reports of birth defects in children born in areas subject to aerial spray began appearing in 1965." [13] Other accounts documented Agent Orange babies with confronting deformities that began to emerge in 1967 and continue to the time of writing. The work of Vietnamese artist, Dinh Q Lê, best illustrated the long-term intergenerational effects of these products with his 1999 work *Lotusland*, which depicted in porcelain co-joined siblings, two-headed babies and a range of knitted baby garments with disturbing features like four arms, and there were many images on the internet. [38] The poignant black and white images by photographer, Philip Jones Griffiths gave public expression to this unsettling reality. [39]

Importantly, toxicity was known during the British research period of the 1930s and the proven dangers were apparent in Việt Nam by 1965-67 in areas accessed by Australian and US forces. No excuse could suffice for the expressed profession of ignorance in the Australian Parliament on 27 March 1980, by then Minister for Defence, James Killen, answered Labor MP, Mr Kerin with these words that fuelled rage among veterans:

"I asked my Department what toxic herbicides were used. It was a simple question, and this is the answer I was given: reglone, grammoxone, tordone and hyva [correct spelling is hyvar] (sic). I do not wish to be disrespectful to the honourable gentleman or indeed the House; but, as far as I personally am concerned in the field of qualifications, they could be four horses running at Rosehill on Saturday". Defence Minister James Killen, 27 March 1980, "Parliamentary Debates (Hansard)", House of Representatives 1980, Vol. H of R 117, pp.1311-12

5. The use of defoliants was legal – wasn't it?

Many historians have failed to address the issue of human consequences of toxic spraying. The British government was a signatory to the 1925 *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases and of Bacteriological Methods of Warfare*, also called the Geneva Protocol. As collaborators with the US in the development of these weapons, they were also cognisant of their ally's refusal to ratify this treaty and the

US's indulgent interpretation of its provisions. As Grant Evans pointed out on page 183 of his 1983 book, this was "largely because of effective agitation against it [ratification] by the already powerful US Chemical Warfare Service". The majority of signatory nations, excepting General Salazar's fascist Portugal and Australia, regarded both defoliants and riot-control gases as prohibited by the Convention. Australia was also using these chemicals in Việt Nam, as Evans pointed out. [3]

In 1966, United Nations Secretary General, U Thant tried to institute a Protocol under which defoliants would be banned, but his efforts were blocked by the United States and other powerful members of the UN Security Council. On page 49, Mario Rossi described U Thant's efforts to have defoliant weapons banned in his article, *U Thant and Vietnam: The Untold Story*. [40] Peter Schuck outlined the pressure that was applied in the UN on page 19 of his book:

"In the United Nations, resolutions were introduced as early as 1966 charging the United States with violations of the 1925 Geneva Protocol limiting the use of chemical and biological weapons. Although the United States was able to defeat most of these resolutions, the General Assembly, over strong American opposition and the abstention of many allies, adopted a resolution in December 1969 that clearly defined the United States' defoliation program as a violation of the protocol." [36]

This vote in the UN General Assembly in 1969 resulted in thirty-six abstentions, but eighty nations voted *for* the motion and just three against. However, the use of defoliants continued and its use was greatly expanded.[12]

On 16 December 1969, Harold Wilson tabled a document to his Cabinet entitled, *The Geneva Protocol and the use of riot control agents in war Note by Prime Minister*. This note was prompted by the anomaly of British use of riot-control agents in Northern Ireland in a context in which the US government was obliged to seek legal clarification regarding their use of these agents in their war in Indochina. This clarification was necessitated by British development and sale of these gases to the US government.

Predictably, Harold Wilson and his Cabinet colleagues arrived at a recommendation which would provide some respectability to the trade in which they were already engaged:

"3. On the other hand, it can be maintained that chemical agents, whether regarded as lethal or incapacitating (including harassing materials) are all toxic agents. The terms "lethal" and "incapacitating" agents are not absolute terms but imply statistical probabilities of response. ...

1. Up to now it has been possible to avoid making any statement of Her Majesty's Government's present interpretation of the Protocol ...

(b) To reaffirm our 1930 statement, but to explain that the use in war of recently developed riot control agents such as CS, which we did not regard as significantly harmful, was not in our view covered by the Protocol". [41]

Yet, as the Stanford scientists pointed out in their 1971 article, the Charter of the International Military Tribunal at Nürnberg "defined 'murder, extermination, enslavement, deportation and other inhuman acts committed against any civilian population' as 'crimes against humanity' and 'wanton destruction of cities, towns or villages not justified by military necessity' as war crimes." [12]

6. Australians were only incidentally involved with Agent Orange use

There were signs of sickness among the returning US, Australian and New Zealand veterans, which were manifest in a bewildering range of symptoms. This led to demands for a full investigation of the chemicals used in the war in the US, Australia and New Zealand. Governments attempted to avoid responsibility and tried to falsify these investigations by manipulating their terms of reference to produce predetermined negative findings.

Both Australia and New Zealand veterans were rebuffed in their governments' attempts to claim benefits based on harm to their health caused by defoliants. The two allied governments made the untenable claim that Phước Tuy Province, Việt Nam, where New Zealanders and Australians served, had not been sprayed. This in spite of US official records, maps and veterans' accounts. These demonstrated that the province had been the first province used in a trial, then repeatedly sprayed, as veteran, Lachlan Irvine explained in his thesis.[42]

There were numerous examples of defoliant use in which Australian military planners adhered to the strategies of their US counterparts. Australian Veterans returned to a nation that preferred to forget the war and a government that was determined to pay as little attention as possible to the health problems of veterans. In his account of the 1985 Australian Inquiry into the toxicity of Agent Orange under Justice Phillip Evatt, Ham concluded that the Inquiry was a fraud. The conclusions of the inquiry contained statements like: "The suggestion that chemical defoliants had caused birth defects was 'fanciful'. The government had no case to answer". [14] Yet, as Ham explained:

“The commission had simply lifted large chunks of its conclusions from the submission by Monsanto ... Evatt adopted 70% of his materials [in the section on cancer] from Monsanto’s submission”. [14]

According to Thair Shaikh, expert witness at the inquiry, epidemiologist, Sir Richard Doll worked as a consultant for Monsanto and for the Chemical Manufacturers’ Association, whose members included Dow Chemicals and ICI. Doll, “was receiving a consultancy fee of \$1,500 a day in the mid-1980s from Monsanto” and stated to the Australian Royal Commission that “there was no evidence that the chemical caused cancer”. [43]

In spite of its shortcomings and this obvious conflict of interest, the outcome of the 1985 Australian Inquiry continues to be defended by historians, including those working at the Australian War Memorial. On 27 April 2011 an article by journalist, David Ellery in *The Canberra Times* article, *Vietnam veterans at war with historians* described the tension between academics and veterans. [44] Australian veterans, Ambrose Crowe, Lachlan Irvine and Graham Walker have all written academic papers and theses describing their experience of dealing with government and produced very similar conclusions. [45-47]

In spite of denials and inconclusive scientific and epidemiological studies, dioxin’s toxicity was known to science from the mid-1930s or as late as the 1940s. Its discovered teratogenic properties were concealed from 1966 till 1969, enabling continued use with devastating costs both to the target communities and to US and allied combatants. But the toxicological evidence demonstrated that there is a risk that children can be born with life-threatening deformities. For Western veterans it has meant a painful struggle with governments to gain recognition of harm and appropriate compensation; the Indochinese this has resulted in a form of inter-generational collective punishment.

Conclusions

In this paper fresh challenges have been issued against some of the disinformation and omissions surrounding the use of Agent Orange, that has beset Australian society to varying degrees since the Indochina War; has clouded public perception, government transparency, infected the official history and inflicted hurtful insults to the injured memories of Australian veterans, imposing conformity and silence on the nation’s narrative, to which Ellery drew attention.

Yet evidence was available regarding the purpose of defoliant warfare and its devastating consequences. Its early development and its use in the very earliest stages of the Indochina conflict have been fully documented. To date, in Australia a sanitised history has displaced a more accurate appreciation of the great harm that Agent Orange and its siblings inflicted on the peoples of Indochina, especially in the southern regions of Việt Nam, and

secondarily on many of the Australian, New Zealand and American soldiers who used the weapon. This is indeed a toxic recipe overdue for scholarly revision.

Whether or not civilians were specifically targeted, the use of chemicals known to be toxic against opposing forces constitutes the intentional use of chemical warfare agents against combatants, which was beyond the original stated purpose of defoliants and would have contravened Geneva Conventions and long-standing conventions against the use of chemical weapons.

(Gutman and Rieff: 2007)

What has happened to civilians is infinitely more reprehensible.

Surely, the last word goes to the ‘father’ of Agent Orange:

In 1974, Geoffrey E. Blackman carried out a study in South Việt Nam and Los Baños in the Philippines for the US National Academy of Sciences - National Research Council, as lead author: Geoffrey E. Blackman, John D. Fryer, Anton Lang and Michael Newton

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General Conclusions

“6. Claims that the herbicides as they were used during the war have rendered the soil "sterile." permanently or at least for prolonged periods, are without any foundation. It should be noted that these claims were contrary to all existing information for the herbicides in question”. (Blackman et al: 1974)

... As he commented on his own life’s work.

Birth defects were not mentioned. That question was beyond the ‘Scope of Work’.

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