Agent Orange Furor Continues to Build

For Vietnam veterans, the herbicide has become a symbol for everything that was wrong about the war

Over the past 2 years there has been increasing agitation among Vietnam veterans, several thousand of whom believe, or at least fear, that they have been poisoned by Agent Orange, one of the herbicides widely used as a defoliant in Vietnam in the 1960's.

The suspected culprit is dioxin (2,3,7,8-tetrachlorodibenzo-*p*-dioxin), a contaminant created in the manufacture of Agent Orange, which is a combination of 2,4-D and 2,4,5-T. The veterans claim to be suffering from a diffuse variety of symptoms, including numbness and tingling in the extremities, skin rashes, liver dysfunction, and vague complaints such as loss of sex drive, radical mood changes, and weakness. Furthermore, veterans fear that dioxin is responsible for a number of cases of cancer, and of birth defects in children who were born to them after they returned from Southeast Asia.

Although everyone knows that dioxin is very toxic, none of these complaints, with the exception of a skin condition called chloracne, can be directly traced to the chemical. But in absence of definitive evidence on dioxin's long-term effects, fear and suspicion continue to spread.

Owing to extensive media coverage of the problem, a continuous stream of veterans has been contacting Vietnam veterans' organizations or presenting themselves at Veterans' Administration (VA) facilities to see if what ails them might be Agent Orange. The herbicide now has become the focus for a tangled assortment of scientific, legal, political, and social questions. And the veterans don't want answers in 10 years. They want satisfaction now.

On 16 July a number of Vietnam veterans' groups met at the National Council of Churches in New York where they announced the formation of a coalition, The National Veterans' Task Force on Agent Orange, which plans to organize a national conference on the problem in Washington, D.C., sometime in the fall.

Meanwhile, the issue has been receiving stepped-up attention from the federal government. The Air Force has reluctantly agreed to conduct a study of 1200 men who were involved in "Operation Ranch Hand," one of the major herbicide-spraying projects in Vietnam. The Senate in June passed an amendment to a veterans' bill, now in House-Senate conference, calling on the Department of Health, Education, and Welfare to conduct a massive epidemiological study of the effect of 2,4,5-T on veterans and domestic populations. A House subcommittee in July held widely publicized hearings on Agent Orange which featured a little girl with multiple birth defects sired by a veteran claiming to suffer from dioxin poisoning.

The VA says it is now putting top priority on getting to the bottom of the question. It has issued circulars to hospitals detailing examinations to be made of veterans complaining of Agent Orange symptoms; it has an advisory committee on herbicides that is reviewing the literature; it is compiling a registry of alleged victims; and it is conducting a limited study analyzing fat samples of veterans exposed to Agent Orange to see if they contain traces of dioxin.

Meanwhile, two lawsuits have been launched on behalf of potential Agent Orange victims. One is being conducted by Long Island lawyer Victor Yannacone, known for his efforts a decade ago in behalf of the DDT ban. Yannacone has launched a class action suit against six chemical companies and is trying to blaze a precedent that would compel them to set up a trust fund to reimburse the government for the costs of damages to Agent Orange victims. The other suit, filed by the National Veterans Law Center located at American University in Washington, D.C., is aimed at getting the VA to go through a formal public rule-making procedure regarding its policies governing claimants for Agent Orange disability.

A noteworthy feature of the Agent Orange furor is that it did not exist until about 1½ years ago. Some 2000 veterans, mostly in the past year, have gone to VA hospitals for treatment of alleged Agent Orange symptoms. By June of 1978 the VA had received 300 claims for disability benefits based on Agent Orange exposure; a year later the figure stood at 547.*

If any single development has set the ball rolling, it appears to have been the case of Paul Reutershan, a veteran who discovered he had abdominal cancer in the fall of 1977. Reutershan, a commuter train conductor, was convinced his illness was caused by exposure to chemicals in Vietnam. (Reutershan eventually won disability benefits from the VA, but not for Agent Orange: the VA conceded that his duties might have aggravated a preexisting condition involving abnormal abdominal cells.) He told his story in a chance meeting with a Chicago television producer, which led to appearances on numerous radio and TV shows. He also founded a group called Agent Orange International which is now run by Vietnam veteran Frank McCarthy in New York.

The beginnings of the uproar can also be traced to a Chicago employee of the VA, Maude de Victor, who in 1977 noticed she was getting an unusual number of queries and applications for disability benefits for health problems that have been attributed to Agent Orange. She reported her findings to a Chicago veterans' group.

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The media have taken to the apparent scandal with great enthusiasm. Several television documentaries have been produced on the subject, the most notable being one called "Agent Orange: Vietnam's Deadly Fog," which was put together by a Chicago CBS affiliate and aired in March 1978.

Although veterans' groups feel that all the publicity has provided a crucial service in informing veterans of potential problems, it has also helped create an at-

*So far, 19 of these have been granted benefits for service-connected disability; only one, a chloracne case, has been acknowledged as possibly herbicide-related.

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mosphere where fear and rumors are rife. Veterans have been frightened by stories of inept and inappropriate treatment at VA hospitals—Yannacone, for example, said people complaining of liver problems have been assumed to be alcoholics, given thorazine, and packed off to psychiatrists.

There is no question that dioxin is something anyone can be alarmed about. It is a potent carcinogen and teratogen. It causes widespread effects on animals including tissue edema and liver damage, gastrointestinal erosion, and atrophy of the thymic and lymph systems. Perhaps the best-known animal studies with dioxin have been performed by James R. Allen of the University of Wisconsin. Allen found that a diet containing 500 parts per trillion of dioxin killed half a population of monkeys in 9 months. In doses one-tenth that size it caused numerous reproductive failures. Other studies, with rodents, have shown that extremely low doses of dioxin cause birth defects, particularly cleft palate and kidney abnormalities.

Among human populations, the data are scant, collected mainly from industrial accidents. The short-term effects of exposure to chemicals containing dioxin are legion: nausea; diarrhea; impairments in senses of smell, taste, and touch; tremors; and temporary focal paralysis. However, the only long-term effect that has been definitely linked to dioxin is chloracne. The National Academy of Sciences study of herbicides in Vietnam, completed in 1974, concluded that the likelihood of long-term health effects, aside from chloracne, on Americans was "highly remote." A couple of studies in Vietnam in 1969 yielded inconclusive evidence that birth defects were higher among babies whose mothers had been exposed to Agent Orange.

The most recent industrial accident where large amounts of dioxin were released in the environment (see *Science*, 9 September 1977) in Seveso, Italy, has yielded no evidence of increased birth defects. One member of a recent expedition to Seveso, Robert Miller of the National Cancer Institute, told *Science* that in addition to a few cases of chloracne, there was some subclinical evidence of delayed neurotransmission, although as far as he knew this would not register itself in any of the complaints veterans have attributed to Agent Orange.

Last month, 13 of 74 employees at a 2,4,5-T manufacturing plant in Jacksonville, Arkansas, were found to have chloracne from dioxin leakage. A medical team headed by Irving J. Selikoff of Mount Sinai School of Medicine has been dispatched to the scene to look for effects of the chemical on skin, the nervous system, and immune systems of past and present workers.

Evidence on carcinogenicity cannot be obtained now because of cancer's long latency period; however there is hope that follow-up on an explosion that occurred in Nitro, West Virginia, in 1949 may yield some clues.

In short, there is very little to go on in the scientific evaluation of veterans' allegations. There is no responsible scientist who would completely dismiss them; however, most scientists appear to consider it unlikely that the doses of Agent Orange received in Vietnam—which can probably never be measured but which certainly contained far less dioxin than the amount fed to Allen's monkeys—could produce the effects now being ascribed to it.

One scientist, Harvard's Mathew Meselson, an expert on the effects of herbicide spraying in Vietnam, says: "I don't think there is convincing evidence that TCDD [dioxin] is causing serious widespread health problems." However, since there is no convincing evidence to the contrary, "I believe there is good reason to be concerned."

Cancer and birth defects are the two most serious potential problems. Cancer, however, is a long-term affair and the difficulties of ascertaining a causal relationship with the herbicide are very like those relating cancer to radiation exposure (see *Science*, 13 April 1979). With one-quarter of the population getting cancer anyway, massive studies would be required to uncover even a hint of connection.

As for birth defects, the scientists questioned said there has been little research on transmission through the male. Frederick Coulston of Albany Medical College, who recently convened a conference to discuss epidemiological studies of 2,4,5-T, told *Science* there is enough evidence to state that "there is no causal relationship between dioxin and spontaneous abortion" in Seveso or in Oregon, where a spate of miscarriages triggered the Environmental Protection Agency's February decision to further restrict spraying of 2,4,5-T. Coulston, who described himself as "one of the leading toxicologists in the world," said "there is no evidence of immediate [or long-term] harm in the amount of dioxin people were exposed to" in Vietnam, the United States, or Seveso.

Another scientist, John A. Moore of the National Institute for Environmental Health Sciences at Research Triangle Park in North Carolina, said there is "no scientific evidence" that "chemical insult to a man" could result in birth defects. Said Meselson, "it's been generally assumed that the sperm could not be affected." Scientists say that dioxin is probably a mutagen, since most carcinogens are also mutagens; this means it might or might not affect sperm. But most studies on mutagenicity have been conducted on female animals so, as Moore says, "toxicological data that could shed light on that issue are somewhat nonexistent." It may be worth noting, though, that even Ton That Tung, the North Vietnamese scientist who believes Agent Orange has contributed to cancer and birth defects in North Vietnam (*Science*, 25 May 1979), did not know of any case where such defects appeared to have been transmitted through the father.

The most "studiable" human population, according to an HEW official, appears to be the members of Operation Ranch Hand. The Air Force has finally been prodded into designing a protocol for such an investigation. The study of the 1200 men is supposed to extend over 6 years to provide for follow-up and there will be a control population of 1800 veterans not exposed to the herbicide. The study is to be conducted by the School of Aerospace Medicine in San Antonio. The Air Force has not yet disclosed any details, other than it will involve lengthy questionnaires.

Veterans' groups are not in the least mollified either by the VA fat sample study or the Air Force study. The former, they claim, won't show anything, because dioxin can disappear in a short period from body tissues after setting into motion various somatic events. The scientists involved agree that it will only demonstrate the presence or absence of dioxin—not how it came to be there, which could be through subsequent occupational or other exposure, or its potential adverse effects. At most, it might lend some weight to the contention advanced by biologist Barry Commoner among others that dioxin stored in body fat could have a delayed effect, being released into the system when an individual loses weight, like DDT and other lipophilic chemicals.

It thus could have some bearing on the contention by veterans' groups that Agent Orange exposure can have a delayed reaction, a notion that most authorities dismiss. The dominant belief is that if no immediate effects of herbicide

poisoning are noted, there will be no later ones.

As for the Ranch Hand case, there is an understandable feeling that there may be a conflict of interest in having the Air Force study itself. Besides, the veterans' groups contend that any or all of the 2.4 million men who served in Vietnam could have been exposed to the herbicide, and they don't believe that the participants in Operation Ranch Hand necessarily had the biggest doses.

The veterans are more interested in a project being conducted by Jeanne Stellman who, with her husband Steven Stellman, is surveying Agent Orange problems under the auspices of the National Health Foundation, a private group in New York. Stellman says she sent a questionnaire to 600 veterans complaining of Agent Orange symptoms, and of the 570 responses she has 35 cases of cancer, including three of the kidney, one of the lung, and two or three cases of testicular cancer, all exceedingly rare for young men. She acknowledges the respondents are "self-selected" but believes that the types of cancer indicate something is amiss. The new veterans' coalition intends to generate support for Stellman to conduct an expanded study.

It will be difficult to trace any direct links between Agent Orange and the alleged effects. It may be impossible to establish doses, except perhaps in the case of Operation Ranch Hand. Another obstacle is the fact that the symptoms ascribed to the herbicide are amorphous ones that could come from any of a wealth of causes. Many veterans have fathered defective babies, but statistically speaking, thousands of major birth defects (the kind Yannacone has dubbed "catastrophic and polygenetic") can be expected from a population of 2.4 million men. The rate for spontaneous abortions and miscarriages in the general population ranges from 15 to 25 percent, so a very large concentration would be required to confirm suspicions.

The types of complaints, from nervousness to cancer, have not so far been shown to be unique in any way. As Miller of NCI says, it takes very few cases to arouse suspicions of causality when the disorders are truly unusual—seven cases of vaginal cancer among young women in Boston led to the exposure of diethylstilbestrol (DES); three cases of angiosarcoma (liver cancer) in Louisville, Kentucky, were enough to alert scientists to the menace of vinyl chloride. But there have been no such unique clusters of disorders detected in the case of Vietnam veterans.

Science spoke with Paul L. Haber, VA assistant chief medical director, who was still ruffled from an appearance on a local television show in which he had had to respond to a vociferously hostile alleged Agent Orange victim, a stony-faced Frank McCarthy (head of Agent Orange International), and an interviewer who wanted to know why the VA wasn't doing anything about men who had been poisoned in the service of their country. Haber later expressed frustration and some bewilderment—"I wish somebody could show me the light." The central issue, he said, is "Is there a body of symptoms?" Contrary to popular perception, there is nothing unique about the veterans' physical complaints (aside from chloracne). "I've heard about veterans complaining of numbness and tingling and paralysis for as long as I've been at the VA." Numbness and tingling, he said, "could be caused by a thousand different things"—diabetes, stroke, circulatory problems and so forth. If paralysis is caused it would not be intermittent (many veterans have complained of off-and-on paralysis)—"with peripheral neural toxicity you either have it or you don't." Haber recalled that after World War I, veterans complained of something that was dubbed "soldiers heart," or "neurocirculatory asthenia" featuring many of the same complaints, including numbness, tingling, palpitations, loss of libido, shortness of breath, insomnia, irritability, mood changes, restlessness, and sweats.

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Gerrit W. H. Schepers, a pathologist who is chairman of the VA's Ad Hoc Advisory Committee on Herbicides, told *Science* that so far no one has been able to determine that the complaints of Vietnam veterans are any different in kind from those of other wars. He admitted the VA was the object of a great deal of antipathy from the Vietnam veterans, but tossed it off. "Some people are always dissatisfied. . . ."

This seeming insensitivity would seem justification for the veterans' rage against the VA; but it was not apparent in the attitudes of other VA officials *Science* talked to, including administrator Max Cleland's new assistant Dean Phillips, himself a former paratrooper who recently won a battle with thyroid cancer, and Phillips' predecessor Paul Weston. These men acknowledged that Vietnam veterans are a unique group with special problems owing to the specially unpopular nature of the war. They pointed out that the VA's mandate is determined by veterans' affairs committees in Congress which have long been under the influence of traditional veterans' groups. Some of the services veterans have demanded—such as examination and treatment of children with birth defects—are not permitted under VA legislation. The absence of appropriate counseling services is not entirely the VA's fault; it has been trying for 4 years to get money from Congress for a decentralized network of "storefront" counseling facilities and it has not been until this year that money—$9.9 million—was granted.

It could well be that VA facilities are "inept, inefficient, and should be phased out," as veterans' leader McCarthy contends. (A National Academy of Sciences report issued in 1977 recommended phase-out of the system.) However, it could also be that the VA is unfairly being used as a scapegoat for the diffuse rage of the veterans which has now become attached to Agent Orange. As Phillips pointed out: "The VA's the closest thing to the Army."

Agent Orange has become a complex symbol for the perverse nature of the war—a symbol, as Champlin says, that "our enemy was ourselves"—and a focus for the anger so many veterans feel, against the government in general, the Army in particular, the VA; against peers who didn't go to war and have treated them with apathy or contempt; against older veterans who blame them for not winning the war; and against the American public for its ingratitude for the sacrifices made. Agent Orange is also contributing to a sense of solidarity they never had—says Champlin "it is helping a lot of veterans reach out and help each other."—CONSTANCE HOLDEN