

=====~~Electronic Edition~~=====

RACHEL'S ENVIRONMENT & HEALTH WEEKLY #436

---April 6, 1995---

News and resources for environmental justice.

=====

Environmental Research Foundation

P.O. Box 5036, Annapolis, MD 21403

Fax (410) 263-8944; Internet: erf@rachel.clark.net

=====

The [Back issues](#) and [Index](#) are available here.

The [official RACHEL archive](#) is here. It's updated constantly.

To subscribe, send E-mail to rachel-weekly-request@world.std.com

with the single word SUBSCRIBE in the message. It's free.

===[Previous Issue](#)=====Next Issue===

THE DOGS OF WAR

Somewhere between 2.6 and 3.8 million American men and women served in Vietnam during the years 1965 through 1971, the years when chemical herbicides were being used to denude the jungle and destroy enemy crops. Military records do not allow a more accurate determination of the true number who served. [\[1\]](#)

Alongside the humans serving in Vietnam, there were 3895 military working dogs, almost all of them purebred German shepherds. [\[2\]](#) (Among the 3895, there were 64 Labrador or golden retrievers used as trackers; the other 98.3 percent were German shepherds.) These dogs served as scouts, sentries, trackers, mine detectors, and tunnel explorers. About 91% of these dogs were "intact" (uncastrated) males.

When a military working dog dies, regardless of the circumstances of death or the duty location, an autopsy is performed by a veterinarian, and a standardized set of tissue specimens and organs are sent to the Armed Forces Institute of Pathology in Washington, D.C.

During the late 1980s, researchers compared autopsy records of 1167 military working dogs with Vietnam service against autopsy records of 791 military working dogs who served in the continental U. S. and saw no Vietnam service. In a separate study, the stateside dogs were also compared to 437 dogs that died in Okinawa, because many dogs that served in Vietnam were sent to Okinawa after the war. [\[3\]](#)

These studies showed that dogs who served in Vietnam were about twice as likely (1.8 times as likely) to have cancer of the testicles, compared to military working dogs who served only in the states. Likewise, military dogs that died in Okinawa were about twice as likely (2.2 times as likely) to have testicular cancer as dogs who served only in the states. A separate study was then conducted, excluding the dogs who had testicular cancer. Among the non-cancer dogs, there was clear evidence of significant

deterioration of the testicles in those dogs who served in Vietnam (compared to dogs who served only in the U.S.): degeneration of the testicles, atrophy (shrinking) of the testicles, and evidence of a below-normal ability to produce sperm.

Dogs have often served as sentinels of human disease. Back in 1938, the well-known researcher W.C. Hueper showed that beta-naphthylamine caused bladder cancer in dogs. [4] In 1954, researchers showed that another industrial chemical, 4-aminodiphenyl, produced bladder cancer in dogs. [5] In 1980, a study of 8760 pet dogs showed that bladder cancer in dogs correlated with residence in industrialized counties in the U.S. and Canada; this same study showed that bladder cancer in men and women was similarly correlated with residence in industrialized areas. "The findings of this study suggest that the bladder cancer experience of pet dogs resembles that of human beings living in the same general locale," the study concluded. [6]

Pet dogs are particularly relevant in such studies because 40 million pet dogs share their owner's domestic environment yet do not indulge in behavior that could confuse or confound the interpretation of epidemiologic studies: dogs don't smoke, and they usually don't work. In 1983, a study of pet dogs with the asbestos-related lung disease, mesothelioma, showed that their disease correlated with household members who (a) worked in an asbestos-related job, or (b) had an asbestos-related hobby or (c) applied flea powder to their dog. [7]

For these reasons, the finding of testicular cancer and testicular dysfunction in dogs who served in Vietnam was an eye-opener, and it soon led to a comparison of 271 human veterans with testicular cancer to 259 veterans without testicular cancer, to see whether Vietnam service was related to testicular cancer. This study revealed that, like dogs, human veterans of Vietnam were about twice as likely (2.5 times as likely), to have testicular cancer compared to veterans who did not serve in Vietnam. [8]

Naturally, the question occurs, what aspects of military service in Vietnam caused testicular cancer in men, and testicular cancer and dysfunction in military working dogs?

An obvious suspect is Agent Orange, which was sprayed in large quantities (11.2 million gallons, or 42.4 million liters) over 3.6 million acres (1.5 million hectares) of Vietnam. Agent Orange, named for the orange stripe on its 55-gallon storage containers, was a 50-50 mixture of two herbicides: 2,4,5-T and 2,4-D. One of these, 2,4,5-T, was banned in the U.S. about 1980 because evidence indicated that it could cause birth defects in humans; the other half of Agent Orange, 2,4-D, remains in wide use throughout the U.S. where it is popular for killing dandelions and other broad-leaf plants in lawns, and as an agricultural weed killer.

During manufacture, the herbicide 2,4,5-T becomes contaminated with dioxin unavoidably. According to the National Academy of Sciences, the average dioxin contamination in Agent Orange in Vietnam was 2 parts per million (ppm). An estimated total of 368 pounds of dioxin was sprayed onto Vietnam's land and people during the 7-year spray program. [9]

However, a recent study of Vietnam veterans that tried to estimate 2,4,5-T exposure and link it to testicular cancer found that only Navy men had elevated levels of testicular cancer associated with 2,4,5-T exposure; men in the other services showed no such effect of exposure to 2,4,5-T. [\[10\]](#) The authors of that study speculated that Navy men might also have been exposed to fuels (oil and gasoline), which previous studies have linked to testicular cancer.

The other half of Agent Orange, herbicide 2,4-D, is also a suspect. Although the manufacturers of 2,4-D claimed for years that their products were not contaminated with dioxin, this claim has now been shown to be false, using the manufacturers' own data. [\[11\]](#)

Dioxin has been shown to damage the reproductive organs and systems of many animal species, including men and women. [\[12\]](#)

A study of pet dogs in the U.S. found excess cancers (lymphomas) associated with 2,4-D lawn spraying. [\[13\]](#) And a study of 32 farmers who sprayed 2,4-D, compared to a control group of 25 unexposed farmers, revealed significant effects on the exposed farmers: diminished sperm count, increased number of sperm with poor motility (swimming ability); increased numbers of dead sperm; and increased numbers of malformed sperm. [\[14\]](#)

No federal agency keeps close track of pesticide use in the U.S.; however U.S. Environmental Protection Agency (EPA) estimates that farmers apply 25 to 30 million pounds (11.3 to 13.6 million kilograms) of "active ingredient" of 2,4-D each year in the U.S. Non-agricultural use of 2,4-D in the U.S. is estimated to total another 12 to 15 million pounds (5.4 to 6.8 million kilograms) of "active ingredient" per year. [\[15\]](#) The "active ingredient" of a pesticide is only 0.5% to 5% of the total formulation so these "active ingredient" amounts must be multiplied by anywhere from 20 to 200 to get the total 2,4-D formulation used each year. The bulk of the formulation is secret ingredients (called "inerts") which are, themselves, often toxic solvents. [\[16\]](#)

Other chemicals suspected of causing testicular cancer and dysfunction in dogs and humans who served in Vietnam are the antibiotic tetracycline and the pesticide malathion. Many military dogs in Vietnam suffered from ear infections and other diseases. [\[17\]](#) Therefore, many received one or more doses of tetracycline during their tour of duty. Tetracycline is strongly absorbed by sperm in mammals, and is known to cause testicular atrophy (shrinkage), and diminished sperm quality in humans and dogs.

The other suspicious candidate is malathion. The same military unit that sprayed Agent Orange also sprayed DDT and malathion extensively in the vicinity of U.S. troops, to reduce the dangers of malaria carried by mosquitoes. It has been reported that 44% of the land of southeast Asia, mainly Vietnam, was sprayed with malathion during the war. [\[18\]](#) Furthermore, military working dogs in Vietnam were dipped in a 0.5% solution of malathion to kill disease-carrying ticks. Malathion is known to cause testicular atrophy and damage to the sperm-generating cells of laboratory animals. [\[19\]](#)

Malathion is widely use throughout the U.S. today for mosquito control though not for fear of malaria. Mosquitoes are simply a nuisance. EPA estimates that 4 to 6 million pounds (1.8 to 2.7 million kilograms) of "active ingredient" of malathion are sprayed in the U.S. each year. The yearly total of malathion formulation sprayed is, again, 20 to 200 times this amount.

Sperm count in men throughout the industrialized world appears to be dropping. (See [RHWN #343](#) and [#432](#).) Testicular cancer is the most prevalent cancer among white males between the ages of 25 and 34 years and the second most common in the 35-to-39 age group. The causes of testicular cancer are thought to be environmental because the rates vary widely from one location to another. During the last 15 years, the rates have increased rapidly (2.3% to 3.4% per year) in many industrialized countries. [\[20\]](#)

It may take scientists many decades to tell us all we would like to know about a complex chemical like dioxin, or malathion. However, we already know enough to act: To guide our personal choices, and new public policies, to minimize the danger to ourselves, our families, and our communities, we need only to remember that chemicals not used cannot cause harm. This we can learn from the dogs of war.

--Peter Montague

=====
[1] Harold Fallon and others, VETERANS AND AGENT ORANGE: HEALTH EFFECTS OF HERBICIDES USED IN VIETNAM (Washington, D.C.: National Academy Press, 1993), pg. 3-1.

[2] Howard M. Hayes and others, "U.S. Military Working Dogs with Vietnam Service: Definition and Characteristics of the Cohort," MILITARY MEDICINE Vol. 159, No. 11 (November 1994), pgs. 669-675.

[3] H. M. Hayes and others, "Excess of Seminomas Observed in Vietnam Service U.S. Military Working Dogs," JOURNAL OF THE NATIONAL CANCER INSTITUTE Vol. 82, No. 12 (June 20, 1990), pgs. 1042-1046.

[4] W.C. Hueper and others, "Experimental Production of Bladder Tumors in Dogs by Administration of Beta-Naphthylamine," The JOURNAL OF INDUSTRIAL HYGIENE AND TOXICOLOGY Vol. 20, No. 1 (January 1938), pgs. 46-84.

[5] A.L. Walpole and others, "Tumours of the Urinary Bladder in Dogs After Ingestion of 4-aminodiphenyl," BRITISH JOURNAL OF INDUSTRIAL MEDICINE Vol. 11 (1954), pgs. 105-109.

[6] Howard M. Hayes and others, "Bladder Cancer in Pet Dogs: A Sentinel for Environmental Cancer?" AMERICAN JOURNAL OF EPIDEMIOLOGY Vol. 114, No. 2 (1981), pgs. 229-233.

[7] Lawrence T. Glickman and others, "Mesothelioma in Pet Dogs Associated with Exposure of Their Owners to Asbestos," ENVIRONMENTAL RESEARCH Vol. 32, No. 2 (December 1983), pgs. 305-313.

- [8] Robert E. Tarone, and others, "Service in Vietnam and Risk of Testicular Cancer," JOURNAL OF THE NATIONAL CANCER INSTITUTE Vol. 83, No. 20 (October 16, 1991), pgs. 1497-1499.
- [9] Fallon, cited above, pg. 2-4.
- [10] Tim A. Bullman and others, "Risk of Testicular Cancer Associated with Surrogate Measures of Agent Orange Exposure among Vietnam Veterans on the Agency Orange Registry," ANNALS OF EPIDEMIOLOGY Vol. 4, No. 1 (January 1994), pgs. 11-16.
- [11] U.S. Environmental Protection Agency, ESTIMATING EXPOSURE TO DIOXIN-LIKE COMPOUNDS VOL. II PROPERTIES, SOURCES, OCCURRENCE AND BACKGROUND EXPOSURES [EPA/600/6-88/005Cb June 1994 External Review Draft] (Washington, D.C.: U.S. Environmental Protection Agency, 1994), Table 3-18 on pg. 3-58.
- [12] Arnold Schechter, editor. DIOXINS AND HEALTH (New York: Plenum Press, 1994); see, for example, pgs. 26, 145, 318, and 332, among others.
- [13] Howard M. Hayes and others, "Case-Control Study of Canine Malignant Lymphoma: Positive Association With Dog Owner's Use of 2,4-Dichlorophenoxyacetic Acid Herbicides," JOURNAL OF THE NATIONAL CANCER INSTITUTE Vol. 83, No. 17 (September 4, 1991), pgs. 1226-1231.
- [14] D. Lerda and R. Rizzi, "Study of reproductive function in persons occupationally exposed to 2,4-dichlorophenoxyacetic acid (2,4-D)" MUTATION RESEARCH Vol. 262 (1991), pgs. 47-50.
- [15] Arnold L. Aspelin, PESTICIDES INDUSTRY SALES AND USAGE; 1992 AND 1993 MARKET ESTIMATES [733-K-94-001] (Washington, D.C.: U.S. Environmental Protection Agency, June 1994), pg. 19.
- [16] John H. Bukowski and Leroy W. Meyer, "Simulated Air Levels of Volatile Organic Compounds Following Different Methods of Indoor Insecticide Application," ENVIRONMENTAL SCIENCE & TECHNOLOGY Vol. 29, No. 3 (1995), pgs. 673-676.
- [17] Paul B. Jennings and others, "A Survey of Diseases of Military Dogs in the Republic of Vietnam," JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION Vol. 159, No. 4 (August 15, 1971), pgs. 434-440.
- [18] Fallon, cited above, pg. 3-14.
- [19] K. Balasubramanian and others, "Effect of malathion on the testis of male albino rats," MEDICAL SCIENCE RESEARCH Vol.15 (1987), pgs. 229-230.

[20] Hans-Olav Adami and others, "Testicular Cancer in Nine Northern European Countries," INTERNATIONAL JOURNAL OF CANCER Vol. 59 (1994), pgs. 33-38.

Descriptor terms: vietnam war; military; army; navy; marines; air force; herbicides; veterans; dogs; german shepherds; labrador retrievers; golden retrievers; okinawa; testicular cancer; sperm count; testicular atrophy; 4-aminodiphenyl; beta-naphthylamine; bladder cancer; asbestos; mesothelioma; flea powder; agent orange; 2,4,5-t; 2,4-d; birth defects; agriculture; farming; dioxin; fuel; oil; gasoline; lymphoma; pesticide use data; inert ingredients; secret ingredients; antibiotics; tetracycline; malathion; mosquito control;

[Next issue](#)