Letters

Agent Orange Studies

Marcia Barinaga's article "Agent Orange: Congress impatient for answers" (News & Comment, 21 July, p. 249) may leave the impression that the American Legion study is the first epidemiologic investigation of Vietnam veterans. Such is not the case. In fact, Agent Orange and its notorious contaminant dioxin (2,3,7,8-tetrachlorodibenzo-*p*-dioxin) differ from most environmental toxicants because of the volume of information that has been accumulated about them.

There can be no doubt that the Air Force personnel who served in Operation Ranch Hand and sprayed 90% of the Agent Orange in Vietnam got the greatest exposures there. The concentration of dioxin in their blood fat now averages 38 parts per trillion (ppt), the highest concentration being greater than 300 ppt. The average is more than seven times greater than the average concentrations (<5 ppt) found in the blood fat of veterans of ground warfare in Vietnam, as well as in that of veterans who did not serve in Vietnam. Skin cancers of the sort usually associated with exposure to the sun are more frequent in the Ranch Hand veterans than in a nonexposed control population, but incidence of none of the health effects reported in the American Legion study is higher.

Neither are those effects elevated among residents of Seveso, Italy, where a chemical plant explosion in 1976 exposed more than 35,000 people of all ages to varying amounts of dioxin. Twelve years of medical examination and follow-up have not convincingly demonstrated increased rates of any disease except chloracne, which is associated with high dioxin exposure.

Several chemical plant accidents around the world in the 1940s, 1950s, and 1960s exposed workers to high concentrations of dioxin that caused chloracne. There are no consistent findings of elevated rates of cancer, other serious diseases, or premature death in those populations.

Discussions of the health effects associated with Agent Orange and dioxin have been fueled by contradictory results. In general, associations between exposures and disease (except chloracne) have been made in populations in which we are least certain of exposure. Studies in highly exposed populations have failed to verify those associations. The two cancers now most commonly associated with exposures to Agent Orange and dioxin—soft tissue sarcomas and non-Hodgkins lymphomas—fit that pattern. In any event, much more definitive information will be available in March 1990, when the Centers for Disease Control is scheduled to release the results of a study of the occurrence of six cancers, including soft tissue sarcomas and non-Hodgkins lymphoma, among Vietnam veterans.

Agent Orange is one of the last vestiges of the nation's torment over the Vietnam War. Many members of Congress as well as many citizens are ashamed of our treatment of Vietnam veterans during and immediately after the war, a feeling that I share. But that guilt also fuels the continued search for evidence that Agent Orange "did" something to the health of veterans. It is ironic that the mental and emotional anguish caused by all wars is largely ignored while we search in vain for a chemical cause for diseases that occur as frequently in nonveterans as in veterans, and, so far as can be told, as frequently in veterans not exposed to Agent Orange as in those who were exposed. This is not the way to right any wrongs that may have been done.

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Barinaga portrays the American Legion–funded study of Vietnam veterans (*1*) as the centerpiece of a congressional hearing. While we believe that our study shows the fallacy of the Centers for Disease Control (CDC) contention that it is not possible to analyze the relationships between herbicide exposure and health on the basis of available military records (*2*), the hearing only tangentially focused on our previously published analysis.

A major focus of the hearing—and of the American Legion panel, in which our collaborators, Jeanne Mager Stellman and Steven D. Stellman, participated—was the massive data available on troop movement and herbicide spraying abandoned by the CDC. The data comprise hundreds of thousands of records of specific locations and dates of troop movements, including records of daily troop movements , over at least 30 months, of 50 combat battalions that served in the Third Corps tactical zone of South Vietnam, coded down to the company level, and about 75,000 other records of dates and locations of marine and army units in the other military combat tactical zones.

In addition, we described and illustrated at the hearings more than 22,000 detailed records of the spraying of some 12 million gallons of Agent Orange and 19 million gallons of all herbicides in Operation Ranch Hand compiled by the National Academy of Sciences and supplemented by the U.S. Army and Joint Services Environmental Support Group. We showed clearly many instances of "direct" hits and great differences between sprayed and unsprayed areas, all of which can be used as the basis for clinical, environmental, and epidemiological studies. The CDC has never demonstrated why these data are not useful for epidemiological and other studies.

Science readers deserve to know about the rich data available on herbicide exposures in Vietnam and the grave problems associated with the methods used by the CDC in their congressionally mandated Agent Orange study. The CDC has expended nearly $63 million of public funds on its Vietnam veteran research. The American Legion is currently working with the Stellmans to develop a mechanism by which the data on exposure and military units, which the Stellmans have painstakingly reduced to practical size, can be shared with the research community for future much needed work on the health and well-being of Vietnam veterans.

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"Radiation-Induced" Cancer

I was surprised to read in Eliot Marshall's article about fallout on Rongelap Atoll that the nephew of a Marshall Islands senator had "died of radiation-induced leukemia" (News & Comment, 14 July, p. 123). Radiation-induced cancer, including leukemia, is indistinguishable from cancer that arises from any other cause. It is impossible for any physician or pathologist, no matter how skilled he or she may be, to be able to say unequivocally that any cancer would not have occurred but for exposure to radiation. The best that can be done is to estimate the probability, on the basis of the size of the radiation dose, that any particular cancer is due to radiation. When a large population is exposed to a carcinogen such as radiation, the carcinogenic effect can only be deter-

mined statistically by noting an increase in the expected incidence rate for that particular cancer. Even when such an increased incidence rate is observed, we cannot distinguish between those cancers that would have normally occurred and those that were due to exposure to the carcinogen.

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Balance in *Science*

I disagree with Daniel E. Koshland, Jr.'s, statement that "the chance of being published in *Science* is approximately the same for all fields of research" (Editorial, 28 July, p. 341).

To favor papers in physics and social sciences over those in biology does help represent the former two disciplines. But a definition of "biology" based on the contents of *Science* excludes many fields of biology. So many of the papers in *Science* are concerned with molecular, cell, and biochemical biology, especially those with human applications, that the journal's name might be changed to "*Biomedical Science.*" One has to be in one of those specialized fields to even understand the titles! *Science* publishes so few papers on organismal biology (in such fields as ecology, zoology, or vertebrate morphology—which is the major division of the American Society of Zoologists), that it is no wonder authors from these fields do not bother to submit their papers to *Science.*

I think that *Science* has a long way to go before it "publish[es] the cutting edge of research in every branch of science as well as present[s] research that will interest readers ranging from physicists to social scientists."

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Response: Physicists will find it hard to believe that a biologist feels discriminated against by *Science*, but reader Reilly illustrates the point I was trying to make. Within each major field (physics, biology, and so forth), there are subdivisions (organismal, AIDS, crystallography, cell, and so forth in biology), each of which thinks their own area is underrepresented. What appears in *Science* is to a first approximation a constant fraction of what we receive in each area. That distribution is affected by funding and fashions that control the number of workers in a field, but we do not want it to be further influenced by the preconceptions of authors. We try to judge all papers equally but, if anything, give a slight edge to underrepresented areas—DANIEL E. KOSHLAND, JR.

Correction

We wish to make a correction concerning our 9 September 1988 report "Selection of variable-joining [VJ] region combinations in the α chain of the T cell receptor" (*1*). We have discovered that the $V_{58}J_3$ isolates actually contain part of the 3′ heptamer-spacer sequence from the V_{58} germline (*2*) and thus these do not, in fact, contain a joining segment. Because these isolates exhibit diversity at the coding-signal junction, we incorrectly assumed that they were bona fide VJ transcripts. At this time we do not know whether the junctional bases are nongermline elements introduced at the coding-signal joints, or whether transcripts from such nonrearranged V_α genes might serve some function. Transcripts from nonrearranged gamma genes have recently been reported, and these are inducible by interleukin-3 (*3*).

We would also like to comment on the observation that the $V_{58}J_{58}$ isolates do not contain diversity at the VJ joint. This lack of diversity, in contrast to that of all other VJ isolates from our laboratory, has raised the question of whether these may have been derived, as a polymerase chain reaction contaminant (*4*), from the α chain gene isolated from CTL 2C. At this time we do not have a definitive answer.

Despite the error in our analysis of the $V_{58}J_3$ isolates, the main tenet of our report (that is, the preferential association and expression of particular VJ combinations) holds true. Thus, the J_1 and J_2 isolates (figures 1 and 3) and only a few other J segments (*5*) have been found to be expressed as the predominant V_{58} transcripts.

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