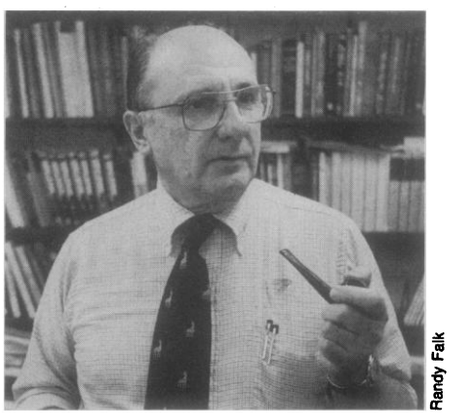
NAS Panel Critical of NIOSH Proposal

Says cytogenetic study of nuclear shipyard workers would not contribute to science or predictions about health

For nearly 2 years, the National Institute for Occupational Safety and Health (NIOSH) has wanted to conduct chromosome and sperm studies of workers exposed to low-level ionizing radiation at the Navy's nuclear shipyard in Portsmouth, New Hampshire. But the Navy has resolutely refused to let NIOSH in. "The proposed cytogenetic study clearly falls into the category of research for the sake of research," Admiral Hyman G. Rickover declared in a letter to Health and Human Services (HHS) Secretary Richard Schweiker in June 1981. (NIOSH is part of HHS.) Rickover asked Schweiker to cancel the proposed study.

In an effort to resolve the impasse between NIOSH and the Navy, Schweiker asked the National Academy of Sciences–National Research Council to weigh in with a review of the NIOSH protocol. The Academy has just done so with a report* which says in no uncertain terms that the proposed study should not be carried out—not even for research's sake. "The cytogenetic study under consideration will not contribute significantly to scientific knowledge regarding the effects of radiation on human chromosomes," the report states. Nor, in the committee's view, would it offer much with respect to predictions about the future health of the nuclear workers. The committee, chaired by cytogeneticist Sheldon Wolff of the University of California at San Francisco, also concluded that ". . . the sperm study under consideration will not contribute to scientific knowledge of the effects of ionizing radiation on sperm in humans or on ill health related to infertility or genetic changes." The proposed study is just a "spinning of wheels," Wolff told *Science*.



Randy Falk

Sheldon Wolff

Cytogenetic studies are confronted with an array of difficulties.

But NIOSH has yet to be convinced. "I think they are unduly pessimistic about the scientific value of the study," says Philip Landrigan, director of the division of surveillance, hazard evaluation and field studies at NIOSH. According to Landrigan, NIOSH still wishes to conduct its study "with only minor changes in the protocol" and is continuing to seek the Navy's permission to test the Portsmouth workers. He expects the matter to be "resolved within a couple of weeks." The Navy remains firmly opposed.

Serious concern about the health of the workers who build and overhaul nuclear submarines at Portsmouth was sparked in 1978 by a report of greatly increased deaths from cancer. According to an article in *The Lancet* (13 May, 1978, p. 1018), there was a five-fold increase in death from leukemia and a two-fold increase in death from all types of cancer among the nuclear workers. In an effort to confirm those data, a team of NIOSH scientists that included Landrigan, conducted a more complete retrospective analysis of mortality among the shipyard workers. "Although [our] study had a power of greater than 99% to detect statistically a five-fold increase in leukemia mortality among the radiation workers, and a power of 67% to detect a two-fold increase, there was no excess due to leukemia or any other cause," they reported in the 31 January 1981 issue of *The Lancet*. They also noted that a reanalysis of the 1978 data by one of the researchers who compiled them by and large corroborated the lack of correlation betweeen exposure to low-level radiation and death. But at the same time, the NIOSH team discounted the finality of its own conclusions. "Despite the apparently negative findings of the present study, it would be quite improper to interpret our results as constituting evidence against leukemogenesis of low doses of external ionizing radiation," they wrote, citing the short latency period of their study as one of its limits.

Furthermore, mortality is not the only measure of potential harm from exposure to low-level radiation. In 1979, researchers from the Medical Research Council, Edinburgh, Scotland, reported a 10-year cytogenetic study of nuclear shipyard workers at a United Kingdom naval base. Their data, reported in *Nature* (15 February 1979, p. 534), showed a definite correlation between exposure to low-level radiation and chromosomal aberrations. What the data did not show was what the aberrations mean as far as worker health is concerned. "Our data . . . tell us nothing about possible biological consequences," H. J. Evans and his colleagues wrote, noting that persons who have not been occupationally exposed to radiation also have thousands of aberrant cells.

The continuing scientific challenge is to link these aberrations to specific diseases. As the Wolff committee observed, "Although the chromosomes in malignant cells are often abnormal, the relationship between induced aberrations and cancer is still to be understood."

It was in part to corroborate the Evans data and that of another British study of nuclear workers that NIOSH first proposed the Portsmouth study. But the Wolff committee believes the correlation among existing studies is sufficient. "The two most fundamental biological questions have already been answered: aberration frequencies in peripheral lymphocytes are elevated to a detectable level in groups occupationally exposed to radiation, and the degree of elevation is a function of radiation dose. The committee does not believe an additional study at [Portsmouth] is justified simply to confirm earlier findings." Furthermore, the Wolff panel said that the NIOSH protocol, as presently drafted, would not elucidate the one surprise finding in the Evans study that needs further exploration—namely that older workers appear to be five times more susceptible to chromosome damage from radiation than younger workers.

Although Landrigan was understandably disappointed with the committee's opinion of the value of the NIOSH study, he was heartened by its endorse-

*"Evaluation of Portsmouth Naval Shipyard cytogenetics and spermatogenesis protocol," National Research Council, October 1982. (A limited number of copies are available from the Commission on Life Sciences, NRC, 2101 Constitution Avenue, N.W., Washington, D.C. 20418)

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ment of the findings of Evans and others. In an interview with *Science*, Landrigan said that some of the Navy's initial objections to the Portsmouth study centered on the view that the British data were not very convincing. The committee's strong endorsement of those data "really supports our position," about the effects of low-level radiation, Landrigan said.

The Wolff committee was equally unpersuaded that studying the Portsmouth shipyard workers for sperm abnormalities would be useful. Although the NIOSH protocol included analysis of sperm samples from each of 266 men who have been exposed to radiation and 266 controls, a number sufficiently large to detect an effect, the proposed group does not contain 266 men who have been recently exposed to 5 or more rems of radiation. According to the committee, "Between 1971 and 1977, the records at [Portsmouth] indicate that only three . . . employees have been exposed to more than 3 rems in any one year." Because sperm production recovers after low doses of radiation, recent exposure would be necessary to obtain meaningful data. The committee concluded that there is "no reasonable chance" of obtaining such data with the present NIOSH protocol.

Although the Academy's report is primarily a critique of the particular NIOSH protocol in question, it is also a statement of the difficulties inherent in many studies designed to assess a connection between exposure to low doses of radiation. "Well-designed studies of the effects of ionizing radiation at low-dose or low-dose rate exposures over an extended period could be informative, but such studies are confronted with a formidable array of difficulties," the report states. Existing data indicate that adverse health effects are "rare or hard to detect within a reasonable period." Furthermore, results in the field are muddied by the fact that age, health status, socioeconomic position, and exposure to other environmental agents, including alcohol, can effect chromosomes and sperm. "Thus, it is not certain whether any study of an occupationally exposed population, or combination of populations, will produce unambiguous results," the committee concludes.

Nevertheless, the committee is not against trying if a good, long-range study of the right group of workers could be devised. Uranium miners, workers who bury radioactive wastes, certain medical researchers, and personnel in nuclear power plants are cited as candidates for study.—BARBARA J. CULLITON

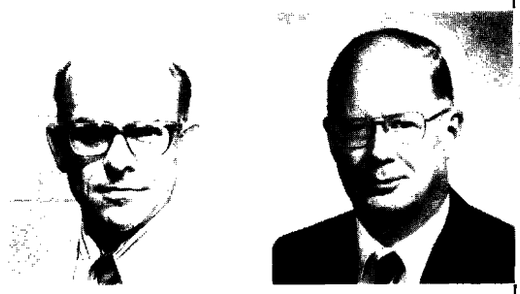
Acid Electioneering at ACS

Old tensions between academic and industrial members of the American Chemical Society (ACS) came to the surface again this fall during the presidential election campaign, due to end on 15 November. The controversy erupted with the appearance of a letter to some ACS members written by the academic candidate, F. Albert Cotton of Texas A & M University, describing his opponent as "an undistinguished, mid-level industrial chemist who is due to retire in December." He added that he had been informed that the man was "defensive and indecisive."

In unusually strong invective, Cotton wrote that his opponent, Warren Niederhauser of the Rohm & Hass Company, has "nothing in his background to suggest that he is capable of leadership. . . . He is supported by a small but politically hyperactive faction of the ACS whose primary interest is in employment conditions for industrial chemists."

Cotton added that this group, known as the "grass roots" lobby, is not to be underestimated. "They play hard ball," he wrote. "A few years ago they succeeded in electing a total nonentity against a distinguished opponent by dint of hard campaigning." He warned against complacency—the assumption that "Cotton ought to beat whoosis easily." Recipients of the letter were urged: "Give particular attention to contacting everyone you know in industry, ask them to vote for me, and ask them to ask other industrial chemists that they know to vote for me."

The grass roots group referred to in Cotton's letter is an informal coalition made up chiefly of industrial chemists who believe the ACS should worry less about its academic journals and do more to advance the careers of members. One of the founders of the group, Alan C. Nixon, says that he and his colleagues believe that in addition to promoting chemistry, the ACS should "promote chemists." By this, he means specifically that chemists should act in concert to raise their salaries and improve working conditions. With the support of the strong Californian grass roots contingent, Nixon won a place on the ACS ballot and was elected president of the ACS for 1973. Since his retirement, he and another Californian, Attila Pavlath, have continued to promote the cause of professional services for ACS members.



F. A. Cotton *W. D. Niederhauser*

This year, for example, the grass roots people backed Niederhauser and helped circulate a petition that got Niederhauser on the election ballot. More recently, the grass roots people have circulated hundreds of copies of the Cotton letter, for they believe it is damaging to the author.

By tradition, the ACS tries to nominate exclusively academics or industrial chemists in alternating years. The ACS nominating committee intended 1982 to be an academic year: two prominent university chemists were selected for the ballot this fall. They were Cotton and George Pimentel of the University of California at Berkeley. Thus, when Niederhauser's petition came in, it spoiled the purity of the 1982 ballot. On 2 August, Pimentel withdrew from the race, pleading overcommitment. He had just agreed to chair a massive review of the discipline of chemistry, a successor to the Westheimer study of 1965. Many people believe one reason he stepped aside was to avoid splitting the academic vote in the ACS election.

In the meantime, a letter of support for Niederhauser, written by a former colleague now teaching at the University of Notre Dame, has been circulating in the academic community. And Cotton has written a remorseful note to Niederhauser, apologizing for his harsh words, calling the letter a private communication, and ascribing the lapse to faulty information provided by overzealous supporters.—***Eliot Marshall***

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