"until the Industrial Revolution man was largely confined to the fertile sites of the earth." These sites, which provided the plants and animals which remain his major sources of food, are the most threatened by population growth. Man is being forced to farm poorer land, taking with him crops more or less unsuited to the new lands. The fragile ecosystems of these primarily tropical lands are being rapidly destroyed, leaving no time for the economic potential of indigenous plants to be evaluated and developed.

If a lack of funds hampers conservation of germplasm resources, a lag in policy is also deplored by some. Ashton notes that the economics of world agriculture are not static. The era of cheap energy, fertilizers, and pesticides from petroleum is ending. Current methods of farming rely on large inputs of fertilizer and water and little human labor to raise a narrow range of crops. Population growth, a shortage of arable land, and rising oil prices make it advisable to consider different approaches. Many LDC's have a wide variety of indigenous crops. These are not as productive as hybrids under present conditions, but it may be advantageous for some LDC's to turn to agro-forestry, for example, planting fast-growing trees for fuel in rotation with food plants. Multiple cropping of several crops in the same field may be the answer to higher production in other places.

The point, says Ashton, is that a totally different attitude toward agriculture should be encouraged, suggesting that the small-is-beautiful approach to alternative technology advocated by Ernst Schumacher has much to commend it.

Ashton concedes that the problem is "many faceted and, therefore, difficult to get across." More organizations are showing interest—USDA and AID, for example, as well as nongovernmental organizations such as the World Wildlife Fund and International Union for the Conservation of Nature, says Ashton. But "there is a lack of communication. Nobody is running the show." Moreover, he sees far too little evidence of concern in influential political quarters.

The possibility of change in that respect may be read into the scheduling of a U.S. Strategy Conference on Biological Diversity in Washington on 16 to 18 November sponsored by the State Department and AID. The agenda calls for a discussion of "crop and noncrop plants, trees, domesticated and wild animals, microbial organisms, ecosystems, aquatic resources and genetic engineering applications." About 100 resource managers and technical experts from the United States are being invited along with some foreign participants. The aim is to consider steps the United States might take to preserve biological diversity throughout the world. Since the strategy session is the first such conference convened by the Reagan Administration, it is considered a boost for biological diversity.

Meanwhile the voices crying in the wilderness are warning that the wilderness is fast disappearing.—JOHN WALSH

Gore Investigates Radiation Clinic

Hearing finds no evidence that patients were mistreated in research on space hazards

Congress recently looked into some well-publicized charges that cancer patients at a hospital in Tennessee were given nontherapeutic doses of radiation to produce data for the space program. The results were mixed. While the findings raised questions about the quality of care at the clinic, they did not substantiate the charges of misconduct, which had received national attention in August (*Science*, 4 September, p. 1093).

The hearing was held on 23 September before the House science and technology subcommittee on investigations, chaired by Representative Albert Gore, Jr. (D–Tenn.). Gore picked his way carefully through the evidence, laying out a record that essentially faults the clinic for operating at less than the highest medical standards in the 1960's and 1970's, but fails to support the charge that patients were used in a callous fashion to generate data on space hazards.

Much of the testimony focused on the case of Dwayne Sexton, a child with acute leukemia who was treated at the Institute of Nuclear Studies (INS) in Oak Ridge, Tennessee, from 1966 to 1969. He died there in 1969 at the age of 6½. Early press accounts suggested that Sexton was needlessly given radiotherapy as part of a program to collect data for the National Aeronautics and Space Administration (NASA). The evidence did not support this allegation. Indeed, the hearing produced little new information on the NASA-sponsored research.

Witnesses did raise questions about the quality of care Sexton received, however. One physician said that it may have been wrong to involve the child in an immunologic experiment at INS before he had been given a standard course of chemotherapy. Gore questioned some of the former INS researchers about the wisdom of conducting experiments in which people were exposed to radiation at low dose rates for prolonged periods. But medical witnesses said the experiments seemed reasonably well run, given the state of knowledge about radiotherapy in the late 1960's.

The inquiry was limited because there were many gaps in the record. Andrew Stofan, a NASA official, disclosed that all of NASA's documents on the INS research, which ran from 1964 to 1974, had been thrown out in the course of routine housecleaning. Gould Andrews, INS' chief medical investigator, whose testimony would have been valuable, died last year.

The INS clinic was closed in 1974 after a review committee decided that it would cost too much to bring the facilities into compliance with the health and cleanliness standards enforced at that time by the big insurance companies. The staff and facilities were incorporated into the Oak Ridge Associated Universities.

As the hearings revealed, INS had several goals, which at times may have been in conflict. First, the clinic sought to help cancer patients by giving them a variety of treatments, including chemotherapy, which one INS staffer referred to as a "competitor" with the clinic's specialty: radiotherapy. A second goal was to develop new techniques for treating cancer with radiation. Third, some of the researchers were being paid by NASA to collect information on the effects of small doses of radiation on man. NASA wanted to know, for example,

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whether the radiation emitted by solar flares would fatigue or sicken astronauts in space.

The fundamental questions Gore asked were: Did the Institute's desire to collect experimental data affect choices of therapy, and did the therapy harm the patients? The hearing demonstrated that some of the research was closely coordinated with the effort to collect data for NASA. It did not show that patients were harmed or deprived of good medical care because they participated in experiments. In fact, many were given conventional therapy and benefited from it. Those who volunteered for experimentation had failed to respond to standard treatment. That, at least, was how the system was supposed to work. Whether or not it did in every case is not as clear.

Mary Sue Sexton, mother of Dwayne, told the subcommittee that she felt she had been "betrayed . . . lied to, and misled" by the physicians at the INS clinic. She had not felt that way at first, she explained, but only after she learned recently from a journalist that her son might have lived if he had been given a course of standard maintenance chemotherapy. Instead, he was given a partial course of chemotherapy and then an untried form of immunologic therapy. The treatment failed. The child was then given "maintenance chemotherapy," and, when all else had failed, a single large dose of gamma radiation.

Although Mrs. Sexton said that she was not fully informed of the risks that she and her son were taking, she did sign a consent form that described the proposed experiment in simple terms and noted that conventional treatment had been freely offered as an alternative. The Sextons clearly volunteered.

The subcommittee called on two scientists as independent commentators: Robert Wiernik, director of the Baltimore Cancer Research Center, and Eli Glatstein, chief of the radiation oncology branch of the National Cancer Institute. Neither found any evidence in the material produced for the hearing that patient care at the INS clinic had been altered to suit NASA's needs. At the same time, they said, the research protocols and consent forms used did not meet the highest standards.

The Sexton case did not cast light on the controversy involving low-level radiation studies of interest to NASA. Sexton, after all, was exposed to a high level of radiation. Officials who were at INS argue that the Sexton case would not have been included in NASA's data bank under any circumstances, because NASA was interested only in adults.

Nevertheless, Gore did produce evidence showing that INS researchers felt pressure to find data for NASA. In the example that Gore cited, the INS' medical director Andrews—to his credit—refused to participate in what he considered unethical experiments involving prisoners in California, as had been proposed with "enthusiasm" by a NASA official.

Andrews—to his credit—refused to participate in what he considered unethical experiments involving prisoners in California

Gore also quoted from an INS budget report to NASA on low-dose radiation experiments planned for 1970 which said: "An active canvassing program for increasing our utilization of these facilities has been developed. . . . We anticipate that this program will produce a greater influx of patients than we have experienced in the last 2 years." The same memo informed NASA that "We now believe we are ready to use regularly spaced, carefully selected, repeated small exposures over a small period of many months in an effort to maintain more uniform control of disease. . . . We will use therapeutic irradiation scenarios derived in part from 'space radiation profiles.' . . . These may be based either on intelligent conjectures or actual experience measured in space . . ." However, Gore did not cite evidence showing that this desire to please NASA had any detrimental impact on care at the INS clinic.

Gore said that he had called the hearing to find out "whether the people involved in this program were treated in the best possible way for their welfare or whether they were in any way dehumanized in the search for some other social good." Neither he nor the committee staff has passed judgment on that question yet, but they promise to do just that in a written report now being prepared.—ELIOT MARSHALL

Arms Control Teach-ins Planned by Scientists

The subject is Armageddon, but the people meeting to learn about it on 90 college campuses this fall will not be gathering to hear revivalist preachers. On the contrary, they will hear talks given by some profound materialists: nuclear physicists, computer scientists, and electrical engineers from America's best universities.

The occasion, scheduled for Veterans Day, 11 November, is being called the "Convocation on the Threat of Nuclear War." The prime sponsor is the Union of Concerned Scientists (UCS), an independent group with strong ties to the Massachusetts Institute of Technology (MIT).

The purpose of the campaign, according to a draft statement circulated by UCS, is to educate Americans about the "threat of nuclear weapons, the growing possibility of nuclear war, and the urgent need to reduce the risks. . . . If properly organized, these events will identify a group of individuals who might participate in and help" organize future arms control efforts.

To insure that the message gets beyond the confines of academe, the UCS has budgeted for expenses of about $50,000 and secured the help of some skilled political advisers. Two of these are Carl Wagner, a former field campaign manager for Senator Edward Kennedy (D–Mass.), and David Brunell, a longtime activist in congressional reform movements.

The person who conceived this campaign is Henry Kendall, chairman of the board of UCS and a professor of physics at MIT. In January he commissioned an in-house study of the technological and political factors inhibiting arms control. By June he had become so concerned about the chaotic state of U.S. weapons policy that he felt some emergency action was called for. Until recently, the UCS has focused chiefly on the commercial nuclear sector. Suddenly, arms control has been made the first priority. Kendall insists, however, that older projects will not be neglected as a result.

Kendall and UCS' executive director, Eric Van Loon, say they have been surprised by the strength of the response they have received. They

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