

Who says scientists are detached, suspending their reactions in glass beakers? In February, *Science for the People's* steering committee evaluated the magazine, frequently interrupting parliamentary procedure to critique the issues we published in 1985. We haven't held a meeting with as much animation in a long while.

No votes were taken, but we kept a tally of strong opinions that were met with a chorus of agreement. Most people favored shorter articles and more departments in the magazine. All agreed that *SftP* needs more spark—livelier debates and opinions, stronger political analysis, diversity in the topics we report on. Many thought that *Science for the People* should offer readers a better vision of the future, with more examples of positive uses of science and technology. Some thought that we should focus more on science policy and the social impact of new technologies.

We'd like to know what our readers think. What articles would you like to see in the magazine? What topics should we cover? What do you like and what can't you stand about *SftP*? We're working on a readers' survey to help us plan promotional efforts and changes in the magazine. But you don't have to wait; send us your feedback now.

In this issue, we've slightly expanded our departments. With more forums, interviews, letters, opinions, grassroots news and international reports, we hope that readers will feel more like participants. We want to produce a magazine that involves its readers. As an almost all-volunteer publication, our members and readers are the magazine. So your involvement really counts.

Our September/October issue will focus on alternatives in science. We'll report on alternatives in medicine, research, occupational health, public interest work, and education—in and out of the mainstream. It's going to be a very participatory issue. If you'd like to contribute by sharing your own experiences, or sending us ideas or names of people to contact, you can still squeak in under the May 1 deadline.

With this issue, we'd also like to extend a warm sendoff to the three profesores who are participating in *SftP's* program of cooperation in science teaching with Nicaragua. Beginning in March, they will teach engineering and statistics at two universities in Managua.

While they're working in Nicaragua, we will be fighting against President Reagan's proposal for \$100 million in U.S. aid to the contras, with \$70 million earmarked for military use. We will keep sending ambassadors of peace to Nicaragua, while working to stop the CIA's war on Nicaragua.

SCIENCE FOR THE PEOPLE

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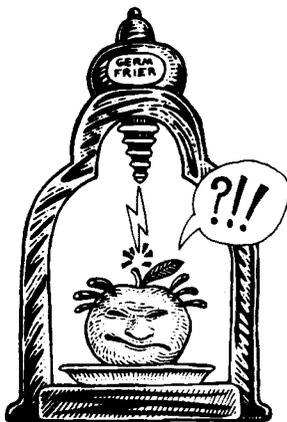
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Scapegoating the Contra War?

Dear SftP:

I just read Julie Ogletree's article about the Nicaraguan sea turtles in the Nov./Dec. 1985 issue, and it left me with more questions than answers.

My greatest puzzlement was the statement that 4,000-6,000 turtles lay their eggs on the coast of Nicaragua, followed by the statement that 40,000 dozen eggs were allowed to spoil. Does this mean that up to 10 dozen eggs are taken from each turtle, and they all spoiled, and this is called conservation? Or was there an error in the numbers given?

Another thing I wondered about was the description of Nicaragua's coast as a "dry rain forest". What is a dry rain forest?

To get back to the 40,000 dozen (or however many) rotten eggs, the article says that the culprit was transportation difficulties caused by the contra war and the U.S. embargo. While I don't doubt that the war has caused great disruptions of all activities in Nicaragua, it seems that in some cases it might be too easy a scapegoat—unless information is given to support the claim that the U.S. is at fault. (Ed. Note: See article in Jan./Feb. 1986 issue of SftP, "Moving Towards Independent Agriculture: Nicaragua Struggles in a World Economy," for an economic history and analysis.)

All in all, I felt that the article failed to explain just how the Nicaraguan turtle protection and egg marketing method works, or if it works. I'd appreciate anything you could do to make this clearer to me.

—David Stein
Chicago, Illinois

The author responds:

As mentioned in the article, 4,000-6,000 turtles lay their eggs on Nicaragua's Pacific Coast each month for eight months between May and December. Each turtle lays between three and five dozen eggs a month.

The 40,000 eggs which spoiled due to transportation problems

were essentially the fruits of one monthly *arribada*, or arrival. First priority use of vehicles and gasoline goes to the war effort, which now consumes about 50% of Nicaragua's gross national product. IRENA's conservation projects are not next in line for such equipment and money.

It represents a step forward in conservation of marine turtles, but not the completion of that task. Many fewer eggs are collected and marketed than ever before, even taking the spoilage into consideration. This is the program's first year, and project managers are taking steps to eliminate transportation snags.

The reference to the "dry rain forest" is based on an exact translation of the Spanish—*bosque seco*. I claim no expertise in forestry, but my understanding is that the forest is deciduous but also includes tropical plants.

—Julie Ogletree
Cambridge, Massachusetts

Stronger Feminist Analysis

Dear SftP:

I am writing because two book reviews in your 100th issue (July/August 1985) of *The New Our Bodies Ourselves* and *Test Tube Women* really disappoint me.

Because of history, science is not yet a strong thread in the women's movement, and the concerns of women have a barely embryonic status among scientists, but in the past SftP has really made progress for everyone on the latter aspect at least. However, these book reviews are not good enough.

Our Bodies Ourselves is considered with enthusiasm, which is nice, but doesn't advance theory or place the issue(s) among other feminist concerns. What does such a review do to educate people at various stages of experience and knowledge, and with different perspectives? What does the review do for feminist writing in this area, except to generally encourage?

Then I looked at *Test Tube Women*, and it was not long before I became aware that

something was quite wrong. Looking up to the author's name [Roger Felix] confirmed my hunch. I was really amazed. I wondered if there was some strange dearth of women in the Boston area, or whether they are all so advanced that they would be above writing a book review for SftP. Surely there are women whose development you wish to recognize or to foster?

Certainly men father children, but they just do not have the experiences which provide the grounding for the issues of this book. Rather than thoroughly present the book, all he did was to make his inadequacies as a reviewer of it very clear.

Women (and men) need powerful analyses in the health reproduction area, and all book reviews should contribute to some kind of theoretical framework. Science has the potential to be a tool of liberation, and women are your largest constituency. Let's see SftP living up to its ideals.

—Joan Scott
St. Johns, Newfoundland

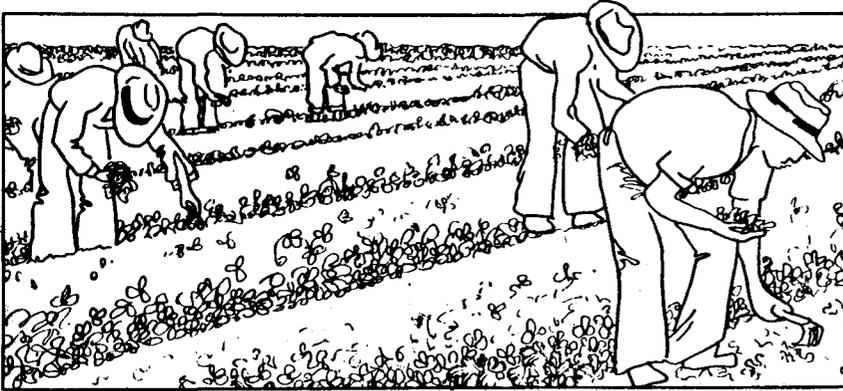
Call for Papers

Dear SftP:

A special issue of *Hypatia: A Journal of Feminist Philosophy* will be devoted to feminist perspectives on science. We welcome submissions on topics in the history, philosophy, and sociology of the natural and behavioral sciences, approached from feminist perspectives. We are also interested in discussions and critiques of current feminist scholarship in these areas.

Manuscripts should have the author's name on the title page only, for the anonymous reviewing process. Papers must conform to *Hypatia* style, with only informational footnotes. All references must be made by parenthetical inserts in the text. Papers should be submitted in duplicate to Nancy Tuana, Arts and Humanities, JO 3.1, University of Texas at Dallas, Richardson, TX 75083-0688. Papers must be received by October 1, 1986.

Talking Bread and Butter with Campbell's Soup



For more than seven years, midwestern farmworkers have fought for union recognition and the right to negotiate a contract with the growers of Campbell Soup Company. The company has finally agreed to recognize the Farm Labor Organizing Committee (FLOC), ending a three-year consumer boycott of Campbell's products. FLOC represents over 2,000 Ohio farmworkers who had gone on strike in the tomato and pickle fields contracted to Campbell Soup.

Child labor abuses have been FLOC's major concern. Children as young as five years old work in the fields to support themselves and their families. They live in deplorable housing, earn sub-

imum wages, and face a grim future. Migrant children have only a 40% chance of finishing the eighth grade, and only 20% will finish high school. Their infant mortality rate is 125% to 300% above the national average, and their life expectancy is 20 years shorter than nonmigrant children.

Conditions for adult farmworkers are not much better. In Ohio, field workers earn a dollar an hour less than the national minimum. With the right to negotiate a contract, farmworkers hope to win higher wages, decent housing, and protection from pesticide poisoning, so their children won't have to work the fields.

Heavenly Hamburger?

"Look, there's the North Star, there's the Little Dipper, and there's...*Gomez's Big Mac*???" Yes, it's true. The Big Mac became officially enshrined as a celestial body when astronomers at the Cero-Tololo Inter-American Observatory in Chile named a star with a ring of dust around it after the McDonald's hamburger.

We at SftP are watching out for any large grants from the fast-food industry making their way to these particular astronomers, but so far such a flagrant funding connection doesn't seem to have

materialized. According to the researchers, they chose the name simply because the star "looked hamburger shaped."

What can we say? Since the star wasn't christened with a kickback, perhaps it's not the crassest name to have ever graced the heavens. Still, when we next look to the skies for inspiration, won't it be disquieting to know that those ever-so-earthly golden arches already have a claim to what's staring back down at us?

—information from *New Scientist*

Automated Vice

One year ago there were over 2,000 vending machines selling adult magazines in Tokyo. They were largely unregulated, some being installed near schools. Complaints about the machines and the behavior of their younger customers initially had little impact, as the municipal government had no authority over the machines.

Parents' organizations then joined together with local police departments to develop a strategy of meeting with merchants and landowners on whose property the machines stood. Their efforts succeeded in reducing the number of machines by 50% as of last December.

Two other groups have their eyes on unregulated vending machines in Japan. The All Japan Anti-smoking Council and National Citizen's Association of Alcohol Problems met recently to discuss the "Hazards of Vending Machines". The impossibility of halting sales to minors or regulating selling hours under current arrangements was criticized. Recommendations for supervisable siting, a ban on tobacco vending machines, and increased consumer education were made.

While one can hardly sympathize with the loss of jobs to automation in the pornography, booze and sot-weed sector, it remains unclear whether eliminating the machines will dampen the appetites they serve. Such traditional vices have a persistent history, one full of male bonding rituals involving smoking, drinking, and whoring. Treating the pornographic contents of vending machines as so many cans of Dr. Pepper may be disconcerting, but it serves to remind us that these individual pursuits of pleasure have a cold, impersonal quality.

—Gary Keenan

Newsnotes are compiled and edited by Leslie Fraser.

VDTs and Reproductive Health, Take 57....

Just how safe is that computer you use every day at work, anyway? We wish we knew; as longtime readers of SftP remember, we have been covering this important story for over five years. Unfortunately, the research to date remains inconclusive, and the answers aren't becoming any more clearcut, especially where birth defects are concerned. The latest round in this ongoing debate comes from Sweden.

The National Swedish Board of Occupational Safety and Health (NBOSH) recently reported that significant numbers of birth defects were found in mice subjected to low-level magnetic fields from Video Display Terminals (VDTs). These findings appear to support results from a Polish study involving rats.

Five hundred pregnant mice were subjected to magnetic radiation pulses for 14 days. This was said to be the equivalent exposure to a woman sitting in front of a computer screen for six months. The results of the study, to be fully reported at an upcoming conference in Stockholm this May, were released to the press based on preliminary abstracts of the study.

Almost immediately, in the U.S. and elsewhere around the world, the study raised tremendous controversy. According to Louis Slesin of the New York-based *Microwave News*, it reopened the debate about potential effects of VDTs on reproductive health. "Everything went berserk in Sweden when these results were announced," he stated. "NBOSH was flooded with inquiries."

Shortly after the preliminary results were released, a further announcement was issued in response to the outpouring of concern about the study's conclusions. NBOSH reiterated the mixed nature of the results of previous animal health studies and epidemiological research to date. Claiming that when the results of the Swedish study



photo/Earl Dotter

were analyzed, taking into account not only fetal malformations but also "fetal deaths and resorptions," the effects are less significant and do not "suggest any damaging effect on fetuses." Looking only at birth defects in mice, the researchers had found effects five times higher in the mice subjected to the radiation than those in the control groups.

To put this research in perspective: as many readers may remember, the issue of possible adverse effects of magnetic fields originated in 1982 after Dr. Jose Delgado, a Spanish researcher, found that weak, pulsed magnetic fields damaged the development of chicken embryos. Delgado's research indicated that this effect was due to the pulse form of the field, not simply the strength of the field.

Delgado's study caused controversy too, and some critics found methodological problems with his research. The few studies that have followed up on Delgado's research—of which the Swedish study is one—have had mixed results. A recent Finnish study replicated Delgado's results, also finding effects on chick

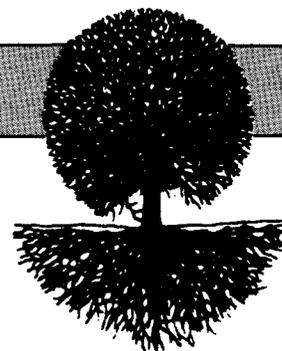
embryos, but a study in the U.S. did not replicate the results.

The Swedish research is the first to look for effects on mice, and is also the first study to be careful to replicate the saw-toothed shape of the pulses that actually emanate from VDTs and television sets. Until the full results are reported in May, the issue remains, as Slesin stated, "reopened," and probably won't be settled until this area is given the funding priority for research that it deserves.

Meanwhile, here in the U.S., the Center for Office Technology, an industry research and lobby group, responded to the second announcement from NBOSH with press releases of its own, stating in bold headline: "VDTs Do Not Endanger Reproductive Health, Swedish Government Declares." Perhaps this one-sided emphasis of such a little understood area is business as usual, when industry meets health concerns. Instead of fostering such polarized debate, we at SftP would like to see less posturing and more research in this increasingly important area.

—Seth Shulman

Plant a Tree for Nicaragua



Ernesto Cardenal, Nicaraguan priest, poet and minister of culture, wrote that the country's lakes, rivers, trees and animals joined the human call for revolution in 1979. Days after Anastasio Somoza was overthrown, an agency responsible for preservation and management of natural resources and the environment was created to meet this challenge.

But just a few years after the dictator's overthrow, the U.S.-backed *contra* war redirected scarce economic resources from environmental protection to the defense of Nicaragua's people. Environmental workers have been killed, newly-planted forests have been burned, and some projects have been temporarily abandoned. But the environmental need remains to conserve forests and wildlife, restore polluted lakes, prevent erosion, and develop parks.

North American ecologists, scientists, and environmental activists are now being called upon to help preserve and extend this environmental reclamation by joining month-long volunteer reforestation brigades in Nicaragua during June and August. Nicaragua is seeking 100 volunteers to help plant and tend trees which make up windbreaks that are designed to stop soil erosion, prevent flooding, and reduce air

pollution.

For the past two years, North Americans have worked under the supervision of IRENA, the agency responsible for protecting natural resources and the environment. They planted trees on cooperative farms outside Managua and on state farms near Leon, Nicaragua's second-largest city. Volunteers also seeded corn and sorghum between eucalyptus trees as part of an agroforestry project. Last September, some brigade members worked on an IRENA-sponsored wildlife conservation project with marine turtles on the Pacific coast (see Newsnotes, Nov./Dec. 1985).

Volunteer workers contribute their technical expertise as well as their physical labor. Past brigade members have also donated much-needed tools to IRENA. Brigade volunteers have met freely with Nicaraguans from all walks of life to discuss changes brought by the revolution and the impact of the *contra* war. This year's participants will be exposed to a full range of the country's environmental work, and they'll also have an opportunity to learn about Nicaragua's government, mass organizations, culture, and people.

The two 50-member brigades, cosponsored by the Environmental Project on Central America

(EPOCA, formerly Environmentalists for Nicaragua) and the Nicaragua Network, are scheduled from May 31 through June 28 and August 2-30, 1986. They will leave for Managua from Mexico City. Expenses, excluding airfare to Mexico City, are estimated at \$800. Ability to speak Spanish is not a prerequisite, since the groups will include translators. Participants will receive a few days of orientation in Managua before going to the work sites, which will be assigned when the groups reach Nicaragua.

If you're interested in applying to the reforestation brigades, send inquiries to Linda Devlin at the Nicaragua Network, 2025 I St., NW, Suite 1117, Washington, DC 20006, or call 202/223-2328. Applications must be returned by early April or early June.

For more information about supporting environmental work in Nicaragua, contact EPOCA c/o Earth Island Institute, 4089 26th St., San Francisco, CA 94131, or call 415/821-7625.

—Julie Ogletree

Anti-AIDS Hysteria

The *New England Journal of Medicine* (Feb. 6, 1986) contained a plea for scientists to quell public fears about catching the virus through casual contact with AIDS victims. An article in the journal reported that people who share their residence with AIDS victims run little risk of catching the virus.

The study of 101 household members and 39 AIDS sufferers revealed only one AIDS carrier

among the residents of AIDS victims' homes. Blood tests were done for all household members, and the only evidence of the AIDS virus was in the blood of a five-year-old girl whose mother is infected and who was probably born with the virus. None of the household contacts was a sexual partner.

Dr. Gerald H. Friedland of Montefiore Medical Center in New York led the team of research-

ers who conducted the research. Participants in the study shared cookware, dishes, silverware, toothbrushes, towels, clothes, beds, baths, and toilets with AIDS sufferers. They also hugged, kissed, and helped AIDS victims with bathing and eating. With this evidence, we hope that people with AIDS will receive more support and acceptance in and outside of their homes.

RADIATION WORKERS

The Dark Side of Romancing the Atom

by Robert Alvarez

In May 1928, Marie Curie, the famed discoverer of radium, received a letter from an American journalist named Florence Pfaltzgraph.

The letter mentioned that at least 17 women who worked as radium watch dial painters in Essex, New Jersey had been afflicted by necrosis of the jaw—a rare disease where the tissues of the jaw simply rot away. Twelve had already died. At the time, about 3,000 workers—mostly young women—were busy in around 50 factories in the U.S., dipping brushes in radioactive paint that made watches glow in the dark. Unfortunately, many were ingesting deadly amounts of radium as they licked the brushes to make the tips finer.

Pfaltzgraph's letter arrived at a time when Madame Curie herself was also paying severely for her pioneering work with radioactive sources. Frequent bouts with chronic illness often kept her bedridden, and cataracts, now a well-known radiation-induced injury, made it all but impossible for her to read without assistance. Even holding a piece of paper was difficult because of painful scars on her hands from radiation burns.

"In your wonderful work," wrote Pfaltzgraph, "I wonder if you have discovered anything which might benefit these women." True to form, Madame Curie expressed her sym-

Robert Alvarez is director of the nuclear power and weapons project at the Environmental Policy Institute in Washington, DC. He is the coauthor of Killing Our Own: America's Disastrous Experience with Atomic Radiation, published by Dell.

Over half a century has passed since Marie Curie's death, and nations with multibillion dollar nuclear industries are once again facing revisions in radiation exposure limits.

pathies and advised the women to eat calves liver. Although Pfaltzgraph's letter clearly disturbed her, Madame Curie refused to accept that radioactivity had anything to do with the suffering of the dial painters, much less with the deaths of her own laboratory assistants.

The workers were ill-advised. By the time Madame Curie died in 1934 from radiation damage to her bone marrow, dozens of angry radium workers were filing lawsuits against their employers, while many were dying in agony from America's first industrial epidemic of radiation-induced disease. Finally, in 1941, the first industrial standard for radiation exposure was set in the U.S. limiting the ingestion of radium.

As a monument of sorts to the haphazard way occupational radiation standards developed, parts of the Curie laboratory in France have been condemned for their high levels of radioactivity, including

the contaminated pages from Madame Curie's notebook, a record of her pioneering work.

Over half a century has passed since Marie Curie's death, and nations with multibillion dollar nuclear industries are once again facing revisions in radiation exposure limits for the public, over 1.5 million radiation workers in the U.S., and an equal number of workers around the world.

On January 10, 1986, the U.S. Nuclear Regulatory Commission (NRC) proposed the first sweeping changes in occupational radiation exposure limits since 1959. Despite the NRC's explanation, which describes them as an improvement, these changes actually represent a weakening of radiation exposure standards. According to an NRC press release, the purpose of the proposed changes "is to establish a scientifically sound and explicit risk-to-health basis for the NRC's radiation protection standards to protect the public and workers."

The same limits that apply for radiation workers also serve as an umbrella standard for millions of patients exposed to medical sources of radiation every year. Nations with nuclear programs are waiting to see what the U.S. will do before they make their changes in worker standards.

Epidemiological Evidence Goes Unheeded

Since the 1920s, increased knowledge of low-level radiation damage has brought about a steady reduction—by over 150 times—in the allowable doses for workers. But counter to the historic trend in standard setting, efforts are underway to increase radiation exposures to workers. Incredibly, this is happening in the face of the findings of several

studies heralding a new and large wave of cancer deaths among radiation workers exposed to levels well below current official limits.

Evidence of high cancer death rates has been emerging from long-term studies of over 600,000 U.S. nuclear-weapons workers since 1974. That year, a Washington state researcher found that workers at the Atomic Energy Commission's (now the Department of Energy, DOE) Hanford Plutonium Works were dying of cancer at a rate 25% greater than non-nuclear workers in the state.

Two years later, Dr. Thomas Mancuso of the University of Pittsburgh, working under a DOE contract, not only confirmed the Washington study's findings, but also found that the risk of dying from radiation-induced cancer at Hanford was 10 to 30 times greater than current standards assume. For his troubles, Mancuso was denied further funding for his research, and he was promptly subjected to a

firestorm of criticism by government nuclear agencies in the U.S. and Britain.

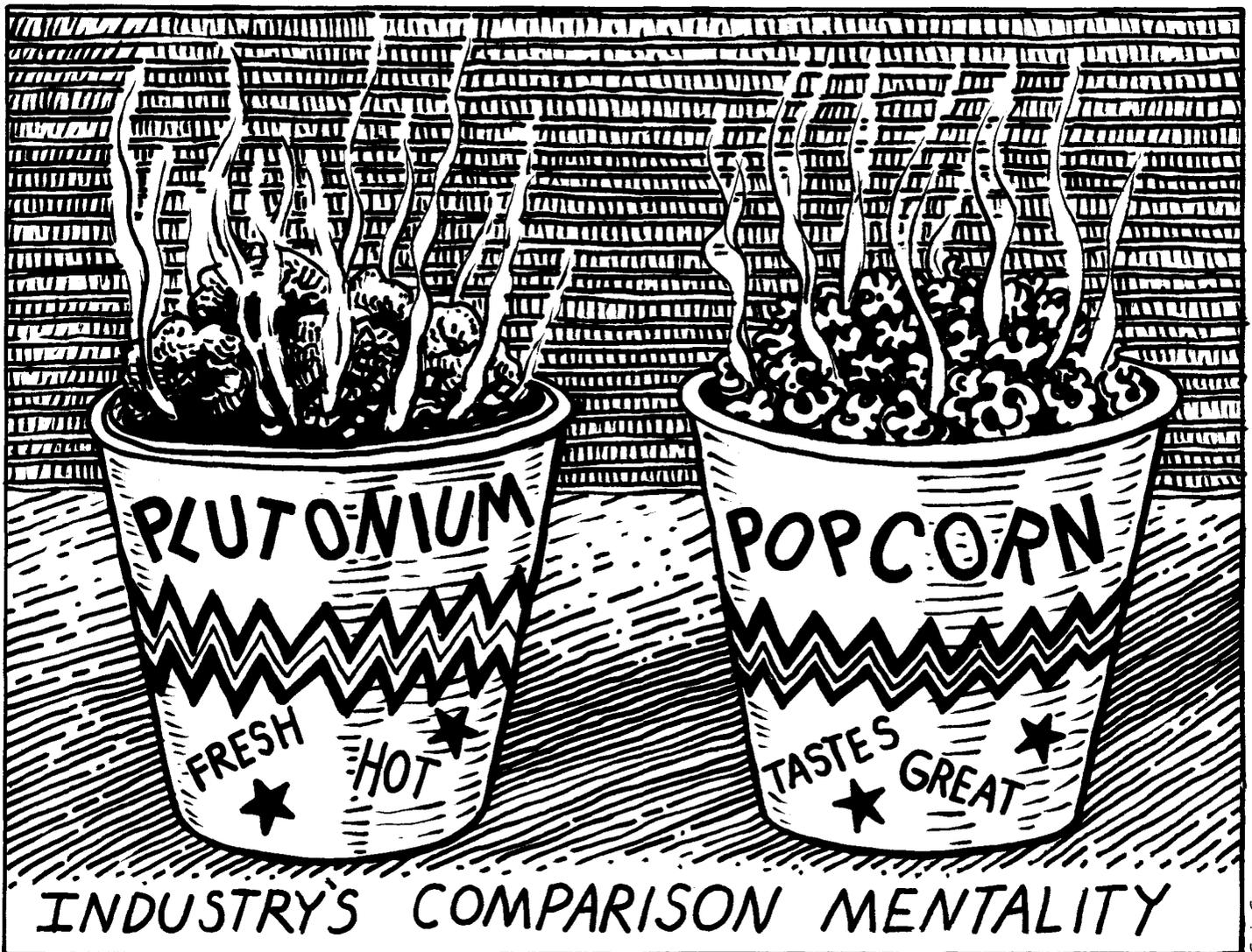
But more evidence kept piling up. In 1978, two independent studies found excess leukemia deaths among workers at the nuclear navy shipyard in Portsmouth, New Hampshire and a threefold excess death rate from melanoma (a virulent form of skin cancer) at DOE's Livermore National Laboratory in California. Government scientists responded by publishing studies, based on Dr. Mancuso's data, suggesting that there were no major health problems among federal nuclear workers.

However, internal DOE reports released by the Environmental Policy Institute in October 1984 indicated something quite different. Mancuso's critics showed that he and others may have merely identified the tip of an iceberg. Based on project summaries and memoranda generated by DOE contract researchers, exceptionally high cancer

death rates have been found in at least eight government worker populations spanning over 20 DOE nuclear facilities. Positive findings have been established in nine of the twelve government studies that have yielded research results so far.

According to a report to DOE by Oak Ridge Associated Universities and the University of North Carolina dated May 1984, "excess mortality due to site/type specific cancers (leukemia, lung, brain, digestive tract, prostate, and Hodgkins Disease) and excess nonmalignant respiratory disease morbidity were found among workers exposed to uranium dusts and/or radiations from other internal and external sources." Specifically:

- Workers at the Oak Ridge National Laboratory have a 49% excess death rate from leukemia when compared to the general public, with "leukemia mortality...demonstrat[ing] a gradient with increasing dose."



Craig Comeau



• Janitors, laborers, maintenance people, and construction workers at the laboratory have a "significant excess risk" of radiation-induced cancers.

• Workers who fabricate nuclear warhead parts at the Oak Ridge Y-12 weapons plant have "excess deaths for cancer of the lung, brain, and central nervous system, Hodgkins Disease and other lymphatic tissue." Brain tumor deaths are nearly 500% higher than expected for the general public.

• Workers at DOE's Rocky Flats plutonium "bomb trigger" facility near Denver, Colorado are dying of brain tumors at a rate 400% higher than the general public.

• Workers at the Oak Ridge uranium

enrichment plant exhibit "excess deaths due to lung and brain cancers and respiratory disease."

• A 1976 study of employees at DOE's Savannah River Plant near Aiken, South Carolina found a 60% excess incidence of lung cancer in male white-collar workers and a 114% excess of leukemia incidence among male blue-collar workers, when compared to the general public and to non-nuclear Dupont workers.

• A study of 2,529 workers at over a dozen DOE nuclear facilities who were reported to have received more than five rems of radiation in a year found a 300% excess death rate from rectal cancer.

• Workers at DOE's Fernald, Ohio uranium processing plant have a 36% excess of digestive cancers,

which is "significant" among wage employees. Also, "there is an association between exposure to uranium and the development of nonmalignant respiratory disease."

According to Dr. Clarence C. Lushbaugh, the former principal investigator of the Oak Ridge studies, "we don't think anybody should have alarm about them, or consider them a basis for action...we just don't consider them substantive conclusions." Lushbaugh finds that working conditions at DOE nuclear facilities are among the safest in the country—something the Congressional Government Accounting Office (GAO) takes issue with.

Since 1981, GAO has reported that the Energy Department could not assure that "employees at DOE's nuclear facilities are provided with safe working conditions." According to GAO, the Department of Energy is slow to act on employee complaints and inspects its contractors only infrequently for health and safety violations.

After defunding Mancuso's studies, the DOE chose Lushbaugh to take over, who directed a radiation study for the National Aeronautics and Space Administration (NASA). In 1975 Lushbaugh reported to NASA that this "prospective study" of radiation damage to cancer victims was "sorely needed to defend existing environmental and occupational exposure constraints from attack by well-meaning but impractical theorists."

Since that time, the list of "impractical theorists" has grown to include Dr. Edward Radford, Chairman of the 1980 National Academy of Science's Committee on the Biological Effects of Ionizing Radiation (BEIR). Radford advocates a 10-fold drop in the U.S. occupational exposure limit of five rems per year. (A rem—radiation equivalent man—is a unit of measurement which factors in the amount of radiation absorbed and the degree of biological damage.)

In 1979 the Environmental Protection Agency (EPA) and the NRC officially reduced allowable doses to the general public from nuclear power stations by 20 times (.5 rem to .025 rem per year). But similar changes in worker standards are fiercely opposed by the civilian and military nuclear programs. Why?

"If Radford's regulations went into effect," a fellow BEIR Committee member told the *New York Times*, "it would wipe out the nuclear industry." Reeling from severe setbacks such as the Three Mile



Craig Comeau

Island accident, enormous cost inflation, low electrical demand, and massive public opposition, the commercial nuclear power industry believes it can't afford to make changes necessary to accommodate a major reduction in worker exposures.

"You could cut standards in half and it wouldn't change a thing we do," claimed Neal Linkton, an official for Rockwell International. "There's been talk about cutting it to about one-tenth. You could cut it to a point where it would be impossible."

The DOE, in the midst of a costly renovation and expansion of its aging nuclear weapons production complex, also faces prohibitive costs if worker exposure limits are reduced 10-fold. In the fall of 1983, Dr. William Loewe, a radiation expert at DOE's Lawrence-Livermore Laboratory, reported at an in-house meeting of DOE scientists that "there are tens of billions of dollars to be spent in the commercial and nuclear defense industries if protection standards were to be changed."

DOE's nuclear program has almost twice as many facilities as the commercial nuclear industry. Since many workers, residents living near federal facilities, and military personnel were exposed to nuclear weapons-related radiation in the 1940s, '50s, and '60s, a significant change in worker exposure standards also implies a substantial government liability to compensate a growing number of claims for latent radiation injury.

In defending against these claims, the government asserts that exposures were often "insignificant" and that adequate precautions were taken from the very beginning.

History of Occupational Radiation Exposure Standards

During the 1940s, radiation health experts in the Manhattan Project (which gave birth to the modern nuclear industry) realized that their standards were often inadequate to protect against the risks being taken to produce and test the first nuclear explosives. In 1947, after Operation Crossroads exploded the first nuclear test weapons in the Bikini atoll during the summer of 1946, Colonel Stafford Warren, Chief of the Manhattan Project's Radiological Safety Section, wrote, "in view of the experience [with existing radiation standards]...they would hardly be worth the paper they are printed on."

By the time
Madame Curie died
in 1934 from
radiation damage to
her bone marrow,
dozens of angry
radium workers
were filing lawsuits
against their
employers.

Thousands of military and civilian personnel were exposed to potentially dangerous levels of radiation after Baker, the second test, shot up a million-ton column of highly radioactive water which then rained down, contaminating the entire lagoon. Navy officers were warned by Warren's team before the Baker test that the lagoon would be seriously contaminated. But several ships were sent in hours after the blast, and eventually a large portion of the Navy's entire Pacific fleet became contaminated. Warren finally succeeded in blocking a third test explosion and closed down Operation Crossroads after decontamination efforts proved overwhelming.

Influenced by the growing body of

evidence, scientific opinion began to change after World War II. By 1949, the National Council on Radiation Protection and Measurements (NCRP) quietly advised the Atomic Energy Commission (AEC) that there no longer appeared to be a safe tolerance dose of radiation, below which no risk of cancer or genetic damage existed. Worker exposures were subsequently lowered from 36 rems to 12 rems per year.

Large-scale nuclear weapons test explosions in the atmosphere triggered a worldwide outcry which was fueled by an often hostile scientific debate. For decades after the NCRP's 1949 recommendation, AEC officials regularly attacked scientists who warned the public that there was no safe dose of radiation.

Behind the smug reassurances, however, government experts were well aware of the inherent weaknesses in radiation standards. At a secret meeting held in November 1958 to discuss high radioactive fallout readings in Los Angeles, NCRP Chairman Lauriston Taylor noted that official public statements about standards "carry the implication that we know what we are talking about when we set them. But in actual fact they represent the best judgement we could exercise in the total absence of any real knowledge as to whether they are correct or not."

By 1959, widespread concern over genetic damage and other health effects prompted the International Commission on Radiological Protection (ICRP) to recommend an across-the-board drop from 12 rems

Radiation and Health

Unlike the physicists of the early twentieth century, today's government-spawned nuclear industries have a substantial body of scientific evidence on radiation health effects. Researchers now agree that small doses can be harmful and that the violence of low-level radiation occurs at the level of the single living cell.

Radiation is ionizing when it carries enough energy to knock off electrons of the atoms it strikes. Doctors John Gofman and Arthur Tamplin, former government radiation experts, theorized that when radiation strikes a cell and ionizes its biomolecules, "a massive nonspecific disorganization" and destruction of chemical bonds can occur that is similar to "the effect of a jagged piece of

shrapnel passing through a tissue."

A 160-pound person who receives one-fifth of the annual radiation dose allowed for a worker absorbs enough energy to ionize each cell of his or her body by 100,000 times. Some of these ionizations can affect vital parts of the cell, such as DNA, the essential genetic material which determines the nature of the cell.

Once the DNA is damaged, distorted messages can be transmitted to the cell and passed on through reproduction and heredity. Thus, thousands of mutated clone cells can reproduce themselves, forming the basis for cancerous tumors. By the time a tumor can be seen or felt, several years may have passed, and it is composed of several million of these abnormal cells.



to five rems per year of external penetrating radiation. ICRP's recommendations also took into account internal exposures to several radioactive products.

Interestingly, public exposure limits were set ten times lower. These limits were soon adopted by the U.S. and other countries.

Formed in 1929, the ICRP is a self-appointing body of radiologists and radiation experts. Since the 1950s, its membership has come mainly from nuclear industries and the bureaucracies of nations with major nuclear programs. In the past 30 years, its recommendations have paralleled those of its U.S. counterpart, the NCRP, and have been generally accepted.

Raising the Limits

The major scientific evidence used by the U.S. government to justify relaxing occupational exposure standards comes from the 1977 ICRP recommendations. Although its stated rationale is to update the 1959 proposal by providing a more rational approach to radiation protection based on the best available science, ICRP recommends continuing the 25-year-old five rem limit. And in certain circumstances, it calls for allowing even higher doses of radiation.

ICRP also supports substantial increases in internal exposure limits or "body burdens". This is one of the most dangerous risks facing radiation workers. Although certain radiation products are not immediately harmful outside the body, once they are inhaled or ingested they can lodge in sensitive organs for periods of years, cumulatively causing serious health damage.

On the positive side, ICRP recommends eliminating a current loophole through which workers may be exposed to three rems of external penetrating radiation every three months, or 12 rems a year, as long as their lifetime average does not exceed five rems annually.

But ICRP's substitute—a "special planned exposure"—is a subject for concern. This exception to the rule allows a worker to receive as much as 15 rems over a few seconds to a day. Apparently it is designed to allow temporary unskilled workers, involved in jobs with high radiation fields (particularly at nuclear power plants) to receive much higher exposures than they could get under current standards.

The use of temporary workers—

The first study on fetal irradiation reported positive findings in 1956. Thirty years later, the NRC is finally proposing the first formal standard to protect the developing child, .5 rem, which may double the risk of childhood cancer and mental retardation.

known as jumpers—has risen dramatically in the past few years, as aging nuclear power plants have become more radioactive. Current standards protecting temporary workers are largely voluntary and do not necessarily prevent a worker from going to the next reactor to receive yet another high dose of ionizing radiation.

Another alleged improvement is ICRP's proposal to integrate external with internal radiation risks when multiple-organ exposure occurs. On the face of it, this system may seem better because it considers the risk to all organs at once. But in situations where radiation is deposited on one organ alone, the ICRP's elaborate model allows for very large increases over current limits.

For example, the current limit for radioactive products, like plutonium or strontium-90, which deposits in bone marrow (a very radiation-sensitive organ), is five rems per year. ICRP's proposal allows for an annual dose of 42 rems!

Jerry Harden, former president of the United Steel Workers Local 8031 at DOE's Rocky Flats facility, where workers are exposed to internal radiation like plutonium, comments, "ICRP's recommendations appear to be designed to allow workers who are over the current limits for internal exposures to continue work."

Dr. Robert Baker, who prepared the revised worker standards at NRC's Office of Research, concedes that some exposures will go up, but that the science behind ICRP's recommendations is sound. "We are going to let the science drive the policy in this area," Baker concludes.

Denial of Data

For the past few years, doubts about the underlying rationale for these recommendations have been surfacing among industry scientists. The most significant questions are those dealing with the data on the Japanese atomic bomb survivors, which have become the principal scientific reference used by the ICRP to determine low-level radiation exposure risks.

The survivor study, begun in 1950 by the U.S. government, is comprised of about 80,000 people exposed to A-bomb radiation in Hiroshima and Nagasaki in 1945. Although it is a study of high doses, it has been the only large-scale study of radiation effects on humans.

Soon after ICRP issued its recommendations in 1977, government-sponsored scientists began to discover flaws in the A-bomb survivor study. Radiation doses which triggered cancer among the survivors were found by researchers at DOE's Lawrence-Livermore Laboratory to be much smaller than previously thought. Radiation/cancer risk estimates for survivors were also increased when it was discovered that cancer *incidence* is about twice as great as cancer *mortality* (the current basis for survivor risk estimates).

Variations in individual sensitivity to radiation-induced cancer among the survivors has added another twofold increase in cancer risks. Additionally, a new wave of long-latency cancers is being observed among the survivors, suggesting that the worst is not over yet. These

revisions imply that ICRP's interpretation of the Japanese A-bomb survivor study may underestimate low-level radiation/cancer risks by almost ten times.

In light of evidence from large populations of U.S. nuclear workers exposed to low-level radiation (which was individually measured), the A-bomb survivor study may have little value in determining low-level radiation standards. But DOE scientists are reluctant to admit that the worker studies have any worth.

DOE researchers also refuse to accept years of evidence that children exposed as fetuses to low-level radiation bear very high risks of health damage. These studies, conducted in the U.S. and Britain for more than 25 years, show that a single x-ray given during pregnancy can initiate a childhood cancer—the most prevalent cause of death by disease in the U.S. for children aged two to ten years.

Since the 1960s, concern has grown among medical doctors about the radiation sensitivity of the fetus, particularly since the first trimester of pregnancy is considered to be the most vulnerable developmental period. Moreover, the human fetus is thought to be 10 to 100 times more sensitive to radiation damage than an adult. In January 1984, the *British Journal of Radiology* reported that fetal exposures of even a tenth of a worker's allowable annual dose (.5 rem) during a crucial stage when the fetal brain is developing can lead to mental retardation.

The first study on fetal irradiation reported positive findings in 1956. Thirty years later, the NRC is finally proposing the first formal standard to protect the developing child, .5 rems, which may double the risk of childhood cancer and mental retardation.

It should not be surprising that epidemiological findings of excess cancer mortality among radiation workers are not being taken seriously by the regulatory agencies, even in the face of opposition to ICRP's recommendations by labor unions in the U.S., Canada, Europe, and Japan. Except for some minor modifications, the NRC staff has adopted ICRP's recommendations in toto.

The historical pattern which started with Marie Curie appears to be repeating itself. First, early warnings are ignored. Then victims start to appear, but official disbelief dominates until evidence is overwhelming. By that time, it's too late to help those who could have been protected.

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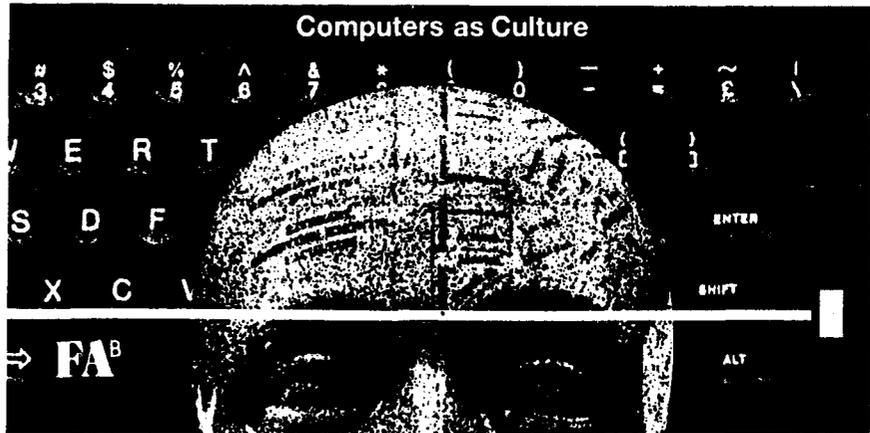
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"Thirty years of research have shown this process to be safe."

Margaret Heckler

"We don't know it's safe. For the government to say it's safe is simply untrue."

Dr. John Gofman

FOOD IRRADIATION

Zapping What You Eat

by Leslie Fraser

In the 1950s, the Atomic Energy Commission and the Pentagon had high hopes for nuclear weapons waste.

Side-by-side visions of nuclear furnaces in every basement, they dreamed of irradiated chickens in every pot. Why worry about radioactive waste? Just use it up by using it again.

According to Kitty Tucker, president of the Health and Energy Institute in Washington, DC, times may have changed, but the government is acting out a very old fairy tale. The Department of Energy is playing Rumpelstiltskin with the Food and Drug Administration and Health and Human Services department. "Rumpelstiltskin turned straw into gold; the DOE wants to turn its

Leslie Fraser is editor of Science for the People. She wishes to thank the Health and Energy Institute for material provided for this article.

nuclear weapons waste into a saleable product by using it for food irradiation," Tucker claims.

Last July, the FDA approved commercial use of irradiation to kill *trichinella spiralis* in pork, the parasite that causes trichinosis. Industry spokesmen claim that trichinosis could be eliminated in the U.S. by 1987. But use of irradiation seems superfluous, since trichinosis is no longer a serious health threat in the U.S., and it's now possible to test for *trichinae* in living pigs.

Irradiation certainly won't eliminate the cause of trichinosis. If U.S. farmers stopped feeding their pigs uncooked garbage and rodents, a practice banned in other countries, the parasite would not appear in pork. And irradiation won't provide a better method for killing *trichinae*. Cooking pork at 170 degrees for five minutes will kill the parasite more economically.

The final go-ahead for pork irradiation was given on January 14, 1986, with the U.S. Department of Agriculture's approval of irradiation





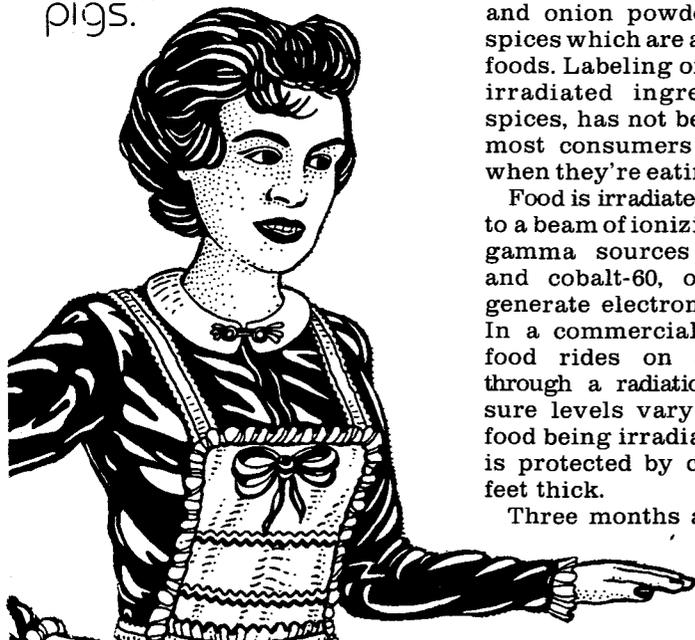
at doses of 30,000 to 100,000 rads. For consumers, "USDA plans to approve labeling terms on a case-by-case basis, but plans to approve labels such as 'irradiated,' or 'treated with ionizing radiation,'" according to Donald Houston, USDA's food safety and inspection administrator.

The impetus to irradiate pork came from Radiation Technology, Inc., a company in Rockaway, New Jersey who petitioned the FDA in 1984 to amend food additive regulations. The company hopes that these new regulations will extend to poultry and other meat. "I believe we can be one of the largest growth industries in the history of this nation," RTI's president and former Atomic Energy Commission physicist, Martin A. Welt, predicted in a *New York Times* interview. RTI cleared \$2.1 million in sales last year.

Radiation Technology may be ready to start zapping pork, but the government won't approve their plant until it's cleaned up. RTI is a major environmental polluter, and the plant is an Environmental Protection Agency Superfund site because of chemical contaminations.

Radiation Technology is also a radiation hazard. In January 1977, the Nuclear Regulatory Commission fined RTI \$4,800 for nine violations of federal radiation safety standards. Nine months later, the company exposed a worker to an almost fatal radiation dose from unshielded cobalt-60. Employee Michael Pierson entered a radiation chamber at RTI, receiving a dose of 200 rads. The

"We don't think the American people should be guinea pigs."



"The kind of epidemiological study required to find out whether or not a diet of irradiated food will increase the frequency of cancer or genetic injuries among humans simply has not been done."

company had taken the door to the room off its hinges, and disconnected a safety lock which should have prevented anyone from entering the room while the cobalt-60 was exposed.

With companies like Radiation Technology at the forefront of the irradiation business, why worry about environmental or occupational safety in the industry?

Stamp of Approval

Besides pork, the FDA has approved irradiation of wheat and potatoes since the 1960s, to prevent potatoes from sprouting and to kill insects in wheat grain and flour. Because irradiation is more expensive than chemical treatment, it hasn't been used commercially on wheat and potatoes. But with new FDA regulations approving irradiation of more foods, the commercial market plans to harvest this technology in the next two years, making irradiation an economically viable option.

Irradiation of spices, approved in 1983, is used for some commercial products, especially garlic powder and onion powder, and for many spices which are added to processed foods. Labeling of foods containing irradiated ingredients, such as spices, has not been mandatory, so most consumers have not known when they're eating irradiated food.

Food is irradiated through exposure to a beam of ionizing radiation from gamma sources like cesium-137 and cobalt-60, or machines that generate electron or X-ray beams. In a commercial plant, packaged food rides on a conveyor belt through a radiation chamber. Exposure levels vary with the type of food being irradiated. The chamber is protected by concrete walls 6.5 feet thick.

Three months ago, on December

12, 1985, Health and Human Services Secretary Margaret M. Heckler approved FDA regulations that would extend commercial irradiation to fruits and vegetables for killing insects and lengthening the time that produce can sit on a grocer's shelf before rotting. The regulations permit up to 100,000 rads of ionizing radiation for fruits and vegetables. Responding to a petition from McCormick, Inc., a major spice manufacturer, the new regulations also triple current limits for irradiation of herbs and spices from 1 million to 3 million rads.

"This regulation is an important step forward for consumers—a proven, safe method to protect fresh fruits and vegetables from insects, and to inhibit spoilage and extend shelf life," Heckler said, as she signed the new regulations. "Thirty years of research have shown this process to be safe."

These regulations also require labels for irradiated fruits and vegetables, including the "radura" logo for irradiated food, which pictures a flower inside a broken circle. This symbol is favored by the irradiation industry, because it looks so benign. In time, Radiation Technology president Martin Welt hopes that the symbol will take on positive connotations that irradiation is "safe, wholesome and nutritious." In two years, the FDA will decide whether the symbol is familiar enough to the public to be used without written labeling.

The FDA originally proposed eliminating retail labeling entirely, but since over 5,000 people wrote to protest, they changed tactics. Instead, the term "picowaved" will be used to identify irradiated foods. If the FDA required the word radiation on fruits and vegetables, irradiation companies would take the FDA to court. Martin Welt claims that it's

essential to "consumer education" to avoid any labeling that refers to radiation, which he believes would unduly alarm the public.

Whose Studies Should You Believe?

The FDA reviewed 441 scientific studies before deciding that further testing is unnecessary. Dismissing all but five of those studies as scientifically flawed, the FDA maintains that the five studies they approved show irradiated food to be safe. They also claim that irradiation will improve consumers' health by replacing EDB and other hazardous pesticides.

Critics cite at least 32 studies showing negative effects from irradiated food. They question the longterm health effects of irradiated food diets, and advocate further testing to assure that chemical changes which occur in food after irradiation aren't harmful. "We don't believe the American people should be guinea pigs," said Health and Energy Institute president Kitty Tucker.

"Despite industry's protest that this has been studied to death, there's an insufficient number of studies," said Allen Greenberg, staff attorney for the Public Citizen Health Research Group. "The FDA is misleading consumers by suggesting there are no potential health hazards."

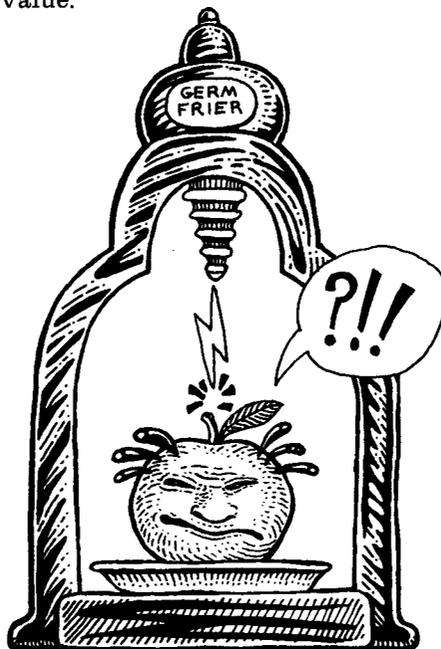
Although irradiation does not make food radioactive, it does change the composition. Gamma rays can ionize atoms and molecules in the food, forming unstable secondary products called free radicals. They react with the food and cause molecular changes which create unique radiolytic products (URPs) that are not caused by other food processing techniques.

These radiolytic products could be carcinogenic or toxic. Formaldehyde, benzene, and hydrogen peroxide have been found in some irradiated foods. In a 1980 report, the USDA stated that irradiated foods may contain enough URPs "to warrant toxicological evaluation."

Irradiation also causes increased production of naturally occurring aflatoxins, a carcinogen produced by fungi. It can increase the chance of food poisoning by encouraging radiation-resistant botulism bacteria.

Irradiation also causes nutritional losses by destroying several vitamins, including vitamin A, some Bs, C, and E. It may alter amino acids and fats. If more than one food processing tech-

nique is used (such as irradiation followed by canning), there may be a decline in a food's nutritional value.



According to Dr. John Gofman, professor emeritus of medical physics at the University of California at Berkeley, "We don't know it's safe. For the government to say they know it's safe is simply untrue. I don't think people are going to drop over dead in 30 days—my concern is the longterm carcinogenic potential.

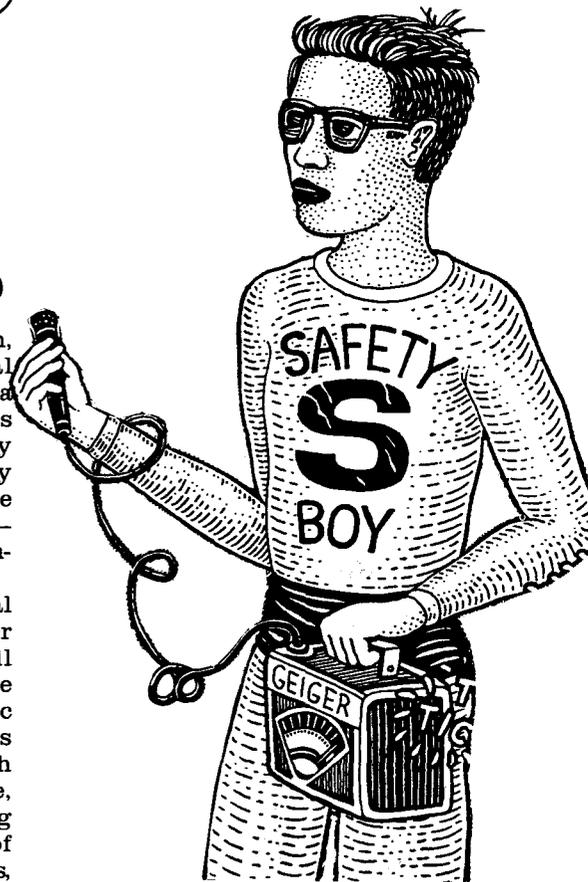
"The kind of epidemiological study required to find out whether or not a diet of irradiated food will increase (or possibly decrease) the frequency of cancer or genetic injuries among humans simply has not been done.... What is more, such a study is unlikely to ever be done, because it would require controlling the diets of 200,000 humans of various age groups for at least 30 years, and following their life histories for at least 50 years (preferably their full life spans)," Gofman warns.

For more than 25 years, the U.S. Army performed most of the research on irradiated food. In April 1984, Sanford Miller, the food safety chief of the FDA, claimed that only three studies done by the Army on sterilizing meats met the FDA's criteria for acceptable research, and even those studies were questionable.

Many of those studies were done by the Industrial Bio-Test Laboratories, Inc. In 1983, IBT officials were found guilty of defrauding the government in drug research due to unsanitary lab conditions, lack of routine analyses, faulty record

keeping, and suppression of unfavorable findings. Two of their three animal feeding studies on irradiated beef, ham, and pork were found fraudulent. The third study, which was not held in default, found reduced numbers of offspring, and greater numbers of tumors in animals fed irradiated food.

An Indian study published in 1975 in the *American Journal of Clinical Nutrition* reported a high rate of chromosomal abnormalities in the white blood cells of children fed freshly irradiated wheat. A U.S. Army-sponsored experiment in

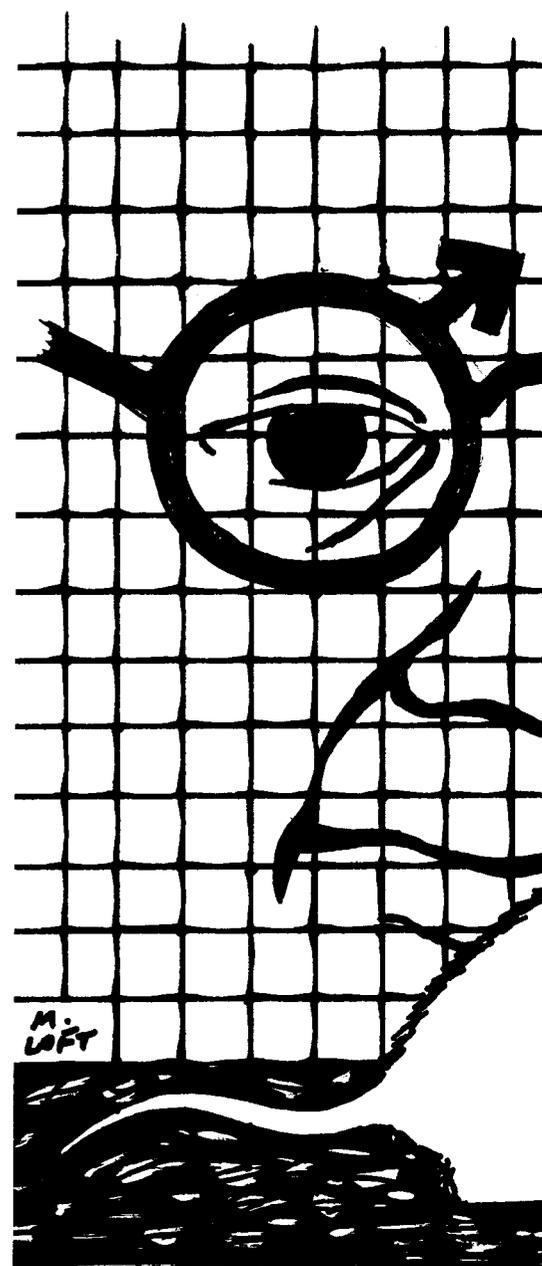


1979 revealed severely depressed reproduction among fruit flies fed irradiated chicken. And Soviet studies published in 1978 and 1981 showed abnormalities in the kidneys and testes of rats fed irradiated meat and fish.

The Health and Energy Institute hopes to file a lawsuit to demand an environmental impact statement and technology assessment of food irradiation before full-scale commercial implementation. With so many questions about the integrity of those conducting food irradiation research, and the poor health results shown in some studies, commercial food irradiation should be halted until it's proven safe. ①

FA A FEMI

Thoughts on of Natur



by Ruth Hubbard

Brazilian educator Paulo Freire has pointed out that people who want to understand the role of politics in shaping education must "see the reasons behind the facts."¹

I want to begin by exploring some of the political, economic, and social reasons behind a particular kind of facts, "facts of natural science."

I am attracted to this because ever since I began to think critically about science, and about my own activities as a scientist, I have been fascinated by "facts", what they are and how they get to be. After all, facts aren't just out there. Every fact has a factor, a maker.

As people move through the world, how do we sort those aspects that we permit to become facts from those that we relegate to being fiction—and from those that, worse yet, we do not even notice and therefore do not name as fact, fiction, or figment? In other words, what criteria and mechanisms of selection do people use in the making of facts?

The Facts of Science

Making facts is a social enterprise. Individuals cannot just go off by themselves and come up with their own brand of facts. When people do that, and the rest of us do not agree to accept or share the facts they offer us as descriptions of the world, they are considered schizophrenic, crazy. If we do agree, either because their facts coincide or overlap sufficiently with ours or because they have the power to force us to accept their facts as real and true—to make us see the emperor's new clothes—then the new facts become part of our shared reality, and their making becomes a social enterprise.

Making science is such an enter-

Ruth Hubbard teaches in the biology department at Harvard University, writes about women's health issues, and is a member of SftP's editorial advisory board.

prise. As scientists, we must follow certain rules of membership and go about our task of fact-making in particular, professionally-sanctioned ways. We must submit our facts to review by our colleagues and be willing to share them with others by writing and speaking about them. If we work for private companies with proprietary interests, we must still be willing to share our facts, but only with a limited number of people.

If we follow proper procedures, we become accredited fact-makers. In that case, our facts come to be accepted on faith. Large numbers of people, who are in no position to judge whether they're fact or fiction, begin to believe us. After all, a lot of "scientific facts" are counterintuitive—like the earth moving around the sun, or that if you drop a pound of feathers and a pound of rocks, they will fall at the same rate.

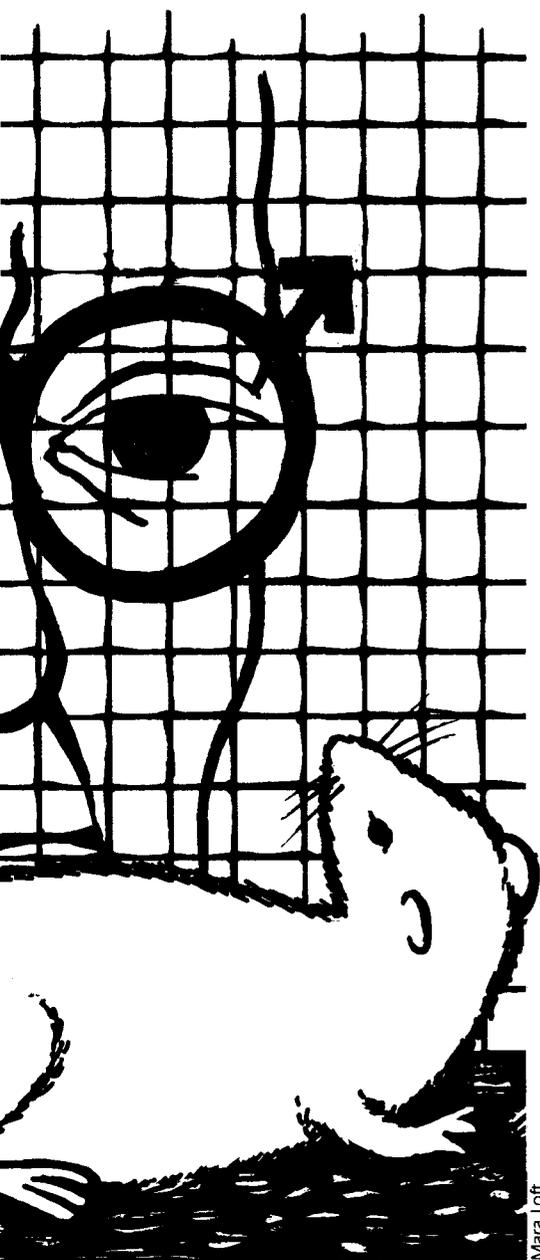
What are the social or group characteristics of the people who are permitted to make scientific facts? Above all, they must have a particular kind of education that includes college, graduate, and post-graduate training. That means that in addition to whatever subject matter they learn, they are socialized to think in certain ways and to have familiarized themselves with a narrow slice of human history and culture—primarily the experiences of western European and North American upper class men during the past century or two.

But who gets to have access to that education? Until the last decade or so, they have been predominantly upper-middle and upper class youngsters, most of them male and white. In the past decade, a slightly larger number of white women and a few more people of color have been let in, but the class composition has not changed appreciably.

What about the other kinds of people? Have they no role in the making of science? Quite the contrary. In the ivory—that is, white and male—towers in which science gets made, people from working class and lower-middle class backgrounds are well represented. But they are technicians,

ITS D NISM

the Masculinity Science



secretaries, and clean-up personnel.

Decisions about who gains the status of fact-maker are made by university professors, deans, and presidents. They call on scientific colleagues from similar institutions to vouchsafe the quality of a particular candidate and to guarantee that he or she conforms to university and scientific professional standards.

At the larger, systemic level, decisions are made by government and private funding agencies who operate by what is called peer review. Like-minded people from similar personal and academic backgrounds get together to decide whether a particular fact-making proposal has enough merit to be financed. It is a club in which people mutually sit on each other's decision-making panels.

The criteria for access are supposed to be objective and meritocratic, but they aren't. Orthodoxy and conformity count for a lot. Someone whose ideas or personality are out of line is less likely to succeed than "one of the boys". These days, some of us girls are allowed to be one of the boys, particularly if we have learned the rules by which the game is played.

Thus, science is made by a predominantly self-perpetuating, self-reflexive group: by the chosen, for the chosen. The assumption is that if the science is "good" it will, in the long run, "serve the people." But no one and no group is responsible for seeing that it does. Public accountability is not built into the system.

What are the alternatives? How could we have a science for the people, and to what extent could—or should—it be a science by the people? After all, divisions of labor are not necessarily bad. There is no reason and no possibility, in a complicated society like ours, for everyone to be able to do everything. Inequalities which are bad come not from different people doing different things, but from different tasks being valued differently, carrying with them different amounts of prestige and power.

For example, American and European societies assign different values to mental and manual labor. We value mental labor more highly than manual labor, we pay more for

it, and we think it is somehow better.

This is a mistake in a scientific laboratory, because it means that the laboratory chief—the person with "the ideas"—often gets all the credit. The laboratory workers—the people who work with their hands—are the ones who perform the operations and make the observations that permit hypotheses and ideas to become facts. Often, they are the ones who produce the substrata of observations out of which the new ideas emerge, that the laboratory chief then puts out as his, or occasionally her own.

But it is not only because of the way natural science is done that head and hand, mental and manual work, are often closely linked. Natural science requires a conjunction of head and hand because it seeks an understanding of nature for use. To understand nature is not enough.

Natural science and technology are inextricable; natural science is true only to the extent that it works. Its laws are relevant only if they can be applied and used as technology. The science/technology distinction is an ideological device of relatively recent historical origin which does not hold up in the real world of economic, political, and social institutions.

Women's Nature: Facts and Fiction

An entire range of discriminatory practices is justified by the claim that they follow from the limits that biology places on women's capacity to work. Though exceptions are made during wars and other emergencies, these are forgotten as soon as life resumes its normal course. Then women are expected to return to their subordinate roles, not because the quality of their work during the emergencies has been inferior, but because these roles are seen as natural.

Recently a number of women employees in the American chemical and automotive industries have been forced to choose between working at relatively well-paying jobs and their ability to have children.

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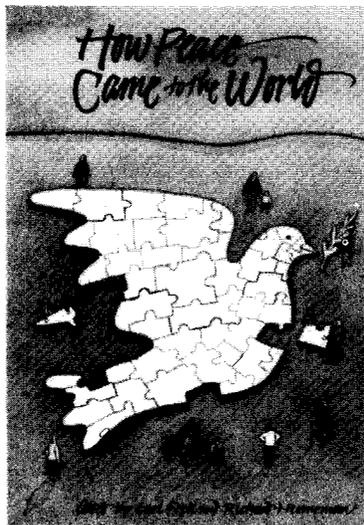
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HOW PEACE CAME INTO THE WORLD

edited by *Earl W. Foell*
and *Richard A. Nenneman*
Foreword by *Kurt Waldheim*

It can happen. In the year 2010 the world is at peace and the threat of nuclear devastation has vanished. How did this come about?

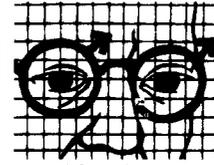


Through the imaginative ideas of forty women and men—lawyers, doctors, professors, conflict research specialists, and others who think about peace in a different way, who do not accept that war is inevitable. The wealth of original and workable approaches to peace presented in this book were selected from entries to "Peace 2010," a contest sponsored by *The Christian Science Monitor*. Earl W. Foell, Editor in Chief of the *Monitor* and Richard A. Nenneman, the *Monitor's* Managing Editor have written introductions to scenarios that range from catastrophe and activism to insight and diplomacy.

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In one instance, five women were required to submit to sterilization by hysterectomy in order to avoid being transferred from work in the lead pigment department at American Cyanamid in Willow Island, West Virginia to janitorial work at much lower wages and benefits. While other women in the department refused hysterectomies and were demoted or fired, the women who were sterilized still lost their jobs when the department shut down months later.

Even though none of these women was pregnant or planning a pregnancy in the near future (indeed, the husband of one had a vasectomy), they were considered pregnant or "potentially pregnant" unless they could prove that they were sterile. Men in the plant weren't sterilized, despite the fact that exposure to lead can damage sperm as well as eggs and can affect the health of workers (male and female) as well as a "potential fetus".

This vicious choice has been forced only on women who have recently entered what had previously been considered relatively well-paid male jobs. Women whose work routinely involves exposure to chemical or radiation hazards in traditionally female jobs—such as nurses, X-ray technologists, cleaning women in surgical operating rooms, beauticians, secretaries, workers in the ceramics industry, and domestic workers—are not warned about the presence of chemical or physical hazards to their health or to that of a fetus, should they be pregnant.

In other words, protection of women's reproductive integrity is being used as a pretext to exclude women from better paid job categories from which they had traditionally been excluded. But women (or men) are not protected against health-endangering work in general.²

The ideology of woman's nature that is invoked at these times would have us believe that a woman's capacity to become pregnant leaves her at all times physically disabled by comparison with men. The scientific underpinnings for these ideas were elaborated by nineteenth century biologists and physicians. They claimed that women's brains were smaller than men's, and that women's ovaries and uteruses required much energy and rest in order to function properly.

They "proved" that young girls must be kept away from schools

and colleges once they had begun to menstruate, and warned that without this kind of care women's uteruses would shrivel, and the human race would die out. This analysis was not carried over to poor women, who were not only required to work hard, but often were said to reproduce too much. Indeed, the fact that they could work so hard while bearing children was taken as a sign that these women were more animal-like and less highly evolved than upper class women.

But this kind of scientific myth-making is not past history. Since the 1970s, there has been a renaissance in sex differences research that has claimed to prove scientifically that women are innately better than men at home care and mothering while men are innately better fitted than women for the competitive life of the marketplace.

Questionable experimental results obtained with animals (primarily that prototypic human, the white laboratory rat) are treated as though they can be applied equally well to people. On this basis, some scientists are now claiming that the secretion of different amounts of so-called male hormones (androgens) by male and female fetuses produces lifelong differences in women's and men's brains. They claim not only that these unproved differences in fetal hormone levels exist, but imply, without evidence, that they predispose men and women as groups to exhibit innate differences in our abilities to localize objects in space, in our verbal and mathematical aptitudes, in aggressiveness, competitiveness, and nurturing ability.³

Other scientists and sociobiologists claim that some of the sex differences in social behavior that exist in our society (for example, aggressiveness, competitiveness, and dominance among men; coyness, nurturance and submissiveness among women) are human universals that have existed in all times and cultures. Because these traits are ever-present, they deduce that they must be adaptive (that is, promote human survival), and that they have evolved through Darwinian natural selection and are now part of our genetic inheritance.

In recent years, sociobiologists have tried to prove that women have a greater biological investment in our children than men, and that women's disproportionate contributions to child- and homecare are biologically programmed to help us insure that our "investments" mature—in other words, that our children live long enough to have

These days, some of us girls are allowed to be one of the boys, particularly if we have learned the rules by which the game is played.

children themselves. The rationale is that an organism's biological fitness, in the Darwinian sense, depends on producing the greatest possible number of offspring, who themselves survive long enough to reproduce. This is what determines the frequency of occurrence of an individual's genes in successive generations.

Following this logic a step further, sociobiologists argue that women and men must adopt basically different strategies to maximize the spreading of genes over future generations. The calculus goes as follows: women cannot produce as many eggs as men can produce sperm, and must "invest" at least nine months in pregnancy (whereas it takes a man only the few minutes

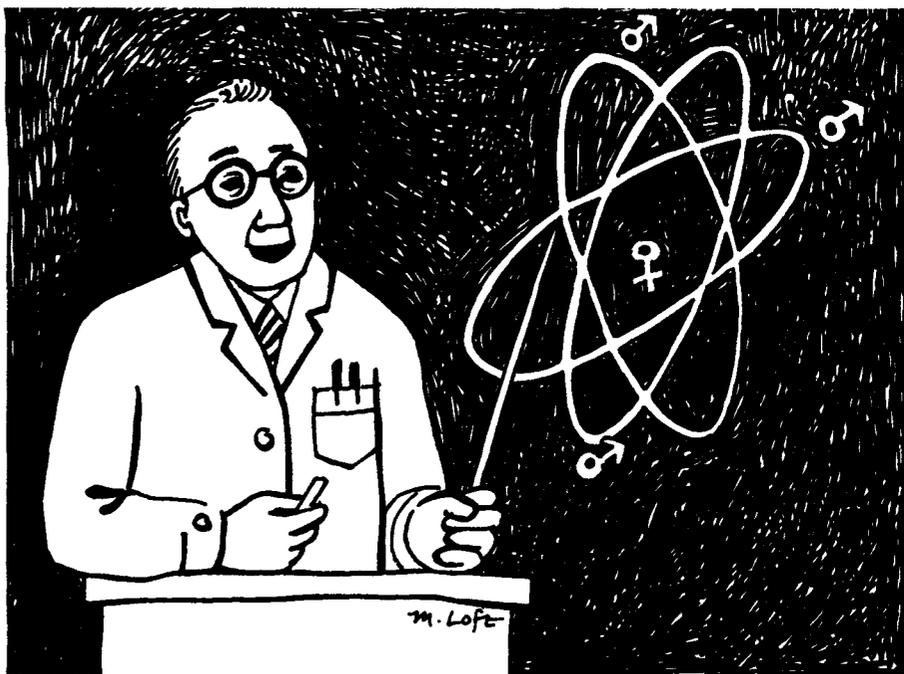
of heterosexual intercourse to send a sperm on its way to personhood). Therefore, each egg and child represents a much larger fraction of reproductive fitness for a woman than each sperm or child does for a man.

From this biological asymmetry follow female fidelity, male promiscuity, and the unequal division and valuing of labor by sex in this society. As sociobiologist David Barash presents it, "mother nature is sexist," so don't blame her human sons.⁴

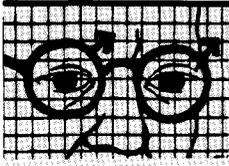
In devising these explanations, sociobiologists ignore the fact that human societies do not operate with a few superstuds, nor do stronger or more powerful men usually have more children than weaker ones. Though men, in theory, could have many more children than women, in most societies equal numbers of men and women engage in producing children. But in caring for them, this is not the case. Nonetheless, this kind of theory is useful to people who have a stake in maintaining present inequalities. It has a superficial ring of plausibility and thus offers naturalistic justifications for discriminatory practices.

Subjectivity and Objectivity

Natural scientists attain their objectivity by looking upon natural phenomena (including other people) as isolated objects that exist outside the context of interrelationships of



"My research shows conclusively that the proton is female, as she stays in the nucleus and cooks while the male electron goes out and hunts valences!"



Women have played a very large role in the production of science—as wives, sisters, secretaries, technicians, and students of “great men”—though usually not as named scientists. It is one of our jobs as feminists to acknowledge that role.

which human beings are a part. Natural scientists describe their observations as though they and their activities existed in a vacuum. In that vacuum, they can make facts and formulate laws.

What feminists have to contribute is the insistence that subjectivity and context *cannot* be stripped away. They must be acknowledged if we want to understand nature and use the knowledge we gain without abusing nature. Natural scientists must try to understand our position in nature and in society as subjects as well as objects.

The problem is that the context-stripping that used to work for the classical physics of falling bodies (that experience no friction) and “ideal” particles (that don’t interact) has become the model for how to do every kind of science—even though physicists early in this century recognized that the experimenter is part of the experiment and influences its outcome. That insight produced Heisenberg’s uncertainty principle in physics: the recognition that the operations performed by the experimenter disturb the system so that it is impossible to specify simultaneously the position and momentum of atoms and elementary particles.

Awareness of subjectivity and context should be part of doing science, because they are part of being human, which includes living in society. Anthropologists often try to take field notes to describe a new culture as quickly as possible after they enter it. They realize that once they come to know a culture well and feel at home, they will begin to take its most significant aspects for granted and stop seeing them. Yet they must also acknowledge the limitations that their own

personal and social background imposes on the way they perceive the foreign society.

The social structure of the laboratory in which scientists work and the community and interpersonal relationships in which they live must be acknowledged as part of the subjective reality and context of doing science. Yet they are usually ignored when we speak of a scientist’s work, despite the fact that natural scientists work in highly organized social systems.

Obviously, the sociology of laboratory life is structured by class, sex, and race, as is the rest of society. To understand what goes on in the laboratory, we must ask questions about who does what kinds of work. What does the lab chief—the person whose name appears on the stationery or the door—contribute? How are decisions made about what work gets done and in what order? What role do women, whatever our class and race, and men of color and from working class backgrounds play in this performance?

Note that women have played a very large role in the production of science—as wives, sisters, secretaries, technicians, and students of “great men”—though usually not as named scientists. It is one of our jobs as feminists to acknowledge that role.

If feminists are to make a difference in the ways that science is done and understood, we must not just try to become scientists who occupy the traditional structures and follow the established patterns of behavior. More important, we must understand and describe accurately the roles women have played all along in the process of making science.

Why are certain ways of systematically interacting with nature

and of using the knowledge gained from that interaction acknowledged as science, whereas others are not? I am talking of the distinction between the laboratory and that other, quite differently-structured place of discovery and fact-making, the household. There women explore and use our brands of botany, chemistry, and hygiene in our gardens, kitchens, nurseries, and sick rooms. Much of the knowledge that women have acquired in those places is systematic, communicated, and it works.

But just as our society downgrades manual labor, it also downgrades practical knowledge, however systematic it may be. We downgrade the orally-transmitted knowledge and the unpaid observations, experimentation, and teaching that happen in the household. Yet here is an entire spectrum of empirical knowledge that has gone unnoticed and unvalidated (in fact, devalued and invalidated) by the institutions that catalog and describe, and thus define, what is to be called knowledge.

I am not sure, and indeed rather doubt, that women as gendered beings have something new or different to contribute to science. But women as political beings do. And one of the most important things we can do is to insist on the political content of science and its political role. The pretense that science is objective, apolitical, and value-neutral is profoundly political because it obscures the role that science and technology play in underwriting the existing distribution of power in the society.

No active component of society—and science and technology are that—can be politically neutral. By claiming to be objective and neutral, scientists merely align themselves with the powerful against the powerless. Feminist science—by which I mean science done by scientists who consciously integrate feminist politics into their science—can expose the errors and dishonesty of the claim of scientific objectivity and neutrality. This is done by insisting on the political nature and content of scientific work and of all science teaching.

Clearly, science and technology always operate in somebody’s interest. The so-called neutrality of science merely indicates the extent to which it supports the existing distribution of interests and power. The male-dominated science we have now is just as political and value-laden as a feminist science

continued on page 26

CORPORATE ENERGY FUTURES

A Dumbo Ride Through Epcot Center

by Anthony E. Ladd

Walt Disney Productions continue to prove themselves as corporate peddlers of fantasy.

At almost 60 years old, Mickey Mouse still managed to lead the company to over a billion dollars in earnings last year from character merchandising alone. Disney's "theme parks"—Disneyland and Disney World—continue to draw tens of millions of visitors every year. Disney World in Florida, the younger of the two, boasts over 200 million visitors since it opened in 1971. But with its newest addition, Epcot Center, Disney moved into new terrain: marketing a vision of the technological future. Sixty years from now, will their vision be as pervasive as Mickey Mouse is today?

Epcot Center (Experimental Prototype Community of Tomorrow) is a \$900-million, 260-acre addition to

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the existing Walt Disney World complex of resort and entertainment attractions near Orlando, Florida. Supplemented by World Showcase, an attraction featuring the cultural displays and reconstructed elements of nine countries, Epcot features a Future World of multinational corporate pavilions dealing with the universe of current and futuristic technological achievements in energy, communications, space travel, and transportation.

Sponsorship of Future World's pavilions includes an elite parade of conglomerates like Exxon, General Electric, General Motors, Kraft, Sperry, Kodak, Coca-Cola, AT&T, American Express, and Time, Inc., who have spent as much as \$25 million each to sponsor exhibitions seen by almost 11 million people each year.

A self-described permanent world's fair, as well as a "proving ground for American technology," Epcot is by all accounts an intricate blend of Disney fantasy, entertainment, and technological education. Not incidentally, it is also a marketplace of corporate entities selling themselves as the white knights of technology, scientific progress, and the future. As one General Electric executive noted, "It's the best kind of advertising available. And from a public relations standpoint, it is very effective."¹



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Cynics and pundits aside, an observer of Epcot's Future World cannot leave the premises without feeling the inculcation of at least three dominant themes: that there will be a future of optimistic choices, that there are natural

history of relentless progress toward a future worth building. As author Jennifer Allen puts it:

Here is history without what the Disney people refer to as "downers": a past without plague, genocide or famine; a present without unemployment or overpopulation; a future in which everyone will own a bubble car and a telephone with a TV screen.²

In presenting their "voice of optimism" about the future, as well as the past, Epcot officials are

Energy companies not only disseminate messages that deflect the blame for the energy situation away from themselves but also present to the public an image of responsibility, service, sacrifice, and expertise in solving energy problems.

resources and technological strategies to get us there, and that big American corporations can do it for us best.

The Future Is "Fer Sure, Fer Sure"

While many academics and scientists have labored over the past decades to alert the public to the growing problems of overpopulation, energy crises, and the like, Epcot has busied itself with presenting a view of the future that is as sure as daybreak and as comforting as Mickey Mouse. In the Future World half of Epcot that occupies part of the giant Disney World complex, visitors are presented with a glowingly optimistic view of the future where, as Epcot puts it, "the dreams of today can become the realities of tomorrow."

Epcot sells itself as Walt's Final Dream, a technological testing ground that will never be finished, but will always be in a state of becoming. Instead of Walt's experimental prototype community, Disney executives have chosen to create what might be described as the world's largest trade show, an amusement park showcasing a

unflinchingly upfront concerning their priorities to entertain first and inform their visitors second. As one Disney vice president remarks, "We're interested in seeing technology work to accomplish a story point. We wanted to make a point about America, that dreaming and doing things is an ongoing thing."

Describing Epcot as "a new kind of entertainment, spectacular for communicating ideas to people in ways they can understand," Disney and corporate partners have merged to find that ideological messages are best delivered to mass audiences by creating a sense of magic and animation around their views. An official of Kraft's pavilion, The Land, puts it clearly: "Epcot is an opportunity to counter the doomsday attitude that people are going to starve in the next century."³

Like the Magic Kingdom, Future World is a place where dreams come true, problems are simplified, and worries suspended in an aura of dazzling entertainment. This application of Disney techniques to futuristic imagery provides the platform and context for various forms of advertising on behalf of energy and technology interests.



Andrew Joslin

Energy Futures? Leave the Driving to Us

Since October 1, 1982, Epcot Center has provided the largest corporation in the energy industry—Exxon—with perhaps the most sophisticated pavilion of exhibits showcasing Exxon and Corporate America in general. Epcot has provided a host of elite conglomerates with a unique and technologically dazzling forum for the dissemination of corporate viewpoints and achievements. Indeed, this marriage of big entertainment and big business has provided the energy industry with an unmatched public relations pulpit from which to shape mass attitudes toward energy policies and preferences.

Of all the corporate pavilions at Epcot's Future World, perhaps none

is as technologically sophisticated and awesome in its cinematic appeal as Exxon's Universe of Energy pavilion. Housed in a huge wedge-shaped structure and blanketed by a glistening roof of 80,000 photovoltaic solar cells, the pavilion itself seems to speak not only to the role of energy in the future world, but to Exxon's dominant role in the world energy marketplace.

Exxon's public relations publications stress that the Universe of Energy presents "an accurate, credible story about energy" where people can learn that "by exploring and developing alternative energy sources we can build a bridge to the future." Although clearly more balanced than many American science museums, the Universe of Energy nevertheless expounds a relatively one-dimensional view of energy problems and alternative

energy solutions.

Throughout the 30-minute presentation, visitors are not only comforted about our energy future but instructed that present policies pose no real problems. In the pre-show film about global energy resources, one learns that "the world must continue to depend on imported fuels until the real breakthroughs come."

After visitors emerge from the primeval diorama, a "prehistorical" ride through dueling dinosaurs and erupting volcanoes, they learn not only about the creation of fossil fuels and their prehistoric origins, but also a healthy respect for the mysteries of oil—Exxon's main product. Not coincidentally, in the energy information film following the diorama, tourists are exposed to a heavy promotion of oil, nuclear energy, coal, and synthetic fuels as the most promising "faces of

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energy" for solving the world's growing demands. There is little mention in the film of the environmental or economic drawbacks of these sources.

readers of *Harper's* that he left the exhibit with the feeling that "dinosaurs don't have anything to do with energy policy and neither do you."

While Exxon's attitudes about hard energy technologies are reassuring, their views on soft energies are ambivalent. The most dramatic example of this is the structure of the pavilion itself. Although the ride through the Universe of Energy is partially powered by the 80,000 photovoltaic cells on the building's

As well as a proving ground for America's technology, Epcot is by all accounts an intricate blend of Disney fantasy, entertainment, and technological education. It is also a marketplace of corporate entities, selling themselves as the white knights of technology, scientific progress, and the future.

In the walk-through exhibit on nuclear power, Exxon categorically declares that "scientists have developed methods to handle, stabilize, and store radioactive waste safely to protect the human environment." The exhibit has no mention of the political controversies over nuclear energy that have crippled its growth, except to say that "nuclear energy is controversial but is still a significant source of energy." Additionally, visitors are reminded that "Japan, France, and other countries are using nuclear power to build their bridge to the future," implying the unspoken question, "So why aren't we?" And at their Energy Exchange exhibit, visitors are invited to play a video game where they can run their own nuclear plant.

Whatever the range of information given at the Universe of Energy and Energy Exchange exhibits, the presentations are dominated and upstaged by the mechanical dinosaurs and their role in the creation of oil. As John Rothchild noted in *Rolling Stone*, "What one remembers about the future of energy is that the dinosaurs were very exciting." Still another critic, P. J. O'Rourke, told

roof, the narrator of the exhibit only briefly mentions that solar energy has helped to propel the very cars on which the visitors are seated. To find out how much electricity the cells produce, how they work, or what their potential as an energy source might be, you must call the Disney public relations office.

In the exhibit, sunlight is discussed vaguely as a source of energy "someday" in the distant future, similar to the way wind and hydroelectric energies are discussed. Although conservation of present-day fuels is mentioned as an integral part of the energy picture, the touch-sensitive computerized exhibits emphasize the "major drawbacks" of solar and wind power. In contrast, the same presentations stress that there is oil and plenty of coal.

Exxon has no reservations about its aim to inculcate visitors with a sense of energy optimism while they play in a technological funhouse. As their promotional literature points out, "Replacing feelings of hopelessness about energy with a sense of optimism and choice is the challenge met by Universe of Energy." Indeed, they suggest to

visitors that their "total energy experience...offers a breath-taking summation of energy possibilities... it is difficult not to share in the belief that the dream of an energy-abundant future can be made into a reality."

And by many accounts, Exxon's messages are getting through. An Exxon news release boasts of their ten-millionth visitor to the Universe of Energy, a young boy named Billy. When asked by Exxon officials how he liked the show, Billy remarked that he could identify most of the dinosaurs and "learned a lot." He thought that "it was better than a book where all you can do is look at the pictures." Added his parents, "It makes learning about a complex subject like energy fun and easy—for adults and kids."

Peddling Policies and Benevolence

Major energy conglomerates have been relatively successful in molding favorable public opinion toward sources and systems of energy compatible with corporate investments and profits. By way of various media channels, advertising has influenced the public's perception of corporate energy policies as being acceptable solutions to the perceived energy crisis.

Energy companies not only disseminate messages that deflect the blame for the energy situation away from themselves but also present to the public an image of responsibility, service, sacrifice, and expertise in solving energy problems. At Future World, serious policies and solutions are indeed expounded, but more importantly, visitors are reminded of *who* has the resources and ingenuity to make them happen.

Exxon, like the other corporate sponsors at Epcot, never lets the visitor forget what company has sponsored which pavilion and their own role in solving the problems of the future. From the monorail to the tunnel rides through the exhibit, recorded voices and messages constantly remind people of how Epcot's sponsors are bringing them a better life. As Exxon's project coordinator explains it:

We want people to realize that energy is an important part of daily life, that there are satisfactory explanations to our present energy problems, and that as a large diversified supplier of energy, Exxon can help solve some of those problems.⁴

Indeed, the corporate soft sell is perhaps one of the most prevalent

themes at Future World. At Sperry's computer exhibits, visitors are gently reminded that Sperry makes American manufacturing more efficient and U.S. census data more understandable. At the General Motors pavilion on the history of transportation, a visitor arrives at the end of the exhibit to a full lineup of GM's new models. The subtle inference is that the automobile is the culmination of evolutionary progression and that it will be with us for a long time to come as the optimal mode of transport.

Finally, in the Bell System's exhibit, visitors are asked, "What is the most important innovation in the last 100 years?" only to be answered, "Bell System's data communications network." Given the added presence at Epcot of Coca-Cola and Kodak, it should be no mystery why their cola and film are the only brands sold.

Such marketing messages are not

surprising, given the \$300 million spent by Future World's sponsors. But the companies seem to want to peddle policies as well as products. Exxon's promotional literature makes this point clearly: "We believe that the ultimate result of our involvement is going to be a better informed public, particularly in the energy-related areas, and that has just got to lead to the formulation of sounder public policy over time."

If people come away from Exxon's exhibit not only impressed with the energy potential of nuclear, oil, shale, and coal but also with Exxon's ability to deliver such complex technologies, then the energy industry in general has been well served. Exxon's oil- and electricity-centered interests merge smoothly with the energy-intensive themes of GM's automotive policies, Kraft's vision of future technological farming, and Bell's and Kodak's

Disney's Make-Believe World

"Back in Missouri in the early 1900s there lived a farmboy who discovered that he had a knack for drawing barnyard animals. As an adult he began to put his animals into cartoons, and he became convinced that he could entertain people by telling stories about a little creature with a high voice, red trousers, and yellow shoes and white gloves.

"Professionals in the field made fun of the idea, and to produce his first cartoons the young man had to sell or pawn virtually everything he owned. But today, 57 years later, this man and his creation have become permanently fixed in the history of our popular culture. His name was Walt Disney; his little creature was Mickey Mouse."

Today, as Disneyland's thirtieth anniversary is drawing to a close, and a weary Mickey Mouse returns home from a promotional tour of Peking and twenty nine other cities, perhaps it is time to reflect on the real Walt Disney, beneath the sugar coated media hype. Like Ronald Reagan—the kindly story teller who wove the above tale—Walt Disney had a mythical life suitable for consumption in the popular press and presidential speeches, as well as a less savory dark side.

The center of a media empire with significant influence on popular culture, Disney was a target of FBI surveillance. When "Moon Pilots" was being produced in 1962, J. Edgar Hoover directed his chief agent in Los Angeles to

meet with Disney to protest the way FBI agents were to be portrayed.

According to documents released under the Freedom of Information Act to the Arizona Republic, reviewers described the agents as "a mass of dolts." A review of the movie in the file contained a handwritten note attributed to Hoover that said, "I am amazed that Disney would do this. He probably has been infiltrated." Disney did finally comply with Hoover's wish, and he changed the characters from FBI agents to Federal Security agents.

In spite of Hoover's apparent concern, Disney was not a likely candidate for communist subversion. An outspoken critic of the New Deal, Disney once remarked, "It's the century of the communist cutthroat, the fag, and the whore! And FDR and his NLRB [National Labor Relations Board] made it so."

When the animation artists at Disney's studio unionized, Disney refused to negotiate, and they went on strike. In retaliation, Disney fired the chief artist, who won reinstatement after a court appeal. But Disney continued to carry a grudge, and the artist never regained the stature of his former job.

Disney not only opposed unions but he distrusted Jews, and never employed blacks as studio technicians. He actually had a cordial relationship with Hoover, who wrote him a number of friendly letters over his lifetime.

—Dan Grossman



panoramas of microelectronic software utopias.

Should visitors to Epcot be concerned about the relationship of technological automation to future unemployment, GM's Bird and the Robot exhibit tells them that robots can do their jobs more dexterously, and that they'll be glad to be rid of those jobs anyway. If this vision of robotic romanticism still feels discomfiting, the exhibit's theme music in the background reminds visitors that "It's Fun to Be Free."

Back to the Real World

That corporations like Exxon and its partners at Epcot want to influence public attitudes with messages and images compatible with their interests is nothing new. What appears to be emerging, however, is a different thrust on the part of such powers to clothe their interests and policy preferences behind a high-tech veil that simultaneously projects their messages to the public in a context of scientific fact, entertainment, and awe-inspiring disbelief. Couched in the objective and authoritative imagery that science expositions and their clones convey to the public, the contents of those expositions—whatever their ideological slant and balance—often become legitimized and accepted as fact by the viewing public.

As many observers have pointed out, it is easy to believe that life at Epcot is better than life in the real world. Politics, contradictions, and ideological conflicts have been left out. The traveler emerges from Epcot's pavilions and darkened tunnels convinced that the world is beautiful, its inhabitants uniformly hyperactive, its resources adequate, and its problems under control.

Compared to Future World, the real world, as well as the rest of Disneyworld, seems relatively primitive and frivolous. The World Showcase of nations at Epcot may seem clean and entertaining, but at Future World the serious problems of energy, technology, and communications are taken up by the reliable and efficient corporate entities working for us.⁵ Indeed, there are probably few places in America like Epcot where their power and

presence is more effectively felt or symbolized.

The increasing use of scientific exhibits—by industry or others—and the public's increasing exposure to scientific achievements may be producing in our society a kind of passivity and acquiescence to future change that is directed for us, rather than a future that we steer ourselves.

Epcot is more than what Alison Bass has called "corporate America's view of technological progress—a view that is sadly oversimplified and sugarcoated with hype." It is a monument to the notion of Scientism, a Dumbo ride into the future, based upon the technological fix where corporate powers do the fixing and scientific experts call the tunes. Despite the pavilion's messages that "the future is in your hands," Epcot's very existence and technological imagery suggests that the future is anything but something that ordinary people can actively understand and solve.

Social issues are not presented at Epcot as having human roots and therefore human or political solutions. Rather, they present what are essentially questions of economic and political policy as being technological problems, amenable only to scientific solutions—and therefore the domain of only those with enough specialized knowledge to deal with them.

The theme that the future is in the hands of value-free experts is an underlying message of most scientific expositions today, a message that encourages more awe than curiosity about the role of science and technology in the engineering of progress. Encased within the fantasy and magic of Disneyworld itself, Epcot has become a showcase for the belief in a technofix future, where corporations are the major actors and beneficiaries.

Like all Disney tales, as Exxon says, the Epcot story holds great promise of a happy ending. And like the tale of Dumbo, it portends a future of ringmasters, circus acts, and happy crowds.

NOTES

1. Del Marth, "Where Business Presents Tomorrow." *Nation's Business*, 69: 1981, page 65.
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3. Marth, *op. cit.*
4. *Manhattan*, "The Fantastic Story of Energy." Exxon Company, USA, Sept. 24, 1982, page 10.
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FACTS & FEMINISM

continued from page 20

would be. Once we realize that, it becomes easy to identify and name the political underpinnings and values that lie hidden beneath its presumed neutrality.

A feminist science would have to start by acknowledging our values and our subjectivity as human observers with particular personal and social backgrounds, and with inevitable interests. Once we do that, we can try to understand the world, so to speak, from the inside, instead of pretending to be objective outsiders looking in.

NOTES

1. Paulo Freire, *The Politics of Education*. South Hadley, MA: Bergin and Garvey, 1985, page 2.
2. This is discussed by Jeanne M. Stellman and Mary Sue Henifin in their article, "No Fertile Women Need Apply: Employment Discrimination and Reproductive Hazards in the Workplace," in *Biological Woman: The Convenient Myth*, edited by Ruth Hubbard, Mary Sue Henifin, and Barbara Fried, Cambridge, MA: Schenkman, 1982, pp. 117-145.
3. Several recent publications have been concerned with hormones and the brain. Up-to-date summaries of research can be found in Robert W. Goy and Bruce S. McEwen's *Sexual Differentiation of the Brain*, Cambridge, MA: MIT Press, 1980, and in a series of review articles published in *Science* 211 (1981): 1263-1324. Articles intended for general readers have appeared in *Quest* (October 1980), *Discover* (April 1981), *Newsweek* (May 18, 1981), and *Playboy* (January-July 1982). Feminist criticisms of sex differences research, including research on hormones and the brain, can be found in *Genes and Gender II: Pitfalls in Research on Sex and Gender*, edited by Ruth Hubbard and Marian Lowe, New York: Gordian Press, 1979; *Alice Through the Microscope*, edited by the Brighton Women and Science Group, London: Virago, 1980; and *Biological Woman: The Convenient Myth*, *op. cit.*
4. The investment calculus of sex differences in social and economic roles is presented in many recent publications on sociobiology. Examples are chapters 15 and 16 of *Sociobiology: The New Synthesis*, by Edward O. Wilson, Cambridge MA: Harvard University Press, 1975; *The Whispering Within*, by David Barash, New York: Harper & Row, 1979; *The Evolution of Human Sexuality*, by Donald Symons, New York: Oxford University Press, 1979. Criticisms are included in *The Sociobiology Debate*, edited by Arthur L. Caplan, New York: Harper & Row, 1978, and in *Sociobiology Revisited*, edited by Ashley Montagu, New York: Oxford University Press, 1980.

11:39:12 am EST

by George Salzman

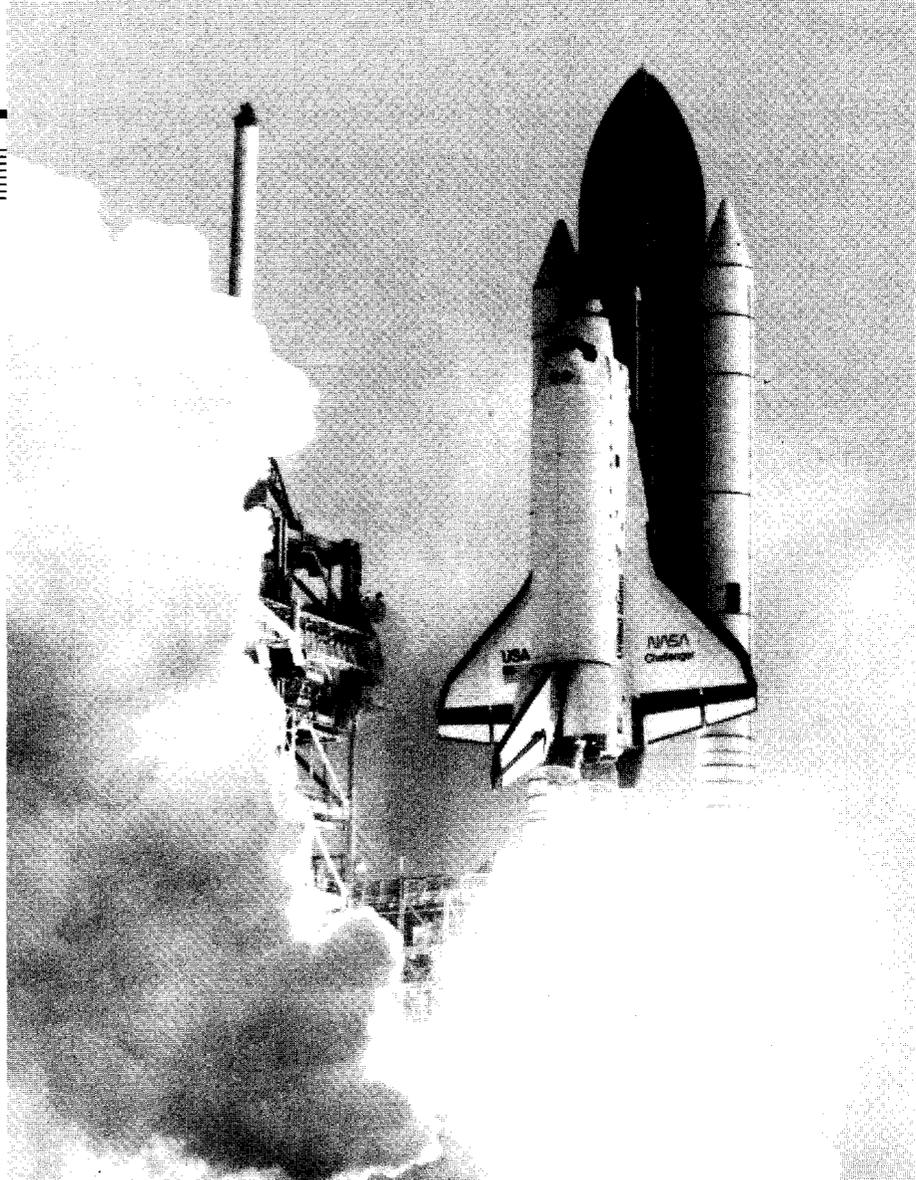
Mrs. G.H. Moore wrote to the *London Daily Telegraph*: "Sir—The hymn 'Onward Christian Soldiers', sung to the right tune and in a not-too-brisk tempo, makes a very good egg timer. If you put the egg in boiling water and sing all five verses and chorus, the egg will be just right when you come to Amen."

Technology long ago made such whimsical time-keeping methods quaint. In the late 1960s, the second was redefined to be the duration of 9,192,631,770 oscillations of the light radiated when a cesium-133 atom changes in a particular way. Imagine measuring one nine-billionth of a second! The increasing precision and power of instruments for measurement, and for manipulation—artifacts of modern technology—is indeed awesome.

There's no denying the fascination we feel watching a circus performer on a high wire, unprotected by a safety net, trusting the tensile strength of a thin steel wire and pitting her skill at maintaining almost perfect balance against the unrelenting force of gravity that threatens her with a quick, gruesome death for us to watch. That morbid instant doesn't happen often, but we all know it may be only a moment away, triggered by the slightest mishap. As spectacle, a shuttle launch is far more gripping, a firework of Olympian proportions, a prodigious technical feat with people riding the rocket into space and back—unless the morbid moment comes, as it did to Challenger at 11:39:12 a.m. Eastern Standard Time on January 28th.

Since that awesome moment,

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photo/NASA

thanks to the technology of television and satellite communications, untold millions of people have watched reruns of the fatal minute and twelve seconds from blastoff to explosion. The untimely death of sympathetic human beings, prime stuff of tragedy, came quickly and spectacularly to the astronauts aboard Challenger. But, assured President Reagan, this tragedy will not deter us from "our quest in space". For the anguished survivors bereaved in that terrible instant one feels only compassion, but other reactions are stirred as well.

Nationally, our thoughts and feelings are largely determined by what we know, and that in turn is mainly determined by the mass media. Imagine the results of a national poll that asked:

- 1. How many teams played in the Super Bowl in New Orleans? [2]
- 2. How many astronauts died in the Challenger explosion? [7]
- 3. How many Americans are homeless? [possibly over 3,000,000]

- 4. How many East Timorese did the Indonesians kill? [over 100,000]

Nearly everyone would know the first two answers. Most, though conscious of homelessness, wouldn't know of this estimate from a late 1984 Congressional report. The number has been growing steadily since then. And hardly anyone would have even heard of East Timor, let alone the ferocious war waged—with U.S. support—against its people.

Can it be that U.S.-supported killing of 100,000 East Timorese is so much less of a tragedy than the deaths of the seven astronauts that it warranted negligible media attention? By humane standards, of course not. By U.S. foreign policy and mass media standards, yes. East Timor is but an extreme example of the distortion of our perceptions nurtured by the mass media. In a recent article in the February/March *Utne Reader*, Noam

continued on page 31

The Dialectical Biologist

by Richard Levins and
Richard Lewontin
Harvard University Press
1985

reviewed by Michael Filisky

Can there be a Marxist science? This is the central question of Levins and Lewontin's book.

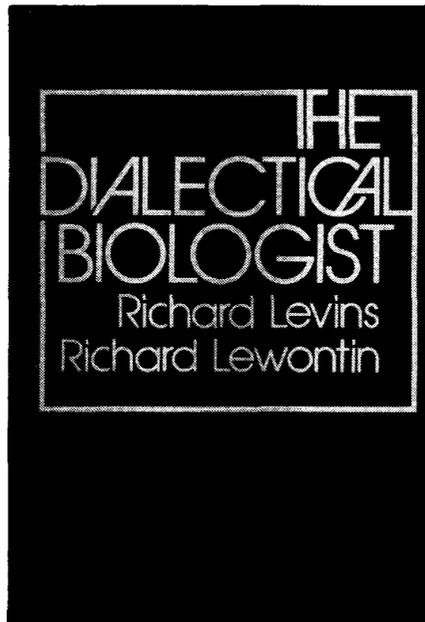
The answer the authors provide is a conditional "yes." If Marxism means a strict adherence to a party line, then a science based on it will probably fail. But if the approach is one of dialectics as pioneered by Marx and especially Engels, then a Marxist science can be a powerful tool for solving problems that have resisted the more traditional scientific method.

The Dialectical Biologist gathers together previously published essays of various lengths, subjects, and tones. Only the final conclusion was newly written for this volume. Most of the essays originally appeared in publications not widely read by biologists.

Since the essays are independent of one another, it is possible to skip around without sacrificing continuity. It would be a good idea for anyone needing a firmer understanding of the meaning of dialectics to start with the conclusion.

Levins and Lewontin offer dialectics as the alternative to Cartesian reductionism, which sees the world as made of parts with intrinsic properties that determine the nature

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"Organisms are both the subjects and objects of evolution."

of the wholes they make up. In contrast, dialectics is an interpenetration of part and whole. The properties of parts alter the nature of the whole and are themselves altered by being fragments of a totality. "Part makes whole and whole makes part," the authors explain.

Dialectics assumes all systems to be heterogeneous at every level. Rules derived from observations at one level of a system might not apply to any other level or to any other system. For example, the rules that apply to the workings of the endocrine system might not explain human social interactions. A reductionist biologist might start a study of some aspect of human behavior by assuming a hormonal cause and confine the search to correlations between blood hormone levels and behavior. The dialectical approach would look into social, developmental, dietary, and other environmental factors, as well as physiology. Most important, the dialectical biologist would avoid confusing correlation with causality.

In the authors' view, reductionism oversimplifies, extrapolating universal rules from limited observations. They claim this world view "captures a particularly impoverished shadow of the actual relations among

phenomena in the world, concerning itself only with the projections of multidimensional objects on fixed planes of low dimensionality.... Of course, some objects, like spheres, are the same in all projections, so the reductionist strategy sometimes succeeds."

The first two sections of *The Dialectical Biologist*, "On Evolution" and "On Analysis," seem to have been written primarily for specialists in evolution, ecology, and statistical analysis. They are far more technical in language and in detail than the final section, but no less dialectical in approach.

The three essays on evolution challenge the traditional belief that species evolve by solving problems posed by the environment. According to this view, environmental niches somehow predate the animals or plants that eventually fill them. In the dialectical view, individual living organisms are the parts and the environment is the whole. While it is true that species of animals and plants do change with time to better fit their environments, they also alter the environment as they change. Oxygen fills the atmosphere because green plants put it there. Evolution is a dynamic process resulting from the interpenetration

of the individual and the environment, where each individual is also part of every other individual's environment.

"On Analysis" contains both the heaviest and the lightest reading in the book. One essay, "Dialectics and Reductionism in Ecology," includes pages of equations that sent me back to my textbooks. Such advanced mathematics are required by the complicated nature of community ecology. As reward for working through this essay, the reader can enjoy "Isadore Nabi on the Tendencies of Motion", which is both a parody of a turgid scientific paper (conclusions: plants grow up, apples fall down, London is sinking, and drowning men move upward 3/7 of the time and downward 4/7 of the time) and an exchange of letters to the editor of *Nature* questioning the identity of the paper's author, one Isadore Nabi. Is this really a pseudonym for Lewontin and others or, as listed on page 3165 of *American Men and Women of Science*, a distinguished scientist from someplace called Cochabamba University?

Of the three sections of *The Dialectical Biologist*, the third, "Science as a Social Product and the Social Product of Science," is the most accessible and immediately useful to nonspecialists. It includes clear, insightful applications of the dialectical approach to the problems of health care, applied biology for the Third World, agricultural research, and the dangers of pesticides. In "The Commoditization of Science" the authors trace many of the negative social results of scientific research to the status of science in the West as a valuable (and profitable) commodity.

[The commoditization of science] stands between the powerful insights of science and corresponding advances in human welfare, often producing results that contradict the stated purposes. The continuation of hunger in the modern world is not the result of an intractable problem thwarting our best efforts to feed people. Rather, agriculture in the capitalist world is directly concerned with profit and only indirectly concerned with feeding people. Similarly, the

organization of health care is directly an economic enterprise and only secondarily influenced by people's health needs.

This section also includes a convincing argument against reductionist sociobiological explanations of human behavior. For Levins and Lewontin, the question of human nature is simply the wrong question. The incredible diversity of human behavior argues against a search for some uniform and universal human way of being. The search for this uniformity reminds the authors of some pre-Darwinian Platonic idealism, in which differences among individuals are subordinated to some ideal form which characterizes the essence of human nature.

Perhaps the finest essay in *The Dialectical Biologist*, "The Problem of Lysenkoism," contains, in less than 34 pages, a history lesson, a clear political analysis, a firm warning against the dangers of dogmatism and a note of hope for a rationally political science. It is the story of T. D. Lysenko, the Soviet plant breeder whose belief in the inheritance of acquired characteristics contradicted the emerging genetic theory. Lysenko's belief became policy under Stalin. After detailing some of the conditions that led to the rise of Lysenkoism and warning against such abuses of science in the name of politics, the authors go on to describe positive ways that politics can influence science. One major success is the field of community ecology, a complex systems analysis that resulted from a conscious application of the Marxist world view.

The weakness of *The Dialectical Biologist* is that the ideas that unify the essays into a solid and useful book are not always apparent. A hostile reader might feel that the raison d'être of this volume is merely the recycling by Levins and Lewontin of old work for new royalties. But thoughtful people interested in the problems that arise when science and politics meet (or fail to meet) will see the authors' point and be grateful that these essays have been brought together in a single volume.

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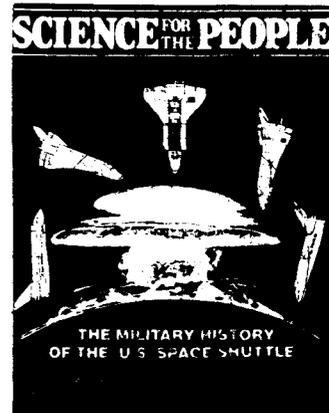
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World Population and Development

Gigi M. Berardi, editor
Rowman & Allanheld, 1985

The problem of hunger occupies the public's attention with renewed importance, due in part to the famine conditions in Africa and the celebrity relief campaigns in Britain and the U.S. Closer to home, the economic crisis in the farming states and a growing malnourished, homeless class in our cities have shown that hunger is not simply a function of drought, primitive technology or overcentralized planning (though these may play a part). Hunger is primarily a problem of power. Its complexities are examined from a wide range of perspectives in Gigi Berardi's anthology.

The perspectives vary widely in political and scientific content. George F. Will starts off the volume with some simplistic observations on the need for increased technological efficiency, while Cornell historian Walter Lafeber ends the book with a plea for the inalienable rights of people in Central America to free themselves from foreign domination, as the U.S. did over two hundred years ago. In between, such writers as Lester Brown, Susan George, Frances Moore Lappe and Jane Brody explore how and why hunger has persisted in the face of rapid technical innovation.

The number of authors and enormity of the topic precludes any definitive answers. It also makes the book a slow read; the variety of sources, from op-ed columns to detailed studies with charts and graphs, keeps the tone of the anthology constantly shifting. The editor's brief introductions to each chapter lend some continuity. Despite the divergence of views in the book, it portrays a clear

need for solutions that move beyond the purely technological. —Gary Keenan

High Tech and Toxics A Guide for Local Communities

by Susan Sherry

Conference on Alternative State and Local Policies, 2000 Florida Ave., NW, Washington, DC 20009, \$19.95 (\$39.95 for businesses) plus 10% postage/handling, 1986

Conceived as a practical guide for local officials and community leaders, this 470-page book offers new solutions for the emerging problems of chemical pollution by high-tech industries. "All of us—citizens, government, and industry alike, and especially the local communities that may be affected—must seek solutions to this problem," says author Susan Sherry.

Following the economic promise of high tech, 37 states now house clusters of high-tech industries. The largest centers are in California, Massachusetts, Connecticut, Florida, Illinois, New Jersey, New York, Ohio, Pennsylvania, North Carolina, and Texas. California's Silicon Valley, home to the largest concentration of high-tech firms in the country, also contains more Superfund hazardous waste sites than any other area in the U.S. Eighteen of its 19 Superfund sites are high-tech related.

High tech isn't clean or risk-free. Vast quantities of hazardous substances—solvents, acids, bases, metals, and gases—are consumed and wastes generated in the manufacture of semiconductors, computers, scientific instruments, and communications equipment. Hazardous chemicals have reached the air, soil, and water supplies through leakage, discharge, disposal, and fires.

The findings and

recommendations presented in *High Tech Hazards* resulted from a two-year study by over a dozen environmental health scientists, chemical engineers, physicians, policy analysts, and researchers. The author and California's Golden Empire Health Planning Center are available to assist communities in developing local toxics policies. Call 916/731-5050 for more information.

X-Rays Health Effects of Common Exams

John W. Gofman and Egan O'Connor
Sierra Club Books, 1985

Gofman and O'Connor have compiled a resource for both patient and physician on the varieties of risk encountered in specific x-ray tests. They examine a number of myths about x-ray diagnosis, establishing at the outset of the book that they believe such procedures have great value, though the value is not their focus.

The authors do present much information on risks, with chapters devoted to ways of minimizing risks. There are tables of doses from common exams such as dental x-rays, mammographies and angiographies. While the tables are highly technical, the lay reader is given detailed instructions on their use. Children's risk factors are also covered at length, as the young are more vulnerable to the hazards of overexposure.

Risk can be further compounded by the type of exam. For example, the lifetime chance of getting cancer resulting from one full-mouth dental exam at age ten is 1 in 900 for males, 1 in 1400 for females. This is a higher risk than a full skull exam.

Gofman and O'Connor have given parents, and all

prospective patients, the information they need to ask appropriate questions when a physician calls for x-ray exams. Their contribution to increasing doctor-patient communication and accountability may prove invaluable. The authors calculate that up to 51,000 cancers could be prevented per year simply by lowering x-ray doses by 2/3, which should still yield good diagnoses. Their views deserve wide consideration and debate. —GK

AIDS in the Mind of America

by Dennis Altman

Anchor Press/Doubleday, 1986

How does one live in the midst of an epidemic? For all too many of us, the answer lies in building defenses that isolate us from any sense of responsibility or participation. We create a category, "victim", and focus on how those so characterized deviate from ourselves or our idea of normal.

If we see an epidemic in terms of retribution for deviation, the "wages of sin", whether the sin is drug use or sodomy or darker skin, how does that affect the public commitment to curing the epidemic? Do we act out of a compassion tainted with smug superiority? Do we use the tragic circumstances to question our culture's tendency to push minorities into social, economic and intellectual ghettoes, then blame the ghetto dwellers for the problems they encounter?

Dennis Altman's *AIDS in the Mind of America* confronts these and other difficult, sometimes ambiguous issues around Acquired Immune Deficiency Syndrome. A professor of political science in Australia, and a gay writer with substantial connections to the gay activist community,

Altman combines a rational, perceptive analysis of the epidemic's impact internationally with a moving account of what AIDS means to him: the friends lost, questions of personal risk, reconsideration of sexual and emotional needs.

While Altman clearly recognizes that AIDS is not a "gay disease", he traces the history of gayness itself as disease, an idea that still holds sway in much of society despite the American Medical Association's 1973 decision to stop classifying homosexuality as illness. Thus, the developing conception of AIDS, which Altman describes with great insight, reflects conscious and unconscious biases in research, medicine, and perhaps most notably, the media.

In Canada, doctors involved in the early stages of recognizing the appearance of a new syndrome were noting the "homosexual and bisexual practices" of patients. In the U.S., the preferred description was "homosexual and bisexual men". The difference is subtle, but it was a factor in the course of public reaction to the new disease. These dying people were perceived as sick because of who they were, not what they did.

Altman puts in historical perspective the cynical exploitation of fears in the mass media, most notoriously exemplified by *Life Magazine's* "Now No One is Safe" cover story last year. He recounts medieval fears about homosexuality's link to the plague and the similarity of reactions to the appearance (or recognition) of syphilis in Europe in the 16th century.

The cure for AIDS may very well be years away. But we need another healing, in the mind of America as much as the body. Altman's book is a good place to start.

—Gary Keenan

Chomsky cites example after example of deliberate omissions and/or distortions, consistent with U.S. foreign policy, committed by the *New York Times*,—not the least respectable daily.

It is not only the news media, but the entire dominant cultural and ideological milieu that threatens the wisdom of our collective national judgments. Again and again, one hears the theme of technological rescue. The most blatant, absurd, and inhumane example is that space research will make human survival possible, not on earth where it is already hopeless, but in space colonies, which will be engineered for longterm survival.

The idea of technological rescue grows out of: (1) a realization of the power of science and technology, (2) an arrogance in manipulating the natural world—supposedly without disaster—because of that sense of power, and (3) a false belief that social and economic problems can be solved technically, that society can be engineered.

Our very consciousness, our ability as a people to choose wisely what to think about is being eroded. After each dramatic tragedy or near tragedy—Three Mile Island, Bhopal, Seveso, Challenger—massive media coverage directs the national consciousness to focus on some small problem: a malfunctioning valve, a gauge that failed to register, a rubber seal that became too cold to retain its flexibility, an easily comprehensible problem.

Millions of school children are being conditioned to aspire to be astronauts. How easy it will be for many of them to accept the idea of survival-in-space, and to dismiss even the possibility of making the Earth a good habitat. The choice of Christa McAuliffe, an attractive schoolteacher, was far from innocent.

The real tragedy of Challenger is not the loss of life in its explosion, terrible though that is, but that it is widely perceived as tragedy and is used to obscure our perception of what the world might be if human intelligence and compassion were directed to solving social problems. How many of us know the number of homeless, hungry, destitute people who live within a ten-mile radius of us?

Seabrook

Don't Let Them Flip the Switch

by Sharon Tracy

Greenfield, Massachusetts

The Seabrook, New Hampshire nuclear power plant is scheduled to switch on by October 31.

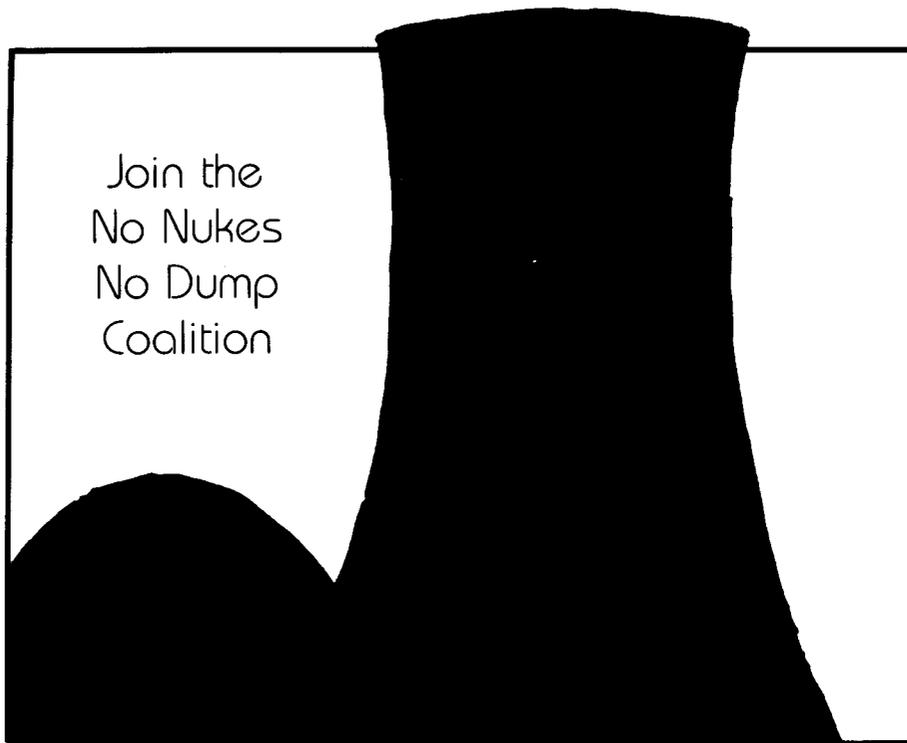
Construction is more than 95% complete. The first load of nuclear fuel arrived at the site on February 5, and loading is planned for this June. But cost overruns—from a \$1 billion estimate for two plants to current \$4.5 billion estimates to complete only one—and local resistance to emergency evacuation plan approval will delay startup of the Seabrook nuke.

Many people believe the nuke is unsafe and, if activated, could destroy New England's east coast. The New Hampshire Clamshell, an opponent since 1976, is calling on people from New England in an urgent effort to prevent the nuke's activation. Their goal is to create a political climate which, in concert with the efforts of other organizations, individuals, and elected officials, will make it impossible to turn on the nuke.

One new element in the political and nuclear equation is the selection of southwest New Hampshire as a potential disposal site for highly radioactive commercial and military nuclear waste. Even though Governor Sununu, along with almost everyone else in New Hampshire, opposes the dump, he and his business and political cronies still want to start up the Seabrook nuke.

To help business and government officials understand the connection between the generation of radioactive waste at the nuclear plant and the need to dispose of that waste, citizens and local officials are

Sharon Tracy edited the Clamshell News and River Valley Voice, and is an organizer in the environmental movement.



applying some pressure. Since New Hampshire has no statewide referendum, local town warrant articles opposing both production and disposal of nuclear waste will be voted on throughout the state early this spring. Warrant supporters contend that if New Hampshire turns on the nuke, the state's position in refusing the dump will be seriously weakened, since Seabrook would be the state's only producer of high-level radioactive waste.

Other environmental hazards are on Seabrook's horizon. The ocean will certainly be polluted in three different ways: radioactively, chemically, and thermally. Radioactive releases from the plant, even if kept within the absurdly high limits set by the Nuclear Regulatory Commission (NRC), will creep into the food chain, as they have at other oceanside nukes. This will damage the livelihoods of those who fish for a living and the health of those who eat the

fish.

Thermal pollution will also harm the ocean environment. The nuke is supposed to be cooled with ocean water that's piped back into the sea an average of 39 degrees warmer, changing the ocean ecology. And to kill the algae encouraged by the warm water in the cooling tunnels, six million gallons of chlorine will be flushed through them constantly. Claiming that these pollutants pose no environmental hazard, the NRC recently granted the request for a speedy licensing process from Public Service Company (PSCo), owners of the nuke.

Before licensing, federal authorities must approve evacuation plans for all towns within a 10-mile radius of the Seabrook plant, and PSCo must stage a full-scale emergency drill to test the plans. Governor Sununu upset residents of the 17 New Hampshire towns in the evacuation zone when he approved PSCo's

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CONTACTS

proposed plan and sent it to the Federal Emergency Planning Administration without allowing those towns to assess the evacuation plans themselves. The towns have refused to participate in the drills and will continue to challenge Sununu's actions.

In Massachusetts, the six towns in the evacuation zone did have a say. Newburyport and Amesbury refused to cooperate with PSCo's plans. Massachusetts officials did not submit an evacuation proposal to the federal government, scrubbing PSCo's evacuation drill on February 26.

The state has not said when, if ever, it will participate in such a test. According to the *Boston Globe*, the Massachusetts Attorney General's Office recommended that the state seek a commitment from Seabrook's owners to protect summertime beach populations from a possible accident, either by shutting down the plant in the summer or by providing shelters. The Seabrook plant can't receive an operating license without the approval of Massachusetts.

Massachusetts has another leverage to prevent turning on Seabrook's switch. The high-level nuclear waste dump proposed for southwest New Hampshire is only 25 miles from the Quabbin Reservoir, Boston's water supply, and the Connecticut River. Since seepage is common at nuclear waste dumps—ask folks in Hanford, Washington and West Valley, New York—a lot of people will be endangered by the dump. Ten truckloads a day of high-level waste, over 3,000 each year, will travel New England highways. Without the Seabrook nuke, the case for a New Hampshire dumpsite will be much weaker.

Now is the time to prevent loading and activation of the Seabrook nuke, and siting of the high-level waste dump. Join the Clamshell Alliance at a rally on April 12, 1986 at New Hampshire's Hampton Beach State Park and say No Nukes, No Dump. Organizations are invited to cosponsor this event. Time is short; act now. Contact the Clamshell Alliance at Box 734, Concord, NH 03301, or call 603/224-4163.



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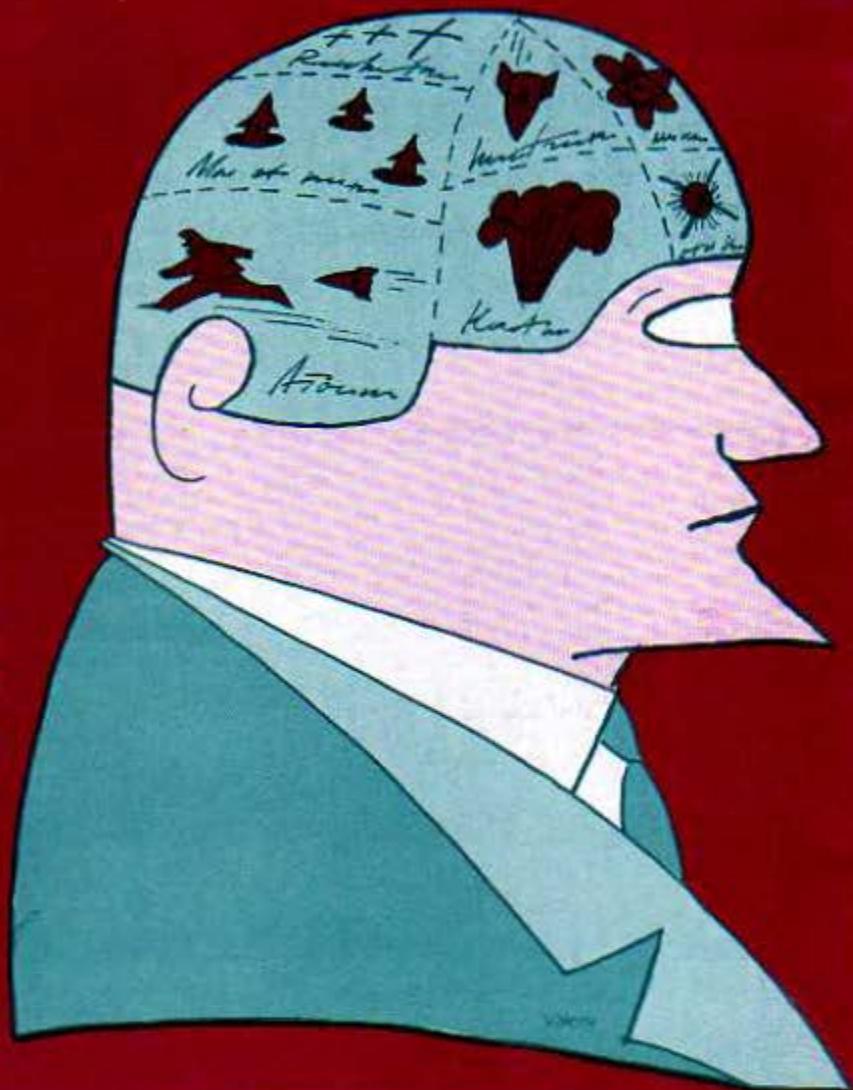
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