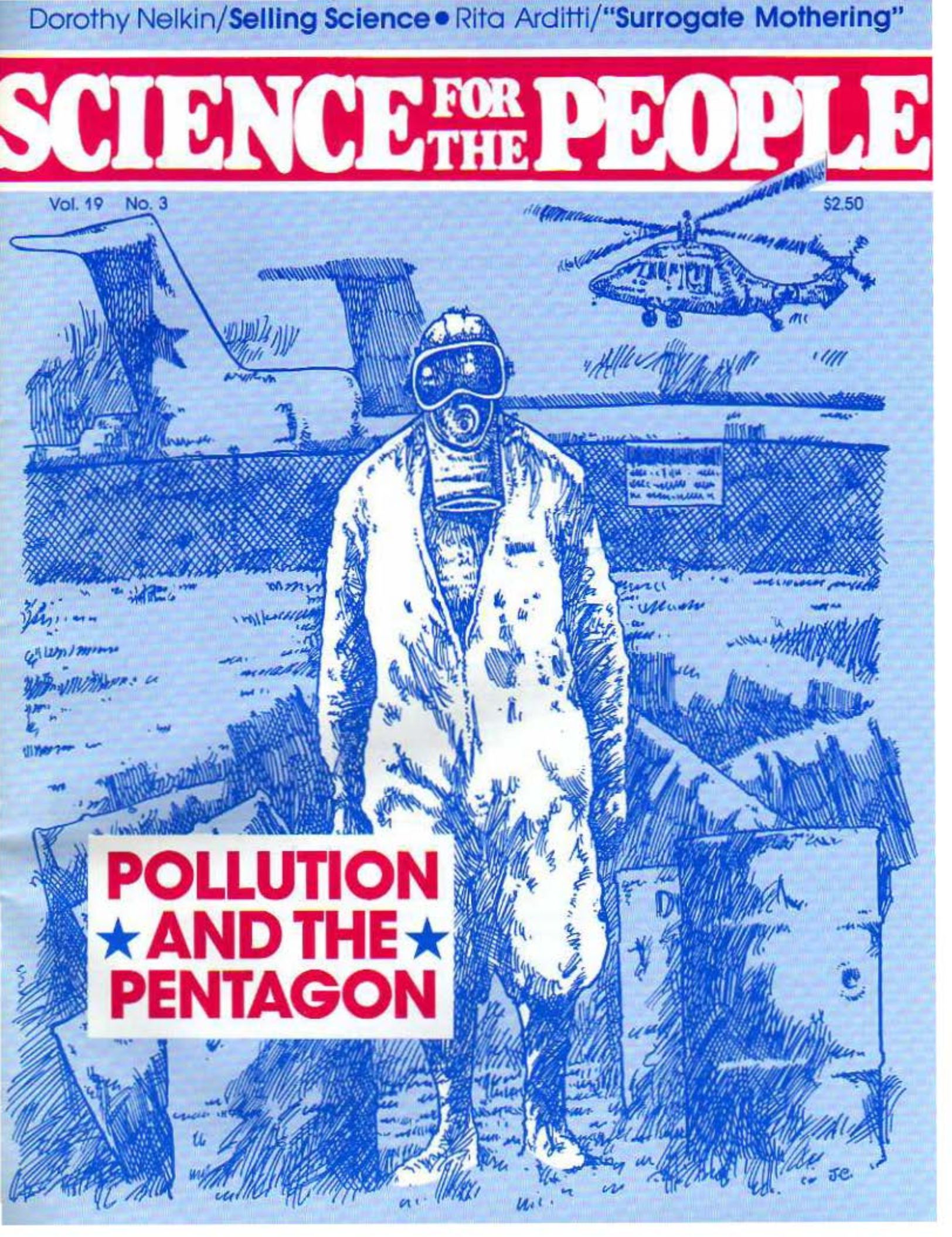
Dorothy Nelkin/**Selling Science** • Rita Arditti/**"Surrogate Mothering"**

SCIENCE FOR THE PEOPLE

Vol. 19 No. 3

$2.50



POLLUTION ★AND THE★ PENTAGON

Letters

Toxic Resistance

Dear SftP:

You may have read of the trial in Barnstable, Massachusetts of Dr. Joel Feigenbaum, a professor of physics at Cape Cod Community College, one of thirty-two people arrested for disorderly conduct while engaging in an act of civil disobedience at the Otis Air/Camp Edwards National Guard Base last May. They were protesting the contamination of Cape Cod air and water by chemical dumping and burning at the military base, and the training of Green Berets there for missions in Central America. The action was part of a demonstration sponsored by the Boston and Cape Cod chapters of the Pledge of Resistance.

Dr. Feigenbaum was convicted and sentenced to two months in prison. The harshness of the sentence, together with the fact that charges were dropped against all the other participants who committed the same "crime", suggests that Dr. Feigenbaum is being punished not for what he did, but for his history of outspoken political activism on Cape Cod. The case is currently under appeal on the grounds that the selective prosecution of Dr. Feigenbaum is improper, and that the sit-in at the base was a legitimate exercise in free speech.

This was the third such demonstration to occur at the base in recent years. It is important to realize that the previous demonstrations and Dr. Feigenbaum's ongoing work with the Upper Cape Concerned Citizens have been effective politically: Governor Dukakis has prohibited sending the Massachusetts National Guard to Honduras and has ordered an investigation of the health hazards by an independent consulting firm.

The case goes beyond the issue of Joel Feigenbaum's personal liberty. The selective prosecution and the severity of the sentence are indicative of a heightened level of repression against political activism. The judge stated specifically that he imposed a sentence which was intended to "act as a deterrent."

An estimated $7,000 to $10,000 is needed for the court appeal, including about $2,000 just for a transcript of the trial. Please consider a gift of $100 or $50 or whatever you can reasonably afford. Checks should be made out to Upper Cape Concerned Citizens and sent to Freddie Feigenbaum, 8 Pin Oak Drive, East Sandwich, MA 02537.

—Mel King, Noam Chomsky, Ruth Hubbard, Howard Zinn
Cambridge, Massachusetts

Psychological Warfare 101

Dear SftP:

I came across this announcement and thought it would be worth calling it to the attention of SftP readers. I think it would be worth attending and writing up the proceedings of these workshops:

"ANNOUNCEMENT OF AMERICAN PSYCHOLOGICAL ASSOCIATION DIVISION 19 (MILITARY PSYCHOLOGY) PRECONVENTION WORKSHOP

Division 19 will be sponsoring a 1-day workshop in New York City on 27 August 1987, the day before the 95th Annual Convention of the American Psychological Association commences. The workshop will be entitled 'Psychology in Support of National Security.'

A tentative list of workshop topics includes: (1) psychology of deterrence; (2) Strategic Defense Initiative: human factors and perceptions; (3) psychology of arms control negotiations and policies; (4) national security decision making and foreign policy in peace, crisis, and war; (5) antiterrorism and counterterrorism; (6) international conflict management and resolution; (7) psychological contributions to personnel, physical, and communications security; (8) reliability and validity issues in polygraph research; (9) torture: psychological effects, abuses, prevention, and treatment; (10) psychology of low intensity conflict; and (11) psychology of international diplomacy, foreign policy, and political media.

Those who wish to participate as instructors in the workshop should contact Major (Dr.) Richard W. Bloom, OJCS/J-33 POD, The Pentagon, Washington, DC 20301, (202) 695-5080. Please contact colleagues and students about the upcoming event."

—Bart Meyers
Brooklyn College/CUNY

SCIENCE FOR THE PEOPLE

Editor
Leslie Fraser

Publisher
Gary Keenan

Designer
David Gerratt

Cover
Joe Corrao

Art and Photos
Mara Loft, David Keith, John Klossner, Paul Valerry

Editorial Committee
Roger Felix, Leslie Fraser, Gary Marchant, Stephanie Pollack, Joseph Regna, Seth Shulman, Mike Wold

Book Review Editor
Joseph Alper

Material Requests
Jim Barton

Outreach Coordinator
Jon Beckwith

Fundraising Coordinator
Gerry Waneck

Editorial Advisory Board
Joseph Alper, Rita Arditti, Jon Beckwith, Philip L. Bereano, Edith Brickman, Stephen Chorover, Fran Conrad, Eric Entemann, Roslyn Feldberg, Ross Feldberg, Marilyn Frankenstein, Douglas Futyama, Ted Goldfarb, Rae Goodell, Stephen Jay Gould, David Himmelstein, Eric Holtzman, Ruth Hubbard, David Kahn, Charles Koplik, Richard Levins, Richard Lewontin, Karen Messing, Frank Mirer, David Noble, Richard Novick, Connie Phillips, Alvin F. Poussaint, Stephen Risch, Richard Rosen, Virginia Schaefer, Scott Schneider, Miriam Struck, Sue Tafler, Michael Tanzer, Scott Thacher, John Vandermeer, Gerry Waneck, Joseph Weizenbaum, Sandy Wiper, Steffie Woolhandler

Printing
Rowley Printing, 395 Main Street, Rowley, MA 01969

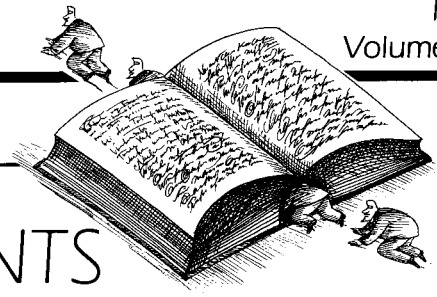
SUBSCRIPTIONS: U.S. one year/six issues: $15. Foreign rate: $21. U.S. libraries/institutions: $24. Foreign libraries: $30. Member subscriptions (includes the magazine, our newsletter and other communications): $30. Foreign subscribers must remit in U.S. currency, with either an International Money Order or a check drawn on a U.S. bank.

SCIENCE FOR THE PEOPLE is available to bookstores on consignment from the publisher or through Carrier Pigeon Distributors, Box 2783, Boston, MA 02208. The magazine is available in microform from University Microfilms, 300 N. Zeeb Rd., Ann Arbor, MI 48106. Science for the People is indexed in Alternative Press Index, Box 7229, Baltimore, MD 21218.

SCIENCE FOR THE PEOPLE (ISSN 0048-9662) is published bimonthly by the Science Resource Center, Inc., a nonprofit corporation at 897 Main St., Cambridge, MA 02139, telephone 617/547-0370. Edited and produced by the national organization of Science for the People. We offer a progressive view of science and technology. Articles, letters, reviews, newsnotes, photos, and art work are welcome. Please send double-spaced, typed manuscripts, on Wordstar IBM-compatible disks if possible. Unless otherwise noted, all material copyright 1987 by Science for the People.

SCIENCE FOR THE PEOPLE

May/June 1987
Volume 19, Number 3



CONTENTS

Newsnotes

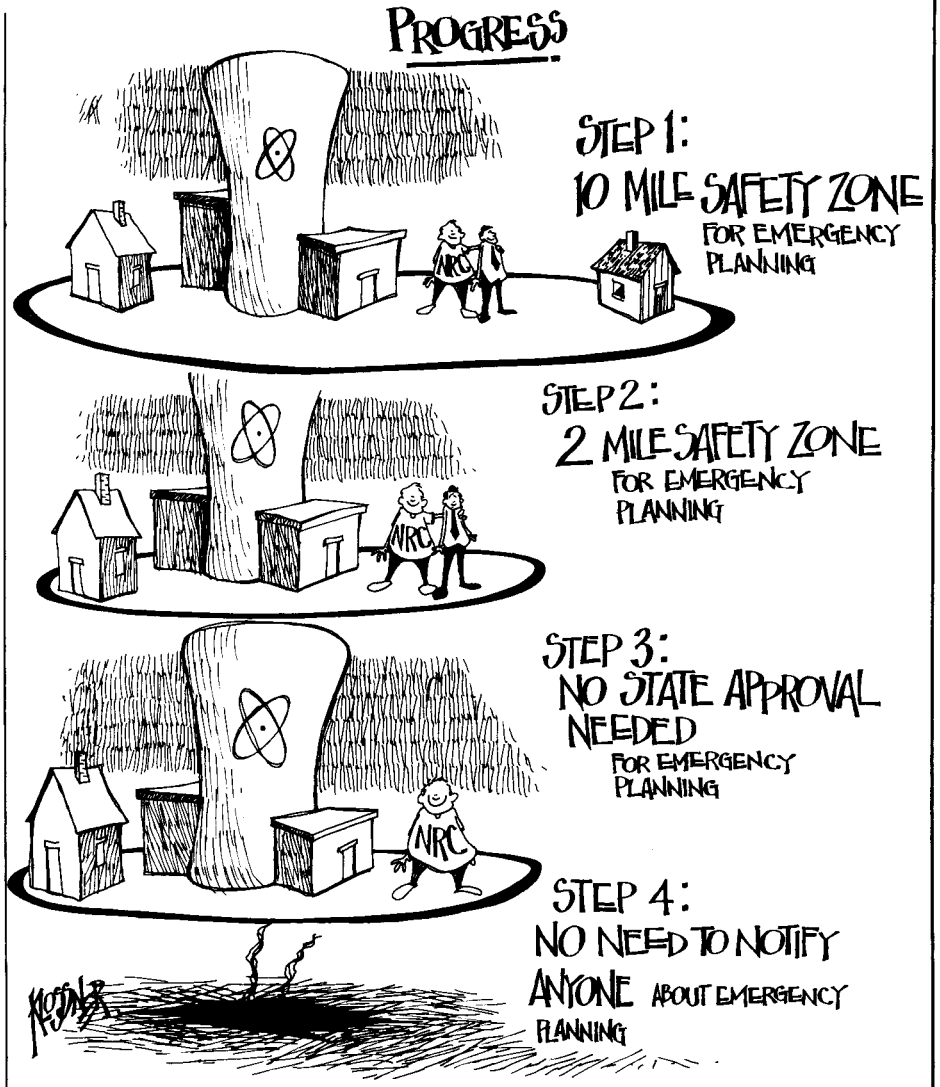
SHRINKING EMERGENCY ZONES

The owners of the Seabrook nuclear power plant, using extremely weak arguments that predate the Three Mile Island nuclear plant accident and the nuclear reactor explosion at the Chernobyl complex in the USSR, have applied for an exemption from the Nuclear Regulatory Commission (NRC) requirement for a 10-mile Emergency Planning Zone. The utility argues that the probability of a serious accident is so low that it's not necessary to make emergency plans beyond one mile. In the case of the Seabrook plant, that mile doesn't even reach to the utility site's main gate!

Motivation for the company's exemption from emergency planning zone regulations stems from citizen opposition to the Seabrook plant and fears about the health and environmental risks posed by the reactor. State and local officials, most notably Massachusetts Governor Michael Dukakis, have opposed the Seabrook plant's emergency plans, considering them inadequate for the summertime visitors who crowd the Massachusetts beaches and towns just a few miles from the plant. Local opposition to the emergency plans and evacuation procedures is seen as the last obstacle to licensing the Seabrook plant.

In response, the NRC has sided with the nuclear industry by offering to change its rules. In a desperate attempt to license nuclear power plants over state and local opposition, the NRC has proposed a fundamental change to its emergency evacuation planning regulations. The proposed rule, "Licensing of Nuclear Power Plants Where State and/or Local Governments Decline to Cooperate in Offsite Emergency Planning," filed on March 6, 1987, would allow the NRC to license reactors when state and local governments have failed to approve or refused to participate in the development of emergency evacuation plans.

The immediate benefactors of such a rule change would be the owners of the Seabrook nuclear plant, located on the New Hampshire seacoast bordering Massachusetts, and the Shoreham plant outside of New York City. Government officials in those areas believe that no effective emergency plans can be developed for the areas where the Seabrook and Shoreham reactors are sited. The NRC plainly admits that the rule change is motivated by "regulatory policy considerations" and not by new safety data.



The rule change may also provide a disincentive to utilities with operating nuclear plants to continue day-to-day cooperation with state officials and local communities. Why should they bother with the expense and planning involved in maintaining and updating emergency procedures if there's no penalty from the NRC for noncooperation? Some states, faced with fiscal deficits, may choose to opt out of emergency planning since the nuclear plant can continue to operate without their cooperation. The new rule may actually encourage the construction of new nuclear reactors, with the removal of state authority in emergency planning, which has become a key roadblock to licensing new plants.

—information from the Nuclear Information & Resource Service

IN CIGARETTES WE TRUST

To save taxpayers about $200,000 a year, the Federal Trade Commission announced, on Tax Day, that it would stop testing cigarettes for tar and nicotine. Instead, it will rely on data compiled by the tobacco industry. The FTC claims that its tests duplicated the information available from the tobacco companies.

Now that there's no federal watchdog to check their data, cigarette manufacturers can have a public relations picnic. They've already misused data by making smokers think that low tar and nicotine cigarettes are safer to smoke, according to Karen Monaco, a spokeswoman for the American Lung Association, who opposed the FTC's abdication of cigarette testing.

Newsnotes

UNFREEZING FROSTBAN

More than a year after open-air tests on a genetically altered bacterium, Frostban, were challenged by environmentalists because they violated Environmental Protection Agency (EPA) guidelines, the bacterium's owner received court approval in late April to release the new organism by spraying it on a field of strawberries. A California Superior Court and state Appeals Court ruling overturned environmentalists' demands for further laboratory testing.

Last April, the EPA fined Frostban's manufacturer, Advanced Genetic Sciences (AGS) of Oakland, California, for conducting an unauthorized open-air test of the altered bacteria and revoked their license to test the new organism outside of the laboratory. (See "Freeze on Frostban" in the May/June 1986 issue.)

The organism was designed to prevent frost damage by altering Pseudomonas bacteria so that it won't coat itself with a protein that encourages ice crystals to grow on plants. The ice-minus bacterium effectively lowers the temperature at which frost forms on certain plants.

Environmentalists tried to prevent the field test on many fronts: litigation against the company, monitoring of EPA compliance with biotechnology regulations and environmental impact assessments, public education, and direct intervention at the test sites. Monterey County officials in California, where the first authorized test was proposed, brought an injunction against the company's research last year, so AGS moved their tests to Contra Costa County, where they didn't face local government opposition.

Frostban's field test and environmental release leads the way for about 100 other genetically engineered organisms, still waiting their turn to be set loose. The experience with Frostban shows us that public health and safety concerns in biotechnology may not be protected—and might not even be addressed—through litigation.

BATTLING BALDNESS

"There's no time for a man to recover his hair that grows bald by nature." Thus spake the balding bard of Britain, William Shakespeare. Yet eternal truths of literature are never safe when confronted by the engines of science in the service of corporate profits. This was recently affirmed when a Food and Drug Administration advisory panel recommended that FDA approve Rogaine, a drug produced by the Upjohn Company to promote hair growth. In order to enhance sales—estimated to be $200 million annually—Upjohn has set up an organization in New York called HAIR, or Hair Awareness, Information and Research.

Company officials insist that the organization was formed to provide "good scientific background about hair growth and hair loss." But Sidney Wolfe of Ralph Nader's Public Citizen Health Research Group, which opposed the advisory panel's recommendation of Rogaine, said that Upjohn has been attempting to "make bald people feel terrible."

Baldness is not likely to be eliminated in the near future, even with the help of corporate attempts to stigmatize the bald: Rogaine is only expected to be effective for one in every five balding men. And besides, at a cost of between $600 and $1000 a year for life, it's not a treatment for everyone. And so the bald image of cultural celebrities such as Telly Savalas of "Kojak" fame and Yul Brynner, who played the stern monarch in "The King and I," are not yet destined to disappear. They will merely retreat before corporate-induced approbations that only the poor and the unlucky cannot avoid.

—Dan Grossman

NUCLEAR NIGHTMARE

The Nuclear Regulatory Commission shut down Pennsylvania's Peach Bottom nuclear power plant in late March, after finding that control room operators were often asleep on the job. The NRC investigated reports of frequent instances of sleeping and "inattention to duty" by operators. "At times during various shifts, in particular the 11 P.M. to 7 A.M. shift, one or more of the Peach Bottom operations control room staff have periodically slept or have been otherwise inattentive to license duties," according to the NRC's report.

The NRC shut down the plant, owned by the Philadelphia Electric Corporation, on March 31, one week after learning that the fate of the nuclear plant rested in the dreams of its control room operators. How's that for waking up and taking quick action?

SEND US A NOTE

Keep a lookout for news that might have missed the mainstream. Send us newsnotes about science and technology, and we'll extend your subscription six months for every item we print. Send to Newsnotes, Science for the People, 897 Main St., Cambridge, MA 02139. Newsnotes are compiled and edited by Leslie Fraser.

SCIENCE FOR SALE

Let's travel to a "brave new world of optimal health and vitality." So begins United Science of America Incorporated's (known as USA) hard-selling videotape promoting its "revolutionary" new vitamin supplement products. According to the tape, "advanced technology has given us gifts, but it has done so with a price tag: our air, water, and food are becoming contaminated." Even Ralph Nader couldn't add to the ills which USA's promotion department has discovered in everyday life.

The solution? A dietary program consisting of a Master Formula containing "a state-of-the-art integrated blend of 30 potent anti-oxidants;" a fiber bar containing a "revolutionary blend of 10 fibers;" and Formula Plus capsules containing fish oil and garlic. One calculation in *Science* magazine estimates that the total cost of drinking the formula, eating the bar, and consuming nine fish oil pills a day is about $135 per month.

Fad diet programs for the well-to-do are not new, but USA added a novel twist to an age-old tradition beginning with patent medicine. USA's founder, Robert Adler, established a "braintrust of scientists who have pioneered the most dramatic program in the history of nutritional science." Among the fifteen members of USA's original distinguished advisory board were two Nobel prize-winners, Andrew Schally of Tulane University and Julius Axelrod of the National Institute of Mental Health.

At least one attraction for the board was probably the research fund established by USA—in an area of science otherwise poorly funded. USA has disbursed $100,000 in grants; and seven out of twelve grants went to USA board members. But the catch was that these members were required to participate in USA's promotional campaign.

On video, amid gleaming scientific apparatus, scientists in white coats and computer technicians conduct experiments and analyze data. "USA computerized all pertinent medical research from 150 countries," boasts the tape. "For the first time, the information was assembled and analyzed." Furthermore, since neither you nor your family doctor have the time to sift through the many important research papers published every day, USA scientists "continually update formulas with the newest scientific data" for you.

In the field of nutrition, USA's program and the use of top-notch scientists to promote it caused a furor. Harvard nutritionist Frederick J. Stare told National Public Radio listeners, "I think it's the biggest current health scam that I know of." And some of USA's board members, finding the company's promotional style distasteful, have resigned. Harvard cardiologist Eugen Braunwald backed out, claiming that the firm did not want his advice, only his name. At least four of the board members resigned, including the two Nobel Laureates.

But after the company agreed that it would not use members' names without their express consent, those who remained appeared content. In the end, the tape's concluding remark, "No investment pays greater dividends than an investment in your health," summed up another chapter in the tale of science in the service of business. USA's sales of $27 million in its first six months of operation proves that point.

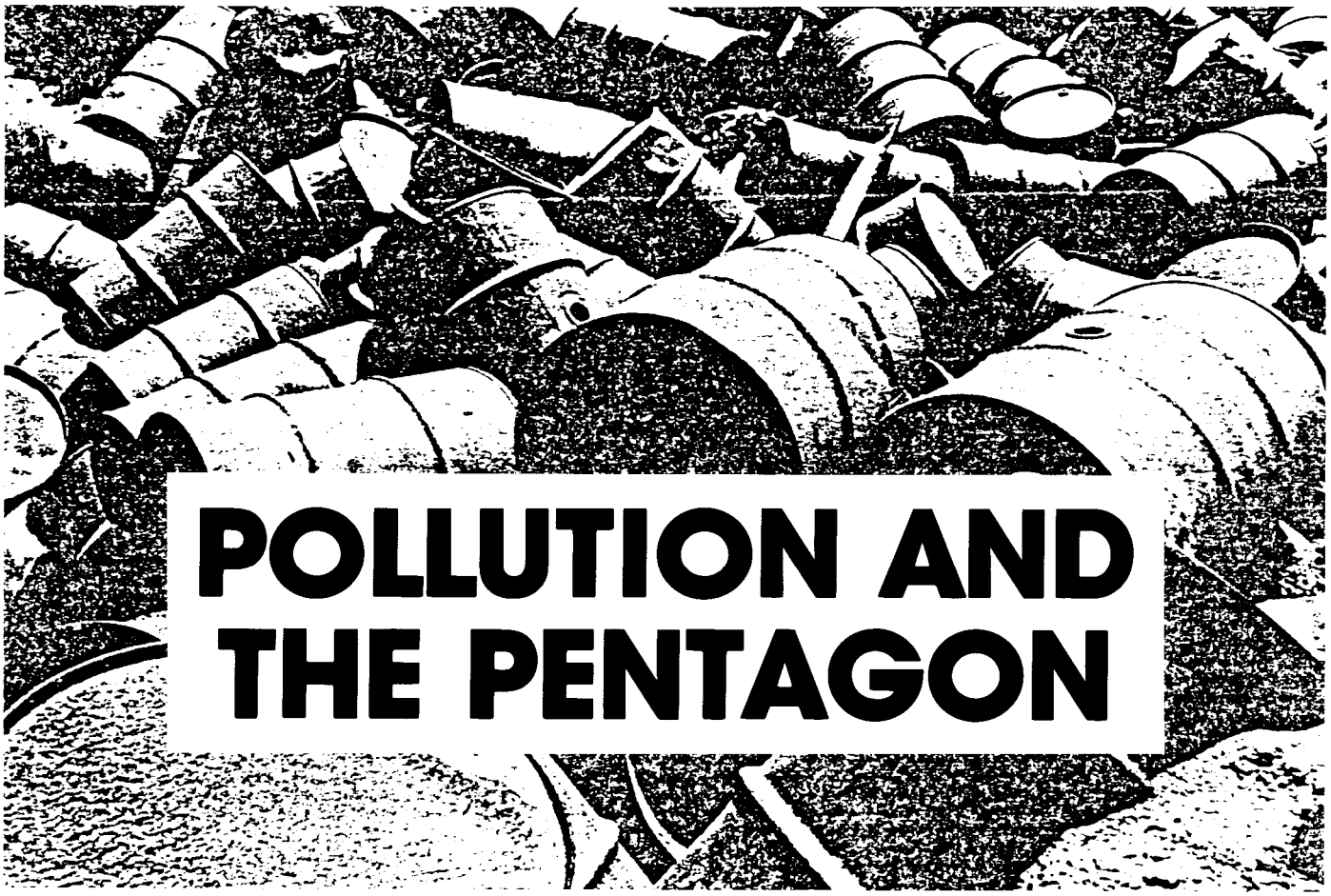
"Are you tired of limits on your income? Have your dreams outrun the reality of you job?" Another one of USA's innovations is to use "networking," based on the advice in the book *Megatrends,* to sell its products. Not quite as glamorous as it sounds, networking means turning your friends into employees and customers. New members of USA's sales force are asked to sell products and to recruit new members from their network of friends and relatives.

As an incentive, USA's business promotion tape reminds its viewers of the drawbacks of not being the boss: "As a salaried worker, no matter how good your pay or benefits, you're always at the mercy of a single employer. You could be dismissed at any time, and when that happens it's almost always a catastrophe." The pyramid created by the networking approach encourages you to exploit your friends, much as your boss used to exploit you.

But purchasing the USA "success system" is more than just joining a company. Vitamin sellers buy into a set of values as well—values which are mutually contradictory. The two USA videotapes, the first describing the hazards of daily life for vitamin consumers and the second declaiming the lucrative possibilities for vitamin pushers, contain conflicting messages. The video for vitamin sellers encourages its viewers to lead a lifestyle which is the cause of the environmental destruction condemned in the first video for vitamin consumers. The deadly link between consumption and the environmental ills of production, and between personal satisfaction and societal damage, is neglected.

Postscript: According to Robert J. Morin, a pathologist at Harbor University of the California Medical Center, USA filed for bankruptcy in late January. Morin, who was a board member and supported the company until it shut down, blames sensationalist media accounts of USA's vitamin program on its demise.

—Dan Grossman



POLLUTION AND THE PENTAGON

BY STEPHANIE POLLACK AND SETH SHULMAN

Who is the largest producer of toxic waste in the U.S.? If you guessed Union Carbide, Monsanto, or Exxon you are not even close. The United States military, which generated some 700,000 tons of toxics last year, actually produces more wastes than the top five corporate polluters put together.

What is considered the most toxic square mile on the earth? Love Canal, New York, Times Beach, Missouri, and Bhopal, India are all good guesses. But according to some, including technical advisor Michael E. Witt, who is involved in its cleanup, the Army's Rocky Mountain Arsenal wins this dubious distinction. This military arsenal on the outskirts of Denver, Colorado is home to decades' worth of accumulated byproducts from mustard gas, nerve gas, and pesticides like aldrin and dieldrin—all lying in unlined ponds and storage lagoons.

In fact, the military is responsible for

Stephanie Pollack is an environmental lawyer and a member of Science for the People's editorial committee. Seth Shulman is a freelance science writer and former editor of Science for the People.

★★★★★★★★★★★★★★★★★★★★

The War at Home

what are perhaps the most serious toxic hazards in this country. A full accounting would include radioactive and mixed radioactive/toxic wastes at Department of Energy nuclear weapons facilities, wastes produced by government-owned, contractor-operated facilities ("GOCOs"), wastes generated by defense contractors, and sites contaminated by military surplus items.

Military toxics stretch around the world to U.S. military bases and installations in other countries. And yet, nine years after President Carter launched the effort to identify and clean up military sites, the problem has barely begun to be addressed. The first few dozen Department of Defense facilities are only now being added to the Superfund's National Priorities List of the country's worst sites. A few environmental and citizens groups are beginning to address the problem. And the Environmental Protection Agency, for years reluctant to take action on toxic cases at military installations, is only now being forced into more substantive oversight of the problem.

Military hazardous waste sites are often ignored or overlooked. In part, this may be because people don't normally associate the U.S. military with the types of manufacturing and maintenance practices that produce large amounts of toxic waste. As Lois Gibbs, Love Canal activist and director of the Citizens' Clearinghouse for Hazardous Waste, has put it, "Few people realize their friendly, next-door military base is their not-so-friendly, next-door toxic dump site." Another problem is that military installations aren't "next door" to many people. Located on restricted, sometimes remote military installations, military toxic dumping practices are largely hidden from public scrutiny.

Such scrutiny is also made difficult by the military's general penchant for secrecy; until recently, the Pentagon has remained largely close-mouthed about its toxic problems. Efforts on the part of community groups and other federal agencies to get information on potential hazards affecting nearby residents are often met with

stonewalling and claims of "national security."

In addition, at least until recently, military personnel have been relatively oblivious to local and state government concerns about the air and groundwater contamination they have caused at some of the 874 bases around the U.S. Peter Shelley of the Conservation Law Foundation in Boston, who is suing the Otis Air Force Base on Cape Cod, Massachusetts, finds that "infected with the importance of their purpose, the military's fundamental mentality seems to be that they are simply not interested in mundane matters like environmental contamination."

Cape Cod residents, like citizens who live near military bases across the country, have been particularly frustrated by the military's unwillingness to rethink practices that are arguably illegal, certainly hazardous, seemingly unnecessary, and perhaps even frivolous. At Otis, the objections have focused on the National Guard's burning of propellant bags and other toxic chemicals on site, some of which have been shown to produce dioxin, and the dumping of literally millions of gallons of aviation fuel as a way to test planes' fuel ejectors. (For more information about the Otis base, see the accompanying sidebar.)

The standard military response to such objections is that it is impossible to modify their practices if they are not adaptable to battle conditions—the military must "train as we fight." Peter Shelley replies, "That sounds nifty, but Cape Cod isn't at war."

CLEANUP EFFORTS
"Mistakes Along the Learning Curve"

Although the Army began a program to identify and clean up hazardous wastes in 1975, serious efforts throughout the Defense Department did not begin until 1980, two years after former President Carter had issued an Executive Order requiring all federal agencies to comply with environmental laws. Even then, early efforts were marked by a combination of intransigence and incompetence.

A General Accounting Office review of the Pentagon's Installation Restoration Program conducted in 1985 found that many of the Army's early investigative efforts would have to be redone because they had either overlooked whole categories of bases –such as National Guard installations—or failed to look for specific toxic chemicals. Andrew Anderson, chief of the cleanup assessment program for the Army's Toxic and Hazardous Materials Agency, explained, "We were looking before there were standards for some of these compounds. So, yes, there have been mistakes as we have gone along the learning curve. A lot of our work was done before much was known about most

Photo/David Keith

OTIS BASE vs. CAPE COD RESIDENTS

A Community Fights Military Toxics

BY SETH SHULMAN

Life near a military base can be dangerous. Long before the residents of the five towns adjacent to the Massachusetts Military Reservation in western Cape Cod knew of any toxic waste problems at the base, they were galvanized into action when a neighborhood boy brought a live, unexploded grenade into school for "show and tell."

Because many portions of the vast military installation were without fences, this child had simply found the grenade on the beach. Alerted to the incident, parents questioned their children and found that many had grenade collections and played war games with stray munitions from the Air Force and National Guard base.

Residents were already upset at the nuisance posed by the military base, an installation which many residents saw as a large blemish on an otherwise idyllic, sandy retreat an hour outside of Boston. But they didn't realize that their water was being contaminated and their health threatened. It was enough that they had to contend with heavy artillery practice starting at 8 AM, and the existence of live, unexploded ordnance lying on the beach around the unfenced sections of the base. As one resident put it, "With artillery going off, machine guns, planes, helicopters—all just three miles away—it often feels like a war zone around here."

Realization of the environmental threat posed by the base didn't come until much later, and might not have come to light at all if not for a vigilant struggle on the part of community activists. The story of this region's fight to learn about military practices, and how they might affect the local environment, is one of perseverance and determination in the face of little cooperation and many denials from the military base, local and state officials, and the federal government.

In 1982, Joel and Freda Feigenbaum joined neighboring Cape Cod residents to form a community group, Upper Cape Concerned Citizens, primarily to deal with the noise pollution and potential dangers from artillery presented by the base. Five years later, the group has been the major force in determining that western Cape residents face the highest cancer rates in the state of Massachusetts, ranging from 36 to 79 percent above state averages for certain cancers. They have also been instrumental in linking those rates to practices at the base which, due to the geology of the region, have potentially contaminated the aquifer for all of Cape Cod.

"The cancer rates are horrendous and have been for as long as the state has been keeping records," says Joel Feigenbaum.

"Initially, the State Department of Health tried to explain away these higher rates as a factor of our lifestyles, but we demanded a close comparison between the lower Cape, where there is no proximity to a military base, and the four upper Cape towns that adjoin Otis. This data is still being gathered, but one of the worst aspects is that the burden of proof is always on us to show that their methodology is wrong."

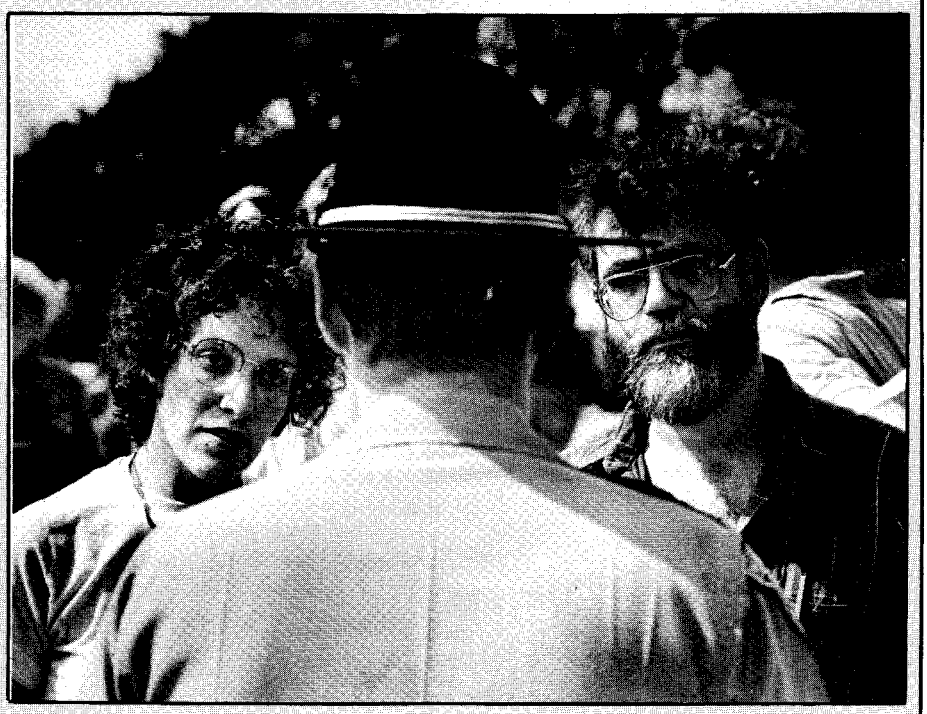
The latest report has indicated that personnel at the base, simply to test planes' automatic fuel release mechanisms, have dropped as many as six million gallons of aviation fuel, which have leached directly into the ground. The military has also introduced aromatic hydrocarbons into the environment—solvents like benzene and toluene, flammable wastes, lubrication fluids, diesel fluids, hydraulic fluids, transformer oils, and paint thinners. Many of these substances were "disposed of" by pouring them on the sand and igniting them, causing an increased hazard for nearby residents.

Upper Cape Concerned Citizens has tried many avenues in the fight to expose and curb practices at the base; almost all have met with resistance. When they first tried to raise their concerns with personnel from the military base at public meetings, they were told that only elected officials could speak. When they pressed for a health study, they were denied initially. When a preliminary health study was finally conducted, it showed elevated cancer rates. State public health officials tried to explain these cancers away as owing to "lifestyle factors" such as smoking and diet.

When the group appealed to the governor—now a presidential candidate—Michael Dukakis, they got no response. And when they held demonstrations, Joel Feigenbaum was singled out and sentenced to jail by a judge who acknowledged that he was making "an example" of Feigenbaum to discourage future actions. Feigenbaum even says that at times it has seemed "not like the community against the military, but more like the community against state government."

After learning in the summer of 1984 of a multimillion dollar Army plan to expand the base, residents, in conjunction with the Conservation Law Foundation, sued the National Guard (one of the main users of the base) in an effort to require an environmental impact statement. Since that time, after further evidence of health problems linked to military practices, these groups have sued for violation of EPA regulations at the base.

Fighting against practices at a military base, according to Feigenbaum, is "a problem as big as any." And as he points out, the difficulties are endemic. "Massachusetts is the paradigm of the liberal state," continues Feigenbaum. "This power of a bloated military budget is not just a Reagan problem, but one that is deeply woven into the fabric of our political economy. Still, we wouldn't have even gotten the awareness of the problem, and the health studies—we wouldn't have gotten this far if we hadn't kept at them."



Photo/David Keith

Freda and Joel Feigenbaum converse with a state trooper at the Massachusetts Military Reservation, an Air Force and National Guard base charged with causing environmental pollution and health problems.

of the substances we were finding."

The new information made a big difference. Trichloroethylene (TCE), one of the more important chemicals overlooked in early Army studies, was identified as a potential carcinogen by the National Institute of Occupational Safety and Health in 1978. A preliminary study of Fort Dix in New Jersey done in 1977 did not identify any hazardous waste sites. But a reevaluation conducted after the Army realized that TCE was a dangerous carcinogen caused some rethinking—in October 1984, the Environmental Protection Agency (EPA) proposed adding Fort Dix to the Superfund National Priorities List.

Another New Jersey potential Superfund site, the Lakehurst Naval Air Engineering Center, had been given the Department of Defense's Environmental Award for being the "cleanest" military installation in the country in 1981. Within three years, though, studies by the Navy and the EPA made the 1981 honor highly ironic. The studies identified 43 hazardous sites at this naval installation, ten of them serious enough to necessitate cleanup operations. Neither report was made public until late 1985.

Failure to go public with information about known contamination is another hallmark of the Pentagon. Many examples of military stonewalling were uncovered by the *Sacramento Bee* in an award-winning series of articles published in 1984. For example, offsite damage to crops was first noted at the Rocky Mountain Arsenal in Colorado in 1951, only nine years after it opened. But it took 27 years for actual cleanup to begin.

Officials at the Cornhusker Army Ammunition Plant in Nebraska first found contamination in off-site wells in 1982, but waited for almost a year to notify the public. By that time, over 900 wells had been contaminated or endangered. The Army's Andrew Anderson gave the *Sacramento Bee* an explanation for this one, too: "We just didn't want to excite the people out there until we knew what the readings were. We didn't want to get them overly anxious. It just took a long time. First, we sampled and found it (contamination) at the plant boundary. So we sampled again a mile further out, figuring out we would get beyond it. But we found it again. So we had to sample a third time before we got what we felt was accurate data."

The Pentagon and its allies at the Environmental Protection Agency claim that the military has learned from its past mistakes and is no longer withholding information about toxic pollution. Louis Mitani, the EPA regional project officer overseeing cleanup at McClellan Air Force Base, one of the longest-running cleanup efforts, notes that "lately McClellan has been pretty straightforward in presenting their data," including establishing a

DESTROYING A TOXIC ARSENAL

The Army's Chemical Weapons

BY DAN GROSSMAN

At eight sites around the United States, the Army is making presentations and requesting comments on its plan to destroy 30,000 tons of chemical weapons—including over half a million rockets filled with nerve gas—in huge incinerators. According to program head Brigadier General David Nydam, the community response has been good, and the program well accepted.

If all goes according to current plans, the Army will release a final draft of its Environmental Impact Statement at the end of this year, and will make a choice among three alternative plans under consideration within the following month. Construction of the "demilitarization" facilities will follow quickly, in order to meet the 1994 deadline mandated by Congress in 1985. But already, delays and growing community resistance threaten to disrupt the tight schedule.

The 1986 Department of Defense authorization bill contained a provision that the Army must destroy the obsolete chemical weapons stockpiled at eight bases by 1994. The weapons are stored at the Lexington-Blue Grass Depot in Kentucky, the Anniston Army Depot in Alabama, the Umatilla Depot in Oregon, the Tooele Army Depot in Utah, the Pueblo Depot in Colorado, the Newport Army Amunition Plant in Indiana, the Aberdeen Proving Ground in Maryland, and the Pine Bluff Arsenal in Arkansas. This legislative provision was linked to the Reagan administration's desire to begin production of a new generation of binary chemical weapons.

Since no chemical weapons have been manufactured in the U.S. since 1968, none of the stockpiles is less than eighteen years old, but some date back more than forty years. The inventory consists of a variety of nerve agents, as well as blister-causing mustard gas and Lewisite. It's stored in a multiplicity of forms, including artillery and mortar projectiles, land mines, rockets, and gravity bombs. The bulk of the chemical weapons—over 60 percent—are stored in one-ton steel containers.

The Army unveiled its proposal for a plan to meet the 1994 deadline at a cost of nearly $2 billion to Congress in March of 1986, and planned to complete the final Environmental Impact Statement (EIS) by the beginning of 1987. In July of 1986 the Army released a draft EIS.

John Klossner

Three alternatives to leaving the munitions as they are were considered: incineration on site at each of the eight depots where the weapons are stored; incineration at two regional incinerators, which would receive materials from the other six sites; and incineration of the entire stockpile at a single national facility. Calculations in the draft EIS determined that as many as 15,000 deaths could occur in a worst-case accident if either regional or national disposal centers were chosen, while a worst-case accident at an on-site disposal center could result in up to 1,500 deaths.

Although alternatives to on-site incineration were considered in the study, many observers believe that the choice of the on-site option is a foregone conclusion, because transportation of nerve gas and chemical weapons across the U.S. would face stiff opposition in the states that the shipments would pass through. At present, the program is already a year behind—with the final document now scheduled to be released in January of 1988—and the expected cost of the program has grown by about ten percent.

Meanwhile, opposition to the Army's plans is growing around the country. Activists in local communities and in Washington, D.C. are questioning whether or not the Army can safely dispose of the chemical weapons by 1994. Lois Gibbs, executive director of the Citizens' Clearinghouse for Hazardous Waste, thinks it is "ludicrous" to burn the weapons, and proposes a delay until a safer disposal method is found and thoroughly tested. She is creating a national coalition of opponents at the eight sites.

Two of the most vocal groups opposing on-site incineration have formed in Aberdeen, Maryland and Richmond, Kentucky. In Kentucky, concern has been so intense that meetings have consistently drawn 200 to 400 people and continued all night. According to Madison County, Kentucky resident and local Concerned Citizens member Betsy Ney, there is a lot of skepticism over the disposal plan in the community, despite a desire to trust the Army—widely considered a "good neighbor." Concerned Citizens is opposed to on-site destruction at the Blue Grass Depot, and is calling for the Army to postpone its plans until more research has been conducted on destruction techniques.

Local residents have good reason to doubt the Army's ability to conduct the operation safely. In 1979, 45 Madison County residents were hospitalized when a toxic cloud from the base blew

Dan Grossman is a student of science policy and a frequent contributor to Science for the People.

over their community. It took days before the Army stopped denying that it had caused the cloud. A later internal investigation revealed that "smokepots"—munitions produced in World War II to camouflage troop movements—were burned in violation of the Army's own guidelines and caused the toxic release.

In 1985, an explosion occurred at the Blue Grass base, destroying a shelter, called an igloo, in which munitions were stored on the base. Although chemical weapons are stored in the same type of shelters, fortunately this igloo did not contain chemical munitions.

An Army-sponsored trip to visit a pilot chemical weapons destruction facility in Tooele, Utah did little to quiet fears. Betsy Ney, who toured the Tooele facility, was surprised at how isolated the site was. "The farther we drove, the more I realized how dangerous it was," she recalled. "It was in the middle of nowhere!" In contrast, the Blue Grass depot is less than a mile from an elementary school, and nearly half-a-dozen schools are within a three-mile radius.

Members of Concerned Citizens for Maryland's Environment expressed fears similar to those of neighbors of the Blue Grass Depot. Linda Koplovitz, secretary of the group, complains that the draft Environmental Impact Statement did not address problems specific to individual sites—such as the high population density in Maryland. Her group is cautiously awaiting the results of further studies that will quantify the expected emissions of toxic agents from the incinerator's stacks.

But Concerned Citizens of Maryland is prepared to fight tooth and nail if these studies indicate a potential problem. The group proposed that the Army send the Aberdeen stockpile to an incinerator under construction on Johnston Atoll in the Pacific—an option which Brigadier General David Nydam claims is under consideration.

Lois Gibbs thinks that the Army is proceeding with a "crisis mentality" and that no alternative presently under consideration is safe. She fears that an Army divide-and-conquer strategy will force each community to fight to ship the agents to some other community. That is why she wants to postpone the 1994 deadline. But such a reevaluation of alternative disposal methods and community cooperation will require national organization and could involve legal and grassroots confrontations with the Army. A veteran of hazardous waste struggles, Gibbs notes, "Unless there is strong opposition, the Army will do whatever they choose."

newsletter to publicize the progress of their restoration efforts.

This openness is a far cry from the early days of handling their toxic problem at McClellan, a spate of blundering and noncooperation that has been called "the McClellan experience," because of the Air Force's reluctance to acknowledge and act upon the problem until after a stinging indictment by the General Accounting Office and heated comments from members of Congress, state and local politicians, and angry neighbors.

Carl J. Schafer, Jr., deputy assistant secretary of defense for the environment, prefers "to look to the future rather than focus on past communication problems." Until there is a consensus on cleanup needs, Schafer believes that the military "must be always dissatisfied with our efforts to communicate." He insists that there is "absolutely not" a need to keep information secret because it is classified or vital to national security. "Environmental compliance," Schafer acknowledges, "is not a national security matter."

Activists fighting the military on toxics problems are not so sanguine about the military's improved performance. Chuck Carpenter is the founder of Good Neighbors Against Toxics, or GNATs, a group formed in response to the contamination caused by the Cornhusker base in Nebraska. When the Army first tested residents' wells for contamination, Carpenter notes, they refused to make the results public—even to the people whose wells were tested. The base later tried to improve information flow by starting a newsletter, but according to Carpenter only one issue was sent out and "since then, nobody's received beans."

TOXICS
"An Integral Part of the Modern Military"

Despite the extent of the problem, military bases have rarely, if ever, drawn the same amount of fire from their neighbors as private hazardous waste sites. One reason may be that few people think of their friendly neighborhood military facility as a source of a myriad of toxic chemicals. Yet Peter Shelley from the Conservation Law Foundation points out, "Hazardous wastes are an integral part of the modern military."

Some of the toxics used by the military would be hazards for any private operation that performs large amounts of maintenance and cleaning of machinery and vehicles. Tanks and airplanes are washed with cleaning compounds and solvents that are drained onto the ground or into ditches. These solvents include TCE, the Air Force's widely used but carcinogenic "miracle solvent." Maintenance work, including painting and stripping, generates a variety of wastes, including waste oils, solvents, paint strippers, thinners, and sludge. Electroplating shops are used to repair metal parts, generating cyanides, acids and heavy metals.

Of course, some pollutants are unique to the military. Bombs are packed with chemicals such as RDX, an experimental explosive compound which has leached into the wells around the Cornhusker plant. The military has claimed the safe level of RDX in drinking water to be fifteen parts per billion (ppb), but 84 private wells in Grand Island, Nebraska were found to be contaminated with RDX in concentrations ranging from 50 to 400,000 ppb.

The production of weapons at all munitions plants has left a highly toxic legacy. Chemical weapons such as mustard gas and nerve gas have contaminated many of the sites at which they were produced, and will pose more hazards when the current stock of chemical weapons are destroyed, pursuant to a recent congressional directive (see the accompanying sidebar). Will Collette, of the Citizens Clearinghouse for Hazardous Waste, has called this prospect "the worst environmental problem we face in the U.S. today."

The use of munitions, not just their production, also produces toxic hazards. Nitrocellulose propellant bags used to fire artillery shells are regularly burned at bases around the country. And practice ranges, at which multiple rounds of weapons are fired, are contaminated by airborne pollutants such as lead.

Each service has its own particularly dangerous practices. The Army's worst contribution is from production and use of munitions. Electroplating and the use of lead-based paints on naval vessels create contamination by metals at Navy installations. The Air Force, perhaps the service with the worst environmental legacy, was a heavy user of TCE and other hazardous solvents. As a result, the Air Force has the most potentially hazardous sites—1,862, compared to 839 for the Army and 771 for the Navy. The Air Force also has the most sites known to require major cleanup actions—216, compared to 149 Army and 87 Navy sites.

SCOPE OF THE PROBLEM
The Military's Greatest Toxic Hits

Some of the most important unanswered questions about hazardous waste sites at Department of Defense (DOD) installations concern how many sites exist and how dangerous they are. The Pentagon's Installation Restoration Program was set up to answer those questions by identifying and evaluating past hazardous material disposal sites on DOD property, controlling the migration of hazardous contaminants, and controlling hazards to health or welfare which result from these past disposal operations.

In what was originally called Phase I of

the program, each potential site is the subject of a preliminary assessment and site investigation. When this assessment indicates that contamination may pose a threat to the environment or public health, a more detailed remedial Phase II investigation and feasibility study is conducted to confirm and quantify the contamination. Finally, a cleanup plan is designed and carried out.

The Pentagon program, like civilian efforts to inventory waste sites, is moving ahead slowly. The Department of Defense's last count, released in March 1987, identified 3,526 sites as needing more detailed Phase II studies. Although such studies are underway at 3,188 of these sites, they have been completed at only 696 sites. About two-thirds of the sites which have been completely assessed—462 —will require cleanup actions.

As if operating bases won't keep the Pentagon busy enough, the military has also begun to assess waste sites formerly owned or used by the DOD. This program, which is being run by the Army Corps of Engineers, has identified 7,000 potential sites on these properties, but only 1,163 have been fully investigated and another 491 have just had studies initiated. The current plan is to study about 500 such sites annually.

Despite the Defense Department's efforts to date, the problem is far from solved. No Phase II studies have begun at over 300 sites known to need such evaluations, and cleanup has been completed at less than 100 of the 462 sites deemed serious enough for remedial action.

Another problem is the reliability of the DOD's assessment as to how many of the 3,500 potentially hazardous sites at 529 military bases across the U.S. pose enough of a threat to warrant a Phase II evaluation. At the Otis Air Force Base on Cape Cod, for example, sixteen sites were initially identified as being worthy of Phase II investigation, but 43 sites were finally evaluated, and at least 23 will require cleanup.

Similar problems were documented by a 1985 General Accounting Office report and a 1984 investigation by the *Sacramento Bee*. The newspaper found that much of the Army's Phase I work had to be redone because officials had entirely overlooked hazards from solvents. The *Sacramento Bee* quoted a Navy official's estimate that they were "going back to about 90 percent of the facilities that we started at" to restudy various problems. Although most of the Pentagon's attention is now focused on Phase II and beyond, there is reason to wonder whether the problem of hazardous waste contamination from military installations isn't even more widespread than the military's sizable inventory indicates.

The Pentagon's Installation Restoration Program is separate from the more familiar

THE PENTAGON'S GREATEST HITS

Some Sites Proposed for the Superfund's National Priorities List

ROCKY MOUNTAIN ARSENAL
Adams County, Colorado

According to the Sacramento Bee, this site is quite likely "the nation's largest and oldest serious hazardous waste contamination site." It houses unlined ponds and storage lagoons used for byproducts from mustard gas, nerve gas, and pesticides like aldrin and dieldrin. The 25-acre site contains what the Sacramento Bee says "may be the most contaminated square mile on earth." The first off-site damage was documented in 1951. The Army tried to control contamination with a thin asphalt liner in the 1950s, but that cracked. They switched to injecting wastes deeply underground, but that caused earthquakes.

Sixteen million cubic yards of contaminated soil, spread among 88 different sites, are contaminated with up to 500 chemicals. The Installation Restoration Program identified 224 potential sites at Rocky Mountain, but cleanup has started at only eight sites. Restoration and cleanup may last until the year 2000, and cost estimates range from $500 million to $6 billion.

CORNHUSKER ARMY AMMUNITION PLANT
Hall County, Nebraska

Built in 1942, the plant loaded bombs, artillery shells, and mines for World War II and the Korean and Vietnam Wars. The Army asked for funds to build a toxic waste treatment plant there in 1970, because dumping was contaminating groundwater, but the request was dropped as Vietnam production dwindled. In the early 1980s, officials estimated that it would take a century for the plume of toxic substances, including an experimental explosive, to reach the town boundary of nearby Grand Island, Nebraska, but in May of 1982 contamination was found in wells off base.

Nothing was said to the public for almost a year, by which time 900 groundwater wells were contaminated or threatened. The plume has been detected more than three miles downstream from the base. Thirty out of 77 potential sites at the plant were found to pose a significant hazard and require cleanup.

McCLELLAN AIR FORCE BASE
Sacramento, California

This is a major aircraft repair base, containing nearly 70 hazardous waste disposal sites. Contamination was discovered in 1979, but civilian authorities were not notified. In 1982, the Air Force refused to give the state a report indicating that contamination had moved off the base. The report was released only after enforcement action was threatened. These incidents, plus congressional hearings and a critical General Accounting Office report, are now dubbed "the McClellan experience."

Officials assumed that a toxic plume on base was traveling only a few feet per year, but contamination has been found more than one mile away, which would indicate 1000 years of toxic migration at the officially projected rate. McClellan is expected to be ranked approximately 70th on the Superfund National Priorities List. Remedial action is underway at only two of 27 sites found to pose a significant hazard. Cleanup will take more than ten years and cost at least $60 million.

LAKEHURST NAVAL AIR ENGINEERING STATION
Lakehurst, New Jersey

Dumping was first disclosed by civilian employees in November of 1980. Illegal dumping continued for five years after it was banned by federal law. A November 1983 Environmental Protection Agency report found systemwide contamination of the nearby Cohansey Aquifer, from which most of southern New Jersey gets its potable water. A May 1984 Navy report estimated that at least 3.2 million gallons of contaminated fuels and other toxic substances had been dumped since the 1950s. Neither report was made public until August 1985, after information about the contaminated water had leaked to the press.

Installation Restoration Program studies have identified 43 hazardous waste sites at the base, at least ten of which pose serious threats. Municipal officials have closed one well due to benzene contamination. In 1981, Lakehurst had received the Department of Defense's Environmental Award as the cleanest military installation in the country.

—Stephanie Pollack

Superfund cleanup program, but the most hazardous Pentagon sites will soon join the worst privately owned sites on the Superfund National Priority List (NPL). To speed cleanup at privately owned sites, remedial actions at NPL sites can be initially financed from Superfund, with the federal government later suing responsible parties for reimbursement.

Because the 1980 Superfund law prohibited money from the fund to be spent on remedial actions at federal facilities, Department of Defense sites were not considered for the NPL until 1984. Then the EPA decided to include federal facilities "so as to focus public attention and appropriate resources on the most serious sites, even though they are not eligible for Fund-financed remedial action."

Since 1984, 48 federal facilities have been proposed for inclusion on the Superfund National Priorities List and 45 are Defense Department facilities. The Pentagon sites read like a list of the military's greatest toxic hits. Among the proposed sites that rank as being as dangerous as any in the top 250 sites on the private sector list are: the Rocky Mountain Arsenal in Colorado; McClellan Air Force Base in Sacramento, California; Aberdeen Proving Ground in Maryland; Cornhusker Army Ammunition Plant in Nebraska; Lakehurst Naval Air Engineering Station in New Jersey; and McChord Air Force Base in Tacoma, Washington. (See accompanying sidebar.)

Cleaning up these and other military hazardous waste sites will cost the Pentagon billions of dollars. The Department of Defense has allocated $327 million for installation restoration in fiscal year 1987, but estimates that cleanup costs over the next five to ten years will total five to ten billion dollars. By comparison, the Superfund program will spend $9 billion over a five-year period on private sites.

Even this enormous figure probably underestimates true costs, since the $5-10 billion figure has remained unchanged while the number of sites to clean up and cost estimates at specific sites have risen. Lee Herwig, the EPA's chief of federal facilities compliances, believes that "if EPA had to make the same kind of cost estimate as DOD, it would be much, much bigger."

CLEANUP
EPA's Not-So-New Approach

Although most federal and state environmental laws apply to federal facilities, the Department of Defense has been less than fastidious about complying with the law. The Pentagon is not the only villain in this story, however. The military's illegalities have been compounded and allowed to go uncorrected by the Environmental Protection Agency, which has long been reluctant to take enforcement action against its fellow federal agencies.

As two Air Force lawyers acknowledge in a recent law review article, legal reality differs from what seems to be their ideal. "One might expect that due to the unique status of the military in our society," they state, "environmental laws would, like the public, stop at the installation gate, leaving the Department of Defense free to concentrate on military matters." In fact, almost all state and federal environmental laws apply to military and other federal installations, as President Jimmy Carter made crystal clear in a 1978 Executive Order designed to reinforce the existing legal situation with respect to hazardous waste disposal.

Barbara Blum, then deputy administrator of the EPA, has explained that the purpose of the Executive Order was to reinforce existing statutory requirements at a time when the EPA was cracking down on private dump sites. "The idea was that if we were requiring all the private and community hazardous waste dumps to clean up their act," Blum claimed, "then we had better get our own house in order and do the same at all federal installations."

Unfortunately, President Carter's order allowed the Environmental Protection Agency to enforce federal environmental laws by negotiating "compliance agreements" with noncomplying agencies. Although this procedure was supposed to provide an additional enforcement mechanism to complement existing statutory procedures—including imposition of sanctions—in practice, non-negotiated enforcement actions by the EPA are rare. The Department of Justice, in fact, takes the position that the EPA cannot take unilateral enforcement action against a fellow federal agency.

Congress has not been satisfied with the EPA's conciliatory approach. It has been pushing the EPA to take more aggressive action against intransigent agencies. When Congress amended the Superfund law last fall, it added a new section on federal facilities designed to establish, once and for all, that the Defense Department and other agencies have to clean up their abandoned hazardous waste sites. Under the Superfund law, the EPA is responsible for ensuring that such cleanup is done quickly. When a government polluter and the Environmental Protection Agency disagree on the remedial actions to be taken, the EPA explicitly is given the final word.

For a while, the EPA seemed to have gotten the message. In January, word leaked out that the EPA would soon be adopting a "whole new approach" to federal facilities compliance. Under the new strategy, while compliance agreements would remain the preferred enforcement response, the EPA would issue unilateral administrative orders demanding compliance when agreement could not be reached in a timely manner or when public health or the environment were threatened with imminent and substantial harm from the violation.

The proposed new strategy has stalled because the Department of Justice and the Office of Management and Budget contest the EPA's assertion of authority to issue unilateral enforcement orders. The EPA's Lee Herwig notes that the EPA had only planned to use such authority "sparingly, because our other mechanisms are more than sufficient." He sees the "problem" of compliance orders as a red herring.

The Pentagon has allocated $327 million for cleaning up military hazardous waste sites in 1987, but estimates that costs over the next five to ten years will total five to ten billion dollars.

Others disagree. Gene Lucero, director of the EPA's Office of Waste Programs Enforcement, believes that "the threat of using administrative enforcement orders is a valuable tool." Dan Reicher of the Natural Resources Defense Council is worried that the Departments of Defense and Energy are using the Justice Department and OMB as their swords in the longstanding battle to rein in the EPA. Reicher believes that "there is still a great effort underway right now to yank the teeth out of EPA and the states with respect to enforcement at federal facilities."

The stalled enforcement policy is only one of the efforts to limit the EPA's authority to take enforcement action against agencies such as the Pentagon. Another is President Reagan's recent Executive Order implementing the Superfund amendments, which requires the concurrence of Attorney General Meese before the EPA can take enforcement actions against federal facilities.

Reagan's order also injects the Office of Management and Budget into the dispute resolution process for deciding what cleanup actions will be taken. Representative John Dingell sent a scathing letter to the EPA, criticizing the Executive Order, and

held hearings on the EPA's enforcement actions against federal facilities in April.

PROSPECTS FOR CHANGE
"Intellectual and Moral Outrage"

Efforts to spur cleanup of the Pentagon's toxic legacy and efforts to ensure that current and future practices are safer can come from a variety of directions: the military itself, the federal government, the states, and citizens' groups using grassroots organizing and legal tactics.

There are some indications that the military's attitude is improving. Pentagon environmental administrator Carl Schafer seems sincere in his desire to join with the federal, state, and local governments and citizens to reach a consensus on appropriate cleanup mechanisms. Barry Breen, former assistant to the general counsel for the Army, believes that "the military isn't anti-environment. It's just that the environment is one of dozens of concerns, and it's the institutional nature of the place that protecting the environment isn't what gets you promoted to General."

But it remains to be seen whether the changes are only in public relations, or mark a true change in military attitudes. Speaking about federal facilities in general, Philip Rarick, environment counsel for the National Association of Attorneys General, continues to believe that "in many cases, they're far worse environmental citizens than the private companies." And even if the Pentagon has experienced a change of heart, NRDC's Dan Reicher points out, "they cannot disconnect themselves from the legacy of the past."

Many see the Department of Defense and other agencies as well-intentioned but constrained by their size and institutional inefficiencies. The EPA's Lee Herwig believes that government agencies have the same compliance rate as private facilities, and it is the "lead time that hampers federal agencies, not some diabolical scheme on their part that they don't want to comply." Gene Lucero, another EPA administrator, argues that "the other dimension of DOD that just has to be acknowledged is that it's so damn big," and so it takes a long time for changes to filter through the ranks.

The military is not only big—it's slow. Barry Breen claims there is "no underestimating the petrification of the procurement process." These institutional constraints within the Pentagon highlight the need for the EPA to drop its historical reluctance and shoulder its responsibility for forcing fellow agencies to comply with environmental laws.

Congressional pressure is on the Environmental Protection Agency to make government agencies clean up and comply. Senator John Glenn's Committee on Government Affairs held hearings in March on problems at the Department of Energy's Fernald plant in Ohio. (See "A Win at the Nuclear Starting Gate," by Robert Alvarez, in the March/April 1987 issue of SftP.) At the hearings, Ohio Attorney General Anthony J. Celebrezze, Jr. emphasized the need for "strong environmental laws which are administered and enforced by a strong and independent regulatory agency."

Representative John Dingell's oversight and investigations subcommittee held hearings on the EPA's enforcement of environmental laws at federal facilities in late April. Perhaps the Environmental Protection Agency will finally be pressured to do its job.

A better hope may lie with state agencies, which do not have to worry about the politics of enforcing laws against fellow agencies. Philip Rarick has tracked efforts by Ohio, Maine, California, Colorado, Georgia, North Dakota, and Minnesota to take enforcement action against federal facilities and is convinced that "many states out there are willing to play the enforcer role." He muses, "EPA talks about being the gorilla in the closet for environmental violators—the states could be the gorilla in the closet for federal facilities." Even EPA's Lee Herwig agrees that, particularly for non-Superfund sites, "there is plenty of room for states and citizens to take action if they don't think cleanup is happening fast enough."

Dissatisfied with governmental protection from military hazards, some citizens are beginning to take legal action. Colorado residents living near the Rocky Mountain Arsenal received $7 million in the settlement of a lawsuit against the Army. A similar case is currently being brought against Corhusker Army Ammunition Plant in Nebraska. Other legal actions are pending against military installations around the country, using a variety of legal arguments. The Conservation Law Foundation's suit against Otis Air Force Base and Camp Edwards on Cape Cod, for instance, alleges a failure to prepare an Environmental Impact Statement and violations of federal hazardous waste law.

Some environmental groups have also begun to address the issue of military toxic waste. The Citizen's Clearinghouse for Hazardous Waste in Arlington, Virginia has been organizing around this issue for a long time and recently released a report entitled, "Dealing with Military Toxics." The Fund for Renewable Energy and the Environment is preparing a thirty-minute documentary on the subject of military toxics(see resource information at the end of this article). The National Resources Defense Council and the Government Accountability Project have tackled the problem of mixed radioactive and hazardous waste at Department of Energy facilities.

These efforts mark the beginning of what is likely to be a long battle against a large problem. There is plenty of room for national and local environmental groups—and peace and antimilitary groups—to take action against past and present hazardous waste threats posed by military installations. Individual citizens and grassroots groups can also play a key role, but they will need perseverence and technical assistance.

Joel Feigenbaum, a Cape Cod activist and scientist, believes that "if I hadn't been technically trained, we would never have known about many of the hazards." Feigenbaum warns that battling the military is frustrating and difficult, finding it "intellectually and morally outrageous that the burden of proof is always on us to show that their methodology is wrong." Such difficulties, however, also crop up in battles against civilian polluters.

As Will Collette of the Citizen's Clearinghouse writes, "Sure, it's a big problem, and sure, the military is a tough opponent. But so what? The grassroots movement against toxics takes on big Fortune 500 companies every day and wins."

MILITARY TOXICS RESOURCES

Citizens' Clearinghouse for Hazardous Waste
P.O. Box 926, Arlington, VA 22216
Contact: Will Collette (703) 276-7070

Tracks activities by grassroots groups around the U.S. and provides assistance to communities responding to military, government, and private sector hazards. They published the guidebook, "Dealing with Military Toxics."

Rural Coalition
2001 S St. N.W., Washington, DC 20009
Contact: Jodi Schwartz (202) 483-1500

Their Military Issues Task Force is putting together a resource guide and can provide technical assistance.

Conservation Law Foundation of New England
3 Joy St., Boston, MA 02108
Contact: Peter Shelley (617) 742-2540

Brought a lawsuit against the Otis Air Force Base and Massachusetts Military Reservation. They direct the New England-wide Military Pollution Project.

Fund for Renewable Energy and the Environment
1001 Connecticut Ave. N.W., Suite 638, Washington, DC 20036
Contact: Tina Hobson (202) 466-6880

They're producing a documentary for public broadcast and video on the military's abuse of the environment.

ALTERNATIVE POLICIES

Replacing Prerogatives with Partnership in Occupational Health

BY ROBERT SASS

The present organization of industry robs workers of personality and dignity by damaging their self-respect and preventing self-development. This is a crime against the spirit! Individual humiliation will produce anger and self-assertion, as does wounded pride. To date, the infliction of humiliation and wounds upon the "collective" feelings of workers and the asphyxiating conditions of working life have deprived the individual worker of social and emotional security.

There is an escalating hypocrisy from those who profess the moral imperative associated with an efficiency which requires the continued domination and servility of ordinary workers. Consequently, oppression remains commonplace and on the increase because of the policies of our present-day industrial and political masters. The problem with a nonmediated market economy is that, over time, it erodes the individual's sense of equality and value.

In establishing joint labor-management health and safety committees in Saskatchewan, I observed that the relationship between the employee and employer members on the committees was clouded by apprehension and tension. The dialogue between the two was more of a monologue, rather than interrelated discussion characterized by mutual attention and concern regarding the adverse effects of work upon the worker.

The widespread notion that both labor and management have equal concerns regarding occupational health and safety because they are dealing with pain and suffering is one of the major myths in industrial relations. Improving working conditions costs money. Management members on these committees are forever aware of this fact as legal agents of the shareholders, who are primarily concerned with optimizing their return on capital investment.

For committees to work effectively, there must be a sharing of power. Management generally views this an an infringement upon their "management rights." They resist the extension of worker rights into work environment matters more fiercely than the actual expenses associated with better ventilation or noise reduction programs. Management, on the whole, insists that an organization requires an authoritarian administrative structure if it is to be efficient, and that democracy will not work whether it's in the public or private sector.

Obstacles to Participation in Saskatchewan

Throughout my tenure as Executive Director of the Saskatchewan Occupational Health and Safety Branch, managers demonstrated a lack of respect for participation at all levels of decision making. I heard over and over the repetitive cliches, stock phrases, adherence to conventional standards, and codes of expression and conduct emanating from their allegiance to "efficiency." They continually justified hierarchy based upon false empirical beliefs about the nature and the behavior of "their" subordinates, and were convinced that hierarchy and discipline are necessary to "get the job done."

If, on the other hand, the parties were to freely come together as equals in a partnership, there would be greater likelihood of a critical dialogue which would brush away the dishonesty and dual monologues.[1] Partnership in the organization of industry would provide sufficient scope for worker competence and moral development. Only then can there be a *dialogue* in the deeper sense.

Workers need special rights for questions of work environment. Since health and safety are values tantamount to those of freedom & liberty, workers must have full rights in this area.

While it is desirable for the varied functional groupings in production to make decisions collectively pertaining to production, investment, and the direction of the firm, workers need "special" rights when it comes to work environment questions affecting their health and safety. Since health and safety are values tantamount to those of freedom and liberty, workers must have full rights in this area.

While I would argue that the labor factor of production has the same right to influence the management of the enterprise as the capital factor, I maintain that there is a *greater* right for labor to participate in decision making when it comes to matters of health and safety. This right must be regarded as a higher priority than profit, since it is a question of life and death for workers.

Needless to say, owners and managers will advance reasons for regarding such a right as an infringement upon their freedom to manage their property, produce efficiently, and maximize their contribution to society. However, I have yet to see the evidence that supports this proposition.[2]

Managers also claim that partnership is impossible because workers are not competent enough to be treated as real partners. However, what competence they lack is a direct result of the crippling subordination and domination under which they must work. The most damaging injury we observed in Saskatchewan was not from the noise, dust, and toxic chemicals in the work environment, but from the subordination and structure of command in industry, and its effects upon the character development of the worker, produced by fear of punishment and dismissal.

In her seminal publication *Participation and Democratic Theory*, Carole Pateman noted, "John Stuart Mill argued that an 'active' character would result from participation, and (G.D.H.) Cole suggested that what we might call a 'non-servile' character would be fostered."[3] Based on my experience, I have come to believe, following G.D.H. Cole, that the major positive consequence of an industrial partnership system would be the development of a "non-servile character" among working people, which would also result in a healthier, more democratically oriented and politically aware working class.

The Norwegian Experience

In the late 1970s, I visited Sweden and Norway to study developments pertaining to workplace health and safety. Both of these countries offer valuable lessons for trade union strategy toward health and safety reforms, but Norway, I believe, has the most to offer.

In 1977, Norway enacted a new Work Environment Act which represented a break with the legal traditions in the field of occupational health and safety. The legislation combined ideas about worker rights with traditional health and safety matters. It attempted to bring worker participation to bear on the work environment by placing the issues of work organization and job design into a context of greater workplace democracy. The law included provisions for skill building to counteract the tendency towards a generalized deskilling of workers, and for the reintegration of labor to counteract the increasing subdivision of labor.

The Act respects the notion that work is a fundamental way in which people fulfill themselves as human beings, and that what happens to people in the workplace is more important than the output of the work process. Thus, this legislation promotes the idea that work must be redesigned to be more meaningful for individual workers, allowing them to discover their full potential as human beings. This approach is a beacon for occupational health law, focusing attention upon human skills and competence as fundamental aspects of our humanity.[4]

The heart of the Act, Section 12, deals with the organization of work, reflecting the research findings that freedom and competence are directly related to one's ability to withstand both pathogenic and functional consequences of stress, including sensory deprivation, which can induce accidents.[5] Section 12 specifically states:

> "Employees shall be afforded opportunities for personal development and the maintenance and development of their skills. Monotonous, repetitive, machine or assembly work that does not permit alteration of pace shall be avoided. Jobs shall be designed to allow some possibility for variation, for contact with other workers,...and for information and feedback to employees concerning production requirements and performance.... Efforts shall be made to avoid undiversified, repetitive work and work that is governed by machine or conveyor belt in such a manner that the employees themselves are prevented from varying the speed of the work. Otherwise, efforts shall be made to arrange the work so as to provide possibility for variation and for contact with others, for connection between individual job assignments, and for employees to keep themselves informed about production requirements and results." (Norwegian Work Environment Act, II, 12, 2)

This legislation represents the most progressive statute extant dealing specifically with the way work is organized and planned, taking into account "individual employees' opportunity for self-determination and professional responsibility."

The legislation also recognizes that Taylorism and the present-day organization of work do not serve the needs and the aspirations of a large part of the work force. It recognizes that this historical tendency in industrial societies results in greater job impoverishment, leading to both physiological and psychological stress and ill health. The legislation and rationale behind the Work Environment of 1977 make it sufficiently clear that workplaces can be organized in a way that is compatible with a broadened concept of health and safety and with the social goal of a democratic working life.[6]

Developments in Sweden

As a political-legal response to the negative effects of the stress factors in

Robert Sass teaches in the Department of Industrial Relations and Organizational Behaviour at the University of Saskatchewan. He served as Executive Director of the Occupational Health and Safety Program for the Province of Saskatchewan. In 1982, the New Democratic Party was defeated by the Tories, who disbanded the experiments in democratization discussed in this article.

work, Sweden passed the Co-determination Act of 1978, requiring collective negotiations of work environment, work organization, and job design matters. Both Sweden and Norway, in effect, have adopted a public policy in response to the rapid introduction of new technologies. These laws address the narrowing of the job cycle, the proliferation of monotonous and repetitive work tasks, machine pacing of work rhythms, machine control of work methods, worker isolation from other people, and the detailed and authoritarian control of the worker.

It is not the purpose of this article to review the literature pertaining to the different aspects of job characteristics, such as job cycle, fixed posture, lack of diversity in job tasks, and control of the pace of work. I do, however, wish to indicate that social science research in Scandinavia has gone much farther than it has elsewhere in addressing working life issues. As a result, Scandinavian research has been of enormous benefit in shaping the legal-political policies relating to work environment concerns. We should examine these developments as a part of exploring the next stage in occupational safety and health reforms.

While Swedish public policy allows trade unions the legal right to negotiate work environment matters, the Norwegians have "pushed down" these rights into the joint work environment committees on the shop floor. In other words, the same rights afforded Swedish workers through the Co-determination Act are given to Norwegian workers through the Work Environment Act to deal with directly on the shop floor. This is accomplished by extending the legal right of workers to deal with work organization and job design questions as legitimate committee concerns.

Towards a Democratic Workplace

I believe the Norwegian approach is more efficacious and desirable than that of Sweden. A Norwegian-type approach would legitimate joint labor-management workplace health and safety committees to deal with these issues at the shop-floor level. Since many jurisdictions already have legislative requirements for joint health and safety committees, unions ought to demand greater rights for such committees regarding work environment matters, along with a widening of the present legal concept of risk. Workers could then deal with workplace stressors and quality-of-work issues, as well as the traditional quantitative aspects of the work environment, such as heat, noise, and chemicals.

The existing legal right of workers to know about workplace hazards and risks, to participate in health and safety reforms, and to refuse dangerous and unhealthy conditions should be extended. Laws should permit workers to deal with work organization as a social concept, and job design via the individual's relation to workplace technology. This would include pace of work, monotony, scheduling, and job cycles, as well as work environment matters such as daily punishments and humiliations. The expansion of the present-day legal concept of risk to ensure worker involvement and increased *control* over working conditions is a moral right derived from a fundamental need—health and safety.

I advocate a form of democracy based upon a partnership of equals among the different interest groups in production. I maintain that "partnership" is an appropriate democratic form relating to work environment matters, because it is based upon a balance of rights between the owners of capital and the workers. Workers own their bodies and, therefore, have a full right to be involved as equals in matters which may affect their bodies. No doubt, this form still requires compromise and trade-offs among the diverse interests involved in production. Nonetheless, on the shop floor, workers should have a form of participatory democracy enabling them to influence *all* work environment matters.

At middle management levels, there should be a form of representative democracy which could be further extended to the Board of Directors. This development would improve working conditions and directly address occupational health and safety concerns. At the same time, worker involvement and participation would eliminate their present subordination and subservience, which is detested by true democrats.

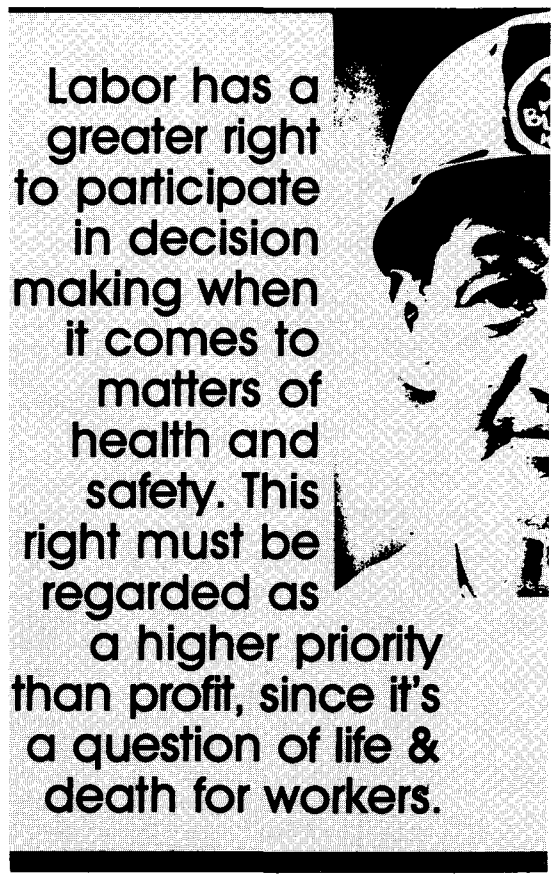
Unskilled and skilled workers, together with professional and technical staff, should be part of the decision-making process for each enterprise, as freely participating equals through appropriate representation. At the same time, workers must have full citizenship regarding work environment matters, because it is the nature of work which directly affects their health and safety. And health and safety in a civilized society are of paramount value.

Unfortunately, neither existing collective bargaining agreements nor workplace health and safety statutes in North America have sufficiently pierced the impregnable fortress of management prerogatives. The reduction of industrial injury and disease necessitates the democratization of industry. This ought to be the next stage in the reform of occupational health and safety.

NOTES

1. Aristotle, in Book One of his *Politics*, states that "there is in everyone by nature an impulse toward this sort of partnership" when making the distinction between slave and laborer. He states that the slave works for a single person and the free laborer for the partnership. John Stuart Mill, in his essay, "On the Probable Futurity of the Labouring Classes," states the desire for "partnership" among labor.

2. On the contrary, the literature is replete with evidence supporting the advantages to efficiency and productivity accruing from worker participation. See, for example, Bruce Stokes, "Worker Participation, Productivity, and the Quality of Working Life," *Worldwatch Paper 25*, December 1978.



3. Carole Pateman, *Participation and Democratic Theory*. Cambridge: Cambridge University Press, 1970, page 45.

4. The passage of this most innovative legislation followed from the development of an industrial democracy program in the 1960s. A joint labor and management committee launched a series of field experiments designed to demonstrate the viability of alternative forms of work organization based on increased freedom and competence for the workers. It must be remembered that 80 percent of Norwegian workers are organized into trade unions. See F.E. Emery and Einar Thorsrud, *Form and Content in Industrial Democracy*. London: Tavistock, 1969; and Emery and Thorsrud, *Democracy at Work*. Liden: Martin Nijhoff, 1976. Also see Bjorn Gustavsen and Gerry Hunnius, *New Patterns of Work Reform: The Case of Norway*. Oslo: Universitetsforlaget, 1981.

5. For a fuller treatment, see Gustavsen and Hunnius, *New Patterns of Work Reform: The Case of Norway*, op. cit.

6. Bertill Gardell, "Psychosocial Aspects of Industrial Production Methods." *Reports from the Department of Psychology*, University of Stockholm, Supplements 47, November 1979.

SELLING SCIENCE

The High Cost of Hype

BY DOROTHY NELKIN

Scientific information is often reported in the press, but theories are seldom newsworthy. A notable exception are those theories of behavior that bear on controversial social stereotypes. Thus theories of evolutionary biology and natural selection, when used to explain human differences, have had an active press. The theory of biological determinism attracted considerable news coverage following the controversy over Jensen's claims about the relationship about race and IQ. Its reappearance in the growing field of sociobiology has again attracted the press. The reports on sociobiology have been less concerned with its substance than with its purported applications. In selecting this subject for extensive coverage, journalists are in effect using a controversial theory to legitimatize for a particular point of view.

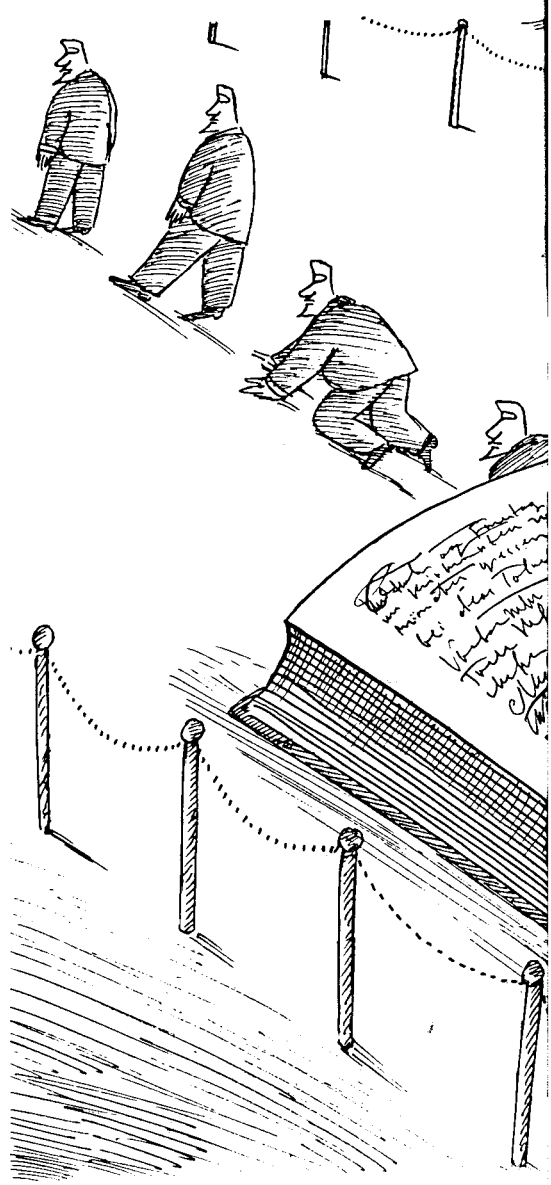
Sociobiology is a controversial field devoted to the systematic study of the biological basis of social behavior. Its basic premise is that behavior is shaped primarily by genetic factors, selected over thousands of years for their survival value. Its most vocal proponent, entomologist Edward O. Wilson from Harvard University, contends that genes create predispositions for certain types of behavior and that a full understanding of these genetic constraints is essential to intelligent social policy. He believes that sociobiology is "a new synthesis," offering a unified theory of human behavior. "The genes hold culture on a leash," he writes in his book *On Human Nature*. "The leash is very long but inevitably values will be constrained in accordance with their effects on the human gene pool."[1]

Wilson's arguments about human behavior, extrapolated from his research on insect behavior, have been widely attacked by other scientists for their apparent justification of racism and sexism, for their lack of scientific support, and for their simplistic presentation of the complex interaction of biological and social influences on human behavior.[2] Yet, ever since the publication of Wilson's first book on the subject, *Sociobiology, A New Synthesis,* was reported as news in the *New York Times* and welcomed as a "long awaited definitive book," the press has typically discussed the arguments for sociobiology and the details of particular studies in uncritical, often enthusiastic, terms. Sociobiological concepts subsequently have appeared in articles about the most diverse aspects of human behavior, used, for example, to explain:

- The differences between male and female behavior: "Authorities now say nature not nurture makes him thump and thunder while you rescue lost kittens and crimp." *(Cosmopolitan)*
- Human decency: "Decency is rooted in gene selfishness to enhance the prospect of survival." *(New York Times)*
- Child abuse: "The love of a parent has its roots in the fact that the child will reproduce the parent's genes." *(Family Week)*
- Machismo: "Machismo is biologically based and says in effect: 'I have good genes, let me mate'." *(Time)*
- Intelligence: "On the towel rack that we call our anatomy, nature appears to have hung his-and-hers brains." *(Boston Globe)*
- Promiscuity: "If you get caught fooling around, don't say the devil made you do it. It's your DNA." *(Playboy)*
- Selfishness: "Built into your genes to insure their individual reproduction." *(Psychology Today)*
- Rape: "Genetically programmed into male behavior." *(Science Digest)*
- Obesity: "A genetic tendency to stock for a famine that never comes." *(Science Digest)*
- Aggression: "Men are more genetically aggressive because they are more indispensable." *(Newsweek)*

The press has been most aroused by sociobiology's controversial implications on the subject of sex differences. Not surprisingly, the most uncritical acceptance of the theory appears in *Playboy*. In a somewhat tongue-in-cheek article, called "Darwin and the Double Standard," *Playboy* says the critics of sociobiology are "burying their head in the sand" and "refusing to face facts." The theory, we're told, directly challenges women's demands for equal rights. "Perhaps (women) are defying biology—it's not nice to fool Mother Nature. Recent scientific theory suggests that there are innate differences between the sexes and that what is right for the gander is wrong for the goose."[3]

Such efforts to entertain by playing on conventional stereotypes are not confined to *Playboy*. *Time,* for example, begins an article with the question, "Why do men go to war? Answer: Because the women are watching." The reporter explains that this conclusion is confirmed by sociobiology: "Male displays and bravado, from antlers in deer and feather-ruffling in birds, to chest-thumping in apes and humans,



Dorothy Nelkin is a professor in the Cornell University Program on Science, Technology and Society and the Department of Sociology. *This article was excerpted from her forthcoming book,* Selling Science, *published by W.H. Freeman and Company in 1987. Science for the People published an excerpt from her previous book,* Workers at Risk: Voices from the Workplace, *in the January/February 1984 issue.*

evolved as a reproductive strategy to impress females."[4] And *Cosmopolitan,* citing the "weight of scientific opinion" to legitimize its bias, tells its readers, "Recent research has established beyond a doubt that males and females are born with a different set of instructions built into their genetic code."[5]

Cultural stereotypes also attract the press to specific kinds of research. In 1980 two psychologists, Camille Benbow and Julian Stanley, published a research paper in *Science* on the differences between boys and girls in mathematical reasoning. Their study, examining the correlation between Scholastic Aptitude Test scores and classroom work, found that differences in the classroom preparation of boys and girls were not responsible for differences in their later test performance. The *Science* article was careful to qualify the implication of male superiority in mathematics: "It is probably an expression of a combination of both endogenous and exogenous variables. We recognize, however, that our data are consistent with numerous alternative hypotheses."[6] But the press was less qualified, writing up the research as a strong confirmation of biological differences and a definitive challenge to the idea that differences in mathematical test scores are caused by social and cultural factors. The newspeg was not the research, but its implications.

The authors themselves encouraged this perspective in their interviews with reporters, where they were less cautious than in their scientific writing. Indeed, they used the press to push their ideas as a useful basis for public policy. According to the *New York Times,* they "urged educators to accept the possibility that something more than social factors may be responsible.... You can't brush the differences under the rug and ignore them."[7] The press was receptive. *Time,* writing of the "gender factor in math," summarized the findings: "Males might be naturally abler than females."[8] *Discover* reported that male superiority is so pronounced that "to some extent, it must be inborn."[9] It was left to a few *New York Times* op ed pieces and to some women's magazines to question the methodology of the research and the limited nature of the evidence.[10]

What is striking about many of the articles on sociobiology is how easily reporters slide from noting a provocative theory to citing it as fact, even when they know that the supporting evidence may be flimsy. A remarkable article called "A Genetic Defense of the Free Market" that appeared in *Business Week* clearly illustrates this slide. While conceding that "there is no hard evidence to support the theory," the author writes: "For better or worse, self-interest is a driving force in the economy because it is engrained in each individual's genes.... Government programs that force individuals to be less competitive and less selfish than they are genetically programmed to be are preordained to fail." The application of sociobiology that he calls "bioeconomics" is controversial, he says; nevertheless, it is "a powerful defense of Adam Smith's laissez-faire views."[11]

This journalist and many others writing about sociobiology recognize, indeed rely on, the existence of controversy to enliven the story. Yet most articles convey a point of view by allowing considerable space to sociobiology's advocates and by marginalizing the theory's critics.[12]

In numerous articles, critics of sociobiology are variously dismissed as ideologues, Marxists, feminists, or members of the radical left. They are "few in number but vociferous"; people who are "unwilling to accept the truth." To the extent that their views are presented, they are characterized as distorted or isolated. A *Science News* reporter, for example, wrote that "one runs the risk of misrepresenting the consensus view by focusing, however briefly, on critics and criticism."[13] *Newsweek* suggested that Wilson was a victim like Galileo: "The critics are trying to suppress his views because they contradict contemporary orthodoxies."[14] *Science Digest* compared the criticism of sociobiology to the attack of religious fundamentalism on the theory of evolution—"Like the theory of evolution, sociobiology is often attacked and misinterpreted"[15]—a comparison that places sociobiology's scientific critics, such as Stephen J. Gould and Richard Lewontin of Harvard University, in the same league as William Jennings Bryan.

The uncritical acceptance, indeed promotion, of sociobiology once again reflects the idealization of science as an ultimate authority, albeit selectively applied. For by its selection of what theories to champion, the press in effect uses the imprimatur of science to support a

particular world view. It does so, however, with little attention to the substance of science, its slow accumulative process, and its limits.

The High Cost of Hype

On January 28, 1986, a long-standing and comfortable partnership between NASA and the press was shattered, when the space shuttle Challenger exploded seconds after lift-off, killing all aboard.[16] The press reaction to the explosion was one of grief, disillusionment, and rage. For many longtime space journalists the event was a personal tragedy. "Those people were me," wrote a Houston reporter. "The shining star of technology for 30 years has dimmed." The *Miami Herald* compared the "countdown to disaster" to a "Greek tragedy, peppered with portents of the doom to come." The *New York Times* wrote of its disillusionment with an agency that "has symbolized all that is best in American technology...computerized, at the cutting edge of technology, sophisticated in its public relations strategy, squeaky-clean in its integrity."[17]

The space program had been important to the development of science journalism as a profession. The many months at Cape Canaveral had brought together journalists interested in science and technology. For 30 years they had covered the space program as an awesome and pioneering venture, a source of national prestige. The first space shuttle in 1981 assumed symbolic dimensions in the popular press as an affirmation of American faith in science and technology, a solution to problems of military security, a "sweet vindication of American know-how." In effect, the press reports of space launches incorporated all the images that are so characteristic of science and technology journalism.

Fascinated with the technology, reporters for years had simply accepted what NASA fed them, reproducing the agency's assertions, promoting the prepackaged information they received, and rarely questioning the premises of the program, the competence of the scientists, or the safety of the operation. Only three days before the accident, a *Boston Globe* reporter joked about NASA's public relations: "How does NASA spell publicity? Christa McAuliffe," referring to the school teacher who was among the astronauts. Three days later, McAuliffe was called "the victim of a PR campaign."

After the accident an angry press felt betrayed. *Newsweek* announced that "the news media and NASA, wedded by mutual interest from the earliest days of the space program, are in the midst of a messy divorce." Having suddenly lost faith in the veracity of NASA, some newspapers even engaged in electronic war games, using high-technology interception antennas and experimental laser cameras to get stories about the recovery of the shuttle that NASA wanted to conceal.[18] The press was filled with self-incrimination, as reporters accused themselves of accepting "spoon-fed news," of ignoring the safety problems of NASA by focusing only on the launches, of "treating the shuttle like a running photo opportunity," of letting readers down. More than any other event, the Challenger accident brought press and public awareness of the importance of probing and critical science journalism.

Science writers, in effect, are brokers, framing social reality for their readers and shaping the public consciousness about science-related events.[19] Through their selection of news about science and technology they set the agenda for public policy. Through their presentation of science news they lay the foundation for personal attitudes and public actions. For they are often our only source of information about the technical choices that significantly affect our lives.

Press coverage of science and technology is increasing, reflecting the pervasiveness of science and technology in business, politics, and health. Scientific and technological choices affect our work, our health, our lives. We pay for their implementation and bear their social costs. Public understanding of their social implications, their technical justifications, and their political and economic foundations is in the interest of an informed and involved citizenry. It is also critical to the health of our scientific and technological enterprise. The high cost of public naiveté regarding science and the nature of scientific evidence has been apparent in many controversies—over the value of animal experimentation, the appropriate precautions to prevent the spread of AIDS, the risks of a nuclear power plant explosion, and the teaching of evolution in the schools.

The press can play an important role in enhancing public understanding, but it frequently fails to do so. There are many examples of brilliant science reporting, written with analytic clarity, critical insight, and provocative style; but too often science in the press is more a subject for consumption than for public scrutiny, more a source of entertainment than of information.[20] Too often science is presented as an arcane activity outside and above the sphere of normal human understanding, and therefore beyond our control. Too often the coverage is promotional and uncritical, encouraging apathy, a sense of impotence, and the ubiquitous tendency to defer to expertise.

Science is practiced by an elite, but its impact extends to us all. Yet political questions of scientific responsibility and accountability are seldom considered news; nor are the ideologies or social priorities that guide science policy decisions. Focusing on individual accomplishments and dramatic or controversial events, journalists convey little about the sociology of science, the structure of scientific institutions, or the daily routines of research. We read about the results of research and the stories of success, but not about the process, the dead ends, the wrong turns. Who discovered what is more newsworthy than what was discovered or how. Thus science in the press becomes a form of sport, a "race" between scientists in different disciplines or between competitive nations.

There is little in this type of reporting to help the reader understand the nature of scientific evidence and the difference between science and unverified opinion. As a result, when new problems emerge as the focus of public concern, people are ill-prepared to deal with scientific information. The pesistent fear of catching AIDS through casual contact with AIDS victims despite scientific evidence to the contrary is a case in point.

The reporting of technology, like that of science, tends to be promotional. Many writers convey a fervent conviction that new technology will create a better world. But the message is polarized—we read of either promising applications or perilous effects, of triumphant progress or tragic risks. Impending breakthroughs are reported with zeal, and

technological failures are reported with alarm. But the long-term political and social consequences of technological choices are seldom explored. Thus technology in the press becomes a side show unrelated to the political events at center stage.

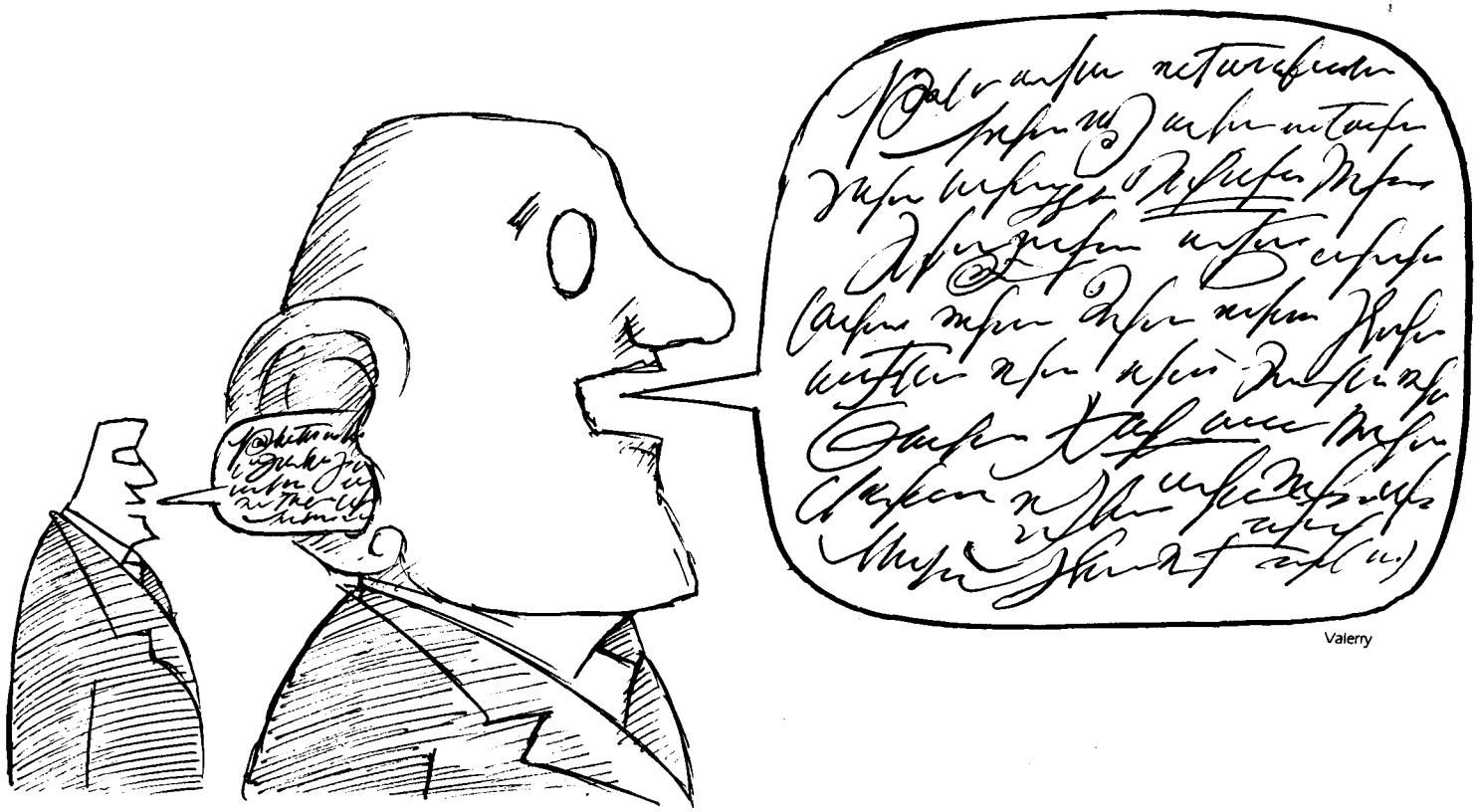
This study has suggested that many of these characteristics of science and technology reporting follow from the nature of the relationship between journalists and their sources. Many scientists today, concerned about their legitimacy in the political arena and anxious to receive support for their work, are sensitive to their image in the press. Hoping to shape that image, they are becoming adept at packaging information for journalists. Like advocates in any field, they are prone to overestimate the benefit of their work and minimize its risks. Indeed, the problems of science and technology reporting can often be traced to the influence of sources advocating their ideas.

For their part, journalists, especially those with limited experience in science reporting, are vulnerable to manipulation by their sources of information. They are concerned about balance and objectivity and accept the ideology of science as a neutral source of authority, an objective judge of truth. Some science writers are in awe of scientists; others are intimidated. But most are bewildered by the complexity of technical issues. The difficulty of evaluating a complex and uncertain subject converges with the day-to-day constraints of the journalistic profession to reinforce the tendency to rely uncritically on scientific expertise. While political writers often go well beyond press briefings to probe the stories behind the news, science reporters tend to rely on scientific authorities, press conferences, and professional journals. The result? Many journalists have adopted the mind-set or "frame" of scientists, interpreting science in terms defined by their sources, even when those sources are clearly interested in projecting a particular view.

Thus while art, theater, music, and literature are routinely subjected to criticism, science and technology are almost always spared. While political writers aim to analyze and criticize, science writers seek to elucidate and explain. Few are the outlets for journalists who would serve as critical commentators on, or probing investigators of, science and technology. Rare are the Walter Lippmanns or I.F. Stones of science who write regularly in the press.[21] Unaggressive in their reporting and relying on official sources, science journalists present a narrow range of coverage. Many journalists are, in effect, retailing science and technology more than investigating them, identifying with their sources more than challenging them.

If the reporting of science and technology is so uncritical, why is there continued tension between scientists and the press? The communities of science and journalism differ in certain fundamental and important respects. To begin with, they differ in their judgments about what is news. In the scientific community, research results become reliable and therefore newsworthy through replication by and endorsement of professional colleagues. Prior to publication in reputable journals, scientific papers are carefully evaluated and approved through the system of peer review. This system of establishing reliability is critical to the structure of science, and especially to the process of scientific communication. For scientists, then, research findings are tentative, undigested, provisional—and therefore not newsworthy—until certified by peers to fit into the existing framework of knowledge. For journalists, on the other hand, certified and established ideas are "old news"—of far less interest than new and dramatic, though possibly tentative, research. Seeking to entertain as well as to inform, they are attracted to nonroutine, nonconventional, and even aberrant events.[22] This difference between scientists and journalists often becomes a source of contention, when overzealous researchers seek press coverage of "hot" research prior to the time-consuming process of peer review.

In their search for credible perspectives on controversial issues, journalists often rely on the opinions of scientists who have become well-known public figures. Nobel Prize winners are frequently cited in the fields well outside their specialized expertise, journalists having sought their opinions simply because of their general prestige in science and the familiarity of their names. Scientists suspect such use of unverified opinion. Arnold Relman, editor of the *New England Journal of Medicine*, expressed the scientists' view: "If a (politician) makes a statement of what the policy of his government is or what he thinks or what he is going to vote, that's



Valerry

news.... News of a new development in science is coupled with evidence. Opinion is not important, it's evidence. Opinion is cheap and can be misleading in science, but opinion in politics or public affairs is another matter."[23]

Certain professional practices that are part of journalism conflict with scientific expectations about appropriate styles of communication. For example, while both groups are committed to communicating truth, journalists must often omit the careful documentation and precautionary qualifications that scientists feel are necessary to accurately present their work. While scientists are socialized to qualify their findings, journalists may see qualifications as protective coloration. Furthermore, readability in the eyes of the journalist may be oversimplification to the scientist. Indeed, many accusations of inaccuracy are traceable to reporters' efforts to present complex material in a readable and appealing style.

Journalistic conventions intended to enhance audience appeal may also violate scientific norms. For example, to make abstract technical decisions more concrete, science writers often examine the personal choices of their technical informants ("Would you live at Love Canal?"), undermining the idea that technical decisions are based on depersonalized evidence. To create a human interest angle, journalists also personalize science; but the focus on individual accomplishments and the presentation of scientists as stars contradicts communal norms, which favor a collective image of science as an objective and disinterested profession. Similarly, to convince their editors about the newsworthiness of science and technology, journalists tend to emphasize the uniqueness of individual events (the "first" discovery, the "breakthrough"). Although many scientists actively contribute to the breakthrough syndrome, ideally they prefer to emphasize continuity and the cumulative nature of research.

The journalistic preoccupation with conflict and aberration, intended to attract the reader's interest, is a further source of strain. In covering disputes journalists tend to create polarities: technologies are either risky or they are safe. The quest for simplicity, drama, and brevity precludes the complex, nuanced positions that scientists prefer. But the polarized presentation of technical disputes also reflects journalists' norms of objectivity—their belief that verity can be established by balancing conflicting claims. This approach further contributes to strain, for objectivity to a scientist is based on the understanding that claims must be verified by empirical means—hardly by balancing opposing views.

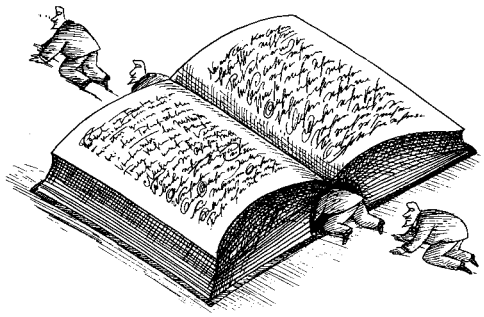
Differences in the use of language add to the strain. The language of science is intended to be precise and instrumental. Scientists communicate for a purpose—to indicate regularities and aggregate patterns, and to provide technical data. In contrast, journalistic language has literary roots. Journalists will choose words for their richness of reference, their suggestiveness, their graphic appeal. They are likely to prefer a "toxic dump" to a "waste disposal facility."

In any discourse, language is organized to address the background and assumptions of the anticipated audience.[24] Scientists direct their professional communication to an audience that is trained in their discipline. They take for granted that their readers share certain assumptions and therefore will assimilate the information conveyed in predictable ways.[25] Journalists, on the other hand, write for diverse readers who will interpret the information in subjective terms, depending on their interests, objectives, and technical sophistication.[26] Thus, while scientists talk of aggregate data, reporters write of the immediate concerns of their readers: "Should I use saccharin? Will I be harmed?"[27]

Often words that have a special meaning in a scientific context will be interpreted differently by the lay reader. For example, the word "epidemic" has both technical and general connotations. Scientists use the word "epidemic" to describe a cluster of incidents greater than the normal background level of cases. If the background level is zero, then six cases are technically an epidemic. To the public or the journalist an epidemic implies thousands of cases, a rampantly spreading disease.

Confusion over the definition of "evidence" occurs among scientists as well as in the press, often confounding the discourse of risk disputes. Biostaticians use the word "evidence" as a statistical concept. But for biomedical researchers the critical experiment may also be defined as evidence. Most lay people accept as credible evidence anecdotal information or individual cases. So, too, do journalists. Such differences frequently lead to misunderstanding. In reports about health effects of exposure to toxic chemicals at Love Canal and Times Beach, for example, scientists and journalists held different assumptions—about the definition of credible evidence concerning the validity of animal tests, the neighborhood's habitability, and the adequacy of containment of the chemicals. Thus, when scientists described the health effects of dioxin with a cryptic "no evidence," meaning no statistically significant evidence, journalists interpreted their response as an effort to cover up the problem, since they knew of individual cases.

Similar linguistic confusion marked the dispute over the report written by the National Academy of Sciences panel on food additives, when the Academy's placement of saccharin in a "moderate risk



category" was interpreted by the press to mean it was a "moderate cancer-causing agent."

Perhaps the most important source of strain between scientists and journalists lies in their differing views about the appropriate role of the press. Scientists often talk about the press as a conduit or pipeline, responsible simply for transmitting science to the public in a way that it can be easily understood. They expect to control this flow of information to the public as they do within their own domain. Confusing their special interests with general questions about the responsibility of the press, they are reluctant to tolerate independent analysis of the limits or flaws of science. They assume that the purpose of journalism is to convey a positive image that will promote science, and they see the press as means of furthering scientific goals.

This view of journalism is reflected in scientists' complaints about the press and its effects on public attitudes. Scientists tend to attribute negative public attitudes about science and technology to problems of media communication, ultimately to journalists, who, they believe, distort the flow of information from scientists to the public. Alternatively, however, problems of scientific communication could as easily be attributed to the sources of information, to suppression of facts, to manipulation of information, or to over-eager, promotional public relations.[28]

Many science journalists, of course, have a perception of their role that is not too different from that of scientists. They see their mission as one of recording "official history"—of elucidating and even eulogizing science. But there are some who are beginning to question their role as "self-appointed trumpets" for science and technology. Reacting to events such as Three Mile Island, Love Canal, or the Challenger explosion, and to the economic implications of large and costly scientific endeavors, they are beginning to suspect promotional hype about science and technology, and to raise probing questions in their interviews with scientists: Who pays? Who is responsible? What's in it for the public? What are the stakes?

While "gee whiz," "cosmic breakthrough" articles continue to dominate press coverage of science and technology, a number of journalists today want to probe scientific issues so that, as one journalist put it, "public expectations do not get out of control." "It is not enough for us to report the new discoveries or gadgetries; we must delve deeper into their effects on people and public policy." "I want to take some of the awesomeness out of science." "I want to create a better-informed citizenry able to deal with problems." These are among the goals expressed by at least some journalists today.

Formal training in science is increasingly viewed as essential background for science journalists, and special courses have proliferated. There are about 43 programs in science journalism in 67 colleges and universities. Fourteen offer masters degrees in the field. These programs include science requirements, so that soon most younger reporters specializing in science writing will have some science background.

If the popular press is to play its traditional role as a watchdog over major social and political institutions, if it is to mediate between science and the public and facilitate the public discourse about crucial policy issues, both scientists and journalists must accept and come to terms with an uneasy and often adversarial relationship. Scientists must restrain the promotional tendencies that lead to controls on information or to oversell, and they must open their doors to more probing investigation. And journalists on their part must try to convey understanding as well as information. It is not enough merely to react to scientific events, translating and elucidating them for popular consumption. To understand science and technology, readers need to know their context: the social, political, and economic implications of scientific activities, the nature of evidence underlying decisions, and the limits as well as the power of science as applied to human affairs.

NOTES

1. Edward O. Wilson. *On Human Nature* (Cambridge, Mass.: Harvard University Press, 1980).

2. For a comprehensive review of the criticism and the controversy, see Ullica Segerstrale, "Colleagues in Conflict: An In Vivo Analysis of the Sociobiology Controversy," *Biology and Philosophy* 1, 1986, pp. 53-87.

3. *Playboy,* August 1978.

4. *Time,* August 1, 1977.

5. *Cosmopolitan,* March 1982.

6. Camille Benbow and Julian Stanley, "Sex Differences in Mathematical Reasoning: Fact or Artifact?" *Science* 210, December 12, 1980, pp. 1262-1264.

7. *New York Times,* December 7, 1980.

8. *Time,* December 15, 1980.

9. Pamela Weintraub, "The Brain: His and Hers," *Discover,* April 1981, pp. 15-20.

10. See, for example, the *New York Times,* May 30, 1981.

11. *Business Week,* April 10, 1978.

12. See, for example, interviews in the *New York Times,* October 12, 1975, and *People Weekly,* November 19, 1975.

13. *Science News,* November 19, 1975.

14. *Newsweek,* April 12, 1976.

15. *Science Digest,* March 1982.

16. This section on the Challenger accident was developed with the help of Susan Lindee, a Cornell University doctoral student.

17. *Houston Chronicle,* February 1, 1986; *Miami Herald,* February 23, 1986; and *New York Times,* February 5, 1986.

18. *New York Times,* March 20, 1986.

19. For a theoretical perspective on the hegemonic rule of the press see Stuart Hall, "Culture, the Media and the Ideological Effect," in James Curran, M. Gurevitch, and J. Woollacott (eds.), *Mass Communication and Society* (Beverly Hills, Calif.: Sage, 1979), chap. 13.

20. See discussion in Robert Young, "Science as Culture," *Quarto,* December 1979, p. 7; and Langdon Winner, "Mythinformation," in Paul T. Durbin (ed.), *Research in Philosophy and Technology,* vol. 7 (Greenwich, Conn.: JAI Press, 1984), pp. 287-304.

21. There are, of course, notable exceptions. Daniel Greenberg, who publishes a newsletter entitled *Government and Science Report* and sometimes writes a science policy column for the *Washington Post.* The *New York Times* has hired several reporters from *Science* who have been writing some interpretive and critical articles. The news and comments section of *Science* also publishes critical commentary; however, *Science* is a specialized publication read mainly by scientists and science policy professionals.

22. L.E. Trachtman, "The Public Understanding of Science Effort," *Science, Technology and Human Values,* vol. 6, summer 1981, pp. 10-15.

23. Arnold Relman, "Special Report on Medicine and the Media," *P&S,* April 1982, p. 22.

24. See Erving Goffman, "Felicity's Condition," *American Journal of Sociology* 89, July 1983, pp. 1-53.

25. J.C. Pocock, "Ritual Language and Power," *Politics, Language and Times* (London: Methuen, 1970).

26. Richard Whitley, in Terry Shinn and Richard Whitley (eds.), *Expository Science* (Dordrecht: D. Reidel, 1985), points out that the many different nonscientific groups that constitute the audience for scientific information seek such information for specific purposes and assimilate it accordingly.

27. Quoted in Harold I. Sharlin, *EDB: A Case Study in the Communication of Health Risk* (Washington, DC: Environmental Protection Agency, 1985).

28. See, for example, David Rubin, "What the President's Commission Learned about the Media," in T. Moss and D. Sills (eds.), *The Three Mile Island Accident* (New York: New York Academy of Sciences, 1981), pp. 95-106.

"SURROGATE MOTHERING" EXPLOITS WOMEN

Poor & Third World Women Breed Babies for the Rich

BY RITA ARDITTI

While the eyes of the world focused on renegade mother Mary Beth Whitehead and her efforts to keep the child she had contracted to sell through a surrogacy company, a case that portends an even more ominous future for women has been quietly developing in National City, California. The case of Alejandra Muñoz, which opened on February 18, 1987 in San Diego, raises the issue of the exploitation of poor and immigrant women, through the use of their bodies as breeders, to an unprecedented degree.

Alejandra Muñoz, a twenty-year-old Mexican woman, was brought illegally to the United States to be inseminated by the husband of her cousin, Natti Haro. The couple had first asked Angela Garcia, who is Natti Haro's sister, to serve as a surrogate, but she refused. Alejandra Muñoz was then asked by a member of her family to "help" her infertile cousin by agreeing to an "ovum transfer."

After the insemination and one month into the pregnancy, Alejandra Muñoz was told that the embryo transfer could not be done and that she would have to carry the pregnancy to term. At that point, she signed an agreement by which the Haros agreed to pay her $1,500 to continue the pregnancy, which was well below the standard $10,000 fee offered to surrogates. After she signed the agreement, the Haros added, in

Rita Arditti is a member of Science for the People's editorial advisory board and the Feminist International Network to Resist Reproductive and Genetic Engineering. She coauthored Test-Tube Women: What Future for Motherhood? *and* Science and Liberation.

handwriting, "I will give up my rights to the baby."

Alejandra Muñoz has a second-grade education, does not speak English, and cannot read handwritten writing. She never agreed to become a "surrogate mother". She only agreed to insemination and the transfer of her fertilized ovum. The Haros' lawyer, Merlen Schneidewind, tried to justify the couple's right to the child by saying, "I don't want to sound cold, but we're looking at an uneducated, illegal alien with no visible means of support."

Alejandra Muñoz wants to keep her child. But the Haros received initial custody of the baby, whom Muñoz saw three times a week. The presiding judge has now ruled that Alejandra Muñoz and the Haros should share joint custody, and that Muñoz can see her child four times a week. She will receive $50 per month for expenses for the child.

Mr. Haro had many opportunities to adopt newborn Mexican infants, but he wanted to continue *his* bloodline. Women employed as "surrogate mothers" provide men the opportunity to have babies carrying their own genes. This is not a minor detail in the surrogacy business. Couples, like the Haros, have hired surrogates even when the now-infertile woman had children from a previous marriage, because the present husband wanted a child "of his own." That is also the case with William Stern, "Baby M's" natural father, who said that he felt "compelled" to continue his family's bloodline.

The surrogacy industry hopes that the decision of the judge presiding in the Mary Beth Whitehead and William Stern case will settle some of the gray areas that surround surrogacy. Whitehead signed a contract to give up the baby she conceived through artificial insemination with William Stern's sperm, but changed her mind after the baby's birth. The psychologist's report from the Infertility Center of New York, the surrogacy business that arranged the pregnancy, stated that "she expects to have strong feelings about giving up the baby at the end."

More than twenty surrogacy businesses are operating currently, and more than 500 babies have been born this way. Mary Beth Whitehead is not the first "surrogate mother" to change her mind, but this is the first time that the contracting father and his wife have contested the mother's choice and taken her to court. This is the first time that the legal system has had to rule on the legality and enforceability of a surrogacy contract.

And in fact, in his ruling on March 30, 1987, Judge Sorkow came out on the side of the surrogacy business. He ruled that "Baby M" belongs to William Stern, and has deprived Mary Beth Whitehead of her rights as a mother. He stated that "the surrogate parenting agreement is a valid and enforceable contract pursuant to the Laws of New Jersey. The rights of the parties to contract are constitutionally protected under the Fourteenth Amendment of the United States Constitution."

Judge Sorkow also claimed, "It is his own biological genetically related child. He cannot purchase what is already his." According to this twisted logic, based on the idea of the supremacy of the sperm, "Baby M" has only one parent, the father, and the mother's genetic and nurturant contribution is ruled out of the picture.

Surrogacy reinforces the patriarchal view that the woman is just a container, an incubator of the man's sperm. She receives it from him and gives it back as his baby. She is simply the maternal environment for the development of his progeny.

Proponents of commercial surrogacy claim that women have always had babies for other women, often citing the case of Sarah and Hagar in the Old Testament of the Bible. Genesis 16 tells that Abraham had a child with his wife's handmaiden, Hagar, when Sarah could not become pregnant. What the proponents of the baby-selling business never mention is this: Hagar was a slave who had little control of her life. When Sarah finally became pregnant and gave birth to Isaac, Hagar and her son with Abraham, Ishmael, were cast out into the desert. Hagar did not produce a child for *Sarah*, but for *Abraham*, and a "second-rate" child at best.

The term "surrogate mother" is a misnomer, reflecting the male perspective that pervades this whole issue. Clearly, the woman who carries and labors to give birth to a baby with her own ovum, genes, and from her own womb is a real mother. She could be considered, however, to be a surrogate wife to the man whose legal wife is infertile. But the surrogacy agreement, the media, and all of the literature on this subject always call her a "surrogate mother," while referring to the sperm donor as the "natural father." Proponents of the surrogacy business want us to forget that the woman is the natural mother.

The issues of class differences and the exploitation of poor women are paramount in surrogacy. Contracts are made mainly between upper-middle-class couples and working-class or lower-middle-class women. For example, Mary Beth Whitehead is a homemaker married to a sanitation worker with a salary of $28,000 a year. The Sterns have a joint income of more than $90,000 a year. The Sterns are highly educated professionals: he is a biochemist and she is a pediatrician. Mary Beth Whitehead left high school before graduating, married at age 16, and had two children before her nineteenth birthday.

The Sterns have spent $60,000 to $70,000 so far on fees for lawyers, private detectives, and expert witnesses. Mary Beth Whitehead was hoping to use the $10,000 she was paid to conceive and bear "Baby M" for her other children's education. As Noel Keane has said, "Rich women, after all, are not likely to become surrogate mothers." And he should know. He is the founder and director of the Infertility Center of New York, the for-profit business that drew up the contract between William Stern and Mary Beth Whitehead, and he is the primary advocate for the surrogacy industry.

Surrogacy also offers the potential to exploit Third World women, as Alejandra Muñoz's experience illustrates. Until recently, women used as surrogates always furnished the ovum for the creation of the embryo. But the combination of new techniques for in-vitro fertilization and embryo transfer make "total surrogacy" possible. An egg from one woman can be fertilized in the lab and then implanted in the uterus of a different woman.

The woman who provides her womb and body, but not her ovum and genes, can act as the incubator for the embryo without having any genetic connection to the developing fetus. Who is the mother in this case? The gestational mother or the woman who donated the ovum? A Michigan judge has ruled that the donor of the ovum should be deemed the natural mother of the infant.

Racism and the demand for certain physical looks have protected women of color from being used as rented wombs. But with the new technologies of in-vitro fertilization and embryo transfer, many nonwhite women become possible surrogates. Couples would be able to hire poor Third World women to carry their child at spectacularly low wages.

Gena Corea, in her book *The Mother Machine,* quotes John Stehura from the Bionetics Foundation, who speculated that Third World women could be paid one-tenth the commercial U.S. surrogacy fee. Asked what countries he had in mind, Stehura replied, "Central America would be fine." A woman from the Third World who served as a surrogate womb could even have a serious health problem, he added, "However, if her diet is good and other aspects of her life are O.K., she could become a viable mother for a genuine embryo transfer."

Commercializing childbirth means that the dynamics of the market will enter directly into one of the few realms of our lives that had, up to now, resisted that intrusion. The rules of the capitalist market, when applied to women's bodies and reproductive power, institutionalize women as breeders and devalue motherhood. Surrogacy turns children into commodities—objects that can be bought, sold, or returned if defective. The commercialization of women's procreative power promotes the exploitation of women, especially low-income women and women of color, and constitutes an attack on the dignity of all human beings.

Opinion

THE WOBURN CASE

Health and Hazardous Waste

BY DAVID OZONOFF

There are certain places that go from obscurity to notoriety overnight on the basis of catastrophe. Three Mile Island, Love Canal, Times Beach, and Chernobyl are melancholy examples. And so is Woburn, Massachusetts, whose citizens have been burdened by more than their share of the worst kind of illness: illness of their children.

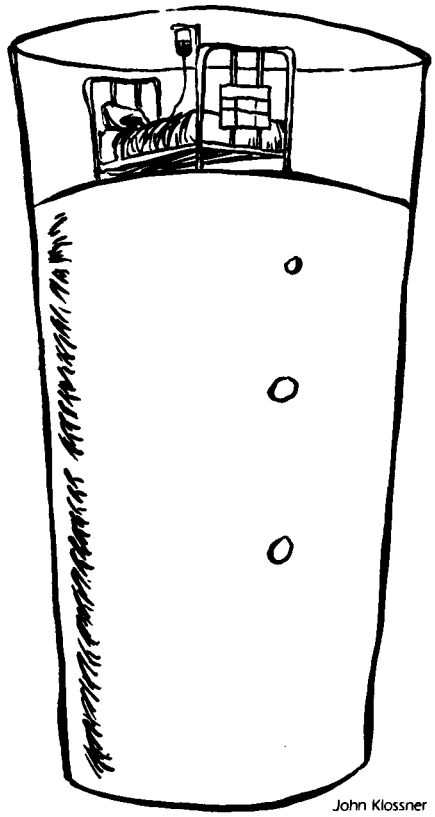
The "cluster" of childhood leukemia that struck Woburn was eventually associated with contamination of the domestic water supply by a variety of common chlorinated hydrocarbon solvents, among them trichloroethylene, tetrachloroethylene, and 1,1-dichloroethylene. The association was made, not by public health experts, but by the citizens of Woburn, whose persistence in the face of official indifference and denial eventually forced public health and environmental protection authorities to take the "Woburn case" seriously.

It is a formidable task to demonstrate causal connections between health effects and hazardous waste exposures, the more so when the disease involved is relatively rare, as is childhood leukemia. The branch of public health science that must make these connections, epidemiology, is a relatively new discipline that is rather insensitive to any but the strongest kinds of health effects.

The practice of epidemiology amounts to observing "natural experiments" that go on around us, not by design, but by accident. For example, while we cannot experiment with asbestos by exposing one group of people while keeping another free of exposure, we can observe the health experience of workers exposed to asbestos on the job. Since we are not dealing with a nice, controlled experiment, there is usually a great deal of "noise" in the system, which severely limits our ability to pick out a "weak signal." Thus health effects must be relatively powerful for us to see them with this method.

Hazardous waste situations compound the difficulties. Usually there is little in the way of exposure information, little information on what health effects to expect, and normally a relatively small, neighborhood-sized exposed population. Since the statistical power of our studies is related to sample size, this presents us with a very difficult problem. It is made worse when we have to look for rare conditions, like cancer, since the statistical power is worse when the "background rate" (the "normal" rate to which our group is being compared) is itself small.

Thus when the Reverend Bruce Young of Woburn's Trinity Church showed up at my office some time in 1979, carrying an impressive spot map of leukemia cases in a particular neighborhood in his town, I was less than encouraging. It was clear that something tragic was happening in Woburn.



John Klossner

Between 1969 and 1979, twelve cases of childhood leukemia had occurred in the town when only 5.3 were expected. The excess was due to six cases in one of the town's six census tracts in East Woburn. But at the time, I was at a loss to see how to attack the problem.

Fortunately for Woburn, the Reverend Young and Mrs. Ann Andersen, mother of one of the leukemia victims, persisted in their search for help. Eventually they succeeded in interesting Marvin Zelen, Steven Lagokos, and Barbara Wessen of the Harvard School of Public Health's Biostatistics Department in the problem. Using a water model developed by the state's environmental protection agency, they developed a new statistical analysis method that established a relationship between the availability of water from the two contaminated wells and the risk of leukemia.

Like everyone else, I followed the Woburn story through the newspapers, until eight families, whose children had leukemia and who themselves alleged illness, sued the companies thought responsible for the contamination of the wells. By that time, I had accumulated a good deal of additional experience working with communities on hazardous waste problems, and agreed to conduct additional studies for the plaintiffs' case in federal court.

The legal case was one of the most thoroughly prepared of any I have seen. It was also one of the most expensive. Despite the fact that it was not carried through to a verdict, a great deal was learned from the experience. The studies that were done have proved extremely valuable in investigating other chemical exposure situations, and the same techniques are now being applied elsewhere. Meanwhile, the citizens of Woburn continue to be concerned about the long-term consequences of the exposure to chemicals in their water supply. Additional studies of the town are now being proposed by state and federal agencies, as well as university researchers.

What, then, was learned from the Woburn trial? First and foremost, the Woburn experience once again emphasizes the crucial importance of giving full weight to the suspicions and concerns of communities. Citizens have proven that they know more and see farther than the

CONTINUED ON PAGE 32

David Ozonoff is Chief of the Environmental Health Section of the Boston University School of Public Health.

DRUG TESTING

A Rush to Judgment

BY LEW PEPPER

Hold on to your specimen. If United States Attorney General Edwin Meese has his way, all of us may be required to submit a urine specimen on demand and in full view of an examining officer. Such is the spectre haunting this country's forced march into a "drug-free America."

Before beginning our procession, with urine specimens in hand, a few significant aspects of substance use, abuse, and drug testing need to be examined. The current political climate in our country makes policies such as mandatory random drug testing appealing.

Ronald Reagan, in his September 15, 1986 Executive Order, "Drug-Free Federal Workplace," set the stage for far-reaching drug testing programs. The program he outlined, as well as the countless others already extant in the public and private sectors (it is estimated that 25 percent of the Fortune 500 companies have drug-testing programs), has three essential premises: that drug abuse is pervasive, it costs society, and drug testing will eliminate the problem.

Despite the warnings and incantations from on high about an epidemic increase of drug use in America, a closer analysis of the situation seems to indicate that the use of illicit substances has plateaued in the last few years.

It would be both dishonest and naive, however, to deny that substance abuse is a problem in our society. Unfortunately, the purveyors of the current quick-fix solution to drug abuse seem to miss the essential aspect of this question. Simple technological answers will not lead to appropriate remedies for complex social problems.

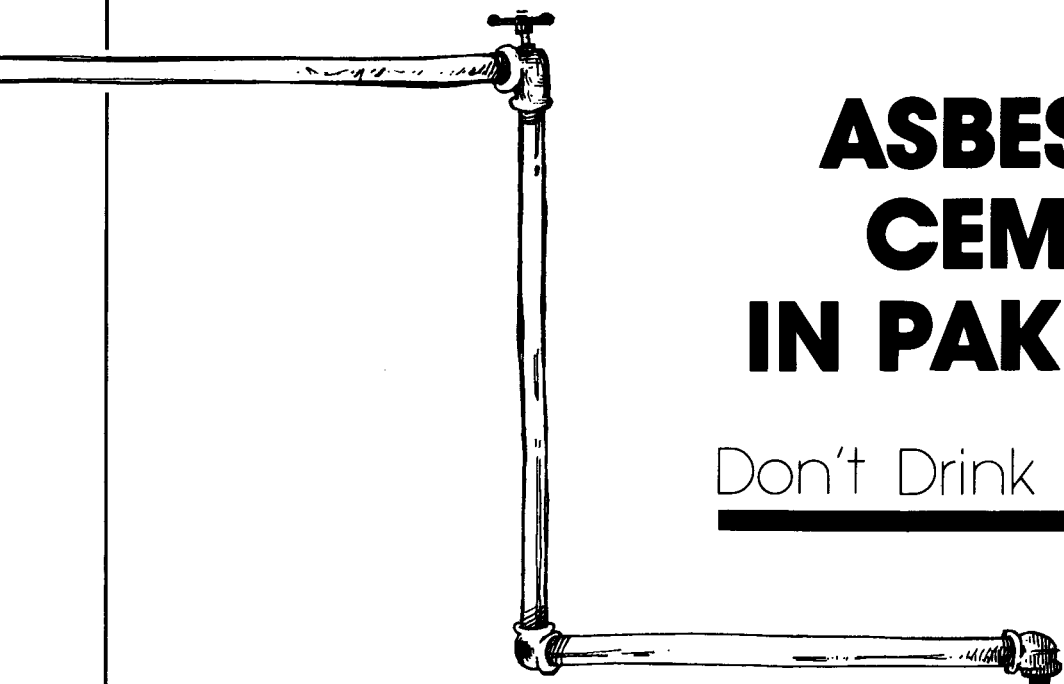
Similar appeals to our collective imagination are made regarding the alleged "cost" to society. Various analysts have claimed that from $15 to $65 billion is lost to society because of reduced productivity, decreased workplace safety, and increased health care costs. The accuracy of these projections is not clear.

The issue of drug testing is not an isolated phenomenon. The demand for creating a "drug-free" workplace along with increased productivity is part of the drive to be "competitive". Denying workers their Fourth Amendment right to privacy occurs alongside of union busting, demands for speedup, forced overtime, relaxation of basic safety provisions, and plant closures. It is clear that corporations are interested in controlling the workforce in order to accomplish their need for increased profits. Drug testing constitutes a part of that scenario.

The rush to test everyone's urine is fraught with serious problems. There are no studies to date which document that testing eliminates drug use, creates a safer work environment, or increases economic productivity. The claims of its supporters have never been documented in rigorous studies. It is interesting that the lack of any standard of proof was not considered important before establishing mandatory drug testing guidelines by the federal

CONTINUED ON PAGE 32

Lew Pepper is a physician at the Cambridge Hospital, which is affiliated with Harvard Medical School.



ASBESTOS-CEMENT IN PAKISTAN

Don't Drink the Water

BY SUSAN A. MOTLEY

The export of a potentially hazardous water pipe from the industrialized to the developing world may be exposing a large, unaware population to increased risk of cancer. While asbestos-cement (a-c) pipe may soon be totally banned from use in the United States, the Canadian-centered asbestos industry is actively promoting this product in Third World countries. The Lahore Development Authority (LDA) in Pakistan is one of the major users of a-c pipe.

Asbestos and its links to lung cancer and asbestosis were researched and well documented in both England and the United States during the first half of this century. In 1964, Dr. Irving Selikoff received widespread acceptance from the medical community when he presented conclusive evidence of its direct links to cancer. Nine years later, an international disaster alarm was sounded when the U.S. landmark case, Clarence Borel vs. Fibreboard Paper Products Corporation, exposed asbestos as one of the major causes of occupational cancer.

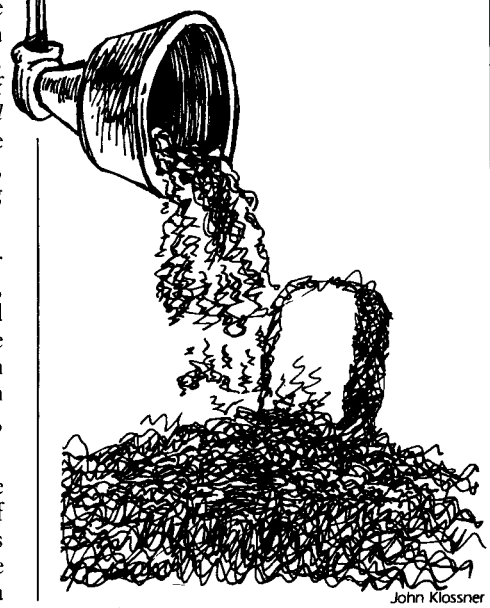
Immediately, U.S. federal and state agencies reacted by drastically restricting use of asbestos and implementing plans for removal and encapsulation to reduce the public's risk of exposure. More recently, the shutdown in December 1985 of Woodstock, New York's water system due to asbestos contamination has brought growing pressure from the public to replace all a-c pipe used in drinking water systems throughout the U.S. While the U.S. was apparently phasing out the use of a-c pipe over the last ten years, Lahore, Pakistan began a new construction project which has converted one-third of the city's water network to asbestos-cement pipe.

Granted, the dangers of ingesting asbestos are not yet as definitive as those for inhalation. Even if the body's digestive system is found to effectively eliminate asbestos particles, water-borne fibers may easily become air-borne in showers, humidifiers, and sprinklers. Also, as early as 1964, Dr. Selikoff reported in the April 6 issue of the *Journal of the American Medical Association* the higher-than-normal rates of stomach, colon, and rectum cancers among asbestos workers:

> "Twelve deaths from gastric cancer occurred among the asbestos workers, as compared with only 4.3 expected (among the general U.S. male population). Seventeen deaths from cancer of the colon and rectum occurred among the asbestos workers, as compared with 5.2 expected."

Perhaps Pakistani officials are not the only ones responsible for selection of such a highly questionable material as asbestos-cement. Western industries have tended to use Third World nations as a dumping ground, and the asbestos industry is certainly no exception. In many ways, it closely parallels the tobacco industry. Once tobacco started to become unacceptable in the West, the industry moved aggressively into the Third World, where it developed an extremely profitable market.

Since Canada is the world leader in asbestos exports, it is not surprising that the Canadian government and the country's asbestos industry have embarked on a campaign to capitalize on the market potential of the undeveloped world. One of their first acts was to hire Hill and Knowlton, the same public relations firm



John Klossner

Susan A. Motley is a freelance writer from Virginia. Her report on the tobacco industry's expansion into the Third World appeared in our January/February 1987 issue.

used by the tobacco industry when it attempted to discredit the negative publicity associated with smoking.

The industry also funds the Canadian Asbestos Institute, a research and propaganda organization whose president, Gary Nash, described the Third World market as "absolutely crucial" to the asbestos industry's survival. The Canadians criticize the U.S. Environmental Protection Agency's recently proposed total ban on all asbestos products because of the ripple effect such a move would have throughout the rest of the world. Such a ban would certainly impact their sales close to home, since Canada supplies 80 to 90 percent of all the asbestos used in the U.S.

Asbestos-cement pipe is one of the products that Canada hopes will be a big seller in developing countries. It is made of a mixture of either portland cement, portland blast-furnace slag cement, or portland-pozzolan cement, asbestos fibers, and silica. Accepted industry standards specify a series of quality assurance tests that measure its composition, strength, size, workmanship, finish, and chemical requirements. The latter is one of the most critical, since asbestos-cement pipe is susceptible to external and internal corrosion from acidic soils and aggressive water, defined as having low alkalinity, high acidity, and low hardness levels.

To counteract this tendency to corrode, the pipe can be lined with plastic. This is not a fail-safe solution, however, since liners can also corrode and contaminate the water. Such was the case with epoxy-lined pipe used in the Middle East during the late 1970s. Tests proved the resin was poorly mixed and unevenly applied and cured. This lack of quality control probably weakened the resin; making it susceptible to the corrosive effects of the soil's highly soluble salt content and the aggressiveness of the water.

The asbestos industry argues that any slight risk that may exist is far outweighed by the advantages of bringing drinking water to millions of people in the Third World. Since asbestos-cement pipe can be produced relatively easily and is extremely durable, the industry typically argues that it is the ideal product for developing countries. Most Third World countries have neither the resources nor the facilities for manufacturing polyvinyl chloride pipe (PVC), which is now in widespread use throughout the industrialized world. However, some Third World countries, including Pakistan, do have active, productive PVC plants.

Another favorite claim of the industry is that asbestos-cement pipe is cheaper and therefore more likely to be affordable for financially strapped Third World governments. In contrast, local inquiries reveal that U.S. construction contractors view a-c pipe as obsolete technology with about the same cost as PVC pipe. Over the last ten years, they have switched almost exclusively to PVC pipe because it is easier and faster to install, and provides substantial savings in labor costs.

As pipes age and corrode, more asbestos particles are released into the flow of water. Reportedly, Pakistan's poor installation practices exposed workers to asbestos dust and increased the risk to the water supply. The absence of long-range planning by the Lahore Development Authority has meant that each time a new housing development is connected to the system, more holes are drilled into the pipe, releasing asbestos fibers into the air and water.

Replacement of asbestos-cement pipe presents problems of its own. Of course, there is the expense; but if left in the ground, the pipe might eventually leach and contaminate the ground water. If removed, fibers will be released into the air. Finding a disposal site is another safety requirement that carries many hazards.

Dr. M.A. Qadeer of Queens University in Canada speculated, in a recent issue of the Pakistani journal *Viewpoint*, that the decision to install asbestos-cement pipe in Pakistan was probably made "almost absent-mindedly, though with great self-confidence." The country's military regime has elevated its government officials to a position of immunity. Since they cannot be held accountable by the populace, a lecture from a fast-talking foreign salesman, followed by a trip abroad by a team of government officials, may be all that goes into many vital aspects of city planning.

It appears that no scientists were consulted in Lahore before the pipe was purchased, nor is there evidence that engineers were asked to develop long-range plans for the city's water network. There is no indication that anyone studied the aggressive quality of the water or the soil composition of Lahore to determine how corrosive they would be to asbestos-cement.

Apart from Lahore, there are other cities in Pakistan and in other developing countries where a-c pipe continues to be installed. For example, the July 20, 1986 issue of *Middle East Business Intelligence* carried an announcement for bids on an extension project for Taroudant, Morrocco's water distribution system. It specified the use of asbestos-cement water mains.

Keeping in mind the way bureaucracies work in Third World countries, the local media may attempt to press for the testing and monitoring of water for asbestos content. The Pakistan Center for Scientific and Industrial Research could easily assist in establishing a water monitoring system. People in areas where the asbestos level is above the 7.1 million fibers per liter U.S. Environmental Protection Agency standard should be advised to use alternative sources of water until the problem is rectified. In addition, pressure groups within these countries should demand a halt to new installations and the initiation of a program to replace existing pipe.

The absence of long-range planning has meant that each time a new housing development is connected to the system, more holes are drilled into the pipe, releasing asbestos fibers into the air and water.

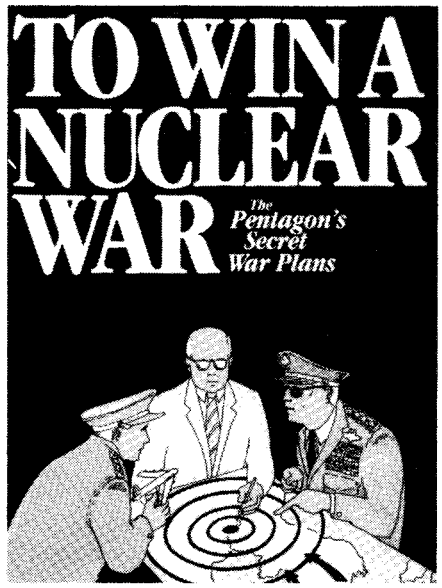
Financing such a replacement project is a problem. Even more difficult but crucial, however, is the need for genuine political changes that will encourage government officials to be accountable to the public, free inquiry, and open hearings. Decisions should be made based on carefully considered information on available alternatives. Long-range planning should be conducted with the assistance of qualified local and, if necessary, foreign scientists and engineers. Third World countries should not be exposed to hazards, like asbestos-cement pipe, which are being banned in industrialized countries.

To Win a Nuclear War

The Pentagon's Secret War Plans

By Michio Kaku & Daniel Axelrod
South End Press, Boston, 1987

REVIEWED BY GARY KEENAN



If war is an extension of politics, then nuclear war represents an absolute limit to our political development. This limit is both material and moral. Nuclear weapons are the most violent technologies in existence, capable of killing and devastating the environment on a scale humankind has only encountered in the mythic imagination. It is rather unlikely that our forms of government, our social institutions, and our individual psyches will survive a major nuclear war, or survive in any way worth pursuing. The material havoc, through blast, radiation, and climatic changes, would alter the biosphere as irrevocably as an ice age or meteor impact.

The crucial difference in the case of nuclear war is the presence of human will. And this means that our species faces a moral crisis as well as a material one. Regardless of talk about "surgical" strikes, tactical versus strategic weaponry, neutron bombs or cruise missiles or X-ray lasers, these technologies all serve strategies of genocide. Every nuclear state, and the citizens of those states, must face the implications of their preparations for mass murder. Any equivocation of this moral fact will make the arms race nearly impossible to reverse.

In the U.S., the lines of conflict are in sharp relief. We have an oligarchy growing more militaristic in its economic and diplomatic character. We devote unprecedented resources to building ever more thorough and baroque tools of holocaust: Star Wars systems, Trident subs, stealth bombers. Yet the resistance to this pursuit of evil is also unprecendented, including thousands of scientists and engineers who have pledged to boycott Star Wars research contracts. The opposition to U.S. intervention in the Third World, both in Latin America and the Middle East, has clarified the role of our nuclear arsenal as our ace-in-the-hole when we gamble on contras, mujahedeen or our own Rapid Deployment Force.

Two of the most consistent voices in this opposition, Michio Kaku and Daniel Axelrod, both professors of physics, have written a concise history of U.S. nuclear war policy, from Truman's nuclear-fueled boldness at Potsdam in July 1945 to Reagan's efforts to regain the superiority enjoyed (and continually wielded) by Truman, Eisenhower, and Kennedy. The authors' use of declassified material, acquired from the Pentagon through the Freedom of Information Act, makes for chilling portraits of men whose opinions and actions have kept our country prepared for "the nuclear option" over the last four decades.

Kaku and Alexander divide this period into three eras: Massive Pre-emption (1945-1960); Mutually Assured Destruction (1960-1974); and Counterforce (1974-present). These are the three basic scenarios for nuclear combat, and so play determining roles in the diplomacy of nuclear states. Each era's war-fighting strategy, based on available technologies and global politics, generated arms competition to compensate for possible defeat.

One of the clearest messages of *To Win A Nuclear War* is that generals are trained to win wars, not prevent them or eliminate them. Nuclear war is no exception, no matter how often a Reagan or Gorbachev declares otherwise. In the first era, the generals looked to World War II as a model for victory: bombs delivered by plane, a focus on political tensions in Europe and the Soviet Union's southwest frontier, and targeting major population centers for destruction.

This era was probably the most dangerous. The U.S. faced little chance of attack or retaliation just after the war. Truman and Eisenhower could establish nuclear weapons as our enforcer in foreign policy disputes. Actual defense of the homeland was, and still is, largely left up to the Atlantic and Pacific oceans. Even after six years of Reagan, only one of 21 Army and Marine divisions is trained and outfitted for American combat, in Alaska.[1] This is because of our largely successful effort to establish our defense perimeter on the ruins of the French and British empires. Our forward bases in Germany, Greece, Turkey, Iran and other countries on the Sino-Soviet periphery assured us an advantage in delivering nuclear bombs by plane.

Through these bases we began to develop nuclear weapons as a tool of "escalation dominance," the practice of controlling a conflict by asserting the power to overwhelm the enemy at the next level of conflict. The U.S. used nuclear blackmail to keep Iran and Turkey firmly under our domination. We offered our arsenal to the French during the siege of Dien Bien Phu.

Kaku and Axelrod also describe instances when Truman, then Eisenhower, and their top advisors contemplated surpise attacks on the Soviet Union and China. During a prolonged stalemate in Korea in 1953, Eisenhower and the Joint Chiefs of Staff endorsed such a plan if our fortunes in conventional combat worsened, targeting cities in Korea, China, and Russia. And the presence of Chinese troops in the Korean War made that confrontation particularly volatile.

Direct superpower conflict approaches the highest plane of escalation, although nuclear weapons are primarily made and used for other reasons. They play a leading role in our "permanent war economy," requiring resources that could be devoted to peaceful technologies, agricultural and industrial development, public health, and education. In some ways they are more like monuments than weapons—icons of greed and absolute tyranny, useful symbols of the state's deadly power over its enemies and friends alike. The political power these weapons incorporate allows the U.S. to secure foreign economies to provide the consumer goods and labor necessary to sustain a semblance of prosperity at home.

Gary Keenan is the business manager at Science for the People.

But the decline of our domestic civilian economy is becoming more evident. In seven out of ten technology-oriented industries, the U.S. has been falling behind its international competition. While this has happened, military research has risen at a rate of 62 percent above inflation, while civilian research funding has fallen by 10 percent.[2]

This downturn has its origins in the second period designated by Kaku and Alexander, that of Mutually Assured Destruction (MAD). By 1960, the Soviet Union acheived the likely ability to strike at the U.S., no matter how many bombs we rained on them. Since even a few nuclear bombs would impose severe damage, this spurred strategists in the Pentagon to develop more complex war plans. In public fora, most analysts emphasized MAD as the rationale for the weapons' existence; building them guaranteed that they could not be used. Privately, the Pentagon began to search for ways to enhance the credibility of the nuclear option.

Sending out waves of bombers to pulverize 200 cities was not the most flexible plan. So a missile gap was created (at a time when our advantage stood at ten-to-one) to encourage the acquisition of more delivery systems. Robert McNamara's Defense Department began overhauling the massive retaliation plans into more flexible, multi-option plans for fighting nuclear war, emphasizing counterforce targeting, tactical weaponry such as nuclear artillery and landmines, and limited war scenarios. Such options were accompanied by improvements in satellite intelligence and guidance systems.

During this period, the Cuban missile crisis showed the world the stakes involved in nuclear poker. The confrontation began when U.S. missiles arrived in Turkey, to which the Soviets responded, stationing missiles in Cuba. Tensions escalated so rapidly that it was clear to both sides that any armed conflict would likely lead to nuclear war. Yet Kennedy's advisors were recommending an invasion of Cuba.

Kennedy's (and Khrushchev's) reluctance to initiate nuclear war led to a mutual withdrawal of missiles. For years this incident was portrayed as nervy victory for the U.S., proof that nuclear muscle was needed to contain the Reds. Kaku and Axelrod detail more ambiguous outcomes. Both sides were determined not to get caught in another such faceoff. The Pentagon was distressed that there seemed to be no way of containing armed conflict over Cuba once it commenced, and no way of delivering a decapitating blow and remaining unscathed. The humiliation of Khrushchev led to his downfall, but it also precipitated a major arms buildup in the USSR to preclude another embarrassment.

The Soviets gained approximate parity of forces in the early 1970s. Parity is unacceptable to U.S. strategists, so the push for a new degree of superiority began. This involved not only more accurate and powerful missiles, multiple warheads, and other technical advances. Now counterforce, the goal of striking at enemy missile systems, assumed new prominence. Slow-moving bombers and ICBMs with reasonable accuracy could devastate cities. Silo-busting, submarine

CONTINUED ON PAGE 32

In Brief

Vaulting Ambition

Sociobiology and the Quest for Human Nature

by Philip Kitcher

MIT Press, Massachusetts Institute of Technology, Cambridge, MA 02142, 1985 (1987 paperback edition: $12.50)

Sociobiology has presented a formidable challenge to progressive scientists since its articulation by E.O. Wilson in his 1975 book, *Sociobiology: The New Synthesis.* The challenge has not been primarily scientific. The rebuttals by Stephen Jay Gould, Richard Lewontin, Anthony Leeds and others have exposed this latest gloss on the "scientific" basis for sex and race inequality as a pseudo-science, in which metaphors drawn from observed animal behaviors are mixed with general genetic theorizing to justify the sociobiologist's biased view of human society.

As Philip Kitcher points out in his masterly analysis of sociobiology, this "pop" version of biological determinism persists in our culture for reasons that have little to do with social or biological science, but much to do with power, its rationalization and distribution.

Kitcher considers the debate about the genetic basis for social behaviors, distinguishing the valid contributions sociobiology has made to investigations of animal behavior from its reckless and grandiose "synthesis" of human biology and society. He examines the methodologies of researchers and consistently finds that those working on nonhuman behavior take a more conservative, cautious approach, in which the problems of human-animal interface are acknowledged by the observers. But such research does not produce headlines or best sellers.

Evolutionary genetics, philosophy, sociology, and common sense are applied with dexterity in Kitcher's lucid prose. The final chapters, concentrating on the ethical dimensions of the controversy, are particularly good, as Kitcher outlines Wilson's misuse and misunderstanding of Rawls' *A Theory of Justice,* as well as the degree to which sociobiology betrays its ambitions when it attempts to provide ludicrous mathematical models of cultural change.

Just published in paperback, *Vaulting Ambition* presents a thorough account of one of the most acrimonious scientific debates of our time. Kitcher stays remarkably dispassionate, yet his rigorous treatment of both sides of the controversy gives hope to those who see science as a means of expanding and improving human possibility. The lesson of sociobiology is that human nature remains a mystery. Whether or not a serious inquiry into the biological basis for social goals like justice, cooperation, and equality is possible depends on how scientists face the responsibilities of science and human society.

—Gary Keenan

Behind the Poison Cloud

Union Carbide's Bhopal Massacre

by Larry Everest

Banner Press, Box 6469, Chicago, IL 60680, 1986, $8.95 paperback

In the deluge of information that bombards us, even the worst industrial massacre in history can get lost. Larry Everest's personal witness to the aftermath and his analysis of the Bhopal disaster jar us back into reality.

Everest traveled to Bhopal shortly after the fatal release of methyl isocynate at Union Carbide's pesticide factory on December 2 and 3, 1984. Based on his investigations and interviews of Union Carbide officials, government bureaucrats, environmentalists, victims, workers, residents, and health care providers, an account emerges not only of the specific events themselves, but also of the ongoing context of exploitation and irresponsibility—a context that makes Bhopal a likely outcome, not an exceptional one.

After graphically describing the human toll, Everest details the physicochemical roots of the toxic-chemical release. Unavoidably, this discussion leads to an exposé of the plant's sloppy engineering design and operations. This situation is typical of so-called technology transfers (also known as "dumping") from industrialized to poor nations, in which the double standard of the different value of human lives in those two kinds of countries applies.

Everest, of course, does not say that comparable plants—like the Carbide plant in Institute, West Virginia—in Western countries are safe; in fact, he shows just the opposite. Yet, his case study of Union Carbide in Bhopal clearly shows that multinationals go to Third World countries, in part, because they know they can get away with lax health, safety, and environmental practices—which helps in keeping up their profit margins.

Of course, the multinationals could not go about their business in Third World countries without help, both from those local elites who stand to profit from the multinationals' presence and from a justifying ideology—in this case, the Green Revolution and the empty notion of "development." What is a pesticide plant owned by a giant corporation doing in the middle of India? Why are there densely-populated slums adjacent to such a facility, and why are there such tracts of human misery at all?

Everest answers these questions in the context of the specific facts of Bhopal, India, demonstrating in the process who benefited from the plant and who didn't. He shows why the Bhopal disaster was not accidental: "the logic of profit maximization and imperial domination shaped all the various components of the catastrophe—from the plant's design and location, to its day-to-day operational procedures and whole history, to the way the corporation reacted on the night of horror itself, to its actions in the wake of the gassing. In this sense, the disaster in Bhopal was not so much a tragedy as a crime; not so much a 'unique combination of unusual events' as a horrifying and concentrated illustration of the essential operation of imperialism; not so much an accident as a massacre."

—Joseph Regna

Contemporary Moral Controversies in Technology

edited by A. Pablo Iannone

Oxford University Press, New York, 1987, $12.95 paperback

Here is a collection of over thirty previously published articles, gathered from a diverse range of sources, on controversial issues in science and technology. Although primarily intended for college ethics or science and society courses, it makes valuable reading for anyone interested in science and public policy.

The book focuses on problems involving social ethics rather than individual ethics, dealing with the justifiability and morality of the policies, practices and norms of groups and institutions. For example, whether or not a worker blows the whistle on an employer's illegal or dangerous practices is a question of individual ethics. The social ethics side of the issue is what protections a society should offer to whistle-blowers.

The editor has carefully attempted to select articles from a wide variety of political and social perspectives, while recognizing that neutrality is neither possible nor necessarily desirable. Among the many issues discussed are: the uses and abuses of risk-cost-benefit analysis, the relationship between robotics and unemployment in factories, the morality of nuclear deterrence,

university/corporate research agreements, and appropriate technology.

One of the most powerful contributions is an article by Robert Sinsheimer on the long-term dangers from genetic engineering, which are often ignored in regulatory proceedings and policy analysis. Sinsheimer asks if we really want to turn the earth into one big experiment, treating life as our plaything. Another noteworthy article is a review by Lois Ember of the political and legal issues involved in the government's efforts to restrict or classify more and more scientific knowledge for the sake of "national security".

This book does a good job in covering a broad range of controversial issues from various perspectives. However, one area that seems to have been overlooked is the question of who participates in science and science policy. For example, no articles deal with the under-representation of women and minorities in science, nor do any directly address the barriers to, and possible mechanisms for, greater involvement by the public and interest groups in setting science policy.

—Gary Marchant

Weaponry in Space

The Dilemma of Security

produced by the Soviet Scientists' Committee for the Defense of Peace Against Nuclear Threat

edited by Yevgeni Velikhov, Roald Sagdeev, and Andrei Kokoshin

Mir Publishers, Moscow, 1986
distributed by Imported Publications, 320 W. Ohio St., Chicago, IL 60610, $8.95 hardcover

Since Ronald Reagan's "Star Wars" speech in March 1983, the Soviet Union has produced many pamphlets and publications strongly criticizing the Strategic Defense Initiative on scientific, strategic, political and moral grounds. *Weaponry in Space: The Dilemma of Security* is the latest Soviet offering, and it is by far the most thorough, authoritative, and forceful presentation of the Soviet case against Star Wars to date. The report was written by 25 top Soviet experts, including several top members of the prestigious and politically influential USSR Academy of Sciences.

The first half of this book is very technical, with pages of mathematical equations and physical formulas explaining the capabilities and limitations of potential Star Wars systems and weapons. There is a heavy emphasis on laser and particle beam weapons, although these "exotic" weapons have recently been de-emphasized by the Strategic Defense Initiative Organization in favor of more readily deployable kinetic weapons. However, the book also makes a convincing argument about the technical limitations of kinetic and all other possible Star Wars weapons, and describes steps the Soviets could take to counteract such weapons.

The most useful and interesting part of the technical discussion is the Soviet response to the question: "If Star Wars won't work, then why are the Soviets so worried about it?" The Soviet experts answer this frequently asked question in two ways. First, Star Wars will force the Soviets to develop expensive countermeasures that will further burden the Soviet economy. The authors do point out, however, that the cost of Soviet countermeasures will likely be only a fraction of the cost to the Americans for deploying Star Wars in the first place.

Second, and more importantly, even if Star Wars is deployed and then effectively neutralized by Soviet responses, the net effect will be a much more unstable "strategic landscape". The available reaction time in a crisis will be shortened, more and more important decisions will have to be made by computers, and space will become the newest and probably most dangerous flashpoint for the outbreak of superpower conflict. The end result of Star Wars will be a much higher risk of nuclear war, "among other things due to accidental errors in strategic assessments and possible self-activation caused by failures in components."

Perhaps the most interesting sections are those that deal with the possible offensive uses of Star Wars. One chapter notes that Star Wars is being accompanied by the deployment of large numbers of highly accurate MX and Trident II warheads, and discusses the important "back-stopping" role Star Wars would have in a U.S. first strike attack. Another chapter considers the possibility of Star Wars weapons themselves being used for an offensive attack. Space-based Star Wars lasers could be used to attack airplanes, and possibly even some land-based structures.

An even more ominous possibility is that a fleet of space battle stations might someday be secretly equipped with small, nuclear-armed missiles that could be fired from space at targets on the ground below. Such missiles would only take about one minute to reach their target, although they would not be as accurate as land-launched missiles because of their re-entry angle. Ironically, such a scheme would be the ultimate countermeasure to Star Wars, since such missiles would entirely circumvent the opponent's own space-based defenses designed to "look down" and intercept ballistic missiles on their way up into space.

One frustration about this and other Soviet publications on military matters is the failure to discuss or even mention Soviet weapon systems or activities. The Soviets have a limited land-based ballistic missile defense system deployed around Moscow as permitted by the 1972 ABM Treaty. The Pentagon has greatly exaggerated the significance of this system and has charged that the Soviets have a more extensive Star Wars program than does the U.S.

The Soviet authors obliquely address such accusations when they point to the "qualitative distinction" between limited land-based defenses of a single site (which the Soviets have built) and comprehensive boost phase defenses deployed in space (as envisioned by Star Wars). Most western scientists agree with the Soviets that this latter type of ballistic missile defense is far more destabilizing and threatening than the former.

Nevertheless, the Soviets will continue to be vulnerable to misrepresentations until they are willing to freely disclose and address the scope and nature of their own military programs (rather than leaving it to the Pentagon to do so). The unwillingness to openly discuss Soviet arsenals robs Soviet experts, and books such as this, of the credibility they otherwise deserve.

—Gary Marchant

REVIEW

CONTINUED FROM PAGE 29

hunting, and destroying missiles in flight required a more dizzying array of weapons and a new justification for their development.

In the third part of *To Win a Nuclear War*, the authors bring out the institutional nature of our premeditations for mass murder. Their account of Jimmy Carter's naive order to the Joint Chiefs of Staff to reduce our arsenal to 200 warheads (all that is needed for true deterrence) is particularly instructive. Of course, the generals and admirals demurred on that suggestion. And Carter matured enough to rattle the nuclear saber over Iran and the Persian Gulf and begin our current push toward first-strike capability.

Enter Ronald Reagan and Company. Though the move toward first-strike capability began with Jimmy Carter and Zbigniew Brzezinski, it has been Reagan and his cohorts who have brought us out of the post-war era and into the "pre-war" mindset that so threatens our planet.

That men in leading positions of power and prestige assume the inevitability of nuclear war and the sacrifice of tens of millions of human beings is symptomatic of a wider moral vacuum in our political and economic system. Reagan has presided over the widening of this void, behind his telegenic image and rhetoric of traditional values. Any government that asks its citizens to accept millions of hungry and homeless, and whose leaders show such contempt for what rituals of democracy we have left, does not inspire trust as the guardian of the machinery of genocide.

Kaku and Alexander raise questions they cannot answer. Given the presence of nuclear weapons in the world, and given that generals should try to anticipate winning any likely conflict, how should the military regard nuclear weapons? What resources can we draw on to dismantle these weapons, if that is desirable? What within our culture allows our esteemed leaders to plan the deaths of millions of people?

By clarifying what it means to build and maintain a nuclear arsenal, and by recounting the number of times we have stood at the brink of war, Kaku and Alexander have conveyed the urgency of opposing the nuclear warfighters. They have offered much material, restoring much history to us. But their sense that time is running out on opportunities to prevent nuclear war makes for a persuasive call to action. We face difficult questions. Not finding answers will be more difficult still.

WOBURN

CONTINUED FROM PAGE 22

"experts." To dismiss their concerns as the rantings of "hysterical housewives" is the height of irresponsibility, although this is, unfortunately, still a common practice on the part of many public health officials, who neither understand the problem nor know how to cope with it professionally.

Second, we have learned that the tort system is a valuable and important mechanism that can enable us to learn more about a problem, not just a vehicle for avaricious lawyers to profit from human misery. Litigation-driven science is highly applied and focused, but it can be enormously useful and generalizable, as the Woburn experience demonstrates.

Finally, we can learn from the courage and persistence of the Woburn citizens who have never given in to the calamity that has befallen them. Through their effort to stop it and prevent its recurrence in their own community, they have helped make all communities safer.

DRUG TESTING

CONTINUED FROM PAGE 23

government and industry. One can only wonder why there is such a demand for "scientific" proof when efforts are made to regulate numerous proven workplace carcinogens.

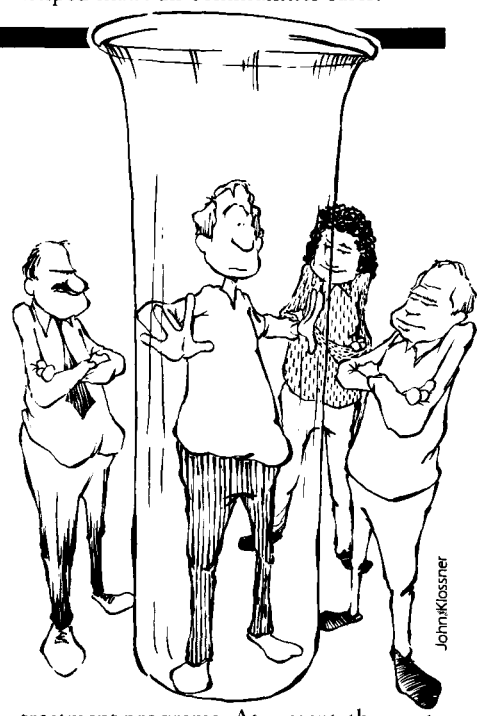
Drug testing has other significant problems. First, specimens must be properly identified. This requires an individual watching while a worker urinates. We can call this urine watcher a micturition observer. It is not clear that there were micturition observers present when Cabinet members and the President submitted their specimens.

Not every test result is guaranteed. Depending on the type of test performed, there may be numerous false positives and negatives. Consequently, individuals who are drug free can be falsely accused of drug use and denied employment or fired. Furthermore, the results of urine testing are essentially qualitative. Impairment can neither be presumed nor diagnosed on the basis of a urine test. Therefore, claims that testing can provide for a safer workplace rest on shaky grounds, since the tests cannot answer or address job performance.

A urine test cannot determine when a drug was taken or how much substance an individual used. It cannot distinguish between a recreational user and a habitual user. It may indicate, however, what one did while at home and not on duty.

Most drug-testing programs do not test for alcohol. This occurs in spite of the fact that alcohol continues to be the most widely abused drug in the workplace, causing the gravest safety and medical problems.

The cost to society for drug testing may run into the billions. This comes at a time when the Reagan Administration has reduced funding for positive and creative attempts at dealing with the problem, such as drug education and



treatment programs. At present, the most vociferous supporters of drug testing, professional drug-abuse consultants and drug-testing laboratories, are the ones who stand to make the greatest financial gains.

Mandatory drug testing constitutes an unlawful search and seizure and is in violation of the Fourth Amendment of the U.S. Constitution. Furthermore, the threat of testing can be used to intimidate worker activists.

The mad rush to fill up our specimen cups for mandatory drug testing needs to be stopped before serious harm is inflicted on its victims. In place of mindless horror stories about the evils of drugs and their destructive impact on our economy, we must stop and thoughtfully examine the issues. A social problem cannot be dealt with by the use of police tactics and technological solutions.

Mandatory random drug testing must be opposed. Funding needs to be directed towards intelligent drug education programs. Saying no is not enough.

Network

CONTACTS

NATIONAL OFFICE: Science for the People, 897 Main St., Cambridge, MA 92139. (617) 547-0370

CALIFORNIA: Science for Nicaragua, c/o Robert Van Buskirk, 1627 Euclid St., Berkeley, CA 94709. (415) 549-1233. Dave Kadlecek, Box 390871, Mountain View, CA 94039. (415) 960-3639

DISTRICT OF COLUMBIA: Miriam Struck and Scott Schneider, 9311 Sudbury Road, Silver Spring, MD 20901. (301) 585-1513. Wanda Katz Fishman, 6617 Millwood Rd. Bethesda, MD 20817. (301) 320-4034.

FLORIDA: Bob Broedel, Progressive Technology, Box 20049, Tallahassee, FL 32316. (904) 576-4906

IOWA: Paul C. Nelson, 604 Hodge, Ames, IA 50010. (515) 232-2527

MARYLAND: Pat Loy, 3553 Chesterfield Ave., Baltimore, MD 21213

MASSACHUSETTS: Boston Chapter, 897 Main St., Cambridge, MA 02139. (617) 547-0370

MICHIGAN: Ann Arbor Chapter, 4318 Michigan Union, Ann Arbor, MI 48109. (313) 761-7960. Alan Maki, 1693 Leonard St. N.W., Grand Rapids, MI 49504

MISSOURI: Peter Downs, 4201 A Russell, St. Louis, MO 63110

NEW HAMPSHIRE: Val Dusek, Box 133, Durham, NH 03824. (603) 868-5153

NEW YORK: Red Schiller, 382 Third St., Apt. 3, Brooklyn, NY 11215. (212) 788-6996. **Stony Brook Chapter,** Box 435, E. Setauket, NY 11733. (516) 246-5053

NORTH CAROLINA: Douglas Bell, 2402 Glendale Ave., Durham, NC 27704. (919) 471-9729

OREGON: Sheila Smith, 925 NW Merrie Dr., Corvalis, OR 97330

RHODE ISLAND: Carolyn Accola, 245 President Ave., Providence, RI 02906. (401) 272-6959

TEXAS: Ed Cervenka, 3506 Manchaca #211, Austin, TX 78704. (512) 447-9481

VERMONT: Steve Cavrak, Academic Computing Center, University of Vermont, Burlington, VT 05405. (802) 658-2387; 656-3190

WASHINGTON: Phil Bereano, 13B Loew Hall, FH-40, University of Washington, Seattle, WA 98195. (206) 543-9037

AUSTRALIA: Brian Martin, STS, Wollongong University, Wollongong NSW 2500, Australia. Telephone (042) 27076. Lesley Rogers, Physiology Dept., U. of New England, Armidale NSW 2351, Australia. Janna Thompson, Philosophy Dept., La Trobe University, Bundoora, Victoria, Australia. Tony Dolk, 17 Hampden St., Ashfield NSW, Australia.

BELGIUM: Gerard Valenduc, Cahiers Galilee, Place Galilee 6-7, B-1348 Louvain-la-Neuve, Belgium

BELIZE: Ing. Wilfredo Guerrero, Ministry of Public Works, Belmopan, Belize, Central America

CANADA: Ontario: Science for the People, Box 25, Station A, Scarborough,Ontario, Canada M1K 5B9. **Quebec:** Bob Cedegren, Dept. of Biochemistry, University of Montreal, Montreal 101, Quebec, Canada. **British Columbia:** Jim Fraser, 848 East 11th Ave., Vancouver, British Columbia V5T 2B6, Canada

DENMARK: Susse Georg and Jorgen Bansler, Stigardsvej 2, DK-2000, Copenhagen, Daneland 01-629945

EL SALVADOR: Ricardo A. Navarro, Centro Salvadoreno de Tecnologia Apropriada, Apdo 1892, San Salvador, El Salvador, Central America

ENGLAND: British Society for Social Responsibility in Science, 25 Horsell Rd., London N5 1XL, England. Tel. 01-607-9615

INDIA: M.P. Parameswaran, Parishad Bhavan, Trivandrum 695-001, Kerala, India

IRELAND: Hugh Dobbs, 28 Viewmont Park, Waterford, Eire. 051-75757

ISRAEL: Dr. Najwa Makhoul, Jerusalem Institute for the Study of Science, 6 Bnai Brith St., Jerusalem 95146, Israel

ITALY: Michelangelo DeMaria, Via Giannutri 2, 00141, Rome, Italy

JAPAN: Genda Gijutsu-Shi Kenkyo-Kai, 2-26 Kand-Jinbo Cho, Chiyoda-Ky, Tokyo 101, Japan

MEXICO: Salvador Jara-Guerro, Privada Tepeyac-120-INT, Col. Ventura Puente, Morelia, Mexico

NICARAGUA: New World Agriculture Group, Apdo 3082, Managua, Nicaragua, Central America. Tel. 61320

SWITZERLAND: Bruno Vitale, 8 Rue Des Bugnons, CH-1217, Meyrin, Switzerland. Tel. (022) 82-50-18

WEST INDIES: Noel Thomas, Mt. Moritz, Grenada

WEST GERMANY: Forum fur Medizin Und Gesundheitpolitik, Gneisenaustr., 2 Mehnighof, 100 Berlin 61, West Germany. Wechsel Wirkung, Gneisenaustr., D-1000 Berlin 61, West Germany

Science Resource Center
897 Main Street
Cambridge, MA 02139

Nonprofit Org.
U.S. Postage
PAID
Boston, MA
Permit No. 52696

Science Resource Center

PUBLICATIONS

Decoding Biotechnology

An essential guide to the issues posed by new genetic engineering technologies. Questions concerning hazards and benefits, biological warfare, reproductive technologies, corporate influence over research and development, and the need for public involvement are given comprehensive treatment. Recommended for classroom use. **$4.00**

Computing the Future

A unique collection of articles on computers and the high-tech industry, focusing on computers and the military, industry health and safety, and a special section on computer use in schools. An excellent educational resource. **$4.00**

Biology as Destiny: Scientific Fact or Social Bias?

A provocative look at the controversies surrounding genetic theories of human behavior. A collection of eight articles produced by the Sociobiology Study Group. Recommended for personal or classroom reading, and as a resource for the Sociobiology Study Group's slide/tape show, "Fate or Fiction." $4.00

Feed, Need, Greed

The classic high school curriculum guide on hunger, population, and food resources. **$5.50**

Science for the People Magazine

For 18 years, the only national magazine devoted to the political significance of science and technology. Bimonthly. **$15/year**

Also available from SRC

Fate or Fiction: Biological Theories of Human Behavior

A 30-minute slide/tape presentation for college, high school, and community groups. Explores the link between genetics and behavior, exposing the use of science to rationalize social and political inequalities. **Purchase: $150. Rental: $35**

Science and Journalism: Covering Controversy in Science

Addresses by scientists and science writers on the media's coverage of AIDS, Star Wars, sex role research, yellow rain, genetics and crime. Speakers include Stephen Jay Gould, Leon Kamin, Matthew Meselson, Jon Beckwith, Jerome Groopman, Kosta Tsipis, Vera Kistiakowsky, Anke A. Ehrhardt. VHS video tapes, cassette audio tapes, and printed transcripts are available. Send SASE for order form and complete list of titles and prices.

Please add $1 postage and handling for each title. Discounts available for bulk orders.

Send orders, with payment, to:

SCIENCE RESOURCE CENTER
897 Main Street
Cambridge, MA 02139
617/547-5580