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SCIENCE FOR THE PEOPLE

Vol. 20 No. 5

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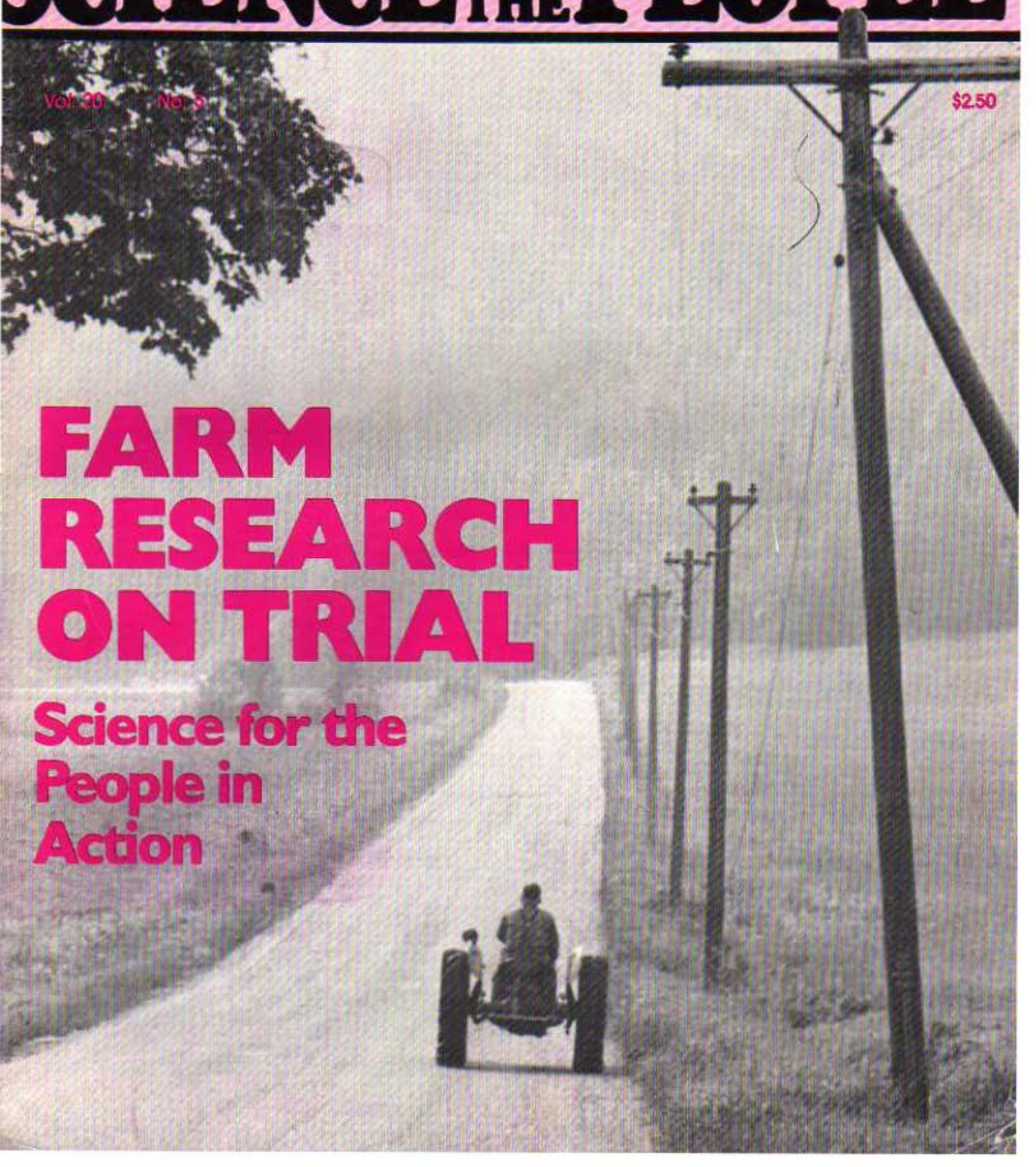

FARM RESEARCH ON TRIAL

Science for the People in Action

Letters

Guinea Pigs in Prison

Dear SftP,

It was with great interest that I read your article "Human Subjects: America's Nuclear Guinea Pigs," by Lew Gurman (September/October 1988). The most remarkable thing about the fact that prisoners were used in dangerous, if not deadly, medical experiments isn't so much the fact that they occurred, but that they aroused little controversy both now and at that time. When German scientists conducted similar experiments on captive subjects, many were hanged at Nuremburg (or brought to the U.S. to work in the fledgling Cold War industries). Yet American scientists experiment on American prisoners and they receive government grants for their efforts. I guess it all depends on whose testicles are being irradiated.

While there are many who will protest if this same type of experiment were conducted on animals, very few appeared concerned when it was being done on human prisoners. It seems that very few people are aware of how vulnerable prisoners are to this kind of exploitation. In the article, Mr. Gurman mentions how many prisoners were led into the barbaric experiments, but then were afraid to withdraw. Prisoners as a class are almost totally disenfranchised, with no voice and no power. A large percentage of the prison population in this country is either illiterate or mentally ill. When prison wages average $13 to $30 a month, it's no wonder that some prisoners will volunteer for experiments of dubious safety. For these reasons, all types of medical or scientific experimentation on prisoners should be outlawed.

—Paul Wright
Washington State Prison
Monroe, Washington

Kid Science

Dear SftP,

I publish a newsletter for teachers which contains science activities for elementary classes. Most of these activities so far have emphasized simple science skills for kids and basic science information for teachers. I began this project because I sincerely believe that science skills and methods are empowering ways of relating to the environment, and that everyone deserves to learn science, just as everyone deserves to learn to read. I realize, however, that science skills without application are not very useful, so I'd like to go beyond this cookbook approach to:

- continue to include activities which empower kids by helping them learn new science skills but which, in addition, require analysis of the consequences of applied science. These activities would be suitable for children ages five to thirteen. Ideally, they should be hands-on (lab, rather than book-based), illustrate basic scientific principles, and demand analysis and evaluation.
- add activities, exercises, or essays for teachers which would give them the confidence to learn new material and develop new and locally relevant activities for their classes.

Any suggestions from SftP readers would be much appreciated. In exchange for suggestions, articles, or science activities, I offer free subscriptions to the newsletter. Write to KidScience, 916 Marsh St., Mankato, MN 56001.

—Catherine Reed
KidScience Editor
Mankato, Minnesota

Editorially Speaking

With the production of this issue, Lisa Greber joins the staff of *Science for the People.* Lisa comes to SftP from Massachusetts Citizens for Safe Energy, the coalition that led an unsuccessful referendum petition in the November election to close the state's two nuclear power plants. Trained in physics, Lisa hopes that her tenure as editor will nudge SftP closer towards a community base, making us more of a progressive science resource for the public.

After more than four years as editor, Leslie Fraser is leaving Boston and SftP for an editing position in Brattleboro, Vermont. Speaking in the unobjective third person, she would like to express her indebtedness to the readers, writers, and members who traveled SftP's trail with her. But she won't stop giving editorial advice and contributions, and will always know a home in these pages.

Due to financial exigencies and staff transitions, this issue of SftP is being published later than we had anticipated. We plan to be on track again with the January/February 1989 issue, a special edition focusing on cancer and the environment.

SCIENCE FOR THE PEOPLE

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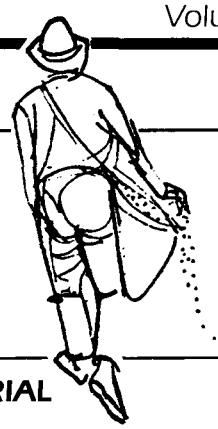
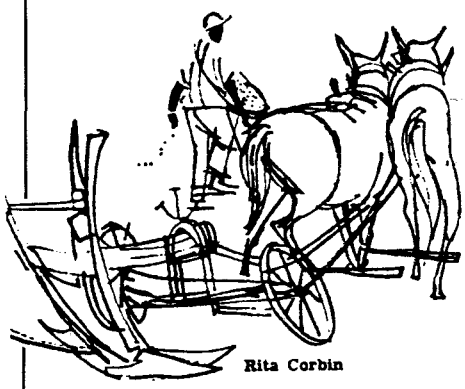
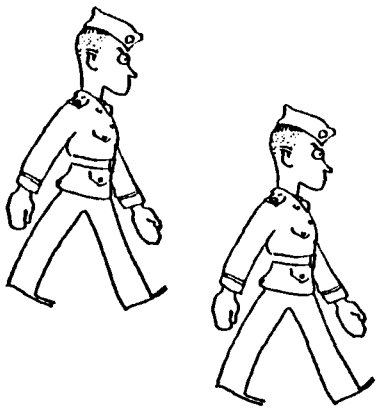
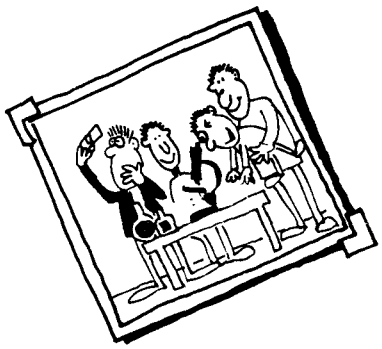


CONTENTS





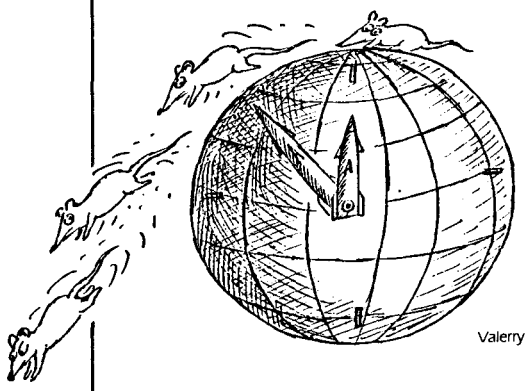


Newsnotes

ANOTHER IRRADIATION ACCIDENT

Another in a series of accidents at irradiation facilities occurred in Decatur, Georgia on 6 June 1988. Although a "no threat to the public" conclusion was reached by federal and state officials, pinpoint contamination to workers and property did occur. The technology used in this facility to sterilize medical products will also be used in the irradiation of food. The inability to maintain safety is particularly worrisome given DOE and industry plans to develop many new food irradiation facilities.

The accident occurred at the Radiation Sterilizers Inc. plant in Decatur. An



Valerry

estimated four curies of cesium-137 were released into the water storage pool sometime between a previous inspection on 29 April and 4 June when the leak was discovered. After the plant was shut down, state and federal officials began the immediate recall of all products irradiated at the facility since April 29: over 70,000 medical supply boxes and empty milk cartons that included surgical gloves, medical towels, and saline solution. These products had been shipped throughout the country. As of September no official statement had been made on the success of a recall effort made by the Nuclear Regulatory Commission.

In addition, ten employees were exposed to the leaking cesium-137 containers. Further investigation showed that two of the employees had transfered the radiation to their homes and a third to his automobile. Substantial contamination also occured to the RSI administrative offices.

According to Michael Colby of Food and Water, Inc. this accident is particularly ominous because the cesium-137 containers have been called "fool proof" by the DOE and irradiation industry officials. In public hearings they have emphasized the reliability of the metal casks and dismissed those skeptical of their durability as "emotionalists" and "fear mongers". Food and Water, Inc. is calling on the FDA to rescind its approval of food irradiation until safety and health concerns are met. They have also just begun a campaign to put pressure on food stores to not carry irradiated products. Many food retailers support such efforts. In addition, in several states, Massachusetts included, legislation is pending to ban the sale of irradiated food. For more information, contact Food and Water, Inc. in New York City.

Seth Tuler

ABANDON SHIP

The *Pelicano* has finally ended its two year ocean cruise, unloading its cargo of toxic ash in an undisclosed location.

The 19-year old freighter gained worldwide notoriety as it searched the globe for a place to dump 28 million pounds of ash generated by Philadelphia's municipal and industrial incinerators. According to the Environmental Protection Agency, the ash contained aluminum, arsenic, chromium, copper, lead, mercury, nickel, zinc and toxic dioxins.

The ship is now anchored in international waters near Singapore, but the final fate of the wastes remains unclear. Greenpeace activists have claimed the ash was dumped in the Indian Ocean. Ship captain Arturo Fuentes told reporters the ash was unloaded in port, although he declined to specify in what country. Over the course of its two year journey at least 11 countries refused to allow the ship into their ports, including the Bahamas, Costa Rica, Guinea-Bissau, and Honduras.

In an apparent effort to avoid publicity, the ship has changed names twice since leaving Philadelphia in 1986 as the *Khian Sea*. In spite of this, it has remained a public symbol of this nation's toxic waste crisis; in particular, it is a forceful reminder that third world countries will not be willing to serve as toxic dumping grounds forever.

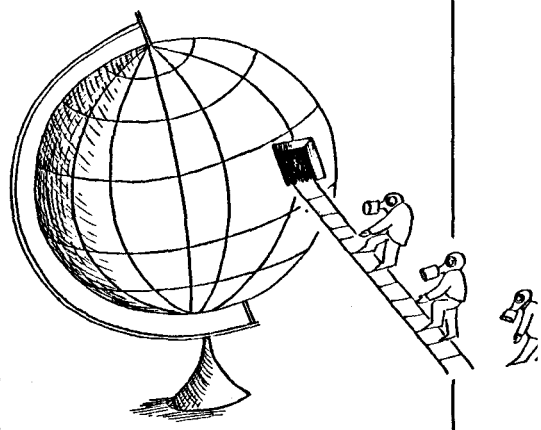
DON'T DRINK THE WATER

Prisoners at the Marion, Illinois federal prison may be serving an additional sentence. Crab Orchard Lake, the source of the prison's water supply, has been found to contain PCBs and other toxic contaminants. Local residents stopped drinking the lake's water two years ago. A nearby dump site, thought to be the source of the contaminants, is slated to receive Superfund money for cleanup, but in the meantime, inmates are becoming ill.

This is not the first of the prisoners' trials. According to Amnesty International, conditions at the prison violate UN standard minimum rules for the treatment of prisoners. Eighty percent of Marion's inmates have spent the last five years locked in their 6-by-10 foot cells for 23 hours a day. They are subjected to constant surveillance and frequent invasive body searches. Prison activists have been unable to convince the courts to take action. Last July, the Seventh Circuit Court ruled that conditions at Marion were constitutional, albeit "sordid and horrible."

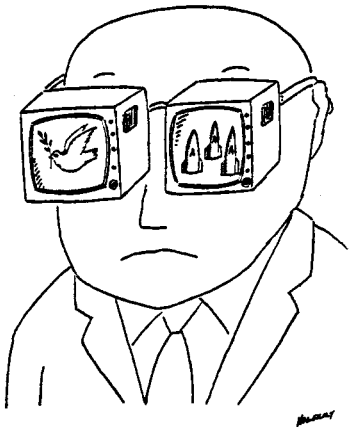
Opponents of the lockdown are planning to organise their next campaign around the issue of contaminated water, hoping this newest tactic will strike a chord with an increasingly environmentally conscious public.

For more information, contact the Committee to End the Marion Lockdown, 343 South Dearborn, Ste. 1607, Chicago, IL 60604



Valerry

Newsnotes



THE BUENOS AIRES OATH

Aware that, in the absence of ethical control, science and its products can damage society and its future, I pledge that my own scientific capabilities will never be employed merely for renumeration or prestige or on instruction of employers or political leaders only, but solely on my personal belief and social responsibility—based on my own knowledge and on consideration of the circumstances and the possible consequences of my work—that the scientific or technical research I undertake is truly in the best interests of society and peace.

An international conference on Scientists, Disarmament and Peace adopted a workable "Hippocratic Oath" for scientists last April. Led by Guillermo LeMarchand, an Argentinian astrophysicist, and activist-biologist Alberto Pedace, the Argentinian conference succeeded in passing what has become known as the Buenos Aires oath. The adoption of the oath overturned a history of failed attempts to pass similar proposals at Pugwash and the International Physicians Movement conferences.

LeMarchand and his colleagues envisioned the Buenos Aires Oath as part of a larger program encouraging scientists to disassociate from military-related research. Two of the stated goals of the five-point "Project" were "the elimination of university courses that proposed destructive or harmful scientific techniques" and "limiting the access to the educational media by persons presently engaged in bellicose activities." These points were dropped, reflecting participants' concerns about wording in addition to their hope that the Project would gain the support of a broad range of scientists. In accordance with this, the Conference chose to adopt an oath that was "ethical", not "scientific pacifist".

Although the tradition of professional oaths is much more deeply rooted in Latin American than North American culture, the practice is sparking interest on U.S. campuses. In 1987, many students at Humboldt State University in northern California signed a voluntary graduation pledge of social and environmental responsibility (see SftP, Sept/Oct 1987). MIT students unofficially distributed a similar pledge at the 1988 commencement exercises; this year, they will try to formalize the process.

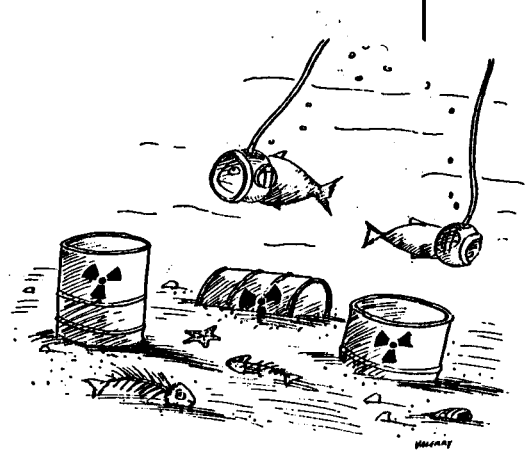
Technology Review

CRAFOORD PRIZE TURNED DOWN

Editor's note: Alexandre Grothendiek, a professor of mathematics at Montepelier University, was selected by the Royal Swedish Academy of Sciences to receive this year's Crafoord prize for his work in algebraic geometry. He sent SftP a copy of his response to the Royal Academy.

I thank you for your letter of April 13, which I received today, and for your telegram. I am aware of the honor the Royal Swedish Academy of Sciences does me in deciding to award this year's Crafoord Prize, together with a substantial sum of money, jointly to Pierre Deligne (who was my student) and myself. However, I regret to inform you that I do not wish to receive this prize (nor any other, for that matter), for the following reasons:

1) My salary as a professor, and even the retirement pension which I will receive as of next October, are much more than enough for my material needs and for those for whom I am responsible, thus I have no need of money. As for the distinction accorded to certain of my foundational works, I am convinced that the only decisive proof of the fertility of an idea or of a new vision is that of time. Fertility is recognized by progeny, not by honors.



2) I note as well that the high level researchers, to whom a prestigious prize like the Crafoord prize is addressed, are all of a social status such that they already have both material well-being and scientific prestige, with all its associated powers and prerogatives, in abundance. But it is not clear that the overabundance of some can only come at the expense of others?

3) The work which has earned me the benevolent attention of the Royal Academy is 25 years old, from a period when I was part of a scientific milieu, and for the most part shared its spirit and values. I left that world in 1970 and, without giving up my passion for scientific research, I have increasingly distanced myself internally from the milieu of scientists. But, during the past two decades, the ethics of the scientific

profession (at least among mathematicians) has declined to such a degree that pure and simple plundering among colleagues (especially at the expense of those who are not in a position to defend themselves) has almost become the rule, and in any case is tolerated by all, even in the most flagrant and iniquitous cases. Under these conditions, to agree to enter into the game of "prizes" and "rewards" would be to give my support to a spirit and an evolution in the scientific world, which I recognize as profoundly unhealthy, and moreover doomed to disappear in short order, as they are so spiritually and even intellectually and materially suicidal.

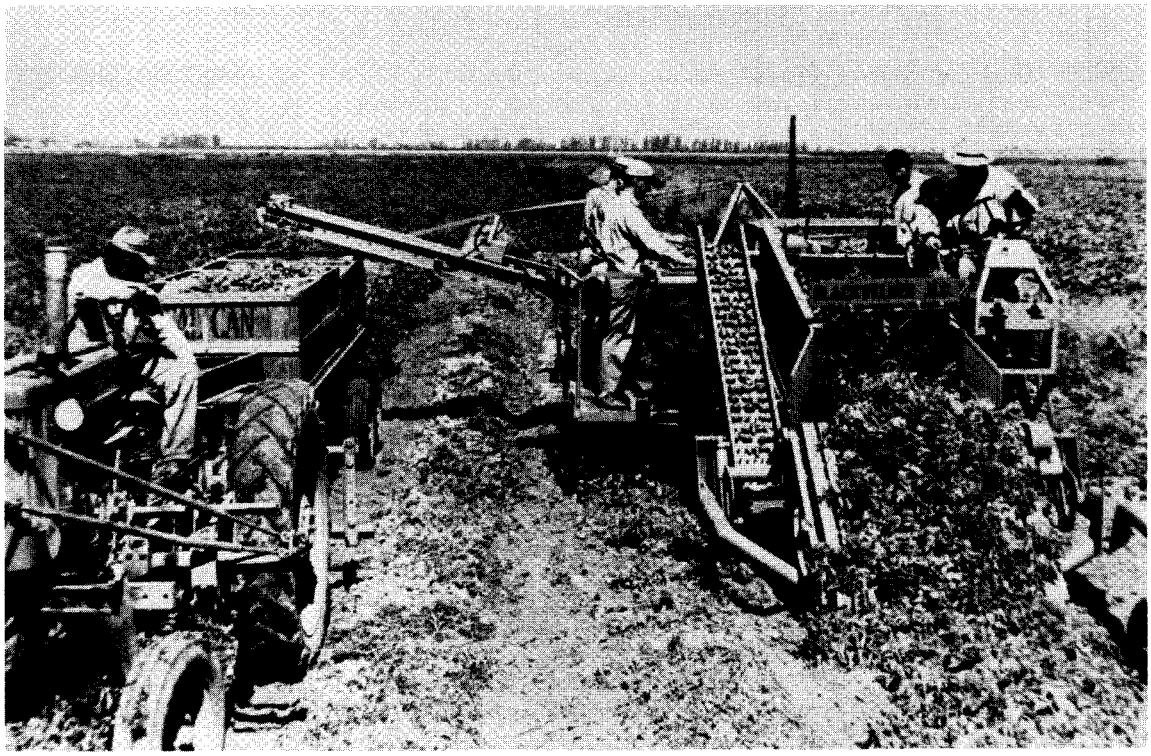
It is this third reason which is for me by far the most serious. If I bring it up, it is in no way with the purpose of criticizing the intentions of the Royal Academy in its administration of the funds entrusted to it. I have no doubt that, before the end of the century, entirely unforeseen upheavals will transform it from top to bottom the very notion we have of "science," its great work is carried out. Undoubtedly, the Royal Academy will then be among the institutions and individuals which will have a useful role to play in an unprecedented renewal, after an equally unprecedented end of civilization.

I am sorry for the annoyance which my refusal of the Crafoord Prize may represent for you and for the Royal Academy, as it seems that a certain amount of publicity has already been given to this award before obtaining the agreement of the designated laureates. Nevertheless, I have not failed to do everything possible to make it known in scientific circles, especially among my old a long reflection entitled *Reaping and Sowing* on my life as a mathematician, and on creation (particularly scientific creation) in general, which at the same time unexpectedly became a "moral tableau" of the mathematical world between 1950 and today. A provisional printing (awaiting its appearance in book form), produced in 200 copies by my university, has been almost entirely distributed among my mathematical colleagues, especially among algebraic geometers (who have now done me the honor of remembering me).

Thanking you for your attention, and in repeating to you and to the Royal Swedish Academy of Sciences my thanks and my apologies for this involuntary complication, I am, sincerely,

Alexandre Grothendiek

translated by Michael Harris



PHOTO/Shields Library, UC Davis

FARM RESEARCH ON TRIAL

Addressing the Social Costs of Agricultural Mechanization

BY JOHN SAPONARA

More than a century ago, American agriculture was influenced by an influx of German scientists, who brought a new system of research and education to the United States. Changes in agricultural research combined with the industrial influence of farm implement manufacturers on farming methods. These were the major forces that produced the dominant agricultural system in the U.S., known as the land grant complex. To promote agricultural research for family farmers, the passage of the Hatch Act of 1887 created and funded agricultural experiment stations in every state and incorporated the stations into the nation's land grant colleges.

On November 17, 1987, in the Hatch Act's centennial year, the Alemeda County California Superior Court upheld the act's original goals. The court handed down a landmark decision which found the University of California's Agricultural Experiment Station guilty of failing to consider how university research projects would affect small family farmers. Lack of consideration for small farmers, the court held, violated the intent of the Hatch Act, which had created the Agricultural Experiment Station in the first place.

The ruling clearly had an immediate effect on the research conducted at the University of California. But the court's decision also has ramifications far beyond the university department involved in the lawsuit. Because there are agricultural experiment stations in many states, the University of California decision has nationwide implications. Nor are the issues involved restricted to agriculture: the lawsuit directly addressed the question of the social costs of technological innovation. But to fully understand the ruling requires a presentation of the specific context for this case.

John Saponara studies ecology at Cornell University in Ithaca, New York.

TOMATO HARVESTER TAKES OVER

In the first week of the 1976 tomato harvest, nearly 3,000 farmworkers migrated from Texas to the Anderson farm, a 37,000-acre tomato farm near Davis, California. That year, however, they were in for a shock. When the workers arrived, they found the entire farm mechanized with the tomato harvester technology developed by the University of California (UC). Not only were the workers displaced by a new tool of industrial agriculture, but by machines that were developed using taxpayers' money at a state university.

Protests at the UC Davis campus and in Sacramento soon followed, which stirred up popular discontent with university

priorities. In 1978, the California Action Network (then called CAAP, the California Agrarian Action Project) and fifteen farmworkers filed suit against the UC Regents (the university's governing body) on ten accusations, including violation of the Hatch Act. All of the farmworker plaintiffs either had been displaced by mechanical devices or were currently working with crops targeted by ongoing UC mechanization research. With this lawsuit, a decade-long trial over agricultural priorities had begun.

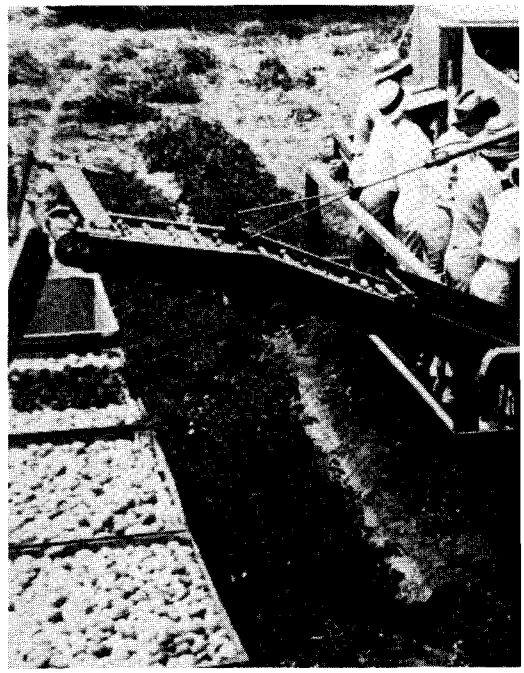
THE LAND GRANT COMPLEX

Central to the trial was the establishment by Congress of the "land grant complex" (which includes the University of California). Desperate to encourage agricultural development vital to the nation, Congress instituted the land grant complex through three separate acts.

The Morrill Act of 1862 granted land to each state for the purpose of building and funding an agricultural college. The Hatch Act of 1887 created an agricultural experiment station in each state, and the Smith-Lever Act of 1914 established the Cooperative Extension Service. Each of these three acts gave distinct functions to the land grant complex: agricultural education at the state colleges, agricultural research in the experiment stations, and communication of research results and farmer needs through the cooperative extension program.

The Hatch Act defined the mission of the state agricultural experiment stations. The plaintiffs in the UC farm mechanization lawsuit argued that the congressional intent of the Hatch Act and its amendments was for the experiment stations to do research which primarily benefits small family farmers, rural residents, farm laborers, and consumers.

Some have argued that the goals of the Hatch Act are outdated, but are they? This question addresses central issues of our nation's agricultural system: How are the



SCIENCE FOR THE PEOPLE IN ACTION

An Expert Witness Makes His Case

BY RICHARD C. LEWONTIN

Much of the work of the critical science movement in general (and of Science for the People in particular) is devoted to educating people about science and society. Our goal is to counteract ideology and politics masquerading as "objective" science. As a result, we sometimes feel frustrated at the lack of clear-cut and visible evidence that we are accomplishing something. For that reason, the success of the suit against the University of California is particularly heartening. The victory of the plaintiffs in that case and the remedies demanded by the court were a direct result of close cooperation between public interest lawyers and people in the critical science movement, particularly Science for the People and the New World Agriculture Group.

For a number of years, several groups have been engaged in studying agricultural research. They have investigated how agricultural priorities are set, who controls the research, and the effect of this research on agriculture and farming. They have also been concerned about its impact on family farmers, farmworkers, consumers, and rural residents. These studies have included economic, historical, sociological, and biological questions.

When Public Advocates, the attorneys for the California Agrarian Action Project, constructed their case against the University of California, they enlisted the technical help of several of these research groups. A small committee of advisors was formed from people at the University of California, Cornell, the University of Kentucky, and Harvard to serve as the technical resource for the plaintiffs' case. I was a member of this advisory committee.

The work of the committee and its separate members was in three phases. First, the case had to be prepared. This involved the study and evaluation of vast numbers of documents produced by the University of California, its College of Agriculture, Agricultural Experiment Station, and Extension Division. These documents included policy statements, detailed proposals for particular research, and progress reports on research already carried out. From these documents there emerged a general picture of how the University of California went about the business of research and extension.

Second, committee members testified at great length as "expert witnesses" at the trial itself, and advised the attorneys for the plaintiffs on the testimony of the university's "experts." Finally, when the university decided not to contest the case further, and the court held in the plaintiffs' favor, the committtee was enlisted in the difficult task of deciding upon what legal remedies would be requested of the judge. Each phase had its own problems and surprises.

All of us had extensive experience in interviewing agricultural research and extension workers, reading the public record produced by agricultural

Biologist Richard C. Lewontin is a professor at Harvard University and coauthor of The Dialectical Biologist. *A veteran member of SftP's Sociobiology Study Group, he serves on our editorial advisory board.*

PHOTO/Shields Library, UC Davis

social and cultural traditions of small farm communities affected by large agribusiness farming concerns?[1] How valid is the current justification for research into industrial agriculture, which seeks to increase the comparative advantage of the U.S. and thereby improve export earnings? How does this affect third-world development efforts, and is this a sustainable strategy for the U.S?[2]

Judging from the goals of the land grant complex, by almost any measure, it has failed in its mission. Farms have dropped in number from seven million in 1935 to two million in 1980. The mass urbanization of the U.S. population and increase in absentee land ownership have contributed to a decline in the quality of rural life.

Beyond merely failing to reverse these trends, some accuse the land grant complex of contributing to the decline of the small family farm and the deterioration of rural life. Jim Hightower, in his book *Hard Tomatoes, Hard Times*, provides numerous examples of agricultural experiment stations serving interests antithetical to those intended by Congress.[3] Mechanization research projects, for example, routinely produce machines which displace farm labor, including farmers and farmworkers, thus retreating from maximum employment. Many research projects adopt agribusiness product criteria of cosmetics or compatibility with mechanical harvesters over consumer food criteria such as nutrition. All of these issues were raised during the UC hearings and trial.

BACK TO THE PLOW

Although UC Vice President for Agriculture James Kendrick charged that the plaintiffs favored a return to plowing with mules, in court the university tried to persuade the judge to dismiss the case on more subtle procedural grounds. UC lawyers claimed that individuals lack the right to enforce the Hatch Act because it provides no right of "private action," but can be enforced only by the U.S.

experiment stations, and proposing and evaluating questionnaires on agricultural research and extension services. But I, at least, was not prepared for the overt politics and ideology revealed in many of the documents. In particular, the very strong antilabor bias of research and extension scientists was clear. They identified with farm owners as employers of labor and saw their task as intervening on the side of the employers through technological change and education.

As described in the university's documents, dwarf fruit tree varieties were developed in order to "make use of a different work force" (women and children). Extension schools on insecticide spraying were reorganized because, when attended by workers, they complained about the dangers of pesticides, "whether real or imaginary," and used the meetings as opportunities to organize. What was most revealing was not the direction of the biases, a direction that we could expect from our knowledge of the background and training of agricultural research and extension workers, but the unself-conscious way in which those biases were revealed in research proposals and reports.

The process of giving testimony at the trial was especially revealing. We each gave many hours of direct testimony and response to cross-examination based on our past research and our analysis of the documents. To validate our testimony, our academic status had to be demonstrated. Our testimonies began with recitals of our degrees, honors, academic accomplishments, and reasons why our own research qualified us as experts on the subject at hand. The fact that none of us were "professional witnesses" (we had not done this sort of thing before and were not being paid a fee) was important.

The credibility of "experts" in the case depended not on the cogency of their arguments, but on their status and therefore the credibility of their opinions. At one point, under cross-examination, the university's attorney asked me if a particularly outrageous economic assertion of mine was shared by any professional economist. When I cited a former member of our research group, he asked whether the person was a professor at *Harvard*. When I replied, "No, the University of South Carolina," the attorney was triumphant.

Politically, the deepest issues arose in the third stage of our work, when we engaged in long and frustrating attempts to design legal remedies that the judge could apply. The university had conceded that its research did not take into account the interests of its various legitimate constituencies. How could the court enforce a consideration of those interests? If the various constituencies—farm labor, small farmers, consumers, and rural residents—were given some sort of veto power over the funding of particular research proposals, the issue of academic freedom would be raised.

When nonexperts from traditionally powerless constituencies join policy boards filled with powerful experts, their influence is usually coopted by the experts. This process raises a myriad of questions concerning the problems of empowering the unorganized and disenfranchised: Who should choose the representatives of these constituencies? What proportion of research funds should be expended on the interests of each group? Who should determine the numerical quotas to divide up the research pie among small farmers, farm labor, rural residents, and consumers? How can one determine whether a particular proposal addresses the issues of these groups or not? Such questions approach the heart of this social contradiction: without political organization, how can local reforms be introduced into a system whose basic structure remains unchanged?

In the end, the chief benefit obtained from this lawsuit is not in the remedy imposed by the judge, which ruled that the university be accountable to the court in future years and that it demonstrate positive actions which guarantee that the interests of its constituencies are considered in funding agricultural research proposals. Rather, its value lies in the precedent set by the trial and in its effect on other states.

All over the United States and Canada, state and provincial agricultural experiment stations are worried about the implications of the University of California lawsuit and are beginning to look for ways to avoid being sued. Until this case, the agricultural research establishment has done as it pleased, serving only the interest of the narrow constituency it so consciously represents. Yet the positive result of the trial provides a legal platform for continued challenges to the specific direction of agricultural research.

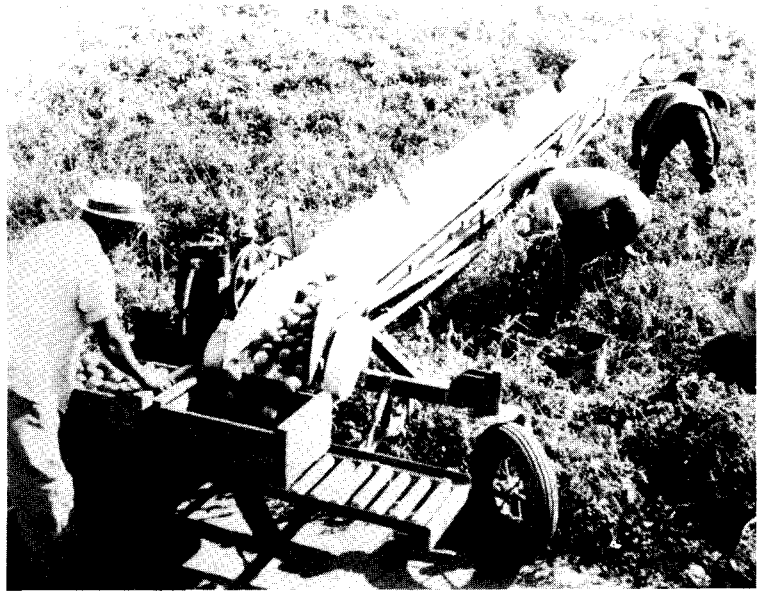
Department of Agriculture. Another UC tactic was to argue that the lawsuit threatened academic freedom and the university's right to decide which research projects to pursue. Finally, the university argued, the dispute is a social issue to be settled in the legislature, not a legal issue for the court.

But in 1980, Judge Spurgeon Avakian dismissed the university's objections. While he noted that it was not a matter for the court to decide "whether agricultural mechanization is good or bad for society," he ruled that the court could address "whether legislative and constitutional mandates are being followed in the allocation of public funds to particular research projects."

The judge interpreted the Hatch Act to require plaintiffs to demonstrate that the act's intended constituencies are not being served in specific research projects. During the ensuing four years of formal investigation, plaintiffs selected 69 mechanization projects for this purpose and proceeded to obtain tens of thousands of pages of depositions (interview transcripts) and documents. At the nonjury trial, which began in March 1984, several eminent scientists, including a UC professor, testified against the university. Five weeks into the trial, however, the judge became seriously ill and a mistrial was declared.

A new judge, Raymond Marsh, upheld the plaintiffs' right of private action in the case but differed from his predecessor. Marsh interpreted the law to require evaluation of the UC experiment station's entire research program of approximately 1400 research projects. The plaintiffs' strategy then shifted accordingly, and they attempted to show that UC lacked decision-making mechanisms to ensure that its projects addressed the interests of the Hatch Act constituencies.

PHOTO/Shields Library, UC Davis



PHOTO/Shields Library, UC Davis

MECHANIZATION SHOULD BENEFIT EVERYONE

By this time, the case had already begun to attract public attention—much of it favorable to the plaintiffs' cause. Many who had originally scoffed at the notion of suing the university came to acknowledge the legitimacy of the lawsuit. The case even captured the popular imagination through bumpers stickers that read: "Mechanization Should Benefit Everyone."

The Experiment Station Committee on Organization and Policy, a panel of land grant social scientists, produced the monograph "Research and the Family Farm."[4] This document claimed that while most land grant research is "scale neutral"—rather than primarily benefiting farms in a certain size class—in practice, the land grant complex serves groups whose interests conflict. The study therefore called on the agricultural experiment stations and the extension service to recognize that fact. The committee concluded that "the mission of the land-grant university includes a responsibility not only to increase agricultural productivity but also to the social and economic well-being of the entire rural community."

The Council on Agricultural Science and Technology, known for whitewashing controversies to favor the status quo, appointed a panel to study the court case. Surprisingly, the panel deadlocked, and then finally issued a report which acknowledged an unequal distribution of the benefits of technologies introduced into a society with a skewed distribution of wealth.[5] Changes should be made in the current system, the report argued, by which the public guides the adoption and monitors the effects of mechanization.

FINAL RULING

Eight years after the case was filed, on November 17, 1987, the court finally handed down its ruling. The Alameda County Superior Court ruled that the Hatch Act requires the University of California, in approving agricultural research projects and allocating Hatch funds to them, to consider the extent to which all congressionally intended beneficiaries will be affected by these projects. The ruling also states that the university must give primary consideration in this process to the interests of the small family farmer.

The university admitted that it has no such process, and the court subsequently found UC to be violating the Hatch Act. This decision applies not only to the three percent of the California Agricultural Experiment Station budget provided by the federal government under the Hatch Act, but also to the state matching funds required under the act. Thus the decision applies to six percent of the experiment station's budget. These percentages differ

among states, but the largest agricultural states usually spend far more than enough to match their federal funds.

The university is appealing the ruling, and UC attorneys have made it clear that appeals will continue, if necessary, up to the Supreme Court. During appeal, the ruling that UC must report on its plans and progress in implementing a research project evaluation process within 90 days of the court decision and then annually for five years has been stayed. The university asked for two extensions on its appeal brief deadline, and is expected to issue its first brief by the end of 1988.

The court handed down several other interesting rulings: it acknowledged that the interests of the various Hatch constituencies may conflict, so that each project need not serve all groups. The court also held that judicially ordered compliance does not violate academic freedom because academic institutions are bound by law.

The farmworker plaintiffs were disappointed that the ruling did not mention farm labor. The plaintiffs' position had been that the Hatch Act designated four constituencies: small family farmers, rural residents, farm labor, and consumers. The court mentioned maximum employment in its decision only as it benefited small family farmers, not farm labor. This could change on appeal.

RESEARCH AND THE SOCIAL EFFECTS OF TECHNOLOGY

It seems ironic that although the suit was motivated by substantive political issues regarding the social effects of technology, procedural issues were paramount throughout the case. From UC's initial motion for dismissal of the case on the grounds of the private right of action to the final decision that UC lacked a mechanism for evaluating the distribution of benefits of its research, the emphasis was on legal and administrative process rather than on the sociopolitical effects of UC research.

Even in the consideration of 69 separate mechanization projects under the lawsuit's first judge, the question was whether UC considered the impacts of past research projects in planning future projects, not whether the impacts were positive for small farmers, farmworkers, rural populations, and consumers. Thus content motivated the suit and process decided it.

Perhaps this is just as well. The plaintiffs might have lost on the basis of the actual effects of agricultural research, because there is no indisputable evidence that technologies have been primarily responsible for the urbanization of the U.S. population and the concentration of farmland ownership by large farm businesses.

Even in an extreme case such as the tomato harvester, it is not clear how much of the dramatic concentration of tomato cropland ownership which occurred during the eight years of its adoption was due to increasing demand for tomatoes and how much was due to the harvester. Furthermore, the tomato harvester is often studied because of its association with drastic changes in tomato growing in California. Most mechanization technologies have a less extreme apparent effect, and most land grant research is not on mechanization. However, technologies


SIX-MAN MACHINE MASS-HARVESTS TOMATOES

PHOTO/Shields Library, UC Davis

have probably contributed to the concentration of wealth and control of the food system. A study by UC economists concluded that the benefits of the tomato harvester were primarily captured by the four largest tomato processors.

SMALL-SCALE FARMS & LARGE-SCALE TECHNOLOGY

Many scientists and administrators believe that most research is "scale neutral." While it is difficult to determine the net effect of many technologies (even in retrospect) on the complex socioeconomic fabric in which these machines and techniques are implemented, many researchers do not recognize the potential for even hypothetically neutral research to become biased in its dissemination. Cooperative Extension Service agents have an incentive to affect as many acres as they can, so large farms means less overhead.

Some land grant scientists do recognize that the benefits of technology are not evenly distributed, and they attempt to do research with primary application to small family farms. These scientists should be aware that even information-intensive techniques can be biased to farms of a certain size class. For example, integrated pest management may require the coordination of farmer action that's more difficult to achieve in a region of small farms than amidst large farms.

The flip side of this warning is to choose research which is easier for the small farmer to adopt. However, the scale bias of research is often influenced by the political context into which the resulting methods are introduced, which is hard to predict beforehand. Surer ways to channel the benefits of one's research might be through on-farm research or through research which, though off the farm, uses crops or conditions unique to the farms of one's constituents. A third approach is to get involved in the dissemination of research results to your constituent group.

An alternative to the view that technology is the main cause of social change is that technology allows or accelerates social change. For example, it is hard to see how such dramatic concentration could have occurred in California tomato farms without the harvester. This view is compatible with the correlation observed between research output and the growing concentration of farmland ownership.[6] But correlation does not imply causation—perhaps the long-term decline in the price of farm capital relative to labor created an economic trend to which mechanization seemed, to land grant researchers and farmers, a logical response.

Rather than adopt the atomistic goals of the individual farm, whose ownership is becoming more concentrated in the hands of large farm industries, the land grant complex might have recognized that the economic environment (as modified by government policies) is intrinsically biased against small family farmers. In order to carry out its mission, the land grant complex must go beyond scale-neutral research to actively promote small family farms.

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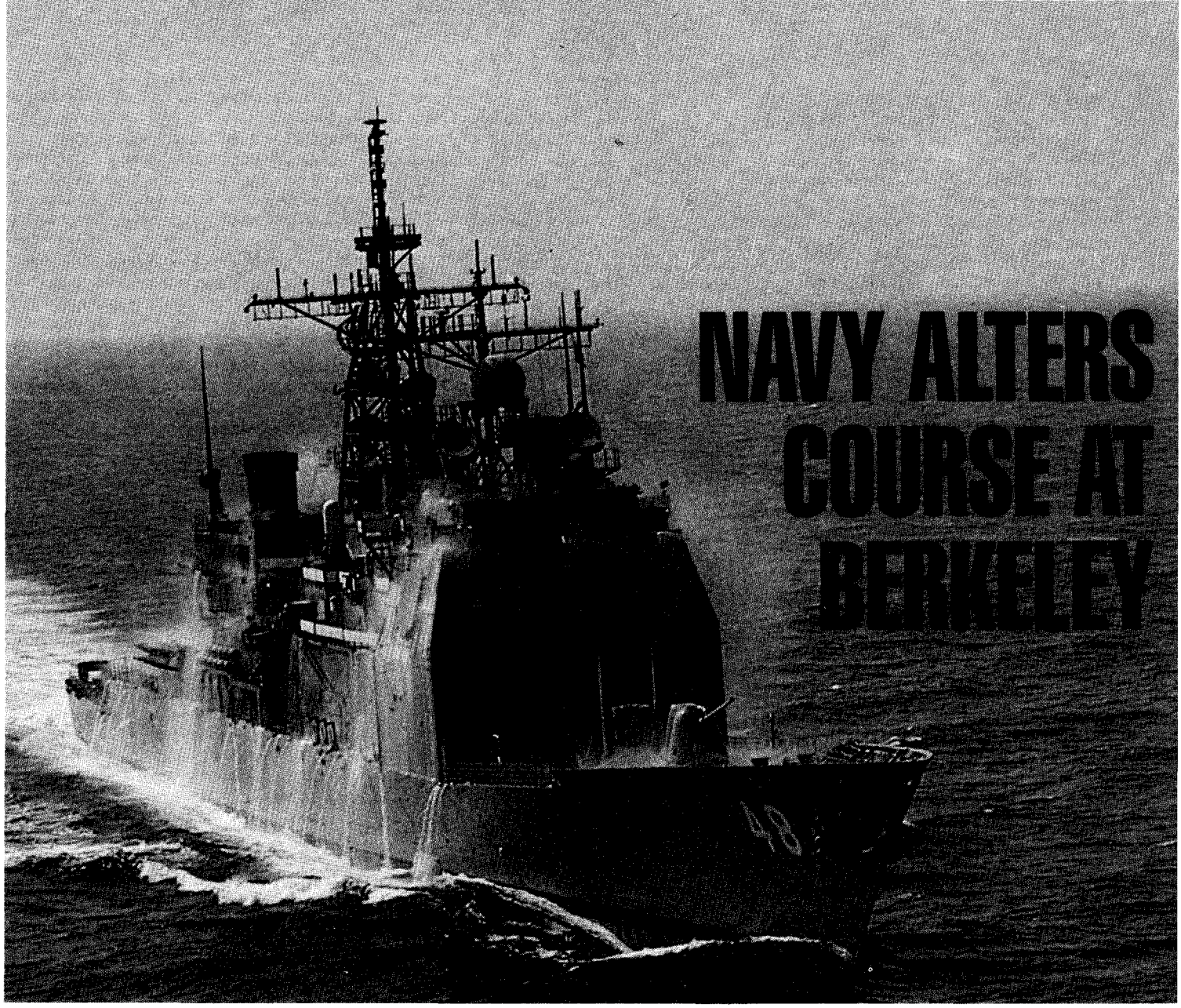

NAVY ALTERS COURSE AT BERKELEY

PHOTO/U.S. Navy

BY J.B. NEILANDS

It is well known in academic circles that, through management of the Los Alamos and Livermore National Laboratories, the University of California has placed its imprimatur on the design of every nuclear weapons system, from the relatively primitive device exploded at Hiroshima up to and including Star Wars. The initial liaison between the university and the military was natural enough, given the exigencies of the times. The scientific community believed that Western democracy was in a struggle for survival during World War II, and physicists and chemists were anxious to contribute to the war effort.

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Military Biological Research Moves Off Campus

Robert Oppenheimer, a professor of physics, proved to be the single individual with the combination of scientific skills, personality, and administrative ability to bring the Manhattan Project to a successful conclusion. Always considered something of a security risk because of his early contacts with leftists, he subsequently became an outright liability to the weaponeers when he failed to back construction of ever more powerful versions of the bomb.

The University of California, to this day, continues to manage the laboratories, with faculty opinion about evenly divided on whether the university should continue military research at the Los Alamos and Livermore labs. Thus far, only one chancellor, Robert Sinsheimer of the Santa Cruz campus, has suggested publicly that the relationships should be severed.

The Department of Energy (DOE), which owns the facilities and pays the bills, including the management fee, renews the contracts every five years. Having the operation directed, if only nominally, by a university supplies a patina of academic respectability and facilitates recruitment of staff. From the university's perspective, the management fee looms large in their calculations. But the public rationalization for accepting DOE funds is that university involvement prevents the government from doing really crazy things (like developing the neutron bomb?). However,

faculty and others who have taken the trouble to look into the matter believe that the university exerts zero control over the direction of the work in the laboratories.[1]

NAVAL RESEARCH ON CAMPUS

Less well known is the fact that for the past 38 years, the Berkeley campus of the University of California has managed another military facility, the Naval Biological (now Biosciences) Laboratory (NBL). Not to be outdone by their colleagues in the physical sciences, microbiologists at Berkeley, chief among them Professor Albert P. Krueger, persuaded the Navy to underwrite the NBL, which first appeared in 1944 on the fifth floor of the Life Sciences Building as the Naval Medical Research Unit No. 1.

Six years later, the Secretary of the Navy commissioned the NBL, which was then located off-campus at the Oakland Supply Depot on the island of Alameda in San Francisco Bay. The university assumed management of the facility and also supplied its director who, by tradition, held a professorial appointment. Initially drawn from the Bacteriology Department, directors have subsequently come from the School of Public Health.

On the record, the stated purpose of the laboratory has been basic research in microbiology, environmental health sciences, and epidemiology. In fact, research at the NBL has focused on the dissemination and survival of microbes in aerosols. It has been alleged that for its first two decades, the mission of the NBL—although discreetly camouflaged—was biological warfare.[2] Furthermore, the NBL may have been involved in biological warfare research at least as recently as 1980, when it was known to be working on *Coccidioides immitis*, an organism acknowledged to be a potential biological warfare agent by a U.S. Senate subcommittee.[3] The Navy has always denied this allegation and claims that its interest in infectious agents stems from a need to protect the health of military personnel stationed around the world.

Dating from the November 25, 1969 policy statement of President Richard Nixon, the U.S. has officially renounced biological weapons. At that time, the Department of Defense (DOD) was asked to dispose of existing stocks of biowarfare agents. The right to continue research was retained, however, and the "offensive" versus "defensive" purposes for bioweapons research has now been reduced to a largely semantic argument. (See Jonathan King's article, "Biology Goes to War," in SftP's January/February 1988 special issue on military funding of scientific research.)

In 1950, the National Science Foundation had not yet been created and the extramural grants program of the National Institutes of Health, now the major source of the university's largesse, was in its formative stage. At this time, however, the Office of Naval Research (ONR) had a well established system for awarding grants in support of basic research. The early work from this laboratory on microbial iron metabolism was supported virtually in its entirety by ONR grant number 222 (39).[4]

However, in the mid-1960s, when I became hyperactive in the antiwar movement and traveled to Hanoi as an investigator for the Bertrand Russell War Crimes Tribunal, word came from the ONR that the research was "no longer pertinent to Naval needs." While campus unrest over the war in Vietnam and accompanying congressional strictures resulted in a general cutback in military grants in this period, this episode illustrates the potential chilling effect such contracts may have on the freedom of political expression of the recipients.

A study of DOD support for university research and development over the thirty-year period from 1956 to 1986 shows that the sum reached 1.1 billion dollars by 1964 and then declined sharply to a low of 0.4 billion dollars in 1975.[5] The curve is again moving sharply upward, and funding is essentially equal to the benchmark year of 1964.

PHOTO/U.S. Navy

NBL ATTACKS THE SAN FRANCISCO BAY AREA

At about the time of the formal establishment of the NBL, an incident occurred which, when revealed, irreparably tainted the reputation of the laboratory. During the week of September 20 to 27, 1950, the Army performed a large-scale simulated biological warfare experiment in the San Francisco Bay area.

Water suspensions of the spore forms of *Bacillus globigii* and vegetative cells of *Serratia marcescens* were sprayed from a ship cruising offshore. The bacteria, both of which grow as brightly colored colonies on solid media, were collected in air samples taken at testing stations deployed throughout the region. The cultures were described as nonpathogenic. *B. globigii* was selected on the basis of its resistance to physical and chemical damage, and *S. marcescens* was chosen for its susceptibility to such damage.

In its January 22, 1951 report on the experiment, initially stamped "Secret" and later labelled "Unclassified," the Army concluded that a successful biological attack could be launched in the same manner as its San Francisco aerosol experiment and could affect an area up to 20 miles inland, depending on meteorological conditions.[6] In an unusual display of interservice harmony, the Army paid effusive tribute to the "boys in blue" and included a salute to the scientists: "The Officer in charge of the Naval Biological Laboratory, Oakland, California, cooperated to the maximum extent in every manner and provided the greater portion of the required logistic support insofar as laboratory facilities and equipment are concerned. In additon, personnel furnished by the Naval Biological Laboratory manned approximately half of the sampling stations used in each trial."

A full quarter of a century after this test, the scientific community was to learn of a most unusual outbreak of infections due to *S. marcescens* which immediately followed the experiment and resulted in the death of one individual. At the time of the spraying, Edward Nevin, a retired pipefitter, was resting in the old Stanford Hospital in San Francisco, following routine surgery for urinary retention. During his recuperation at the home his daughter, Mr. Nevin suddenly developed fever and chills. A urinary culture detected *S. marcescens*.

On November 1, 1950, Nevin succumbed to a heart infection attributed to the bacterium. This case, in conjunction with the mini-epidemic of other *Serratia* infections that occurred at that time, was regarded as highly significant and prompted a research paper on the topic in a medical journal devoted to infectious diseases.[7]

Edward Nevin III, a San Francisco lawyer and grandson of the victim, while waiting for a train in 1976, noticed a newspaper account of the 1950 experiment. He concluded, "The Department of the Army completely disregarded the dignity of the individual. There is no justification in our society to act in reckless disregard of the very people it is supposed to protect."[8] In 1981, Edward Nevin III brought suit against the Army in Federal District Court. The suit was unsuccessful, however, because the original isolate was not retained, so it could not be proven beyond all reasonable doubt that the strain which killed the elder Nevin was identical to UK 8, the bacterium deployed by the Army in collaboration with the NBL.

It seems that more than the dignity of the individual had been disregarded. It is now well accepted that *S. marcescens* can infect humans who may have diminished natural resistance to this particular species, although, in fairness to the Army, this was not widely known in 1950. The military can nonetheless be faulted for failure to clear the experiment with public health authorities and for its general arrogance in performing a trial of this type.

ALTERCATION IN THE BACTERIOLOGY DEPARTMENT

Although the *S. marcescens* incident remained a tightly held secret until 1976, two decades earlier a dispute had erupted in the Bacteriology Department over the appointment of a new director at NBL. Opposition to the appointment was organized by the late Professor Roger Y. Stanier, who regarded bacteriological warfare as a "dirty business" and who, in any case, held the candidate in low esteem as a scientist and believed him not qualified to assume the rank of full professor in the department.[9]

Stanier appealed the case to Chancellor Clark Kerr, who appointed an ad hoc committee to advise him on the matter. After consideration of the matter, the committee recommended a separation of the directorship and the professorial appointment. This imbroglio became known to many in the campus's scientific community and deeply tarnished the image of the NBL.

Stanier's colleague in the Bacteriology Department, the late Michael Doudoroff, also had an unpleasant experience with the military. One night at the Alameda Naval Air Officer's Club, Doudoroff was overheard to utter certain remarks which were deemed to be disloyal. As a result, he was permanently barred from membership on panels which dispensed funds from U.S. government agencies under extramural programs. Doudoroff had an exceptionally sharp mind and an extraordinary breadth of knowledge in experimental biology. U.S. science is the poorer for having been denied his advice and judgement.

FACULTY ELITE CIRCLE THE WAGONS

All units of the university are subject to periodic review, the NBL not excepted. The review commissioned in 1977 by then vice chancellor, now chancellor, Ira M. Heyman, posed some key questions to the comittee of five professors and one graduate student. They asked whether "the applied nature of some of the Laboratory's research" was "appropriate for the University to sponsor." They also asked, "Has the Laboratory come to the point where its contribution to the University...is no longer adequate to sustain its continuation? Would a dignified termination be more appropriate?"

In early 1978, the committee reported a unanimous opinion that the NBL should be retained as an organized research unit of the university.[10] The recommendation was based on provision of free space, special containment facilities not available on the campus, and a contribution of "approximately one-quarter million dollars in overhead per year."

Access by academic researchers to special facilities at both the Los Alamos and Livermore Laboratories and at NBL has been used as a perennial argument for retention of this questionable relationship. Regarding specialized facilities, the 1978 NBL review committee sought the opinion of Daniel E. Koshland, Jr., chairman of the Biochemistry Department. Professor Koshland, now editor of *Science* magazine, assured the committee that his department had "maintained cordial cooperative arrangements" with the unit and asserted that "it is encouraging to all members of our department that there is a facility off the campus which has been willing to cooperate with us if the need arises."[11]

THE FUTURE OF NAVAL RESEARCH

A few years ago, Director David Kingsbury moved on to an administrative post at the National Science Foundation, and the Naval Biosciences Laboratory recruited Dr. Nina Agabian from the University of Washington, who had established a distinguished research record in molecular parasitology. Dr. Agabian obtained appointments in a number of departments, including public health and biochemistry. But the relationship didn't work out. Word soon came from the Office of Naval Research that the NBL unit would be phased out. All appeals to reverse the decision were turned aside, and the facility was scheduled to close in 1987.

Curiously, the reason given by the Office of Naval Research for closing the NBL—cost effectiveness—may be at least partially truthful. The facility at Alameda was aging and not all of the projects may have had the highest priority with the Navy. Certainly the ONR is not going out of the biological research business. A list of DOD contracts issued by the Berkeley Sponsored Projects Office for the year ending June 30, 1986 shows that the ONR provided half of all grants and 100 percent of those in the biological sciences.

Inspection of an employment notice issued by the Office of Naval Research in 1987 shows that, at the time of the NBL's closing, the Chief of Naval Research was actively seeking a microbiologist and a molecular geneticist to manage contract research programs at universities, government and industrial laboratories where "leading scientists" may be performing work worthy of support by the ONR.

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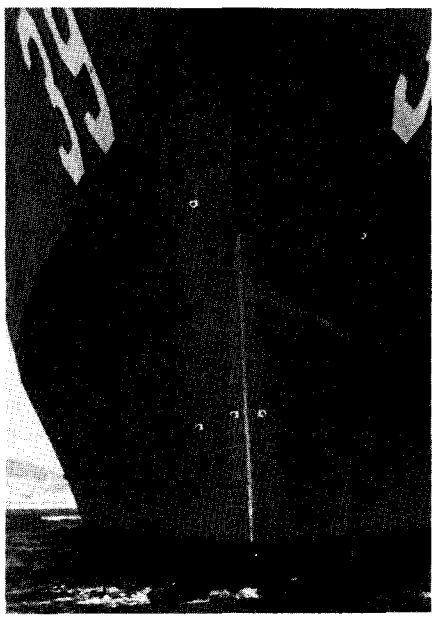
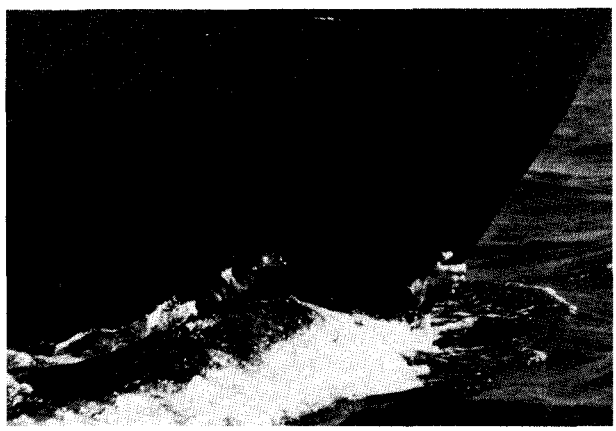


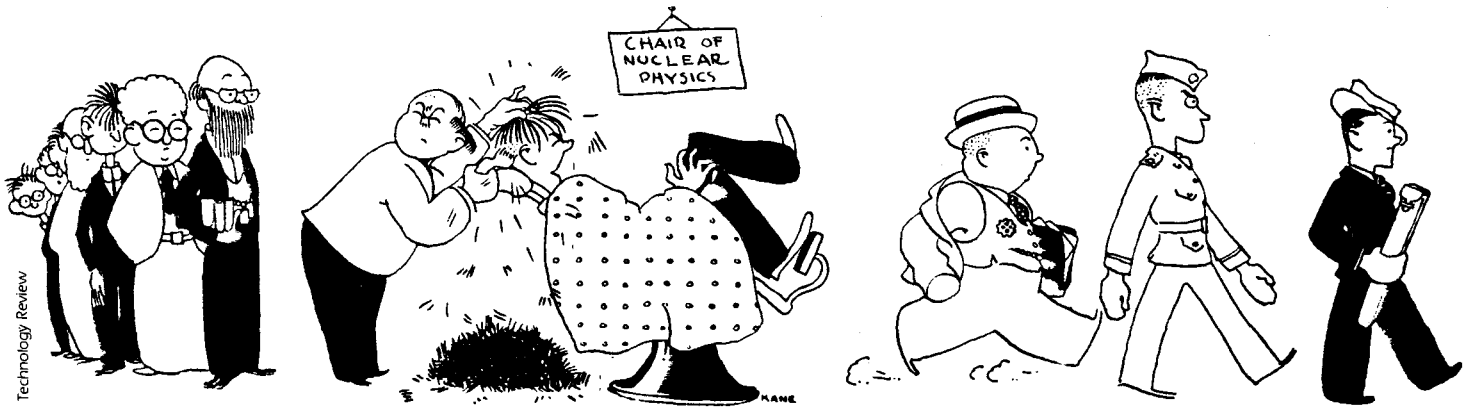
PHOTO/James Perez, Greenpeace



PHOTO/James Perez, Greenpeace

Greenpeace diver tries to turn the U.S.S. Texas away from the San Francisco Bay.

UNCOVERING
THE PENTAGON CONNECTION



Technology Review

Does Your School Work for the Military?

BY RICH COWAN

The nuclear arms race and U.S. intervention may seem distant and overwhelming to students who are preoccupied with their classes and social lives. When these issues are recast into campus issues, they no longer seem so far removed. Students see definite possibilities for change, both on the institutional and personal level. Local action leads to empowerment.

Rich Cowan received a master's degree in computer science from MIT in 1987. He is working as a community organizer in Cambridge, Massachusetts and writing the University-Military Action Guide, *from which this article was adapted.*

A new student movement is developing in the northeastern U.S. which recognizes the importance of local action. In a series of conferences held since the National Student Convention at Rutgers University in February 1988, students have formed the Northeast Student Action Network (NSAN).

Some of the students in the network have acted against the militarization of academia. At the University of Massachusetts in Amherst, students organized a wedding ceremony (with fancy invitations) to symbolize the marriage of the university to the Department of Defense. At SUNY/Buffalo, progressive students took over the campus orientation guide and printed sections on the Strategic Defense Initiative and military research on campus.

At MIT, students published a Disorientation Manual, with descriptions of military contracts, and held several creative protests. In one student protest, the pillars at MIT's main entrance were chained to a "Defense Dollar." In another action, a memorial to World War III was created by taping all the pages of the student directory to one of MIT's granite walls.

A prerequisite to such actions is the investigation of your local university's ties. This process involves asking questions. Because military influence permeates American culture and institutions, including universities, research for antiwar organizing may seem somewhat more complicated than that for a divestment campaign. In addition to investment portfolios, you must pay attention to the content of courses, military scholarships and recruiting, faculty research and consulting, political lobbying by administration members, and trustee connections to military companies.

After a little searching, you can usually figure out which connections are most

Tips on Using The Freedom of Information Act

To file a Freedom of Information Act (FOIA) request, all you have to do is ask for the information in a letter to the agency that is most likely to have it. However, there are several bureaucratic and legalistic caveats that you must also be aware of.

First of all, if you can find the office which puts out the information, and if it's easily accessible, why not try requesting the information without the use of FOIA? Hundreds of Pentagon offices are staffed by friendly and cooperative civil service employees who will be glad to provide information to students studying campus research policy. The best way to make this type of request is with a phone call. Congressional committee staff are especially cooperative. They often send out copies of hundred-page reports and hearing transcripts for free to anyone who asks.

If the information requires extensive searching, compiling, or "security review" before it can be released, then you will be better off using FOIA. But keep in mind the following when you write your request:

- Be aware that it may take time. Although the government is required to acknowledge receiving your request within ten days, processing often takes months.

- Send the request to the proper agency, office, or military base. If you send a request to the Office of the Secretary of Defense, for example, you will probably get a note indicating that there is a backlog of 900 cases, and your request won't even be examined for months. The Office of the Secretary of Defense can send you a list of current FOIA contacts for Defense Agencies.

- State your noncommercial status. The FOIA was intended for journalists and nonprofit, educational organizations, not companies who need information for commercial reasons. Therefore, stating your affiliation with a newspaper, university, or nonprofit group greatly enhances the chances that the information will be released. As a nonprofit organization, you can request a fee waiver. Even if you do, it is possible that you will be told you have to pay fees, which can easily run into hundreds of dollars at Pentagon rates.

- Be specific about what you want. If you don't use the precise name for the information you are requesting, you will likely get a letter asking for a clarification or you will get the wrong information. The best way to find the correct name for the information is to make a few phone calls before you start. There are a number of laws, such as the Administrative Procedures Act and the Federal Advisory Committee Act (FACA), that define what information must be kept by law.

important for your campus, and then narrow your search. To get you started, here are 21 questions to ask:

21 QUESTIONS ON MILITARY TIES TO YOUR CAMPUS

1. Does your campus have an ROTC program? If so, what percentage of undergraduates enroll? *(This information should be available from the Financial Aid, ROTC, Admissions, and Registrar's Offices.)*

2. What are the largest employers of graduates (especially in engineering, sciences, political sciences, and business)? Are any of these companies military contractors located nearby? *(The career/job placement office can provide this information. Large military contractors will be listed in the DOD's annual list of the top 500 Defense Contractors;*[1] *smaller contractors can be identified through the* Million-Dollar Directory.*)*

3. How large are the science and engineering programs compared to liberal arts? Has the balance been shifting in the last decade? *(The president's or provost's office should have this data.)*

Questions 4-7 apply only to schools that have externally funded research. Answers should be available from the Sponsored Research or equivalent office:

4. How much sponsored research does your campus perform, and what is the breakdown by sponsoring agencies?

5. Over the past ten years, has the amount and percentage of research conducted by the DOD at your campus gone up?

6. How much of the research on your campus is conducted by professors, graduate students, research staff, and undergraduates?

7. Is classified research permitted on your campus? Are prepublication restrictions acceptable?

8. Are any professors from your university listed in the *Who's Who in America* or *American Men and Women of Science* as corporate directors or national committee members?

9. What annual reports are published by different offices and laboratories in your university? Are copies freely available? Are they displayed in the library?

10. Does your university supervise any external laboratories or manage committees for the military (or did it used to)? How much money does the university receive every year for its services?

11. Does your university hold any conferences or conduct training programs for military personnel or engineers? *(Individual departments may make their own arrangements here.)*

12. Are there courses for scientists and engineers dealing with issues of social responsibility, and are they required?

13. Does your university have a Peace Studies program?

14. Are most of the people appointed to high positions in your university white men? (The "old boy" networks that influence such decisions often consist of men bound by their military ties.)

15. Is CIA recruiting allowed on campus?

16. Are there any internal reports from the late 1960s or early 1970s that were published by your campus in response to movements for progressive change in the university's policies during the Vietnam War? *(The president's office would know.)*

17. Are there any sympathetic veteran faculty members or former activists whom you can contact to get some leads?

18. Do any campus newspapers or university archives exist so that you can examine controversies related to the military in the past (especially during the late 1960s and early 1970s)?

19. Does the university (or faculty) have a research oversight committee which reviews research proposals to make sure they comply with university regulations?

20. Do any of the professors at your campus consult for or own nearby companies which perform military work? *(Check the university policy on consulting work.)*

21. Does your university participate in lobbying? Does it belong to AAU (American Association of Universities), ACE (American Council on Education), or the NALGCU (National Association of Land Grant Colleges and Universities)?

GAINING ACCESS TO INFORMATION THROUGH THE UNIVERSITY

Most of the questions above can be answered by consulting the appropriate office at your college or university. At first, it may seem strange walking into all these offices and asking questions. Sometimes you will be able to state your true purpose, and staff people will be glad to give you new leads. In other cases, you will be confronted by cautious administrators who are afraid to divulge information that will anger their bosses and lead to a reprimand. (This is the hierarchical system in action.)

Use your judgement. When asked, "Can I help you?" don't say, "Yes, I'm looking for some information on the university's complicity in imperialist weapons research." Simply say you are studying "how the university contributes to Department of Defense needs" or "the effect of federal funding shifts on academia" or, even better, "the social contexts of science and technology." It may help to get a professor as a sponsor, and you may be able to earn credit.

There is a tendency of many activists today to take over a building first and ask questions later. Although this may "work" in placing short-term pressure on the administration, it may be hard to justify such action to the students and lead to a backlash effect. Direct action will be effective only if you can later convince people that other methods have been exhausted. For this reason, it is a good idea to put your requests in writing, publish them widely, notify the press, and involve as many students as possible, through petition drives, rallies, and other public events.

USING NONADMINISTRATIVE SOURCES

When university offices are tight-lipped, the best resource by far is people who are concerned with similar issues. Sympathetic faculty and staff members, former campus activists, journalists, and members of local peace and community organizations are most likely to be of help. They can often show you relevant newspaper clippings and refer you to other people who are interested. Former faculty members may have interesting stories to tell, and they need not worry about retribution. See the resources at the end of this article for organizations that may aid your research.

Some key publications to keep in mind are the *Chronicle of Higher Education* (for dates of meetings and statistics), *Commerce Business Daily* (for research contract awards), the various *Who's Who* directories (to find out the connections of professors), and federal government reports (including annual reports) which give the names of members of committees and boards.

INVESTIGATING MILITARY CONTRACTS

Of course, not every campus performs military research, so this section may not be relevant to you. But at the 200-plus universities that do, investigating military contracts is one of the most effective tactics that activists can use.

Although most universities have policies regarding classified work, enforcement of those policies is often slipshod. Administrators will tell you that you're wasting your time and that you won't find anything of interest. But more likely, they are wary that you will discover politically controversial research, and perhaps violations of university policy. In the face of huge economic incentives to do otherwise, universities cannot be trusted to enforce their own research policies. We must enforce them.

The first step is to obtain a list of all the research going on at your university. Some schools, such as MIT, print an annual list of all the sponsored research by department, sponsor, principal investigator, and dollar amount.

If you can't get a list of contracts from the contracting office, perhaps you need official legitimacy. Try other channels, such as faculty committees or the Provost. Most administrators and faculty, defending the openness of the university, will defend your right to gain access to information, and they will help you justify your request. At state universities, it may be possible to get the contracts released under the state's Sunshine or Freedom of Information Act, if it has one.

Once you get a list of the contracts and their titles, you can then select a portion of the list and ask for a copy of the Statement of Work which is included in each contract. If you are especially interested, you may request the rest of the contract and the research proposal.[2]

REQUESTING INFORMATION FROM THE GOVERNMENT

All the information you need is neatly recorded in unclassified government files and federal databases. So it makes sense to file a Freedom of Information Act request immediately if you encounter any resistance by the administration. All you have to do is understand a little bit about what a research contract contains and how the government keeps track of its research.

Research projects evolve over a fairly long time period, starting with the

Resources You Can Use

NARMIC Pentagon Audit Project, 1501 Cherry Street, Philadelphia, PA 19102; telephone 215/241-7175

Fund for Open Information and Accountability, 145 W. 4th St., New York, NY 10012; telephone 212/477-3188. They offer an eight-page booklet on how to file a Freedom of Information Act request.

Institute for Peace and International Security, 91 Harvey St., Cambridge, MA 02140; telephone 617/547-3338

MIT Science Action Coordinating Committee, MIT Room W20-401, Cambridge MA 02139; telephone 617/738-5624, contact Steve Farber

University-Military Action Guide Project, c/o Rich Cowan, 117 Rindge Ave., Cambridge, MA 02140; or Matt Nicodemus, 968 F St., Arcada, CA 95521 707/826-7033

Northeast Student Action Network, P.O. Box 1050, Cambridge, MA 02142. A spring conference is scheduled at Simons Rock College in Western Massachusetts.

United Campuses Against Nuclear War, 309 Pennsylvania Ave., SE, Washington DC 20003; telephone 202/543-1505, contact Vivian Mills

National Student Action Center, PO Box 15599, Washington, DC 20003; telephone 202/547-2300

Computer Professionals for Social Responsibility, PO Box 717, Palo Alto, CA 94301; telephone 415/322-3778

Center for Economic Conversion, 222-C View St., Mountain View, CA 94041; telephone 415/968-8798, contact Randy Schutt

National Coalition for Disarmament and Economic Conversion, PO Box 15025, Washington, DC 20003; telephone 202/544-5059, contact Robert Krinsky

Committee to Bridge the Gap, 1637 Butler Ave., Room 203, Los Angeles, CA 90025; telephone 213/478-0829, contact Steve Aftergood

War Resisters League, 339 Lafayette St., New York, NY 10012

Committee for Responsible Genetics, 186 South St., Fourth Floor, Boston, MA 02111; telephone 617/423-0650

Alliance to Stop First Strike, 1265-B Guerrero St., San Francisco, CA 94110; telephone 415/285-8372

FEDERAL AGENCIES:

U.S. Department of Defense, 202/545-6700

Defense Science Board, 202/695-0192

Director of Defense, Research & Engineering, 202/695-3042

appropriation of money for projects on a nationwide scale, and ending with the publication of technical papers and research reports.

First, the Pentagon proposes a research budget in January or February. Then Congress approves the DOD's Research, Development, Testing and Evaluation (RDT&E) R-1 budget for the fiscal year beginning in October.[3] In the Department of Defense, the budget is broken down into Program Elements. These are listed in the final budget document as brief titles and five-digit numbers, followed by a letter representing the DOD branch or defense agency.

In November, just before the final budget is approved, a heavily censored version of the near-final R, D, T&E and procurement budgets is published in *Defense Electronics* magazine. The *Defense Electronics* version is especially useful because it contains one-line descriptions of each of the projects, in addition to the often cryptic titles.

Then the universities apply for the funds. Sometimes, the proposals are submitted in response to a notice advertised in *Commerce Business Daily.* To get a jump on competing universities, a school may use as contacts former professors who are now work at the DOD and former Pentagon administrators who now work on campus. The DOD gets more proposals than it can fund, and simply selects the proposals which best suit its technical and political objectives.

Next, a research contract is prepared, and sent back to the university for approval by the campus administration. At the Department of Defense, a description of the technical objective and military relevance of the work is entered into a central database, called the "Research and Technology Work Unit Information System."

Finally, the professor prepares annual progress reports and asks for "extensions" of the contract. Any final reports are returned to the sponsoring agency, and are usually catalogued in the database of the National Technical Information Service. Directed military research may be reported secretly, without the benefit of a public report.

Using the Freedom of Information Act (FOIA), you can request a copy of the proposal, the contract, and the Research and Technology Work Unit Summary. The work unit summaries are most useful because they pack a lot of information into one or two pages. Compiled by DOD program managers, they give the name of the project, the date of expected completion, and the principal investigator. They also list the program element that the research is attached to along with a description of its technical objective. A sample work unit summary for "Rapid Solidification Technology with Emphasis on Liquid Dynamic Compaction," obtained by MIT student researchers, states that "The proposed research is directly relevant to Army needs for more reliable high energy product magnetic alloys for missile guidance systems."

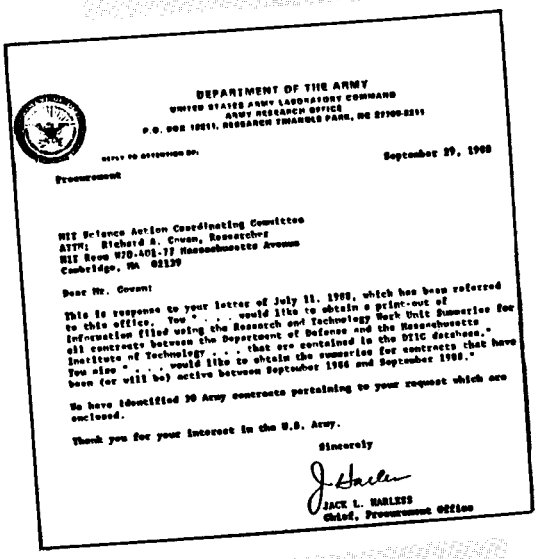
If you try to obtain research contracts, you will have to specify the research contract number, which looks something like "N00013-87-K-0121" for a Navy contract. If you try to obtain work unit summaries, you can actually send a request to the Defense Technical Information Center (DTIC) and ask for a print-out of all the work unit summaries for university.

If you do obtain a copy of both the professor's proposal and the work unit summary, try comparing the two. In 1972, students at Stanford discovered that the professor's description of research was often quite different from the application that the DOD intended. The work unit summaries are rarely shown to the professors conducting the research. Because of the pervasive notion of the "neutrality" of science, professors and students seldom care to ask what their work is used for. You can challenge that myth!

Good luck with your research. If you get any interesting results, don't hesitate to submit an article describing your findings to *Science for the People.* See if the university will keep a copy of your findings on file for public access. After all, if your university is serious about its plans to promote the consideration of social responsibility, students must be able to see the intended use of their work by the DOD (as well as other government or private agencies).

This letter was received in response to a request from the MIT Science Action Coordinating Committee to the Freedom of Information Act Focal Point, Defense Technical Information Center, Building 5, Cameron Station, Alexandria, VA 22304. DTIC forwarded the request to various Defense agencies who had the authority to release work unit summary information. The original request pointed out that all the research was unclassified (MIT policy requires this), and requested that "the information be released and that a fee waiver be granted under the Freedom of Information Act."

To justify the request according to FOIA guidelines, the letter continued, "The Release of documents on publicly sponsored research is in the public interest and the information is to be used for scholarly, non-commercial purposes. We are a non-profit, MIT-recognized student organization and are studying how the scientific community assists the Department of Defense. The work unit summaries are to be used to determine how closely university research meets Department of Defense needs...we indicate willingness to pay fees for duplication costs, but we request prior notification if the fees are to exceed $75.00."



DEPARTMENT OF THE ARMY
UNITED STATES ARMY LABORATORY COMMAND
ARMY RESEARCH OFFICE
P.O. BOX 12211, RESEARCH TRIANGLE PARK, NC 27709-2211

REPLY TO ATTENTION OF:

September 29, 1988

Procurement

MIT Science Action Coordinating Committee
ATTN: Richard A. Cowan, Researcher
MIT Room W20-401-77 Massachusetts Avenue
Cambridge, MA 02139

Dear Mr. Cowan:

This is response to your letter of July 11, 1988, which has been referred to this office. You "... would like to obtain a print-out of information filed using the Research and Technology Work Unit Summaries for all contracts between the Department of Defense and the Massachusetts Institute of Technology ... that are contained in the DTIC database." You also "... would like to obtain the summaries for contracts that have been (or will be) active between September 1986 and September 1988."

We have identified 30 Army contracts pertaining to your request which are enclosed.

Thank you for your interest in the U.S. Army.

Sincerely

JACK L. HARLESS
Chief, Procurement Office

NOTES

1. U.S. Department of Defense, Assistant Secretary of Defense, Directorate for Information Operations, "500 Contractors Receiving the Largest Dollar Volume of Military Prime Contract Awards for RDT&E," available from Defense Technical Information Service.

2. U.S. Department of Defense, Office of the Secretary of Defense, "Department of Defense Program for Research and Development" (R-1 Summary, annual).

3. Roger Kerson, "Investigating the Investigators," Radical Teacher, June 1984, p.9.

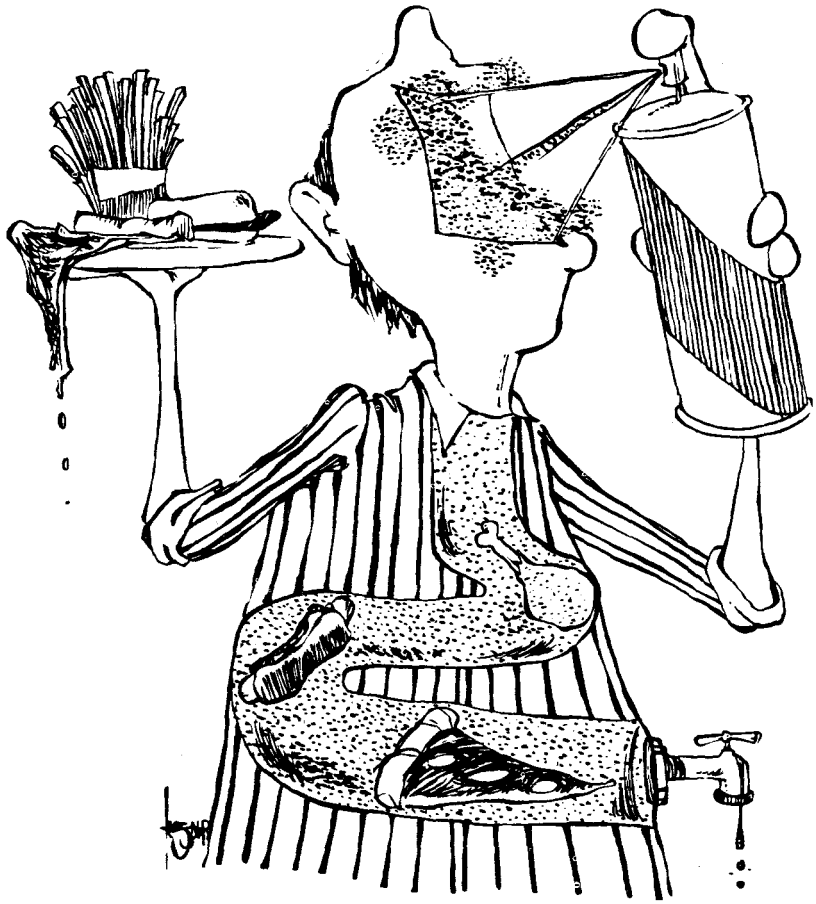
Top 25 Non-Profit DOD R&D Contractors,1987

(figures in millions)

MIT	$407.64
Johns Hopkins Univ	$354.92
MITRE Corporation	$347.53
Aerospace Corporation	$338.92
Draper Laboratory	$164.67
SRI International	$67.69
IIT Research Institute	$65.65
Institute for Defense Analyses	$57.37
Rand Corporation	$43.42
Carnegie Mellon University	$41.51
University of Texas System	$39.04
Pennsylvania State University	$38.99
Stanford University	$37.02
Battelle Memorial Institute	$34.67
Georgia Tech	$33.29
University of California	$33.08
University of Southern Cal	$32.81
Analytic Services, Inc.	$22.74
Riverside Research Institute	$20.31
University of Washington	$19.62
University of Dayton	$18.98
University of Illinois	$10.01
Utah State University	$14.83
Logistics Management Inst.	$14.41
University of Maryland	$13.65
Woods Hole Oceanographic Inst.	$13.23
New Mexico State University	$13.22
Southwest Research Institute	$11.88
University of New Mexico	$11.35
Cornell University	$11.19
National Academy of Sciences	$10.56
University of Massachusetts	$9.93
Hudson Institute	$9.46
Research Triangle Institute	$8.95
Purdue University	$8.62

[Source: *Chronicle of Higher Education*, 4/13/88]

BITTERSWEET



John Klossner

BY RIF S. EL-MALLAKH AND DANIEL P. POTENZA

Sloppiness pays off. At least it did for Dr. James Schallter of Searle Laboratories. Back in 1965, when he was involved in research on stomach ulcers and peptides, he spilled a bit of a solution of a dipeptide on his notebook. Later, while flipping through its pages, he licked his finger in an automatic movement. The unexpected sweet taste quickly caught his attention. To the credit of the company's administration, the issue was pursued. Now, over 20 years later, that peptide is grossing over one billion dollars annually.

The dipeptide is commonly known, and consumed, as NutraSweet. The generic name is aspartame, and it is composed of two naturally occurring amino acids: aspartate and phenylalanine, and a methanol group. On the surface, aspartame is an ideal artificial sweetener. It is made of natural substances, it is very low in calories (one one-hundred-eightieth the calories of sugar for the same sweetness), and it can be manufactured relatively inexpensively.

Logically, G.D. Searle and Company spent nearly $100 million to develop this new product. Despite this, aspartame's approval by the Food and Drug Administration (FDA) was difficult, complicated, and expensive. When finally approved in 1981, aspartame had been the subject of the most prolonged FDA approval process.

For G.D. Searle, it was certainly a worthwhile process. From a humble beginning of $13 million in profits in 1981, earnings quickly soared to $74 million in 1982, $336 million in 1983, $585 million in 1984, $700 million in 1985, and over one billion dollars in 1986. The growth of NutraSweet sales has been so staggering that soon after Monsanto bought G.D. Searle in 1985, the newly formed NutraSweet Company was split off as a wholly owned subsidiary. But this is not the sweet story of success implied by NutraSweet's profit margin.

In the late 1970s and early 1980s, animal studies on the effect of aspartame on brain chemistry were first being published. By 1985, the first reports of aspartame-related seizures, headaches, and psychiatric illness began appearing in the medical literature.

In July 1986, the Washington-based Community Nutrition Institute (CNI) felt that there was sufficient evidence to petition the FDA to repeal its approval of aspartame, calling it an "imminent hazard." The group cited some 80 cases of aspartame-related seizures compiled by Dr. Richard Wurtman of the Massachusetts Institute of Technology.

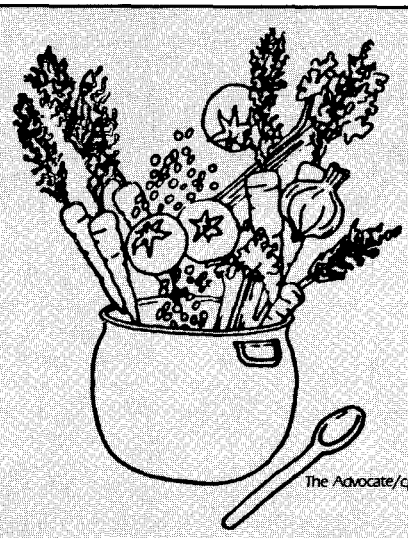
By October of 1986, CNI returned with another petition to the FDA, this time supported by the newly formed Florida-based Aspartame Victims and Their Friends, Inc., citing some 60 cases of aspartame-related "eye damage." These cases were compiled by Florida doctors Orion Ayer and Morgan S. Railford.

Rif S. El-Mallakh and Daniel P. Potenza are physicians in the Department of Psychiatry at the University of Connecticut Health Center in Farmington.

FAKE FOODS & THE FUTURE

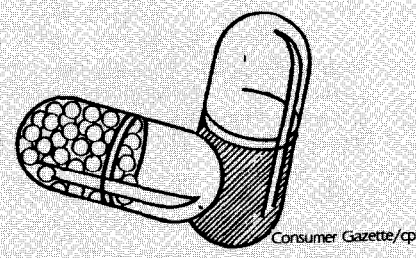
While aspartame may be one of the most invasive and commercially consumed manufactured food products to come along the beverage and diet food trail in recent years, there's a long line of future fake foods on the horizon. In the September/October 1987 issue of *Science for the People*, Tracey Cohen reported on olestra, a sucrose polyester compound created by Proctor & Gamble. This fake fat has no calories, but it also has no food value, since our digestive systems can't break down the compound. Proctor & Gamble hopes to market the fake fat in shortenings, oils, and snack foods. If it wins the Food and Drug Administration's approval, olestra may soon appear in ice cream, salad dressings, mayonnaise, lunch meats, butter, and margerine as well.

Not to be shrunk out of the fake fat



market, the NutraSweet Company has come up with its own cholesterol-free product, Simplesse, and may beat Proctor & Gamble to the grocery store shelves. Simplesse is a protein made from egg whites or milk that has been heated, congealed, and then formed into bead-like molecules. Like olestra, it has the taste and feel of real fat. The NutraSweet Company hopes to bypass the Food and Drug Administration's regulatory process, since its product is made from foods that are already approved by the FDA.

Simplesse can't be cooked like olestra, but it can be added to foods after the heating stage. Although it probably won't turn up in your cooking oil, NutraSweet is eyeing the processed food industry for its market. NutraSweet Company researchers are hard at work developing new foods with their new fat



that may reach consumers before they finish reading the fine print on the label of their frozen pizza.

Suspiciously, their impressive medical series has yet to be published. The FDA has responded conservatively to claims of adverse health outcomes related to aspartame consumption, supporting aspartame's manufacturers.

Worries are not new regarding aspartame. In 1974, initial approval by the FDA was bogged down when concerns over amino acid toxicity reached a peak. It appears that glutamic acid—a common amino acid that is often ingested as monosodium glutamate (MSG)—and aspartate cause brain lesions in experimental animals in high doses. Likewise, excessive phenylalanine intake can produce brain damage and mental retardation, as it does in the genetic disorder phenylkentonuria (PKU).

By 1981 the evidence brought forth and reviewed by the FDA showed that it would take approximately 14 grams of aspartame, or about 400 Equal sweetener packets consumed over a few hours, for the amino acid levels to reach the toxic range. The NutraSweet Company believed that people would not consume more than 3.5 grams of aspartame a day. Consequently, the FDA approved aspartame as a food additive.

In July 1983, the FDA approved use of aspartame in soft drinks. This decision was delayed because of further investigations into aspartame's qualities. Aspartame tends to decompose in liquid and/or acidic environments. If your typical diet soft drink sits in a warehouse (or your pantry) at a hot 86 degrees for eight weeks or so, about 38 percent of the aspartame in the soda turns into something else. Ten percent would change to methanol, and about twelve percent would be diketopiperazine, both of which may be toxic to humans.

These figures moved the Arizona Dietetic Association and the Central Arizona District Dietetic Association to file a petition with the Arizona Department of Health Services in 1984 to forbid the sale of aspartame-containing beverages in Arizona. (The mean high daily temperature in Phoenix is 85.1 degrees Fahrenheit.) The appeal was turned down because the health department felt that the amounts consumed of these breakdown products were not a danger to health. It was further noted that fruits and vegetables are natural sources of methanol, and that aspartame doses of 200 mg/kg (approximately 24 liters of aspartame-sweetened beverage) do not increase the blood levels of the methanol metabolite, formic acid.

The FDA is now in an unenviable position. Memories of saccharin studies are still fresh. In 1977, when the FDA attempted to ban saccharin, there was a tremendous uproar that ultimately required Congress to intervene and delay the FDA's action against saccharin. Aspartame now serves the essential role that saccharin served in the 1970s. Aside from the obvious benefits of a nonsugar sweetener to people with diabetes, there is a larger population of weight-conscious Americans who do not want to give up their sweet tooth. Consumers want aspartame.

The FDA's response to CNI's petitions and the growing medical reports of aspartame-related illness has been appropriate and balanced. It has called for a new round of animal-based testing. The U.S. Senate has also responded by setting up public hearings on the safety of aspartame. Headed by Ohio Democrat Howard Metzenbaum of the Senate Committee on Labor and Human Resources, and chaired by Massachusetts Democratic Edward Kennedy, sixteen senators began the hearings last November.

The NutraSweet Company has also responded by setting up a toll-free number (1-800-321-7254) to report any problems that might be related to aspartame, and continues to spend nearly $25-30 million annually in both clinical and basic research. Certainly, research is where the long-term solution lies. In the meantime, increased awareness and increased consumer choice would seem to be in order.

RESOURCES

Aspartame Victims and Their Friends, P.O. Box 6184, Ocala, FL 32678; telephone (904) 351-2086

Aspartame Consumer Safety Network, P.O. Box 19224, Washington, DC 20036

Consumer Nutrition Institute, 2001 S St., N.W., Suite 530, Washington, DC 20009; telephone (202) 462-4700

The Nutrasweet Company, Skokie, Illinois; telephone 1-800-321-7254

INDIGENOUS SCIENCE IN AN INDUSTRIAL WORLD

BY JOSEPH REGNA

Certainly no one can disagree with the common theme of the three articles on science education in the third world in the July/August 1988 issue of *Science for the People,* that the creation of knowledge about the world needs to be an active process in which we are all engaged as subjects, not a passive process in which we are merely objects receiving a flow of laws and facts to learn. Whether in Nicaragua, Tanzania, Brazil, or elsewhere, such a process of trusting in yourself to observe and think critically is an important component of empowerment, the development of one's full potential as a human being and, ultimately, of real democracy.

The Nicaraguan authors of the article "Creating a Culture of Science" want independence for the citizens of their country. As Emilio Perez and his coauthors point out, "the development of science and technology is fundamental and indispensable" to gaining that independence. Although they do advocate a science by and for the people, the authors seem to have already decided which direction that indigenously created science should take. But I cannot agree with their underlying assumption that achieving independence means creating a society based on the Western economic model of progress and development, and using their indigenously created science to get there.

The authors' argument is based on these premises: independence for the people of Nicaragua is equated with "the development of an economy that is multiple, dynamic, and independent." They write, "Modern economic theory now recognizes that technological innovation plays a central role in production." Therefore, "any developing independent economy must have a basis in science and technology," for "only science and technology will permit the rational and efficient apportionment of natural resources and industrial development."

In other words, it is "only through that community [of science and technology] that it will be possible to intensify and diversify our economy, so as to satisfy our national demands and eventually to compete effectively in international markets," the Nicaraguan scientists write. The government, the scientific-technical infrastructure, and the productive structure of the economy serve as the vertices of the social triangle which will influence the development of an independent economy. A modern economy is seen as a desirable goal, and science and technology are vehicles for getting there.

WESTERN DEVELOPMENT & ECONOMIC INDEPENDENCE

If these statements have a recognizable ring to them, they should, for they could have come from the mouths of people like the editor of *Science* magazine, the head of the National Science Foundation, or the science advisor to the U.S. president. They should also sound familiar becauses they add up to a justification for the type of society we in the so-called developed world are accustomed to. It is a society characterized by a money economy, industrialization, mass production of consumer goods, and mass consumption of those goods. It is an apt description of the Western development model. What I question is whether such a society is the correct road to independence and whether an indigenously developed science must inevitably lead to the economy envisioned by these Nicaraguan scientists.

Many characteristics of such a society are troubling. For example, spiritually deadening employment, such as factory work, is spiritually deadening whether performed in the U.S. or Nicaragua. I also question the quality of human relations that are influenced by an economy based on buying and selling material goods.

As an environmentalist, I hate capitalism as much as any person struggling for social justice. But when one looks to societies which seek a break with capitalism and call themselves socialist, the phenomenon of industrialization and its devastating effect on the environment must be considered. To those who identify themselves as environmentalists, industrialization is a definite blunder.

ENVIRONMENTALISM & INDUSTRIALIZATION

Marxist theory, which motivates many fighting for social justice throughout the world, endorses the control and development

of the "forces of production"—meaning, in part, industry. Industrialization is a fact of life and social policy in most socialist countries. With third world revolutionary societies pursuing, to varying degrees, economic industrialization, it is not difficult to understand why many environmentalists see capitalism and socialism as two sides of the same coin.

Some Native American thinkers, such as Russell Means, have even suggested that this affinity should not be surprising. Both ways of organizing society have emerged out of the same European context, emphasizing rationality, abstraction of all reality into equations and numbers, objectivity, and dominance over nature. (See *Marxism and Native Americans,* edited by Ward Churchill, South End Press.)

By not critically examining the ideologically loaded concepts of progress and development, the authors of "Creating a Culture of Science" ultimately accept the logic of the Western development model, which is the basis for both capitalism and socialism. By accepting one facet of that model, industrialization, these scientists avoid

CONTINUED ON PAGE 24

Joseph Regna is a physician active in the peace and environmental movements. He is a member of SftP's editorial committee.

THIRD WORLD WOMEN AND WESTERN WORLD SCIENCE

BY RUTH BERMAN

I've just finished reading the section on Science Education in the Third World in the July/August 1988 issue of SftP and was impressed with the concern and involvement of the authors. However, in the articles on Nicaragua and Tanzania, their understanding of the relation between science and society seemed to be unclear, and the perspective from which the introduction of science into the third world was approached omitted what I think has become a key aspect of the situation. This key development is the the dependence of global, capitalist high-technology on the superexploitation of impoverished, primarily third world women. This is not just a "woman's issue," but is *the* central economic struggle in the world today. These women, and their point of view, were invisible in the discussions of third world science education. Therefore, their analyses of the role of science in the development of the third world led to "good-guy," peace-corps type solutions, with the dissemination of "good" Western science as their primary goal.

Science, a product of human social activity, is presented as being above social conflict, a thing-in-itself. It is popularly defined as a body of absolute facts and immutable laws which is independent of the milieu of specific human relationships and conditions from which it has emerged. It is the "objective truth" of present-day Western civilization, to be venerated and passed on to future generations and undeveloped countries. It can be misused, added to, or even "corrected." But because science is "objective," it does not have an ideology; it can only be "good" or "bad."

This science is created primarily by the thinking of "great men," with technicians and disciples back in the laboratory ready to carry out their ideas. If there are no recognizable "great men" around, we annoint them as such with the Nobel Prize; we can then always identify them by their title, "Nobel Prize Winner."

The articles by Emelio Perez and his associates in Nicaragua, "Creating a Culture of Science," and by Robert Lange, "Teaching Physics in Tanzania," express many of these accepted generalizations. Both of these articles are about earnest young men in a university setting who want to acquire this body of objective knowledge.

The enthusiasm of the young men from Nicaragua was especially moving, and the vision of technological power which they see up north must be overwhelming. But they have accepted the view that there exists a "basic science" which is "the search for the truth" in a "systematic...objective form." They also propose that the scientists at the top—at the universities—who would be carrying out this research should be recognized as the creative leaders of the scientific-technical infrastructure of the society (albeit in "dialectical relationships" with other "vertices" of technological innovation.) And, as they believe that "there are only two classes of scientific research: good and bad," therefore "we should strive to make research of a very high quality."

In the article on physics teaching in Tanzania, Lange shows an impressive awareness of feminist critiques. His recognition of the similarity between the power relations expressed within established science and by "the religious state of mind" is also perceptive; they both operate by handing down *the* word and *the* truth from above. However, Lange still speaks of sharing "all of science" with, presumably, the people of Tanzania, as if science were some objective entity, a separate thing, a "possession."

Both sides of this sharing bridge, unfortunately, seem to be anchored in very shaky ground. The science being offered is not a solid, defined body of knowledge, but is an intricate aspect of the society within which it develops, incorporating all its conflicts and contradictions. In our current capitalist society, for example, science is not only inherent in its exploitative processes and "abused" to enforce the domination of its ruling group, but the way of thinking of the practitioners of its science reflects the nature, relationships, and especially the ideology of capitalism.

This does not mean that there is no reality in the old science and that we have to throw it all out and begin anew if we are to have a new world! After all, capitalism itself developed from a real, material need for increased productivity. It does mean, however, that the ideas, as well as the practices, of science are not neutral; they cannot be sexless in a sexist society, nor even-handed in a hierarchical one. A developing society does require science, and has to begin by turning to the orthodox science of the past. But science must become the knowledge of all peoples, especially women who have been so rigorously excluded from its control and thinking in the past. Then, in transforming their society, they will also transform its science.

The philosophical pillars supporting western capitalist science are primarily Cartesian and positivist. These view natural processes as mechanisms (like computers) with linear cause and effect relationships, statistically smoothed out curves, repetitive unitary structures, and fixed laws. A machine, however, requires an outside operator to control it, giving rise to a system consisting of two separate

Ruth Berman writes, "My formal qualifications include the standard ivy-league university degrees in genetics, biochemistry and neurochemistry. My socialist orientation and studies in dialectics go way back—to the days of the depression and World War II—but were greatly reinforced by the feminist/women's movements of the past decades."

parts, the controller and the controlled. Dualist thinking actually goes back to Plato and Aristotle, bit it is this Cartesian form which is most clearly expressed in the science of our day.

PHOTO/Shia/Photophia/LNS

This is not the place for an extended discussion of Cartesian and dualist ideology in science. However, a short discussion of one of its most persistent and virulent forms, biological determinism, could illustrate the role that ideology plays in determining the nature of the science which is practiced today. There have been many excellent well-researched books written to combat the sociobiological thesis that those who are on top belong there because of their inherent superiority. Yet these ideas keep resurfacing at an increasing rate.

Biological determinism is based on assuming an oppositional dichotomy between heredity and environment. These two aspects of development are separated from each other and treated as isolated and isolatable components which can, however, be mixed in various fractions. In this system, heredity is the fixed component, received from the past; environment is the changing and changeable element.

In Lysenkoism, which was also predicated on this dichotomy, the changing environment was considered the all-controlling factor; in our form of Lysenkoism, the obverse of this dualist coin, the fundamentally fixed heredity is considered to be dominant. The concordance here between social ideology and biological theory is readily seen. (In the nondualist, dialectical approach, these aspects are in inseparable interaction, mutually influencing each other in development at all times. The isolation of one from the other factor for experimental purposes may be useful, but it is recognized as artificial.)

The most pervasive form of biological determinism today is the search for "the gene for:" Alzheimer's disease, mental depression, schizophrenia, cancer, and anything else you can think of. These are viewed as switches to turn the disease on. Even the continuous flow of contradictory evidence published in *Science* itself (see the report on the absence of the highly advertised Alzheimer gene in many cases in the September 16, 1988 issue) does not slow the enthusiastic hype. In addition to the ideological conformity shown by this disease-causing gene research, there is also a very real financial incentive for it. Prominent molecular biologists are now associated with companies marketing kits for gene diagnosis, including fetal diagnostic kits for tests requiring penetration of the mother's body.

A simple listing of widely accepted dichotomies indicates how the division of reality into *separate* dominant and subordinate aspects reinforces the idea of the naturalness of hierarchy in our society: nature/nurture, heredity/environment, head/hand, basic science/applied science, theory/practice, white/black, male/female. In each case, the first member of the pair is seen as dominant over the other.

The structure of the receiving side of this science to be shared with the third world also does not seem to be well defined. It is tempting to think of these receivers as the people of Tanzania. But what part of the people do they represent? The pictures of those friendly young faces suggest that they are all bright young men, eager to succeed at the university. (There are, of course, no young women there, but then, there are precious few in the U.S. physics establishment.) But what are they trying to succeed at, with their memorization of long lists of formulae, "facts," and "immutable laws"? What will this kind of success mean for the less successful people of Tanzania, for those without any education, and without any chance of getting it?

There is no reason, of course, why some black young men should not have the chance to "make it" like white young men do. However, this would seem to make it an affirmative action program for a favored few, rather than sharing a body of knowledge which the people of Tanzania can use to transform their society. And it has the pitfalls of all affirmative action programs: it is self-limiting and a form of tokenism, which can be used to perpetuate and establish new forms of domination.

Science, therefore, is not just an "objective" body of knowledge which we can share with our third world friends, nor can it be evaluated as just "good" or "bad" work, carried out in university basic research laboratories, separated and isolated from the practical, "applied" world below. The science of a society, its theory and its practice together, is rather an inseparable organic function of that society, which does not arise *de novo,* but is historically derived. In a society in the process of transformation from hierarchical to egalitarian, science cannot belong just to a privileged few, to be handed down from the top.

Sloppy, careless technique and thinking always leads to "bad science." "Good science," however, is not only good technique. It must first of all be perfused with the perspective and needs of those whose body, hands, and head are most exploited by high-tech global capitalism, but have been completely excluded from

PHOTO/Stephanie Urdang/LNS

any power within it. These women have, up till now, been the victims, the *object* of the research of the privileged scientists. But science plays too important a role in the world today for them to be left out of it. They must be among those who direct the science of their society, plan it, and do the research, for it is they who have the fullest understanding of the needs of a society in which everyone's needs are to be served. The perspective of the natural and social world that they, and others who think like them, will bring to science will transform it into a truly great science.

SHARING SCIENCE

ROBERT V. LANGE RESPONDS

In response to my article on teaching physics in Tanzania, Joseph Regna and Ruth Berman have presented interesting positions and criticisms. We are entering into what is, for me, a very important controversy for the left. I wrote my article generally aware of the positions and arguments put forward by Regna and Berman. So, this is not an instance of my ignorance; it is more like real disagreement about the history and meaning of the relationship between the first and third worlds.

The fact that something is not neutral does not mean it should not be shared, communicated or taught. When I support teaching our science, I am not claiming it is value free. Everything we might share, including our political positions, is coming out of our culture, our values, and our history. We certainly do not claim that our political ideas are neutral, and yet, of course, we teach and share them (viz. this magazine). So deciding whether something should be taught or shared must depend on what values are in it, and whether it may have a positive role to play for the participants in the process.

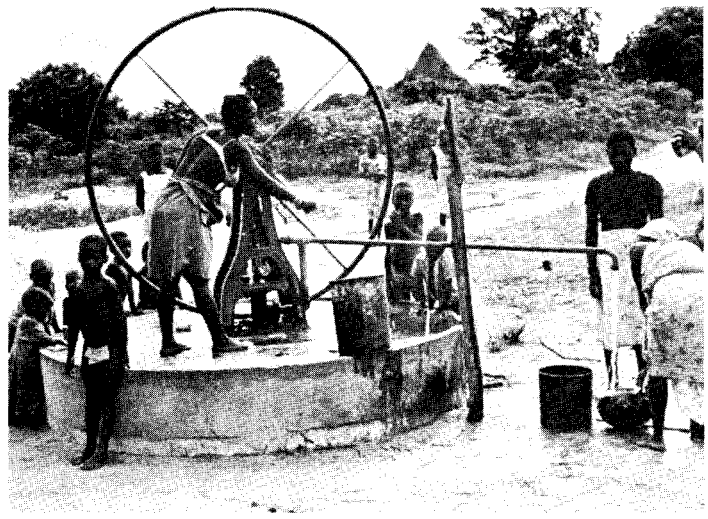
When I say we should share *all* our science I do not mean that all *our* science is all *of* science. There are reasons for sharing all of what we have, regardless of there being a science that we cannot invent beacause of who we are. Ever since the European invasion of Africa, Africans have been dealing with the European culture and its values. Walter Rodney, in his famous book, *How Europe Underdeveloped Africa,* overcomes the vision of an indigenous culture waiting to be itself again if we only let up on it. Too late. The people in the post-colonial world have a difficult task: to destroy the colonial structures while simultaneously building on them. We do no one a service by idealizing this task into one of destruction leading to a revelation of a pure non-European culture waiting to bloom. Cultures are intertwined in very complex ways. And we are not the only ones who must define the implications of the fact that Europe is very much in the culture and life of the Africans already. Of course there are different values in the world, and that is why the Tanzanians (themselves not homogeneous and in struggle) will make what they can and want to out of the specific things that have invaded their world. But we do not assist that as comrades if we use our values to decide for them what they should want from us. It is precisely because ours and all science is value laden and culturally generated that we should show them the whole thing, as deeply and generously as we can, and see what they do with it.

I think, further, that the idea that we should withold our science so that we don't mess up some new way of looking at the world that we want to receive from unspoiled cultures is a little self-indulgent. If we want a progressive science, we have to work to transform our science so that it expresses the progressive possibilities within it. Let us not be static and deterministic in our theorizing. Our job is to transform our own culture, to recreate our own science, in interaction and alongside the developments from all over as people win self-determination. And I would argue that part of doing that is to share it all. Without idealizing the cultures of the third world, we must trust the people to do the analysis of value alongside us. Our monopolization of that process will only lead us to the illusion of being above value.

Let me say one thing, though, that is a little more personal. It is just not fair to project onto the Tanzanian physics students, mostly men to be sure, the image of black men "making it" just like their white counterparts in the first world. These guys have a hard life, one not leading to an easy road, with no first world way to cash in on having studied. Most of them will be back in the countryside teaching in a primary or secondary school in difficult situations by the time we are debating this.

I was in a meeting with a Kenyan who was establishing radio programs about the environment. On the programs, they interview both "scientists" and "elders from the village." The elder may say, "If you kill the tree, it weeps." The scientist may say, "The root system of that tree helps stabilize the soil that maintains the ground water in this sort of terrain." Usually they agree about the value of the particular trees in particular contexts. Sometimes they don't, and the program uses these disagreements to generate interest. When the scientist speaks in jargon, he or she is asked to explain in better terms. But so is the elder. "What do you mean, the tree weeps?" Surely that is jargon too. How are people supposed to learn to solve problems for themselves if wisdom is in such a code? That too can be authoritarianism and elitism, and not science for the people. So the elder, too, must be clear to help others be creative in their responsibilities. It's a complicated world we live in.

Robert V. Lange teaches physics at Brandeis University and develops multicultural educational programs for science teaching. A longtime member of SftP, he is active in our Science for Nicaragua program.



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In Brief

Exploding the Hunger Myths

A High School Curriculum

by Sonja Williams

Institute for Food and Development Policy, 134 Ninth St., San Francisco, CA 94103, 1987

True or False? Hunger is the result of overpopulation. If birthrates were decreased, hunger would decrease. If you were an average high school student learning from a standard textbook (world geography or biology) proffered by any one of the major educational publishers today, you would answer *True*. According to the mainstream teaching materials that are in widespread use, there are too many people and not enough food. The problem is exacerbated by drought, floods, and other caprices of nature.

In fact, as Sonja Williams ably demonstrates, there is ample food produced to feed all 5 billion people on earth a healthy diet containing 3,600 calories a day. The causal relationship between population size and scarcity is but one of many pernicious myths about world hunger that Williams lays bare in her new book for high school teachers and students. Among other myths she tackles are: technology, notably biotechnology, will eliminate scarcity by improving agricultural productivity; more foreign aid will buy more food; hunger and poverty are problems only in developing nations; and the actions of individuals are irrelevant.

Williams, herself a high school biology teacher, has designed a curriculum to take teachers and students beyond the vapid, and often insidious, characterizations of Third World agricultural economies presented in most high school textbooks. The exercises in *Exploding the Hunger Myths* challenge teachers and students to examine their own assumptions and to look critically at causes and possible solutions to the problem of world hunger. Methods for stimulating students to think vary. Some exercises require students to apply statistics to their own lives (e.g., if this class represented the world) to concretize mathematical abstractions. Other times students role play or take part in simulation games.

In the second lesson, Williams challenges a central tenet of hunger mythology—the myth of scarcity. She provides ample evidence (as she does for all the topics) that world food supplies are abundant. Students learn that farmers around the world are facing declining crop prices due to surplus production. Moreover, many countries with large numbers of malnourished or starving people are actually net agricultural exporters. Brazil, for example, is the second largest exporter of food in the world, yet more than half of its population is underfed. In the northeastern regions of the country, 22 percent of rural children suffer from long-term malnutrition.

Having learned that scarcity is not the problem, students go on to explore the question of distribution: Where does the food that is produced actually go? A series of handouts describing real-life incidences helps students make the connections between land ownership, land use, poverty, and hunger. In "Cows for Fast Food," for example, students read about a family of poor tenant farmers in Honduras who are rented land on which to grow food in exchange for clearing forest to plant pasture grass. Once the land is cleared, however, the family is forced off and the land is given over to raising beef cattle. The poor move on and repeat the cycle of forest destruction, while the meat made possible by their labor is exported to the United States for the fast-food industry.

The complex interrelationships governing hunger and poverty cannot be learned from mainstream textbooks because they are barely acknowledged, much less discussed. Thus while students learn that Central America is an important region for the production of sugar, rubber, bananas, coffee, and beef for export, they do not learn that production of these cash crops comes at the expense of local food production.

Williams takes on the myths, distortions, and ommissions found in most "objective" and "authoritative" sources of information: textbooks, newspapers, magazines, and television broadcasts. But her tone is never hostile or confrontational. She invites students to think, learn, and react. She helps them to see human beings beyond statistics, thus making the information relevant and moving. And perhaps most importantly, she teaches students that they have both the right and the responsibility to take action. From consumer boycotts to letter-writing canpaigns, *Exposing the Hunger Myths* gives students solid action ideas. "This curriculum," writes Williams in her introduction, "emphasizes activism and hope—not guilt, apathy, or despair.... It introduces students to the idea that human activities, not acts of nature, are both the root cause and the potential solution to hunger." *Tracey Cohen*

Nuclear Weapons and Scientific Responsibility

by C. G. Weeramantry

Longwood Academic, Wolfeboro, NH, 181 pp., 1987, $25 cloth

The premise of Professor Weeramatry's book is that the legal principles of individual responsibility established at Nuremburg and in similar cases will one day be used to convict researchers whose work promotes the development of nuclear weaponry. While this vision of justice might gladden one's heart, it is impossible to envision any possibility of its happening. His presumption that scientists are legally culpable for creating the possibility of dire global effects is unsubstantiated by the treaties cited. On the other hand, waiting for the war to happen so that there will be a prosecutable offense is also useless, since the presumable effects of nuclear war would include the demise of the International Court of Justice.

The other rope by which to hang scientists—knowledge of the fact that their work helped impoverish the planet—is consistent with Weeramantry's view of the world, but is not mentioned in this book. Could there be a class-action suit by residents of inner-city slums against scientists who help funnel money away from them? We simply can't tell from this book.

Weeramantry spends the bulk of his book explaining the nuclear war and the changes its possibility has brought to the previous concept of war. He drags in a summary of the TTAPS ("nuclear winter") study and a chapter describing the make-up of the superpowers arsenal, as though anyone likely to be reading this book would not already have an understanding of this information. Suprisingly, the author's past as a Justice of the Sri Lankan Supreme Court and current employment as a law professor at Monash University in Australia has not given him a factual writing style. Particularly annoying is his tendency toward literary anecdotage.

I wanted very much to like this book, because it discusses ideas which have been so neglected of late—personal responsibility, international sanctions and force strong enough to bring belligerent countries into line—but this still isn't the treatment these ideas deserve. *Ellen Weinstock*

NAVY

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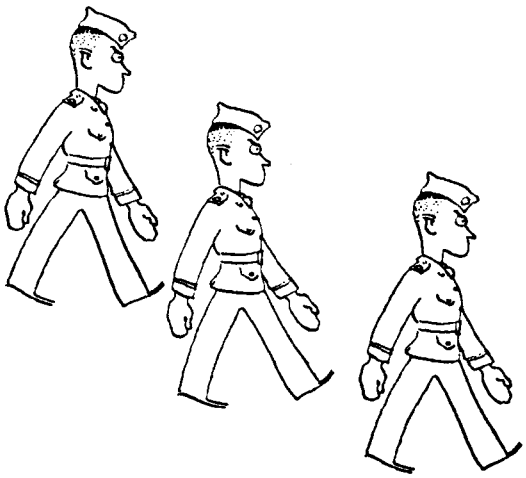

The new modus operandi would appear to cast the Chief of Naval Research as a spider at the center of the web, farming out the unclassified, fundamental work to public institutions while reserving the final, sensitive, applied pieces of the jigsaw puzzle for his central office. For example, the U.S. military has in recent times supported the work of colleagues in Israel who are cloning the gene for acetylcholine esterase, which happens to be the target enzyme for nerve gas. And of course in military R&D, there should always be the inevitable civilian spin-off. In this case, it seems to be the prospect of undermining the academic independence of legions of science professors in our major research universities.

NOTES

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2. R.Y. Stanier, *Annual Review of Microbiology* 34, 1, 1980.
3. A. Conadera, *Science for the People*, Vol. 13, No. 4, July/August 1981;E. Geissler, *Biological and Toxic Weapons Today*, Oxford University Press, 1986, page 23.
4. J.B. Neilands, *Bacteriological Reviews* 21, 101, 1957.
5. *Journal of the Federation of American Scientists* 39, No. 7, 1986, page 12.
6. U.S. Department of Defense, *Special Report Number 142*, Chemical Corps Biological Laboratories, Camp Detrick, Maryland, January 22, 1951.
7. R.P. Wheat, A. Zuckerman, and L. Rantz, *Annals of Internal Medicine* 90, 79, 1952.
8. R.Y. Stanier, op. cit.
9. Ibid.
10. *Report of the 1978 Committee to Review the NBL*, Chancellor's Office, University of California at Berkeley, 1978.
11. Ibid.

INDIGENOUS SCIENCE

CONTINUED FROM PAGE 19

what may be the ultimate issue: the relationship of humanity to the rest of the planet. Thus they fail to deal with the question of whether social justice—assuming that this means a socialist society—is sufficient to guarantee protection of the environment. As one torn by the unrelenting destruction of the environment, I suspect that it is not.

Because of its revolution, Nicaragua has a great opportunity to explore alternative ways of organizing society and relating to nature. It would be a shame for Nicaragua to waste such a unique historical moment and evolve into a small-scale version of the society which has dominated it for so long. "We feel that we are now in a position to grow to a seedling and finally bear fruit, due to the special conditions created by the Sandinista revolution," the Nicaraguan scientists write. But what kind of fruit will their revolution bear?

With numerous examples of indigenous people living autonomously, happily, and harmoniously with nature, without the so-called benefits of modern society, can we really be so sure that living independent and fulfilling lives must depend on the Western development model and its attendant mass production and industrialization? Are these indigenous people really underdeveloped, or with all our scholarly and technological sophistication, are we?

INDIGENOUS SCIENCE & WESTERN LEGACIES

I cannot agree with Robert Lange as he asserts in his inspiring and well-written article, "Teaching Physics in Tanzania," that Western physics is the common heritage of all people and therefore will be a natural component of the active process of knowing and creating an indigenous science. From my own experience in the natural sciences (when you become a physician, you get a taste of literally everything), I believe that the feminist critique is right on the mark: Western science is a distorted, masculinist way of viewing and conceptualizing the world that emphasizes rationality and control.

The intellectual motivation of scientists is to "understand" the world, to come up with some deep "laws of nature," to be the holder (one of the few) of nature's "secrets." In other words, the goal is to construct, albeit piece by piece, a mental abstraction of reality, called "truth," which teases us into thinking that we understand or know the reality of experience. Granted, this process does give psychological comfort to those who engage in it—it's gratifying to feel as if you "know" something about the world. Yet there is nothing sacrosanct about this scientific method, for this process is only one way of interacting with the world, of coming to know it.

I am not saying: stop doing Western science. I am saying that we who practice Western science should recognize that there may be—and indeed are—other ways of trying to understand the world. For example, Western medicine, allopathy, is not the only way to understand the human body, as medical anthropologists have discovered. Likewise, a truly Tanzanian physics, if allowed to grow, may not even use the same constructs that we do—such as mass, charge, and force—to make sense out of the world. Unless it has the opportunity to germinate, we'll never know. Once you've become used to Ohm's law, amperage, voltmeters, and diodes, it's doubtful you'll ever think about electricity in a new and different way. In other words, the very way you conceptualize phenomena has already been given to you, in prepackaged constructs.

So Isaac Newton "is theirs," the Tanzanians', in the sense that anything any human being has ever done is part of the common heritage of our human family. But in another sense, he's really not theirs, his physics does not "already belong to them." For Isaac's way is culturally bound, and thus is only one way of practicing physics. Those who are living in different cultures may try to answer the same questions Isaac faced, but their answers and their methods for answering them might look quite different. And the very questions themselves may differ from Isaac's.

I cannot agree that by teaching Western science, "you are distributing something already belonging to the culture which you are visiting," as Lange states. You are distributing something belonging to your own culture; and that's O.K., as long as you recognize it as such. It is *this* recognition which "releases you to be a person of your own culture."

Indeed, the Tanzanians may "want physics to be a part of what they learn and work on." But this begs the question of whether they want *Western* physics and, if so, whether this desire is a truly informed consent or whether it is based on conditioning which, as Lange described it, teaches them that Western science is "the WORD." I do not know the answer to this question. I do know that if we teach the European way of understanding the world as the only way, as Science with a capital "S," we may be extinguishing the embers of a potentially different and indigenously created science with a small "s," one which might help improve not only the lives of the people who create it, but the rest of the world as well.

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