

SCIENCE FOR THE PEOPLE

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FOR SOCIAL AND POLITICAL ACTION · SESPA JULY 1971

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EDITORIAL PRACTICE

Each issue of *Science for the People* is prepared by a collective assembled from volunteers by a committee made up of past collectives. A collective carries out all editorial, production, and distribution functions for one issue. The following is a distillation of the actual practice of past collectives. **Due dates:** Articles received by the first week of an odd-numbered month can generally be considered for the magazine to be issued on the 15th of the next month. **Form:** One of the ways you can help is to submit double-spaced typewritten manuscripts with ample margins. If you can send six copies, that helps even more. One of the few founding principles of SESPA is that articles must be signed (a pseudonym is acceptable). **Criteria of acceptance:** *SESPA Newsletter*, predecessor to *Science for the People*, was pledged to print everything submitted. It is no longer feasible to continue this policy, although the practice thus far has been to print all articles descriptive of SESPA/Science for the People activities. Considerably more discrimination is applied to analytical articles. These are expected to reflect the general political outlook of *Science for the People*. All articles are judged on the basis of length, style, subject and content. **Editorial procedure:** The content of each issue is determined by unanimous consent of the collective. Where extensive rewriting of an article is required, the preference of the collective is to discuss changes with the author. If this is not practical, reasons for rejection are sent to the author. An attempt is made to convey suggestions for improvement. If an article is late or excluded for lack of space or if it has non-unanimous support, it is generally passed on to the next collective. **Editorial statements:** Unsigned articles are statements of the editorial collective. **Opportunities for participation:** Volunteers for editorial collectives should be aware that each issue requires a substantial contribution of time and energy for an eight-week period. Help is always appreciated and provides an opportunity for the helper to learn and for the collective to get to know a prospective member. There are presently plans to move the magazine production to other cities. This will increase the opportunity for participation.



LETTERS

Dear SESPA:

A group of about twenty scientists from the University of Wisconsin have been meeting since Feb. to plan ways for putting the Science for the People ideas into practice. To start discussion of these ideas among other scientists, we have held meetings in many science departments in the university and circulated pamphlets and posters. We have also been working to start Science for Vietnam projects and a union of research workers which would demand facilities and funds for People's Science through collective bargaining.

In Community,
Joe Bowman

Dear Brothers and Sisters,

We are here at a technical school (Polytechnic Institute of Brooklyn) and think we could use some copies of your magazine for organizing. Enclosed is \$3 cash. Please send as many (10-15) copies as possible.

Struggle On!
Poly Radical Action Group
Box 559
333 Jay ST. Bklyn 11201

Dear SESPA,

I have now received a couple of complimentary copies of Science for the People and wish to make it legitimate by sending you people my ten bucks for a regular membership. In addition, I'm enclosing an extra buck for two of the Science for the People buttons that I know make the establishment cringe in their guilt.

Power to the Compassionate,
William K. Plunkett, Ph.D.

Dear Friends,

Here is \$10 for a membership and subscription. I am a post-doctoral fellow in medical genetics and would like to hear what you have to say. I was once a practising M.D., but got turned off by the bullshit of medical professionalism.

Power and Community,
Lorne Taichman

Dear Friends,

You gave, in your May, 1971 issue, one of the best lessons, in the shortest space possible, of the effects of American investments in underdeveloped countries (correctly referred to as American colonies) on both foreign and American workers, by reprinting the ad from Electronic News and spelling out in the caption what it meant. The purpose of the ad was to attract American manufacturers to set up plants in South Korea and the big selling point was the low production costs there. As you correctly noted, low production costs there are made possible because of low labor costs--and in South Korea, when the superexploited workers rebelled, the U.S. troops were called in to protect U.S. investments. Thus, as you pointed out, it is to the American worker's own best interest with respect to jobs and pay rates to support the liberation struggles of his fellow workers.

Enclosed are two items from the New York Times which bring out these points explicitly. Our "army of occupation" in South Korea is maintaining in control a repressive regime which has actually passed a law forbidding workers to strike against foreign corporations. The working conditions and pay are miserable, as the articles indicate.

This is a very important aspect of American intervention in Southeast Asia--and in other underdeveloped countries--and I hope you will print more on it.

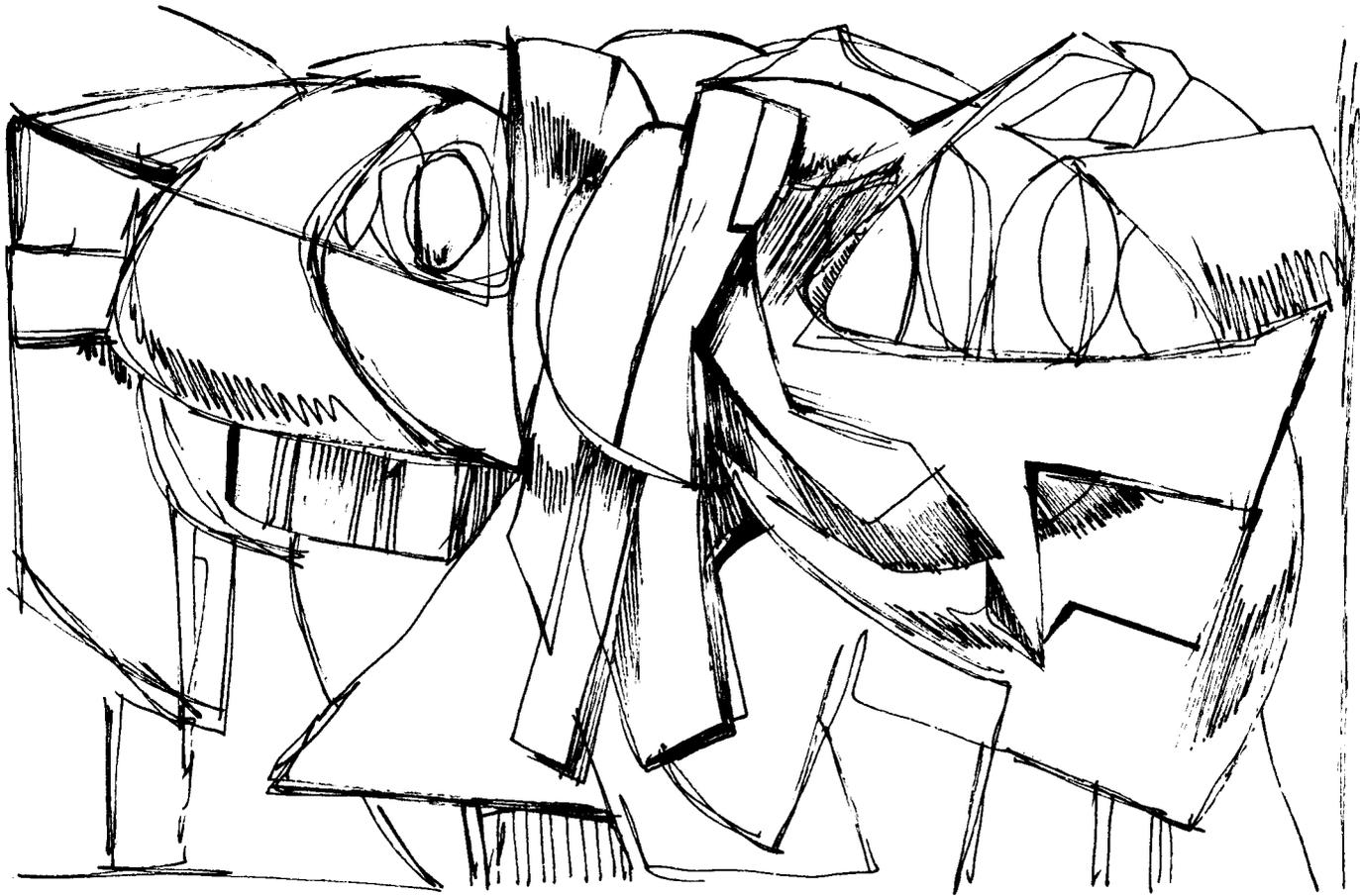
Sincerely Yours,
Freda Salzman

Editors: In the article sent by Freda, 'South Korea's Economy Booming With Cheap Labor', N.Y. Times, May 12, 1970, George A Needham, representative director of the Motorola's electronic component assembly plant, stated that production costs in Korea were one-tenth of costs for similar production at Motorola's plant in Phoenix, Arizona.

In the article, 'Why Free Trade Is Unfair To U.S. Workers' by William Bywater, president of District Three of the International Union of Electrical, Radio and Machine Workers, N.Y. Times, Jan. 3, 1971, it is stated:

'It does America no good to have United States corporations open plants overseas and exploit local workers. A few years ago Oak Electronics opened a TV manufacturing plant in South Korea. After a couple of years the workers organized and went on strike for higher wages. They could not live on the 15 cents an hour they were being paid. The American corporation closed the plant down and moved it to Taiwan. Subsequently, the Korean legislature passed a law forbidding strikes against American corporations. Now, that has nothing to do with free trade. It has a great deal to do with old-fashioned wage exploitation.'

More letters on page 31



MANIPULATION OF MEN FOR A WAR ECONOMY

The Evolution of a War Economy

World War II demonstrated to the class that rules America [1] the advantages of a corporate-controlled military economy based on costly research, development and hardware. Whereas the piddling expenditures of the New Deal failed even to produce economic stability, the massive war spending generated a profit surge beyond the wildest dreams of the pre-War capitalist [2]. At the same time old-fashioned colonialism had gone into decline and

1. G. William Domhoff *Who Rules America*, Prentice-Hall, Englewood Cliffs, N. J., 1967; and Fred J. Cook, *The Warfare State*, Collier, New York, 1962, pp. 76-77.
2. See Harry Magdoff, "Imperialism and Militarism Equals U.S.A.," *Monthly Review*, 22 (February, 1970).

Great Britain was battered beyond repair by colonial resistance, the War and international competition. The need for a replacement to defend Western Imperialism was eventually satisfied by the highly profitable American war machine.

Actually, Capital was slow to grasp the possibilities inherent in the military; the benefits of a fully coordinated economy dominated by the monopolies had already been demonstrated by World War I. During that conflagration Monopoly Capital found that it could mobilize and plan the entire economy, with each industry run by representatives from the appropriate mega-corporation -- a system which guaranteed profits thru cost-plus contracts [3]. But

3. See James Weinstein, *The Corporate Ideal in the Liberal State*, Beacon Press, Boston, 1968, Chapter 8.

after the traumas of the Great Depression which nearly shattered the whole scheme, war assumed a new and more central significance for the ruling class. War was the solution to stagnation, the "pump-primer" which could maintain the boom and keep employment sufficiently high to prevent open revolt.

World War I pointed the way, the Great Depression served warning that the system was in danger, and Keynes obligingly provided the necessary ideology. However, Keynes was palatable *only* if government invested in areas which did not compete with or threaten the monopolies or undermine the value system of Capital (eg., by providing too much security for the worker).

The details are now well known to everyone. Government military spending is large enough so that variations in it can provide economic stabilization. (Increases in government spending usually come conveniently enough in the areas of arms, while cutbacks are made in the less profitable realm of non-destructive items, eg., health and education). Military spending provides low-cost, risk-free opportunities for private investment, because most of the plants are provided *gratis* by the taxpayer's money and because contracts are almost always "cost-plus". Virtually unlimited opportunities for investment are opened up because new weapons are always "needed" as old ones rapidly become obsolete, or are used up in imperialist wars or sold to client states. Military spending makes possible the development of weapons that can be sold to lesser imperialist powers who pay in dollars thus tipping the balance of payments in the direction desired by the American rulers and insuring the hegemony of the dollar in the capitalist world. In this "permanent war economy", first openly suggested by GE's Charles E. Wilson in 1944 [4], the rational, efficient training and allocation of manpower becomes important. Consequently, Capital has attempted to forge a "manpower" policy, culminating in the Manpower Development and Training Act of 1962. This act was "to provide training opportunities for those whose unemployment resulted from a mismatch between the skills they had to offer and those demanded in the labor market" [5]. In other words, the skills of men were to be shaped to serve an economy of destruction -- the only profitable economy which the monopolies could spawn.

As a result there are today over two million people employed in the four war-industries of aircraft, electronics, instruments and ordnance -- 10 percent of all manufacturing workers [6]. The spending of war companies for materials and services generated another 174,000 jobs

outside the four war-industries in 1967. In addition, the Pentagon doled out 14.1 billion dollars in 1967 for procurement in "non-defense" industries such as construction and petroleum, creating roughly one million more jobs. Moreover, as of 1965 the federal government employed another one million civilians in Pentagon-related agencies before the giant escalation in Vietnam. These "civilians" plus those in uniform constituted 72 percent of the federal employment in 1965 [7]. The slaughter in Indochina for the protection of foreign investments has undoubtedly raised that percentage.

Altogether there at least seven million jobs which are war-related in that they contribute *directly* to the various activities of the Pentagon. These seven million workers exert a profound influence on the economy when they spend their wages and thus create other jobs. To determine the magnitude of this "induced" employment a "national employment multiplier", as the economists call it, must be calculated. Let us assume an employment multiplier of 3.0 (other research puts the multiplier between 1.33 and 5.0 so that 3.0 is a moderate estimate). The multiplier is so-called because the number of jobs which are *newly created* by an investment need only be multiplied (sic!) by it in order to get the *total* number of jobs eventually induced by that investment. To avoid any overestimate in our computations, we can eliminate the men and women in uniform from our estimates. Then 4.1 million non-military, war-related jobs "induce" 8.2 million *additional* jobs for the 71 million people in the labor force. Thus 12.3 million jobs or 17.3 percent of the civilian labor force is directly or indirectly dependent upon military spending. Since, to be on the safe side, we assume that the expenditures of those in uniform have no "multiplier" effect, then we can simply add another 3 million jobs to the total number of jobs dependent upon military spending. *The result is that over 15 million jobs are generated by the war machine, that is, 20.3% of all those employed.*

The Proletarianized Professionals of the War Economy

To continue the enormous military outlays, a large scientific and engineering work force was necessary to create rapidly and reliably the innovations that would render the previous year's weapons obsolete. This work force was already being assembled in the mid-fifties [8] when it received an outside boost. The Soviet Sputnik illustrated to the American ruling class the scientific capabilities of a planned economy; and the media went to work generating an even more intense cold-war hysteria which provided suitable background for another surge in military

4. Fred J. Cook, *The Warfare State*, p.66.

5. "Toward Full Employment: Proposals for a Comprehensive Employment and Manpower Policy in The United States." A report prepared by the Subcommittee on Employment and Manpower of the Committee on Labor and Public Welfare, U.S. Senate, 1964.

6. United States Bureau of the Census, *Statistical Abstract of the United States, 1967*, Washington: United States Government Printing Office, 1968, Table 322, p. 225.

7. *Ibid.*, Table 361, p. 255.

8. For example, Richard V. Clemence, *The Economics of Defense: A Primer of American Mobilization*, The Telegraph Press, Harrisburg, Pa., 1953; and Fredrick Harbison, "Utilization and Development of High-Talent Manpower", *The Technology Review*, 60(January, 1958), pp. 3-8

spending. Every high school with the aid of federal advice and monies upgraded its science programs. The National Defense Education Act was enacted to support the training of minds for a military economy. Secure careers in great quantity seemed to be available for everyone who possessed the appropriate aptitudes. The want ads were full of notices offering scientists high starting salaries.

But much was never mentioned. A war machine was generating a military ethos, a "crackpot view of reality" based on military ideas. This, of course, was very convenient for the American rulers who saw their empire threatened by the rising tide of world socialism. These facts meant that the new scientific careers would eventually contribute the technical means for crushing some popular revolt within the empire. Vietnam was the logical result of the entire process. Nor were the actual working conditions of these new scientists and engineers ever mentioned. The frequent layoffs went unpublicized as did the slow salary increases and the factory-like working conditions. The myth of the day was that these proletarians of the military economy were actually members of the "middle class".

To ensure the existence of large numbers of these new workers, capitalism used the dual pressure of enticement and threat. The enticements were to be laid out in detail by the President's Committee for the Development of Scientists and Engineers appointed by Eisenhower. The committee held conferences around the country at which educators, industrialists and personnel executives received instructions in the methods of coopting scientists into the economy of destruction. Direct economic incentives as well as emphasis on the creation of a "professional environment" for technological workers were major recommendations made at these regional conferences. In addition, the President's committee established the Local Action Program which sponsored local demands and activities to improve education in mathematics and the sciences.

The threat was provided by the Selective Service System which applied its "channeling" or "pressurized guidance" procedures. According to the Selective Service, "Many young men would not have pursued a higher education if there had not been a program of student deferment. Many young scientists, engineers, tool and die makers and other possessors of scarce skills would not remain in their jobs in the defense effort if it were not for a program of occupational deferment..." "One reason the Nation is not in shorter supply of engineers today is that they were among the students deferred by the Selective Service in previous years." [9] In other words, young men

had either to wield the weapons of destruction on the battlefield or create them in the factories and engineering laboratories.

The bits of status offered by the President's Committee and the prods applied by the Selective Service had the desired effects. Between 1954 and 1960, the number of scientists increased sixty-eight percent while the labor force as a whole expanded by ten percent. Between 1960 and 1963, when the labor force grew only three percent, engineers increased twelve percent and scientists increased twenty-two percent. [10]

Because they are trained to work for and satisfy the demand of the profitable military economy, scientists and engineers remain highly dependent upon that economy. Their jobs, professional development and recognition and career stability are all tied in with the economy of destruction. Today nearly half of all scientists and engineers in all American business are employed in the war-aerospace industries. These workers, taken together with the engineers and scientists in the Department of "Defense" and with those in the universities performing war-related research and development, make up a grand total of over more than 240,000 technological and scientific workers. This is 30% of all engineers and scientists in the country.

But the employment of these men is not all that secure. Military products become obsolete rapidly so that they can be replaced by other profitable hardware. And the engineer or scientist who is closely tied to one kind of product may also find that he is obsolete, and so consigned to the junk heap by the value system of Capital. "Today's graduate engineer has a half life of about ten years. In other words, half of what he needs to know in 1974 has not yet been developed." [11]

11. I. I. Raines, "Engineering Obsolescence: A Challenge to the Professional Personnel Man." Industrial Relations Seminar of the Cape Kennedy Personnel Association, Cocoa Beach, Fla., October 24, 1964, p. 4.

Survivre / Survival

A journal published in French and English by "An international and interprofessional movement for the survival of humanity."

c/o E. Wagneur, 1527 A. Ducharme, Outremont, P.Q., Canada.

Health: big business for computers

A pamphlet --- (50 cents)

prepared by Dave Kotelchuck, for *Computer People for Peace, The Dolphin Center, 137A W, 14th st., New York, N.Y., 10011.*

9. From a document distributed by Sel. Serv. System in July, 1965. Reprinted in *Crisis in American Institutions*, ed. Jerome H. Skolnik and Elliott Currie.

10. Computed from Table, p. 14, National Science Foundation, "Scientific and Technical Manpower Resources", 1964; see also Chart 11, p. 19, National Science Foundation, "Trends in the Employment and Training of Scientists and Engineers", May, 1956.

Engineers and scientists in the war industries are also highly vulnerable to the changes in American foreign policy and the imperialist politics which determine that policy. During 1963-1964 (the period just preceding a Presidential election), approximately 30,000 professional engineers and scientists in the war industries lost their jobs because of mass layoffs by firms throughout the country. It is estimated that on the average these individuals remained unemployed for a period of three months. Then, after the election, Johnson escalated the war in Vietnam and thereby created jobs for engineers and scientists as well as many other occupational groups. New jobs in the four war industries accounted for forty-four percent of the increase in manufacturing jobs between January, 1965 and January, 1966. Engineers and scientists benefited more than the average of all occupational groups. There was a 3.3% increase in manufacturing jobs during the period referred to above, but there was a 12.4% increase in jobs for scientists and engineers in R & D in the electrical equipment and communication industry. [12]

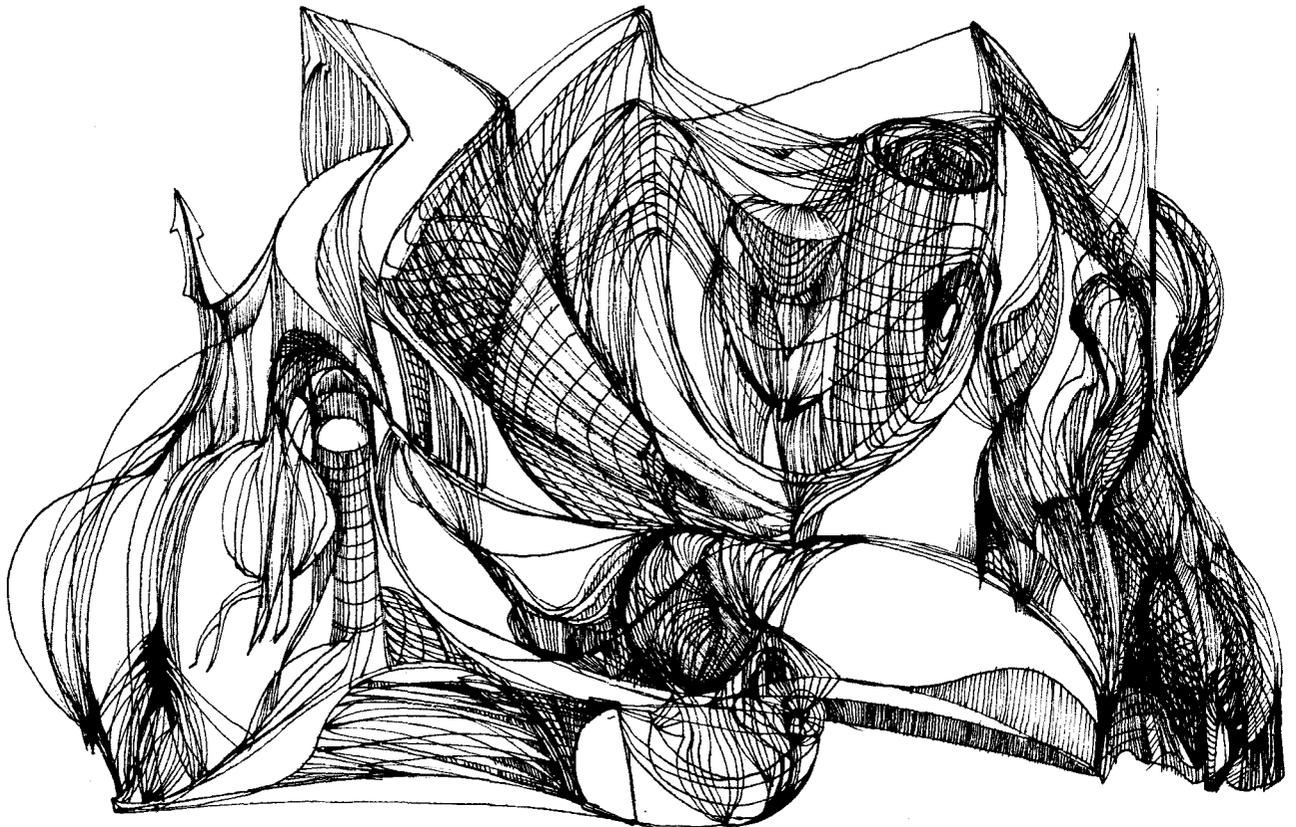
But now the large military expenditures and the war they demanded have together produced the inevitable inflation. To fight it, the ruling class is laying off workers - including military workers. For example, in the past year

12. National Science Foundation, "Research and Development in Industry, 1966", 1968, Calculated from Table 36.

Pentagon cutbacks resulted in the loss of 90,000 jobs and 750,000 more are expected in the present year. An MIT administrator estimates that of America's one million engineers, 60,000 are out of work, 6%. And as the anti-inflation crusade, fought to protect the international competitive edge of American Capital, proceeds, the crunch gets worse for all workers, including the scientific and technological workers.

Capital has created a proletarianized "professional" to serve its war-dependent profits. Skills and talents of potentially enormous usefulness have been bent to destructive ends to guarantee expansion and protect imperialism. For the sake of the ruling class scientists and engineers have been turned into creators of destruction by the mechanisms of an economic and social system over which they can exert no control. By themselves these scientific workers cannot alter their powerless position. To become an effective force they must stop focusing on the crumbs of privilege that separate them from other workers and develop a consciousness of their shared condition as servants of Capital. Only this consciousness of the real state of affairs will enable scientific workers to join with others in creating a new society. In that society the unbridled profit quest of the ruling class will exist no more. Human skills, talents and effort can then serve the real needs and satisfy the highest aspirations of the working people.

Jeff S.



ACTIONS AT NSTA

In the December issue of *Science for the People* two professors of science education from Boston University placed a notice asking for help in organizing at the annual National Science Teachers Association (NSTA) convention. By early February a group of from 12 to 15 was meeting weekly in Boston to prepare for the convention, which was to take place in late March, and to discuss the role of science education in this country. The group included 6 secondary school teachers, 7 research scientists and the two original catalysts from BU.

It was clear from the beginning that there was strong appeal to each of us to meet and get to know people connected with science who came from different backgrounds and who faced quite different problems in their jobs. From initial communication problems, it also became clear to the academic scientists how isolated and out of touch they were with people working much closer to everyday community life. Furthermore, several of the teachers did not have experience working with radical groups. However, by the time of the convention we had achieved a good deal of coherence. What brought us together was a dissatisfaction with the present ideological role of science education.

We spent the first few weeks discussing what issues we would bring up and what sorts of materials we would distribute at the convention. In many cases, group discussion of a piece of literature helped us to understand each others' perspective. The weeks spent writing and rewriting the pamphlet reprinted here served the same purpose.

One of the most useful discussions occurred when we spent an evening watching and analyzing an 'educational' film sponsored by the National Science Foundation which purported to describe Kit Peak Observatory in Arizona and the research that is done there. The film-makers' clear attempt at mystification of science and scientists and the lack of real scientific content, typical of many science teaching materials, helped to illustrate the problem we faced. As a result of our discussion, the film was shown by one of the teachers in our group to his science class and a good discussion on the function of the film resulted. Remarks of the students were taped and played as part of the sound track for the movie at one of the NSTA sessions.

In March, we held an advertised meeting for science teachers from the Boston area to discuss with them our radical critique of science education and alternatives to the present approach. We attracted many new teachers who expressed great interest in working with us after we returned from the NSTA convention.

On to Washington

Finally, with the literature and films assembled, we met on the last night to parcel out materials and to make a late night trip to the New England Free Press to collate

The educational system is one of the most important means by which the power of the ruling class in this country is maintained. This process can be seen very clearly in science education. (For a more detailed statement of this position and some of the reasoning behind it, see the excerpts of our pamphlet printed in this issue.) We feel that one of our tasks is to develop a radical analysis of science education and to propose ways in which students and teachers can be made aware of the social and political context of science. In addition, we must struggle against the use of the high school science curriculum as a means of perpetuating the class structure of society. At the same time, it is also vital to provide people with the knowledge that will allow them to deal with the problems of technology. In order to achieve our goals it will be necessary to demolish the barriers between science teachers, scientists and students, so that all can fight together for change.

There are very strong reasons for building groups which include teachers and researchers. For the scientist who sees the way in which his research is exploited in this society, it is an opportunity to have an impact on the public attitude toward knowledge of science through involvement in early science education. For the teacher, such groups can provide means for direct access to the current production of science and technology, and help him in demystifying false images built by the media. In addition, the ties built between us will serve to widen the base of a movement of people who believe in radical change in the United States. Certainly this alliance would contribute to meeting one of the greatest needs of the radical movement in this country: that of broadening its scope

and staple our pamphlets. The next day we packed our literature and people into a few cars (and airplanes) and headed for Washington. When we arrived in Washington, a local SESP member was able to put up some of us while others camped out in the hotel rooms we had reserved for our activities. The existence of a Washington chapter was quite a boost to us, as 5 or 6 of its members helped out substantially during the meeting. It is important to have local support for a convention action, for logistics and mimeograph help as well as for morale.

The convention, which was to run for four days, was sandwiched between a USO and a steelworkers' convention. (We actually had some good raps with people from both of these meetings.) The first day of the meeting March 26, we marched into the lobby of the Shoreham Hotel, discovered a table conveniently near the entrance and immediately began selling our literature and advertising our first discussion session for that evening. For the next three and a half days we found ourselves fully occupied showing films, selling literature, rapping with people and holding workshops in the evenings. The workshops together with discussions after films must have involved close contact with a total of about 500 people.

Saturday was our best day. By early morning we had persuaded the hotel detective to provide us with an official meeting room for the whole day, complete with projector and screen. Meanwhile, two of us put out a leaflet advertising the films, using the official NSTA mimeograph machine and facilities. Some of us leafleted in the halls--one, in fact, wearing a big sandwich board. We showed films and held raps in the room all day and by the afternoon were serving liberated food.

At one of the workshops on Saturday night, we spent several hours discussing resolutions for the convention to be presented to the Issues Committee meeting on Sunday morning. After a long rough debate, which gave us a good feeling of where the teachers were at politically, the two resolutions--one opposing the war in Vietnam and the other dealing with political repression in the U.S.--were passed by a group of around forty.

We were allowed to present these the next day along with the rest of the resolutions which were introduced by the Issues Committee on matters of 'pure' educational interest. In discussing the resolutions, the chairman of the Issues Committee pointed out that any vote on resolutions was not binding on the Committee, and that even decisions of the Issues Committee were not binding on the national governing board of NSTA. Furthermore, he said that the Committee considered itself much more expert on matters of educational policy than the rank and file of the organization and that, therefore, it recommended uncritical acceptance of the Committee's resolutions. After several teachers had spoken in support of our resolutions, a motion was presented not to vote on any of the resolutions, since the issues were too complex. This motion was passed by a substantial majority! The contrast between our open, freewheeling debate the night before, and the blatantly

anti-democratic tactics used by the leadership directly illustrated certain aspects of our political analysis. The frightening aspect was the majority decision not to involve itself in decision-making. This attitude is a result of a long process of training, part of which is undoubtedly the very educational system we are struggling against.

At two final meetings on Sunday evening and Monday morning, we gathered a total of around eighty teachers to talk of future actions, organization and relationship to regional NSTA meetings and the national convention in 1972. NSTA leadership, including the new president, came to these meetings in a classic attempt at co-optation. The NSTA leadership seems to be quite cooperative in putting us, on the program for next year. In fact, during the whole meeting in Washington, instructions were given to be as cooperative with us as possible. We discovered, through an informant, that one of the reasons for this was fear of disruption.

What Next?

Since the convention we have spent several meetings in Boston trying to analyze our successes and failures in Washington. We went to the convention with no idea of what the response to our presence would be. For a meeting where issues of the sort we were presenting had never before been raised, we felt that the response was very encouraging. A number of comments from teachers at the convention indicated that our workshops, discussions, films, etc. had caused them to decide, for the first time, where they were on certain issues. Many were enthusiastic about our pamphlet; we reached many teachers; and, in the last two days, we discovered great interest in maintaining contact with us and organizing for regional and the next NSTA conventions. Most importantly, the teachers wanted to find out how we built our groups so that they could do the same in their areas.

Where do we go from here? On May 4 we held a second large meeting at Boston University to discuss our activities at the NSTA convention and to begin to combine our knowledge, skills and political perspective as scientists and teachers for the development of ways of dealing with science teaching which reflect the concerns expressed in our pamphlet. As a beginning, we discussed the teaching of ecology from a radical perspective, using as one tool the film and booklet *The Earth Belongs to the People*. We have begun to bring scientists into high school classrooms and are organizing to bring teachers and students into labs.

As a result of our experiences, we feel that the collaboration of scientists and science teachers has tremendous potential. We strongly urge that groups such as ours be formed all over the country. We have a list of science teachers from many states who would like to make such contacts. Those of you who are interested please write us (c/o George Hein, 19 Fairmont Ave., Newton, Mass., 02158) and we will send you names of science teachers in your area and

copies of our pamphlet which can provide initial topics of discussion. Even without names, there are many ways of contacting people which should allow you to form a science education group in your area. See if there are any radical teachers' groups in your area. (The Boston Red Pencil Collective has just opened a Boston

Teachers' Center.) If there is a school of education or teachers' college, see if it is possible to make contacts through the college itself or through individual teachers of science education. Or, call a meeting and post flyers advertising it in science departments of schools. Do it!

Boston Science Teaching Collective

SCIENCE TEACHING: A CRITIQUE

The following is an excerpt from a leaflet that was prepared by the Boston area SESPA science teaching group for the National Science Teachers' Association convention in Washington, D. C. It was distributed to several thousand science teachers at the convention. This version includes some slight modifications of the original text. We hope that the article will initiate discussion of this important issue in Science for the People.

The leaflet opened with an introduction of the group and a SESPA analysis of the role of science in this country. After describing the plight of scientists who recognize their own exploitation, the pamphlet proceeded to discuss the role of science education. For copies of the entire pamphlet write: SESPA, Science Teaching Group, 9 Walden Street, Jamaica Plain, Mass. 02130.

An educational system reflects the purposes of the society it serves. If the purpose of our society is to promote corporate growth, we can expect our educational system to mirror this. We believe that many of the materials, methods and curricula used in science teaching today do just that.

In the classroom, the myth of an apolitical, benevolent science prevails. The training of a scientist involves a total submersion in technical material with little, if any, historical or philosophical perspective. Research productivity is the measure of worth, as the student acquires skill in a specialized field. Technical questions are isolated from all social and economic considerations, other than prestige and financial reward.

Courses are designed to select and separate out potential scientists from their fellow students. Emphasis

is on competition and individual excellence instead of cooperation and shared experience. The successful student is led to view himself as a member of an elite intellectual class with a commitment to the authoritarian structures of the present system. The end product of this training is a narrow specialist indoctrinated to perform scientific miracles in a political void, a reliable instrument of the power structure.

For students who don't pursue scientific studies, the curriculum is structured in such a way as to leave them feeling mystified, frustrated, and helpless against the enormous power of technology and those who control it.

In many of the materials available there is a "hidden curriculum" which conveys the social myths that perpetuate the control of people through technology. For example, in "educational" films provided by oil companies, the telephone company, or NASA, scientists are portrayed as infallible experts. The message, though never spoken openly, is clear: The corporations and the military, through the enormous power of technology, are omnipotent. You are utterly dependent upon their benevolence.

The framework for extreme division of labor and perpetuation of the social class structure is built into schools. To understand this point more clearly, consider for example the PSSC physics curriculum. Obviously, PSSC offered many improvements over previous physics curricula, which attests to the talents of its designers. We imagine many teachers and students would appreciate some of the inexpensive PSSC experiments and films. But the PSSC course was written by research physicists for potential research physicists. It conveys the lesson

CANCER: WE CAUSE IT, WE CURE IT!

“SEARCH FOR CAUSE OF CANCER LEADING LITTON UNIT TO PROFIT” is the headline of a recent story in the *Los Angeles Times*. The story explains that the Bionetics Lab, a Maryland subsidiary of Litton Industries, is receiving a large chunk of money from President Nixon’s highly publicized “War on Cancer”. Litton officials are quick to point out that their interest in cancer research is aimed at dollars, not at health. Fred Green, a Litton executive, is quoted in the article: “Money is costly. You don’t trade it off against an image or idea of public service.”

This article becomes even more interesting when we examine the history of Litton and the Bionetics Lab. What credentials do these organizations have which qualify them to look after the public health? Litton is a conglomerate which has gotten rich primarily on contracts with various governments. Its Minnesota subsidiary has performed studies of delivery of biological weapons, and its Mississippi subsidiary produces nuclear submarines. Litton holds an \$800 million contract with the Greek military junta for economic development of Western Peloponnesus and Crete.

Under a National Institute of Health contract, the Bionetics Lab recently performed a study of the hazards

of several hundred agricultural chemicals. Some chemicals in heavy use were found to be quite dangerous, but the Bionetics Lab managed to keep this information hidden from the public. Low doses of 2,4,5-T were shown to produce deformed fetuses in rats. 2,4,5-T is a defoliant widely used in Viet Nam, and recent reports from Viet Nam have indicated a huge increase in the number of malformed babies born. Bionetics said nothing of its findings, and the report might still be secret if a group of “Nader’s Raiders” had not stumbled across it during the summer of 1969. Subsequent attempts by various scientists to obtain a copy of the report met with evasions, “no comments”, and being told it was classified.

With considerable effort a Harvard biologist obtained a bootlegged copy. In December, 1970, after much furor from a few scientists, and two years after the original results were in, President Nixon said he would “phase out” the use of 2,4,5-T in Viet Nam. It is also worth noting that some of the other chemicals in the Bionetics study, pesticides used primarily in the U.S., were found to *produce cancer*. Joel S.

Ed.’s note: We felt that Litton’s all-out efforts in the area of cancer deserved attention.

that the reason to take science is to develop research skills. Social and cultural aspects of science are considered out of bounds.

The new science curricula often come in the form of a total package. The prepackaged curriculum provides a framework for rigid tracking. This is apparent, for example in the three-track BSCS biology curriculum. But an even more rigid tracking arises indirectly from the emphasis of science curricula on “pure science” (removed from everyday experience) as opposed to practical science. The division between “academic” students who take chemistry, and those who take shop instead, is complete. The chemistry student does not learn how to harden a steel tool, and the shop student does not learn about crystal structure. The future scientist is denied freedom as well as the mechanic. He is dependent on the existence of a class of workers to perform such tasks for him, and he learns quite early in school that this is the way things should be. Students and their teachers can perceive these needs better than educational equipment companies (which operate, after all, on their need for profit). Funds should be given directly to teachers and students to use according to their mutually agreed upon educational needs; surely part of learning to cope with the technological world must be the process of seeking out and choosing the tools needed to learn.

The Role of the Science Teacher

The teacher in this society is oppressed by unfavorable working conditions, low pay, and most important, lack of decision making power. He has no funds to buy equipment that he and the students might want to work with. The critical decisions - what to learn, what tools to use - are removed from student and teacher, to some curriculum expert who has the purchasing power or to some academic curriculum designer who has a preconceived and narrow minded notion of what students need.

Science is a politically charged subject that teachers are expected to deal with in a “neutral” manner. No wonder students are turned off when, for example, a teacher attempts to discuss problems of ecology without discussing the politics and economics of consumption and waste. Another very serious problem is that the science teacher does not have access to scientific research as it progresses. Students sense this, and the relationship between teacher and student is further compromised.

What We Want

We don’t pretend to have all the answers to problems of science education in America, but we do have some ideas.

We want an end to tracking of all kinds - economic (industrial arts vs. academic programs), and sex-based ("home economics" vs. "shop"). We want the emphasis shifted from training potential technicians to providing access to real tools.

We want students and teachers to have the opportunity and power to develop their own curricula. That means that each classroom should have its own budget for books and equipment. We want teachers to have adequate funding and free time to develop their own materials, such as films, instead of having to rely on propaganda from industry and the military. We would like to see museums, connected with urban school systems, planned and operated by teachers, where students could actually work with special equipment.

It is evident that these demands are not compatible with the value system of capitalism which puts the quest of profit above human well-being. As Jonathan Kozol says: "School cannot at once both socialize to the values of an oppressor and toil for the liberation and the potency of the oppressed. If innovation is profound, it is subversive. If it is subversive, it is incompatible with the prime responsibility of public school. The public schools may be inept, archaic, old and unattractive, but they are not suicidal." (Recent article in *New York Times*) Changes will not occur without a struggle. Teachers should, for example, be prepared to go on strike (perhaps together with students) to demand decent pay, decent working conditions, and a chance to give their students a meaningful educational environment. In the past year, thousands of teachers and students across the country have been on strike for such demands. We support these strikes.

There are many other things we can do now to start bringing about the changes we want. There is now a substantial alternative collection of written materials and films dealing with education and problems of technology which may be useful to teachers. We have brought a small sample with us.* There are groups of people scattered all over the country with social visions similar to ours who are working on these problems. We should build local organizations of scientists and teachers as part of a national access network for people to meet each other, share materials, and work together to start making science serve people.

* The literature which we brought with us included:

The Destruction of Indochina (Stanford Biology Group); *The Earth Belongs to the People and Vietnam - A Thousand Years of Struggle* (People's Press, 968 Valencia, San Francisco, 94110); *This Magazine is About Schools* (56 Esplanade St. E., Suite 401, Toronto 215, Ontario); *The Red Pencil* (c/o Phyllis Ewen, 131 Magazine St., Cambridge, Mass. 02139); *Education - An American Problem*; *Jumping the Track*; *The Making of a Pollution-Industrial Complex*; *The Politics of Ecology* (New England Free Press, 791 Tremont St., Boston, Mass. 02118); and, of course, *Science for the People* magazine.

The films which we showed included: *The Earth Belongs to the People*; *People's Park and High School Rising* (Boston Newsreel, 595 Mass. Ave., Cambridge, Mass. 02139); *Choosing to Learn and What They Want to Produce not What We Want to Become* (Educational Development Corporation, Newton, Mass.).

Science Teaching Group



RAYTHEON: THE TIP OF A STOLEN ICEBERG

The Raytheon Company is the biggest military producer in Massachusetts, and in 1969 was the 11th biggest in the nation. Raytheon is also the largest employer in the state. Early last year the company employed over thirty thousand in the greater Boston area alone. Raytheon does much more military work in Massachusetts than, for example, General Electric, a major gas turbine producer which holds the number two spot, and nearly four times as much as MIT.

Clearly Raytheon is a major fact of economic life of this region. At a time when unemployment, war and inflation are becoming overwhelming perturbations in most people's lives, it is especially worthwhile to look at Raytheon and see what it shows us about America. Let's begin with a discription of its activities in some detail.

Raytheon navigational radars guide B-52 bombers in their daily runs over the free-strike zones in Vietnam, Laos and Cambodia. Raytheon makes bomb fuses for the war as well as electronic countermeasures equipment and communications gear. But most of the war business accruing to the company is from Hawk, Sparrow and Sidewinder missiles which are designed to protect ground installations from attack by hostile aircraft.[1] It is these missiles that help make the U.S. air force secure, allowing air strikes with impunity over most of S.E. Asia and thus making possible the basic U.S. strategy air war on the people.

While Vietnam is a welcome trove of extra profits, the bulk of Raytheon's wealth comes from the Great Cold War. In 1968 only \$60 million of the Company's \$620 million in sales to the government were directly attributable to the war in Vietnam.[2] More than anything else it has been the Hawk surface-to-air missile that has turned Raytheon into one of the biggest 100 companies in the United States. The Hawk, the Army's principal air defense weapon, is produced and stationed in countries all over Europe, and in Japan as well. It has been sold to Saudi Arabia and to both Jordan and Israel.[3] In 1960, over 40% of the company's profits came just from the sale of Hawk patent and proprietary rights to foreign nations and companies.[4] Raytheon is one of the top arms exporters to nations all over the world.[5]

Raytheon's other principal military systems include the air-to-air Sparrow and Sidewinder missiles, a variety of radar and sonar work, and development of the Sam-D missile, which will replace the Hawk. The biggest money, of course, is in the strategic arms race, and Raytheon's contracts for the ABM missile site radars and for guidance and control systems for the Poseidon MIRV (multiple independently targeted re-entry vehicle) make it one of the principal beneficiaries of strategic arms spending.

As this scramble for contracts for the making of a "credible deterrent" has advanced, some disagreements have arisen in U.S. ruling circles over such questions as whether or not they need a "first strike" capability in order to sufficiently impress their chief global antagonist [6]. This controversy over current U.S. strategic arms "needs" has only slightly moderated the pace of "progress" in this area, and Raytheon is marching forward. The submarine James Madison set sail April, 1971, armed with 16 Poseidon missiles, each one carrying 10 MIRV warheads. The multimillion dollar Poseidon guidance and control work which Raytheon is doing in Sudbury, Mass., has begun to be deployed. Similarly several ABM sites are currently under construction around the country.

Finally, bringing up the rear of Raytheon's profit march is the B-1A, the advanced manned bomber. In 1970 Raytheon won the research and development contract for the avionics equipment of the aircraft, which includes radar, electronic countermeasures systems and other navigational apparatus. [8]

When the B-70, the first attempt at the big supersonic bomber to replace the B-52, was killed in 1962, the name was changed into B-1A and another program was begun. As with the ABM and MIRV, the strategic value of the B-1A for defending U.S. "vital interests" is being debated by our rulers. B-52s, the defender of the early 1960s, cost \$8 million each; the B-1A will cost up to \$80 million apiece. Senator Proxmire, claiming that the total cost for a B-1A fleet could go up to \$25 billion, says they aren't worth it, in view of their relative slow speed and vulnerability compared to ICBMs. But there are other factors which help keep the B-1A alive.

For one thing, like the B-52 which rose from its deathbed to become a major weapon in anti-peoples' war in S.E. Asia, the B-1A might provide a faster, new generation of saturation bombers as part of the advancing counterinsurgency technologies. Then there is the tie-in with the SST, a favorite project of the same special interests. At a time when the pressure against the SST was mounting in 1970, the B-1A received its first sizeable appropriation of \$100 million. [9]

Since the airframe and the engines being developed for the B-1A and the SST are similar, the development of either would make the other less expensive and therefore more attractive. The B-1A thus has the additional attribute of helping to keep the back door open for the SST.

Military profits: the icing on the cake

Raytheon's profits from its military production follow the pattern of the large war producers. Profits in these firms are lower than in the average large industrial firm if measured as a percent of total sales, but are far higher than the average when measured as percent of stockholders equity or of investment by the firm. According to Murray L. Weidenbaum, a former professor of Economics at Washington University and currently assistant secretary of the Treasury, the profits of large military firms are 75% larger than average [10]; Admiral Rickover, the "pioneer" of nuclear submarine propulsion, agrees that profits are higher (but not as much as 75%) [11].

Raytheon, like all major war contractors, frequently is able to use tax dollars to capitalize its operations and then keep all of the profit from that investment for itself. For example, the government built and equipped plants for Raytheon in Quincy in 1951 and in Waltham in 1952. All this was free of charge for the company. When such plants are eventually sold to the company, they are typically sold at a tremendous loss to the government [12]. All this is quite in accord with government policy. These subsidies provided by the taxpayer are used to build factories, pay for research and development, and supply interest-free working capital. The government then gives away all patent rights on systems developed at the public expenses [13].

Another basic feature of military production in general is the phenomenon of "cost overrun". One of the most notorious cases of profiteering, not because it was unusual, but because it was investigated publicly, was Western Electric's profit pyramiding up through the tiers of its subcontractors on its Nike missile program [14] in the '50s. Western Electric is now prime contractor for the ABM, the biggest single procurement program in existence at the present time. Raytheon is one of the principal subcontractors, and the cost overruns in just the first year of the program have doubled the cost of initial deployment from \$5 to \$10 billion [15]. The Comptroller General of the U.S. has reported several incidents in the past of totally "unjustified" Raytheon

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cost overruns. The General Accounting Office --Congress' "watchdog" on spending-- whose bureaucrats are from time to time unleashed against token offenders, studied Hawk production facilities and practices in 1970, and uncovered enormous 'waste' adding up to 30% [16]. According to Charles L. Schultze, past director of the Bureau of the Budget, "the average unit cost of missiles is 3.2 times the original estimates" [17].

What does all this mean? Is Raytheon a big 'meany'? Another bull in the china shop of the American economy? Is this the military industrial complex run amok? Is it dangerously more powerful and influential than the non-defense sector?

We think not! Not only is Raytheon comfortably situated in the mainstream of American public and private institutions, it actually represents merely one of many organizational forms by which the ruling and wealthy elite who run this country go about pursuing their well-calculated interests. Let's look at how it works.

New Technology for Cold War Business

Ever since the 1930's, the federal government has played a major and increasing role in defining conditions under which big business operates. But this regulation was not "government of the people" gaining control over private capital. Instead, it was the most powerful and far-sighted big businessmen recognizing *their* need for certain kinds of extensive, central controls over market formation and capital allocation so that profits would be guaranteed large and steady, protected from such threats as the inherent instabilities of the 'free market'. They also grudgingly promulgated other innovations in the state apparatus--like social security and workers' compensation--to help protect themselves from the costs of concessions that workers were winning through increasingly militant struggles. By means of taxation, inflation and other manipulations of the economy and government, the businessmen have tried with some success to transfer these costs back to the working people.

Another major development in the role of government was the expanded program for world empire that grew directly out of World War II. As the decrepit European empires finally fell apart, the U.S. moved to take their place and adopted a world-wide posture of containing communism, and stamping out anything that looked like it. (And with good reason: revolutionary movements and secure, lucrative investments do not coexist. Already in 1945, in China and Vietnam, communist-led liberation movements had made major advances.) The U. S. ruling class, presiding over the only major industrial power whose physical plant remained intact, and clutching the "new technology" firmly in hand, seized the challenge of world empire and the promise of vast sources of cheap raw materials and human labor. The overall effect of these developments was that a permanent, large volume of government expenditure was established concentrated in two areas: (1) the new domestic functions





of state that had become an essential part of the business environment, and (2) the global military and political apparatus, including so-called foreign aid. These expenditures, furthermore, especially in the military sector, were to have certain characteristics that were increasingly lacking in the civilian sector--big profits in a planned, constantly expanding market for fancy hardware, the prices of which would not be excessively influenced by the costs of production. Needless to say, the financing for this strategy came mainly from taxes on working people, not to mention the low wages essential for the initial acquisition of profit-hungry capital.

In carrying out its post-war strategy, the U.S. government laid down a heavy dose of anti-communism, especially in the late 1940s and early 1950s. This campaign served several purposes: making the Cold War more convincing, and cleaning out dangerous ideas from all sectors of society. Furthermore, as in the anti-communist raids after WWI, the labor movements's more progressive, class conscious elements were effectively suppressed during this period. What this meant was that the prospects after WWII for a continuation from the 1930s of the achievements of organized workers were greatly reduced. In this period the Communist Party already discredited in the eyes of many, took an even more compromising stance in the face of ruling class attacks, further contributing to a more conservative perspective among rank-and-file workers. As a result, much of the solidarity of the U.S. labor movement with the international working class prior to WWII, which could have fundamentally challenged the expansion of the U.S. empire, was lost.

The Raytheon Story

The rise of Raytheon was part of the unfolding drama of "The American Century". In 1922, a small outfit known as the American Appliance Company was founded by an electrical engineer at MIT, Vannevar Bush, and some friends, in a typical MIT entrepreneurial spin-off. [18] The subsequent histories of Bush and this company illustrate how technological and financial resources are organized to serve only the ruling class. In a relatively few years, the company became the Raytheon Manufacturing Company, incorporating some other firms as well, and in the process, helped make Bush a wealthy man. By the late 1930s Raytheon had made substantial gains, especially in the area of vacuum tube technology and related electronics.

Meanwhile, having demonstrated his mastery of science/technology management and his understanding of the frontiers of electrical systems technology, (as industrialist, professor, Engineering Dean and Vice-President of MIT, 1919--1938), Mr. Bush subsequently became the foremost science and technology advisor to the government. He was appointed by FDR to head the National Defense Research Committee (and its successor, the Office of Scientific Research and Development), as the dark clouds of WWII thundered toward America. (U.S. bosses had hoped the Nazis would limit themselves to taking care of Russia.)

In this position, Bush was the key planner behind the development of the atomic bomb, radar, proximity fuses rockets and other weapons systems. He directed a massive crash program employing 30,000 scientists and engineers and unprecedented in expense and technological "achievement".

With its experience in vacuum tubes, Raytheon was thus prepared for the big action of WWII defense production, especially that growing out of Van Bush's radar project. Recognizing the great potential in microwave research for radar, Bush set up the Radiation Laboratory back home at MIT, and, with top level backing, he pulled together the team which would turn out the basic R&D from which invaluable defense hardware would follow. By the end of the war, a seemingly limitless potential for military capabilities and procurement profits had been uncovered. Thus MIT which formerly produced skilled manpower and advanced research, largely catering to private industry (or to the pursuit of "truth"), was enlisted in a "higher cause" and in the process a new era of government-university-industry coordination began. Raytheon, in the meantime, cashed in on the newly developed technology. By the war's end it was the largest producer of naval radar systems and microwave tubes and was well on its way to bigness. But merely absorbing the rich output of science and engineering was never sufficient for Raytheon to perform in the new markets opening up. This is where big finance enters the picture, putting the whole matter of the "new technology", defense markets, and empire into its proper perspective.

Enter the Bankers

Any time a "good" idea comes along, the crucial ingredient for putting it to work (making profit) is capital. Very few technical innovations ever make it alone, without outside funding from the possessors of wealth. In Raytheon's case, banks -- the managers of capital -- have been involved for some time [19]. In the early days it was J.P. Morgan and the Harris Trust of Chicago. During 1938--1942 Charles Adams, an investment banker, was a director of Raytheon and after a 5 year hitch as a partner in an investment firm he returned as executive vice-president. One year later he was president, and in 1964 he became chairman of the board.

In the 1950s the First National Bank of Boston, its affiliate Old Colony Trust, the State Street Bank, John Hancock, Liberty Mutual and other finance institutions all acquired interests in Raytheon, as owners, lenders, depositories, pension fund trustees, or insurers, etc. Several of these finance companies are duly represented on Raytheon's board of directors [20], making sure their common interests are pursued, their money well employed, and offering assistance from, and coordination with, their own business organizations. A notable example is Roger C. Damon, chairman of the board of the First National Bank of Boston and a director of Old Colony Trust and Liberty Mutual Insurance. (First National and Old Colony Trust, together, held 50% of all trust assets in Massachusetts in 1968 - \$4.2 billion.)

Raytheon--Continued on page 26

A SCIENTIFIC VISIT TO HANOI

In June of this year I spent a week in North Vietnam where I met with North Vietnamese scientists and doctors and lectured on molecular biology. Like the other scientists [1,2] I know to have visited North Vietnam -- a country that is startlingly poor by American standards and yet clean and healthy by any standards -- I came away with the impression of a society in which a vigorous intellectual life outruns material capacities in a unique way. And, in the face of continuing military pressures, the Vietnamese scientists and medical people I met have a firm confidence in the importance of even fundamental research for building their future society.

I confess I traveled to Hanoi doubting the usefulness of just one or two lectures on molecular biology, a science whose discoveries are not related in any simple way to the practical problems facing an underdeveloped country, particularly a country at war. I shall not attempt to describe the physical damage there, except to quote Richard Gott's summary [3] of his extensive survey published in the *Guardian Weekly* in February of this year:

Virtually all Vietnamese achievements since 1954 have been destroyed or rendered useless...the bombing of the North has done very great damage. Vietnam has not been bombed back into the Stone Age, but a promising underdeveloped country that was pushing its way through the middle of the nineteenth century has been forcibly smashed back into the eighteenth.

In fact, I found the Vietnamese to have a very lively interest in recent developments in basic science -- even in molecular biology -- and I was impressed by their serious efforts to develop their educational and medical programs. In attempting to convey this I should emphasize that my most vivid impressions are from direct conversations with the Vietnamese.

On a Wednesday morning at 7:30, I began a lecture to about a hundred Vietnamese students and professors in a bare room with a scratchy blackboard. My translator and I moved about a large wooden platform at the head of the room as we spoke. A microphone had been placed

on the lectern, but neither of us used it. On our left, in the open doors, people who I later learned take care of the building watched, and on our right, below the open windows, oxcarts and bicycles moved by quietly. For the first few hours I reviewed a few of the basic aspects of molecular biology and described in some detail the repressor theory of Jacob and Monod. After outlining for them my own experiments, including the principal results, I paused before continuing with more recent developments in the field. At this point there was a barrage of questions. Mrs. An said:

"We are sorry, but we do not understand. You must tell us the precise logic you used in isolating the repressor." From another member of the audience:

"Please tell us why you succeeded where others had failed. Explain to us what were the scientific and historical factors which led you to choose one alternative over the other at each stage."

Still another questioner:

"What did it feel like to make this scientific discovery, what precisely was that experience?"

A moment earlier I had told them that the detailed methods we had used to isolate the repressors were primarily of historical interest because there now are easier ways of doing these things and besides, I had said, a detailed understanding of those methods is not absolutely necessary to understanding the overall results. They had already been listening for two hours, and I assumed they would only be bored by what seemed to me would be excessive detail. But now they were insisting that I supply them with precisely the details I had offered to omit. Moreover, they were probing for an understanding of one scientist's view of the very enterprise of doing science. And so, for the next hour or so I described our experiments step-by-step, telling them what had been hard and what had been easy.

The questions they asked me that Wednesday afternoon initiated a conversation which continued through the early evening (eleven hours in all) and into two more sessions of several hours each. Several of the Vietnamese wanted to compare the results I had described with what

they had heard elsewhere. For example, I was questioned about the work on histones of James Bonner (California); the suggestion of Eugene Bell (Massachusetts) that DNA fragments carry information to the cytoplasm; the arguments of Henry Harris (England) that gene control is effected in the cytoplasm; and the findings of a Hungarian horticulturist which they described to me. One Vietnamese wanted to know whether we may, with certainty, apply the results of experiments with bacteria to understanding the biochemistry of higher organisms, and another offered the argument that certain problems might be studied only in higher organisms. One of the biochemists had just heard on the BBC that Gobind Khorana, now in America, had synthesized a gene, and he wanted to know which gene, and what was the significance of that feat. One of the younger scientists, whom the others referred to as "our futurologist" made several guesses about possible developments in biology by the year 2000, and we discussed for a while their possible applications to man. I was asked about Barry Commoner's arguments concerning DNA and information transfer, and about a description of S-RNA tertiary structure one of them had read in a *Cold Spring Harbor Symposium* volume.

The Vietnamese were also interested in the organization of American science. They asked for a description of the role of the Department Chairman in American universities, and inquired whether I thought that structure was the best arrangement. Someone asked whether there was a consensus on the question of the role of competition in science, and whether science is best done individually or in groups, cooperatively. My impression was that they were trying to plan their own scientific future, and they themselves did not have any set answers to any of these questions.

I had anticipated speaking to an interpreter who I imagined would translate line-for-line. However, rather than translating verbatim Mr. Dang Vien Thien listened to what I said, digested it, and then gave the lecture over again to the audience. Occasionally he would hesitate, ask me rapid questions to check his understanding, and then proceed. During discussion of my own work he sometimes anticipated my words, cut me off, and finished sentences himself. Mr. Thien, age thirty-five, was trained in Hanoi as a mechanical engineer and now works in the Science and Technology Information Department reading foreign engineering journals and then writing periodic reports, in Vietnamese, for technical workers. I asked Mr. Thien where he acquired the background in my field, totally unrelated to his, which enabled him to so readily understand what I was saying. His response: "I read." One of the things he had just read was a *Scientific American* article on repressors which I had brought to Hanoi a few days before. The few Western scientific journals which the Vietnamese receive by mail usually arrive six months to a year late.

Throughout the conversations I was struck by the easy way questions and comments arose from among the eldest and youngest present, without a hint of embarrassment or intimidation. Apparently, my Vietnamese

"class" was not wholly atypical -- I visited a night school class in elementary physics for factory workers and watched as the audience readily offered answers and questions for the teacher, a woman, who I guessed was about thirty-five.

While I was lecturing on molecular biology one of my traveling companions, Dr. Bert Pfeiffer, a zoologist from Montana was meeting with another group of about 100 Vietnamese professors and students. He discussed some ecological effects of modern technology and chemical defoliation in South Vietnam. On another occasion he met with several Vietnamese doctors to tell them about modern techniques for defibrillation and for the use of artificial cardiac pacemakers. He learned that they were already completely conversant with these techniques and are in fact planning to begin this kind of work soon. He was told there is one defibrillation machine in Hanoi.

The night school class I visited is part of a supplementary education program which reportedly enrolls over a million people in North Vietnam. (The total population of North Vietnam is about 17 million.) These classes, which meet for 2½ hours twice a week provide education for those who entered the work force before completing secondary education. Upon completion of the course about half of those enrolled in the final year pass a national exam and enter a higher technical correspondence school.

The more typical primary and secondary education course begins at age seven and lasts in principle 10 years. As of now, the first degree, which lasts four years, is mandatory, and by 1972 the second degree, lasting another three years, will also be required. There are in addition 28 special secondary schools, one in each province, which teach advanced classes, particularly in mathematics. In 1967-68 there were reportedly [4] over three and a half million pupils enrolled in the primary and secondary schools.

There are 33 institutions of higher education in North Vietnam: the University of Hanoi, which enrolls about 5000 students, and 32 branches of the Polytechnical Institute scattered about the country, which in 1967-68 enrolled 62,000 pupils. Admission to one of these universities requires in part passing the baccalaureat, given throughout the country on the same day each year, a schedule which was reportedly maintained throughout the bombing of North Vietnam. There is only one baccalaureat for science and non-science students.

A few hundred Vietnamese students study abroad, mainly in China, Russia, and the Socialist countries of Eastern Europe. However, all teaching in the schools, universities, and medical schools is done by Vietnamese. Their textbooks are periodically rewritten in Vietnamese by professors who read what they can and select materials of interest to them. So far as I can tell, these are not merely expedients to solve the language problem -- many students read scientific English and Russian, and in the physics class I referred to earlier, every word on the board was written in Vietnamese, English and Russian.

The French mathematician Laurent Schwartz recent-

ly studied North Vietnamese education in some detail, and concluded that the number of young Vietnamese graduating secondary school students who possess "good scientific training" is annually almost equal to the number produced at the corresponding stage in France [2]. The magnitude of this achievement is partially revealed by these facts: in 1939-40 there were in all of Indo-China only 400,000 primary and secondary students and 630 graduate students, and at the end of French colonialism in 1945, 95% of the country was illiterate. [2]

I visited one of Hanoi's hospitals, the Viet-Duc. The equipment I saw there is gathered from many countries: a pH meter from Hungary, a balance from Germany, an electroencephalograph from Russia, a heart pump from America courtesy of the American Friends Service Committee. Although I was told the hospital had been equipped since 1954 mainly with German aid, I saw no foreign doctors, and I was told there have been none stationed there nor anywhere else in North Vietnam for over ten years. This is an example of what appears to be a general policy of the Vietnamese -- what foreign aid they receive, in the civilian sphere at any rate, they control themselves. To me one of the most striking aspects of Hanoi, in strong contrast to other Asian cities I have seen, is the virtual absence of visible foreign influence there.

The hospital has 300 beds, immaculately attended by what appeared to be a large staff of doctors and nurses. The hospital specialized in surgery, including brain and heart surgery, with special attention given to tropical diseases of the stomach and liver. I looked in on an operation in progress, and in the basement I saw a research team performing experimental heart surgery on dogs using a manually operated lung pump.

The director of the hospital, Dr. Nguyen Trinh Co, who is also Vice Director of Hanoi Medical College, told me that there are four medical schools in North Vietnam, one in Hanoi, which graduate about 500 doctors a year. The course lasts six years following secondary school, and some students go abroad for advanced training. Dr. Co asked me for more information about the curriculum reform he heard had been instituted at Harvard Medical School.

Both at the hospital and at the Health Ministry the Vietnamese talked at length about their program to attack the health problems which faced the revolutionary government, problems greatly exacerbated by the war. An early explicit decision was made to reject the option of inviting friendly foreign governments to build modern hospitals where foreign specialists would practice and teach. Instead they concentrated on building a public health program, combining hygiene (sinking wells, building sanitary latrines, persuading people to drink only boiled water) with inoculations on a massive scale, sometimes using vaccines developed in North Vietnam. I was told the entire population is regularly vaccinated against cholera, tetanus, typhoid, and tuberculosis. For TB inoculations the Vietnamese claim to have developed an effective dead strain of BCG which is easier to transport without refrigeration than is the live strain. Children are inoculated

INTERACTION

We have just received the first issue of the Washington SESPA newsletter *Interaction*. We welcome this opportunity to reproduce their programs and Washington address:

PROGRAMS

- 1- *Displays and Exhibits: We would like to work on a project related to "The Bad Effects of Technology". Vested interests won't present this view which is as much a part of reality as the good aspects, and certainly important enough for people to be made aware of.*
- 2- *Planning and Organization: for the AAA\$ meeting to be held in Philadelphia. We need speakers who are willing to give prepared talks, and those who are willing to prepare rebuttals to the usual convention bull on the interaction of science and society; also to plan and participate in discussion groups, workshops, etc.*
- 3- *Unemployed Scientists: We are attempting to find and/or create jobs that are not involved with the war-complex of this country.*
- 4- *Technical Assistance Program (TAP): The first objective is to compile a skills list of people in the area who are willing to volunteer their particular technological skills to the community. Eventually we hope to add this to a nationwide list so that there will be technical assistance available to community groups involved in combatting problems of pollution, highways, safety, etc.*

The following list of related Washington area community activities has been extracted from the newsletter and is printed here for the use of interested people in the Washington area who may not have seen the first issue of *Interaction*.

- a. *Emergency Committee on the Transportation Crisis.....526-4592*
- b. *Center for Science in the Public Interest. 1126 16th St., Rm. 403, N. W. Washington, D. C. 20036.....833-3722*
- c. *Washington Ecology Center. Contact Lucky Wentworth.....833-1778*

ADDRESS

*SESPA c/o Mike Marchetti
4004 N. Fifth Street
Arlington, Va. 22203*

against small-pox and polio, using for the latter a modified Sabin vaccine which the Vietnamese claim is stable for a month without refrigeration. In addition to these preventive measures, dispensaries have been established in the villages and cooperatives, and there is reportedly at least one hospital staffed by physicians in every district. Many of these hospitals were destroyed by bombing raids and now exist underground. During the bombings the Vietnamese claim deaths were minimized by massive evacuations of the cities, efficient use of air-raid shelters, and rapid on-the-spot treatment -- only the most gravely wounded were transported to the better equipped centers.

Throughout North Vietnam fractures are set with light splints of bamboo using a method apparently similar to that employed in China. [5] The Vietnamese also grow and use on a large scale suspensions of the bacterium *Bacillus subtilis*, which they claim helps prevent intestinal infections and is an excellent healer of burns and wounds.

The Vietnamese reject "academic" procedures which restrict the practice of medicine to specialists with several years' training in medical schools. Instead, the country is covered by a network of assistant-physicians, midwives, nurses and sanitary officers. After a few years of experience, some of these sanitary officers become midwives or nurses, and with more experience, some of these ultimately become assistant-physicians. The exigencies of war demanded a large number of surgeons, and so all doctors are trained as surgeons. Even the para-medical people are often equipped to do certain types of simple surgery -- for example, I was told that several thousand village workers can now perform the operation necessary to cure entropion, a frequent complication of trachoma.

The North Vietnamese claim to have essentially eliminated the major diseases which ravage the peoples of Asia -- typhus, typhoid, cholera, tuberculosis, smallpox, polio, dysentery -- and to have lowered the infantile mortality rate to a level comparable to that in America. I cannot verify these claims, but the general health of the people of North Vietnam contrasts sharply with that of the residents of Vientiane or Saigon.

The Vietnamese anticipate that a major post-war medical problem will be treatment of various war-induced psychiatric disorders. They feel that the collective moral discipline engendered by direct participation in the war helps their people to avoid the anguish that will surface when the war ends. A second major problem will be treatment of those disfigured by napalm and by pellets from anti-personnel bombs. There are plans to establish a plastic-surgery center in every province and, I was told it is not impossible that they will ask for limited aid from specialists at that time.

The man most responsible for developing the health program of North Vietnam is Dr. Pham Ngoc Thach, [6] Minister of Health from 1958 until his death in 1968. In an interview [7] published in 1967, Dr. Thach described some of the obstacles to instituting these medical practices:



Third World Cinema Group

Distributors of revolutionary films from Latin America, including: *La hora de los hornos* (The Hour of the Furnaces), by Fernando Solanas and Octavio Getino, the first Argentine film-essay on social, political and cultural imperialism and liberation.

G.P.O. Box 3234, New York, N.Y. 10001; (212)462-7151.
2121, Browning, Berkeley, Ca 94702; (415)548-3204.

Tiohero

A movement periodical -- (one issue: \$0.20)
"A pooling of information --from New Left, underground and counter-culture periodicals-- is a strong expression of solidarity as well as a necessary political tool".

Tiohero, c/o Glad Day Press, 308 Stewart Ave., Ithaca, N.Y. 14850.

We have navigated against the stream in many respects. To make physicians trained in the old faculties leave their consulting rooms or hospitals and become interested in digging wells and installation of septic tanks, in a word, in the prevention of diseases, is contrary to their deep-rooted habits. Even a medical nurse of the old school would prefer giving an injection and dislike going to verify whether a septic tank is adequately built or not. To make an injection of antibiotic which cures almost miraculously is a gesture much more captivating than to lift up the lid of a septic tank. To practice complicated surgical operations with costly ultra-modern apparatus imported from abroad gives more prestige than to lecture on hygiene in villages, or to help village cadres complete their medical education. To have toiled many long years in the faculties and now to believe that medical art can be put into the hands of the masses is not any easy matter either.

Visiting the Oriental Medicine Institute in Hanoi one afternoon, I saw that the North Vietnamese take very seriously their accumulated knowledge of traditional medicine -- the treatment of various ailments with vegetal extracts and acupuncture. Here the Vietnamese are gathering traditional formulae -- cures for dysentery, rheumatism, arthritis, headache, shock, bone fractures -- which have been passed on through the years by word-of-mouth and in books. The workers at the institute are analyzing these traditional remedies to determine which are most useful and, if possible, how they work in physiological terms. In the meantime, throughout North Vietnam, thousands of practitioners of the ancient art are working alongside Western-type doctors, learning modern methods as they practice and teach old ones.

The Vietnamese continually emphasized their view that, subject to their severe material limitations, the practices of traditional medicine should provide a strong impetus for research in North Vietnam. And, they said, research is necessary for maintaining and improving the quality of their education and for enabling them to continue to adapt to new requirements. Although the Vietnamese have a strong interest in learning about basic research done elsewhere, their own research, according to Dr. Thach, [7] will be tied to practical problems:

No doubt, a poor, industrially underdeveloped country has not the means that more highly developed countries possess, but shall we fold our arms in the domain of research? On the contrary, the less means a country has, the more it must develop technical and scientific research, so as to find out processes and methods appropriate to its national conditions. If we conceive research work as it is done in other places, if we only repeat and verify the works of scientists of other countries, we can only feel depressed by our powerlessness. We must carefully study what other people have done, strive to get the latest scientific knowledge, but we must also blaze our own trail. Only by boldly taking up practical problems of our country and endeavoring to solve them, can we make our work fruitful.

At the end of the long Wednesday I spent discussing molecular biology, and more generally, how they were able to discuss and learn about abstract intellectual matters in the midst of war. I thought of America: fewer students are going into science, those who do are often plagued by misgivings, and it is not uncommon to hear young scientists complain that they find it increasingly difficult, for reasons sometimes specified and sometimes vague, to continue doing science in our society.

Dr. Nguyen Tan gi Trong, a professor of biochemistry at Hanoi Medical School rose and answered my question. He said that despite the war's destruction the Vietnamese are building a society and planning for the future which, he thought, requires knowing all these things.

M.P.

References

1. Chomsky, N., *New York Review of Books*, 15, 16, 1970.
2. Schwartz, L., unpublished report.
3. Gott, R., *Guardian Weekly*, 102, number 9, Feb. 26, 1970.
4. Some of these figures are taken from reference 2.
5. Penfield, W., *Science*, 141, 1153, 1963.
6. Dr. Laurent Schwartz knew Dr. Thach and described him as "one of the most remarkable men I ever met." [2] *Le Monde*, Nov. 25, 1967, gives this biography of Dr. Thach:

After having completed his medical studies in Hanoi, then in Paris, where he specialized in phthisiology (study of tuberculosis), Dr. Pham Ngoc Thach, a native of the Mekong Delta region (South Vietnam), settled in 1936 in Saigon where he practiced general medicine and phthisiology until 1945. Very early a member of the Communist party, he was one of the founders of the Vietminh in the South and directed the resistance against the return of the French expeditionary corps in Saigon, in September, 1945.

Transferred shortly afterward to the North, he formed a close relationship with Ho Chi Minh and became his personal physician. Prime Minister of Health of the Provisional government, in 1945, he was later Secretary General to the Presidential Council and carried out, between 1945 and 1954, numerous missions which took him from North to South and from South to North. In 1954, he returned permanently to the North and became Minister of Health in 1958.

7. Is North Vietnamese Medicine Facing the Trials of War, *Vietnamese Studies*, Hanoi, 1970.

COMMUNICATION FROM XUAN THUY OF
THE DRV

On Thursday, May 13, the following message was received from Minister Xuan Thuy, head of the DRV delegation at the Paris conference on Vietnam for communication to the conferences on Science for Vietnam to be held on the weekend of May 14 and 15:

Vietnam Project -- Science for the people - Box 59 -- Arlington Heights -- Boston, Massachusetts -- U.S.A. -- warm greetings to your conferences held simultaneously in Washington -- Chicago and Boston -- wish conferences successes contributing to make American public opinion understand better and condemn crimes committed by U.S. administration in Vietnam particularly crimes in chemical warfare -- hope progressive scientists in America will voice more and more strongly their demand of U.S. administration to stop war of aggression in Vietnam and Indochina, to set reasonable date for prompt withdrawal of all U.S. troops home, thus create conditions of normalization of friendly relations between people of our two countries and for science to serve better in building happy lives of peoples. sincerely -- Xuan Thuy.

MAY 15 -- SCIENCE FOR VIETNAM CONFERENCE

Armed Forces weekend (May 15) was commemorated by Science for the People by holding conferences in Chicago, Boston, and Madison on Science for Vietnam.

These conferences were held to build the Science for Vietnam Project initiated by the Chicago Peoples Science Collective shortly after Dick Levins returned from a visit to Hanoi. Of course the success of these conferences depends on what happens now that they are over. Hopefully an increasing number of people will become involved in projects for providing scientific and material aid to

the Vietnamese people. By so doing, scientists and engineers can not only express their opposition to the War in Southeast Asia and their commitment to the use of science for the people rather than against the people, but they can also work on constructive programs as *scientists and engineers* in support of their political understanding and beliefs.

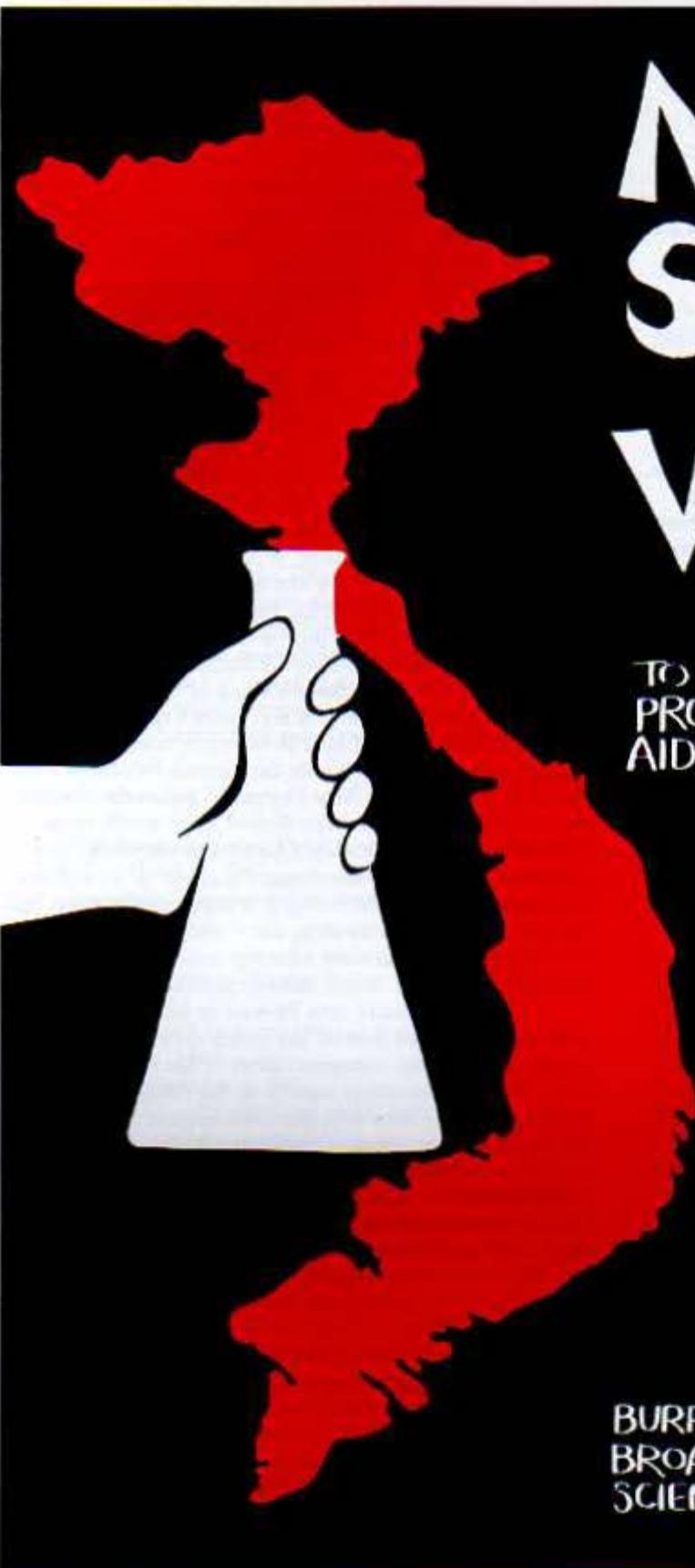
The conferences in Boston and Chicago each drew nearly a hundred people (in Boston's case even in spite of the quite rare, sunny weather) and provided an opportunity for scientists from in town and out of town to meet together for discussions and workshops. Since the two programs were similar, a look at the Boston conference will provide a good idea of what happened in both. In the morning the use of science in the third world was discussed by Bill Haseltine and Carl Goetch. Bill described the miraculous advances which have been made in anti-personnel weaponry, chemical warfare, and automated battlefield technology. Carl discussed how the effects of the introduction of modern agriculture technology depend upon the existing social and economic institutions of a country, sometimes worsening social conditions while the suitable technologies often fail to be developed.

Mark Ptashne and Noam Chomsky both of whom have visited Indochina, then described the situation in Vietnam, specifically with regard to the level of science, technology and education there. Mark's slides of Hanoi showed a very healthy, cheerful population. The degree to which the North Vietnamese have eradicated illiteracy, malnutrition, and respiratory diseases under the severe conditions of warfare and bombardment, seemed nothing less than astounding. Their achievements are the product not only of their great intellectual strength and ingenuity but also of their determined insistence upon self reliance. We understand that it is only within this framework that the Vietnamese request and accept help in a fraternal spirit of cooperation. While the Vietnamese benefit from our scientific aid, we surely can benefit from their understanding of how to use science to meet the needs of the people.

During the afternoon, workshops were held on various topics including medical problems and aid, projects relevant to herbicides and bomb damage, aid for scientific development in the 3rd world, fighting local war production and research, and analyzing the general strategy of people's science. Out of these workshops came several groups which will work in conjunction with the Chicago group and others to build projects of scientific assistance with our Vietnamese colleagues. Work has already been done in the areas of herbicides, reforestation, pest control, and medical problems.

Those interested in becoming part of the Science for Vietnam project should contact: Richard Levins, Department of Biology, University of Chicago, Chicago, Illinois 60637 or The Science for the People Regional Center, 9 Walden St., Jamaica Plain, Mass. 02130

A. W.



MAY 15 SCIENCE FOR VIETNAM

CONFERENCE

TO ESTABLISH PROGRAMS TO
PROVIDE SCIENTIFIC + MATERIAL
AID TO THE VIETNAMESE PEOPLE

MORNING SESSION 11AM-1PM
SCIENCE AND THE THIRD WORLD
EYEWITNESS REPORTS FROM VIETNAM
SCIENCE FOR VIETNAM: IMPLEMENTA-
TION OF PEOPLES PEACE TREATY
FILM ON VIETNAM
VIETNAMESE REFUGEE LUNCH
AFTERNOON WORKSHOPS 2-5PM

- 1 OVERCOMING HERBICIDE AND BOMB DAMAGE
- 2 MEDICAL PROBLEMS
- 3 AIDING VIETNAMESE SCIENTIFIC DEVELOPMENT
- 4 FIGHTING LOCAL WAR AND COUNTERINSURGENCY RESEARCH
- 5 THE STRATEGY OF PEOPLES SCIENCE

BURR HALL, HARVARD UNIVERSITY
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SCIENCE FOR THE PEOPLE · 427-0642
495-2497

Raytheon—Continued from page 18

Numerous non-finance businesses also have a real interest in Raytheon's performance, for example, suppliers. Thus Robert W. Stoddard one of the rulers of Worcester, Massachusetts and chairman of the board of Wyman-Gordon, producer of castings and forgings and a subcontractor for Raytheon, is a Raytheon director. Charles F. Avila, board chairman of Boston Edison, is also a director of Raytheon, which is Boston Edison's largest customer of electrical power. Similarly, Eli Goldston, president of Eastern Gas and Fuel, is also a director of Raytheon, one of his biggest customers.

In the other direction, the two top officers of Raytheon, chairman Adams and president Phillips, are respectively directors of the First National Bank of Boston, Pan American Airlines, Gillette and Liberty Mutual, and of the John Hancock Company and the National Shawmut Bank of Boston. What all these and other numerous "interlocks" reflect is the extensive coordination of profit-seeking that goes on in the board rooms of big corporations and shows that Raytheon is not an isolated cold-warrior on an otherwise largely peaceful terrain.

Another, extracurricular, activity of Raytheon's executives and directors is overseeing the local higher education/research infrastructure which supplies their companies with specialized manpower. For example, 4 out of 11 of Raytheon's directors are members of the corporation of Northeastern University, probably the single most important factory of business, technical and intermediate level engineering personnel and ROTC recruits in New England.

Another university from which Raytheon derives great benefit is, of course, MIT. For example Raytheon has production contracts for the missile guidance systems originally developed at MIT's Draper Laboratory. However the allocation of high powered research at places like MIT is much less a matter for local Raytheon influence since it involves basic ruling class priorities. These are defined by complex processes in the apparatus of state, where Raytheon and its business associates are only one of many accommodating blocks of power and vested wealth. Of course Raytheon does its best to plan and advance its case for bigger and better contracts and so it has people like Prof. Harvey Brooks on its board of directors to give advice on technical-governmental matters. Brooks is Dean of Engineering and Applied Physics at Harvard, served as a Presidential Science Advisor, and is on the Naval Research Advisory Committee, the National Science Board, and the National Academy of Science/National Academy of Engineering. He is also a director of the Hudson Institute, Herman Kahn's think tank to plan and innovate for capitalism.

Putting it All Together

This analysis illustrates important features of the ruling class's decision making processes. Some of their decisions

are mainly of local concern and so are decided by individuals assembled locally (e.g. educational policy matters at Northeastern University; electrical utility policy planning in New England). Other decisions are very fundamental matters (e.g. level and make-up of "defense" spending; foreign policy objectives; inflation management) and are decided through more central channels in the top levels of private and government decision-making, sampling opinion from a wider selection of businessmen and their fronting politicians and agency chiefs.

While there is a fundamental underlying unity of interest among big businessmen, (in favor of high profits and social stability; opposed to the gains of workers against their bosses, anywhere) there are of course minor conflicts and disagreements on specific issues, especially among individuals holding narrow sectoral viewpoints. Thus a Raytheon executive might argue for a higher level of defense spending than a gentleman from the State Street Bank of Boston, whose broad experience leads him to conclude that additional business incentives in other areas (eg., environmental control, "cool-it" programs and urban redevelopment) are essential for the continued security of massed private wealth in America. Nevertheless, this banker looks forward to the nice profits that Raytheon can hustle in the current market context (State Street Bank held almost six percent of Raytheon's stock in 1968), and of course, he greatly appreciates Raytheon's contribution to the essential security of U.S. investors in Asia, Africa, Europe and Latin America. In fact several industries with which he is familiar in New England -- especially electronics, textiles and shoes -- have derived great profit from their operations in S. Korea, Taiwan and elsewhere. But this process of foreign investments leads to U. S. workers losing their jobs. Furthermore, it is happening in most industries-- cars, food processing, etc.-- and is probably one of the primary mechanisms whereby businessmen benefit, and working people suffer, from imperialism.

Raytheon should now be seen in proper perspective as a fully integrated part of the entire system, operating in certain more visibly repugnant areas of the market but pursuing absolutely essential aspects of the ruling class's established priorities. Therefore, the most important feature of Raytheon is what it has in common with all business: the creation of maximum profits, not only to provide great personal benefit to those who own and control corporations but also to increase their hold over the system, and to expand their capital assets for even bigger profits in the future. All the wealth produced, of course, comes from the labor of working people both here and abroad and thus is actually stolen from its rightful owners. A political strategy for "dealing with" Raytheon, then, must be a strategy for dealing with the whole corporate system.

What we must do in general terms is clear. Recognition of the exploitation of workers at places like Raytheon and in general, as well as our own exploitation, should lead us to work to build a unified movement of all working people against the corporate class. This means overcoming the many devastating divisions that so effectively stand in the way. These divisions, based on race, sex, profession and

status are, in fact, sustained or created by the ruling class to facilitate their maintenance of power. Thus we must learn and teach the importance of ideas that clarify the class question: Who are our friends and who are our enemies? We must build the organization needed to advance this process. Finally, we must recognize that any solution which does not represent the interests of the majority of working people will inevitably fail to eliminate the foundations of class exploitation. Therefore a leadership role must be played by the largest sector—the so-called “unskilled” or “semi-skilled”—who have most thoroughly experienced the exploitation of the present order, who have the most to gain, and who will have the most to protect once the ruling class has been thrown out.

In a particular case like Raytheon, knowledge of the way this corporation works gives us the opportunity to begin to help build, with workers there, for an anti-capitalist struggle. We can contribute to such a program by relating to technical workers in their struggles against unemployment and lay-offs. (There have been 15% lay-offs at Raytheon in little more than a year.) More generally, we must expose and fight against the effects of racism, the war, welfare cuts and other destructive manifestations of the corporate economy on both the employed *and* the unemployed. The struggle over these and other issues should provide important experiences for technical workers building similar movements in all science-bound institutions—corporations, R&D institutes, universities and government agencies.

B. P.

1. “Raytheon Company Field Report”, Harris, Upham & Co., October, 1968, p. 5. A securities analysis recommending investment in Raytheon, a company with a future.
2. *Ibid.*
3. *The War Business*, George Thayer (Avon Paperback) 1969, pp. 249, 232, 234.
4. *Militarism and Industry*, Victor Perlo, (International Publishers), 1963, p. 43.
5. *The War Business*, p. 186.
6. Immediately after WWII, a major tenet of U.S. policy was to discourage Soviet support for liberation movements --“communist expansion” -- of the oppressed peoples of the world. Hence the clear message of the first atomic bomb detonations and the cold war that followed. More recently the Soviet state has become a traditional competitor and threat for U.S. business, especially in regions such as the Middle East and South Asia -- consider India, Indonesia and now Ceylon!
7. “First U.S. Submarine Set Out with Multiple-Warhead Missile,” *New York Times*, April 2, 1971.
8. “B-1 Contractors Selected,” *Defense Industry Bulletin*, July, 1970, pp. 30-31.
9. For a good account of the relationship between the B-1A and the SST, see *The War Profiteers*, Richard Kaufman (Bobbs Merrill), c. 1970, pp. 82-87. See also *The Manned Bomber*, by Mary McCarthy, in

- The Pentagon Watchers*, Leonard S. Rodberg and Derek Shearer, Eds. (Doubleday Paperback), 1970.
10. *Economics of Military Procurement*, hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, 90th Congress, 2nd session, Part I, November 11, 1968, pp. 57-65.
 11. *Ibid.*, Part II, November 14, 1968, pp. 8 and 12. This testimony of Admiral Rickover is also important.
 12. Raytheon N.Y. Stock Exchange listing A-14362, August 1, 1952.
 13. For a good summary in 30 pages of the various forms of subsidies to, the high profits of, and the wasteful practices of the large military producers, see “Economics of Military Procurement,” report of the above mentioned subcommittee, May, 1969.
 14. See *Pyramiding of Profits and Costs in the Missile Procurement Program*, hearings before the Permanent Subcommittee on Investigations of the Committee on Government Operations of the U.S. Senate, 87th Congress, 2nd session, 1962. There are two volumes of hearings on Western Electric’s Nike Program.
 15. “Pentagon Accountability,” Senator William Proxmire, in *National Priorities*.
 16. *The War Profiteers*, Richard F. Kaufman, (Bobbs Merrill), 1970 p. 62.
 17. “Balancing Military and Civilian Programs,” Charles L. Schultze, in *National Priorities*, 1969, p. 35.
 18. “Bush, Busy at 80, Feels Pentagon Overdoes It,” *New York Times*, March 12, 1970.
 19. For a good general discussion of the dominant role of banks in establishing the ruling class’ priorities in the U.S. economy, see “Who Really Rules America” by Richard Pelton in *PL* magazine, February, 1970, The information on Raytheon’s early financial history was taken from “The Raytheon-Commonwealth of Massachusetts Military-Industrial Complex,” by Richard Krushnic January, 1971.
 20. R. Krushnic “Raytheon: Problem Child of Massachusetts”.

Footnotes

Much of the factual information in this article on the origins of Raytheon and its current activities was taken from a preliminary draft written by Richard Krushnic, entitled *The Raytheon Company: Problem Child of Massachusetts*.

READINGS

Technology and Counterinsurgency

1. *Police on the Homefront* by NARMIC.

This is a new paperback on applications of Vietnam-type technology to police work in the United States. Articles in the book include a description of police training programs on American college campuses; an analysis of the new technology that is being made available to police for counteracting domestic insurgency; a report on the involvement of the Pentagon in domestic police work; and a comprehensive list of contracts for research and development of new methods and materials for stifling dissent in the country. Extremely important in that this report documents the laying down of the technological base for wide-scale repression.

Available for \$1.35 from NARMIC (National Action/Research on the Military-Industrial Complex), 160 N. 15th St., Phila., Penna. 19102. NARMIC is a research group sponsored by the American Friends Service Committee.

2. *Electronic Battlefield, Inc.* by Chris Robinson.

Article describing the Pentagon's development of the electronic battlefield. Utilizing sensor systems, computers, infrared and laser detection devices, the military hope to be able to fight Vietnam-type wars without involving American Troops. Companies involved include RCA, Westinghouse, Hughes, Honeywell, General Electric, Litton, Motorola, and ITT. A vital part of the Government's strategy for counteracting revolutionary change in the Third World.

Copies available at 15 cents each, from NARMIC, 160 N. 15th St., Phila., Penna. 19102.

3. *The University-Military-Police Complex* by Mike Klare.

Detailed report on the interweaving of the Pentagon, the police, and America's universities. Includes an excellent essay on the growth of the university-military research network and a list of contracts held by various universities with the Pentagon and the police establishment.

Copies available for \$1.25 from NACLA East, box 57, Cathedral Station, New York, N. Y. 10026 or NACLA West, Box 226, Berkeley, Calif. 94701. NACLA is a movement research group.

D.S., T.S., J.W.



devastating irony into "more pencils and erasers."

Liberal Mandarins Unmasked

CLASS STRUGGLE IN THE FRENCH SCIENCE ESTABLISHMENT

A year ago a strike by laboratory technicians (bubble chamber scanners) in the physics laboratory of the Ecole Polytechnique blew these illusions apart. The strike exposed the existence of the class struggle within the scientific institutions themselves. No more could one close one's eyes to the fact that "pure research" is carried on with workers and technicians who often work under conditions of exploitation similar to those encountered in large industry. Deep contradictions appeared among the scientists of the Ecole Polytechnique; they were torn between advocating abstract liberal positions and defending their own privileges. [1] A few scientists at the bottom of the hierarchy, who had themselves experienced some aspects of the oppression perpetrated by those at the top, sided half-heartedly with the strikers. But most mandarins discarded their liberal masks and supported the repression of the worker's struggle and the firing of the most aggressive strikers.

During the academic year following the strike, the level of struggle among science teachers and research personnel has advanced. (For example) in the Paris Faculty of Sciences two lines of thought were brought into conflict when a Union called for "the defense of research". The Union line was challenged in "The Lab's Cry", a publication of a group of progressive technicians - the very existence of which is an important fact - which stated:

The Union leaders present the slogan "defense of government-sponsored research" and explain that scientific research is in the interest of everyone and that its development is an element of social progress. The alternative position is to reject the slogan "defense of research" and replace it with "defense of the research workers". We support the latter position. It is indeed evident to us that under a capitalist regime, research, whatever its social value, is controlled by the bosses, for whom it is first and foremost a source of profit. For example, automation in a socialist society means lighter work loads and less painful work; in a capitalist society it means lay-offs and unemployment.

At the same time an expose was undertaken of the often insidious forms of laboratory despotism: paternalism, veiled threats of lay-offs, professional failings concocted out of thin air, various bonuses distributed on the basis of favoritism, arbitrary assignment of tasks, and alienation of the technician who is the major producing agent of the research work but who remains neglected and despised as an individual.

1. See April issue of *Science For The People* (Vol. 111, No. 2) "Repression Hits The Liberal Fan", an expose of a similar group of liberal faculty mandarins at Washington University. [*The Editors*]

This article first appeared in the French movement paper: L'Idiot International, 2 rue de vauvilliers, Paris, 1. The paper was repeatedly "forbidden from being circulated by distribution agencies." Jean Marc Levy-Leblond is professor of theoretical physics at the University of Paris. He was made a "cause celebre" when the authorities zeroed in on him with trial and partial suspension under the pretext of his participating in the defacing of a government building on which had been painted "all cops off the campus." We are printing this article as part of our continuing effort to keep readers informed on the activities of scientific workers in other countries.

"We shall not be *watchdogs* for the capitalist system." This slogan captures the attitude which emerged on the Nanterre campus in March, 1968, and has been kept alive in the French student movement by a continuing, radical, defiant challenge to the form, content and motivation of higher education. Until recently this radical revolt was essentially limited to the humanities and "social" sciences. In the pure sciences, despite many good intentions, reformist illusions confined student demands to the area of administrative procedures.

Of course, an analysis of the role of the pure sciences is a more difficult task. It is comparatively easy to denounce sociology, political economy and philosophy as ideological instruments of the bourgeoisie used to mold those responsible for the maintenance of the moral and intellectual "order". But a theorem of mathematics, a physical law, a chemical formula are all "true" and independent of class struggle, capitalist exploitation or prevalent ideology! Should we therefore believe that the physical sciences represent closed, pure universes - ivory towers untouched by the contradictions within our society? If so, the only possible actions center around small reforms: a better pedagogical approach or better financial support. The latter is epitomized by the demand "more money for basic research" which the students have translated with

Liberals Pull Strings of Lower Echelon Puppets

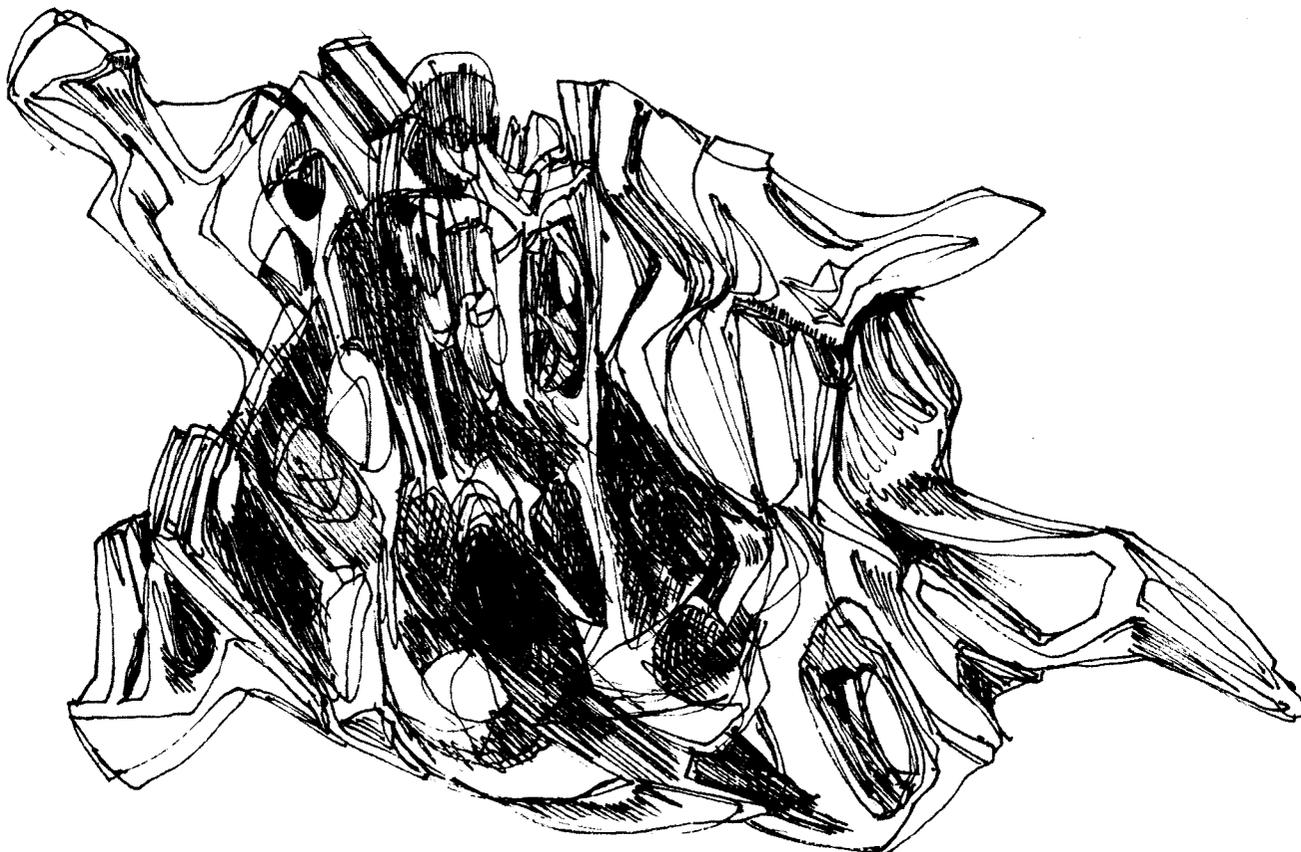
The Faculty of Sciences of Paris is not an isolated case. Even in Orsay, the "modern, competent and smoothly running" Faculty, twenty miles south of Paris, multiple struggles erupt. A strike by students of theoretical physics is followed by a classical lock-out, and the strikers issue the following proclamations:

(We denounce) the profs who are bosses and the bourgeois educational system within which some professors claim to carry out pure and disinterested research. In order to do their research professors have to carry out the bourgeois politics of authority - select students, eliminate young researchers fire technicians. They preach the ideology of building an elite, of high returns, of efficiency. Social problems and unemployment do not concern them. Some, within the university, are the direct representatives of large capitalist interests. They pull the strings and leave the dirty work to those below them, which allows them to put on a liberal mask -- (One important means by which the strings are pulled) is the outside contractor, for instance the "Paris Cleaning Co." It will be put in charge of the exploitation of cleaning ladies for \$0.70 an hour without any job security and will set up its own police-like network of supervisors. Thus, our mandarins are no more responsible for anything; their hands are clean; they may recognize themselves as "laboratory bosses" but never as "factory bosses".

The struggles which we have mentioned (and others) have a common factor: they challenge the whole oppressive bourgeois system. The despotism of laboratory directors, the authoritarianism of administrators, the professors' neglect of students, are only reflections, in forms specific to academic scientific institutions, of the overall capitalist oppression. And they are confronted as such. Scientific objectivity and truth can no longer hide a scientific praxis that is part of the real processes of class struggles.

There is no doubt that the bourgeoisie and its accomplices find it intolerable to see the essential cogs of their mechanism of domination exposed and attacked in this way. They grow even angrier when some individual scientists, whom they believed to be fully in their camp as a result of the distribution of favors and privileges, commit treason to the ruling class and attempt to voice revolutionary criticisms. Furthermore, the bourgeoisie is incapable of understanding that this "treason", far from being the cause of the more and more radical challenges presented by students, technicians, young researchers and teachers, is in fact the consequence of it. This is why no measures of repression or intimidation against individuals will be able to prevent the development of struggles on the new but fundamentally important front of science.

*Translated for American readers by
M. B. and excerpted by the Editorial
Collective*



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MORE LETTERS

Dear Brothers and Sisters:

Three years ago, I discontinued my education in science. At that time I was three courses short from a B.S. degree in chemistry. I had come to the sudden realization, that my education was totally inane, dehumanizing, and worthless. A degree in chemistry was only good for making a buck. From then on, I re-oriented my life away from science and towards humanity.

I guess I made the right decision, because instead of doing something like inventing new nerve gases at SRI and making lots of money, I am awaiting sentencing for refusing induction. It seems like you can't live honestly in this country without being punished for it.

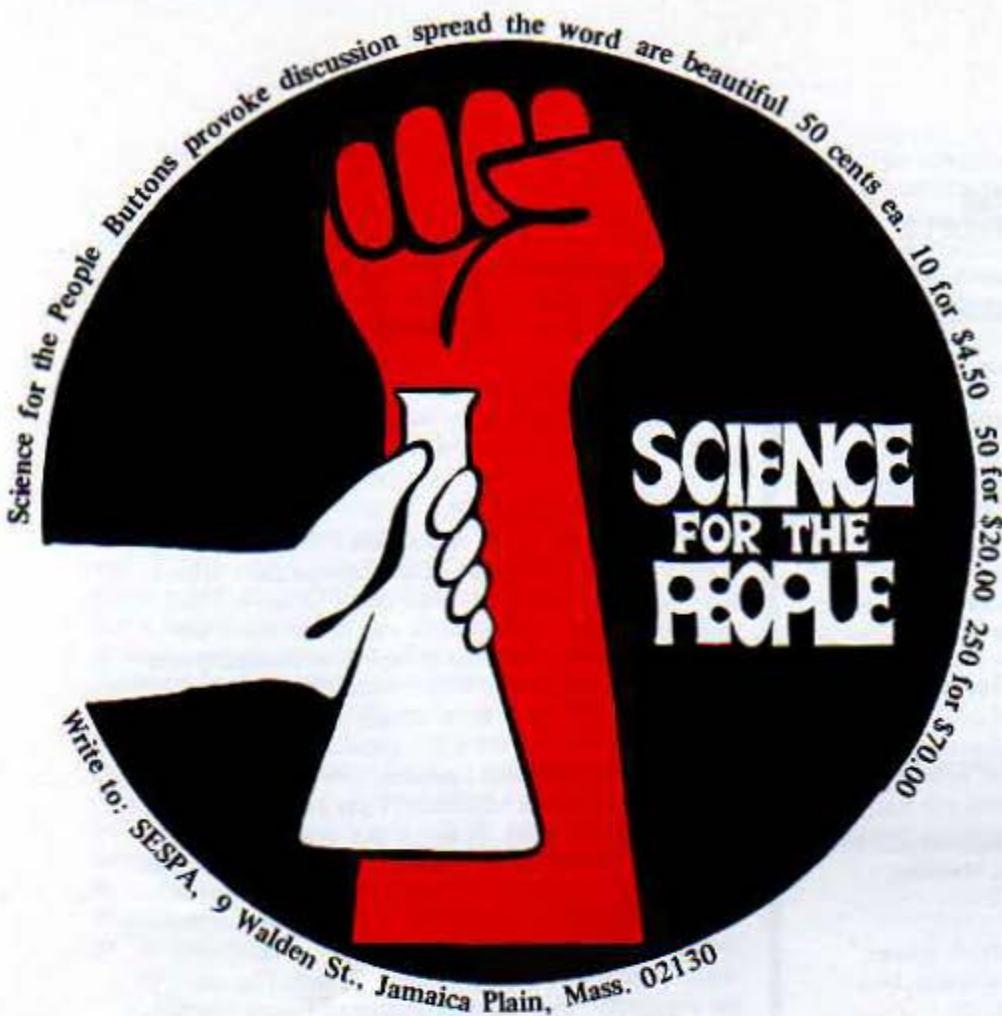
Before I heard about your group, I thought that most scientists were politically, socially, and emotionally retarded. I generally ignored them and worked with other 'organizable' people. Lately though, I've come to the conclusion that ignoring groups of people like the scientists, the technicians, the Silent Americans, is not realistic and maybe even a little self-centered. Technology belongs to the people--not to an elite. The people who rule America use technology to turn the whole world into a servo-mechanism to feed their sick desires. That same technology can be used to feed, provide good health, and house everybody on this planet.

To educate our colleagues and fellow classmates about what this country does with our skills, brings us one step closer to the day when everyone will have these skills. We have to make sure that everybody can be a chemist, or whatever--to have free and open access to that knowledge, like all the other resources of society.

I think your group can be and is a very important source of information that will help clear away a lot of the sham ivory towers that so many brains are impaled upon in this country. Enclosed is a check to pay for a one year membership to SESPA, and I hope I can help you in any small way I can.

My roommate owns a small, bankrupt radical bookstore and we would like to know the bulk rates for your journal. Also, there's money enclosed for 10 of your Science for the People buttons, which we would like to turn over to our friends and customers.

Peace
Larry Wendt



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SUBSCRIPTIONS TO *SCIENCE FOR THE PEOPLE* AND MEMBERSHIP IN SESPA

SESPA is defined by its activities. People who participate in the (mostly local) activities consider themselves members. Of course, there are people who through a variety of circumstances are not in a position to be active but would like to maintain contact. They also consider themselves members.

The magazine keeps us all in touch. It encourages people who may be isolated, presents examples of activities that are useful to local groups, brings issues and information to the attention of the readers, presents analytical articles and offers a forum for discussion. Hence it is a vital activity of SESPA. It is also the only regular national activity.

We need to know who the members are in order to continue to send *SCIENCE FOR THE PEOPLE* to them. Please supply the following information:

I am a member (check here if subscriber only. [])

1. Name:

Address:

Telephone:

Occupation:
(if student or unemployed please indicate)

If you are working, do you work in industry [], government [], university [], other _____

2. Local SESPA chapter or other group in which I'm active:
3. I am enclosing money according to the following scheme: (a) regular membership—\$10, (b) indigent membership—less than \$10, (c) affluent or sacrifice membership—more than \$10, (d) completely impoverished—nothing, (e) I have paid already.
4. I will sell _____ magazines. This can be done on consignment to bookstores and newsstands, to your colleagues, at meetings. (If you want to give some away free because you are organizing and can't pay for them, let us know)
5. I am attaching a list of names and addresses of people who I believe would be interested in the magazine. Please send them complimentary copies.

Please add any comments on the magazine or SESPA or your own circumstances. We welcome criticism, advice, and would like to get to know you.

SEND CHECKS TO: SESPA, 9 WALDEN ST., JAMAICA PLAIN, MASS. 02130