Soviet Union are "particularly hazardous" because of different accounting methods. Similarly, the number of scientists and engineers engaged in R & D per 10,000 population declined in the United States after 1969 but continued to grow in all other countries studied.

In addition to the international comparisons, the report presents indicators relating to R & D resources, basic research, industrial R & D, manpower, and public attitudes toward science and technology.

From the viewpoint of basic scientists, perhaps the most gratifying finding is that "basic research contributes increasingly to technological innovation, as reflected by the growing number of citations to research in patents associated with major advances in technology." That conclusion was reached in a specially commissioned study of the patent documentation associated with 179 major technical advances which occurred in the United States between 1950 and 1973. The special study also found that most of the research cited in patents is now performed in the universities, whereas in the 1950's industry had been the prime source of such research.

A new feature of this year's report was the establishment of "industrial R & D and innovation" as a major indicator category. The report found that industrial R & D is concentrated in a few industries and in a relatively small number of companies within those industries. Just 31 companies accounted for more than 60 percent of all R & D expenditures by industry. Small firms (those with fewer than 1000 employees) produced the greatest number of major innovations during the 1953–59 and 1960–66 periods, but large manufacturing companies (those with 10,000 or more employees) led in innovations in the 1967–73 period.

One of the most striking trends to emerge from virtually every chart and table in the report is that federal support of science and technology has either leveled off or headed downward in most categories when measured in constant dollars (dollars adjusted for inflation). There is also evidence that this has affected research "output." Thus publications by university-based mathematicians and engineers slackened 2 years after federal expenditures for those fields were cut. Whether it matters if the United States maintains a lead over its international rivals in *all* fields of science is a question that is neither addressed nor answered by the National Science Board. But the Ford Administration's budget experts are said to have been concerned about some of the downtrends documented in the report. One well-placed NSF official claims the report was a key factor in winning a big budget boost for basic research in the Administration's proposed budget for fiscal year 1977. —PHILIP M. BOFFEY

Science for the People: Comes the Evolution

The 1976 AAAS meeting in Boston was dominated by the Bicentennial theme, but a minor commemorative footnote might be added. The previous Boston meeting, held in 1969, was the occasion of the first in a series of protests by political activists that continued at several subsequent meetings. The return to Boston this year was notable for an absence of conflict, evidence that both the AAAS and the activists have changed.

Throughout the period the most prominent protesters were a group called Science for the People (SFTP), an organizational mutation of Scientists and Engineers for Social and Political Action (SESPA), which was formed in the late 1960's. To outsiders, Science for the People appeared to bloom perennially at AAAS meetings, defining itself mainly by opposition to the AAAS. In fact, particularly in the Boston area, where the eponymous magazine *Science for the People* is published, the group was developing an independent style of operation which enabled it to outlive the antiwar movement that nourished it and to create its own niche in radical politics.

Science for the People is not exclusively a Boston-Cambridge phenomenon. (Groups are active in Berkeley–San Francisco, Chicago, New York, and Michigan, for example.) Nor in the Boston area is Science for the People the only radical organization involving scientists and other technical people. But SFTP has had the most visibility and has probably shown the most vitality, and it is worth attempting to describe its theories and practices and to assess how it has changed. What follows is an account based mainly on interviews during the period of the recent AAAS meeting with present members of the group or with persons familiar with it, most of them sympathetic.

The history of relations between the AAAS and SFTP does throw some light on the evolution of the group. In the early years, the activists sought to make their points by disrupting meetings more or less in the style then endemic on American campuses. These tactics reached a crescendo at the Philadelphia meeting at the end of 1971 when, among other things, Senator Hubert H. Humphrey was spattered by a near miss from a tomato. The next year, at the Washington meeting, AAAS officials took a harder line on activist activities, some scuffling and several arrests ensued, and the locus of confrontation shifted to hard bargaining on ground rules between the activists and AAAS officials. These negotiations, on such things as the location of literature tables and a place for SFTP to caucus, led to an era of somewhat better feeling. This year SFTP had a literature table and its own room, and SFTP members were arrangers and participants in several sessions on the regular program.

From the SFTP's angle, what has changed is tactics, not the basic viewpoint of the organization. During the years of the Vietnam war the activists had been most vocal in criticizing AAAS for representing the "establishment" and condoning the uses to which science and technology was being put in Southeast Asia. At the same time, SFTP played on the broader theme that science in the United States served government and corporate interests. The AAAS (*Science for the People* habitually spells it AAA$) was dubbed "a propaganda organ of bourgeois science" for uncritically supporting technology responsible for dubious effects in population control and pollution abatement, urban redevelopment, law enforcement, and for general complicity in "social manipulation." SFTP, antihierarchical and antielitist on principle, believes that science should be cooperative rather than competitive, and feels that AAAS embodied all the bad old totems and taboos.

The trend toward tactical restraint occurred in part because SFTP kept hearing that its aggressive tactics were "turning people off." Also the group observed that the character of the AAAS meeting had

changed. Fewer small scientific societies were holding meetings on esoteric specialties, and fewer young scientists were turning up, presumably because the decline in travel funds available precluded their coming long distances. And the AAAS program had changed, with more sessions on issues which permitted the kinds of discussions SFTP was interested in. It should be noted that while SFTP this year renounced the demonstrations of yore, the group continued to send people to selected sessions to ask needling questions and that despite the "new" SFTP posture, it still irritates a fair number of people attending the meeting.

Internally, SFTP puts strong emphasis on discussion and collective policy-making. The decision on tactics at the AAAS meeting was a by-product of a continuing debate on what is perhaps the basic issue facing the group. In oversimplified terms, the chronic question is whether the organization should concentrate on bringing a radical perception to matters involving science or should seek to persuade scientists, engineers, and other technical workers to be active in general issues which concern the political left. A random example: Should SFTP involve itself in the issue of independence for Puerto Rico or instead be active in a case where Puerto Rican women may be used in a scientifically questionable test of birth control methods?

The debate seems to have been resolved in favor of emphasizing a radical analysis of scientific issues. Most concretely, this means that the magazine *Science for the People* will feature articles with a clear scientific dimension. The March issue, of *Science for the People*, for example, included articles titled "Sociobiology: Tool for social oppression"; "Gene implantation: Hazards of genetic engineering"; "Agribusiness: Feeding profit rather than people"; "The structure of American health care"; and "Women in science: Women drink water while men drink wine."

Certainly the decision to emphasize science is not unanimously welcomed. Some members feel strongly that the troubles in science in the United States are only the manifestations of the root problem of "imperialism," which deserves primary emphasis. But the decision probably is consonant with the backgrounds, interests, and attitudes of a majority of members of the group.

The total circulation of the magazine is about 4000 nationally, but the SFTP group in the Boston area has about 100 to 150 members who, in any year, expend sufficient time and energy to be regarded as active members of the group. SFTP's original recruits were primarily university students and junior faculty, and a small number of professionals from industry; the university contingent remains prominent, probably dominant. This causes considerable internal angst in the organization. Like most radical political organizations originally based on an elite, SFTP seeks to expand its membership among "workers," which in the first instance means nonprofessionals within the university and those with science-related jobs outside. SFTP members have a distaste for hierarchical forms and leadership distinctions, but researchers—particularly those with established professional reputations who hail from elite institutions—tend to carry the most clout with authorities and to be noted and quoted by the press, which has its own form of elitist tropism.

Who Are the Leaders?

Consequently, when the press is looking for SFTP "leaders," they tend to seek out people like Jon Beckwith, professor of microbiology at the Harvard Medical School, Jonathan King, associate professor of biology at the Massachusetts Institute of Technology, and Richard C. Lewontin, a professor at Harvard who, a few years ago, resigned his membership in the National Academy of Sciences because of the Academy's political stance. It is difficult for the outsider to identify those who really give SFTP its direction and momentum but it seems that fairly typical of people in that category are Herb Fox, 46, a still-active member of the SFTP old guard, and a physicist recently laid off by the Cambridge consulting firm of Bolt Beranek & Newman; Mike Team, an organizer for the National Education Association's higher education section; and Sue Tafler, a biochemistry graduate who has worked as a high school teacher and for a textbook publisher and is currently on a short-term teaching assignment at a Massachusetts state college.

According to King and others the composition of the current group of active members is roughly one-third university and college faculty and students; one-third science teachers in high schools and junior high schools, technicians, and computer programers; and one-third those who work as secretaries and draftsmen and in other nonprofessional jobs in scientific institutions of various kinds. The number of scientists and engineers from industry active in the Boston group is small. This has always been true in SFTP but has been accentuated by hard times on Route 128.

Members work in groups devoted to specific issues or functions. Three groups are responsible for putting out the magazine—one dealing with the editorial side, another with production, and a third with distribution. Others include a science teaching group, a genetics and social policy group, a food and nutrition group, an occupational health and safety group, and a busing and racism group.

The groups tend to have different styles but proceed on the understanding that each will stay in general political agreement with the larger organization. Most contribute articles to the magazine and will periodically give a presentation of their work to the larger group. The genetics group, as might be anticipated, has been active on the XYY chromosome issue, and on problems of genetic screening, gene manipulation, and IQ testing. The science teaching group started in the early days of SFTP by going to national and state science teaching association meetings and raising science and public policy issues. It has done critical evaluations of the content of standard textbooks, prepared material for minicourses, and holds local workshops for teachers in subjects such as nutrition, the energy crisis, and genetic engineering.

The busing and racism group is obviously dealing with an issue which transcends scientific boundaries and is explosively controversial in Boston these days. Shaping SFTP policy on the issue caused much soul-searching and protracted debate. Not only were many of the blue-collar workers whom SFTP regards as its natural allies and potential recruits bitterly opposed to busing to achieve racial balance in the schools, but some members of SFTP felt strongly that busing would deflect the drive for local control of schools. In facing up to the issue, the group decided that a radical political organization could not condone what could be interpreted as a segregationist stand, and the organization adopted a probusing position. This has not made things easy for the busing group but, as one member said, "If you've had political experience, it's possible to handle disputes."

Ideologically, SFTP can be fairly described, as it is by some of its members, as "loose." There is virtually universal agreement about the "class nature" of science which, for example, is thought to explain the difficulties women and members of racial minorities face in science. SFTP has not done particularly well recruiting women (there are a fair number of women in the science teaching group) and minority members. The stock explanation of this is that SFTP simply reflects the situation in science, which in turn reflects the class dynamics of the larger society. Most members subscribe to a radical analysis of the power structure in the United States which has a decidedly Marxist cast. But the group lacks the doctrinaire aura of some radical organizations. In contrast, for example, the U.S. Labor Party (*Science*, 28 November 1975), which was also repre-

sented at this year's meeting, has a comprehensive program which includes a dedication to the cause of fusion power development and a highly disciplined attitude toward its leadership.

Both insiders and observers agree that SFTP is a product of the New Left, the generation of political activists radicalized by the civil rights movement and resistance to the Vietnam war. By common assent, the New Left was regarded essentially as a movement of intellectuals and students. In class terms it was regarded as "petit bourgeois" rather than a working class movement.

Some of the academics in SFTP see this as a serious defect in the group and in themselves and have tried to remedy it. For some, it has meant involvement in community action projects and for others, union organizing or health and safety activities among nonprofessionals in their laboratory "workplace." Despite the sense of solidarity they develop, the scientists admit that it is difficult to learn to "work collectively." Their training and the atmosphere in most laboratories militates against it, but overcoming elitism in science remains an item high on the SFTP priority list.

China holds a fascination for many SFTP members. There is a China study group, some of whom visited China and produced a generally admiring book *China: Science Walks on Two Legs*, published by Avon. SFTP members see China as a society where science is organized to serve the needs of people directly and where, at the same time, the masses are educated in the principles of science.

What price does a radical scientist pay for his political activism these days? Everyone agrees that it is easier for a faculty member with tenure and a reputation as a productive scientist to be active in left-wing politics. The scientist in industry, as one nonacademic put it, "is not like a liberal professor who can go out and say outrageous things and hang on to his job." The economic squeeze has hit industry scientists hard in the Boston area, and politically active scientists who have refused to do work connected with military contracts or who lack security clearances are particularly vulnerable.

As for academic scientists, universities are not happy when, for example, they feel that radical faculty members have become intramural labor agitators. The major factor, however, is probably peer pressure. Scientists, particularly when they are graduate students or post docs, are expected to spend full time—and that may mean 80 hours a week—on science. Time spent on political activity may well be interpreted as a sign that the individual is not serious about science. And there goes the fellowship or the chance for tenure.

A lot of scientists radicalized by the events and the atmosphere of the 1960's have simmered down politically because of careers or families or mortgages or simply because the war is over. And what about recruits to SFTP and other radical organizations from among young people now coming up through the high schools and colleges who lack experience of the political traumas of the 1960's? Most members of the SFTP who were asked the question admitted they were not sure of the answer, though several said they felt that university students now were politically more sophisticated than their predecessors and suggested that they may be more successful in changing the system from within.

SFTP has certainly not become a mass movement, but it has exceeded the half-life of many of the radical political organizations born in the 1960's and appears to have made the transition into the world of the 1970's and beyond.—JOHN WALSH

Foreign Intelligence Advisory Board: A Lesson in Citizen Oversight?

The President's Foreign Intelligence Advisory Board (PFIAB) has been emerging from its characteristic secrecy lately, in the course of recent examinations of the U.S. intelligence community. Created 20 years ago in a climate of criticism of national intelligence much like today's, the PFIAB (which has turned out to be best known for its advice on science and technology) offers one example of the strengths and limits of citizen "oversight" of intelligence.

The PFIAB's past experience is worth examining because, in his reform proposals of 17 February, President Ford drew on the PFIAB model. He proposed the creation of a new three-member Intelligence Oversight Board, made up of private citizens, with specific authority to investigate the intelligence community and report abuses. Two of the three candidates Ford has proposed for the new board have been PFIAB members.

What is the PFIAB? It is a small, blue-ribbon group of prominent citizens, military experts, and scientists created by President Eisenhower in 1956 at the time of breaking scandals about improper Central Intelligence Agency (CIA) involvement in Iran and Guatemala. Its members serve at the pleasure of the President (although successive Presidents have tended to reappoint the same people over the years*). They are private citizens who, in their daily occupations, are not primarily involved with intelligence activities. The group meets for 2 days in Washington every other month. It never publicizes its findings; members rarely talk to the press. In short, it has an apparently cherished 20-year tradition of secrecy.

The Ford proposals would keep PFIAB in existence, but some of the board's critics in Congress may object to a continuation. They cite its track record over the years, which, as far as is known, has not included the uncovering of major bureaucratic abuses. To the contrary, the critics say, the board is known for its advocacy of intelligence in general, and of certain technical systems of data collection in particular. One vehement critic, Senator Mike Mansfield (D–Mont.), says that the board's value as an "impartial reviewing agency" has been so dubious that "it would be easier, cheaper, and more logical to abolish it."

Critics and proponents agree, however, that the board's chief contribution over the

**Members appointed by Eisenhower:* James R. Killian, Jr. (chairman), Gen. John E. Hull (chairman), William O. Baker, Adm. Richard L. Conolly, Gov. Colgate W. Darden, Jr., Lt. Gen. James H. Doolittle, Benjamin F. Fairless, Joseph P. Kennedy, Robert A. Lovett, Edward L. Ryerson. *Members appointed by Kennedy:* James R. Killian, Jr. (chairman), Clark Clifford (chairman), William O. Baker, Lt. Gen. James H. Doolittle, Gordon Gray, Edwin H. Land, William L. Langer, Robert D. Murphy, Frank Pace, Jr., Gen. Maxwell D. Taylor. *Members appointed by Johnson:* Clark Clifford (chairman), William O. Baker, Gordon Gray, Edwin H. Land, William L. Langer, Robert D. Murphy, Frank Pace, Jr., Adm. John H. Sides, Gen. Maxwell D. Taylor. *Members appointed by Nixon:* Gen. Maxwell D. Taylor (chairman), Adm. George W. Anderson, Jr. (chairman), William O. Baker, Leo Cherne, Gov. John B. Connally, John S. Foster, Jr., Robert W. Galvin, Gordon Gray, Edwin H. Land, Franklin B. Lincoln, Jr., Amb. Clare Booth Luce, Franklin D. Murphy, Robert D. Murphy, Frank Pace, Jr., Gov. Nelson Rockefeller, George P. Shultz, Edward Teller. *Present membership:* George W. Anderson (chairman), William O. Baker, Leo Cherne, John S. Foster, Jr., Robert W. Galvin, Gordon Gray, Edwin H. Land, Clare Booth Luce, George P. Shultz, Edward Teller.