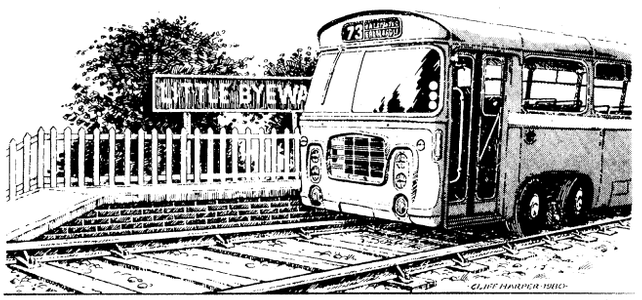
"Science Shops" Flourish in Europe

Organizations intent on focusing more university research on social problems have gained important political and financial support

Over the past few years, small organizations have been mushrooming in many European countries to provide direct links between researchers and the general public. Offshoots of the student rebellions of the 1960's and the environmental movement of the 1970's, these organizations have recently picked up powerful political, and sometimes financial, support from federal and local governments. They have become an established, if sometimes awkward, feature of European science.

In Holland, the organizations are called wetenschapswinkels; in France more evocatively—if slightly misleadingly—boutiques de sciences; in England, reflecting a slight difference in both form and emphasis, they range from alternative research centers to "technology networks." Generically, however, they have all come to be loosely known as "science shops." Their goal is to provide a means for members of the public to seek answers to scientific and technical questions arising from their daily lives, and for scientists and engineers to apply their knowledge, training, and skills to topics of social concern.



The Center for Alternative Industrial and Technological Systems, which is part of London's technology networks, is developing a suspension system to enable buses to run on both roads and rails.

Science shops started in Holland in the early 1970's. Like the science for citizens movement in the United States, they evolved out of complaints that science had become excessively elitist and out of touch with social problems. The biggest group is at the University of Amsterdam, which approved the creation of an official science shop in 1977. The university pays the salaries of its 15 staff members, provides a three-story building in Amsterdam, and contributes another $50,000 a year to its expenses; university officials recently agreed that from 1986, 15 percent of the university's research budget will be devoted to science shop-type activities.

In its first 6 years, the Amsterdam science shop received over 1600 questions from more than 800 different groups and individuals. About half the questions were related to problems of environment, health, housing, and factory working conditions, and chemistry was the discipline most often called upon. More than 20 percent of the questions could not be answered without initiating research projects.

The experience seems to have impressed government officials, who had initially opposed university funds being spent on this type of project. A recent policy statement from the Dutch government recommended that every university in Holland have such an institution—and, indeed, all now do in some form. The statement made clear, however, that science shops should be funded from university budgets, not directly from government funds.

In France, the boutiques de sciences have a shorter history, dating from the election victory of President François Mitterrand and his socialist government. The key political event was a series of regional planning meetings culminating in a national colloquium on science and technology, held at the beginning of 1982. The planning meetings brought together groups such as labor unions and environmentalists, which had previously been excluded from official discussion of science policy, and they endorsed the concept of science shops. At the colloquium itself, Mitterrand and his then research minister, Jean-Pierre Chevenement, voiced support for a wide range of initiatives aimed at integrating science and technology more closely into society—including the creation of boutiques de sciences.

Building on this grass-roots support and presidential backing, seven science shops have now been established at Grenoble, Lille, Lyons, Paris, Marseilles, Seine St.-Denis, and Strasbourg. A variety of government agencies are providing about $125,000 for their operations.

In contrast to the Dutch science shops, which are closely integrated with the universities, the boutiques de sciences tend to be more precariously balanced on the margins of the academic community. They have, however, benefited greatly from the emphasis currently placed in France on the need to stimulate a broad cultural debate about modern science and its role in society. "Science shops are unique tools for making scientific culture something more than just the icing on the cake; it is a way of helping ordinary people use science as part of their daily concerns," says John Stewart, a British biologist, who helps run the boutiques de sciences at the Jussieu campus of the University of Paris, and is also chairman of the Federation Nationale des Boutiques des Sciences et Assimilés.

The British projects mostly got underway 2 years ago with the election of several left-wing city councils. They are frequently justified as a response to the social problems—particularly widescale unemployment—that are blamed on Prime Minister Margaret Thatcher's Conservative government.

The most ambitious scheme is the creation by the Greater London Council (GLC) of a number of "technology networks" based in different parts of the nation's capital. Some specialize in particular fields of technology, such as household energy requirements, others aim to meet a range of questions from a particular geographical area, but all work closely with researchers from one or more of London's polytechnics or university colleges. The GLC, which is currently providing the networks almost $6 million a year out of city taxes, says the purpose is to "make the resources of London's higher education institutions available to workers wishing to develop human-centered technologies."

One feature that differentiates the British projects from their European counterparts is their greater emphasis on the potential benefits of new technology, particularly the development of what are characterized as socially desirable forms of work and socially useful products. "We must learn to design technical systems where human beings are active participants in the production process,

not just passive objects," says Mike Cooley, previously a design engineer in the aerospace industry and an active union official, who was recently appointed director of technology for the GLC's new Greater London Enterprise Board.

The Center for Alternative Industrial and Technological Systems, which is part of the GLC's technology networks and is based at the North London Polytechnic, is perhaps the most prominent group working on the development of such technologies. The center is looking, for example, at a range of alternative suspension systems for public transport vehicles, such as a bus capable of traveling on both roads and railway tracks.

Although science shops are organized differently in the three countries, they share a common goal of opening up public access to the fruits of research. In Amsterdam, for example, requests for aid from the science shop are accepted only from groups that cannot pay for the research themselves, have no commercial ties, and are able to use the results to improve their own situation or that of the individuals they represent.

The science shops also share common origins in the student movements of the 1960's. Some of those who participated in the student movements have since moved up the administrative and/or political ladder to positions in which they can exercise leverage over public funds. Many of what the French call soixante-huitards—and one sociologist has characterized "moral entrepreneurs"-turned-"moral custodians"—see science shops as an appropriate direction in which these funds should be channelled.

But the science shops also share common problems. One of the biggest has been getting scientists to accept that answering questions posed directly from the public should be considered a legitimate part of their professional responsibilities. "At the beginning, laboratory scientists who were approached by the science shops were a bit skeptical, since the questions were mainly of a curiosity kind, such as 'what happens to animals feeding near high-tension cables?'," says Joos Joosse, professor of biology at the Free University of Amsterdam. "However, that has changed. It soon became clear that some people were asking questions that needed either a detailed literature search, or additional research into what was happening in particular situations," he says.

On the other hand, however, there have been difficulties in finding practical ways that scientists who have volunteered to help the science shops can put their skills to use. In France, for example, science shop organizers have occasionally been embarrassed by their difficulties in meeting offers of help from university research workers, emphasizing that part of the problem is that requests for help often do not fall along neat disciplinary lines.

Another problem encountered by almost all science shop experiments has been the tendency to reinforce a deference to scientific expertise and an enthusiasm for the "technological fix" to complex social problems, both of which, ironically, have been key targets of the

Europeans Back Computer Plan

Paris. Research ministers of the ten member countries of the European Economic Community (EEC) agreed last week to give the green light to an ambitious 5-year, $1.25-billion-research program in information technology designed to keep Europe competitive with Japan and the United States in advanced computer techniques.

Funding for the so-called European Strategic Program for Research and Development in Information Technology (ESPRIT) will be shared equally between the EEC Commission in Brussels and 12 private computer and electronics companies. Although the technical details of the program were decided upon in the middle of last year, political support had been held back after the failure of the heads of EEC member countries, meeting in Athens last December, to reach agreement on various broader aspects of the Community's finances (*Science*, 6 January, p. 28).

However, Étienne Davignon, head of both the energy and industry directorates at the Commission, has since been able to persuade both the West German government and, most recently, British Prime Minister Margaret Thatcher to overcome their previous reluctance to approve the research program while the other issues are still under negotiation. He argued successfully that any further delay could seriously jeopardize Europe's chances of remaining competitive in information technology in global markets.

In return for support from these two countries—the main contributors to the Commission's finances—Davignon has promised that resources for ESPRIT will be found by cutting back elsewhere in the Commission's planned research budget.

As currently proposed, the ESPRIT project will fall into five principal areas: advanced microelectronics, software technology, advanced information processing, office automation, and computer integrated manufacturing. Research will be carried out by teams of university, government and industry scientists, with the requirement that each project must involve researchers from at least two EEC countries.

After the meeting, Davignon called the endorsement of ESPRIT "the first optimistic decision of the years 1983 and 1984, which is going to impress both our American and our Japanese partners." There was equal enthusiasm from the meeting's chairman, French Minister of Industry and Research, Laurent Fabius, who claimed that the decision also endorsed the broader strategy being pushed by France for increased cooperation between European countries in all fields of research.

Fabius is now urging his fellow research ministers to adopt a similar program of joint research into biotechnology—dangling as a carrot the prospect that applications of genetic engineering to the transformation of organic materials could help solve the political problems faced by the EEC as a result of the current need to subsidize huge agricultural surpluses.

The major problem now facing the EEC Commission in Brussels, however, is where to make the cuts that it has promised in the rest of its research budget—which could amount to $100 million out of a total of about $600 million next year, and even more in 1986.

It seems unlikely that any significant reduction will be made in funding for research into fusion energy, the single largest component in the research budget. The most vulnerable target is the research program of the EEC's joint research center at Ispra in northern Italy, although any proposed cuts here will be strongly resisted by the Italian government.—**DAVID DICKSON**

political movements in which science shops have their roots.

In Holland, for example, one science shop at the Agricultural University of Wageningen decided 2 years ago to stop answering clients' questions because of fears that it was encouraging a technocratic approach to science. Similarly, London's technology network has been the focus of sharp criticism from members of the "radical science" movement, and the French boutiques have generated less support than they had hoped for from the highly politicized labor movement.

Although sensitive to the criticisms, science shop activists reply that there are times when it is appropriate to be pragmatic—even at the risk of losing some theoretical purity. Thus, the Dutch are now working on ways in which requests for help can be turned into relatively conventional research projects, and hence eligible for funding from traditional government sources. In London, one of the key questions facing the technology networks is how to work in, as well as against, the market, for example in disseminating the products of the community-based research and development workshops that are an integral part of the networks.

At the same time, efforts are being made to ensure that political principles are not submerged. The University of Amsterdam, for example, has recently shifted its emphasis from answering questions from individuals to answering problems defined by project groups formed around the needs of labor unions, environmentalists, women's groups and the Third World. The hope is that this will give a more concrete focus to the science shop and stimulate more interaction between those inside and outside the university in jointly identifying research needs.

Other science shops are, in their different ways, struggling to balance political principles with the responsibilities imposed by the use of public funds—a dilemma felt particularly acutely in London, where Prime Minister Margaret Thatcher is already threatening to abolish the GLC partly as a result of its explicit challenge to her economic policies.

In spite of these difficulties, experiences in Britain, France, and Holland have encouraged similar projects in West Germany, Belgium, Italy, and Switzerland, and inquiries are coming from as far away as Australia. In the medium term at least, science shops are likely to remain a firm fixture of European science.—**DAVID DICKSON**

States Want Stiffer EDB Rules

Environmental Protection Agency (EPA) administrator William Ruckelshaus announced last week a phaseout of the pesticide ethylene dibromide (EDB) for use on citrus fruit, characterizing it as "the last of EPA's major decisions" regarding the chemical. But the issue is not yet settled because several states are contemplating more stringent tolerance levels for grain products than those set by the federal government. The proposals have confused consumers and infuriated food manufacturers. Cargill, a major grain producer, has threatened to stop shipment to states that impose stricter standards than EPA.

Several northeastern states are proposing harsher standards for a variety of reasons. According to Stephen Havas, deputy commissioner of the Massachusetts public health department, state officials there looked at EPA's data and concluded that "there was no safe threshold for cancer. We decided we had to get as close to a zero level as possible." So far Massachusetts is the only state that formally issued a regulation setting a tolerance level lower than EPA's 30 parts per billion (ppb) limit for ready-to-eat food. According to the state standard, EDB concentrations currently cannot exceed 10 ppb and, after 7 March, the limit drops to 1 ppb.

New York wants to impose a 10 ppb level as well but for different reasons. While EPA based its decision on a review of cancer risk, New York health officials are proposing a lower standard because of concern about reproductive hazards. Unlike EPA, they incorporated several additional factors into their analysis, including exposure to EDB in ambient air (EDB is used as an antiknock agent in leaded gasoline), and higher estimates of grain consumption than EPA's analysis.

Nancy Kim, director of the bureau of toxic substance assessment, says that New York's proposed 10 ppb limit stems from concern raised by two animal studies, which were not part of EPA's risk assessment. These studies, along with other reproductive studies reviewed by EPA, suggested to Kim that EDB in small amounts can cause reproductive and behavioral damage. A University of Texas study currently in press indicates that EDB is genotoxic at low levels in rats. Male rats were exposed to EDB concentrations as low as 1 milligram per kilogram per day for five days and then bred with unexposed females. The offspring demonstrated "significant" behavioral changes, according to Kim.

Kim and colleagues also contend that EPA underestimated the amount of grain eaten by adults and children. According to figures provided by General Foods Corporation and the U.S. Department of Agriculture, New York authorities calculated that adults and children eat double the amount of grain that EPA used in its own risk estimate. EPA derived its estimates from Department of Agriculture figures, but for some reason, came up with different amounts.

Kim and colleagues also believe, based on a Stanford University study, that ambient air in major cities is contaminated with a significant amount of EDB. EPA officials have said that EDB in air does not pose a health risk.

Taking into account all this additional data, Kim then determined the concentration at which no behavioral effects were seen in the rat study, calculated the margin of safety at various no-effect levels, and then settled on a margin of 1000 as safe. This margin of safety for a 2-year-old child corresponded to a 10 ppb level. At 10 ppb, the cancer risk for adults, according to Kim's calculations, would also be somewhat less than EPA's estimate.

New York plans to propose a regulation to limit EDB to 10 ppb in ready-to-eat foods, but the rule-making process may take one to two months. In the interim, the state is following EPA's tolerance standards.

In a separate action, Ruckelshaus also disclosed last week that he would push for the phaseout of leaded gasoline, which would incidentally cut down EDB exposure from air. Ruckelshaus' proposal stems from concern about lead pollution. People are substituting leaded gasoline for unleaded fuel out of the mistaken belief that it will increase their car's performance.

—**MARJORIE SUN**