British Science Policy: A Crisis of Confidence

London. Science policy is more often the by-product of political and economic circumstances than the coefficient of rational decisions, but a discussion is now in progress in Britain which could directly, even drastically, alter the organization of British science.

Although the debate is being conducted less privately and politely than is customary in Britain, everyone involved has stuck to the reticent rules of the game, so that for the foreign observer it is like watching a fight under a collapsed tent: it is hard to see who's involved and who's winning, but there's no mistaking the nature of the activity.

The central issue is the effectiveness of government-sponsored civil research in Britain, and what may impend are changes in the way research is commissioned and carried out in universities and government laboratories.

An immediate question is whether the Conservative government will make public two reports on which, presumably, government decisions and ultimate action will be based. Special interest has been directed at the report of a blue-ribbon committee, chaired by F. S. Dainton, charged with looking into the state of civil research in general, but assumed to be primarily concerned with the question of research in the universities. Dainton is a physical chemist, a Fellow of the Royal Society, a former vice-chancellor of Nottingham University, and now a professor at Oxford and a familiar and substantial figure in British science politics. The Dainton committee submitted its report last spring, and the scientific community watched with interest and growing apprehension when the report disappeared into the Cabinet Office—roughly the equivalent of the Executive Office of the President in the United States—and no word subsequently was heard on whether it would be made public.

The second report is to be the product of a study headed by Lord Rothschild, chief of the Cabinet Office's central policy review staff, a new entity that is referred to as a "think tank" for Prime Minister Edward Heath. Lord Rothschild is expected to produce a White Paper embodying broad recommendations on government research policy and providing a basis for action. The Heath government has indicated it will make public the Rothschild document. Rothschild is himself an F.R.S., with a career split between Cambridge's department of zoology and industry research administration at a lofty level for the Shell companies. So what is thought to be brewing is a battle of reports originating in two sectors of the Establishment.

Anxiety about government intentions toward research surfaced at the end of the summer. The chairmen of two of the influential research councils through which the government finances the bulk of research took the unusual step of raising the issue in their annual reports and urging that the Dainton report be made public. Then *The Times* of London endowed the matter with full status as a public issue by devoting two editorials to the matter—one of them the ultimate accolade of a first leader, titled "Heavy Clouds Over Research"—and warning of a crisis of confidence in science.

Scientific Community Restless

Even before the Dainton report disappeared, however, the scientific community was restless because the new Conservative government was on record as believing there had been excessive government funding of research and that industry should pay a greater share of the research bill. And, like the Nixon Administration, the Conservatives had gone into office trumpeting their intention to provide better management of government programs and greater efficiency in the making and implementation of policy.

In the civil science sector, speculation centered on the future of the research councils. The councils were formed to handle specialized areas of research, as in the case of the Agricultural Research Council, the Medical Research Council, and the more recently established Natural Environment Research Council. The council with the biggest budget—about $125 million—the Science Research Council (SRC), performs functions roughly similar to those of the National Science Foundation in the United States. If anything, academic scientists dominate the research apparatus in Britain more than they do in the United States. In the late 1960's, reservations about the system operated by the research councils began to gain currency. One emergent view, associated with the former chief science adviser to the government, now Lord Zuckerman, was that some of the research councils should be dissolved and control over research funds exercised directly by those ministries requiring particular kinds of research.

In an even broader context, the present discussion is influenced by the widely noted disenchantment with science. In Britain, as elsewhere, science seems to be blamed for better weapons and worse pollution, and, with whatever justification, for a streak of social irresponsibility. But there seems also in Britain to be a feeling that promised payoffs from science have never really materialized.

It is understandable, therefore, that the organization of British science and the assumptions underlying that organization are being questioned. Since World War II, it has been assumed that scientific research is in itself a good thing and that decisions on how to spend research funds are best left to the scientists themselves. The result has been the placing of a premium on basic research and a flow of top talent into research careers in an expanding university system. Academic scientists encouraged their brightest students to follow research careers, and the prestige of engineering and applied science, never very high in Britain, has, if anything, sagged.

The implication has been that investment in science would yield dividends in high technology industry and ultimately contribute substantially to the gross national product. Although the blame cannot be placed exclusively on the university scientists and their patrons in Whitehall, the mystique of science is badly frayed. In the realm of high technology, the decline and near fall of Rolls Royce badly tarnished a cherished British image. And in heavy

engineering, where the British enjoyed a traditional eminence, the deep troubles of Clydeside shipyards have had a parallel effect.

Ironically, even where research or brillant strokes of invention seemed to give the British an early technological lead—as with the commercial jet and the vertical takeoff aircraft, the hovercraft, the linear induction motor, and carbon fiber—actual experience in the marketplace has somehow been disappointing. Most notably, the massive national investment in nuclear power technology has so far failed to pay off, a conclusion ruefully documented in a report from the comptroller of the Atomic Energy Authority (AEA) in an appendix to the recently published annual report that compares total development costs and returns.

Disillusionment with Science

Disillusionment with science among the young is reflected in their choices of university courses. The British university system is still a highly selective one and further from an open admissions policy than are universities in any other major European country. Into the British system has been built a bias in favor of science which extends to faculty, facilities, and places for students. As the new university year began, unofficial but apparently reliable figures showed that there were 3571 places in the sciences and only 2700 qualified candidates to fill them. In engineering there were 1240 candidates and 1968 places available. In the arts and social sciences, on the other hand, about 10,000 candidates were vying for 2200 places, with the heaviest crush occurring in the social science faculties.

Excess capacity in science and rising unemployment among science graduates is causing the same sort of examination of science manpower policy, past and present, that is going on in the United States.

The debate over science policy has not, in fact, suddenly blown up. In the mid-1960's, concern about costs and productivity in the relatively large government research establishments had, for example, propelled the AEA toward pushing a policy of diversification in research at its major civil research establishment at Harwell and encouraging AEA scientists to secure research support from industry or other ministries.

It is hardly a surprise, therefore, that the government is reexamining the assumptions on which science policy is based and looking hard at the options available. It is generally expected that, by and large, the Dainton report expresses the research council view of arrangements in science. In the SRC annual report, council chairman Sir Brian Flowers wrote, "It has always been the view of the SRC that an autonomous Research Council entrusted with real powers and responsibilities is well able to judge the intrinsic merit of educational and research proposals, and to relate these to work in other disciplines and the main needs of industry and Government. It is uniquely placed to attract to voluntary public service people with the experience and qualifications to advise how public funds can best be used." Flowers and his opposite number at the Natural Environment Research Council, V. C. Wynne-Edwards, who took a similar tack in his annual report, are obviously not prepared to preside over the liquidation of the system they help to operate.

Kennedy and McElroy Differ

Senator Edward M. Kennedy (D–Mass.) has encountered stolid resistance from the National Science Foundation to his efforts to cast NSF in the central role in the elaborate and expensive scientific conversion program he has designed. Kennedy not only wants NSF to administer the bulk of the program, which would involve an expenditure of $1.7 billion over 3 years; he also thinks the foundation should consider becoming the main focus within government of a strong, centralized civilian effort at redirecting science and technology to social problems. Director of the NSF William D. McElroy, at hearings last week on the Kennedy bills, made it clear that he regarded the program as marginally relevant, and that in any case NSF was not the man for the job.

Kennedy's plan comes in three parts: the first provides temporary relief for unemployed scientists and engineers through low-interest loans; the second authorizes $500 million over 3 years to supply technical, educational, and financial help to companies, communities, and individuals engaged in converting to civilian work. Crowning these is the $1 billion New Cities Research and Experimentation Act, referred to by some as Kennedy's "urban NASA," which would set up an administration (hopefully within NSF) to mobilize the nation's scientific resources for the design and development of livable urban environments.

McElroy, who pointed out that the Administration is already busy implementing schemes to tide over jobless professionals, insisted that NSF was already doing its social thing through its new RANN (Research Applied to National Needs) program. He held to the view that the way to help the unemployed in the long run was through the creation of jobs, not through retraining or loan programs. To improve the long-term situation, he said, what is needed is a bigger investment in basic research and development.

McElroy also explained that, in order to prevent a recurrence of the present situation, people and institutions must learn flexibility and adaptability so they can readily reorient their work as new technologies and national goals roll around. "We have no choice but to 'teach old dogs new tricks,' " he concluded. Suggested Kennedy: "Maybe we should see if we can get NSF to be an old dog that learns a new trick too." But McElroy seemed to think this was too indiscriminate an application of the metaphor. ". . . [T]he sheer magnitude of this total problem is such that . . . NSF's contribution would be limited by the modest resources available to NSF and the nature of our experience, which has been primarily with academic institutions," he testified. If Kennedy's mammoth project gets off the ground, it may well trigger a difficult reevaluation of the role of NSF. McElroy, at any rate, will not have to worry about it. He has announced plans to quit at the end of next January and become chancellor of the University of California at San Diego.

—CONSTANCE HOLDEN

It is assumed that the Rothschild report, considering the source in the Cabinet Office, will express views acceptable to the Cabinet. Recommendations that some of the research councils be modified seem possible. And there is speculation that the Rothschild report may suggest that the structure of government science be changed so that at least some research will be handled in a way that conforms more closely to that employed in large corporations with successful research programs (such as Shell and British Petroleum). This would mean the adoption of a form of contractor-customer relationship, with a greater separation of roles between those who decide which research should be done and those who perform the research.

The scientific enterprise in Britain differs from its American counterpart in that it is designed to answer the helm more smartly. Pluralism in America extends to the financing of research through a variety of government agencies at the federal, state, and even the local levels, as well as by private foundations and industry and by discretionary funds controlled by universities both public and private. The British have a system of national universities, with the bulk of funds for science being provided by Parliament. The University Grants Committee distributes funds for capital and operating budgets and thereby controls not only the size of faculties and the number of places for students, but the emphasis on particular disciplines. The research councils, at least until now, have exercised control over funds for research and graduate education. The British, therefore, have a centralized system that should be relatively responsive to changes in policy.

When this was written, speculation in Britain centered on the question of if and when the two key reports, and particularly the Dainton report, would be made public. Although experience teaches skepticism toward the potency of reports, even by blue-ribbon panels, some responsible people in Britain believe that a damaging overcorrection in science policy is possible. While the influence of the scientists and the inertia in the system should not be underestimated, it is evident that the era of the blank check for science is at an end.

There are obviously some important similarities between those issues being raised in Britain and in the United States. The recent appointment of William M. Magruder (*Science*, 22 October) as a special consultant to the President on ways to promote technological payoffs is a sign of the times in Washington. So it is fair to say that the contest in Britain is of special interest in the United States.—JOHN WALSH

Lead Poisoning: Combating the Threat from the Air

New York. There will likely be lead in the air here and in other cities for many years to come. On 5 November, New York City's Environmental Protection Agency will hear an appeal from Mobil Oil Company to hold back on the city's requirement for a phaseout of all lead antiknock compounds in gasoline sold in the city. Passed last August by the city council, New York's antilead ordinance requires a stepwise reduction to 2 grams of lead per gallon of premium gasoline and 1.5 per gallon of regular this month, and to no lead in any gasoline by 1 January 1974.

The New York law is, to date, the only antilead regulation in the country, and the fight that will surround New York's efforts to implement it is likely to be reflected in similar efforts to eliminate lead from gasoline in other locations and on a nationwide basis.

Mobil objects to the law, according to a spokesman for the company, both because the timing requires unreasonable expenditures for the company, and because the federal Environmental Protection Agency (EPA) will soon pass regulations superseding the New York City law. If the city denies Mobil's request for a variance from the regulations, the company is likely to appeal through the courts.

Irwin Auerbach of EPA's air pollution control office told *Science* that EPA will publish some sort of lead-control regulations by the middle of December, with 30 or more additional days allowed for comments. The regulations, he said, are not yet agreed upon. They could be based on one law or on a combination of laws focusing on auto emissions or on lead's threat to health and safety, or both. At the very least, the federal lead-control rules will require that lead-free or low-lead gasoline be available for 1975 model cars, which will be fitted with lead-sensitive catalytic mufflers to control polluting emissions. Depending on their nature, the federal rules could supersede any state or local laws, but this will not necessarily be the case.

Over 180,000 tons of lead annually spew into the air in the United States from the tail pipes of automobiles, trucks, and buses. Lead poisoning, originally an occupational disease, has also become a disease of urban slum children, who eat the paint crumbling off the walls of dilapidated housing. In recent years, moreover, concern has mounted over the possible effects on health of the poisonous metal in the atmosphere—particularly in urban areas where lead is often found in the air, dust, and soil in levels that many experts believe to be unsafe.

While the scientific data implicating airborne lead in the concentrations found in our cities as a threat to health are as yet incomplete, few would argue that the lead residues in our environment serve anything but deterimental functions. A position paper from EPA's Bureau of Air Pollution Sciences declared that lead in the air does indeed pose a hazard, particularly to children exposed to lead from other sources. "The magnitude of the problem," the report said, "hardly justifies a 'wait and see' attitude, for acute poisoning is associated with a high percentage of irreversible central nervous damage in children, and repeated exposure to high environmental levels of lead greatly increases the risk of irreversible damage."

Similarly, a report prepared for EPA by a committee of the National Research Council found that "the level of lead in ambient air poses a significant threat" in infants and small children. The same report noted that "the