

Science and the StateOttawa U.
31.1.76

The last 10 years have seen a large number of reports on science policy in Canada (more than in any other country, it seems). Science means different things to different people. Some people think only of technology when they talk about science, others of applied science, and still others (and that includes myself) of basic science.

The cost of basic research has increased steadily over the last 50 years mainly on account of inflation but also because of the increasing sophistication, and therefore increased cost, of instrumentation. Nevertheless the cost of basic research is much smaller than the cost of applied research, and even that is very much less than the cost of technological developments.

2

100 or even 50 years ago there were private foundations and individuals who could support basic research in much the same way as they supported art, music, literature. For example, at places like Harvard University, Johns Hopkins University, or even McGill University, the research that people like Lyman, Rowland and Rutherford did was supported by the University which in turn was supported by private foundations or individuals. Now, in our democratic society, all these private funds have been eroded either by inflation or by taxation and almost the only remaining source for substantial support of research rests in the government, that is, the taxpayer. Of course the government has to account in detail for its spending to the taxpayer and this gives rise to the call for a coherent science policy because it is thought that the haphazard way in which research was

done in the earlier part of this century could surely be improved by developing a more coherent and coordinated effort and therefore saving the taxpayer some money.

To my mind, with regard to basic research there is only one interpretation of science policy that is apt to produce better research (and at less cost) and that is the interpretation given many years ago by the British Council for Scientific Policy. They said "The tasks of science policy are to maintain or improve the environment necessary for scientific discovery, to ensure the provision of a sufficient share of the total national resources ...".

In this way of considering science policy our Canadian science politicians have sadly failed. We had

at the National Research Council under C.J. Mackenzie and E.W.R. Steacie ideal conditions for doing basic and applied research. Instead of trying to spread this system to other government research organizations what did our politicians and bureaucrats do? They invented PPB, DSS, collective bargaining and other time-consuming mechanisms. When I became Director of the Physics Division of NRC back in 1949 I spent less than one day on the year's budget. Now we have program planning and budgeting. Every research project is to be listed, planned, etc. The bureaucrats think that a system that works well in getting a building built will also work in a creative activity such as research. In this connection I should like to call your attention to a statement by Professor Casimir, a world-famous physicist and for many years Director of the research laboratory of the Philips Company in Holland (that is, an applied physics laboratory). He said:

"In an industrial research laboratory it is impossible to relate research projects budgetwise to industrial and commercial projects. Any attempt at honestly operating a laboratory on a budget system leads invariably to cheating. But, you will ask, why does the cheating come in? It does because the total budget of a research laboratory is determined fairly accurately by the number of scientific workers: if in a given field of research and a given country you want to have a laboratory where a number of research workers can work efficiently and are adequately provided with technical assistance, workshops and so on, then the cost per research worker will always come out the same. The art of running a laboratory on a budget system consists therefore in splitting a sum total that is known beforehand into a number of separate items in such a way that those in charge of appropriations will fall for it. We get every year a lump sum for our total research laboratories calculated in such a way that it provides reasonable working conditions for the number of people we employ and leaves room for slow expansion. ... Of course we have to keep an eye on expenses, but no reference is ever made to a budget for a specific project."

There is no way in which research, pure or applied, can be improved by PPB. Therefore the taxpayer is not getting more for his or her money. On the contrary, by wasting the time of all research workers with preparing proposals the taxpayer is given much less for his money than before PPB. (I remember several years ago when PPB had just been introduced talking to a Canadian Ambassador who agreed with me about the complete futility and waste involved in PPB even in a department like the Department of External Affairs.)

Or take the Department of Supply and Services. (644) To the bureaucrat it seems obvious that by centralizing all purchasing by the government money will be saved. Everyone who has actually dealt with the problem knows that this is not so. It appears to

be saved if you don't count the time of the research workers or other senior officials involved in the process. At the National Research Council we had an extremely good Purchasing Branch who could get delivery to a research worker within a day or so. We were promised that DSS could do the same thing and of course they can not. The efficiency at NRC has dropped I believe by a factor two by this single move of introducing DSS in place of our own purchasing service. I won't say anything about collective bargaining because it might get me into deep waters, but the fact is that at NRC where our budget has remained almost constant in nominal dollars the number of active research workers has gone down while the number of administrators has gone up; it had to go up in order to look after all the new regulations connected with collective bargaining, grievance boards, etc. etc.

In the preoccupation with reorganization and coordination our politicians and bureaucrats seem to have quite forgotten about quality. Top research people are not liable to stay in surroundings in which they are completely circumscribed with regard to what they are doing. Indeed only the top research man can really judge what at a given time is feasible in research, pure or applied. Only he will have a bright idea about what he might do or some of his collaborators could do.

Much has been written in the newspapers in recent months about the Ministry of State for Science and Technology and its possible demise. It seems to me that if the Ministry is concerned solely with organizational problems and coordination, with an audit of research in the country and things of that sort, they will not be very useful. They would be very

useful if they would recognize and publicize, with other Ministries, the importance of finding top-rate people for research in government laboratories and also provide them with the surroundings and the atmosphere that is necessary to do good work. That of course includes a reasonable budget but, even more important, it includes the freedom of the research worker to pursue the significant problems and the freedom from red tape, forms to fill out, etc. etc., in the operation of the laboratory. I can only appeal to Dr. LeClair to consider this problem as one of the highest priority.

It is fortunate that Canadian governments in the past have seen their way to supporting, by means of the Canada Council, creative works in art, music and literature and, by means of the Research Council, work

in basic science at universities and in government laboratories. It is unfortunate that in the recent drive for restraint, which is a very laudable aim, the relatively minor contributions to our cultural development are the first ones to be frozen, and that means to be cut, due to inflation, because the government will not be faced with a strike as a consequence. We should, however, not forget that it is just those expenditures on art, music, literature and basic science that lead to advances which make survival worthwhile. Surely in the long run the mere increase in the standard of living is far less important as a national goal than the increase in the standard of our culture. The funds for this should be the last to be frozen or even to be cut.