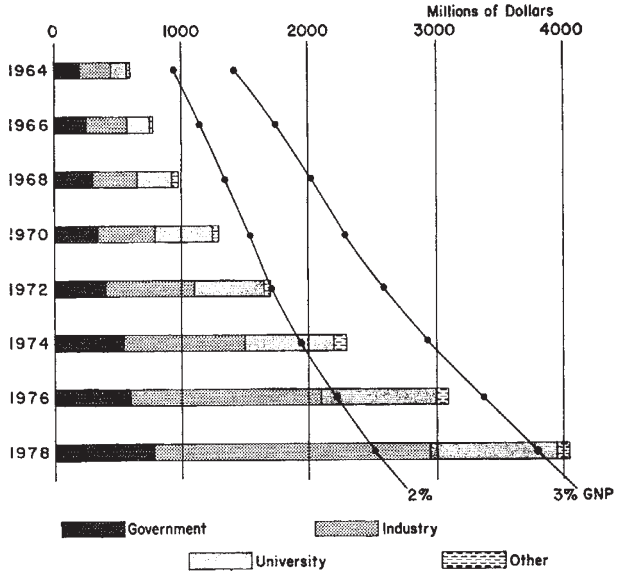
SCIENCE POLICY

Gloom in Canada

THE Canadians seem to be developing an enviably workmanlike way of running their scientific resources, and the Science Council of Canada, which takes a major part in this exercise, has just produced its third annual report. Set up in May 1966, the role of the science council is to assess Canadian "scientific and technological resources, requirements and potentialities", and to make recommendations. Unhappily, this year's report records that expenditure on research and development in Canada is not growing at anything like the rate the science council would like. Recently, gross expenditure on research and development in Canada has been running at 1·3 to 1·4 per cent of the GNP, but the science council and others would like to see the figure rise to 2 per cent. Although hampered by the familiar bogy of inadequate statistical data, the council concludes that during the financial year 1968–69 the percentage rose to only 1·47 per cent, and gloomily remarks that the target of 2 per cent seems as far away as it did five years ago.



Expected trends of Canadian expenditure on research and development over the next ten years.

What the science council would like to see is less emphasis on basic research and more emphasis on research and development to be carried out by industry where the council obviously feels it will have more use than applied research in the universities or by government. Failure of federal government incentives is made the scapegoat for the depressing level of industrial research and development, and the council says that unless things begin to look up this year, direct federal support for industrial research and development will have been static for five years. The suggestion in the annual report is that Canadian industry should undertake a series of major projects in areas such as transportation, urban development and information systems, in the hope that these projects will be an ersatz for the military and space programmes boosting scientific and industrial growth in the United States.

This year's report also contains the first publication of a report on "scientific research and development expenditures and priorities", submitted by the council to the Prime Minister, Mr Pierre Trudeau, at the beginning of the year. The council recommends a target date of 1973 for the achievement of a research and development expenditure running at 2 per cent of the GNP. The programme outlined is for industrial research and development to increase by 20 per cent each year, university research and development to increase by 22 per cent per year until 1970, and then to drop slightly, and research and development by the federal government to increase by a steady 11 per cent each year. As well as the major projects for boosting research and development, the report to Mr Trudeau mentions development of the north; oceanography; and weather prediction, modification and control. There are also more nebulous headings as, for example, energy, urban development and human environment and integrated resource management. The hope is that the science council will soon be able to put forward plans for four major programmes. Expenditure is expected to be several millions of dollars per programme per year during the research and development phase, reaching hundreds of millions per year when any engineering work starts.

REGIONAL RESEARCH

Spreading Out the Dollars

THE United States Academy of Sciences seems to be confirmed in its willingness to comment on all kinds of public issues, and has now given its opinion on the ways in which funds for research and development can contribute to economically backward parts of the United States. The committee under Dr Daniel Alpert which has compiled the study called "The Impact of Science and Technology on Regional Economic Development" (National Academy Publication 1731) owes much of its origin to congressional concern in the early sixties about the equitable distribution of funds for research and development among the (now) fifty states. Unfortunately the committee has also, by the cloudiness of much of what it has to say about the precise meaning of national goals and other generalized concepts of the same kind, produced a report which is particularly hard to fathom. Certainly it will take an ingenious congressman to make political capital out of it, one way or the other.

The committee accepts the argument that research and development expenditure has in the past been badly distributed—the states of California, Massachusetts and New York, with 22 per cent of the American population, carried out 46 per cent of federally supported research and development in 1946. The committee argues, however, that it is not possible to change the economic foundations of a region by importing an institution for research and development into a backward area. In the long run, the link between research and development and other social activities, especially regional education, could be as important as the contribution which it could make directly towards the development of natural resources and the growth of the economy. The diversity of the effects which science and technology may have in a locality

seems to be one explanation of the tortuous nature of the committee's report.

With these reservations, the committee does seem to ask that there should be a more deliberate federal policy for the use of research and development expenditure as an instrument of regional development. The committee in particular suggests that the Government should establish a number of "Exploratory Centres for Regional Development" to explore the possibilities of the direct application of technical innovation. For the rest, there should be a deliberate policy of helping less fortunate universities to grow, especially at the graduate level.

UNIVERSITIES

Towards a Swann PhD

ALMOST a year ago the universities were criticized in the Swann Report for their almost complete lack of imagination in the development of higher degrees with some bearing on the requirements of potential employers. The Swann Committee urged the universities "to start experimenting boldly with the PhD" (*The Flow into Employment of Scientists, Engineers and Technologists 1968*, HMSO, 17*s* 6*d*). The Science Research Council took up the gauntlet and earmarked a small number of postgraduate awards for the Interdisciplinary Higher Degrees Scheme drawn up by a joint committee of the Science and Social Science Research Councils under the chairmanship of Professor H. Kay of the University of Sheffield (*Nature*, **222**, 421; 1969).

The scheme, to its credit, has demanded a much more thorough rethinking of traditional university ideas than the now well established SRC Cooperative Awards in Pure Science (CAPS) which require close liaison between university and industry but are not interdisciplinary. In contrast to CAPS students, holders of the so-called Swann awards are required not only to spend part of their time in industry but also to be involved in, for example, an economic or sociological aspect of the technical problem they are working on. At the University of Aston in Birmingham, where Professor I. F. Gibson and his colleagues are supervising several PhD projects of this type, postgraduate students are doing such work as a manpower planning project for an engineering company and a study of a possible investment in a transportation system for a group of Caribbean islands. The employment prospects for these new style PhDs seem bright; companies apparently look forward to recruiting from scientists who appreciate the overall problems that industry faces. For its part, Aston is hoping to increase the number of interdisciplinary projects to about ten next academic year and to include a team research project of the sort often encountered in industry.

The department of liberal studies in science at Manchester, which, under Professor F. R. Jevons, is rapidly making a name for itself, has also taken advantage of the interdisciplinary awards scheme and has research students working on the international collaboration aspects of the Dragon high temperature nuclear reactor and a study of the Route 128 phenomenon. The department has also persuaded the UGC to back interdisciplinary MSc courses. A few other universities, notably Loughborough and Stirling, have also started experimenting with the Swann PhD.

UNIVERSITIES

Medical Schools Integrate

THE contradictions in medical training in London today, which the latest step in the implementation of recommendations of the Todd report are designed to alleviate, can be traced back several hundred years. The principal teaching hospitals looked for their standards to the professional associations such as the Royal College of Physicians or the Royal College of Surgeons. The colleges opposed the foundation of the university in the nineteenth century and since then the tendency has always been to ignore it.

As a result, medical training is something of a compromise: most students spend their first two or three years learning human biology at an ancillary medical school associated with a teaching hospital, and then a further three or more years with surgeons and consultants in the wards. These schools, if only because they are inadequately equipped, are not where the rapid advances in medical science are now being made. Neither do they run courses in the newer university curricular subjects, such as biophysics and social science, which are increasingly being seen as relevant to medical practice.

The changes announced last week in a joint statement by the University Grants Committee and the University of London are designed to alter all this. Following the recommendations of the Royal Commission on Medical Education, they ask that, where conditions permit, all possible steps should be taken to implement the ideal of "a unified medical teaching centre embedded in a university complex". The students will probably enjoy it more because they will be able to mingle with other faculties. They should be able to choose from a wide range of subjects, perhaps even including arts, and to opt for either an express course of essentials, taking about 18 months, or longer courses, leading to a BSc, and taking 3 years.

As plans stand, University College Hospital Medical School and the Royal Free Hospital Medical School are to be integrated as a matter of priority. Indeed, students at University College Hospital seem to be extremely fortunate, for they already get their preclinical training in the science faculty of University College. The Royal Free Hospital Medical School should be incorporated here at almost any price and not transferred to Hampstead as proposed earlier. The preclinical department of St Bartholomew's Hospital and the London Hospital will become part of the enlarged biological sciences complex at Queen Mary College. Because of limitations of its site, Bedford College cannot incorporate the medical schools of the Middlesex and St Mary's Hospitals and some compromise will have to be worked out. Guy's and King's College Hospital Medical Schools will form a fourth pair and St Thomas's and the Westminster Medical School a fifth. One of these will be linked to King's College, possibly through the development of a biomedical centre. The other two teaching hospitals will remain unpaired.

Clearly the sort of medical education offered depends on the sort of doctor the community thinks it needs. At the moment the consensus seems to be that hospital experience is not enough and that experience in first-class science is desirable, too. There may also be a case for sending students to work with a good GP for a