

around £36 million. The council has been allowed to use some of this saving to offset its overexpenditure on domestic grants this year (see *Nature* 13 November). Next year, the Science Research Council projects a nominal expenditure of £158.5 million on UK-based science, with £39.5 million on subscriptions (at the same October 1980 domestic prices and exchange rates). Since the pound is unlikely to strengthen further, at least to the degree it strengthened in 1979–80, and the grants to which the council committed itself in 1980 will be continuing, 1981–82 seems set to be a difficult year for SRC.

Among other councils, the Agricultural Research Council has registered a 3 per cent rise from £29.5 million to £30.5 million, and the Natural Environment Research Council remains virtually static at £39.4 million. The Medical Research Council gets £73.2 million, including £13.9 million contract research money recently transferred from the control of the Departments of Health and Social Security. The Social Science Research Council will receive £16.1 million, the British Museum (Natural History) £6.5 million, and the Royal Society £3.3 million. These figures will be adjusted in October this year to account for the inflation rate.

**Robert Walgate**

## Canadian research

### Aiming high

*Washington*

Canada's Liberal Government brought its election promises a step nearer reality last month when it committed itself to increasing the proportion of the country's gross national product spent on research and development from 0.9 per cent to 1.5 per cent by 1985. The commitment is ambitious. Even though the federal government expects a large part of the burden to be carried by the private sector encouraged by tax incentives and other inducements, its own contribution will have to rise from \$1,000 million to \$2,600 million in the next five years — in real terms a growth of 8 per cent a year, allowing for inflation.

Much will also depend on the attitude of the provinces, which through their support of universities contribute about 20 per cent of the nation's effort in research and development. Relationships between the federal and provincial capitals have been cool recently, but officials in Ottawa hope that the need to spur the competitiveness of Canadian industry is one area in which it may be possible to reach agreement.

It will be some time before the broad commitments, announced in Toronto by the Minister of State for Science and Technology, Mr John Roberts, are translated into specific budgets for the various research agencies. And the scientific community is therefore reserving judgement until it sees the colour of the government's money. But for now, the minister's

announcement can be taken as a sign of good faith, since if nothing else it provides a broad framework within which sectoral policies can be worked out.

Spending on research and development has become something of a political football in Canada in recent years, to the surprise of foreign observers who frequently point out that — as the United Kingdom discovered the early 1970s — research spending can be a misleading indicator of industrial strength. Nevertheless, the Canadian public has been convinced that one of the reasons for the country's dependence on foreign investment capital, particularly from the United States, has been its relative lack of an indigenous technological capability. And both the Liberal and Conservative parties have competed with bids to raise research spending to correct the situation.

During last year's election campaign, the Liberals had promised yet again to reach the 1.5 per cent figure, but with no specific target date. Now they have fixed on 1985, and determined that by this time 50 per cent of the nation's research and development spending (equivalent to 0.75 per cent of its gross national product) will come from industry, with a third from the federal government and the rest from the provinces and universities.

Reaching these targets will require a considerable shift in responsibility from the public to the private sector. Industry is being asked to increase its share of the budget from 40 to 50 per cent, while the federal government's contribution would fall in relative terms from 40 to 33 per cent, even though the actual amount of money would increase.

To meet these targets, industry would have to increase its spending by 27 per cent a year — a goal which has already been viewed with a certain amount of scepticism, since the government will have to devise an appropriate set of indirect mechanisms to encourage such growth. Officials in Ottawa are now carrying out a quantitative analysis of the effects of previous policy measures, such as tax breaks on research investment and industrial training grants. One official admitted last week that the studies have so far not been too productive; but there is optimism that some fine tuning can be achieved.

Canada's efforts in this direction bear a close resemblance to the recent domestic policy review of industrial innovation carried out two years ago in the United States under President Carter.

One significant difference, however, is that the Canadian government supports a strongly sectoral approach, identifying areas of high technology — such as nuclear energy, telecommunications or space technology — where it feels that Canadian industry has a particular role to play on international markets.

Although there were structural elements in the policy recommendations put

forward by President Carter eighteen months ago, these were overshadowed by broader proposals aimed at encouraging the general climate for innovation. And with the election of President Reagan, even schemes such as the joint government/industry sponsored Cooperative Automotive Research Project, a pet project of the former president's science adviser, Dr Frank Press, are under threat from free marketeers.

In Canada, the sectoral approach has been strongly supported by groups such as the Science Council, whose chairman, Dr Claude Fortier, wrote in the council's recent annual report that government action is urgently needed along sectoral lines to stimulate innovation and productivity.

This concern is reflected in the government's new proposals. Of the new money which it is proposing to make available for the support of research and development, one half will go to support work in the private sector in clearly defined categories, one third to the government's own mission-oriented laboratories and the rest to universities and other research institutes.

But how much Mr Roberts' announcement indicates a genuine commitment by the Canadian government, already facing a growing budget deficit to increased funding, and how much is merely a political exercise, has become a subject of intense debate.

**David Dickson**

## Environmental cadmium

### Europe to ban?

*Brussels*

Moves to restrict the use of cadmium are gathering momentum in Europe. In Brussels, the European Commission's directive laying down limits for the discharge of cadmium into the aquatic environment is close to being adopted, before it goes to the Council of Ministers, while in Germany, the Home Office Minister has caused a furore in industrial circles by announcing that a new report on cadmium may lead to tough restrictions on its use.

This closely follows news of a Swedish ban due to come into force in July 1983, which has caused much unease among European producers of plastics, stabilizers and pigments, many of which contain cadmium compounds. As a result of research carried out by the Danish National Agency of Environmental Protection, the EEC Council of Environment Ministers has concluded that present environmental levels of cadmium are potentially harmful, the cadmium accumulating in the lungs, bone tissue, and particularly in the kidneys. Cadmium accumulates slowly in man, reaching dangerous levels at around the age of 50. Heavy smokers are thought to be most at risk.

German research has revealed dangerously high cadmium levels in beef, veal,

fish, cereals and potatoes, as well as in some types of mushrooms and mussels. Both Danish and German researchers thought that the cadmium in foodstuffs came mainly from sewerage works through the use of the end product as fertilizer.

The European Commission has previously made strenuous efforts to dissuade the Swedes from making a sweeping ban on cadmium's industrial uses. The Swedish government is phasing out "unnecessary" uses of cadmium, but there are not as yet suitable substitutes for cadmium in its many industrial applications.

According to German Home Minister Gerhardt Baum, industry will either have to restrict its use or be faced with a legally enforced ban. The Commission's proposals, if they are finally adopted, will become national law in any case, but as they stand they only serve to protect the aquatic environment, falling short of the restrictions likely in Sweden and Germany.

Two other draft directives on discharge of chemicals into the aquatic environment are already with the council, one on mercury and the other on the "drins" (dieltrin, aldrin and endrin). Other directives are to follow but so far none have been adopted, because member states have failed to agree on limiting values and suitable environmental quality objectives.

The new directive on cadmium will add to the confusion, particularly as it is in two stages, to come into effect in 1983 and 1986, in recognition that the technology for removing cadmium from effluents has still to be developed. One major problem yet to be solved is how to remove cadmium from the wastes created during the manufacture of phosphoric acids from phosphate ore. So until a viable technique is developed, the restrictions will not apply to this industry.

**Jasper Becker**

## Soviet psychology

### IQ rehabilitated?

An article in the November/December issue of the Soviet Academy of Sciences publication *Psychological Journal* could pave the way for a controversial about-face by Soviet authorities on the issue of intelligence testing.

Stalin made IQ tests illegal in the Soviet Union in 1936. Before that, over-enthusiastic and under-qualified Russian educational psychologists, working with Western tests not standardized on the local population, had designated massive numbers of rural schoolchildren educationally subnormal — to the dismay and outrage of their parents and teachers.

The article in *Psychological Journal*, under the title "The evolution of cognitive processes and abilities", is likely to be especially influential because its author is Friedhard Klix, president of the International Union of Psychological Sciences and director of the psychology section of the Humboldt University, East Berlin. The

text formed the presidential address to the opening of the Eastern bloc's 22nd International Psychology Conference in Leipzig in July 1980.

The article stresses the need to treat human intelligence as a subject for study in exactly the same way as other biological phenomena. This is in itself a heresy, since Marxist-Leninist theoreticians have always stressed the need to avoid what they called "reductionism", particularly in relation to aspects of behaviour such as intelligence.

Klix places human intelligence firmly in a biological context and subject therefore to the laws of evolutionary genetics; thereby he accepts an indisputable element of heritability. He refers scathingly to the choice (carefully backdated in his example) that has always faced man in attempting to predict and control his own environment — that is, between adherence to a "cult" and the (scientific) alternative of methodical observation. The unspoken inference is that scientists must be allowed to work unhampered by the dogma of political theory.

Klix later refers (under cover of a paragraph concerned with Sumerian mathematical innovation) to recent experiments in his own university department aimed at pinpointing differences in performance between mathematically gifted children and "normals". The Soviet "ukaz" against objective testing, and in particular the prevention of the development of quantitative norms against which children with learning difficulties or exceptional gifts can be measured, is well known to Klix's audience.

Western observers feel that the demands of the Soviet-styled "scientific and technological revolution" may show that this prohibition works against rather than in favour of the very children whom it was intended to protect — selection for special education in one of the schools for gifted children at present depends on performance in one of the so-called "Olympiads". These events are held all over the country, but regularly return an embarrassing over-representation of urban males. The use of tests capable of revealing intelligence potential, uncrystallized by access to sophisticated teaching methods or the enriched cultural opportunities of the city, might restore balance to the selection process.

Klix ends by pointing out that the task before psychology is to achieve for cognitive processes what biochemists have managed in their microanalysis of other biological phenomena. Soviet psychological journals-watchers will be agog to see whether the debate on the "microanalysis" of human intelligence along the lines suggested by Klix is continued within the profession. At least the East Germans — who have been quietly using their own intelligence tests for selection for many years — have provided the Russians with an acceptable (that is, foreign) example on which to base the debate.

**Elizabeth Roberts**

## Orlov hunger strike

Dr Yuri Orlov, the Russian physicist, who is now serving a 7-year prison-camp sentence for his activities as chairman of the Moscow "Helsinki Monitoring Group", has gone on a hunger strike to coincide with the reconvening of the Madrid review conference last week. According to his wife, Irina, Dr Orlov made a similar protest last November, when the conference opened, although, during that month, he served two fifteen-day terms in the punishment cell after an alleged argument with a camp officer.



Yurii Orlov — now a fast

The Madrid Conference on Security and Cooperation in Europe opened last week with the prospect of two months of acrimonious debate (see *Nature* 29 January, p.343).

Dr Orlov's protest, said Irina, is an appeal to all governments represented at Madrid to grant amnesty to political prisoners and to reduce secrecy in the flow in all fields of information — social, economic and military.

So far, however, the Soviet Union seems unwilling to relax its restrictions on information flow. During the Madrid recess, two scientists, Aleksandr Lavut, a Moscow geologist, and Mark Niklus, an Estonian biologist, received sentences of 3 and 15 years respectively for publicizing abroad what they see as breaches of the Helsinki Accords on human rights. "Secrecy", too, is a frequent Soviet excuse for not allowing would-be emigrants to leave the country. The latest to be denied an exit visa on the grounds that he had had access to classified information, is Dr David Goldfarb, who until he resigned his post last year when filing his emigration application had been head of the Laboratory of Molecular Genetics of Bacteria and Bacteriophages of the Soviet Academy of Sciences.