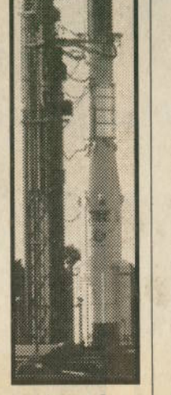
but officials offered none at a recent meeting.

● **THE INSTITUTE of Molecular Medicine in Oxford threatened for the sake of £1 million.**

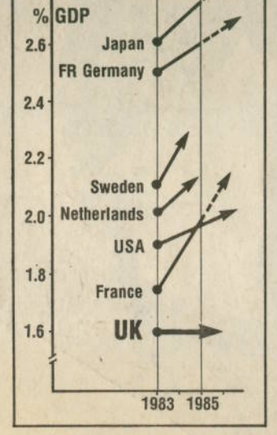
● **STRATEGIC marine research projects, investigating climate, pollution and ocean resources, jeopardised by short-term funding.**

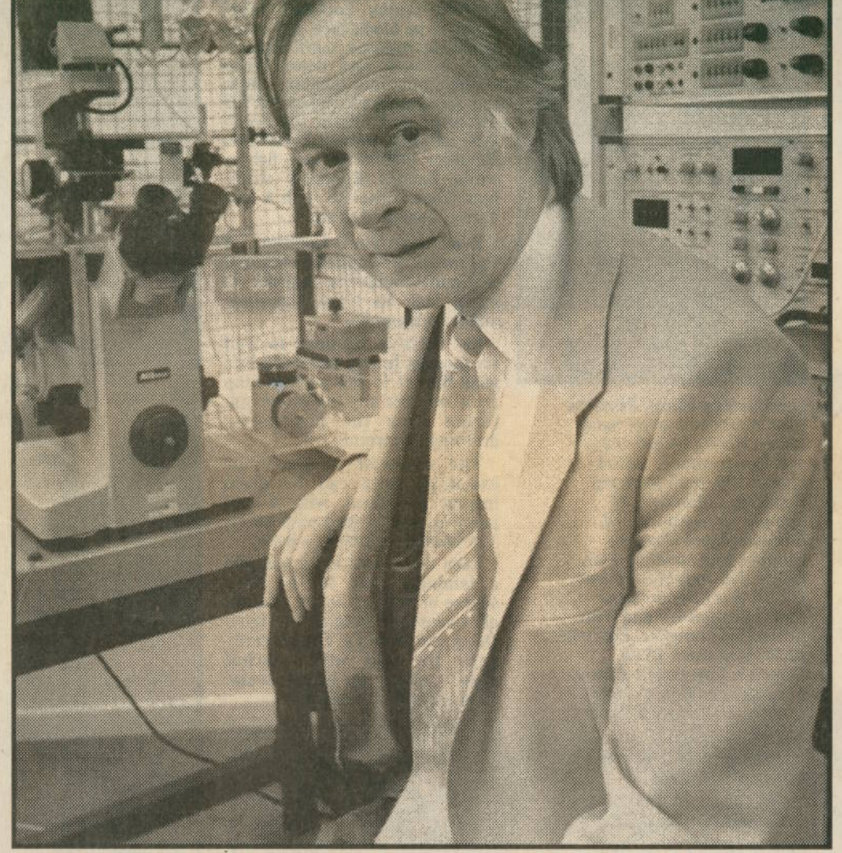
● **TODAY, the 13-nation European Space Agency discusses its programme until the year 2,000 which includes a new launcher, Ariane 5, the Columbus space station and the French Hermes space vehicle. After the Government recently rejected increased spending on space, Britain is destined to play the role of bystander.**

● **A NEW generation of optical telescopes, planned to keep Britain at the forefront of astronomy, looks unlikely to receive funding, according to Sir Francis Graham-Smith, the Astronomer Royal. "Unless we plan for the future, we will be in a state of decline."**



Ariane 5





"A BACKWARD LEAP"... Campaigning biochemist Prof Denis Noble's indictment of the Government line on pioneering research

"THE BRITISH are in danger of becoming the industrial peasantry of the 21st century."

"Britain will become a second-or even a third-class nation if we do not place more importance on science."

"Unless things are changed we shall soon live in a country which is backward not only in its technology and standard of living but in its cultural vitality..."

THESE are not the ravings of a few misguided individuals, nor the gripings of the odd professional who wants to better his lot.

These predictions come from Prof Denis Noble of Oxford University, founder of Save British Science; Sir Kenneth Durham, former president of the British Association for the Advancement of Science and chairman of Woolworth Holdings; and Prof Sir George Porter, president of the Royal Society.

Britain has established a world-class reputation in science, from chemistry and biotechnology to information technology and medicine. But its reputation is being eroded by underfunding, a decline which will continue in the wake of last week's science budget, which was condemned by the scientific community as totally inadequate".

The Chancellor's "boost" of £300 million to reach the figure of £696 million for 1988-89 is a sham. It includes £6 million already earmarked for Aids research and £8·6 million to purchase a new Antarctic survey ship. That leaves £32·4 million, most of which is pledged to cover pay rises.

Indeed, according to Save British Science figures, when inflation and corrections for exchange rates on international subscriptions are also taken into account, the £47 million so-called boost turns into a *cut* of £34 million in real terms.

Sir Walter Bodmer, president of the British Association for the Advancement of Science, denounced the budget as totally inadequate for the real needs of science".

The British Association backed the £103 million increase called for by Government advisers, the Advisory Board for the Research Councils (ABRC), which estimated that in 1988-89 another £32 million would be needed to protect the science budget from increased costs, £44 million to restructure science so that "resources are used to best effect and that science's contribution to the nation's economic development grows rapidly", and £27 million "to relieve chronic equipment problems... which are restricting the ability of the country's best research groups". The

Sir Francis Tombs: "Discipline"

ABRC chairman, Prof Sir David Phillips, found the budget "acutely disappointing".

The pressure group, Save British Science, which represents thousands of scientists, estimates that the budget should increase by £100 million, but for different reasons. SBS claims this is the minimum necessary to "support research of vital importance and rescue the science base".

Prof Denis Noble is concerned by the inability to fund all of what are deemed first-rate research projects by the five research councils. The Natural Environment Research Council manages to fund less than half of these "alpha-rated" projects, the Agricultural and Food Research Council funds half, the Economic and Social Research Council funds two-thirds, and the Science and Engineering Research Council funds 70 per cent.

Prof Noble adapted a familiar slogan to condemn Government policy as *Zurücksprung für Technik* (a backward leap for technology).

□ WHY BOTHER with science at all? After all, the Treasury informed a House of Lords select committee that there was no relationship between research and the health of the economy. Incredibly, the president of the Royal Society also reported hearing senior civil servants say: "There is too much science (like the butter mountain), that our economy does not need it, that we should rely on others to do it and concentrate on important matters like better management."

Every group representing the scientific community is convinced science underpins our economic health by enabling industry to maintain the quality of existing products and develop new ones.

Last month Prof Robert Solow of the Massachusetts Institute of Technology was awarded the Nobel prize for Economics, for his studies of the link between technology and growth. Perhaps his opinion will hold more sway with Whitehall officials.

He told The Daily Telegraph: "The notion that it would be economical for a country to put a lot of resources into applied, directly useful research, but little into basic research seems to me to be false."

Sir Francis Tombs, Chairman of the Advisory Council on Science and Technology (Acost), refuses to discuss details of the confidential advice that he gives the Government. He did however offer The Daily Telegraph a few clues.

On increasing the Science Budget: "There are enough questions to be asked about the way the present resources are allocated. They have to be answered first before you start arguing about additional resources."

On funding international projects: "One problem with international collaborations is that they acquire a momentum of their own, with no one government in control."

On the claim of some scientists that the shift to short-term funding undermines strategic research: "It is a cop-out. That is the guy who is not willing to live by today's disciplines."

Stern advice... But will the Government listen? The influence of Acost is already in doubt, only a few months after it was created. The recent statement by the Trade and Industry Minister, confirming a decision not to fund the European space programme, came at a time when Acost was supposed to be examining the level of space funding.

"We have the really bizarre situation where the Government's decision on the funding of space research was announced before the matter had been referred to the new body which is supposed to advise the Government on that programme," commented Lord Sherfield, a member — and former chairman — of the Lords Select Committee on Science and Technology.

He summed up Government policy on science funding as follows: "There is a clear desire on the part of the Government to put the responsibility for funding R&D (research and development) on industry, a policy which would no doubt be fine if all competing nations followed the same line.

"Of course, they do not and so our industry, which admittedly has not done enough in its own field in the past, is put at a continuing competitive disadvantage."

A great deal is at stake. In the words of one of our most famous scientists, Dr Max Perutz, Nobel prize winner and founder of a laboratory which spawned another eight Nobel prizes: "The brilliance of British science is one of the country's greatest cultural achievements, if not the greatest. But it is a fragile flower... once destroyed by politics, it cannot be restored."

A stark — but civil — answer to the crisis

THE SOLUTION to the crisis in British science, according to Ben Martin of the Science Policy Research Unit at the University of Sussex, "is both simple and stark": to remain competitive, British firms must be persuaded to invest a greater proportion of their turnover in R&D (research and development) while the Government must start devoting more of its expenditure to civil research — and less to defence R&D.

The alternative, according to Martin, is that Britain is doomed to slip ever further behind its major economic rivals.

Organisation for Economic Cooperation and Development figures reveal the unwillingness of British industry to invest in research. In 1985, less than 66 per cent of the total R&D carried out by British industry was funded from its own resources: the poorest showing of all when compared with rival technological nations ... not to mention Japan at 98 per cent.

Save British Science estimates that £3 billion is required to bring us up to the civil R&D spending of our main European competitors. But it would be an act of extreme faith to expect such a sum to be raised by the newly created Centre for Exploitable Science and Technology.

A better bet could be to switch resources away from defence R&D, which consumes more than half of Britain's total research spending (the Nato average is 25 per cent), and invest it in civil research.

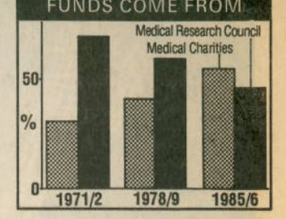
A recent Government White paper promised a reduction in defence R&D but it did not spell out where savings would end up. The same White paper announced a new advisory body, Acost, to assess science priorities. Acost chairman, Sir Francis Tombs, said: "It is important that if there are any savings, they should stay within the total government spending on research and development."

Medical historian Dr Joan Austoker of Oxford University said: "Medical charities in general are disease-oriented, and this could result in a concentration on applied rather than basic research. Yet we need fundamental research that is not immediately recognisable to either the general public or industry. In such areas, support from government is critical."

Even Lord Dainton, who created the ABRC and is the trustee of a number of charities, warned that too much charity-funded research would be a bad thing. "If you are going to have your policy made by the whims of people who create charities you will not get a balanced research policy for the nation."

In the universities, too, charities now represent the major source of funds for medical research, placing grants worth £60 million compared with the Medical Research Council's (MRC) £48 million.

On the over-all level of MRC funding, Sir Walter Bodmer, director of research at the Imperial Cancer Research Fund, was unequivocal: "It is grossly inadequate." And Dr Dai Rees, secretary of the MRC,



said: "We are going to be in real trouble."

The MRC has closed several units, notably those investigating developmental neurobiology and trauma, and cut back its cyclotron units which are used for cancer treatment. It had hoped in this way to generate funds for exciting new units to investigate, for example, nutrition and toxicology. But Dr Rees said: "All we have done is to stay where we are, minus the units we have lost."

The MRC is not even sure it can afford to set up a new collaborative centre, which aims to take research out of the laboratory and into the market place. "It is ironic, because this is the kind of activity the Government is most keen on," said Dr Rees.

Jobs in jeopardy

AGRICULTURE

AT A TIME when food poisoning is on the increase, research into the subject is in jeopardy as a result of cuts in the budget of the Agricultural and Food Research Council (AFRC). Around 17,000 cases of food poisoning were reported last year compared with 13,000 in 1985, with a realistic total estimated at near the million mark.

Now 70 posts, including a team working on botulism, are to be lost at the Institute of Food Research, which has laboratories at Norwich, Bristol and Reading, according to Geoffrey Evans, a higher scientific officer.

The AFRC has already announced the loss of 170 posts, cutting research in horticulture, arable crops, engineering, grasslands and animal production, animal physiology and genetics. Food research takes the brunt of the cuts.

In the past three years the AFRC has shut the Weed Research Organisation near Oxford, the Letcombe Laboratory at Wantage, which investigated soil and drainage, amalgamated some 30 institutes into eight groups, and lost 1,600 scientists and support staff.

According to Mr Joe Duckworth of the Institution of Professional Civil Servants, more jobs are at stake, given that no new money was made available in last week's budget. There are also moves under way to review agricultural research: that deemed, arguably, commercial "will have to be funded by industry or stopped", he said.

Act of vandalism

BIG SCIENCE

PRESTIGE "big science" — research that involves vast teams of scientists and huge sums to match — is causing a big headache for the Science and Engineering Research Council (SERC).

There is increasing concern that Britain will announce next month its withdrawal from one such facility — the international particle-physics laboratory in Geneva. This would be the single most destructive act of vandalism ever inflicted on British science, says Dr Jo[illegible] Mulvey of Oxford Univer[illegible]

This year Britain can Coun[illegible] to CERN (Research) in[illegible] cil for N[illegible] shot to a hefty Gene[illegible] because of the fall in [illegible] value of the pound against the Swiss franc, eating a large

CERN: decision due

Source in Oxfordshire which use rays to study materials.

Big science is affecting small projects because the millions [illegible] major project