

is right to be alarmed. In the past few years, it has dawned on European governments that they must have access to some way of launching spacecraft of all kinds. The chance to join the shuttle project as a partner has however gone. The European launcher Ariane may have a future, if only as an insurance policy against further delay of the shuttle and as an assurance of independence, but is not the ideal way of meeting the need. The space agency itself, now under new management, has a poor public reputation stemming at least in part from its bureaucratic ways and from the way in which member governments appear to regard it as their first objective to ensure that their contributions are required by contracts placed with national companies. Many scientists concerned to put scientific experiments into space have found it easier to work with the American agency than with that in Paris. The first lesson to be learned in Paris from the threatened cancellation of the American half of the solar polar project is that it should put its own house in order. Only then will it be able to take the lead in making sure that European governments collectively have a view of their future role in this important field.

The European Space Agency would at the same time do well to draw a wider lesson from what is going on in Washington. The space budget is being cut not only because of the technical problems with the shuttle but also because expenditure of this kind is not immediately productive. In the long run, it is better for Europe that the American economy should be healthy (free from inflation) and productive than that funds should be found for the second half of the solar polar project. And, it would be folly if the growing European enthusiasm for space projects were further to undermine the economic health of Western Europe.

Questions answered

The British predilection for studying the machinery for administering publicly supported science has burst out again, this time in the House of Lords (*Nature* 26 February, p.741). British governments seem constitutionally unable to decide for themselves what sensible steps to take, and usually set up *ad hoc* committees to tell them what to do. The select committee of the House of Lords is an unexpected but a better way of tackling the problem. The committee has also taken the unusual step of inviting written evidence from anybody, and the specific questions it has asked show that its inquiry may well be radical. What follows may help to start the ball rolling.

The most important, because the most novel, group of questions is that labelled machinery of science. Could the relationship between the British government and the scientific community be improved and, if so, how? The obvious difficulty is that, formally, there is no such thing as a scientific community. There are a few organizations, the Royal Society chief among them, which are sufficiently diverse to be consulted as if they were representative, and so eminent that the advice they give is rarely foolish. However radically the House of Lords committee tackles its inquiry, these influences on government will (and should) continue. Moreover, it would be fruitless to engage an army of constitutional lawyers to devise some way in which the wider scientific community could speak with even greater representative authority. The truth is that opinions within the scientific community differ about all the questions the committee has asked as well as about more specific problems.

What the British government needs is some means by which it can sense the diversity of scientific opinion on contentious issues, forming in the process a judgement about which views should be taken seriously, and at the same time making more effective use of the imagination and willingness to help of people working in laboratories of all kinds. The mechanism required is more like a lightning-rod than a forum. Whether it should be more like the United States President's Science Advisory Committee than the British Advisory Council on Scientific Policy of the 1950s is less important than that it should be accessible to all who want to tell it something.

Given such a device for drawing attention to important problems, some of the select committee's questions would be

answered. Thus, while no amount of organization can ensure that there is sufficient communication between those responsible for the administration of science in industry, research councils and government, common experience shows that public servants respond diligently to well-considered public complaint or even to constructive suggestion. To be effective over the whole field the select committee has mapped out, a committee of this kind would have to be adequately serviced — previous essays in this direction have been less than successful because they have been run on a shoestring. The terms of reference of the existing Advisory Council on Applied Research and Development are too narrow to do what is now required, and the council seems shy of tackling questions of how well government machinery is working. It is, however, essential that any such organization should be independent of particular government departments. The Council for Scientific Policy of the 1960s, which did some useful work, was too dependent on the Department of Education and Science to be effective. The need now is for a channel for communication free from departmental interests. The House of Lords is well placed to decide how such a committee should be plugged into the government machine. Direct responsibility to the Prime Minister would be the constitutional ideal but would make a mountain out of a molehill. A connection with the Treasury would not offend the lawyers and could be fun. Otherwise, the best choice would be a return to the 1960s, when the Lord President of the Council was responsible for the Council on Scientific Policy.

Other questions on the list from the House of Lords bear on the issue of the Rothschild customer-contractor principle. In spite of the mixed experience of the past decade, it would be wrong now to give up the notion that government departments should be equipped to decide scientific questions relevant to their own work, and to commission their own research. But the system in which departments were required to appoint chief scientists to manage their scientific affairs has not always worked well. Some of those appointed have not been up to the job, few of them have been in their posts long enough to learn what to do and none of them has been paid enough. However, there can be no general rule for deciding how much money should be spent by departments and how much by research councils. Research councils should have enough money to discharge their responsibilities properly, and government departments should spend money on research in the expectation of winning tangible benefit as a result. Some of the imperfections of the present system, and especially the difficulties which have arisen in the financing of applied research in which no government has a commanding interest, would not exist if the arrangements for dividing the science budget between those dependent on it took more account of the scientific merits of their different programmes.

These are the easy questions. The committee's question about the adequacy of the government's own scientific manpower is much more difficult. What should be done about the scientific civil service? And what should be done to equip the British civil service as a whole to grapple with modern problems? The British government is at present too directly involved in research in its own establishments (shockingly so in defence research). If the committee does more than skate round the manpower problem, it will recommend that the government reduce its own research effort drastically (but provide better careers for those who remain) and also tackle seriously the recruitment of scientists in mid-career to the civil service proper. The present system merely perpetuates amateurism and ensures inept advice.

The hardest question of all, however, is missing from the list circulated by the House of Lords. What is to be done about defence research? Only two weeks ago (*Nature* 19 February), the European Commission was pointing out that defence research is a larger proportion of all research in the United Kingdom than elsewhere in the European Community. Outsiders have no means of telling how necessary this vast enterprise may be, although there is every reason to believe that the huge defence laboratories could be used more effectively to foster industrial change without hazarding national defence. The select committee should think of adding this topic to its agenda.