

PRIME MINISTER

No - the advice available  
through the ABRC should be  
credible to me and  
it is much more  
varied than that  
of any  
one  
scientific adviser.  
NB.

Scientific advice at the centre

The attached minute from Sir Robert Armstrong argues that we need to strengthen the arrangements for providing scientific advice at the centre of Government, i.e. to you, the Cabinet Office and the CPRS.

To this end Sir Robert Armstrong makes two proposals:-

(i) He recommends an informal arrangement which would allow us to call upon the advice of a small number of scientists who are outstanding in their fields - for example, Sir Sam Edwards and Sir Hans Kornberg. This seems to me a good idea, provided we really are going to make enough calls of the right kind on these people to justify recruiting them in this way.

(ii) Sir Robert Armstrong proposes that when Dr. Ashworth leaves the CPRS in September to become the Vice Chancellor of Salford University, his post should be regraded from Under Secretary to Deputy Secretary. It is for this suggestion that your immediate approval is sought. Plainly, whether you give your agreement depends on whether you are convinced that there are insufficiencies in the scientific advice which is at present available at the centre of Government.

Would you like to discuss Sir Robert Armstrong's proposals with him before you offer a view on them? If you do, I think that this will mean waiting until your return from overseas.

JAW.

10 April 1981





10 DOWNING STREET

From the Principal Private Secretary

*You may  
CW copy*

*Now being delayed.  
[redacted] [redacted] is/w*

*Arranged for  
Monday 27th  
April at 11.30  
Ed. 1514*

SIR ROBERT ARMSTRONG

CHIEF SCIENTIST, CPRS

The Prime Minister has seen your minute AO4675 of 9 April 1981 about ways of strengthening the provision of scientific advice at the centre of Government.

She has said that she would like to discuss this matter with you on her return from overseas, and we will be in touch with your office to arrange a time. You might like to know in advance, however, that the Prime Minister's preliminary view is that there is no need to upgrade the post of Chief Scientist, CPRS. She has commented:-

"The advice available through the ABRC should be available to me, and it is much more varied than that of any one scientific adviser".

*KAW.*

14 April 1981





SENIOR STAFF IN CONFIDENCE

PRIME MINISTER

Chief Scientist, CPRS

The appointment of Dr. Ashworth, the present Chief Scientist, CPRS, to be Vice-Chancellor of Salford University with effect from September 1981 makes it necessary to take early steps to find a successor.

History

2. As you will remember, Lord Zuckerman and Sir Alan Cottrell, as Chief Scientific Advisers to the Government, reported direct to the Prime Minister and the Secretary of the Cabinet; they worked alongside and to some extent with the Head of the CPRS, but did not report to him. When Sir Alan Cottrell retired, he was not replaced as Chief Scientific Adviser; Dr. Press carried out the functions (but without the title) from 1974 until he retired from full-time employment in 1976, and Dr. Ashworth was appointed in 1976 as Chief Scientist, CPRS, with the rank of Under Secretary.

3. As civil science has been organised in Government since the Rothschild Report in 1971 (Cmnd. 4814) and the ensuing White Paper (Cmnd. 5046), there has not been the same need for a Chief Scientific Adviser to the Government as there was before. Responsibility for civil science has been placed with the Secretary of State for Education and Science, whose decisions about the distribution of funds are made on the advice of the Advisory Board for the Research Council's (ABRC). The ABRC's main function has been to advise on the distribution of funds to the Research Councils, but it has also been to some extent (though not a sufficient extent completely to satisfy the scientists) a source of advice on broader questions of scientific policy and a link between the Secretary of State and scientists in the universities.

4. The Advisory Council for Applied Research and Development (ACARD) was set up in 1976 as an advisory body on questions of applied research and technology. It has, as you know, produced some useful reports, and has been effective in defining national needs in the development of technology.



SENIOR STAFF IN CONFIDENCE

The role of the Chief Scientist, CPRS

5. The Chief Scientist, CPRS, is very much at the centre of scientific activity in Government, as a member or assessor both on ABRC and on ACARD, and as a member of the Committee of Chief Scientists and Permanent Secretaries (STO). In so far as you, I and Mr. Ibbs need and look for advice on civil scientific matters at the centre of Government, he is the source of it. He also has to act as Her Majesty's Government's representative in international scientific relations of various kinds (in some of which his partners from other countries are Ministers).

6. Dr. Ashworth has done the job admirably, with energy and drive as well as good sense. It is no reflection on him when I say that I think that we are not quite strong enough on the co-ordination of scientific policy and the provision of scientific advice at the centre; indeed, it is partly his particular personal qualities that have masked what is, I believe, a deficiency in organisational terms.

7. I do not want to go back to having a Chief Scientific Adviser to the Government: I do not think that the present organisation of civil science requires that. Scientific and Technological considerations now enter into a very wide range of decisions, and are nowadays brought to bear on decision-making down the line in Departments; and I am not sure that we can any longer hope to find, or would want to have, a "political" scientist like Lord Cherwell or Lord Zuckerman. But I believe that the centre, and particularly the Prime Minister, should have the means of access to scientific advice over the whole range when necessary; and I believe that there ought to be at the centre of Government a stronger bridge between "pure" and "applied" science than we have at present.

8. I have been discussing this with Mr. Ibbs over recent months and he shares these general views. Our minds have now been concentrated by the prospect of Dr. Ashworth's departure. As a result I have two proposals to make.





SENIOR STAFF IN CONFIDENCE

9. First, I should like to propose that we should have an informal arrangement with a small number of scientists of the highest eminence in their fields - people of the quality of Sir Sam Edwards and Professor Kornberg - whereby they would be available individually to be called upon by you, me, Mr. Ibbs or the Chief Scientist, CPRS, for consultation or advice. I envisage that they might on occasion be asked for advice on specific questions or issues; but that they should also be free to volunteer advice, if they wanted to do so. Such an arrangement would give the centre access to scientific advice over a wide range of disciplines, without going to the formality of setting up a Council of Scientific Advisers.

10. Secondly, I think that we should strengthen the scientific capacity in the Cabinet Office. In my view we should keep it in the CPRS; but we should upgrade the post of Chief Scientist to Deputy Secretary, and we should look for someone who by virtue of his qualifications and experience will be regarded with respect as an interlocuteur valable by the "pure" scientists and the technologists. The sort of man I have in mind might be a Professor of Engineering who was a Fellow of the Royal Society, but that is purely illustrative: that he should be the right sort of man is more important than the exact qualifications. I attach a job description, to give you some indication of what he would be expected to take on.

11. As you know, the House of Lords Select Committee on Science and Government has recently turned its attention to the provision and co-ordination of scientific advice to Government. The main impetus for this has come from Lord Todd, the recently retired President of the Royal Society, who I understand would like to go back to the good old days of a Minister for Science and a Council of Scientific Advisers. The Royal Society has recently put in evidence to the Select Committee, of which I attach a copy. The three salient points are:

- (i) the grading of Chief Scientist posts in Departments has been eroded and diminished and ought to be restored [this shaft is aimed at the Ministry of Agriculture];



SENIOR STAFF IN CONFIDENCE

- (ii) the present arrangements for interdepartmental co-ordination of scientific advice to Government are much less satisfactory than those of a decade or more ago;
- (iii) the post of Chief Scientist in the CPRS should be retained and enhanced in status after Dr. Ashworth's departure.

12. The immediate purpose of this minute is to seek your approval to the upgrading of the post of Chief Scientist, CPRS, from Under Secretary to Deputy Secretary when Dr. Ashworth goes. Mr. Ibbs unreservedly supports this recommendation. I have consulted Sir Ian Bancroft, who has reminded me that you have said that you will not approve proposals for upgrading posts at this level unless they are both urgent and established up to the hilt, but has said that he would have no objections to the proposed upgrading. I hope that you will feel that I have established the case; the departure of Dr. Ashworth makes it urgent. And of course this would not represent any increase in staff numbers in the Cabinet Office: merely the substitution of an Under Secretary by a Deputy Secretary.

13. If you are content, I shall immediately set about drawing up a short list of candidates, in consultation with Sir Ian Bancroft, Sir Peter Carey, Sir James Hamilton, Mr. Ibbs, certain Chief Scientists in Government, Sir Hermann Bondi and one or two other former Chief Scientists. I should also like to consult the President of the Royal Society, Sir Andrew Huxley, who has told me that he would be very willing to assist in the search. I will consult you again when the short list is drawn up, before making any approach.

14. I am sending a copy of this minute to Sir Ian Bancroft.



Robert Armstrong

9th April 1981





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-9 APR 1981



JOB DESCRIPTION: CHIEF SCIENTIST, CPRS

The Chief Scientist provides scientific advice for the CPRS and the Cabinet Office generally. He sits on the principal Government Committees which deal with scientific and technical issues other than secret defence/nuclear matters. He is the Government's scientific representative on many international occasions.

Cabinet Office

The Secretary of the Cabinet as appropriate looks to the Chief Scientist, CPRS to provide, or organise the provision of, advice on scientific matters or scientific aspects of other issues which come to the Cabinet Office, for example, from the Prime Minister's office or from Summit meetings (e.g. the UK response to the US Global 2000 Study to be discussed at Ottawa).

The Secretary of the Cabinet will also look to him when necessary for advice on the overall co-ordination of the Government's scientific interests and effort. It follows that the Chief Scientist, with his opposite numbers in Departments, takes an interest in the general problems of the Scientific Civil Service. (Dr Ashworth was a member of the Working Party which wrote Cmnd 8032.)

CPRS

The Chief Scientist is responsible for providing scientific/technological input to CPRS studies. However, he is not constrained by title and has the opportunity to contribute to issues not overtly scientific/technological so that wide-ranging advantage is obtained by having the Cabinet Office Chief Scientist in the CPRS.

Government Committees

The Chief Scientist is ex officio a member/assessor of -

- (i) Advisory Council for Applied Research and Development (ACARD) - serviced by the Cabinet Office;
- (ii) Advisory Board for the Research Councils (ABRC) on which he is regarded as an "independent" - serviced by DES;



(iii) Member of the Committee of Chief Scientists and Permanent Secretaries (STO) - serviced by the Cabinet Office.

These three bodies between them take all the major scientific/technological issues that come before the Government except the secret defence/nuclear ones or those which are solely the concern of a single Department. The Chief Scientist CPRS is the prime link between ACARD and Government and plays a central role in planning ACARD's work. He has been closely involved with all the ACARD reports so far published (eight in total).

#### International Affairs

The Chief Scientist has a general oversight remit that covers -

- (a) the UK's bilateral scientific and technological agreements with other countries. These are usually part of more general economic co-operation agreements and are serviced by the International Technology Group, Department of Trade. In this connection the Chief Scientist is co-Chairman of the Anglo-Soviet Joint Commission (meets alternately in Moscow and London for one week) and has taken a special interest in Anglo-Chinese relationships.
- (b) The EC R & D Budget. The Chief Scientist is UK titulaire on CREST (the Committee that advises both the Council of Ministers and the Commission) and briefed by EST (an interdepartmental Whitehall Committee) serviced by the Department of Industry.
- (c) Other. The Chief Scientist is often asked to attend (or accompany Ministers attending) general fora on scientific/technological topics organised by bodies such as the OECD, UNESCO, UNCTAD, etc.



# THE ROYAL SOCIETY

## THE PROVISION AND COORDINATION OF SCIENTIFIC ADVICE TO GOVERNMENT

Evidence submitted by the Council of the Royal Society to the House of Lords  
Select Committee on Science and Technology, March 1981

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#### 1. INTRODUCTION

- 1.1 Science, including all branches of natural science and mathematics and their practical application, affects almost every aspect of life and the interests of all departments of Government. It is an engine of technological change and, hence, potentially of economic and social betterment through industry, medicine, agriculture and protection of the environment. There is, therefore, a need both for a national policy for the support of fundamental science (and education in science) and for a means by which science and technology can be taken properly into account in all policy formulation. It is in this sense that 'scientific advice to Government' is here understood.
- 1.2 The advice which Government should seek from scientists and about science can be put into three categories. First, advice on the support of science itself - the accumulation of knowledge, the maintenance of a research capability and the provision of education and training facilities adequate to ensure a supply of trained scientific manpower and a scientifically literate population. Second, there is the advice needed to ensure that any given policy of Government is as soundly based in science and technology as in its social, political, economic or other premises, and that inherently unscientific and hence unworkable policies are modified or replaced. Third, there is the need to look ahead and advise on the implications for Government strategy and policies of all kinds, of likely developments in science and its application.
- 1.3 To be effective, advisers need: (a) a substantial intelligence network and a close relationship with the science and technology community as a whole, both national and international, and (b) a sound judgement and equally close relationship with those concerned in assessing socio-political and economic interactions and in implementing policies. Only in this way can the complexity of problems be adequately tackled and new discoveries find appropriate technological routes to innovation and wealth creation.



1.4 Some examples of the civil fields in which such advice has proved critical are: energy systems (including nuclear power policy); new forms of rail or air transport; space policy; environmental protection policy; industrial strategy, short and long-term (e.g. biotechnology, information technology, robotics, innovation, computer aided design); climatology; resource policy; medical care; implications for agricultural policy of genetic engineering; fisheries policy; the basis of a sound pesticides policy; new technology in fire prevention; the formulation and implementation of policies for such essential services as water; the validity of health and safety procurement options and a host of others. Many of these extend across the whole range of Departmental objectives and impinge on, or may sometimes be central to, the effective implementation of a Government's overall strategy.

1.5 Technological change will occur; employment and wealth will be created, but not necessarily in the U.K. Adequate advice based on information from overseas and its receipt, not least by those defining foreign policy, are essential if the implications of technological change for trade are to be taken fully into account. Our diplomats and negotiators need to be at least as well informed in this way as those of other major countries.

1.6 In the British system of Government in which each Minister is responsible to Parliament for the expenditure in his Department it is difficult, but essential, to ensure both that adequate scientific advice is available to each Departmental Minister and that efficient mechanisms exist for dealing with the many scientific issues that cut across Departmental interests and responsibilities.

1.7 Although Government is a major employer of scientists, more than half of our scientific (in the broad sense) research and development is undertaken outside Government departments - in Research Councils, universities, industry, grant-aided institutions, etc. The arrangements for scientific advice to Government in this country must therefore provide adequate channels to receive advice from such quarters.

1.8 As an independent national academy of science, with a broadly-based concern for all aspects of fundamental and applied science, the Royal Society is a unique source of such advice. It is well placed to assist in monitoring, from a scientific viewpoint, the implementation of policies and to provide on its own initiative, or at the request of Government, periodic reports on specific issues. (See also section 6 of this evidence.)

## 2. THE FLOW OF SCIENTIFIC ADVICE TO POLICY-MAKING LEVELS IN GOVERNMENT

2.1 There are some serious obstacles to the flow of appropriate advice from the best scientific sources to the policy-making levels in Government. Some of these are inherent, for good or ill, in our national traditions; especially important here are the facts (a) that more than half the scientific research in the U.K. is done outside Government departments, (b) that most members of the administrative civil service have no training in and modest understanding of science, and (c) that most scientists have little appreciation of public administration and the machinery of Government.



- 2.2 Science is only one element in defining and executing policy, but too often its role is far too narrowly delimited or even unrecognized by senior administrators and economists. This is especially true in longer-term issues where new technological developments can radically alter the operation of other factors. Assessment of future trends is notoriously difficult but the scientist's capacity to allow for discontinuities instead of simple extrapolations can be vital. It is essential, therefore, that high level scientific advisers should work as administrators and have access to policy papers so that they can assist in defining questions, not just in providing answers.
- 2.3 It was partly to meet these needs that both Lord Rothschild in 1971 and the White Paper on Framework for Government Research and Development (Cmnd 5046) in 1972 emphasized the need for Departments to have strong Chief Scientists. Although it is recognized that the duties of Chief Scientists have in some cases been difficult to define, the Council of the Royal Society views with very grave concern the erosion and down-grading of these posts which is now apparent in some Departments.
- 2.4 The importance of having Chief Scientists at a high level (at least Deputy Secretary) is stressed, since to be properly effective they must work with other administrators at the policy-making level, and not just be on call. Their role is as much concerned with their contribution in terms of judgments made against the background of their special expertise as in the provision of scientific advice per se.
- 2.5 Since no adviser can be an expert in more than a very small part of the broad areas upon which advice may be required, he must be adequately supported by his own technical staff. Here it would be beneficial to see greater use made of high quality people on relatively short-term secondment from outside Government, for instance from industry, the universities and the Research Councils. Moreover, for the reasons implicit above, these support groups will be most effective if they include individuals with experience in both science and administration.
- 2.6 The Chief Scientist also needs to be able to draw on scientific advice from outside Government; he needs to know where to go for this advice and to have easy channels of communications. The Requirements Boards of the Department of Industry have assisted in this process but the abolition of some 'quangos' (for instance, the National Electronics Research Council and the Aeronautical Research Council) has impaired Government's ability to draw on outside advice. It is a matter for concern that no mechanisms seem to have been developed to replace the advice given by these valuable bodies. Chief Scientists should, in addition, feel free to call upon the Royal Society, the Fellowship of Engineering and other independent bodies for advice.
- 2.7 Lord Rothschild (1971) distinguished clearly between the Chief Scientist and the Controller R & D, and this distinction has been reiterated in a recent review of the Scientific Civil Service (Cmnd 8032, 1980). Certainly the provision of high-level scientific advice and judgement within a Department is a different function from controlling in-house and commissioned R & D, but there must be many interactions between the two functions. If the two posts are combined there is an inevitable but not necessarily insoluble dilemma; involvement in day to day consensus management of the Department is essential, but there is also a need to maintain



longer term perspectives and where necessary to upset traditional policies and conventional wisdom.

- 2.8 In large Departments such as Defence and Industry the Chief Scientist with at least the rank of Deputy Secretary should be separate from the Controller R & D who is responsible for the management of the research establishments. (This is currently the practice in the Ministry of Defence.) The Chief Scientist should be responsible for forward thinking, for planning the overall research strategy of the Department, for authorizing research commissions and for helping to formulate policy on matters with a significant scientific content. He or she should not be concerned with the problems of day to day management of the establishments.
- 2.9 Whether the two posts are combined or not, departmental laboratories should report directly to a very senior official widely recognized for his own scientific achievements. Regrettably there has been in recent years a noticeable fall in the scientific status of government laboratories, and part of the reason for this has been the understandable unwillingness of distinguished scientists to head laboratories that report primarily to administrators.
- 2.10 By all these means the voice of the scientist, which by its nature may from time to time strike a discordant note, must be heard amongst those formulating policy and closely advising Ministers particularly in longer-term perspectives. Government cannot afford to be caught technologically unaware by other countries if any overall strategy is to be maintained, even for the life of a single Administration.

### 3. POLICY FOR SCIENCE

- 3.1 Responsibility for Civil Science rests with the Secretary of State for Education and Science and decisions about how the available funds are to be spent are made on the advice of the Advisory Board for the Research Councils (ABRC).
- 3.2 It is proper that fundamental research priorities should be in the hands of the scientific community but it is essential that fundamental research, its implications, and its practitioners are not isolated from the process of advising Government. In some fields today's scientific discovery will rapidly become tomorrow's new products. Fundamental and applied research feed on each other and comprehensive advice will normally be derived from both. Moreover, in some areas no firm policy can be defined until fundamental research has been undertaken and knowledge advanced.
- 3.3 This implies first, that active channels of communication are needed between those in fundamental research and those formulating Government policies of all kinds; and second, that a substantial independent forum should exist for discussion of scientific issues of all kinds, their significance and their implications.
- 3.4 The terms of reference of the ABRC are:
- (a) To advise the Secretary of State on his responsibilities for Civil Science with particular reference to the Research Council system, its



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articulation with the universities and departments, the support of postgraduate students and the proper balance between international and national scientific activity;

(b) To advise the Secretary of State on the allocation of the Science Budget amongst the Research Councils and other bodies, taking into account funds paid to them by customer departments and the purposes to which such funds are devoted;

(c) To promote close liaison between Councils and the users of their research.

Regrettably, however, The Board has been so occupied with (b) that it has not been able to pay sufficient attention to the provision of advice to the Secretary of State on the broader aspects of his responsibilities for Civil Science.

3.5 The ABRC could usefully be strengthened by a small increase in its independent membership and more especially by giving the Chairman a fuller role. The Chairman, who would need to give at least two days a week to the job, could contribute substantially in discharging the unique responsibility of the Department of Education and Science (DES) for basic science, particularly at interdepartmental and international meetings. Similarly, the DES should make greater use of the scientific expertise that is available in the Research Councils, the Royal Society, the universities and other bodies that receive a substantial proportion of their funds from the Department.

3.6 In principle the DES and the ABRC together provide a mechanism by which Government could draw on the whole field of basic science and ensure that Departmental needs are being adequately supported by strategic research. The present rigid distinction in Government thinking (but not in the real world) between basic and applied science is inherently dangerous and particularly so if it leads to a view that advice can be similarly pigeon-holed.

#### 4. PRESENT ARRANGEMENTS FOR THE COORDINATION OF SCIENTIFIC ADVICE

4.1 With responsibilities for science and technology so widely distributed among departments of state, there is clearly a need for coordinating mechanisms. The matter is far too important and far too complex to be left simply to ad hoc interdepartmental consultation as and when problems arise, and to the Cabinet or Parliament or both if the problems become of sufficient political importance. This need was well recognized by Lord Rothschild (Cmnd 4814, paragraphs 56-60) who argued that the task of the Chief Scientific Adviser was a major and continuing one whose successful prosecution will greatly improve the efficiency of Government R & D. This was accepted in the White Paper (Cmnd 5046) which stated that 'The Chief Scientific Adviser to the Government has responsibility for inter-departmental coordination. He advises Ministers on the scientific and technological aspects of the Government's policies, both domestic and international.'

4.2 That was in 1972, but by 1974 the post of Chief Scientific Adviser became vacant and two years later was abolished. In retrospect one can see that, in the absence of strong support by the Prime Minister, and with the parallel growth of the Central Policy Review Staff (CPRS) (headed from 1971 to



1974 by Lord Rothschild, himself a distinguished scientist), this was inevitable. Nevertheless the arrangements for interdepartmental coordination and across-the-board advice to Ministers that have since emerged fall far short of those adumbrated by Lord Rothschild in Cmnd 4814.

- 4.3 In 1976 Government set up a new body, the Advisory Council for Applied Research and Development (ACARD) consisting largely of independent scientists and technologists from industry and the universities with the Lord Privy Seal as titular Chairman and a Fellow of the Royal Society as operative deputy chairman. In 1979 Ministerial responsibility for it was transferred to the Prime Minister herself and the chairmanship devolved on a distinguished scientist and industrialist. ACARD has been effective in defining national needs, but its role is entirely advisory - it has no responsibilities for interdepartmental coordination - and it has no funds of its own. Nor is it clear that Government takes much notice of its advice.
- 4.4 Mention has already been made of the ABRC whose activities, in spite of the potential of its membership, have been limited almost entirely to advice on the allocation of the science budget. The Department of Education and Science itself has had no remit to provide for inter-departmental coordination as it is limited by the binary classification of basic and applied research to the former. Nevertheless, due to the very nature of science, the Department has on occasion found itself having to attempt some measure of coordination in some matters (e.g. genetic manipulation, biotechnology) which cut across rigid classifications of research.
- 4.5 The Chief Scientist in the CPRS perhaps provides the nearest present day equivalent to the Chief Scientific Adviser so clearly advocated by Lord Rothschild. He is centrally placed, has access to Cabinet Office papers and can draw on scientific knowledge from a wide range of sources. Nevertheless at Under Secretary level he is junior to the Chief Scientists in the main Departments and has no mandate to secure coordination between them.
- 4.6 For many years the House of Commons Select Committee on Science and Technology provided a useful forum. It was able to draw public attention to gaps between departments in their support of science and technology, and to longer term issues that might be expected to affect Government policy and national interests as a whole. The abolition of this Committee in 1979 has been regretted by many, including the Prime Minister, and it is already evident that the new departmental Select Committees will find it difficult to provide the broad examination of scientific and technological issues that affect the policies of several departments.
- 4.7 The creation of the House of Lords Select Committee on Science and Technology in 1980 is warmly welcomed. Its first reports have been in areas that lie between departments. However, like its predecessor in the Commons, although its reports require a response by Government, its influence is inevitably less direct than that of the new departmental Select Committees.



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The unavoidable conclusion of this section of the Society's evidence is that present arrangements for interdepartmental coordination of scientific advice to Government are much less satisfactory than those which were in operation in 1971.

5. SUGGESTIONS FOR STRENGTHENING SCIENTIFIC ADVICE ON GOVERNMENT'S OVERALL STRATEGY

- 5.1 The need for some improvement in present arrangements seems particularly evident in relation to matters which affect several Departments and are considered at Cabinet level. At this level there appears to be a need for broadly based scientific advice and judgement which are not closely linked to the interests of any one Department.
- 5.2 There are several options for strengthening the arrangements for advice on matters that affect Government strategy as a whole. Among these may be mentioned: a Minister for Science, a Ministry of R & D, a Chief Scientific Adviser (separate from CPRS), a new body like the old Advisory Council of Scientific Policy, and extended powers for ABRC or ACARD or both.
- 5.3 In present circumstances which do not warrant major changes in the organization of science in Britain, it would seem that significant improvements in arrangements for the provision of advice on Government's overall strategy could better be made in other ways.
- 5.4 The Prime Minister herself has assumed responsibility for coordination of scientific research and development in Government, and in many ways this is preferable to leaving the responsibility with a departmental Minister. Coordination can only be effective if the Prime Minister wishes it to be but inevitably there are many other urgent demands on her attention, so that science (in the broad sense) will seldom get the attention that its long term needs and benefits demand. It would therefore seem necessary for the Prime Minister to have ready access to centrally located high level scientific advice.
- 5.5 The most appropriate location for such advice would seem to be in the Central Policy Review Staff (CPRS), which has a number of valuable features, especially its central position with direct access to the Prime Minister and the Cabinet Office, its concern with Government's strategy as a whole and all aspects of policy, its remit for consideration of longer term issues and its capacity to bring in able young staff on secondment.
- 5.6 Science in the broad sense is one of the major factors that must be taken into account in the CPRS, for it is a pervasive and increasingly influential element - an engine for change. It is therefore important that the CPRS should include a Chief Scientist or a Chief Scientific Adviser with the rank of at least Deputy Secretary. He would have two main functions: to coordinate scientific policy and initiate studies on projects and programmes that involve several departments (e.g. the space programme); and provide independent advice to Cabinet on major and especially controversial issues with important scientific content. These functions include an important role in coordinating British policy on scientific matters in a wide range of international organizations and in bilateral relations.



- 5.7 In order to fulfil these tasks, he will need to have a small technically qualified staff and also to draw freely on expertise and advice from other Government departments, Research Councils, ACARD and non-government bodies (e.g. the universities). The Royal Society is willing to provide a powerful link and channel of communication with the latter.
- 5.8 To be effective, the Chief Scientific Adviser must command widespread confidence and respect within the scientific community as a whole, so he should be a F.R.S., and the President of the Royal Society should be consulted on his appointment.
6. THE ROLE OF THE ROYAL SOCIETY
- 6.1 Throughout its long history the Society has been a forum for the public or private discussion of scientific and technological issues of national concern. The Society, acting corporately through its Council, has also undertaken studies of and produced reports on such matters. This activity has increased recently, some 18 studies having been undertaken in the past two years.
- 6.2 On some occasions these studies have been made in response to specific requests, for instance, when Select Committees of the House of Lords have invited the Society to give evidence, or when the Chief Scientist of the Department of Energy in 1976-7 asked the Society to comment on two draft documents on energy R & D. On other occasions the initiative has come from within the Society and its many committees.
- 6.3 Such studies are entrusted to specially selected and usually broadly based groups with memberships seldom restricted to Fellows. Advice and assistance of other expert individuals or organizations, such as the Fellowship of Engineering, are generally sought. The active involvement of Chief Scientists and others from Government Departments in these studies has been particularly valuable.
- 6.4 The duration of these groups varies; some may continue for 2-3 years, but more often reports, for example in response to official enquiries, are produced in a matter of months or less. The reports are considered and often amended by Council on whose authority they are published, sometimes in association with a public discussion meeting.
- 6.5 In this manner, the Society can provide an independent, constructively critical voice for science as a whole. In proffering advice to Government, Council is aware of the elements other than science (e.g. economic and social aspects) which are relevant to the problem and its solution, and recognizes that the Society's special competence is in the purely scientific - but not of course just pure science - aspects.
- 6.6 The Society has recently carried out one study - on biotechnology - jointly with two advisory bodies to Government and, given the right to comment independently thereafter, would be willing to consider further joint undertakings of that kind with public or private bodies.



The value of the Society's advice has been long recognized by successive Governments. This is also reflected in the statutory requirements for the Secretary of State for Education and Science to consult the President about certain scientific appointments, and the right of the Society to nominate assessors to the five Research Councils and to nominate some members of certain other public bodies. Informal consultation also occurs and the Officers of the Society would welcome an increased dialogue with Departments and with the CPRS, not only about possible candidates for senior scientific posts but also on the much broader basis of providing a ready channel to specific scientific expertise. It should be remembered that the Society's knowledge of the scientific community extends far beyond its Fellowship.

6.8 The breadth of the Society's coverage is not limited to the U.K. Its Fellowship extends across the Commonwealth and through its adherence to the international scientific unions and associations and its bilateral contacts with academies it can provide valuable information about developments in science and technology all over the world.

6.9 The Society also has a special competence in science education. Its Education Committee is supported by a series of subject committees run jointly with the appropriate professional institutions, including the Institute of Biology, the Royal Society of Chemistry, the Institute of Physics, the Institute of Mathematics and Its Applications, the Council of Engineering Institutions and the Institution of Geologists. The Society is deeply concerned to see improvements in the teaching of science and mathematics in schools at all levels. Naturally the Society has a special concern for the education of those who will go on to universities or polytechnics to study science and science-based subjects, but it is also concerned that those who study other subjects, and those whose full-time education ceases at 16-18, shall have a thorough grounding in science. The widespread failure of our education system to inculcate a proper understanding of science, mathematics and technology is a serious national problem. This deficiency is evident in both government and industry at all levels.

7. SUMMARY

7.1 Science, including all branches of natural science and mathematics and their applications, affects almost every aspect of life and the interests of all departments of Government.

7.2 The scientific advice that Government should seek may be put into three categories: advice on support for science itself, advice to ensure that any given policy of Government is soundly based in its scientific and technological aspects; advice on longer term implications of likely developments.

7.3 The implications of technological change must be taken fully into account in foreign policy and trade. Our diplomats and negotiators need to be at least as well informed in these matters as those of other major countries.



- 7.4 Arrangements for scientific advice to Government must take into account the fact that more than half of British scientific research and development is undertaken outside Departments.
- 7.5 There are serious obstacles to the flow of appropriate advice from the best scientific sources to the policy-making levels in Government. It is essential that high level scientific advisers should work as administrators and have access to policy papers so that they can assist in defining questions, not just in providing answers.
- 7.6 It was partly to meet these needs that Chief Scientists were appointed in some Departments. Council of the Royal Society views with very grave concern the erosion and down-grading of these posts which is now apparent.
- 7.7 The importance of having Chief Scientists at a high level (at least Deputy Secretary) is stressed. To be effective they must be adequately supported by technical staff and be able to draw on scientific advice from outside Government. The abolition of some 'quangos' has impaired Government's ability to draw on outside advice. New mechanisms are needed to replace the advice and valuable interactions with the scientific community outside Government which the 'quangos' provided. Chief Scientists should also feel free to call upon the Royal Society and other independent bodies for advice.
- 7.8 Responsibility for Civil Science rests with the Secretary of State for Education and Science. The terms of reference of the Advisory Board for Research Councils include advice to the Secretary of State in the exercise of these responsibilities. Regrettably, however, the Board has been so occupied with the allocation of the Science Budget amongst the Research Councils that it has not paid sufficient attention to the provision of advice on the broader aspects of Civil Science. The Board should be strengthened by increasing its small independent membership and more especially by giving the Chairman a fuller role.
- 7.9 The present rigid distinction in Government thinking (but not in the real world) between basic and applied science is inherently dangerous and particularly so if it leads to a view that advice can be similarly pigeon-holed.
- 7.10 In the sectoral system of British Government it is difficult, but essential, to ensure both that adequate scientific advice is available to each Departmental Minister and that efficient mechanisms exist for dealing with the many scientific issues that cut across departmental interests and responsibilities. The unavoidable conclusion of this review is that current arrangements for interdepartmental coordination of scientific advice to Government are much less satisfactory than those of a decade or more ago.



Noting that the Prime Minister herself has assumed responsibility for coordination of scientific research and development in Government, it would seem desirable to strengthen the Central Policy Review Staff by the appointment within it of a Chief Scientific Adviser with the rank of at least Deputy Secretary. His main function would include coordination of scientific policy, initiation of studies or projects and programmes that involve several Departments, and independent scientific advice to Cabinet on major issues with important scientific contents.

- 7.12 The Royal Society has, in recent years, increased its activity in producing broadly based reports on scientific issues of public concern. Council is ready to continue, and as appropriate to extend, this activity and would welcome an increased dialogue with Departments and the CPRS.