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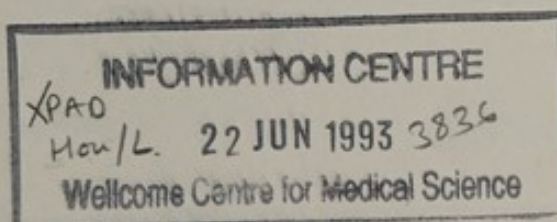
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# SYSTEMATIC BIOLOGY RESEARCH

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the House of Lords Select Committee on  
Science and Technology, 1991-92 Session

Presented to Parliament by the Prime Minister by  
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## SYSTEMATIC BIOLOGY RESEARCH

### GOVERNMENT RESPONSE TO THE 1ST REPORT<sup>1</sup> OF THE HOUSE OF LORDS SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY, 1991-92 SESSION

1. The Government is grateful to the Select Committee for its detailed study of systematic biology in the UK, and welcomes its report.
2. The Government agrees with the Select Committee that systematic biology is an important area of science, providing a fundamental tool for pure research and with applications in the environmental, agricultural, industrial, medical and other fields. Systematic biology underpins the Government's policy initiatives on the environment and biodiversity, both in the UK and in an international context. The Government will therefore continue to support systematic biology research and collections from public funds at a level necessary to maintain the UK's strong position in this field.
3. Since the Select Committee took evidence there have been various initiatives which reflect the Government's positive commitment to the future of systematic biology. These include the conclusion of a review, led and now being implemented by the Ministry of Agriculture, Fisheries and Food (MAFF) and the Scottish Office Agriculture and Fisheries Department (SOAFD) of UK policy on the *ex-situ* conservation of plant genetic resources; the review by the Natural Environment Research Council (NERC) of scientific opportunities in the field of taxonomy and its related disciplines; and the inclusion of systematic biology in the new national curriculum arrangements for science. The report of the NERC Review Group on *Evolution and Biodiversity - the New Taxonomy* was published in May 1992.
4. The remainder of the Government's response broadly follows the order of the detailed recommendations (paragraphs 9.10 to 9.33) of the Select Committee's report.

#### Funding

5. The Select Committee recommends various measures to maintain or increase funding for systematic biology (9.10, 9.11, 9.15 and 9.20)<sup>2</sup>. Whilst the Government is committed to supporting systematic biology, it has to consider its claims alongside other important branches of science and other claims on public funds. The Government also notes that systematic

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<sup>1</sup> First Report, Session 1991-92, HL Paper 22-1

<sup>2</sup> References in brackets are to paragraphs in the Select Committee's report.



biology work is often undertaken as part of other research and is not always explicitly identified as systematic biology in funding and other statistics.

6. The Select Committee recommends that core funding for systematic biology research (9.11) and for national institutions (9.20) should be maintained in real terms. The Government recognises in particular the international renown of the Natural History Museum (NHM) as an outstanding centre of systematic biology and earth sciences and will continue to take account of this in its funding for the Museum. From 1993-94 the museum will be provided with a single grant-in-aid, relieving the museum of the need to approach the Department of National Heritage (DNH) for permission to vire between budgets for running costs, building and maintenance and purchase grants, as has been the case in previous years. Between 1990-91 and 1992-93 the NHM budget has increased by 15 per cent in cash terms. The 1993-94 allocations to the NHM totals over £28 million, and takes into account the overall level of funds available for museums and galleries programmes. Decisions on the allocation of resources within each museum are for the Board of Trustees who are in the best position to decide, in the light of overall priorities, where the best interests of their own institution lie. The Government believes that the earmarking of resources to maintain levels of funding for specific functions in real terms would not allow museums the freedom to target areas which, in their assessment, warrant priority attention.

7. The Royal Botanic Gardens (RBG) at Kew and Edinburgh are valued by the Government as unique centres of excellence. In recent years the Government has increased the proportion of MAFF's overall research and development (R&D) budget spent at RBG Kew, whilst grant-in-aid for RBG Edinburgh has compared well in recent years with grants to other research bodies funded by SOAFD, and increased in real terms in 1992-93.

8. The Select Committee recommends (9.12) that the Office of Arts and Libraries (OAL) should continue to fund the Natural History Museum, (NHM) and should establish an expert advisory panel. The OAL's responsibilities have now been subsumed within the DNH, and the Government agrees that funding for the NHM should continue through this Department. NHM's requirements for funding are given careful consideration each year on the basis of its corporate plan. Due weight is given to the need to support NHM's scientific research together with other aspects of its activities, and these needs are also considered alongside the requirements of other museums and galleries supported by the DNH. The Government will keep under review the need to take specialist advice on aspects of the NHM's requirements where this seems appropriate. It will take account of the fact that the NHM is governed by a Board of Trustees



which contains several very eminent scientists who provide expert advice in the way recommended by the Committee.

9. The Select Committee recommends (9.13) that the Government should press for more systematic research in the next European Community (EC) Framework Programme. There is a long tradition of pan-European systematic research, examples being the production of *Flora Europea*, and the EC-funded investigation into deep marine benthic ecosystems. Encouragingly, a European programme for the conservation of plant genetic resources has recently been proposed. The Government will be looking both to assist the EC in the shaping of this programme and to participate fully in its operation. It is envisaged that this should involve jointly-funded initiatives including the characterisation of genetic material and training for those maintaining and using it. The Government will ensure that the Committee's recommendation is taken into account in the preparation of the Fourth EC Framework Programme.

10. The Select Committee recommends (9.14) that the Government should monitor closely the disbursement of the funds of the Global Environment Facility (GEF). The Government will continue to monitor this expenditure closely. It has committed £40.3 million to the first three year pilot phase of the GEF which is managed jointly by the World Bank and the UN Environment and Development Programmes. Officials of the Overseas Development Administration (ODA) attend the twice yearly meeting of the GEF Participants and comment on proposed projects, taking into account representations from scientific bodies and non-governmental organisations. A UK expert participates in the GEF's Scientific and Technical Advisory Panel (STAP).

11. In order to support the implementation of the Biodiversity Convention, agreed at the United Nations Conference on the Environment and Development (UNCED) in June 1992, the Prime Minister launched the Darwin Initiative for the Survival of Species. The Initiative aims to support the Convention by deploying the strengths of the United Kingdom in assisting with the conservation and sustainable use of biodiversity and natural habitats. New and additional resources, totalling £6 million over the first three years, will be made available from 1993-94 onwards to fund projects which meet the objectives of the Initiative. The Initiative will help to fund and encourage important biodiversity work both in Britain and in developing countries.

12. The Select Committee observes that systematic biology has not fared well under the Research Councils, and recommends (9.15) that the ABRC (Advisory Board for the Research Councils) should set up a fund



of £1 million per annum for five years exclusively for systematic biology research beyond the routine research activity associated with monitoring collections.

13. The ABRC is an advisory body to which the Government looks for advice on scientific priorities and on the allocation of research expenditure between the Research Councils. The Government has accordingly sought advice from the Board on this recommendation in the context of priorities for future funding of the science base. The Board agrees that systematic biology is an important underpinning and complementary discipline for many different parts of modern biology. The individual Councils reflect this in their initiatives.

14. In May 1992 the NERC announced an initiative to help revitalise taxonomic research and training relevant to the environmental sciences. Universities were offered the opportunity to bid for three five-year packages of funding, each to include two postdoctoral research fellowships with funds to support their research, two NERC research grants and support for postgraduate students attending established short courses on taxonomy in the UK or overseas. In return the universities were asked to provide a commitment to the teaching of taxonomy at both undergraduate and postgraduate level, and to maintain links with taxonomic collections relevant to their teaching and research. This novel approach encompasses the Committee's concerns for funding of more research and postgraduate training (9.15, 9.28), for undergraduate teaching in the Universities (9.26) and for links between institutions and universities (9.29). It will provide new funds totalling £2.5 million over five years, in addition to NERC's ongoing support of the order of £2 million per annum for research on systematic biology and for maintaining several collections of national and international importance. Awards under the new initiative to the University of Glasgow, the Imperial College of Science, Technology and Medicine, and the University of Reading were announced at the end of March 1993.

15. The Science and Engineering Research Council (SERC) will continue to support taxonomy research at a level of circa £250k per annum; and will investigate how advanced information technology can be applied more effectively to systematic biology. Both the Agricultural and Food Research Council (AFRC) and the Medical Research Council (MRC) consider systematic biology to be fundamental to many of their existing work programmes. The AFRC estimates that its 1992-93 expenditure on systematic biology totals some £2.5 million. In addition, AFRC institutes house some major systematic collections of plant and microbial germplasm. The AFRC intends to build on its strengths in systematic biology through the development of programmes on the ecological consequences of genetic diversity and comparative plant and animal genome mapping. Systematic



biology is increasingly supported by MRC, especially through genome mapping and the analysis of genetic variation, both in susceptibility to disease and in the adaptive responses of infectious agents. However, quantitative estimation is difficult because the work is funded according to the particular medical context.

16. Thus all the Research Councils concerned with the natural sciences consider systematic biology to be an important element of their portfolios, and actively promote its development. In view of this the ABRC does not at present see the need to single out further funds for systematic biology to place outside its, increasingly stringent, processes of review, evaluation and prioritisation. The Government has accepted this advice.

17. The Government has also invited the ABRC to advise on the Select Committee's recommendation (9.16) that Research Council grants should be open to grant-in-aided institutions. The Board supports the recommendation; it has pointed out that Research Councils are free to consider bids from any research institution, and has recommended that Councils should consider applications from grant-in-aid bodies and Government Research Agencies on their scientific merit. Since this is not the current position for all Research Council grant funding, it is recognised that such an extension of eligibility will need to evolve. AFRC have recently advertised their coordinated programme on genome analysis; this is open to bids from Government Research Establishments as well as universities and institutes.

18. The Select Committee recommends (9.17) that aid projects funded by the ODA and dependent on systematics, should, as a general rule, include funding for a UK based research project at one of the major institutions with appropriate overheads. The Government considers systematic biology to be an important target for research within the overseas development field. Financial provision will continue to be made for systematics research covering animals, plants and microbes where it is identified as an integral and necessary component of aid projects.

### **Curation of Collections**

19. The Government shares the Select Committee's view of the value of the United Kingdom's systematics collections, and agrees that they should be properly maintained and accessible (9.18). This is reflected in the growth in curation expenditure noted in the report (9.19). The Government also believes in maintaining living collections such as seeds, growing plant material and microbial culture collections. Like the museum reference collections on which the report focuses its attention, these have a requirement for long-term, high standard curation and active research.



20. The Select Committee indicates (9.19) that university and local authority holdings may have encountered financial difficulties. The Government considers that the level of expenditure on curation of these holdings is a matter for the bodies concerned, taking account of their overall priorities.

21. The Government notes the Select Committee's recommendation (9.21) that a Biological Collections Fund should be established. Modest financial and administrative support, covering biological collections held outside grant-in-aided institutions, is already available through the Museums and Galleries Commission (MGC). The MGC has recently published a guide to *Standards in the Museum Care of Biological Collections*, evolved through consultation with senior museum biologists in national and non-national museums. The Commission has been asked to keep the situation in this area under review.

22. The Government agrees with the Committee's view (9.22) that there is, as yet, no case for repatriating any of the collections. The Government is pleased to see that the national institutions adopt good practice when acquiring new specimens. For example, both RBG Kew and RBG Edinburgh obtain the permission of the appropriate national authority. Where national facilities of the donor are too poor to allow for long-term conservation, institutions are often able to hold duplicate samples in trust until proper facilities allow for their repatriation. The approach to collection of genetic resources has been commended in the UNCED discussions on biological diversity.

23. The Committee recommends (9.23) that collections should be the responsibility of a staff member who has an active research interest. The Government takes the view that good curation often, but not invariably, goes hand in hand with research.

24. The Museums Association Annual Report 1991-92 *Museums and Higher Education* was published in August 1992. That report's recommendations touch upon these made by the Select Committee.

25. The Government endorses the Select Committee's recommendation (9.24) that there should be a new forum of major systematics institutions to generate a national curatorial policy. The Government envisages that the primary role of such a forum would be the dissemination of information and good practice among bodies which maintain sizeable systematics collections. The Government intends to establish such a forum, which will also seek to build links with overseas institutions to develop an international framework for systematics. There

will also be consultation with, amongst others, representatives of the universities.

26. In addition, the Chancellor of the Duchy of Lancaster, recognising the need for a coherent national policy on the UK's microbial culture collections, has asked the Office of Science and Technology to arrange for a review of these collections to be undertaken to determine national needs and develop an appropriate strategy for the future.

### **Universities**

27. The Select Committee notes the contraction of systematic biology at British Universities as a consequence of the expansion of other areas of biological science (9.25). The Select Committee considers that systematic biology is a necessary adjunct to other biological sciences, and recommends that it should be taught to undergraduates as part of other biological science courses (9.26).

28. The Government's role in higher education is to set the framework and broad strategy within which, principally at institutional level, student and employer demand can help to shape the pattern and nature of teaching provision, while academic priorities determine the overall direction of research. The Government has no involvement in determining undergraduate curricula or the direction of university research.

29. The Select Committee's comments about the extent and perceived consequences of the contraction of systematic biology at British universities need to be seen in the context of the long-term movement in the dynamics of a scientific discipline, rapidly expanding scientific knowledge and full science syllabuses. The Select Committee recognises this in referring to the inevitable consequences of the rapid expansion of biological sciences since the late 1950s. It is desirable that new developments in science should be reflected in courses and appointments, and, as the Select Committee recognises, this process is irreversible.

30. In making judgements about what should be taught to undergraduates, higher education institutions seek to achieve balance in coverage of courses, so as to impart a body of knowledge, reach to the frontiers of research in some areas, and develop scientific and broader skills. Perceptions continue to develop as to what undergraduate biology curricula should cover, and the emphasis which should be given to particular areas. The outcome of this ongoing process of review and development within institutions is a range of courses which vary in length, mode of study, structure, and method of delivery, as well as in content.



31. The Select Committee also comments on the age structure of university systematists, and its perceived consequences. In respect of the supply of skilled manpower in particular subjects, the Government looks to employers to signal their needs. As the major employers, it is for the academic and research community to assess the adequacy of the supply of qualified systematists. It must be for that community to consider the relative place of different approaches to the study of biology in the context of evolving patterns of knowledge, and to determine and make known their own recruitment policies in response to these developments.

32. The underlying level of Universities Funding Council (UFC) funding for research rose by some 11.7 per cent in 1992-93, building on an increase of some 10 per cent in the previous year. The new Higher Education Funding Council for England has increased research grants by nearly 8 per cent in 1993-94. Funding is not earmarked for particular areas of research. It is for the universities themselves to determine their spending on different areas within the total income at their disposal.

33. The Committee recommends (9.27) that the ABRC should assess the need for taught Master of Science (MSc) courses and fund studentships and higher research degrees (9.28) in systematic biology. As previously indicated, the ABRC has an advisory, rather than an executive role in the allocation of research expenditure. The Government considers that the scientific community - in concert with the Funding and Research Councils and the user community in industry and the public service - should determine the need for trained systematists, decide whether there are any shortages in the current supply and, if so, indicate those areas in which the shortage is constraining the development of science and its application. Where higher education institutions plan to develop postgraduate training for systematic biology, it will be for individual Councils in the first place to decide whether this provision meets their own priority needs and to what extent funded studentships might then be provided. The Government is pleased to note that within the NERC initiative on taxonomic research and training, there are plans to support postgraduate students attending established short courses on taxonomy in the UK or overseas, and that commitments were sought from the successful universities to the teaching of taxonomy at both undergraduate and postgraduate level.

34. The Committee recommends (9.29) the establishment of closer links between the institutions and universities to formulate taught MSc courses, to supervise doctoral candidates and to facilitate access to molecular facilities. The Government encourages all institutions for which it has funding responsibility to develop close links with Universities, thus facilitating access to a wide range of resources including, for example, special chemical facilities, infra-red micro-spectroscopy and electron



microscopy. Institutions already have extensive links with Universities - the NHM interacts in some way with every UK university and works with a large number of overseas universities and other institutions. An example of the product of such cooperation is the MSc in systematics being established jointly by the RBG Edinburgh and the University of Edinburgh.

### **Modern Methods**

35. The Government agrees with the Committee's recommendation (9.30) that systematic biology should take advantage of modern scientific developments and that systematists should have access to molecular biology facilities in universities (9.31). The Government also encourages the national institutions to make their facilities available to scientists from other institutions. For instance, the NHM has excellent molecular biology facilities and is strengthening its international and university links in this field. Like the RBG Kew, it is also enhancing its Information Technology (IT) capability by networking and expanding existing computer systems. There is also increasing demand by external scientists for use of its electron beam facilities for microscopy and analytical techniques. Also, the RBG Edinburgh is increasing its capability to develop and apply IT and is arranging access to molecular biology expertise in universities and research institutes. Similarly, funds have been provided for the extension to the Jodrell Laboratory at RBG Kew, thus enabling this institution to expand its research capacity into plant molecular systematics and molecular biology (MAFF).

36. The Committee recommends (9.32) that research into IT for systematists should be eligible for systematic biology funds and that collaboration with the USA should be favoured. The Government believes that priorities in IT should be directed towards establishing standards and compatible software. The Government understands that the SERC already has a considerable degree of expertise in areas of IT which may be applicable to systematic biology, including novel database techniques, expert systems and remote access and interrogation methods. Any computerisation of UK collections will need to address compatibility issues.

37. The Government believes that international strengths in systematic biology will be best exploited in collaborative programmes, and notes the significant degree of collaborative work already undertaken by institutions such as the NHM and the two RBGs. The USA has recognised strengths in molecular techniques and in microbial taxonomy, and it is one of a number of countries involved in the application of IT to systematics. The Government is also aware that the Expert - centre for Taxonomic Identification (ETI) in Amsterdam intends to set up a database system of



world-wide applicability, and there are related projects in Norway funded by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and in Australia (ERIN - Environmental Resources Information Network) in addition to the taxonomically-based initiatives to which the report refers. The NHM is already collaborating in ETI, and is in close contact with those responsible for ERIN.

### **Scientific Advisory Groups**

38. The Government agrees with the Committee's recommendation (9.33) that national gardens and museums should have the benefit of expert scientific advice. Of the three major institutions, the RBGs at Kew and Edinburgh have standing scientific advisory groups and have benefited from visiting groups. The NHM is governed by a Board of Trustees which, as mentioned above, contains several eminent scientists who provide expert scientific advice in the way envisaged in the Committee's report. In addition, the NHM's science is subject to independent review by Visiting Groups of distinguished scientists drawn from leading institutions around the world. Since 1984 there have been six Visiting Groups covering the areas of Palaeontology (twice), Entomology, Mineralogy, Zoology and Botany.

