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ANNUAL REPORT & ACCOUNTS 2001-2002

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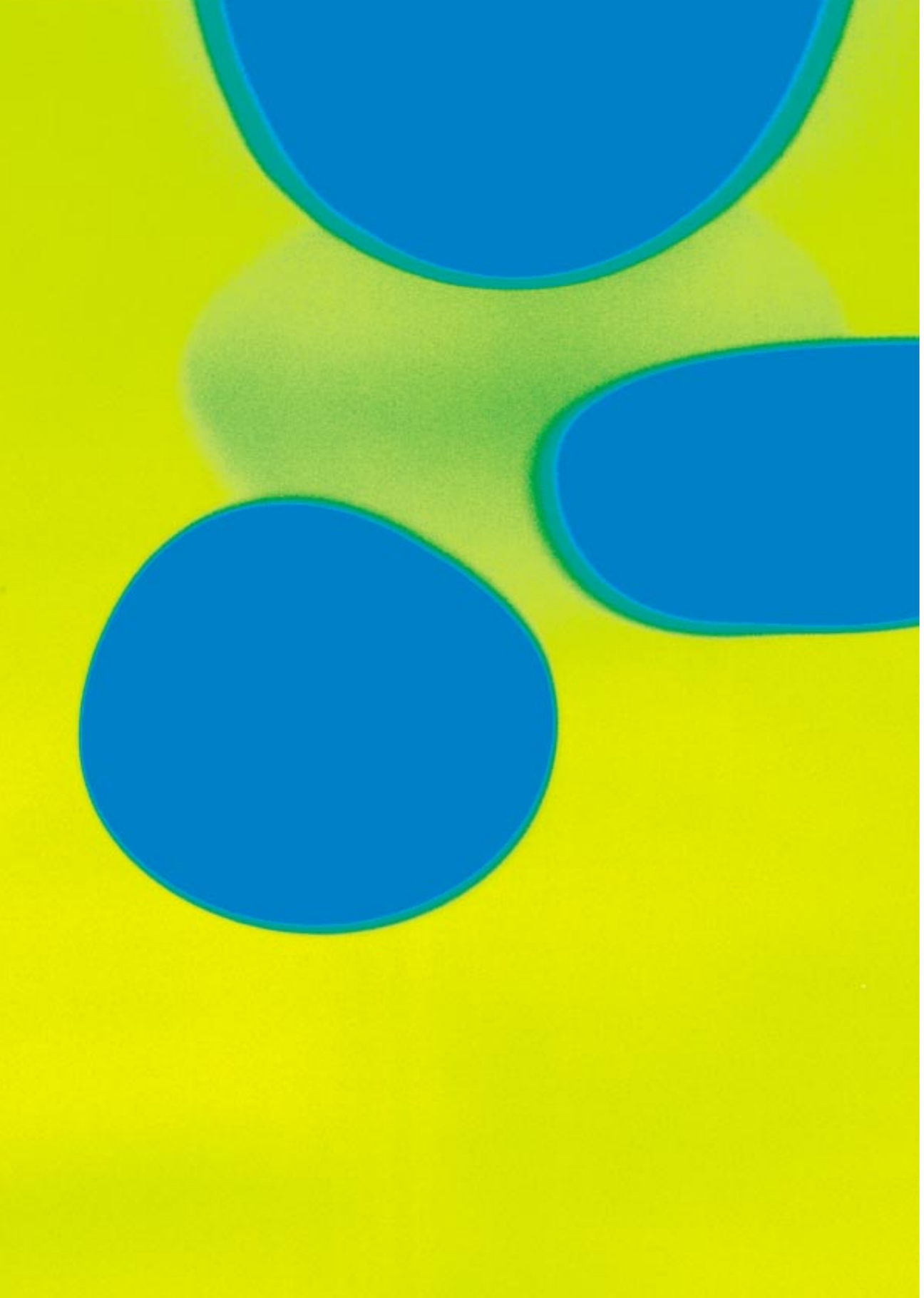
biotechnology and biological sciences research council



BIOTECHNOLOGY AND BIOLOGICAL SCIENCES RESEARCH COUNCIL

ANNUAL REPORT AND ACCOUNTS 2001-2002

Presented to Parliament by the Secretary of State, and by the Comptroller and Auditor General, in pursuance of Schedule 1, Sections 2 (2) and 3 (3) of the Science and Technology Act 1965.

Ordered by the House of Commons to be printed 11 July 2002.

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bbsrc
biotechnology and biological sciences research council

The Biotechnology and Biological Sciences Research Council (BBSRC) is the UK's principal funder of basic and strategic biological research. This covers topics such as:

- **genomics, molecular biology, cell biology and bionanotechnology that provide a basis for new technologies in the healthcare, food safety, plant and livestock breeding, and bio-processing sectors;**
- **whole organism biology relevant to our understanding of diet and health, ageing, animal health and welfare, infectious diseases and immunity, and crop productivity;**
- **and biological populations and systems that support agricultural sustainability, biodiversity and novel bio-based processes in manufacturing.**

We help to ensure that the UK has the high calibre scientists and the research infrastructure to remain a world leader in the biological sciences. We encourage knowledge transfer from research into business and policy applications and we foster public dialogue about advances in research and their implications.

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The Biotechnology and Biological Sciences Research Council, as required by Schedule 1 to the Science and Technology Act 1965, submits the following Report on its activities during the period 1 April 2001 to 31 March 2002.

Dr Peter Doyle CBE FRSE — Chairman

Professor Julia Goodfellow CBE — Deputy Chairman and Chief Executive

Chairman's introduction

I was delighted to accept the invitation of the Secretary of State to remain Chairman of BBSRC for an additional year, until May 2003. The rapid pace of advance in the biosciences continues undiminished, as does the challenge to deploy our resources most effectively in order to maintain the UK's leading position in critical areas such as stem cell biology, genomics and structural biology.

Our science is becoming evermore pervasive, not just in our traditional domains of healthcare, food, agriculture and the environment but increasingly in nanotechnologies that will form the basis of new industries, for example, in sensors and diagnostics, materials science and energy technologies. With the launch of Research Councils UK in May 2002, we have exciting new opportunities to benefit from expanded interactions with our sister Councils to push forward these areas of science. We look forward to contributing fully and to gaining "added value" for our activities that support the UK bioscience base and technological innovation arising from it.

It is a great pleasure both to welcome Professor Julia Goodfellow as Chief Executive from 1 January 2002; and to record the Council's gratitude to her predecessor, Professor Ray Baker who led the BBSRC through most of the period of this Report. The year has witnessed the importance of the biosciences in ways that we would not have wished - in the Foot-and-Mouth Disease epidemic, in heightened concerns about bioterrorism, in so-called superbugs that are resistant to antibiotics, and in attacks on scientists engaged in work that involves the use of animals. But there have also been very positive signs, for example in progress towards gene- and cell-based therapies and in the wealth of data emerging from the genomics programmes. No one underestimates the challenges, but the opportunities are enormous and I am confident that bioscience research, and the BBSRC itself, will continue to be a UK success story.

RESEARCH COUNCILS UK

Research Councils UK was launched in May 2002 as a new body that will enable the Research Councils to work collectively alongside the Office of Science and Technology. It comprises the Chief Executives of the seven Research Councils and is chaired by the Director General of the Research Councils, Dr John Taylor OBE FREng FRS.

Dr Peter Doyle CBE FRSE
Chairman
July 2002

Council Membership (as at 1 April 2002)

Dr Peter Doyle CBE FRSE	Chairman
Professor Julia Goodfellow CBE	Deputy Chairman and Chief Executive
Mr Mike Calvert OBE	Chief Executive, Royal Agricultural Society of England
Mr Derek Davis	Department of Trade and Industry
Professor Howard Dalton FRS	Department for Environment, Food and Rural Affairs
Professor Robert Freedman	University of Kent at Canterbury
Mr John Graham	Head of Rural Affairs Department, Scottish Executive
Professor Keith Gull	School of Biological Sciences, University of Manchester
Professor Doug Kell FIBiol	Institute of Biological Sciences, University of Wales, Aberystwyth
Professor Tom Kirkwood	University of Newcastle upon Tyne
Professor Chris Leaver CBE, FRS, FRSE	Department of Plant Sciences, University of Oxford
Professor Tony Nash	Department of Veterinary Pathology, University of Edinburgh
Dr John Padfield	Chief Executive, Nycomed Amersham Imaging
Dr Alistair Penman FIFST	Unilever Research
Dr Ian Ragan	Lilly Research Laboratories
Professor Cheryl Tickle FRS	University of Dundee

Professors Peter Schroeder and Margaret Stanley and Dr David Shannon served during 2001-2002. Details of Council Members' interests are available from BBSRC.

Chief Executive's report

One of my first acts as Chief Executive has been to challenge our research community and our wider stakeholders to consider and share with us views about the likely trajectory of biological research in the coming decade and BBSRC's role in it. This will culminate, at the end of 2002, in the publication of a ten year vision for BBSRC that will be informed by these consultations and will set out our strategy for seizing the opportunities and meeting the challenges ahead.

In making these plans, our thinking is led by science and by consideration of changing national and international requirements. This does not imply that there is something that "needs fixing". Indeed, as this Report illustrates, assisted by additional funding from recent spending reviews, BBSRC is continuing to support world class research, to push forward into new and exciting areas at the interface between the biological and the physical sciences and to promote knowledge transfer for innovation in industry. However, as a country and as a research community we (alongside others) do not have the resources to do everything at the highest levels of international competition. BBSRC is receiving an increasing number of applications for funding, and the quality of the proposals is also increasing. Our accounts show that planned early commitment of funds allocated for the Spending Review 2000 programmes, e.g. Exploiting Genomics, resulted in a deficit for the year, all but £2M of which is offset by existing reserves. Whilst our budget remains under control, the position remains very tight, with particular pressures on pay and related expenditure. For the present, we must focus on those areas of fundamental research in which we excel - for example, in genomics, informatics, stem cell biology, chemical signalling between and within cells, and structural biology – and those strategic areas where we can support policy development and innovation – for example, in healthcare, sustainable agriculture, food safety, bioprocessing and bio-materials.

We must also identify areas in which we need to collaborate, both nationally and internationally, to effect the best return for research investment. Several examples of such collaborations are given in this Report, but I would like to mention especially BBSRC's commitment to develop effective links with research centres in China. My predecessor established a basis for such collaborations and two Swindon Office Directors, Professor David White and Dr Doug Yarrow, recently visited China as a prelude to more formal arrangements being put in place, possibly along the lines of our successful Japan Partnering Awards (page 16).

I am particularly pleased that BBSRC has made a significant contribution to infrastructure and networking of resources in the UK, especially in emerging scientific areas such as bionanotechnology and E-science (page 15). I am also pleased that we have continued to seek ways of improving the attractiveness and quality of postgraduate training and of raising the quality of PhD applicants and graduates. I look forward to seeing how our forthcoming pilot programme of postgraduate training accounts (page 14) might contribute to achieving these objectives.

This year, we have seen encouraging signs that our activities to promote knowledge transfer and to stimulate researchers to exploit their findings commercially (pages 10-13) are leading to a culture shift, in which individuals develop their own combination of approaches, and customised solutions.

The completion of the latest four yearly assessment of the eight BBSRC-sponsored research institutes, at the end of 2001, coincided roughly with the publication of the Report of The Policy Commission on the Future of Farming and Food, chaired by Sir Donald Curry. The institutes are an important part of the UK's strategic research capability, particularly in providing unique facilities for the science that supports developments in the agriculture, land use and food sectors. The Institute Assessment Exercise (IAE) demonstrated the high standard of their achievements and confirmed that many have developed formal and effective procedures for knowledge transfer. The Curry Report recommended establishment of a new "priorities board" for strategic research that would interface with other bodies, including the Research Councils who fund the core basic science and levy body funders of applied research. Proposals to "join up" research funding in this way resonate with BBSRC's desire to enhance the stability of the funding mix at institutes and to ensure that they are able to deliver their missions by taking basic research through to strategic and applied outcomes. We are pursuing these issues with key customers of the institutes, including the Department for Environment, Food and Rural Affairs (DEFRA).

To take account of possible changes in the requirements of DEFRA and other funders, following the Curry Report, and in the light of the IAE findings, BBSRC set core strategic budgets for the institutes for 2002-2004 that are designed to provide them with both stability and flexibility. Overall, BBSRC spend on institutes over this period will increase by 4%. I am pleased to record my thanks to the Directors and staff of the institutes for their dedication and commitment

"I am particularly pleased that BBSRC has made a significant contribution to infrastructure and networking of resources in the UK"

Providing the appropriate research base to support control of infectious diseases of livestock was one of the themes at our first "Working Together" event, at which we invited views from academics, veterinarians, farmers, industrialists from the food manufacturing and retailing sectors, NGOs, policymakers and others. We were delighted that Professor Sir Brian Follett was able to give the introductory address. The BBSRC submitted evidence to the Royal Society inquiry into diseases of livestock, chaired by Sir Brian, and we await his report with interest.

In a year of many reviews, the outcomes of which potentially impinge on BBSRC's activities (including the DEFRA review of research priorities and the Quinquennial Review of Horticulture Research International) we have set up our own review processes. A group, under the chairmanship of Professor Keith Gull, is considering the role and research infrastructure of the Pirbright Laboratory of the Institute for Animal Health (IAH) which was the national centre for sample analysis during the 2001 Foot-and-Mouth Disease epidemic. The group will report in summer 2002. I have also set up reviews of BBSRC funded research in structural biology and that relevant to sustainable agricultural practices, and on the role of IAH in research on Transmissible Spongiform Encephalopathies.

It is a pleasure to record the Council's thanks to Professor Chris Bostock and Dr Alex Donaldson who led IAH's enormous contribution in the diagnosis and monitoring of the 2001 outbreak of Foot-and-Mouth Disease, and to welcome Professor Paul-Pierre Pastoret who will take over as Director of IAH when Professor Bostock retires this year. Professor Pastoret's experience and expertise in viral diseases, immunology and vaccination will be important in promoting the European profile of the institute.

On a personal note, I thank my predecessor, Professor Ray Baker, Council, Board and Committee members and the staff at the Swindon Office for their hard work on behalf of BBSRC; and I look forward to working with my fellow Chief Executives in Research Councils UK as we address challenging generic issues for UK science.

Professor Julia Goodfellow CBE
Chief Executive
July 2002

BBSRC at a glance
(a statistical overview)

2001-02

BBSRC- SPONSORED INSTITUTES

Babraham Institute (BI)

Institute for Animal Health (IAH)

Institute of Arable Crops Research (IACR)

Institute of Food Research (IFR)

Institute of Grassland and Environmental Research (IGER)

John Innes Centre (JIC)

Roslin Institute (RI)

Silsoe Research Institute (SRI)

BBSRC SENIOR STAFF

Professor Julia Goodfellow CBE
Chief Executive

Vacant
Director of Human Resources

Mr Steve Visscher
Director of Finance and Administration

Professor David White
Director of Science and Technology

Dr Doug Yarrow
Director of Corporate Science

BBSRC STAFF

On 1 April 2002, 2076 staff were employed on indefinite contracts in institutes sponsored by the BBSRC and in the BBSRC Office. Of the indefinite staff, 871 were in the science category, of which 94% were graduate or equivalent level.

A further 1214 members of staff, mainly scientists, held period appointments funded by BBSRC directly (740) or by industry and other external sources (474).

The number of women in senior posts in BBSRC increased. Women now occupy 15.9% of Band 1 to Band 4 posts. The comparable figure for 2000-2001 was 15.7% and in 1999-2000 it was 14.5%.

RESEARCH FUNDING – ANALYSIS OF GROSS EXPENDITURE £244.4M

BY TYPE OF SPEND	(£M)
Core Strategic Grants[1]	55.3
Responsive Research Grants	77.3
Studentships/Fellowships	28.2
Equipment and Facilities	27.4
Research Initiatives	31.7
Capital and Buildings	17.5
Administration	7.0

1 Includes Horticulture Research International and Edward Jenner Institute for Vaccine Research

BY SCIENTIFIC AREA	
Agri-Food	37.4
Animal Sciences	30.2
Biochemistry and Cell Biology	25.6
Biomolecular Sciences	18.9
Engineering and Biological Systems	15.0
Genes and Developmental Biology	33.6
Plant and Microbial Sciences	32.2

INSTITUTE FUNDING (£K)

Institute	BBSRC CSG[1]	BBSRC Other Funding	DEFRA/FSA[2]	Other Govt. Departments	Industrial Contract Income	Industrial Link	Other Research Income (incl. Charities)	EC International	Other Sources	TOTAL INCOME
IAH	7,227	2,192	9,343	1,543	1,124		175	998	4,239	26,841
BI	9,203	1,115	160	869	789	29	1,198	73	2,387	15,823
IGER	4,222	564	6,495	304	1,233	94	14	772	1,580	15,278
IACR	9,098	2,485	6,356	1,960	3,005		112	1,385	2,518	26,919
JIC	10,834	3,003	1,461	331	2,053		824	1,304	1,950	21,760
IFR	8,480	595	1,582	12	714	323		1,320	809	13,835
SRI	3,184	337	2,461	764	1,210	953		184	1,003	10,096
RI	3,449	1,574	1,855	283	2,679	728	108	491	1,620	12,787
TOTAL	55,697	11,865	29,713	6,066	12,807	2,127	2,431	6,527	16,106	143,339
2000/01 Comparatives	53,842	9,760	30,189	6,412	13,846	2,682	2,145	6,521	18,879	144,276

1 Core Strategic Grant includes Capital Equipment and Minor Works but excludes Major Works spend.
2 IAH excludes exceptional income from Foot and Mouth Projects

CENTRES FOR STRUCTURAL BIOLOGY

Bloomsbury (Birkbeck College and University College, London)
Cambridge and East Anglia (Universities of Cambridge, East Anglia, BI, JIC)
Centre for Protein and Membrane Structure and Dynamics (Daresbury Laboratory)
Imperial College London
North of England (Universities of Leeds, Manchester, Sheffield and UMIST)
York

INVESTIGATING GENE FUNCTION CONSORTIA CO-ORDINATORS

York *(Arabidopsis)*
Horticulture Research International (Brassicas)
JIC and Scottish Crop Research Institute (Cereals)
University of Cambridge *(Drosophila)*
RI (Farm and veterinary animals)
JIC *(Streptomyces)*
Hinxton (Mouse microarrays)
UMIST (Third generation proteomics)

SUMMARY OF GRANT APPLICATION AND SUCCESS RATES

	2000-01			2001-02		
	July	Nov	Feb	July	Nov	Feb
Number	**458**	**385**	**410**	**552**	**512**	**520**
% success	**38**	**39**	**36**	**35**	**32**	**31**

APPLICATION AND SUCCESS RATES BY GENDER

Percentage of female applicants for peer reviewed funding

	1996	1997	1998	1999	2000	2001
Project Grants	14.5	14.3	17.0	16.6	16.1	14.8
Programme Grants	16.1	16.3	15.6	12.6	13.0	15.2
New Investigators	20.2	22.1	26.1	21.3	24.5	24.1
Fellowships	31.0	29.3	27.0	31.7	28.6	33.3

Percentage of successful applications from total applications

	1999		2000		2001	
	Male	Female	Male	Female	Male	Female
Project Grants	36.8	41.7	37.5	37.2	36.2	34.7
Programme Grants	36.5	28.2	27.9	32.4	28.1	33.3
New Investigators	37.4	43.0	30.2	22.2	32.1	24.1
Fellowships	6.4	7.8	12.6	10.5	14.8	4.5

STUDENTSHIPS

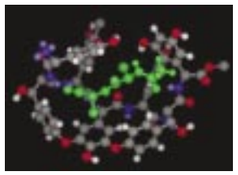
BBSRC Studentships as at 31 March 2002. Total Funding by scientific area for 2001-2002 was £15.6M. The number of students totalled 2016

Area	Number of Students
Agri-Food	205
Animal Sciences	354
Biochemistry & Cell Biology	406
Biomolecular Sciences	238
Engineering & Biological Systems	214
Genes & Developmental Biology	260
Plant & Microbial Sciences	286
Equipment and Facilities	53

BBSRC FUNDING TO UNIVERSITIES – TOP TWENTY FIVE UNIVERSITIES BY GRANT FUNDING FROM BBSRC

University	Research and capital grants (£M)	Postgraduate funding (£M)	Number of postgraduate students as at 31.03.02	Number of Fellowships as at 31.03.02
York	9.69	0.97	83	3
Cambridge	8.26	2.77	210	13
Manchester	6.99	1.58	135	4
Imperial College London	5.32	0.79	64	1
Oxford	5.17	1.26	86	5
Nottingham	4.77	1.28	113	2
Glasgow	4.50	0.49	40	3
Birmingham	4.44	1.04	89	0
Edinburgh	4.41	0.83	71	2
Leeds	3.95	1.09	92	1
Sheffield	3.93	0.91	77	3
University College, London	3.76	1.35	99	2
East Anglia	2.92	1.15	93	0
Reading	2.73	0.50	45	1
Bristol	2.63	0.91	74	2
Southampton	2.37	0.47	42	0
Sussex	2.32	0.33	24	1
University of Wales, Aberystwyth	2.24	0.11	8	0
Liverpool	2.07	0.26	23	0
Newcastle	1.96	0.61	53	1
Warwick	1.80	0.64	49	1
UMIST	1.77	0.30	27	0
Dundee	1.55	0.57	45	1
Kings College, London	1.54	0.26	21	0
St Andrews	1.43	0.40	28	2

"Twinning" antibiotics may help overcome superbugs



A vancomycin group antibiotic (grey, with its oxygen atoms in red and nitrogen atoms in blue) binding to the bacterial cell wall analogue precursor N-acetyl-D-Ala-D-Ala (green). (Courtesy: Professor Dudley Williams).

"Memory" gene in plants

Scientists at the John Innes Centre (JIC) have identified and isolated a gene that enables plants to "remember" that they have been exposed to a period of cold early in their growth. It works by locking the activity of another gene into the "cold" position, even when the plant subsequently experiences warmer conditions. This is the latest advance at JIC in understanding the genetic control of vernalisation – the process by which some plants delay flowering until after experiencing a significant cold period. Interestingly, the new gene resembles one that provides a similar chemical memory in fruit flies.

Vancomycin is the antibiotic of last resort against bacteria that have become resistant to all others. But even it is now being resisted by some disease-causing organisms. Scientists at the University of Cambridge have discovered important clues about how vancomycin works, how bacteria become resistant to it, and most significantly, how antibiotics might be deployed as "double molecules" to overcome this resistance.

Normally, the vancomycin family of antibiotics kill bacteria by sticking to a molecule that is used in making the bacterial cell wall. They attach to the amino acid alanine, at the end of the molecule. Bacteria with a lactate group at this position instead of alanine are resistant to vancomycin. The Cambridge team found that some antibiotics readily form pairs (dimers). These dimers bind strongly to the surfaces of models of resistant bacteria. These include the strongly dimerising antibiotic chloroeremomycin (the precursor of a semi-synthetic glycopeptide from Eli Lilly that is now in clinical trials for use against vancomycin resistant enterococci).

Dimers of this antibiotic bind over 250 times more tightly to the surfaces of these model bacteria than is found for binding in free solution. The work suggests that the enhanced activity of strongly dimerising antibiotics against resistant bacteria is due, at least in part, to enhanced surface binding.

Below: The willingness of mink to put varying amounts of effort into obtaining new features for their accommodation indicates which they value most. (Courtesy Dr Georgia Mason).

UNDERSTANDING ANIMALS' PREFERENCES

Scientists at the University of Oxford have developed ways of studying how important something is to an animal by measuring how much effort the animal is willing to expend to obtain it. Significantly, they have linked behavioural information about preferences to changes in body function associated with different levels of stress. In these experiments, mink were given the opportunity to push through weighted doors to obtain a variety of environmental features such as "toys", extra space, an alternative nest site and water to swim in. The doors were then made increasingly heavy and the animals' responses recorded. The mink were found to do the most work to reach the swimming bath. If access to this was withdrawn, the animals then showed raised levels of the stress hormone, cortisol.

This research was co-funded by the Universities Federation for Animal Welfare. It provides a basis for objective assessment of animal preferences in a range of conditions, including accommodation for livestock and laboratory animals.

Customising proteins for nanotechnology

Starting with a protein called rop that exists as a compact bundle of four alpha helices, scientists have developed a new bio-material that has many potential applications in bioelectronics. (Diagram courtesy of Dr Franco Gilardi).

Using assemblies of proteins and other biological molecules to act as tiny sensing devices is one of the exciting possibilities of nanotechnology (see also page 15). But to achieve its potential we need to expand the repertoire of naturally occurring proteins. Scientists at Imperial College have exploited their knowledge of the structure of proteins that are involved in biological electron transfer to design novel sensors for enzymes that are involved in a wide range of biotechnological and bio-medical applications - in drug and food processing, in pollution degradation and in catalysis.

They also demonstrated how new functions can be introduced in existing proteins, beyond their physiological role.

They have developed and successfully implemented a method for altering a small and stable protein involved in nucleic acid binding so that it can now hold a redox element that interacts electrochemically with the target enzymes. From this they have produced a novel bio-material that can be adsorbed onto the surfaces of electrodes, converting them into highly specific sensors for the enzymes.

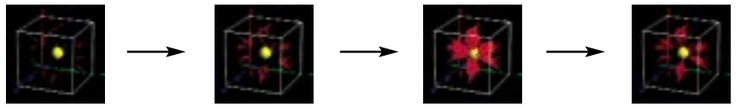
Biomathematics of tumour growth and wound healing

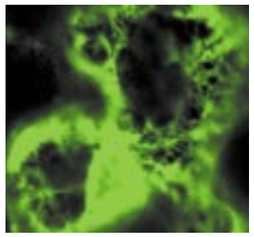
Many biological processes including embryo development, wound healing and the growth of tumours involve cells migrating into tissues to form new blood vessels, in response to molecular signalling molecules in their vicinity.

Mathematicians at the University of Dundee have developed a novel three-dimensional simulation model of blood vessel growth, through a combination of experimental measurements of cell migration behaviour under conditions that mimicked those found in tissues, and mathematical modelling of the response of individual cells to their microenvironment. The result is a system that enables them to begin to predict migration of cancer cells into healthy tissue - something that has clear implications for understanding the spread of secondary tumours and for determining how much tissue should be removed from around tumours. The model also enables researchers to investigate questions about the role of individual signalling molecules in stimulating cell movement migration and proliferation.

The work is now being extended to explore cell migration, proliferation and blood vessel development in wound healing.

Frames from an animated simulation of blood vessel (red) initiation around a tumour (yellow). (Courtesy: Dr Mark Chaplain).





Gene that helps plants cope with stress

A fluorescent marker protein accumulates within the secretory pathway of plant cells that express a mutant form of a protein that responds both to stress hormone and facilitates export from the cells. In a normally functioning cell, no fluorescent marker is seen to accumulate in the cells. (Photo: courtesy Professor Mike Blatt).

Scientists at the University of Glasgow have made an important discovery about how plants respond to stresses such as drought and wounding. They have found a gene that codes for a protein which the plant uses to respond to the stress hormone abscisic acid, for example, by shutting down water loss at times of drought. Significantly, the same protein also helps to transport proteins within cells and between membranes This is the first evidence linking hormone signalling with membrane traffic and cell volume control. Knowing more about the molecular basis of these interactions should help us to understand, and possibly improve, how plants adapt to widely varying and often hostile conditions.

Healthy foods?

Fruits and vegetables are rich in naturally occurring chemicals that are thought to contribute to preventing degenerative diseases and maintaining "optimal" health. Scientists at the Institute of Food Research are using a basic and mechanistic approach to investigate these "phytochemicals". They have identified several key enzymes that control both the amounts absorbed and the nature of metabolites in the circulation and target tissues. They found that dietary phytochemicals behave differently to drugs; firstly, because the doses are smaller and the body is able to efficiently label all the material for eventual excretion, and secondly because the "active" forms are not those ingested.

This provides a new framework for investigating the contribution of phytochemicals to good health and for identifying which metabolites are most important in which tissues. It is funded in part through the EU programme Polybind.

Foods rich in phytochemicals such as flavonoids, isoflavones and glucosinolates, include those commonly perceived as "healthy" and others that are not thought of in this way. (Photo: courtesy Institute of Food Research).

Intelligent weed sensing

Controlling weeds in crops could be made more efficient by the use of vision-guided devices that treat the weeds only and not the rest of the field. Engineers and physicists at the Silsoe Research Institute are developing the imaging and mathematical tools necessary for machines that can sense weeds very accurately. They have developed models for segmenting images so that plants can be precisely distinguished from their background and shadows, and can be "recognised" under different conditions of light and shade.

Image with sun and shadow illumination. Left, original image; middle, transformation to remove the effects of illumination spectral changes; right, thresholded image distinguishing vegetation and soil. (Courtesy: SRI).

UPDATE ON INITIATIVES

BBSRC's Exploiting Genomics initiative is helping to ensure that the UK can capitalise upon the availability of genome sequences of plants, animals and microbes and the significant advances in genomic technology. Eighteen awards were made in the first round of the initiative, totalling £13M. These include support for research at the University of Birmingham into gene activity in the food poisoning bacterium *E coli*, including that associated with its ability to survive under different conditions and to recover from injury; and research at the University of York into the evolution and potential industrial application of plant enzymes (glycosyltransferases) that are involved in hormonal regulation, response to stresses such as wounding and herbicide treatment and in synthesis of plant compounds.

Major awards were also made to scientists at Roslin Institute to study the genetic basis of porcine reproductive and respiratory syndrome; and to researchers at the University of Bath for studies on a bacterial predator of insects.

The UK needs to continue to develop new techniques and technologies and this requires the skills of biological scientists combined with those of physical scientists and engineers. One aspect of the initiative "Post Genomic Technologies" was focused on this aim and was supported jointly by the Engineering and Physical Sciences Research Council.

Experimental Research on Ageing is aimed at underpinning healthcare strategies that will increase healthspan and so improve the quality of life for older people. Eighteen awards have been made totalling £4M. These include support for identification of the basis for decreased immune responsiveness with ageing (Royal Free and University College Medical School); and age-related changes in neuro-hormonal signalling (University of Newcastle).

See also page 16 for international workshop on ageing research.

We have made fifteen awards under our **Comparative Development** initiative that addresses how distinct species use similar genetic processes (conservation) and how genetic differences relate to variation in the characteristics of plants, animals and microbes (diversity). An example is collaborative research between scientists at the John Innes Centre and the University of Edinburgh that uses *Antirrhinum* as a model to identify genes that regulate development and evolution of plant organs.

They're not antennae but eyes! Males of the species Cyrtodiopsis dalmanni have greatly exaggerated eyestalks that are sexually attractive to females. Researchers at University College London are studying the genetic basis of the development and evolution of such novel traits and their role in sexual selection and male/female differences. (Photo: Sam Cotton, Department of Biology, University College London).

Eight projects, totalling £3.2M, have been funded so far under the fifth round of BBSRC's **Biology of the Spongiform Encephalopathies Programme**. New projects include structural studies of prion protein, how the protein is taken up by intestinal and nervous tissue, and its impact on cells of the sheep immune system. In 2002, BBSRC and other public funders of research into this family of diseases jointly awarded an additional £7M for studies towards the development of diagnostic tests for human and animal health.

Generating new bio-business

BBSRC encourages and equips scientists to identify the commercial potential of their research and exploit it through a variety of routes.

Spin out and start up companies
Babraham Institute's trading subsidiary, Babraham Bioscience Technologies Ltd, and KS Biomedix Holdings formed Discerna Ltd in June 2001. The company will develop a new technology (ribosome display) arising from research at the Institute that promises pharmaceutical, diagnostics and other biotech companies a faster way to characterise antibodies and candidate drug targets. A key feature is that this approach uses mammalian rather than bacterial ribosomes, ensuring correctly folded mammalian proteins.

Start up company Protenix Ltd, developed tangentially from BBSRC-funded research at the University of Sussex and launched in May 2001 is developing cost-effective experimental tools to relieve bottlenecks in analysis of cell proteins (proteomics). The company now funds a BBSRC CASE student working on the proteome of rice.

New incubator
A £13M plant and microbial genomics unit was established at the John Innes Centre (JIC) in July 2001. Funded jointly by the agribusiness company Syngenta, the East of England Development Agency, BBSRC and the John Innes Foundation, the new Centre will accommodate separate JIC and Syngenta laboratories and a bioincubator for new companies. The Centre is managed by Plant Biosciences Ltd, the intellectual property company for the JIC and the Sainsbury Laboratory.

University Challenge Fund
Several BBSRC-sponsored institutes receive support under the Government's University Challenge Fund that provides early stage finance for promising business ideas. At the Institute of Grassland and Environmental Research (IGER), the Fund supports a project with MolecularNature Ltd, a spin-out company from IGER that focuses on high value natural products from plants, and another on the application of gene marker techniques in breeding turf and amenity grasses. The John Innes Centre, the Sainsbury Laboratory, Plant Bioscience Ltd, the Institute of Food Research, the University of East Anglia and the University of Essex were jointly awarded £3M from the Fund, to which the partners have contributed a further £1M in total. This is providing seed funding for businesses that are commercialising research findings from the partners. University Challenge Funding is also contributing to schemes to help commercialise research findings from the Babraham Institute and Roslin Institute.

A new stay-green grass for lawns and other amenity areas has been developed by British Seed Houses Ltd and launched commercially in spring 2002. It derives from research funded by BBSRC and its predecessor (AFRC) at the Institute of Grassland and Environmental Research that identified the genetic basis of this trait in a wild fescue grass and enabled its crossing into ryegrass which is suitable for lawns. Other BBSRC funded research at IGER has characterised the biochemical mechanism underpinning the chorophyll retention responsible for persistent green pigmentation.

"A £13M plant and microbial genomics unit was established at the John Innes Centre (JIC) in July 2001"

The new facility at JIC.

IGER researchers Drs Danny Thorogood (left) and Dai Hides with the stay green grass.

Bioscience Exploitation Guide

In October 2001, BBSRC published its Bioscience Exploitation Guide which is designed to give researchers practical advice on how to take research findings into the commercial arena. Supported by a web site, the Guide includes case histories and draws upon the experience and expertise of knowledge transfer professionals. It includes sections on:

- ***evaluation of market potential;***
- ***intellectual property and patenting strategies;***
- ***exploitation routes;***
- ***sources of funding and investment;***
- ***and specialised support networks.***

Centre for Novel Agricultural Products

BBSRC is a major funder of research at the new Centre for Novel Agricultural Products (CNAP) established at the University of York in 2001. The Centre is aimed at bringing together researchers from across the biological, biomedical and materials science fields to exploit plant and microbial cells as factories to make useful biological products. A key feature is the integration of curiosity-driven and target-led research with feed through to a programme of commercial development. CNAP is funded in part by a Joint Infrastructure Award to the Biosciences Department at York and receives funds from the Garfield Weston Foundation and the Department for Environment, Food and Rural Affairs.

LINK

Funded by the **Applied Biocatalysis** LINK programme, researchers at the University of Oxford and the Epsom-based biotech company ABgene jointly developed and commercialised a modified enzyme for multiplying pieces of DNA. This enzyme dramatically increases the efficiency of genome analysis and is being used in the project to map the Human Genome. Research is continuing at Oxford to design and develop even more sophisticated designer enzymes for biotechnology.

Inpharmatica – in a new LINK project to provide the all important structural information about proteins implicated in specific diseases so that these can be targeted by drugs. (Photo: Inpharmatica Ltd)

Identifying virulence factors in the yeast *Candida glabrata*, which causes opportunistic infections especially in immunocompromised patients, is the aim of one of four projects being funded by BBSRC under the **Applied Genomics** LINK programme. The work, at RPMS Imperial College London, is aimed at finding targets for novel antifungal drugs. A project at the University of Cambridge is investigating proteins that regulate cell division in humans, and how this control is lost in cancers, by studying corresponding and very similar proteins in the fruit fly.

Also under this programme, BBSRC is funding a collaboration that brings together the protein structure analysis skills of scientists at University College London (UCL) with drug discovery skills of Inpharmatica Ltd. The company was founded in 1998 on the basis of research at UCL, and has developed and marketed key technologies for predicting and assessing the function and "druggability" of protein targets. The new research will contribute crucial information needed to aid the design of more efficient and safer drugs targeted to individuals.

Generating new bio-business

The Biotechnology Young Entrepreneurs Scheme (YES) is now in its sixth year. It enables undergraduates and postgraduates/postdoctoral researchers to learn about and practise the business planning and commercialisation skills needed to take research findings to the market place. By developing proposals for imaginary new companies based on bioscience research, teams learn how to evaluate market potential, protect intellectual property and obtain financial backing. They then compete in presenting their proposals to a panel of experts.

A team from the John Innes Centre won the 2000-01 competition with their proposal for a "no-mow" grass for golf courses – a grass genetically modified so that it never needs cutting. They beat 28 other teams, including five other regional finalists, to win the Competition. Sponsors of the Competition include: BBSRC, the Gatsby Charitable Foundation, the Medical Research Council, GlaxoSmithKline, Scottish Enterprise, Apax Partners, Eric Potter Clarkson and the University of Nottingham.

The John Innes Centre winners of the Biotechnology Yes Competition.

In May 2001, BBSRC and the University of Nottingham jointly organised a careers workshop for former participants of YES, to help them exploit their experience and to highlight different commercialisation routes and opportunities. Discussions are underway with the Science Enterprise Centres to extend the concept of YES to other sciences.

BBSRC took the lead in organising the second (2001-02) UK Bioscience Business Plan Competition which is supported financially by the BBSRC, the Medical Research Council, AstraZeneca, the Department of Trade and Industry, the Gatsby Foundation and GlaxoSmithKline.

The Competition provides participating researchers with mentoring from leading biotechnology entrepreneurs and professional service companies, as well as training and financial support to develop real business plans from their research. Seventeen ideas were selected for the second stage of the 2001-02 Competition, the teams each receiving £4K to help develop their plans further before the final round of the Competition. The six finalists are:

CoDa Therapeutics
University College London

FFAST Solutions
Hannah Research Institute

Haptogen
University of Aberdeen

IntelliHep
University of Birmingham

medOptica
University College London

Orla Protein technologies
University of Newcastle

"The Bioscience Business Plan Competition gives an opportunity for academics to learn how to bridge the gap between laboratory discovery and commercial development, with access to know-how and expertise that gives the potential for new bioscience businesses to be created, with new challenges and rewards for those involved." Professor Tim Hirst, University of Bristol a former winner of the Competition.

BBSRC has committed £1.2M to the Government's **Small Business Research Initiative** (SBRI), which is aimed at encouraging high-tech companies to start up or develop new research capacities.

BBSRC received forty five applications for support. These were assessed on the quality of science, ability to commercialise the results including evidence that the company had secured other sources of risk capital and value for money. Six awards, each of between £150K and £240K, were made (see table).

Company	Project supported under SBRI
Axordia	Novel methods for the directed differentiation of stem cells *in vitro*
Biotica Technology	Engineering novel hybrid polyketide-polypeptide drugs
ExoSect	Elucidating the mechanisms of "auto-confusion" - a novel approach to lepidopteran mating disruption systems
Hybrid Systems	Cell specific gene supplementation therapy using coated parvoviruses
IFR Enterprise	Industrial and clinical MRI sensors
Regen Tec	Development of self-assembling, injectable scaffold for tissue repair and drug delivery

One of the companies supported under SBRI, Hybrid Systems Ltd, is a former participant in the Bioscience Business Plan Competition. This new company has been set up to manage development of technology arising from research at the University of Birmingham, a development assisted by the University's technology company and the Mercia Fund, established under the University Challenge scheme, and supported by the Cancer Research Campaign.

A further round of applications will be invited in summer 2002.

Professor Philip Howse OBE, Technical Director at ExoSect Ltd, setting up an ExoSex mating disruption dispenser for the control of grape insect pests. (Photo courtesy of ExoSect Ltd).

The solidification and shape retaining properties of self-assembling injectable polymeric microparticles – this technology is to be developed by Regen Tec for use as a tissue engineering scaffold for stem cell delivery. (Photo courtesy Dr A Salem, University of Nottingham).

The BBSRC display at AgriVision.

AgriVision

The research capabilities and achievements of the eight BBSRC-sponsored research institutes, and their relevance to innovation in UK agriculture and food were featured at AgriVision – an industry-focused event run by the Royal Agricultural Society of England at the National Agricultural Centre, Stoneleigh in 2001. The BBSRC display also outlined the Council's overall research in support of food and farming, with particular emphasis on: animal welfare; combating food poisoning; and sustainable systems.

Faraday Partnerships

BBSRC has agreed to set aside a total of up to £2M to support one or two Faraday Partnerships to help bring together the research and technology expertise to promote knowledge transfer in specific areas of bioscience.

BBSRC is participating with the Department of Trade and Industry (DTI) the Engineering and Physical Sciences Research Council, The Natural Environment Research Council and the Particle Physics and Astronomy Research Council in a call for proposals that closed in January 2002. Fourteen proposals requested support from BBSRC, three of these have been shortlisted for consideration by the joint DTI/Research Councils Assessment Panel in August 2002.

Supporting people & facilities

UK science's most important resource is its people. BBSRC has continued to work to provide conditions that attract and retain high calibre researchers. Important contributions to this include providing access to top-flight research facilities through funding of new laboratories, and by providing opportunities for networking, both nationally and internationally.

We have increased the stipend for BBSRC research studentships to £8.5K, i.e. £1K above the Government minimum. Further increases are planned: to £9K from October 2002; and to £9.5K from October 2003. We are piloting a "training account" scheme that will give university departments greater flexibility in setting stipends above the BBSRC minimum, and extending the period of PhD training, up to a maximum of 4 years.

We have reviewed our training courses for institute staff and implemented a four-tiered system: induction; key skills; skills development; and personal and career development. We also launched a coaching initiative for institute Training Officers, and an e-learning programme, piloted at several locations.

After a successful two year pilot at the Institute for Animal Health, BBSRC's Training and Accreditation Programme for Postgraduate Supervisors (TAPPS) has been offered to institutes. We believe this to be the first training programme that provides workshops, seminars and practical work-based elements to equip postgraduate supervisors with knowledge, skills, tools and techniques to enhance their performance.

BBSRC received a Gold Award from Business in the Community's "Opportunity Now" benchmarking exercise for promotion of gender equality.

Individual Merit Promotion

Promotion to Band 2 with effect from 1 July 2001

Professor Keith Kendrick - *Babraham Institute*
Professor Ian Wilmut - *Roslin Institute*

Promotion to Band 3 with effect from 1 July 2001

Dr Peter Lipp - *Babraham Institute*
Dr Mike Taussig - *Babraham Institute*
Dr Peter Mertens - *Institute for Animal Health*
Dr Geraldine Taylor - *Institute for Animal Health*
Dr Nat Bumstead - *Institute for Animal Health*
Professor Lester Wadhams - *Institute for Arable Crops Research*

BBSRC PERSONAL MERIT PROMOTION

Promotion to Band 3 with effect from 1 July 2001

Dr Angela Karp - *Institute for Arable Crops Research*
Dr John Valentine - *Institute of Grassland & Environmental Research*

The 2001 Institute Assessment Exercise (IAE) demonstrated a high standard of achievements at the eight institutes sponsored by BBSRC, and their contribution to UK agriculture, animal health, food research and healthcare. Results from the IAE, and recognition of the need to provide stability and flexibility for institutes to respond to possible changes in research requirements of their external funders, notably the Department for Environment, Food and Rural Affairs, have led to an average 4% pa increase in the Core Strategic Grant awards to institutes for 2002-2004. Indicative planning figures for the following two years show an average increase of 2.5% pa.

Capital grants were made to the Institute of Arable Crops Research (IACR) for imaging equipment; to the John Innes Centre for glasshouse replacement and to Silsoe Research Institute to develop new research opportunities.

The first phase of the £31M redevelopment of the Rothamsted site of the IACR is complete, with the opening of new glasshouses and specialist facilities including rooms with elevated levels of carbon dioxide for studies on climate change and plant growth. A new laboratory is under construction to accommodate 200 molecular biologists and chemists working on plant metabolism and sustainable methods of crop protection.

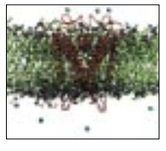
A new laboratory complex at Rothamsted is scheduled for completion in 2003.

BBSRC is administering two Joint Infrastructure Funding* awards. At the University of Lancaster, new equipment will enable researchers to study the impact of environmental change on plants, for example, by monitoring molecular and cellular changes associated with air pollution and other stresses. At the University of Nottingham, new facilities will be used to provide information about genetic influences on the nutritional quality and safety of plant and animal food products.

* JIF is funded by the DTI, Wellcome Trust and HEFCE.

Networking new science

An £18M investment, funded jointly by BBSRC, the Engineering and Physical Sciences Research Council, the Medical Research Council and the Ministry of Defence, has established two Interdisciplinary Research Collaborations in **nanotechnology** – the design and development of structures and devices that operate at the scale of single molecules and molecular assemblies.



The determination of the crystal structure of a bacterial potassium channel (Kcsa from Streptomyces lividans*) has provided the molecular basis to understand the physical mechanisms controlling ionic selectivity, permeation and transport through K^+ channels. The Oxford-led consortium is investigating the structure and function of such membrane proteins using single molecule techniques and molecular dynamics simulations. (Courtesy: Professor John Ryan).*

A research consortium led by scientists at the University of Oxford will focus on the potential applications of naturally assembling biological molecules such as DNA and proteins in molecular motors, pumps and other devices. Scientists at the Universities of Glasgow and York, and at the National Institute of Medical Research are contributing, together with researchers at the Universities of Cambridge, Nottingham and Southampton.

Scientists at the University of Cambridge lead a consortium that will focus on the physical properties of nanoscale structures and their fabrication, in collaboration with researchers at University College London and the University of Bristol.

***Nanotechnology** is about exploiting natural phenomena such as the way molecules self- assemble into structures, proteins work like pumps in cell membranes, and enzymes generate energy to drive linear or rotary "motors" in cells. It has enormous potential, for example, in novel biomedical materials for repairing damaged and diseased tissues; in diagnostics and biosensors for clinical, environmental and industrial monitoring; in new delivery systems for drugs, and in the design of novel solar power units that mimic the photosythetic apparatus of plants.*

See also page 16 for a Japanese collaboration on light harvesting and sensing devices.

Basic Technology

The first awards have been made under the £41M Basic Technology Research Programme that is administered by the Engineering and Physical Sciences Research Council on behalf of the other Research Councils. Eight projects have been funded at a total of £21M.

For BBSRC, **"E-science"** will be crucial for ensuring that UK researchers can investigate and exploit the rapidly accumulating mass of data from gene sequencing and related genomics activities. It is about using computational technology, and especially the Grid (a more powerful version of the world wide web) to enable scientists to collaborate globally with shared access to facilities and data.

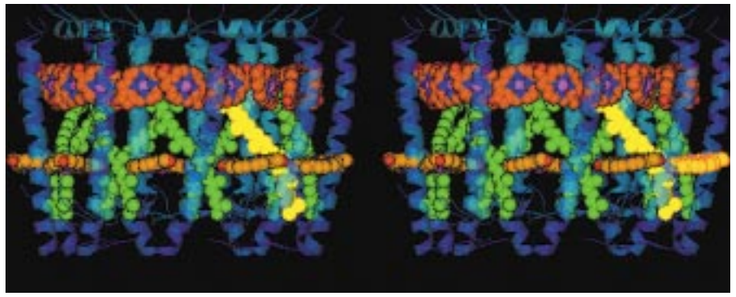
BBSRC has allocated the £8M it was awarded under the Government's UK E-science programme across four pilot projects, a project on neuroscience data led by the Medical Research Council, and sixteen projects for enabling technologies in bioinformatics. It has also contributed to the GRID support centre at the Central Laboratory of the Research Councils and funded training summer schools for researchers.

Among the projects being supported are E-science solutions to predicting the structure of proteins from their sequences, and simulating their dynamics in cells - approaches that will dramatically increase the discovery of targets for new drugs; cataloguing the world's biodiversity; and comparing the genomes of bacteria and other microbes.

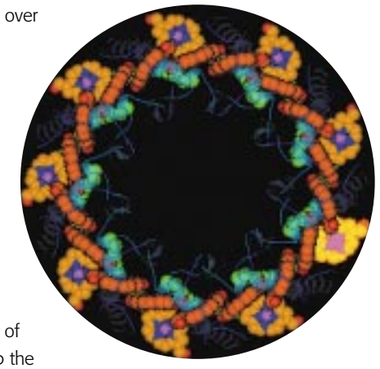
BBSRC, the Engineering and Physical Sciences Research Council and the Medical Research Council have collaborated to ensure that UK scientists have access to a specific protein crystallography beam line (for determining protein structures) at the European Synchrotron Research Facility at Grenoble. The beamline facilitates a technique that is not well catered for currently in the UK, but which will be incorporated in the new Diamond facility being constructed at the Rutherford Laboratory.

International

BBSRC maintains high level links with research organisations in many countries and fosters collaborative research that can benefit UK science.



Side view (top) of the LH2 antenna complex and the cytoplasmic face of the of the LH2 pigment-protein complex from the purple photosynthetic bacterium Rhodopseudomonas acidophila. The antenna apoproteins are shown in blue. The bacteriocholorphylls are shown in orange and yellow with only their bacteriochlorin rings depicted. The carotenoids are shown in green. (Courtesy: Professor Richard Cogdell).



BBSRC made three new grants, totalling over £80K, under its **Japan Partnering Awards** scheme that helps UK scientists to work with the rapidly developing research base in Japan.

Scientists at the Universities of Glasgow and Sheffield will share their complementary skills and expertise with researchers at several Japanese centres to investigate the potential of developing novel devices for harvesting and sensing light, based on the complex of polypeptides and pigments that make up the photosynthetic apparatus of bacteria.

Researchers at the University of Exeter will work with Japanese scientists to develop and characterise heat stable biological catalysts that have potential to replace less efficient and often polluting chemical catalysts in industrial processes.

Scientists working on X-ray crystallography and single molecules observation of intractable membrane proteins at Imperial College will have access to beamlines at Spring-8 in collaboration with researchers at Tokyo Institute of Technology.

BBSRC hosted the 2001 **Tetrapartite Meeting** of agricultural research and policy agencies from Canada, France, the USA and the UK, on the theme of sustainable agricultural systems. Discussions covered options for improved co-ordination of national programmes in Europe, risk assessment of genetically modified products and a life sciences approach to innovation and growth.

Workshops

BBSRC and the US Geological Survey sponsored a workshop for over thirty scientists from Europe, North America and Japan to identify approaches for cataloging the world's 1.75 million known species. This addressed the need for a global taxonomic framework and species catalogue against which information might be referenced, and identified several actions and research tools for biodiversity informatics and knowledge management. *See also E-science project on page 15.*

Forty awards, totalling £83K, were made under BBSRC's International Scientist Interchange Scheme that provides support to initiate international collaborations.

BBSRC awarded five International Fellowships, totalling £38K. This scheme supports UK researchers working abroad for short periods and visits by key overseas scientists.

Speakers from Canada, Germany, The Netherlands, the USA and the European Commission addressed a BBSRC workshop aimed at identifying opportunities for collaborative research into possible ways of reversing or delaying age-related loss of immune function.

In total, BBSRC sponsored thirteen international workshops. Topics included: soil organic carbon, worldwide genomics resources for fruit fly research, food and health, and membrane proteins.

BBSRC awarded three Wain Fellowships, totalling c.£27K, for study and overseas research visits in the areas of agricultural research relevant to the Council's mission. Three awards, totalling c.£12K, were made under the Underwood Fund to support travel and subsistence costs for overseas scientists working at UK research institutions.

BBSRC publicises the objectives and results of research with the aim of helping people to find out more about contemporary science and to participate in dialogue and consultation about its potential applications and implications.

Dr Kate Millar of the University of Nottingham explored the usefulness of an Ethical Matrix for identifying people's attitudes to scientific advances and opportunities, in a way that may enable these to be considered in planning both research and technology trajectories. This study examined bioremediation, the use of plants and microbes to clean up polluted environments, as a case study. It included five focus groups: two with members of the public, one with a range of non-governmental organisations (NGOs), one with a national women's organisation, and one with technology providers and regulators. A final workshop brought together representatives of each focus group. Information from a web site consultation was also used to aid the focus group discussions.

Focus group participants were asked to apply three ethical principles (wellbeing, autonomy and justice) to map potential positive and negative impacts of bioremediation on those using it, those living nearby, those developing and selling the technology, and on the environment, e.g. wildlife and aquifers. The priorities and concerns of different groups were identified: among the topics raised were the need for risk characterisation and long-term monitoring, ensuring stakeholder participation throughout the technology development process and the questioning of the need to pursue GM technology rather than exploit natural organisms.

The project was successful both in facilitating a broad debate between stakeholders and in identifying issues that might be researched. BBSRC is considering how this approach might be incorporated into planning of research initiatives. The project was reported at the EurSafe Congress in Florence 2001, DTI's LINK Bulletin (issue 12 2001) and in Science and Public Affairs (2002).

In March 2002, BBSRC, together with the Times Higher Education Supplement and the British Nutrition Foundation supported a public meeting on food technology at the Royal Institution.

BBSRC launched "Working Together" (see page 3) as a forum for consulting policymakers, industry and NGOs, including consumer and environmental groups, on BBSRC's prioritisation and planning. The first meeting, in February 2002 considered infectious diseases of animals and microbial food safety.

BBSRC's Life web site hosted a consultation on hypothetical novel foods as part of a study into mechanisms of public consultation undertaken by the Debate Taskforce of the Food Chain and Crops for Industry Panel of Foresight.

BBSRC contributed to a cross Research Council and OST project to review mechanisms of public dialogue and identify best practice. From this study, by People, Science and Policy Ltd, guidelines have been produced for researchers and science communicators.

BBSRC supported a public discussion on plant biotechnology, in association with the Edinburgh Science Festival Organisation, and The European Association for Research on Plant Breeding, in September 2001. This was reported in the Business Scotsman as "a welcome move towards reasoned discussion on the pros and cons of genetic modification."

Kate Millar (left) addressed the Annual Conference of the National Council of Women on public attitudes to bioremediation.

Engaging the public

We publicise our activities and the research that we fund through media releases, exhibitions, the BBSRC web site and schools and community events. Additionally, we provide financial support for public communication activities by BBSRC-supported scientists across the country.

"From Genes and Cells to Healthcare" was the title of BBSRC's conference at the 2001 British Association Festival of Science. It was well-attended and attracted extensive media coverage. We launched a new BBSRC exhibition and booklet "Cell Repair Kits" that describes the role of basic research in developing bio-artificial organs, bio-compatible materials for transplants and tissue engineering to repair or replace damaged and diseased cells.

BBSRC presented new information about the swarming and feeding behaviour of desert locusts at the Royal Society's Summer Science Exhibition in 2001. This featured research from the Universities of Bath, Oxford and Southampton and proved popular with school students and general public visitors.

One of the Crowd: the web version of BBSRC's exhibit at the Royal Society.

Making our science accessible	1998-99	1999-00	2000-01	2001-02
Media releases	28	29	24	23
Corporate publications	9	8	6	7
Exhibitions	2	6	8	6
Web site exhibitions - BBSRC Life site	-	-	4	7
Grants for Science Week events	24	22	15	20
Grants for resources to promote public access	-	8	7	9
Research student placements in schools*	65	150	100	154
BBSRC Schools Club membership	5954	4259	5089	6580
Science Communication courses for researchers	-	2	9	10
Local schools co-ordinators	16	20	19	25

* Researchers in Residence Biosciences and the Environment is supported jointly by BBSRC, the Medical Research Council, the Natural Environment Research Council and the Wellcome Trust.

The publication "Demystifying Genomics" - produced jointly by four Research Councils and the DTI, won an award at the 2001 Communicators in Business Event. Dr Diane McLaren of the Medical Research Council and Simon Wilde of BBSRC received the certificate.

BBSRC's schools booklet "Discovering DNA" developed by researcher Dr Sue Assinder, has been translated and used in teacher workshops in China thanks to an initiative between the science centre, Techniquest and the British Council.

Working efficiently

BBSRC has achieved further efficiencies in the operation of its Swindon Office, with administrative costs now representing just 2.4% of the total Council income. The number of research grants applied for and administered has increased substantially in 2001-02 and has led to a significant reduction in the mean cost of processing research grants. Since the inception of the Council in 1994 when administrative costs totalled £8.25M p.a. annual savings have risen to £1.25M or £2.9M if expressed in real terms.

Efficiency improvements, rather than cash savings, have been made in a number of areas of the Office. As well as the increased number of research grant applications that have been processed and administered, the 2001 Visiting Group exercise was conducted successfully, the implementation of Resource Accounting and Budgeting involved additional requirements, and significant input was made to the Quinquennial Review of Research Councils.

BBSRC works jointly with other Research Councils to gain benefits in efficiency and effectiveness. Most of these joint services have been operational for several years, but from 1 April 2002, purchasing will be co-ordinated through the Research Councils' Procurement Organisation which will advise on procurement services to all Research Councils and institutes.

Health and Safety

Consultation arrangements on health and safety issues, both centrally and at Institutes/sites, continued to work effectively. Meetings of Safety Officers were held regularly, and meetings of other safety staff such as Radiation Protection staff were held as required. A steady flow of Information Notes on topical subjects was made available to all sites via their Safety Officers.

Planning was started for the next cycle of health and safety inspections at all BBSRC JNCC sites, while the drafting of a report summarising the findings of the previous inspection cycle across all sites was initiated.

The number of accidents reportable under RIDDOR[1] in the year from 1 April 2001 to 31 March 2002 was 31. This was comparable with the number during previous years. Slightly under half (15) of the reportable incidents were due to injury while handling, lifting or carrying or to slips, trips or falls on the same level. The incidence of occupational disease (3 reportable incidents) was higher than in previous years, but the extent to which this was due to more effective reporting is unclear.

BBSRC plans to introduce two key elements of the ***Revitalising Health and Safety*** strategy, duties of directors and a formal health and safety report, during 2002.

1 Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995

Service First Agreement

BBSRC's Service First Statement and Complaints Procedure was published in August 2000. It is accessible at (www.bbsrc.ac.uk/about/service.html). Following the first monitoring exercise in BBSRC Office in January 2001, a second took place in February 2002. This showed that standards were being maintained. Telephone calls represented 40% of all communications and 100% were responded to within the limit of 3 working days; faxes represented 1% of all communications and 100% were responded to within the limit of 3 working days; emails represented 50% of all communications and 94% were responded to within the limit of 5 working days; letters represented 9% of all communications and 100% were responded to within the limit of 15 working days.

BBSRC has published "Bioscience research and the public" a document that outlines how the Council operates, how funding is awarded, how research is assessed and how the Council handles issues such as conflicts of interest, scientific conduct and ethical dimensions of research.

IS Strategy

The main themes of the year have been:

- development and publication of a joint electronic submissions framework in concert with the other Research Councils (www.pparc.ac.uk/jes/framework/index.asp). The framework will guide future Council developments of electronic applications along a single path.
- pilot running of a new studentship administration system for operation by September 2002.
- selection of a BBSRC wide replacement finance system for implementation across sites over the next two years, following intensive pilot installation at an institute.
- review of options for replacing and enhancing BBSRC's research grants administration system, prior to system selection in June 2002.

Membership
or Boards & Committees

As at 31 March 2002

Strategy Board

Professor Julia M Goodfellow CBE (Chairman)
BBSRC Chief Executive

Dr Simon Bright
Syngenta

Professor Nigel L Brown
School of Biological Sciences, University of Birmingham. (Chair, Committee on Studentships and Fellowships)

Professor Grahame Bulfield CBE FRSE
Roslin Institute

Dr Julian F Burke
Genetix plc (Chairman, Genes and Developmental Biology Committee)

Professor Martin J Evans FRS
School of Biosciences, University of Wales, Cardiff. (Chair, Animal Sciences Committee)

Professor Peter J Fryer FREng
School of Chemical Engineering, University of Birmingham (Chair, Engineering and Biological Systems Committee)

Professor Gwyn Gould
University of Glasgow. (Chair, Biochemistry and Cell Biology Committee)

Professor Keith Gull
BBSRC Council Member

Professor Alistair M Hetherington
Institute of Environmental and Biological Sciences, University of Lancaster

Dr A Jackie Hunter
GlaxoSmithKline

Professor Doug B Kell FIBiol
BBSRC Council Member

Professor Duncan Maskell
University of Cambridge (Chairman Agri-Food Committee)

Professor Robert Poole
Department of Molecular Biology and Biotechnology, University of Sheffield. (Chair, Plant and Microbial Sciences Committee)

Professor Alison Smith
John Innes Centre

Professor Janet M Thornton CBE FRS
Director, European Bioinformatics Institute.
tba

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Professor Bernard Atkinson OBE FEng
Former Council Member

Derek Davis
Council Member

Professor Tom B L Kirkwood
Council Member

Professor Peter R Schroeder FBIM, FIFST
Former Council Member

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BBSRC Chairman.

Professor Julia M Goodfellow CBE
BBSRC Chief Executive

Mike Calvert OBE
Council Member

John S Graham
Council Member

Dr John M Padfield
Council Member

Professor Cheryl A Tickle FRS
Council Member

Advisory Group on BBSRC Response to Public Concerns

Professor Julia M Goodfellow CBE (Chairman)
BBSRC Chief Executive

Ms Karen Barber
Food and Drink Federation

Dr Donald Bruce
Church of Scotland Working Group on Society, Religion and Technology

Mrs Pat Fletcher
ADAS Ethics Group

Dr Brian Johnson
English Nature

Dr Huw Jones
Crop Performance and Improvement Division, IACR-Rothamstead

Ms Sue Kinnersley
Women's Food and Farming Union

Ms Patience Purdy
National Council of Women of Great Britain

Revd Prof Michael Reiss
Institute of Education, University of London
Member of the Advisory Committee on Novel Foods and Processes

Professor Brian Wynne
Centre for the Study of Environmental Change, University of Lancaster

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University of Dundee

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Biogemma

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Mr Kim Travis
Syngenta

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Institute of Arable Crops Research

Professor Athene Donald
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Professor John Mathers
University of Newcastle

Professor C David O'Connor
University of Southampton

Professor Christine Williams
University of Reading

Dr David Marshall
Scottish Crop Research Institute

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Department for Environment, Food & Rural Affairs (DEFRA)

Dr Jon Bell
Food Standards Agency

Dr Andrew Rushworth
Scottish Executive Environment and Rural Affairs Department (SEERAD)

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Professor Barbara Mawer
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Observer

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or Boards & Committees

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Informatica

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Professor Simon Gaskell
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UMIST

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Marine Biology Association

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University of Cambridge

Professor Deri Tomos
University of Wales, Bangor

Dr Zoe Wilson
University of Nottingham

Dr Anil Wipat
University of Newcastle

Observer

Dr Rosie Waterhouse
Scottish Executive Environment and Rural Affairs Department (SEERAD)

ACCOUNTS 2001-2002

Accounts for the year ended 31 March 2002
Foreword to the accounts

Introduction

1. The Biotechnology and Biological Sciences Research Council (BBSRC) was established by Royal Charter on 1 April 1994. BBSRC is a Non-Departmental Public Body (NDPB) and is funded mainly by Grant-in-Aid from its sponsoring body, the Department of Trade and Industry (DTI) via the Office of Science and Technology (OST).

2. These accounts have been prepared in accordance with the Accounts Direction issued by the Secretary of State for Trade and Industry, pursuant to Section 2(2) of the Science and Technology Act 1965.

Mission Statement

3. The mission of the BBSRC is:
   - to promote and support high quality basic, strategic and applied research and related postgraduate training relating to the understanding and exploitation of biological systems;
   - to advance knowledge and technology, and provide trained scientists and engineers, which meet the needs of users and beneficiaries (including the agriculture, bioprocessing, chemical, healthcare, pharmaceutical and other biotechnological related industries), thereby contributing to the economic competitiveness of the United Kingdom and the quality of life;
   - to provide advice, disseminate knowledge, and promote public understanding in the fields of biotechnology and biological sciences.

Review of the year

4. The Annual Report and Accounts represent a key component in the accountability procedure of the BBSRC. The Annual Report for 2001-02 describes in detail developments and progress against the Council's ten Strategic Plan objectives during the year. The Annual Report provides coverage of important scientific advances arising from BBSRC funded work together with a discussion of their potential impact on everyday life.

Financial Highlights

5.
   - Total income for the year amounts to £235 M including grant-in-aid funding of £214 M from the Office of Science and Technology of which £3 M was applied to purchases of tangible fixed assets. Other income of £24 M includes Joint Infrastructure funds of £9 M, £ 8 M research revenue from other Research Councils and £ 5 M recharging of BITS services.
   - Early commitment of funds allocated for the Spending Review period (2001-2004) resulted in a deficit for the year of £9M and a carry forward deficit of £2M at the end of the year.
   - Expenditure on research grants (including training awards and capital grants) to universities and institutes increased from £216 M to £230 M. Forward commitment on approved research grants increased by £14 M to £311 M at the end of the year.
   - Government funds at 31 March 2002 totalled £166 M.
   - The net book value of the Council's fixed assets increased by £5 M to £167 M both as a result of the additions in year and the annual indexation of land and buildings.

Developments since 31 March 2002

6. There have been no material events since the end of the financial year which impact on these financial statements.

Pensions

7. The BBSRC has responsibility for the Research Councils' Pension Schemes (RCPS) and the Chief Executive of BBSRC is the Accounting Officer for the pension schemes. The accounts of the RCPS are published separately.

Creditor payment policy

8. BBSRC observes the CBI's Code of Practice. The Council adheres to the Principles of the Prompt Payers Code, and makes every effort to ensure compliance with the agreed terms of payment of creditors' invoices and endeavours to pay them within 30 days of receipt of goods or services or the presentation of a valid invoice, whichever is the latter - 92 % of payments were made within 30 days during 2001-02.

Council members

9. The following persons were members of the BBSRC during 2001-02 :

Chairman:	Dr Peter Doyle CBE FRSE
Deputy Chairman:	Professor Julia M Goodfellow CBE from 1 January 2002
	Professor Ray Baker FRS to 31 December 2001
Members:	Professor Julia M Goodfellow CBE to 31 December 2001
	Mr Michael Calvert OBE
	Mr Derek Davis
	Mr John S Graham
	Professor Keith Gull
	Professor Douglas B Kell FIBiol
	Professor Tom B L Kirkwood
	Professor Christopher Leaver CBE FRS FRSE
	Dr John M Padfield
	Dr Ian Ragan
	Professor Peter R Schroeder FBIM to 31 March 2002
	Dr David W F Shannon to 31 December 2001
	Dr Margaret A Stanley to 31 March 2002
	Professor Cheryl A Tickle FRS FRSE

People with disabilities

10. The BBSRC's policy is not to discriminate against people with disabilities when seeking employment with the Council. All staff are considered for career development, promotion and training on a non-discriminatory basis.

Employee involvement

11. The BBSRC has well established procedures for communicating with staff and promoting employee involvement and participation at local and national level. Senior Management and Trade Union representatives meet regularly in Central and Institute Negotiating and Consultative Committees to discuss conditions of service and other matters which have a bearing on the management of the Council. Additionally staff are kept informed through the quarterly publication "BBSRC Business" and by intranet bulletins, circulars, staff briefings and letters direct to all members of staff.

Audit committee

12. The Council has an Audit Committee of which the Chairman and at least three non-executive Committee members are appointed by the Council, being members independent of management and free of any relationship that, in the opinion of the Council, would interfere with the exercise of independent judgement as committee members. The Committee meets twice a year to consider internal control issues arising from the internal audit service and external audit reports and to review the Council's Accounts.

Auditors

13. The accounts of the BBSRC are audited by the Comptroller and Auditor General in accordance with Section 2(2) of the Science and Technology Act 1965.

Professor Julia M Goodfellow
Chief Executive and Accounting Officer

Date: 28 June 2002

Statement of Council's and Chief Executive's responsibilities with respect to Financial Statements

Under Section 2(2) of the Science and Technology Act 1965 the Council is required to prepare a statement of accounts for each financial year in the form and on the basis determined by the Secretary of State for Trade and Industry, with the consent of the Treasury. The accounts are prepared on an accruals basis and must show a true and fair view of the Council's state of affairs at the year end and of its income and expenditure, total recognised gains and losses, and cash flows for the financial year.

In preparing the accounts the Council is required to:

- observe the accounts direction issued by the Secretary of State for Trade and Industry, including the relevant accounting and disclosure requirements, and apply suitable accounting policies on a consistent basis;
- make judgements and estimates on a reasonable basis;
- state whether applicable accounting standards have been followed, and disclose and explain any material departures in the financial statements; and
- prepare the financial statements on the going concern basis, unless it is inappropriate to presume that the Council will continue in operation.

As the senior full-time official, the Chief Executive carries out the responsibilities of an Accounting Officer for the Council. Her relevant responsibilities as Accounting Officer, including her responsibility for the propriety and regularity of the public finances and for the keeping of proper records, are set out in the Non-Departmental Public Bodies' Accounting Officer's Memorandum, issued by the Treasury and published in "Government Accounting" (The Stationery Office).

Statement by Chief Executive on Internal Control

As Accounting Officer, I have responsibility for maintaining a sound system of internal control that supports the achievement of Council's policies, aims and objectives. Whilst safeguarding the public funds and Council assets including those at sponsored institutes for which I am personally responsible, in accordance with the responsibilities assigned to me in Government Accounting.

The system of internal control is designed to manage rather than eliminate the risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness.

The system of internal control is based on an ongoing process designed to identify the principal risks to the achievement of Council's policies, aims and objectives, to evaluate the nature and extent of those risks and to manage them efficiently, effectively and economically. I expect to have the procedures fully in place for the year ended March 2004 necessary to implement Treasury guidance. This takes account of the time needed to fully embed the processes which the Council has agreed should be established and improve their robustness.

We have held a risk management workshop, during which we identified the Council's objectives and risks and determined a control strategy for each of the significant risks. As a result of this workshop an inventory of key risks has been issued.

Risk management and internal control will be considered on a regular basis by the Executive Group and Council during the year and there will be a full risk and control assessment before reporting on the year ending 31 March 2003. Risk management has been incorporated more fully into the corporate planning and decision making processes of the Council and its sponsored institutes.

Audit Committee regularly reviews the risk management framework and receives reports on the business critical projects within BBSRC and reports to Council on any issues of concern.

In addition to the actions mentioned above, the Committee plans in the coming year to:

- arrange regular monitoring of key risks for BBSRC and keep an up to date record of risks facing the organisation;
- consider a programme of risk awareness training;
- establish revised output and key performance indicators in collaboration with other Research Councils;
- develop and maintain an organisation-wide risk register; and
- arrange for statements from the Directors of Sponsored Research Institutes and Group Directors on their risk management framework.

The Council uses the Research Councils' Internal Audit Service, which operates to standards defined in the Government Internal Audit Manual. They submit regular reports which include the HIA's independent opinion on the adequacy and effectiveness of the Council's system of internal control together with recommendations for improvement.

My review of the effectiveness of the system of internal control is informed by the work of the internal auditors and the executive managers within the Council who have responsibility for the development and maintenance of the risk management framework, and comments made by the external auditors in their management letter and other reports.

Signed by
Professor Julia M Goodfellow
Chief Executive and Accounting Officer

Date: 28 June 2002

Certificate and Report of the Comptroller and Auditor General to the Houses of Parliament

I certify that I have audited the financial statements on pages 29 to 47 under the Science and Technology Act 1965. These financial statements have been prepared under the historical cost convention as modified by the revaluation of certain fixed assets and the accounting policies set out on pages 32 to 34.

Respective responsibilities of the Council, the Chief Executive and Auditor
As described on page 26, the Council and the Chief Executive are responsible for the preparation of the financial statements and for ensuring the regularity of financial transactions. The Council and the Chief Executive are also responsible for the preparation of the Foreword. My responsibilities, as independent auditor, are established by statute and guided by the Auditing Practices Board and the auditing profession's ethical guidance.

I report my opinion as to whether the financial statements give a true and fair view and are properly prepared in accordance with the Science and Technology Act 1965 and directions made thereunder by the Secretary of State for Trade and Industry, and whether in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. I also report if, in my opinion, the Foreword is not consistent with the financial statements, if the Council has not kept proper accounting records, or if I have not received all the information and explanations I require for my audit.

I review whether the statement on page 27 reflects the Council's compliance with Treasury's guidance "Corporate governance: statement on internal control". I report if it does not meet the requirements specified by Treasury, or if the statement is misleading or inconsistent with other information 1 am aware of from my audit of the financial statements.

I read the other information contained in the Annual Report and consider whether it is consistent with the audited financial statements. I consider the implication for my certificate if I become aware of any apparent misstatements or material inconsistencies with the financial statements.

Basis of Opinion
I conducted my audit in accordance with Auditing Standards issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts, disclosures and regularity of financial transactions included in the financial statements. It also includes an assessment of the significant estimates and judgements made by the Council and the Chief Executive in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Council's circumstances, consistently applied and adequately disclosed.

I planned and performed my audit so as to obtain all the information and explanations which I considered necessary in order to provide me with sufficient evidence to give reasonable assurance that the financial statements are free from material mis-statement, whether caused by error, or by fraud or other irregularity and that, in all material respects, the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. In forming my opinion I have also evaluated the overall adequacy of the presentation of information in the financial statements.

Opinion
In my opinion:

- the financial statements give a true and fair view of the state of affairs of the Biotechnology and Biological Sciences Research Council at 31 March 2002 and of the deficit, total recognised gains and losses and cash flows for the year then ended and have been properly prepared in accordance with the Science and Technology Act 1965 and directions made thereunder by the Secretary of State for Trade and Industry; and
- in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them.

I have no observations to make on these financial statements.

John Bourn
Comptroller and Auditor General
9 July 2002

National Audit Office
157-197 Buckingham Palace Road
Victoria
London SW1W 9SP

Income and expenditure account for the year ended 31 March 2002

	Note	2001-02 £'000	2001-02 £'000	(as restated) 2000-01 £'000
Income				
Grant-in-aid	3	**213,874**		211,991
Less applied to capital purchases		**(3,222)**		(290)
Other Income	4	**23,961**		16,799
			234,613	228,500
Expenditure				
Research & Capital Grants to				
Universities	2,5	**114,127**		105,393
Research Institutes	2,5	**83,638**		80,570
Research Councils	2,5	**4,287**		3,670
Training Awards and Fellowships	5	**28,165**		26,536
Staff Costs	2,6	**5,496**		5,073
Other operating costs	7	**8,790**		6,369
Research Institute staff restructuring	8	**(118)**		(1,413)
Depreciation	10b	**4,269**		4,499
			(248,681)	(230,697)
Operating deficit for the year			**(14,068)**	(2,197)
Transferred from deferred grants and reserves to match depreciation charge	14,15		**4,296**	4,499
Loss on disposals/demolition of fixed assets	9	**(166)**		(7)
Transferred from reserves to offset loss on disposals of fixed assets	14,15	**1,229**		139
Net Gain to reserves from disposals of fixed assets			**1,063**	132
(Deficit)/surplus for the year			**(8,709)**	2,434
Retained surplus brought forward			**6,990**	4,556
(Deficit)/surplus carried forward			**(1,719)**	6,990

All activities are regarded as continuing.
The notes on pages 32 to 47 form part of these accounts.

Balance Sheet as at 31 March 2002

	Note	31 March 2002 £'000	31 March 2002 £'000	31 March 2001 £'000
Fixed Assets				
Intangible	10a		**966**	1,019
Tangible	10b		**166,488**	160,634
			167,454	161,653
Current Assets				
Debtors - due within one year	11	**12,574**		14,479
- due after one year	11	**5,090**		8,550
Cash at bank and in hand		**2,311**		1,133
		19,975		24,162
Current Liabilities				
Creditors falling due within one year	12	**(14,432)**		(8,414)
Net Current Assets			**5,543**	15,748
Total Assets Less Current Liabilities			**172,997**	177,401
Long Term Liabilities				
Provisions for liabilities and charges	13		**(7,262)**	(8,758)
Total Assets Less Liabilities			**165,735**	168,643
Financed by:				
Deferred Income				
Deferred capital grant-in-aid	14		**772**	664
Capital and Reserves				
Capital reserve	15		**166,682**	160,989
General reserve	15		**(1,719)**	6,990
Total Government Funds	16		**165,735**	168,643

Professor Julia M Goodfellow
Chief Executive and Accounting Officer Date: 28 June 2002

The notes on pages 32 to 47 form part of these accounts.

Cash Flow Statement for the year ended 31 March 2002

	Note	2001-02 £'000	2001-02 £'000	2000-01 £'000
Net cash outflow from operating activities	17(a)		**(3,535)**	(67)
Capital Expenditure				
Payments to acquire tangible fixed assets		**(3,222)**		(290)
Receipts from sale of fixed assets		**4,713**		332
Net cash inflow from capital expenditure			**1,491**	42
Net cash outflow before financing			**(2,044)**	(25)
Financing				
Deferred Capital Grant-in-Aid		**422**		290
Total Capital Reserves		**2,800**		-
Net cash inflow from financing			**3,222**	290
Increase in cash	17(b)		**1,178**	265

Statement of total recognised gains and losses for the year ended 31 March 2002

	2001-02 £'000	2000-01 £'000
(Deficit)/Surplus for the year	**(8,709)**	2,434
Other gains		
- revaluation in year	**7,407**	2,506
- asset additions at institutes	**3,497**	3,388
- matching depreciation charged in the year	**(4,296)**	(4,155)
- matching asset disposals at institutes	**(1,228)**	(120)
Total gains and losses for the year	**(3,329)**	4,053

The notes on pages 32 to 47 form part of these accounts.

Notes to the Accounts

1. Accounting Policies

a) Basis of Accounting

i) These accounts have been prepared in accordance with the Accounts Direction issued on behalf of the Secretary of State for Trade and Industry dated 27 November 2001

ii) The direction provides for the accounts to be prepared under the historical cost convention modified to include the revaluation of tangible fixed assets. Without limiting the information given the accounts meet the accounting and disclosure requirements of the Companies Act 1985 and the accounting and financial reporting standards issued or adopted by the Accounting Standards Board in so far as these requirements are appropriate. The Direction exempts the Council from the requirement to produce a note of historical cost profits and losses.

b) Tangible and Intangible Fixed Assets

i) Capital expenditure includes the purchase of land and/or buildings, construction and services projects on BBSRC owned land only, and equipment valued at £3,000 or more.

ii) Tangible and intangible fixed assets are included at cost or valuation. The Council owns land and buildings which are leased to a number of grant-aided institutes, all of whom are constituted as companies limited by guarantee and which prepare separate audited accounts. Additions to these assets may be funded wholly or in part from sources other than the BBSRC. Any funding contribution made by the BBSRC, in the form of capital grants, is included within Research Grants in the Income and Expenditure Account.

Where additions to land and buildings at institutes result in a material change in the value of the Council's owned assets this is disclosed as a fixed asset addition within these accounts based on a professional valuation at the Balance Sheet date. A full revaluation of land and buildings is carried out at least every five years.

iii) The basis of valuation is open market value where this can be established or depreciated replacement cost in the case of specialised scientific buildings. Valuations are uprated annually to the Balance Sheet date by using appropriate land and buildings indices. Buildings have been grouped for valuation purposes and similar types of building have been put into bands which have similar remaining lives. The three main categories of buildings used are depreciated replacement cost buildings (eg laboratories), agricultural buildings and dwellings.

iv) Increased depreciation charges arising from the revaluation are matched by annual transfers from capital reserves to the Income & Expenditure Account. On disposal of a revalued asset, that element of the capital reserves which becomes realised as a result is also transferred to the Income & Expenditure Account.

v) In the opinion of the Council there is no material difference between the historic cost of equipment, fixtures and fittings and their current cost. Accordingly these assets have not been revalued and this position is kept under review.

vi) Provision is made for depreciation on all tangible fixed assets at rates calculated to write off the cost or the valuation of each asset (or group of assets) to its estimated residual value evenly over its expected useful life. An average expected useful life is assessed at each location by the valuer. Buildings are not depreciated in the year of acquisition whilst a full year's depreciation is charged in the year of disposal. Average estimated lives are as follows:

Freehold Land	-	not depreciated
Depreciated replacement cost buildings	-	up to 60 years
Agricultural buildings	-	up to 60 years
Dwellings	-	up to 60 years
Equipment	-	10 to 15 years
Office and Computing Equipment	-	5 years
Personal Computers	-	3 years
Motor Vehicles	-	up to 4 years
Assets Under Construction	-	not depreciated until brought into use

c) Ownership of Equipment Purchased with BBSRC Research Grants

Equipment purchased by an institution with research grant funds supplied by the Council belong to the institution and are not therefore tangible fixed assets of the Council. Through the Conditions of Grant applied to funded institutions, the Council reserves the right to determine how such equipment shall be disposed of and how any disposal proceeds are to be utilised.

d) Grant-in-Aid

Grant-in-aid for revenue purposes is credited to income in the year to which it relates. Grant-in-Aid applied for the purchase of land is credited to Capital Reserves. Grant-in-aid applied to the purchase of buildings is also credited to Capital Reserves and, together with that applied to purchase of other fixed assets credited to the Deferred Grant-in-Aid account, is released to the Income and Expenditure account over the estimated operational lives of the related assets.

e) Research Grants

Research grants are charged to the Income and Expenditure account when due for payment.

f) Foreign Currencies

Assets and Liabilities denominated in foreign currencies are translated at the rates of exchange ruling at the balance sheet date. Transactions in foreign currencies are recorded at the rate ruling at the time of the transaction. All exchange differences are taken to the Income and Expenditure account.

g) Value Added Tax

As the Council is partially exempt for VAT purposes, all expenditure and fixed asset additions are shown inclusive of VAT where applicable. Residual input tax reclaimable by the application of the partial exemption formula is taken to the Income and Expenditure account as a sundry item. Income is shown net of VAT.

h) Payments of Early Retirement Lump Sums

Payments by the Council of early retirement lump sums are recoverable from the Research Councils' Pension Schemes when recipients reach normal retirement age. Recoverable amounts are recognised as debtors in these accounts and set-off against annual staff restructuring costs.

i) Notional costs

In line with HM Treasury requirements, notional costs are included in respect of cost of capital. This charge is included in the accounts to reflect a charge for the use of capital in the business in the year, as the council has no specific interest bearing debt. **Note 7** refers.

2. Restatement of Accounts

(i) To include Research Grants received by other Research Councils previously within the Income and Expenditure Account heading "Universities" within the heading "Laboratory services provided by the Central Laboratory of the Research Councils and share of joint programmes with the Engineering and Physical Sciences Research Council and the Medical Research Council". **Note 5** refers.

(ii) to show staff numbers in 2000-01 as headcount instead of FTE's (full time equivalents). **Note 6** refers.

3. Grant-in-aid

	2001-02	2000-01
	£'000	£'000
Amount provided by the Office of Science and Technology under Request for Resources (RfR) 2 Subhead L	**213,874**	211,991

4. Other Income

	2001-02	2000-01
	£'000	£'000
Grant-in-aid RfR2 Subhead v	**70**	70
Other Research Councils	**8,374**	4,998
IT Services to Institutes	**5,494**	3,264
Joint Infrastructure Fund	**9,400**	7,950
Other Operating Income	**623**	517
	23,961	16,799

5. Research & Capital Grants and Training Awards

	2001-02	2000-01
	£'000	£'000
Universities:		(as restated)
- Research grants	**114,127**	105,393
- Training Awards and Fellowships[1]		
- Stipends	**16,720**	15,383
- Fees (Registration & College Fees)	**6,163**	6,066
- Research Training Support Grant	**1,988**	1,988
- Other UK Conference, etc	**336**	315
	25,207	23,752
- Post Doctoral Fellowships	**2,958**	2,784
	28,165	26,536
Total	**142,292**	131,929
Research institutes:		
- Core strategic grant	**55,252**	53,453
- Capital grants : major works	**8,512**	9,232
- Capital grants : minor works	**2,121**	1,561
- Capital grants : equipment	**4,160**	3,403
- Research grants	**13,593**	12,921
Total	**83,638**	80,570
		(as restated)
Laboratory services provided by the Central Laboratory of the Research Councils and share of joint programmes with the Engineering and Physical Sciences Research Council and the Medical Research Council	**4,287**	3,670
Total	**230,217**	216,169

1 The number of students in receipt of Training Stipends at 31 March 2002 was 2,018 (31 March 2001 : 1,960) and Post Doctoral Fellows 56 (31 March 2001 : 55).

Restatement: to include research grants previously included with "Universities" with other "Research Councils with Laboratory services provided by the Central Laboratory of the Research Councils and share of joint programmes with the Engineering and Physical Sciences Research Council and the Medical Research Council".

6. Staff Costs for BBSRC Office, Bioscience IT Services, and hosted Research Councils' Joint Services

	2001-02	2000-01
	£'000	£'000
Salaries and wages	**5,649**	5,219
Social Security costs	**403**	392
Pension costs	**537**	509
Other fees and honoraria	**265**	196
	6,854	6,316
Less Joint Services	**(1,358)**	(1,243)
Total	**5,496**	5,073

The average number of full and part-time employees during the year was made up as follows:

	2001-02	2000-01
	No	(as restated)
Administrative	**148**	146
Joint services	**64**	60
BBSRC Bioscience IT Services	**42**	38
	254	244

Restatement: to show staff numbers in 2000-01 as headcount instead of FTEs (full time equivalents). The total average **FTEs** for **2001-02** was **232** (133, 60 and 39 respectively) and the total average FTEs for 2000-01 was 233 (136, 58 and 39 respectively)

In addition to the above, 3,243 staff (2000-01 : 3,319) are seconded to, and salaries/wages paid by, grant-aided institutes sponsored by BBSRC. (includes BBSRC funded employees in HRI)

Remuneration of senior management

i) Chief Executive

Professor Julia M Goodfellow CBE was appointed Chief Executive on 1 January 2002. Her total emoluments in 2001-02 were £27,516, comprising salary of £25,370 and employer's pension scheme contributions of £2,146 assessed as 10.1% of pensionable salary. Her fixed-term period appointment will terminate on 31 December 2005.

Professor R Baker FRS was appointed Chief Executive on 1 October 1996. His total emoluments in 2001-02 were £91,278 (2000-01 were £106,342), comprising salary of £65,725 (2000-01 £83,182), a performance-related bonus of £19,098 (2000-01 £14,759) and employer's pension scheme contributions of £6,455 (2000-01 £8,401) assessed as 10.1% of pensionable salary. His fixed-term period appointment as Chief Executive ran from 1 October 1996 until 31 December 2001.

ii) The following number of senior employees received remuneration falling within the following ranges:

	2001-02	2000-01
	No.	No.
£60,000 to £69,999	**3**	2
£50,000 to £59,999	**3**	2
£40,000 to £49,999	**7**	9

Remuneration includes Employers' Pension Scheme Contributions of 10.1% in 2001-02.

Senior employees who are members of the BBSRC Executive Group are

Professor Julia M Goodfellow CBE, BBSRC Chief Executive
Mr S H Visscher, BBSRC Director of Finance and Administration and Acting Director of Human Resources
Professor DCS White BBSRC Director of Science and Technology
Dr D Yarrow, BBSRC Director of Corporate Science Group

iv) Research Institute Directors

Details of research institute Directors' emoluments are published in the statutory accounts prepared by each institute.

Superannuation

Employees of the Council are members of the Research Councils' Pension Schemes, which are funded on a pay-as-you-go basis principally through employer and employee contributions and annual Grant-in-aid. The pension schemes are by analogy to the Principal Civil Service Pension Scheme (PCSPS), except that while the schemes which are defined benefits schemes and provide retirement and related benefits on final emoluments, redundancy and injury benefits are administered and funded by the Council. The pension schemes are administered by the Research Councils' Joint Superannuation Services and the schemes' finances are administered by the BBSRC. A separate Research Councils' Pensions Schemes Account is published each year and contains the further disclosure of information required under the relevant accounting standard.

The Council pays employers' contributions, at a percentage of scheme members' pensionable pay and emoluments assessed by the Government Actuary's Department on a periodical basis. The rate from 1 April 1999 was 10.1% which was established following GAD's most recent assessment at 31 March 1997.

Council Honoraria and Fees

i) The total emoluments of the Chairman of the BBSRC were honoraria of £13,500 (£13,300 2000-01). The Chairman's appointment is non-pensionable and there is no entitlement to compensation for loss of office. Dr Peter Doyle CBE FRSE was appointed Chairman of BBSRC for a period of four years from 1st May 1998. He has been re-appointed for a further year from 1 May 2002 .

ii) The following number of Council and Committee members received honoraria and fees within the following ranges:

No.		No.	**2001-02**	2000-01
£ 10,000	-	£ 14,999	1	1
£ 5,000	-	£ 9,999	11	11
£ 0	-	£ 4,999	294	218

iii) The standard fee paid to Council and Committee members was:

	Until 30 September 2001 £	From 1 October 2001 £	
Council Chairman	13,300	13,700	per annum
Council Members who also chair Committees	7,388	7,609	per annum
Council Members	5,546	5,712	per annum
Committee Chairman	180	190	per day
Committee Members	140	145	per day

No fee was payable in respect of Civil Servants, employees of Research Councils and their institutes and other Non-Departmental Public Bodies and Agencies.

The normal term of appointment to Council is 3 – 4 years.

7. Other Operating Costs

	2001-02 £'000	2000-01 £'000
Maintenance, repairs and cleaning	**486**	554
Rent, rates and insurance	**199**	111
External audit	**34**	33
Internal audit	**148**	147
Office supplies	**355**	272
Computing expenses	**765**	826
Travel, subsistence and hospitality	**892**	644
Publications and publicity	**113**	125
Public Understanding of Science	**413**	427
Subscription to scientific bodies	**140**	57
International funding	**523**	345
Professional fees and management consultancy	**558**	519
Refurbishment of Polaris House	**252**	675
Central Purchasing by BITS	**3,523**	1,288
Other	**389**	346
*Notional Cost of Capital	**10,031**	9,999
Other Operating Costs including Notional Cost of Capital	**18,821**	16,368
*Less reversal of Cost of Capital	**(10,031)**	(9,999)
Total	**8,790**	6,369

*Cost of Capital – This charge is included in the accounts to reflect a charge for the use of capital in the business in the year, as the Council has no specific interest bearing debt. In accordance with Treasury guidance, the calculation is based on a 6% rate of return on average net assets employed at cost or at valuation (2001-02- £166.8M, 2000-01 - £166.6M).

8. Research Institute Staff Restructuring

	2001-02 £'000	2000-01 £'000
Annual Compensation Payments	**167**	-
Redundancy Payments	**2,344**	1,225
Early Retirement & Commuted Lump Sum payments	**1,258**	243
Increase/(Decrease) in provision for future Annual Compensation Payments	**1,087**	(466)
Other Costs	**60**	20
	4,916	1,022
Less:		
Recovered Redundancy and Annual Compensation Payments	**(3,957)**	(1,779)
Recovered Early Retirement Lump Sums	**(649)**	(604)
Recoverable Early Retirement Lump Sums	**(428)**	(52)
Net Cost/(Surplus)	**(118)**	(1,413)

The total number of redundancies during 2001-02 was 77 (2000-01 : 44).

9. (Loss) / Gain on Disposals / Demolition of Fixed Assets

	2001-02 £'000	2000-01 £'000
Income from disposals through sales	**1,063**	132
Less:		
Net Book Value of assets sold/demolished	**(1,229)**	(139)
	(166)	(7)

The above losses on disposals / demolition are fully offset by Capital Reserves transfers (Note 16 refers).

10a. Intangible Fixed Assets

	Milk Quota 2001-02 £'000	Milk Quota 2000-01 £'000
Cost or Valuation		
At 1 April 2001	**1,019**	746
Additions	**-**	173
Revaluation	**(53)**	100
At 31 March 2002	**966**	1,019

10b. Tangible Fixed Assets

Cost or Valuation	Institute Occupied Land & Buildings £'000	Other Land & Buildings £'000	Equipment £'000	Institute Assets Under Construction £'000	Total £'000
At 1 April 2001	238,205	2,958	3,349	1,901	246,413
Additions	3,497	-	422	-	3,919
Reclassification	1,773	-	-	(1,773)	-
Disposals	(2,127)	-	(105)	-	(2,232)
Revaluation	11,948	-	-	-	11,948
At 31 March 2002	**253,296**	**2,958**	**3,666**	**128**	**260,048**
Depreciation					
At 1 April 2001	83,093	-	2,686	-	85,779
Provided during the year	3,907	76	313	-	4,296
Disposals	(899)	-	(104)	-	(1,003)
Revaluation	4,564	(76)	-	-	4,488
At 31 March 2002	**90,665**	**-**	**2,895**	**-**	**93,560**
Net Book Value					
At 31 March 2002	**162,631**	**2,958**	**771**	**128**	**166,488**
At 1 April 2001	155,112	2,958	663	1,901	160,634

The land and buildings were professionally valued as at 31 December 2000 by Powis Hughes Chartered Surveyors in accordance with SAVP and RICS guidance notes save for Scottish properties where Foot and Mouth restrictions did not allow access for formal valuations to take place; Scottish properties were therefore valued on an interim basis. The formal valuations took place during the current year and are incorporated in the Revaluation amounts above.

The net book value of land and buildings comprises:

	£'000
Freehold	**165,578**
Long Leasehold	**139**
	165,717

11. Debtors

	2001-02 £'000	2000-01 £'000
i) Due within one year:		
Trade Debtors	**1,823**	2,190
Disposals of Fixed Assets	**-**	250
Other Debtors	**1,805**	3,451
Repayment of Early Retirement Lump Sums	**1,133**	775
Prepayments and Accrued Income:		
- Research Grants	**2,708**	2,923
- Training Awards	**4,229**	3,784
- Other	**876**	1,106
	12,574	14,479
ii) Due after one year:		
Disposal of fixed assets	**-**	3,400
Repayment of Early Retirement Lump Sums		
2002-03	**see above**	896
2003-04	**832**	705
2004-05	**973**	774
2005-06	**679**	524
2006-07	**840**	705
2007-08	**320**	211
2008-11	**466**	183
	4,110	3,998
Other	**980**	1,152
	5,090	8,550
Total Debtors	**17,664**	23,029

12. Creditors: Amounts falling due within one year

	2001-02 £'000	2000-01 £'000
Trade Creditors	**409**	-
Payments Received on Account	**32**	348
Other Creditors	**861**	928
Amounts Payable to the Office of Science & Technology	**2**	24
Accruals:		
- Research Grants	**11,741**	5,368
- Other	**1,387**	1,746
	14,432	8,414

13. Provisions for Liabilities and Charges

	Provisions for Annual Compensation Payments £'000	Provisions for Restructuring £'000	Total Provisions £'000
Balance at 1 April 2001	5,082	3,676	8,758
Amount provided in year	1,087	-	1,087
Amount expended in year	(1,456)	(1,127)	(2,583)
Total provisions at 31 March 2002	**4,713**	**2,549**	**7,262**

14. Deferred Grant-in-aid

	Other Assets £'000
At 1 April 2001	**664**
Grant in Aid Capital Provision	**422**
Transferred to Income & Expenditure Account to match depreciation charge (Note 15 1a also refers)	**(313)**
Net Book Value of assets disposed (Note 15 1b also refers)	**(1)**
At 31 March 2002	**772**

15. Reserves

	Total Capital Reserves £'000	General Reserve £'000	Total £'000
Balance 1 April 2001	**160,989**	**6,990**	167,979
Revaluation in year	**7,407**	**-**	7,407
Asset additions at Institutes	**3,497**	**-**	3,497
Transfer to Income & Expenditure Account*[1a]	**(3,983)**	**-**	(3,983)
Transfer to Income & Expenditure Account*[1b]	**(1,228)**	**-**	(1,228)
Deficit for the year	**-**	**(8,709)**	(8,709)
At 31 March 2001	**166,682**	**(1,719)**	164,963

*[1a]in respect of tangible fixed assets depreciated during the year
*[1b]in respect of disposed tangible fixed assets during the year

16. Reconciliation of Movements in Government Funds

	2001-02 £'000	2000-01 £'000
(Deficit)/Surplus for the year	**(8,709)**	2,434
Increase/(Decrease) in Deferred Capital Grant-in-Aid account for the year	**108**	(73)
Increase in Reserves for the year		
- on revaluation	**7,407**	2,506
- on movements during the year	**(1,714)**	(887)
	(2,908)	3,980
Government Funds as at 1 April	**168,643**	164,663
Government Funds as at 31 March	**165,735**	168,643

17. Notes to the Cashflow Statement

a) Reconciliation of the operating deficit to net cash outflow from operating activities	2000-01 £'000	2000-01 £'000
Operating deficit	**(14,068)**	(2,197)
Depreciation charge	**4,296**	4,499
Decrease in Provision for Liabilities and Charges	**(1,496)**	(2,312)
Increase/(Decrease) in debtors*	**1,715**	(1,761)
Increase in creditors	**6,018**	1,704
Net cash (outflow) from operating activities	**(3,535)**	(67)

*Excluding: Amounts relating to surplus properties included in the Income and Expenditure Account below operating activities.

b) Reconciliation of movement in cash to movement in net funds	2001-02 £'000	2000-01 £'000
Cash at 1 April	**1,133**	868
Increase in cash	**1,178**	265
Cash at 31 March	**2,311**	1,133

18. Forward Commitments on Approved Research Grants

	2001-02 £'000	2000-01 £'000
2001-02	**-**	141,460
2002-03	**148,899**	91,689
2003-04	**92,394**	46,873
2004-05	**52,114**	16,674
after 2005-06	**17,461**	-
	310,868	296,696

19. Capital Commitments

The following capital commitments have been authorised as at 31 March:	**2001-02 £'000**	2000-01 £'000
Authorised for contracts to be let	**4,365**	-
Approved but not yet contracted	**1,000**	1,800
	5,365	1,800

In addition to the above, the Council has planned capital programmes of £34M of which £10M is in respect of the redevelopment of the Institute of Arable Crops Research and £8M for improved facilities at the John Innes Centre.

20. Contingent Liabilities

The BBSRC had no contingent liabilities at 31 March 2002.

21. Related Party Transactions

The BBSRC is a Non-Departmental Public Body sponsored by the Office of Science and Technology (OST) within the Department of Trade and Industry (DTI).

For the purposes of Financial Reporting Standard 8, OST/DTI are regarded as related parties. During the year, BBSRC has had various material transactions with OST/DTI and entities for which OST/DTI is regarded as the parent department, viz.: Economic and Social Research Council, Engineering and Physical Sciences Research Council, Medical Research Council, Natural Environment Research Council, Particle Physics and Astronomy Research Council, Council for the Central Laboratory of the Research Councils.

During the year, the following material transactions with Council members took place in respect of payments from research grants funded by BBSRC:

		£
Professor Keith Gull	1 award	27,930
Dr Margaret A Stanley	2 awards	37,175

None of the above were involved in the approval of these grants.

21. Related Party Transactions (continued)

The following Council members held positions on the Governing Bodies of sponsored institutes:

Mr Michael Calvert OBE	Rothamsted Experimental Station: Board of Directors
Professor Douglas Kell	Institute of Grassland and Environmental Research
Professor Christopher Leaver CBE FRS FRSE	John Innes Centre
Professor Cheryl A Tickle FRS FRSE	Roslin Institute from 1 October 2001

In addition, grant transactions with the eight BBSRC - sponsored research institutes and HRI amounted to £82.5M (2000-01 £80.1M). The institutes are:

	2001-02 £M	2000-01 £M
Babraham Institute	**11.0**	10.8
Institute for Animal Health	**10.4**	9.3
Institute of Arable Crops Research	**17.1**	18.7
Institute of Food Research	**9.7**	9.4
Institute of Grassland and Environmental Research	**4.8**	4.9
John Innes Centre	**16.5**	13.9
Roslin Institute	**5.6**	5.7
Silsoe Research Institute	**3.5**	3.3
Horticulture Research International	**3.9**	4.1
	82.5	80.1

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