

BUSH TELEGRAPH

The House Magazine of the Edinburgh Centre for Rural Research

Web Watch ...

ECRR

Links to ECRR members' websites can be found at www.ecrr.org.uk

UK Science

The website of the UK Office of Science & Technology provides an entrée to government-related activities on R&D.
www.ost.gov.uk

The OST has set up a researcher's information and discussion forum at www.researchersforum.gov.uk

The Institute of Biology's news pages include a report on discussions with Lord Sainsbury on UK science policy, and also on a recent UK Biosciences Federation meeting.
www.iob.org

And in Scotland

Scottish Enterprise has created the Biotech Scotland website, which provides Scottish and world biotech news.
www.biotech-scotland.org

Science News

www.newscientist.com
www.nature.com
www.sciencemag.org

Inside ...

Steve Jones Lecture

Is Evolution Over ?
Feb 15th 2002
Royal Society of Edinburgh
Tickets from ECRR
Don't miss it!
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August 5-9 ForestSAT 2002 A conference on Remote Sensing Techniques.

Forest Research is hosting ForestSAT 2002 covering the use remote sensing Techniques in managing forests.
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What's TAA?

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Functional Genomics at MRI

The **Moredun Research Institute** is utilising both genomic and proteomic technology to look for new vaccines for livestock diseases. The work is likely to enhance our understanding of the biological processes which cause disease.

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And more ...

SASA is on the Move

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Spuds in Space!

The Scottish Crop Research Institute at Dundee is to collaborate with NASA to grow potatoes in space as a supply of food, a provider of oxygen and as a purifier of water.

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Stirling University's Institute of Aquaculture

Genetically improving fish to meet consumers needs.

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Post FMD Forum in Edinburgh

Some excellent presentations stimulated lively questioning at this ECCR event. See reports in Ian Aitken's Scientific Notes and on

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The Royal Society of Edinburgh

Invites submissions and views on the Foot & Mouth crisis for its Independent Review.

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Editorial

You may notice some minor changes to this edition of the Bush Telegraph in line with a policy of evolution rather than revolution. Over the next few editions BT will be looking to its readers to guide its progress. It is also very keen to see its readership increase. The electronic version of BT is already available on the ECCR website at www.eccr.org.uk and is one step in this direction.

To Crad Roberts we must pay a full tribute to his wise trusteeship of BT over such a long period. If we can do as well in the future as the past we will be doing well. As Crad said in the last edition the *Bush Telegraph* is only as good as its contributors and we continue to rely on them to keep everyone in touch with what is going on in the *ECCR family*. Communications, of which BT is a part, are the lifeblood of science and its society.

Mike Steele

Editor

Correspondents please note.

**Deadline for copy for next issue is
February 22nd 2002.**

**All contributions, comments and
suggestions can now be e-mailed to
M.Steele@ed.sac.ac.uk with copies to
m.talbot@bioss.ac.uk please.**

ROTA OF SOLICITED CONTRIBUTIONS TO BUSH TELEGRAPH

MARCH

British Geological Survey
Biomathematics & Statistics Scotland
University of Edinburgh, Institute of Ecology and Resource Management
Royal Society for the Protection of Birds
SAC Research Division
University of Edinburgh, School of Engineering
University of Edinburgh, Institute of Cell & Molecular Biology
Heriot-Watt University, Department of Biological Sciences

JUNE

University of Edinburgh, Institute of Cell, Animal & Population Biology
Centre for Ecology & Hydrology
MRC Human Reproductive Sciences Unit
University of Edinburgh Royal (Dick) School of Veterinary Studies
Royal Zoological Society of Scotland
SAC Animal Biology Division
University of Edinburgh, Department of Geography
Napier University, School of Life Sciences

SEPTEMBER

Edinburgh Centre for Tropical Forests
Lasswade Veterinary Laboratory
National Museums of Scotland
Roslin Institute
Royal Botanic Garden Edinburgh
Scottish Natural Heritage
University Marine Biological Station, Millport
University of Edinburgh, Centre for the Study of Environmental Change
& Sustainability

DECEMBER

University of Stirling, Institute of Aquaculture
Moredun Research Institute
Forest Research Northern Research Station
University of Edinburgh, Centre for Tropical Veterinary Medicine
Scottish Agricultural Science Agency
Scottish Centre for Animal Welfare Sciences
Scottish Crop Research Institute
Scottish Vertebrate Wildlife Centre

SCIENTIFIC DIRECTOR'S NOTES

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SOME CHANGES

Bush Telegraph

In the last issue of the *Bush Telegraph* the retiring editor, Professor Crad Roberts, commented briefly on his experience over the previous 8 years, recording his appreciation of the support received over that period and anticipating the arrival of his successor. At its half-yearly meeting on 7th November the ECRR Board, through its Chairman, Dr. D. E. S. Truman, formally expressed its warm thanks to Professor Roberts for his sterling editorial stewardship and development of the *Telegraph* during his tenure of the role and particularly for his skill in encouraging busy authors to produce articles about the current work of their organisations.

The Board also formally endorsed the appointment of **Mr. Mike Steele** as new editor and wished him well in the task he was taking on. Through his existing connections with the Centre for Tropical Veterinary Medicine, SAC and the British Society for Animal Science Mr. Steele is familiar with ECRR and thus well-placed to supervise the regular production of the *Telegraph* as ECRR's house magazine. It is a pleasure to welcome him in his new role.

Royal Society for the Protection of Birds

Earlier in the year Dr. Ian Bainbridge resigned as Head of Research (Scotland) to become Head of the Ecological Adviser's Unit in the Environment Group of the Scottish Executive. He has now been succeeded at RSPB by **Dr. Jeremy Wilson** who will be RSPB's representative on ECRR.

Royal Zoological Society of Scotland

Professor David Waugh resigned as the Society's Director in the summer to further his wider interests in conservation of endangered animal species. A successor has yet to be appointed but, in the meantime, **Mr. Henry Elliot** is acting Chief Executive and **Dr. Mauvis Gore**, Curator, will act for RZSS on ECRR matters.

Scottish Natural Heritage

Professor Michael Usher retired as Chief Scientist of SNH in mid November but will continue to pursue environmental research at the University of Stirling.

His successor at SNH is

Dr. Colin Galbraith.

University of Edinburgh, Institute of Cell and Molecular Biology

Professor Mary Bownes has completed her term as Head of Institute with **Professor Graeme Reid** now taking on that role and becoming, *ex officio*, ICMB's link with ECRR. However, Professor Bownes will remain as one of the University's representatives on the Executive Committee of ECRR.

POST FMD FORUM

The public Forum arranged by ECRR for 24-25th October attracted delegates from across Scotland and from various rural and urban sectors affected by the economic impacts of the FMD outbreak. In fact, the Forum was probably unique in assembling such a diversity of groups to discuss common source issues that affected them, albeit in different ways and to different extents. The event itself received media

attention via press, radio and television and there are likely to be follow on features concerning future actions.

Each of the sessions of the Forum stimulated lively and sustained discussions that continued informally during break periods, a good indication of a meeting achieving its purpose. Notable too was the full turnout of the five invited MSPs to lead the 'political' session despite competing demands on their time.

The Organising Committee is now engaged on drawing together the key points raised during presentations and discussions with a view to formulating recommendations for action or for further consideration at various levels. This practical outcome will be presented in a publication that will be distributed to all who contributed to the Forum and to others for whom it will hold interest.

ECRR ANNUAL LECTURE

For several years ECRR has arranged an Annual Lecture, co-sponsored by the Royal Society of Edinburgh and the Scottish Branch of the Institute of Biology. The Lecture, held in the rooms of the Royal Society of Edinburgh, ranks as a prestigious event in the annual cycle and is given by a distinguished speaker drawn from the fields of science, politics or business.

The next in the series will be on **Friday 15th February 2002** at 5.00pm and will be given by **Professor Steve Jones** whose title is "*Is Evolution Over?*"

Currently Professor of Genetics in University College London, Professor Jones' undergraduate and early postgraduate career was spent in Edinburgh where land snails were the subject of his research. Subsequently his work embraced wider issues of population genetics in the fruit fly and the human species but land snails are by no means forgotten. An accomplished author and gifted communicator on radio and television Professor Jones has a deserved

reputation for capturing audience attention and stimulating discussion.

Admission to the Lecture is by ticket only. The sponsoring organisations receive their own ticket allocations but any readers of the *Bush Telegraph* outwith ECRR, RSE or IOB may request a ticket on a first come, first served basis from the Secretary/Treasurer of ECRR, Mr. M. Talbot, BioSS, JCMB, King's Buildings, Edinburgh, EH9 3JZ.

DEPARTMENT FOR ENVIRONMENT, FOOD & RURAL AFFAIRS

In the last issue reference was made to DEFRA's open consultation on its draft aims and objectives to which apparently there was a strong response. In consequence the Department has modified the drafts to take account of views received and recently has provided a final version, available on its website (www.defra.gov.uk). Following a 200 word paragraph on its *Vision* the Department gives its *Aim* as:

" Sustainable development, which means a better quality of life for everyone, now and generations to come, including:

- * A better environment at home and internationally, and sustainable use of natural resources;

- * Economic prosperity through sustainable farming, fishing, food, water and other industries that meet consumers' requirements;

- * Thriving economies and communities in rural areas and a countryside for all to enjoy."

The *Aims* are followed by a set of 7 *Objectives*, equal in priority, to indicate what the Department will do in support of its aims.

Those interested in bidding for open competition research sponsored by DEFRA will find the full text a valuable guide in constructing their bids.

EVENTS DIARY 2001/02

Jan 31 2002	Directors' Lunch	British Geological Survey, West Mains Road 12.30pm Guest: Eddie Frizzell, Scottish Executive Host: Dr Chris Browitt
Feb 4 2002	Directors' Lunch	SAC Animal Biology Division, Bush Estate 12.30pm Host: Prof John Oldham
Feb 15	Annual Lecture	Royal Society of Edinburgh, 5.00pm "Is Evolution Over?" Speaker : Prof Steve Jones, Galton Laboratory
Mar 4	Directors' Lunch	Forest Research, Northern Research Station 12.30pm Host: Jim Dewar
April 16	Directors' Lunch	Centre for Ecology & Hydrology Edinburgh - 12.30pm Host: Prof Melvin Cannell
	Main Board Meeting	Centre for Ecology & Hydrology Edinburgh, Bush Estate 2.15pm
June 3	Directors' Lunch	Institute of Aquaculture, University of Stirling Host : Prof Randolph Richards
Oct 7	Directors' Lunch	BioSS, Edinburgh - 12.30pm Host : Rob Kempton
Nov 4	Directors' Lunch	Institute of Ecology & Resource Management University of Edinburgh 12.30pm Hosts: Prof John Grace & Prof Keith Smith
Dec 2	Directors' Lunch (tbc)	MRC Human Reproductive Sciences Unit Little France Host : Prof Robert Millar

FOREST RESEARCH - NORTHERN RESEARCH STATION

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Northern Research Station

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RESEARCH NEWS

Forest Research win new EU contracts

NRS staff continue to be involved in a number of EU funded contracts. New projects this year include:

- a four year contract on riparian zones
- two projects on adaptive variation in natural ash stands from native seed sources and across seven Western European Countries.

Chris Quine, Head of Woodland Ecology Branch, visited Latvia with other Forestry Commission (FC) staff to support the signing of a FC/Latvian Memorandum of Understanding on Forestry. Contact was established with the Director of the Latvian Forestry Research Institute (Silvava), and some initial ideas for collaboration were identified. The Latvians are keen to collaborate with FC on EU bids in topics where they have expertise.

Quinquennial Review of Forest Research

Forest Research became an Executive Agency of the Forestry Commission in April 1997 and like other government agencies, is subject to review every 5 years. The quinquennial review was announced in August and is currently under way.

Wide consultations have taken place with customers and other stakeholders. The

first stage of the review is expected to be completed by early January.

ForestSAT 2002 - 5-9 August 2002

Forest Research will be hosting a five day gathering on remote sensing techniques 5-9 August 2002. The event will be held at Heriot Watt University and is aimed at scientists, forestry managers, forest practitioners, policymakers and planners. The programme will consist of a three day conference, one day for a field excursion and one day optional seminar. Delegates from all over the world will share their knowledge of how aerial photography, radar, LIDAR, optical systems and thermography can help in monitoring and managing forests. The event is part of the FC's contribution to the EU Life project Forest SAFE. Other partners include: Swedish Forestry Administration; the Swedish University of Agricultural Sciences; Durham University; and Forest Enterprise. It will also form part of 'Treefest Scotland 2002' a year long festival of events to celebrate trees, woods and forests.

**Further information is available from
Juan Suárez or Esther Ker at FR, NRS
Tel: 0131 445 2176
forestsatsat@forestry.gsi.gov.uk or visit
www.forestry.gov.uk/ForestSAT.**

PEOPLE

Dr Jonathan Humphrey has been awarded an Honorary Fellowship in the Faculty of Science and Engineering, University of Edinburgh, in recognition of his contributions in the field of ecology and forestry for the Institute of Ecology and Resource Management.

Dr Sarah Green joined the staff in June as a Pathologist. Sarah has a strong background in biological control and was a Visiting Fellow with the Canadian government in Saskatoon.

Dr Mike Perks joined Silviculture (North) in April as a Tree Physiologist.

Dr Ian Forrest retired from Tree Improvement Branch in September. Ian studied variation at the biochemical level in natural populations, breeding material and individual clones. His work identified population differences in the Caledonian Scots pine remnants using both terpenes and isozymes. This led to the zonation which forms the basis for the genetic conservation, regeneration and expansion of these areas. The approaches begun by Ian have led to the development of molecular methods using DNA-based markers which now form a major part of the Branch's work. Ian's wide botanical knowledge and meticulous writing-style will be missed.

Ms Rhona Brankin, Deputy Minister for Environment and Rural Development, visited the Northern Research Station (NRS). She heard presentations about our work on the National Inventory of Trees and Woodlands, GIS and remote sensing, disease diagnosis and pathological problems, tree breeding, biodiversity research and social forestry.

In May, NRS hosted a party of six visitors from the Forestry Department and the Forestry Academy of the Chinese province of Fujian. After an introduction by Jim Dewar, Chief Executive, and a tour of the Tree Improvement Branch Nursery, presentations were made on Ecological Site Classification (ESC), silviculture and timber quality.

Dr Helen McKay and Alvin Milner won the Institute of Chartered Foresters' Silvicultural Prize for their paper in *Forestry* **73**(3), 259-270 *Species and seasonal variability in the sensitivity of seedling conifer roots to drying and rough handling*.

FUNCTIONAL GENOMICS AT MOREDUN

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Almost all tissues within an animal's body are made of proteins, or have been made by proteins which catalyse their synthesis. The molecular interface between a mammalian host and the parasitic organisms which invade it, predominantly involve proteins and the vanguard of the immunological response of the host to the invader is comprised of proteins. It is not surprising therefore, that an institute dedicated to research on animal disease is interested in proteins. In 1999 Moredun's External Scientific Review Committee recommended that scientists consider ways in which the genomic revolution could be harnessed for the benefit of infectious disease research within the Institute. A working party established to execute this recommendation identified the downstream opportunities in proteomics which would allow the elucidation of host parasite interactions and the ultimate identification of potential vaccines or diagnostics, and which would provide the basis for comparative biological research.

Funding was acquired from the European Regional Development Fund (ERDF) and from the Scottish Executive Rural Affairs Department (SEERAD) and the Moredun Foundation to purchase equipment and to employ staff to undertake proteomic research.

To identify and characterise proteins in a complex mixture such as in a whole bacterial cell they must first be separated. This is done using relatively old technology called polyacrylamide gel electrophoresis. This is essentially a two stage process which separates the proteins according to their charge and size and generates a two dimensional array pattern.

In the first stage the protein mixture is applied to a gel across which there exists a pH gradient. The pH of a substance describes its relative acidity and in the case of proteins dictates their electrical charge. When the proteins are applied to one end of the gel and an electric current applied across the gel the proteins migrate through the gel until they reach the pH equivalent to their isoelectric point – the position where their net charge is zero. This results in a ladder of individual proteins arranged in order of their PI. The direction of the electrical current can then be switched and the gel run at 90° to the first run. In this mode the proteins migrate through a constant pH and are separated according to their size – with smallest proteins moving fastest and furthest. By this technique the proteins are separated and can be identified as individual spots on the gel. It is possible to compare the protein portfolio of a host cell during the process of disease with that of a healthy cell or the proteins expressed by a bacteria in a petri dish with those expressed during invasion of an animal.

In order to undertake more detailed research into the structure and function of the protein it can be further analysed by mass spectrometry. In this process the proteins are broken down into smaller units called peptides which are then attracted through a vacuum by an electrical charge. The time which the peptides take to travel across the vacuum (time of flight) is dependent upon their size. Analysis of the time of flight of the different peptides in a mixture allows the mass and also the amino acid composition of the peptides to be determined. The amino acids are the building blocks of the proteins and it is the

order of amino acids in a protein which are encrypted within the sequence of nucleotide bases in a gene (thus the message to produce a particular protein comes from the DNA of the genes). The message in the DNA is translated on to a messenger molecule called RNA which is generated almost as a mirror image of the DNA. The RNA takes the message to the small factory organelles called ribosomes within the cells and here the message is transcribed into protein. The configuration of each block of three nucleotides (codons) in the RNA codes for a different amino acid. As the codons pass along the ribosome each new amino acid is added to the emerging protein. There is clearly fantastic potential for relating gene sequence to protein structure, although the complexity of the post transcriptional processes leading from gene to protein are only being fully realised now that complete gene sequences of many organisms have been elucidated.

At Moredun we have now acquired the two dimensional gel electrophoresis equipment (*IPGphor, Multiphor and Ettan-dalt systems from Amersham-Pharmacia Systems*) necessary to separate proteins and the mass spectrometry (Matrix assisted laser desorption ionisation – time of flight [MALDI-TOF] (*Perseptive Biosystems Voyager DE-PRO*) and surface enhanced laser desorption ionisation time of flight [SELDI-TOF] (*Ciphergen Inc.*) analysers necessary to determine the mass of target molecules. Amino acid sequences of proteins will be provided by an automated Edman degradation system just recently purchased (*Applied Biosystems CLC Procise*). We also have the equipment (DNA sequencing analysis, *Applied Biosystems 377*) required to relate this back to the genome of the pathogen or host from which the protein was derived.

If the amino acid sequence and function of a target protein in which the scientist is interested could be determined and if databanks with proteome sequence information were available then the

function of unknown proteins could be determined without reference to the encoding genomes. Unfortunately this goal is a long way off. The complete proteome of an organism is much larger and more complex than the genome. In man the genome comprises 30-35 thousand genes - the proteome probably stretches to more than a million proteins. This is possible because of a myriad of post-transcriptional (ie after the DNA blueprint has been read) changes which are made to proteins – by cutting and reforming and by additions of sugars and other molecules. Furthermore, proteins can be constructed in many different three dimensional shapes - which are critical to their function since protein – protein and protein – ligand interactions are three dimensional. Ligands are small molecules with which proteins interact and can be produced by the body or can be administered as medicines. Knowledge of the three dimensional shape of a protein is extremely useful and with it predictions can be made with regard to which chemotherapeutics or biological interactions may take place. The determination of the shape of a protein is possible using X-rays if the protein can be crystallised. Large computers are currently being constructed which will utilise the known amino acid sequence of a protein and the knowledge of inter-molecular forces to predict three dimensional shape in a protein. The computational power required to do this is quite immense and will stretch the micro-computer technologists as much as it will the biologists.

At Moredun the effort will not be to generate whole proteomes – rather to target our efforts towards specific proteins of putative biological interest.

It will be possible to study proteins which are ‘up regulated’ or produced in greater abundance at different stages of a parasite’s life cycle. This will provide clues as to the role of these proteins in the parasite and may provide information relating to the impact that the proteins may

have on their mammalian host. The information derived from proteomics may be more accurate than that derived from genome analysis. Changes in gene expression clearly provide very useful clues to downstream protein generation, however the relationship between gene and protein may not be direct. The messenger RNA produced by a gene and detected as 'expressed sequence' may remain 'silent' without generating protein product, proteomes will help clarify protein expression in real time.

Access to functional genomics technologies is also going to be crucial for biotechnology companies in order to maintain a competitive market position. However the equipment and highly skilled staff required to run a facility like this is expensive and usually beyond the means of individual small to medium sized enterprises (SME's). That is why Moredun has established a Functional Genomics Unit with joint funding from the European Regional Development Fund, and the Scottish Executive Rural Affairs Department. This centre is fully accessible to the forty or so SME's, universities and research institutes in the Edinburgh area and beyond, as well as Moredun's own scientists.

Therefore this unit has been established to provide a Proteomic research facility providing support to ongoing research projects at M.R.I. as well as seeking external collaborations.

The new Unit provides:

2-D Gel Electrophoresis – A technique that allows all of the proteins expressed by an organism to be displayed as discrete spots on a gel. Protein positions can be mapped and the amounts of protein expressed can be compared with organisms from other sources. We utilize the latest in Immobilized pH Gradient (IPGphor) technology for the first dimension combined with either horizontal or vertical SDS-PAGE systems for the second

dimension. At present the technology is available to Moredun researchers with the equipment available to run both the first and second dimension on pre-cast gels as well as the automated staining of the gels.

SELDI Mass Spectrometry – (Surface Enhanced Laser Desorption Ionization Mass Spectrometry), allows researchers to capture proteins on a range of chromatography chip surfaces and then analyze by time of flight. This allows a range of techniques including on-chip purifications, digestion and investigation of protein-protein interactions. We can also use the technology to identify Glycosylation, Phosphorylation and Active sites within a protein. This technique provides an alternative method of identifying proteins from complex mixtures.

MALDI Mass Spectrometry – (Matrix Assisted Desorption Ionization Mass Spectrometry) is a highly sensitive technique (femtomole level) that can provide information on the molecular weight, structure, N and C terminal sequence and post-translational modifications of proteins. MALDI is a major tool in the analysis of spots picked from 2-D gels. The ultimate aim of this service is to provide a method of identifying proteins from either 2-D gels or from samples purified by other means. Techniques have been developed within the unit to demonstrate the diversity of MALDI-TOF mass spectrometry, from the analysis of proteins with masses 10kD-300kD to the analysis of peptides from protein digests for protein identification purposes. Other protocols relevant to studies at the Moredun Research Institute, such as bacterial expression profiling are also under development.

All of this instrumentation is backed up by the latest in analysis software, and fully trained staff. The staff in the unit will be happy to discuss individual requirements.

Amino Acid Sequencing: The Applied Biosystems Procise® cLC Protein Sequencing System has been purchased and we plan to complement the MALDI mass spectrometry technology, especially when dealing with novel unknown proteins that are not yet in databases. This capillary high throughput protein sequencer is able to sequence proteins at the femtomole level. At this sensitivity, if you can see the protein spot, you can sequence it and identify the protein.

DNA Sequencing – run on a PE Biosystems 377 Automated DNA sequencer using “Big-Dye” Terminator protocols to provide long reliable sequence runs – 550-750 bp depending on template quality. The sequencing service has been available to Moredun researchers since July 2000, with a remit to providing a fast and reliable service with the benefits of competitively priced sequencing. A Qiagen liquid handling robotics system is also available to aid in the preparation of samples for DNA sequencing, etc.

The benefits of the genomic and proteomic technology utilised at Moredun to the end-users of our research will be far reaching. New candidates to test as vaccines for infectious diseases of livestock will be generated much more quickly than was previously possible. Furthermore, it is likely that vaccine candidates will be identified for previously intractable diseases for which they have been particularly elusive. A greater range of diagnostic tests should become available and these may be more sensitive, specific and accurate.

Finally, our understanding of the biological processes which cause disease will be greatly enhanced and the ability to look at these processes in real time in animals will be of immense comparative interest across all species including man.

SCOTTISH AGRICULTURAL SCIENCE AGENCY

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SASA Relocation

For any major new building project, once the process of recruiting and appointing the architect, engineers and other professional consultants has been completed, it signals the beginning of an exciting and challenging phase, when the design of the new building starts to take shape.

That is the position we have now reached with SASA's planned relocation from our existing East Craigs site to Gogarbank Farm.

Getting to this stage has taken some considerable time and effort. SASA's history dates back of course to the 1920s, when – as many readers will know - East Craigs was in fact a fully operational farm. It was surrounded by agricultural land, where SASA's field trials also took place.



East Craigs, circa 1955, showing SASA's headquarters buildings and field trial plots

Since these early days, SASA has grown by accumulating new duties, as the need for scientific support to Government increased, and its range of regulatory functions also expanded. The approach to the housing and servicing of these needs has been piecemeal, without an overall strategic plan. As a consequence, a set of individual, fragmented buildings arose, of varying age and quality.

At the same time, there was progressive urbanisation of the East Craigs area. In response to this, in 1971, the extensive field trials of the Agency were transferred to Government land at Gogarbank Farm some 5 miles west of East Craigs, near Ratho.

Since then various operational difficulties have been encountered: the existence of domestic and other surrounding properties have created security and other problems; many of the buildings at East Craigs have been approaching the end of their useful lives; and the unavoidable transfer of the field operations to Gogarbank Farm, with the resultant inter-site travelling, has become increasingly problematic in terms of the effective discharge of the Agency's responsibilities.

Because of these various factors, and following a series of earlier strategic reviews, a major Option Appraisal was undertaken in 1997-98 with external consultancy input. The conclusion reached was that our continued occupancy of the property at East Craigs was not an effective proposition, in economic or operational terms. This led to a detailed follow-up study of various alternative greenfield site locations, including various areas at the Heriot Watt's Riccarton Campus and potential sites beside the Pentlands Science Park and at Bush Technopole. Although offering many advantages, none of these options could provide the extensive field trialling land necessary to provide full integration of SASA's laboratory, glasshouse and field operations – which could be achieved at Gogarbank Farm. The conclusion, as agreed by Scottish Executive Ministers in early 2000, was that planning should therefore be taken forward for relocation to Gogarbank.

A further study was, however, requested by Ministers later that year. This had regard to Scottish Executive Relocation Policy which requires that there should be a presumption in favour of non-Edinburgh locations when a property break arises. The object of this policy is to seek to spread public service jobs around Scotland. A further (independent) scientific review therefore looked at the feasibility of transferring SASA's field operations, and its laboratories etc, to a site adjacent to the Scottish Crop Research Institute at Invergowrie, Dundee. The results of this study, however, showed that the soil conditions there would not be compatible with those necessary for our work on the certification of seed potatoes. Accordingly, Ministers agreed in December 2000 that the Gogarbank Farm option should be taken forward.

The architects we have now appointed are the *Parr Partnership*; the mechanical and electrical specialists are *Ove Arup Scotland*; and the civil and structural engineers are *Blyth & Blyth* – all of whom are experts in designing the range of laboratory and other specialised accommodation we require. If all goes to plan, construction of our new headquarters premises should commence on site in mid 2003, and be completed early in 2005. The move from East Craigs should be completed by the second half of 2005. Moving into modern, purpose-built accommodation is an exciting prospect – and it will give us great pleasure to be able to extend an invitation to you at that time to visit us in our new Headquarters complex.



Gogarbank Farm – showing SASA's existing farm buildings (top centre), and the site (triangular area above this) earmarked for location of the new Headquarters

Professor J R Hillman, Director
Scottish Crop Research Institute
Invergowrie, Dundee DD2 5DA
Tel: 01382 562731 Fax: 01382 562426

Contact persons: **Professor W Powell, Deputy Director** (e-mail: wpowel@scri.sari.ac.uk);
T.D. Heilbronn, Scientific Liaison (e-mail: theilb@scri.sari.ac.uk).

Reorganisation of the SCRI Science Programme

The life sciences are currently in the midst of assimilating a paradigm shift arising from developments in many disciplines, but particularly genomics, computer science and chemistry. The challenge for SCRI has been to align the Institute's research activities to take advantage of these developments and to establish an organisational capability that is sufficiently agile and innovative to exploit new scientific discoveries and to continue to create exciting new business opportunities.

We have recently established a programmatic approach to our research to reflect this change, aimed at achieving international impact in clearly defined strategic research areas. Our programmes are now organised around three themes, and are designed to enhance our capabilities, and capture new strategic opportunities through enhanced synergy and elimination of potential duplication.

Theme 1 ~ Mechanisms & Processes

Theme 2 ~ Genes to Products

Theme 3 ~ Management of Genes & Organisms in the Environment

Our research programmes range from basic cell and molecular biology through to whole organism biology, with a strong emphasis on

computational tools to store, model, analyse and disseminate information and data. Organisation of research programmes into themes reflects our need to change in response to technological advances and to attain a balance between discovery science, as illustrated by genome sequencing projects, and traditional hypotheses driven research groups.

International Triticeae Mapping Initiative (ITMI)

Bread wheat, macaroni wheat, barley and rye are small grain cereals belonging to the tribe of grasses known as the *Triticeae*. The surge of activity in genetic mapping in the late 1980's led to the creation of the International Triticeae Mapping Initiative (ITMI) which was set up to provide co-ordination of the international efforts in genetic mapping of *Triticeae* species. The management office of ITMI was originally located at the University of California, Davis, USA, until January 2001, when the ITMI management office moved to SCRI. The move was part of re-organisation plans, which embraced new methods and directions in genetic studies of the small grain cereals, particularly with respect to genome science, bioinformatics and computational biology.

Today, ITMI is a thriving organisation with over 200 affiliated members world-wide, attracting scientists from a range of organisations including universities, research institutes, and large multinational companies. The research activities of the ITMI community proceed at a pace with ground-breaking ideas and cutting edge technologies being key features. The momentum is sustained and facilitated via electronic communication and access to electronic databases.

One of the main activities of the ITMI management office is to organise two annual international workshops. The first one to be organised from the Dundee office took place in September 2001. Entitled 'Single Nucleotide Polymorphisms – Issues in Detection and Application in the Triticeae', the workshop was held in conjunction with a meeting of the European Association of Plant Breeders (EUCARPIA), in Edinburgh. The rest of the meeting took place at SCRI with one day of seminars followed by a business session. Over 100 scientists attended, with representatives from Private and Public sectors travelling from Europe, North America, Africa, Australia and China to the meeting. The establishment of the new ITMI office and the success of the meeting affirm Dundee as a centre of excellence for crop research. The next ITMI workshop will be held at the 'Plant, Animal and Microbe Genome' conference in San Diego in January 2002.

More information about ITMI is available at our web site:

<http://www.scri.sari.ac.uk/ITMI>, or by contacting the management office:

Prof. Wayne Powell

Managing Co-ordinator

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Visit to SCRI by the Deputy Minister for Environment and Rural Affairs

SCRI was delighted to welcome Rhona Branklin, the Deputy Minister for Environment and Rural Affairs, on 5th November 2001, when she visited the Institute, and announced the award of £500,000 worth of funding by the Scottish Executive for SCRI's contribution to three collaborative research projects:

- To collaborate with the Sanger and Moredun Research Institutes on research that may help scientists develop methods to control blackleg infection in potatoes, by determining the full genomic sequence of the bacterial cause of the disease, *Erwinia carotovora*. In the UK alone, this disease is responsible for most of the £2.9 million estimated losses each year due to soft rot disease.
- To work with the Royal Botanic Garden Edinburgh (RBGE) and the Strathclyde Institute for Drug Research to analyse the biology of certain plants and fungi that could open the door to the discovery of new, natural medicinal compounds. Two sets of biodiverse germplasm will be explored in this project - an *ex situ* collection of tuber-bearing *Solanum* species from SCRI's geenbank and, using RBGE's expertise, a wide range of species from the British flora, focusing particularly on Scottish bryophytes (mosses and liverworts). The *Solanaceae* family is a rich source of bioactive molecules, particularly alkaloids.
- To undertake research with RBGE, the Scottish Agricultural College, Biomathematics and Statistics Scotland, Universities of Edinburgh, and Aberdeen, and Macaulay Institute, to help preserve and promote the biodiversity of ecologically sensitive areas, with particular emphasis on the taxonomy, genetics and ecology of sub-arctic willow scrub.

Collaborative research with NASA

SCRI, acknowledged as Europe's leading centre for potato research, hit the newspaper and the TV news headlines earlier this Autumn, with the news that it is set to collaborate with NASA to grow potatoes in space.

The potato, which is now the world's fourth most important crop after wheat, rice and maize, is one of the major sources of Vitamin C for many people and might form an important part of future space colonies' diet, as a source of carbohydrate, essential amino acids, and vitamins.

If they are to be grown successfully in space, then modifications are needed to the plant to ensure maximum production of potatoes per area, with minimum production of wasteful leaves and stems. Dr Stutte, Leader of the Plant Physiology Group at the NASA Kennedy Space Centre, spent two days at SCRI meeting Dr Roberto Viola, Head of the Plant Biochemistry Unit at SCRI.

Dr Stutte's group has been investigating the growth of crops within a 'Biomass Production Chamber' - a cylindrical steel chamber, 7.5 m high and 3.7 m in diameter, that was originally used for hypobaric tests during NASA's Mercury Space Program. It was converted for its current use in 1987, and has a number of different levels, allowing for about 16-20 square metres of growing area. Their studies include looking at how the plants can aid in revitalising the atmosphere (the plants remove carbon dioxide from the air and give off oxygen); how they can purify water (pure water, evaporating from the leaves, can be collected in the condensation system); and how to increase the amount of effective food production.

The group has also studied the effect of bioregulatory compounds that reduce plant

size. By reducing the height of a plant, extra levels could be added within the chamber, possibly doubling or even tripling the number of plants. Further use of plant growth regulators will allow scientists to ensure that the limited resources are most effectively used, for example getting plants to produce a much higher proportion of potato tubers, rather than wasteful leaves and stems, as well as reducing the problem of disposing of the waste material.

Some growth retardants, such as paclobutrazol and maleic hydrazide, have been successfully used to reduce the growth of potato plants, but these have an effect on all the parts of the plant, including the tubers. What has been required is a compound, specifically to accelerate the induction of potato tubers. The identification of such a 'tuber inducing' factor is crucial for the optimization of benefits provided by growth retardants on biomass production.

Dr Stutte's group has now identified a tuber inducing factor that is produced naturally by potato plants grown under specific (hydroponic) conditions. Application of this compound to potato plants results in remarkable reduction of plant height and increases the induction of tuber formation. The slight reduction in total biomass production is more than offset by the acceleration of tuber production and the large increase in the percentage of economically valuable tubers per plant.

The precise mode of action of the tuber inducing factor is not known and is being investigated now in Dr Viola's laboratory at SCRI. Dr Viola is currently leading a research program to characterize the process of meristem activation in the potato plant. This programme has received £400,000 funding from the European Union and the Scottish Executive Environment and Rural Affairs Department (SEERAD). This groundbreaking programme has established

that similar processes within the apical meristems of stolons and tuber are directly responsible for determining induction of tuber formation and release of tuber dormancy respectively. The objective of Dr Viola's programme is to identify precisely these mechanisms at the biochemical and molecular level in order to develop practical strategies for the management of these crucial developmental aspects of the potato tuber's life cycle. Dr Viola's group has developed a model system for the testing of exogenous compounds on stolon meristematic activity. This system is now being used to investigate the biological properties of Dr Stutte's tuber inducing factor. In addition, Dr Viola is also engaged in the biochemical characterization of the tuber inducing factor in order to test the efficacy of similar molecules on these process and design more powerful chemical analogues.

It is expected that these studies will lead to the development of novel management strategies for the growth and productivity of potato plants that may find important practical application both in conventional agriculture and in space life-support systems.

What is the Tropical Agriculture Association?

The Tropical Agriculture Association (TAA) is the largest non-commercial organisation in Western Europe concerned with tropical agriculture and tropical rural development. It has more than 1100 members who have an interest in and experience of tropical, sub-tropical and/or arid zone agriculture and their related disciplines. The membership includes both generalists and specialists from a wide range of disciplines. These include: agronomy, disease and pest control, plant breeding, animal health and production, economics, engineering, forestry, land use planning, marketing, post harvest technology, estate management, soil and water conservation, fisheries, sociology, general agriculture, education, training and extension.

The TAA aims to exchange and disseminate information on rural development in the tropics to promote development in tropical countries and thus reduce rural poverty.

The association is also consulted by many organisations concerned with development in tropical countries and is able to give balanced independent advice.

The TAA also helps and encourages young professionals with travel scholarships.

TAA is a registered Charity No 800663 organised and run by unpaid volunteers elected by members. Membership is open to tropical agriculturalists from both the Commonwealth and the European Union.

What does the Association do?

The TAA provides a forum for discussion

of matters of importance to tropical agriculture. A number of groups exist throughout the UK with the most active in London, Scotland and SW England.

Principal activities are:

- The publication of a Newsletter four times a year. Meetings, conferences, workshops and discussion groups
- An award fund to assist young graduates to gain experience in tropical agriculture
- The publication and circulation to consultancy companies and other groups of a list of TAA members available for consultancy
- The maintenance of a Web page for the information of members at the following address.
<http://www.taa.org.uk/>

The TAA has an executive committee which runs the association and acts as liaison group which speaks on behalf of the association to bodies concerned with Tropical Agriculture such as DfID, the European Union and the World Bank.

Membership

Ordinary

UK, EU and Commonwealth citizens who have practised in tropical agriculture or rural development at a professional level.

Overseas

Eligible persons not resident in the UK.

Students

Approved students studying tropical agriculture or an allied subject.

Corporate

Open to any institution or company involved in research or development related to tropical agriculture.

A flavour of TAA

The scope of the interests of members of the Scottish Branch of the TAA can be gathered from the content of the workshops that have been organised since 1998. Most of these meetings have been organised in Edinburgh.

- *Indigenous Knowledge in Tropical Agricultural Research and Development.*
- *Seeds in Development - Past, Present and Future.*
- *The effects and control of rinderpest.*
- *'Can sustainable food production feed the human population of the tropics for the next 25 years'.*
- *Food Security in Low Income Countries.*
- *Crops for Africa - Traditional and Exotic.*
- *Soil and water conservation in the tropics.*

Free copies of the papers from these meetings are available on the TAA website.

Here is a flavour of the type of discussion at the soil water conservation conference.

§ Since WW2, approaches to Soil Conservation (SC) tended to follow the US approach focussing on control of runoff (contour terracing etc.). This was not generally critically questioned and so was pretty much universally accepted; this view is much less acceptable today with a more realistic and practical approach to development.

§ The tendency is now to look at SC in the broad environmental management perspective and the wider problem of which it is a part.

§ Is SC being driven by donor agendas with beneficiaries and implementing bodies being drawn along. We need to return to basic common sense farming practices which include SC measures specific to the system and communities. Most encouraging is the shift to farming

practices such as zero-tillage which reduce the need for expensive and often socially unpalatable technical solutions to excessive run off. There is now a lot of information and sound practical examples of the benefits of crop & soil management supporting the shift away from conventional SC. This does not mean that as a longer term approach, traditional SC measures (bunding, contour terracing, etc.) do not still have their place.

§ SC measures are different from and sometimes at odds with the extension messages presented to the farming communities. Closer liaison between the SC people and extension workers has to be initiated and maintained at all times until the problem is satisfactorily under control.

The question returns to confront donors "do aid programmes really address the underlying problems?" both in general and in the more specific SC context.

§ The past focus on run off as the main thrust of SC is now changing to looking at the cushioning effect of rainfall (impact) and ensuring greater water infiltration into the soil. This becomes more an agronomic issue (plant cover & type & management) than an engineering one although both disciplines are inextricably involved.

§ Problems of land tenure are still a stumbling block for effective SC even with the present shift in emphasis of approach. Need to know how the social structure fits into the land tenure system and hence identify areas of responsibility and constraint to development.

§ So often development assistance gets blinkered by the technical solutions to a problem; where in fact the reality is one of policy change. For example, removing feed subsidies for sheep producers would reduce sheep numbers which in turn reduces the pressure on grazing and soils.

§ Too often the problem is one of convincing Governments that soil erosion is a serious problem. Need to establish that there is a problem and that it can be tackled!

Institute of Aquaculture, University of Stirling

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NEW DEVELOPMENTS

There have been a number of new developments at the Institute of Aquaculture in the past year which will have a significant impact on our research capability, mostly in terms of improved infrastructure.

The Institute has a long tradition of aquaculture development overseas and it was pleasing to be successful in a bid to manage the next phase of the DFID Aquaculture and Fish Genetics Programme. Under the direction of Professor James Muir this programme will provide excellent collaborative opportunities for research in the developing world.

New commercial developments are also in the pipeline. Dr Sandra Adams and colleagues from our Vaccine Laboratory received a SMART award to establish a new company, Aquaculture Diagnostics Ltd, to market diagnostic reagents developed in the Institute. There is considerable interest in such products from research institutions and commercial companies interested in the development of vaccines.

The Institute has for many years been involved in the commercial production of salmon smolts and brown trout at Howietoun, near Stirling. Apart from providing a valuable source of income this has led to a number of good research opportunities. There is now increasing interest in the development of “new” species for aquaculture in the UK. Chief amongst these are halibut and especially cod. The Institute has had a research programme on these species for some years and, building on this, we are about to start construction of a commercial marine

fish hatchery at our marine site at Machrihanish, Argyll. This is a joint venture between the University and Lakeland Smolts Ltd, a subsidiary of Marine Farms of Bergen. The hatchery will concentrate initially on cod.

On the Stirling campus we are pleased to have been awarded substantial funding from the SHEFC Science and Research Infrastructure Fund which will allow upgrading of our analytical equipment and the construction of a “clean” laboratory. This development will be of particular value to research programmes in our Environment and Nutrition groups. The Institute will also partner the University of Aberdeen following a successful SHEFC Research Development Grant bid to establish a Centre for Marine Fish Immunology. Apart from access to major new facilities in Aberdeen this project should open up excellent opportunities for collaborative research.

Research

Institute research is grouped under five headings: disease, reproduction and genetics, nutrition, environment, and aquaculture systems. Information on two programmes which are assuming increasing significance are given here:

Virological Research

Nodavirus research has continued to represent the main research activity of the virology group. This work is funded by the European Union, and is performed in collaboration with researchers at IFREMER, Montpellier, and AFSSA, Brest. Research at Stirling is aimed at the development of molecular diagnostic procedures, and analysis of the genetic variation of circulating strains of fish nodaviruses.

Dr Bill Starkey has recently developed a nucleic acid sequence based amplification (NASBA) procedure for the detection of nodaviruses in clinical samples. NASBA is an isothermal nucleic acid amplification procedure that amplifies RNA directly, and thus is particularly suited to the detection of RNA virus targets such as nodavirus and infectious salmon anaemia virus. Detection of amplification products is achieved through the use of an electro-chemiluminescent detection system and a target specific nucleic acid probe. The system exhibits a wide dynamic range and a high degree of specificity. In preliminary experiments, the NASBA procedure has been successfully used to detect nodaviruses in clinical samples from several fish species including sea bass, grouper, Atlantic cod, Dover sole and striped jack. This system has been adapted to run in "real time" using fluorescently labelled molecular-beacons for detection and has proved to be highly sensitive, and is capable of producing results in four hours, as compared with virus isolation in cell culture, which may require up to two weeks.

The design of nucleic acid probes and primers for nodavirus molecular diagnostics, and the development of nodavirus vaccines, is dependent on knowledge of the nucleotide sequence and antigenic variation exhibited by fish nodaviruses. The nucleotide sequence of the coat protein gene of more than fifty nodaviruses isolated in the period 1996-2000 from Europe, Asia and Japan have been determined and we have also identified nodavirus infection in the United Kingdom for the first time. Nucleotide sequence and phylogenetic analysis of nodaviruses isolated from UK farmed halibut, cod, and Dover sole indicate that these viruses are closely related and form a single serotype. These findings are of considerable importance for the development of aquaculture systems for novel fish species in the UK. In 2001, work aimed at the characterization of nodavirus antigenic diversity has

commenced with the objective of identifying regions of the nodavirus capsid which are recognised during protective immune responses. This work will involve the production of a panel of monoclonal antibodies against fish nodaviruses, and is a collaborative venture with the Aquatic Vaccine Unit. The results of this study will facilitate the rational design of nodavirus vaccines.

Selective Breeding

A major theme over the last year has been the development of breeding programmes for a number of commercially important farmed fish species. These projects reflect the growing recognition that genetic management and selective improvement will form the basis for the further development of a sustainable fish farming industry. Every other farmed animal or plant species used as foods for man has been genetically improved for yield and consumer acceptability. The pre-requisite for the genetic management of any farmed stock is the ability to identify the genetic relationship between individuals in any given mating. This has been very difficult in fish because it is impossible to physically tag the many small offspring. Previously, the young fish had to be ongrown in separate family tanks until they were large enough to be handled and survive the tagging operation. Most farms cannot afford this level of capital investment and have utilised a "greenfingered" approach to genetic improvement or broodstock replacement; they have merely chosen the largest or fastest growing animals for the next generation, which in the absence of any pedigree information has often resulted in the genetic degradation of farmed stocks through inbreeding and genetic drift.

Recent development in the identification of highly variable genetic fingerprinting techniques that are easily analysed using the polymerase chain reaction (PCR) and fluorescent visualisation techniques means it is possible to identify the fingerprinting of broodstock fish and identify their

offspring in large commercial populations. This technology alone has dramatically improved our ability to design new cost effective broodstock management and improvement programmes for a wide variety of species with very different biological characteristics.

Projects include work in Cyprus with the Alkioni fish farming company to design a programme for the gilthead seabream (*Sparus auratus*). Genetic fingerprint techniques have been developed based on the use of a number of microsatellite marker loci required to discriminate the offspring from the hundreds of potential families that arise from this mass spawning species. The markers will enable the number of families represented in the

output from the broodstock to be assessed as well as individual male and female contributions to the spawning success.

By contrast the Atlantic halibut offers a completely different set of biological characteristics that need to be taken into account in the design of a broodstock replacement and improvement programme. This is a large, long lived and potentially highly fecund species, which means that the industry will rely on relatively few broodstock compared to other farmed fish species. In these circumstances the correct choice of broodstock is of upmost importance in order to ensure that the industry receives the highest quality seed and that the genetic resource is not compromised by poor management.

RESEARCH STRATEGIES AND ALL THAT!A Personal View

Michael B Usher, former Chief Scientist, Scottish Natural Heritage.

We live in a society that wants a ‘strategy’ for just about everything. The *New Oxford Dictionary of English* defines the word ‘strategy’ as “a plan of action or policy designed to achieve a major overall aim”. If this is the case with all ‘strategies’, then that it is a very laudable way forward.

The first difficulty is in defining the ‘aim’. In some areas of life this is easy, but so often in research it is far more difficult. We may know what we would like the research to achieve, but precisely how the research might be used is something that might be impossible to specify until the research is done. If the aim is to broaden or deepen knowledge, then any research is appropriate, and a strategy is not needed! If we know what we are doing before we start, then there is no need for research. There are clearly difficulties.

The issue was addressed earlier this year in *Nature* by Laver *et al.* (2001). They wrote “Good scientific research is not done by corporations, or by the strategic teams beloved of politicians and administrators, but through ideas which develop in the minds of individual scientists. Strategic research will not produce truly novel discoveries. As George Porter, former president of the Royal Society, once said: “If a man comes to you with a strategic research plan, you’d better lock up the spoons”. US President Richard Nixon had a famously comprehensive strategic plan to cure cancer within five years ...”. Is there any truth in this, or was it an academic grouse about lack of ‘blue skies’ research funding?

SNH has been through a process of preparing its own research and technical support strategy (Anon., 2000). This could be used as an example of the modern appetite for strategies. I had better say at the outset that I did not write any words in it, and hence I can neither take credit nor be criticised. However, first things first. What is the aim of SNH's research? This is set in the context of SNH's overall strategy, which includes three goals, for

- the whole of Scotland's natural heritage to be cared for more effectively;
- the link between the natural heritage and personal well-being to be widely recognised and acted upon; and
- renewable resources to be harvested within their carrying capacity, management operations to provide multiple benefits, and natural resources to be used efficiently (Anon., 2000, pp. 6-7).

This has the potential to provide a pretty extensive research agenda. Some aspects of this triple goal lead directly to research, but others do not. So how does one focus in on an appropriate aim for a research strategy?

In SNH's case, this has been done by defining three themes. These are:

- understanding the state of the natural heritage;
- understanding the causes and nature of changes in the natural heritage; and
- good practice in the care and management of the natural heritage.

Cutting across all of these themes is the need for data management, as well as the next modern foible, the preparation of a suite of ‘action plans’ to fill out all of the detail that a strategy lacks. When I was a student, admittedly 40 years ago now, just one document sufficed – the management plan. Now we have to have both a ‘strategy’ as well as a series of ‘action plans’. At least someone will be kept busy writing all of these documents, but do they contain any more substance than the old management plan?

I have to admit a degree of scepticism when I think of research strategies. True, in writing one it does focus the mind on what is important today. True, it does tend to make the aims of the research programme more widely known. If this helps to obtain funding, or to gain collaborations, then it has been useful. True, it does tend to satisfy politicians and administrators, and hence relieve the researchers from day-to-day questions about what it is that they are doing. But, no research strategy is a substitute for good ideas in the minds of individual researchers. Researchers need to be able to keep abreast of developments in their own field of research, to exchange ideas with others, and to think new ideas (or ideas that develop and extend the ideas of others). Why is it that no research strategy seems to recognise these truisms? Should we have a strategy that provides a strategy and a collection of action plans that will further real innovative research?

Let me conclude with a true story about a head of a large biological sciences department in a Commonwealth university. He was asked if his department had a research strategy. “Yes”, he replied, “get as much research money as possible”! Perhaps it is such a simple strategy that is best. If it is worth taking the time to write a research strategy, then it should be clearly (transparently) useful in achieving and furthering the research that it strategises!

References

- Anonymous (2000). *Research and Technical Support Strategy: Scottish Natural Heritage’s Strategy for Research and Technical Support: 2000-2005* Scottish Natural Heritage, Perth.
- Laver, G., Müllbacher, A. & Waring, P. (2001). How commercialization puts a blight on research: good science stems from people with ideas, not from corporations or strategic teams. *Nature*. **412**, 765.
- Professor Michael Usher retired on 16th November 2001 as Chief Scientist at Scottish Natural Heritage.*

ECCR 'Post FMD' Conference Edinburgh 24-25 October 2001

Over 120 delegates participated in a very successful Post FMD conference at the International Conference Centre in Edinburgh in October that considered ways forward for the Scottish economy after FMD. This timely and topical event generated some lively questioning and debate stimulated by a host of good presentations. The majority of contributors were from either ECCR members organisations, our sister Research Consortium in Aberdeen, The Institute of Biology (Scotland), Royal Society of Edinburgh and the Royal Highland Agricultural Society of Scotland.

The format of the two days varied between presentations, shorts position statements, panel discussions and questioning so that there was something for everyone. The whole affair run like clockwork and the venue, once you got there, was comfortable and feed people well!

A significant number of politicians attended the conference. Ross Finnie gave the opening address and a panel of MSP's from all parties

took part in a surprisingly constructive discussion panel at the end.

The BBC came on the first day and featured the event as part of their Sunday TV programme *Landward* on the 28th October. With Fordyce Maxwell of the Scotsman giving one of the most entertaining but also serious presentations the conference also hit the national press.

One of the telling points to come across was the width of interested parties. This perhaps reflects the diversity and interdependence of communities not just in the rural areas but throughout Scotland. It might also indicate the future role ECCR can play in stimulating interactions between very different organisations to the benefit of whole communities.

A summary of papers and discussions and the recommendations that came from the meeting will be available electronically, probably both as a CD and on the web, early in 2002. Look out for details on the ECCR website.

**For more details contact Mike Talbot at the ECCR office: Tel. 0131 650 4890
E-mail: m.talbot@bioss.ac.uk**

Royal Society of Edinburgh Committee to investigate the impact of Foot & Mouth Disease on Scotland.

The RSE has set up an Independent Committee to undertake a wide ranging assessment of how FMD has affected Scotland. The investigations will focus on *lessons to be learnt* and make recommendations on future methods of prevention and control. Headed by Professor Ian Cunningham it will take evidence from a wide spectrum of individuals and organisations and welcome factual submissions from interested parties.

FMD has had a massive impact on not just agriculture but also other enterprises in or serving rural areas. The review process will take some six months and will cover social and economic effects of the epidemic on Scotland as a whole with a special emphasis on tourism.

If you are interested in giving evidence, obtaining a copy of the report or just finding out more contact Ian Cunningham on 01721 720893.

ECRR MEMBER ORGANISATIONS

University of Edinburgh

- Centre for the Study of Environmental Change & Sustainability
- Centre for Tropical Veterinary Medicine
- Department of Geography
- Institute of Cell, Animal & Population Biology
- Institute of Cell & Molecular Biology
- Institute of Ecology & Resource Management
- Royal (Dick) School of Veterinary Studies
- School of Engineering

SAC

- Research Division
- Animal Biology Division

Centre for Ecology & Hydrology

Forest Research Northern Research Station

Lasswade Veterinary Laboratory

Moredun Research Institute

Roslin Institute, Edinburgh

Biomathematics & Statistics Scotland

British Geological Survey

Heriot-Watt University – Department of Biological Sciences

MRC Human Reproductive Sciences Unit

Napier University – School of Life Sciences

National Museums of Scotland

Royal Botanic Garden, Edinburgh

Royal Society for the Protection of Birds

Royal Zoological Society of Scotland

Scottish Agricultural Science Agency

Scottish Crop Research Institute

Scottish Natural Heritage

University Marine Biological Station, Millport

University of Stirling – Institute of Aquaculture

Edinburgh Centre for Tropical Forests

Scottish Centre for Animal Welfare Sciences

Scottish Vertebrate Wildlife Centre