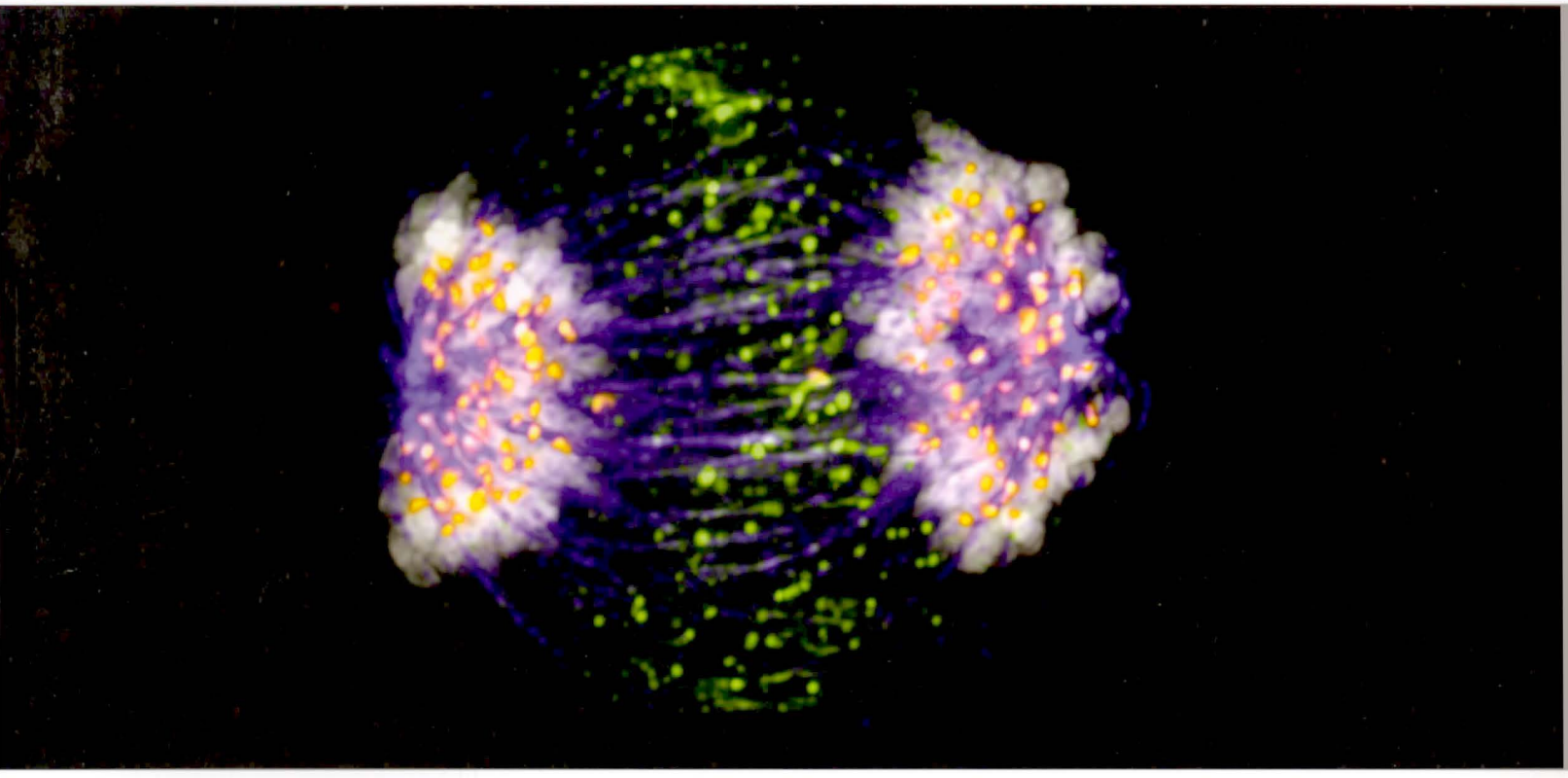


BSCB Newsletter
Winter 2005

British Society for Cell Biology

Travelling Fellowships

Our three international journals – *Development*, *The Journal of Experimental Biology* and *Journal of Cell Science* – offer Travelling Fellowships of up to $4000/£2500 to offset travel and expenses involved in collaborative visits to other laboratories.

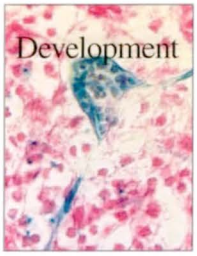
Graduate students and postdoctoral fellows are invited to apply to the Editors of the journal appropriate to their field of study. Application forms may be downloaded from the web sites listed below.

Applications should include:

- Project proposal
- Brief *curriculum vitae*
- Breakdown of costs
- Letters of support from the applicant's laboratory and host laboratory

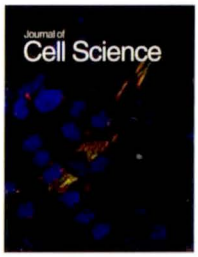
The Editors will be guided by the excellence of the candidates and the importance and innovative quality of the work to be done.

Applications must be received no later than 30 April, 31 August and 31 December.
Application forms should be sent to:



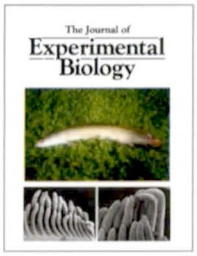
Professor J. C. Smith
Wellcome Trust/Cancer Research UK Gurdon Institute
The Henry Wellcome Building of Cancer and Developmental Biology
University of Cambridge, Tennis Court Road
Cambridge CB2 1QN, UK

http://dev.biologists.org/misc/fellowships.shtml



Kirsty McCormack
The Company of Biologists Limited
Bidder Building, 140 Cowley Road
Cambridge CB4 0DL, UK

http://jcs.biologists.org/misc/fellowships.shtml



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The Company of Biologists
www.biologists.org

BSCB Newsletter
Winter 2005

Editorial

Another Autumn and another fantastic scientific meeting organised by the Society that did not quite get the attendance it deserved. The programme for the conference at Heriot Watt on Signalling and Cytoskeletal Dynamics During Infection featured a stellar list of speakers. Richard Hayward kindly wrote a detailed report at short (zero) notice, for which I am grateful.

The Honor Fell Award scheme is going strong, as witnessed by the plethora of meeting reports in this issue. The range of subjects is impressive and testimony to the central role of cell biology in many areas of both the life and medical sciences. The reports are all very well written, conveying the atmosphere of the conferences as well as the scientific highlights: the photographs illustrate some of the interesting locations to which our awardees have travelled. We also have the usual good collection of book reviews.

There are changes afoot within the Society. Fiona Watt retires as President at the AGM and will be succeeded by Clare Isacke. Clare has served on the BSCB committee and has also recently been an Ambassador for the Society, a role she discusses in an interview in this issue.

The BSCB is a member of various 'umbrella' organisations, one of which is the RDS, formerly the Research Defence Society. Barbara Davies describes their activities in a feature article.

The Editor

Newsletter editor: Joan Marsh
Design/layout: Giles Newton
Printer: Hobbs
Website: www.bscb.org

Front cover: Image of a anaphase cell from a stable HeLa cell line expressing Aurora-B-GFP. Microtubules are shown in purple, centromeres in yellow, DNA in white and Aurora B-GFP in green. Image is a maximum intensity projection of a 3D deconvolved data set acquired on a DeltaVision Restoration Microscope built around a Nikon stand. Courtesy of Dr Paul D Andrews, Division of Gene Regulation and Expression, School of Life Sciences, University of Dundee.

News

Features

Book reviews

Meeting reports

Forthcoming meetings

Society business

Forms

SPRING MEETING

of the British Societies for Developmental and Cell Biology University of York, 20-23 March 2006

BSDB

BSCB

BSCB (Stem Cells)

Utpal BANERJEE (USA)
Yann BARRANDON (France)
Dominique BONNET (UK)
Alan CLARKE (UK)
Ana CUMANO (France)
John DICK (Canada)
Tariq ENVER (UK)
Brian HUNTLY (USA)
Sten-Erik JACOBSEN (Sweden)
Gordon KELLER (USA)
Ron McKAY (USA)
Shinichi NISHIKAWA (Japan)
Roger PATIENT (UK)
Liz ROBERTSON (UK)
Janet ROSSANT (Canada)
Takashi SHINOHARA (Japan)
Austin SMITH (UK)
Barry STRIPP (USA)
Andreas TRUMPP (Switzerland)
Martin VAN LOHUIZEN (Netherlands)
Fiona WATT (UK)

BSDB

Richard ADAMS (UK)
Ethan BIER (USA)
Enrico COEN (UK)
Charles EMERSON (USA)
Scott FRASER (USA)
Isabel GUERRERO (Spain)
Kat HADJANTONAKIS (USA)
Richard HARLAND (USA)
Peter HOLLAND (UK)
Dan KIEHART (USA)
Ottoline LEYSER (UK)
Andy McMAHON (USA)
Nipam PATEL (USA)
Scott SELLECK (USA)
Pat SIMPSON (UK)
Didier STAINIER (USA)
David STRUTT (UK)
Cheryl TICKLE (UK)
David TOSH (UK)
Jerry TURNBULL (UK)
Tanya WHITFIELD (UK)

Early registration and abstract deadline: 20th January 2006.
BSDB travel grant deadline: 9th December 2005.
BSCB Honor Fell travel awards available on application.
For meeting registration and infomation visit: www.bscb.org *or* www.bsdb.org

News

BSCB president

Fiona Watt, who retires as President of the BSCB at the next Spring Meeting, is moving to Cambridge. She will be the Herchel Smith Professor of Genetics with a lab in the new Stem Cell Institute in Tennis Court Road. Fiona will also be Deputy director of the new CR-UK Institute on the Addenbrookes site, which will be led by Bruce Ponder. We wish Fiona well in her new positions.

The incoming President will be Clare Isacke who is Professor in Molecular Cell Biology and Deputy Director of the Breakthrough Cancer Research Centre, which is part of the Institute of Cancer Research in London. Clare is a previous officer of the Society and is currently one of the Society's Ambassadors; there is an interview with her on page 6.

Schools News

The BSCB will be represented at the 2006 Annual Conference of the Association for Science Education at the University of Reading in January 2006. This is attended by about 3000 school science teachers, inspectors and advisers. It is a useful meeting at which to meet teachers face-to-face and 'fly' one's professional interest flag. Professor Gillian Griffiths from the Sir William Dunn School of Pathology, Oxford, a BSCB Committee Member, will give a talk entitled 'Waste Disposal and Recycling Systems in Cells'.

We have introduced our colleagues at the BSDB to the Association and Dr David Wilkinson from the National Institute for Medical Research will talk about how basic research leads to the discovery of disease mechanisms in 'From Development to Disease'. *David Archer*

GCE 'A' Level Examination Data 2005
Entries for chemistry and biology were higher (4.3% and 3.3%, respectively) but sadly not those for physics (down 2%). Entries for maths rose by just 0.6%. The figures given below are provisional.

	No. sat exam		% gaining grade A	
	2004	**2005**	**2004**	**2005**
Biology				
Male	20,761	22,046	20.3	22.1
Female	31,503	31,922	23.8	23.7
Chemistry				
Male	18,311	19,671	29.2	28.5
Female	18,943	19,180	30.6	30.5

Hooke medal winner

This year's Hooke medal lecture will be given by David Owen from the new Cambridge Institute for Medical Research.

David has been an independent researcher since 2000 and has an outstanding track record in applying structural methods to proteins involved in membrane trafficking. His lab uses a combination of structural (protein X-ray crystallography, in collaboration with Phil Evans MRC Laboratory of Molecular Biology), biochemical, biophysical and cell biological studies on individual domains,

whole proteins and protein complexes from a variety of vesicle coats. Their current work focuses on the AP2, AP1, GGA1 clathrin adaptors (with Scottie Robinson CIMR) and the COPI complex, which is distantly related to APs and involved in trafficking from the Golgi to the endoplasmic reticulum (with Rainer Duden University of London).

In collaboration with Mathew Seaman (CIMR) they are studying the structure and function of components of the retromer complex that is involved in non-clathrin mediated traffic from endosomes and with Stefan Honing (University of Göttingen) they are also studying how the recruitment of vesicle coats is regulated.

The BSCB in the 80s

The 1980s saw an increase in the activities and professionalism of the Society. Nancy Lane, who was Secretary at the time under Presidents Lewis Wolpert and John Gurdon (Fiona Watt was the Treasurer) set up the ASCB exchange. Each year, the winner of the poster competition at the Spring Meeting, wins a trip to the ASCB conference the following December. There was some concern that senior people in a lab might contribute unduly to a poster, so it was decided that plenty of weight would be given to the performance of the student when presenting the poster.

Nancy also recruited Margaret Clements to work for the Society, initially on a voluntary basis. Margaret does a huge amount for the Society behind the scenes and I am pleased to say that she is now paid for her efforts.

Another initiative during the '80s was the holding of joint meetings with the BSDB: this proved a huge success and most of our Spring Meetings are now combined affairs. The problem of how to assess the popularity of individual sessions and assign rooms of the correct sizes is one that persists, occasionally leaving the main lecture hall rather empty while it's standing room only elsewhere, but on the whole the correct balance is struck.


Imaging Membrane Dynamics:
Visualization of Trafficking Pathways
A joint meeting of the
British Society for Cell Biology
and the
Royal Microscopical Society
B S C B
RMS
Royal Holloway - University of London
14th - 17th September 2006
Organizers: David Stephens and Rainer Duden
Speakers include:
Jennifer Lippincott-Schwartz, Alberto Luini, Tom Kirchhausen,
Catherine Rabouille, Ben Glick, Pete Cullen, Ari Helenius,
Vladimir Gelfand, Chris Hawes, Viki Allan, Folma Buss, Ben Nichols,
Christien Merrifield, Michael Way, Christoph Thiele, Tim Levine,
Gillian Griffiths, Irina Majoul and Rainer Pepperkok
For further information see: www.bscb.org or www.rms.org.uk

BSCB Ambassadors

Don't forget the Society's Ambassador scheme. Representatives at the institutions listed below, which cover 80% of our membership, have agreed to promote Society activities and membership within their university or institute. They disseminate e-mail advertisements concerning future BSCB meetings, promote the advantages of BSCB membership, particularly to new PhD students, and are available to sign application forms and answer any BSCB-related queries. If your institution is not represented and you would be willing to become an Ambassador, please contact Jonathan Pines (see page 46).

City/Institution	*Representative*	*E-mail*
Bath	Barbara Reaves	bssbjr@bath.ac.uk
Birmingham	Rob Insall	R.H.Insall@bham.ac.uk
Brighton	John Armstrong	j.armstrong@sussex.ac.uk
Bristol	Harry Mellor	H.Mellor@bristol.ac.uk
Cambridge	Jon Pines	jp103@cam.ac.uk
	Scotty Robinson	msr12@mole.bio.cam.ac.uk
	Simon Cook	simon.cook@bbsrc.ac.uk
Canterbury	Martin Carden	m.j.carden@ukc.ac.uk
	Dan Mulvihill	d.p.mulvihill@kent.ac.uk
Cardiff	Morris Hallet	hallettmb@cf.ac.uk
Dundee	Angus Lamond	a.i.lamond@dundee.ac.uk
Durham	Roy Quinlan	r.a.quinlan@durham.ac.uk
Edinburgh	Bill Earnshaw	Bill.Earnshaw@ed.ac.uk
Glasgow	Nia Bryant	n.bryant@bio.gla.ac.uk
	Karen Vousden	k.vousden@beatson.gla.ac.uk
Guildford	Tom Wileman (Pirbright and all BBSRC)	thomas.wileman@bbsrc.ac.uk
Imperial	Vania Braga	v.braga@ic.ac.uk
LIF	Fiona Watt	f.watt@cancer.org.uk
Kings/Guys	Simon Hughes	s.hughes@kcl.ac.uk
Leeds	Michelle Peckham	m.peckham@leeds.ac.uk
Leicester	Dave Critchley	drc@leicester.ac.uk
	Andrew Fry	amf5@leicester.ac.uk
Liverpool	Sylvie Urbe	urbe@liverpool.ac.uk
Manchester	Charles Streuli	charles.streuli@man.ac.uk
	Iain Hagan	IHagan@PICR.man.ac.uk
	Viki Allan	Viki.Allan@manchester.ac.uk
NHLI etc	Clare isacke	c.isacke@icr.ac.uk
NIMR	Lee johnston	ljohnst@nimr.mrc.ac.uk
Norwich	Grant Wheeler	grant.wheeler@uea.ac.uk
Nottingham	John Mayer	John.Mayer@nottingham.ac.uk
Newcastle	Michael Whittaker	michael.whitaker@newcastle.ac.uk
Oxford	Chris Hawes	chawes@brookes.ac.uk
	James Wakefield	james.wakefield@zoo.ox.ac.uk
Queen Mary	Mark Turner	m.d.turner@qmul.ac.uk
Reading	Chris Skidmore	c.j.skidmore@reading.ac.uk
St Andrews	John Tucker	jbt@st-andrews.ac.uk
St Georges	David Winterbourne	sghk100@sghms.ac.uk
Sheffield	Liz Smythe	e.smythe@sheffield.ac.uk
	Andy Grierson	a.j.grierson@sheffield.ac.uk
Southampton	Malcolm East	j.m.east@soton.ac.uk
UCL	John Carroll	j.carroll@ucl.ac.uk
	Patricia Salinas	p.salinas@ucl.ac.uk
Vet College	Nigel Goode	ngoode@rvc.ac.uk
York	John Sparrow	jcs1@york.ac.uk
Clare Hall	Simon Boulton	simon.boulton@cancer.org.uk
Ludwig	Anne Ridley	anne@ludwig.ucl.ac.uk
Marie Curie	Andrew McAinsh	A.McAinsh@mcri.ac.uk

In brief...

Cheaper journal subs for members

Did you know that BSCB members are entitled to discount subscriptions for several journals? The money saved more than compensates for your membership fee, so encourage your friends to join the Society. Details are on the inside back cover.

Funding for local meetings

The Society is prepared to provide limited financial support for meetings organized by any local interest group relevant to cell biology. Requests for funds should be sent to the Treasurer, Mark Marsh (see page 39), accompanied by a report of a previous meeting. If a meeting receives such support, a report of the meeting will be required for publication in the Newsletter.

BSCB Membership Database

The website contains the facility to search for members of the Society. However, under the Data Protection Act, we can include your details only if you specifically grant us permission to do so. If you wish to be included and are not, please contact Margaret Clements (margaret@biologists.com).

Cover images

Would you like your work to appear on the cover of the newsletter? To be featured on the website for posterity? I need striking or beautiful images for the cover. If you think you have something worthy, please send it to jmarsh@wiley.co.uk.

Being a BSCB ambassador

The Society's Ambassador scheme was founded a few years ago and we now have representatives in almost all the relevant institutes and university departments within the UK. One of the Ambassadors is Clare Isacke, who will soon become President of the BSCB, taking over after the AGM at the Spring Meeting. I asked Clare what her current role entailed.

What does an Ambassador do?

The role is fairly easy. At minimum, I receive information about all the meetings and make sure this is disseminated around the Institute. I make sure meeting posters are displayed on the notice boards and circulate details by e-mail. I can also make relevant announcements and plug meetings at our weekly Breakthrough seminar.

At the start of the academic year, I contact all new students and their supervisors, encouraging them to join the Society and letting them know they can approach me if they need advice. The students at the Institute have their own mailing list and are quite well organised.

Are new students/post-docs generally aware of the Society and what it does?

It depends where they come from. Post-docs from cell or developmental biology labs tend to know about the Society and be familiar with some of its meetings. Those with a more clinical background or immunologists tend to be less aware.

Do you have any particular advice for young cell biologists?

If you want a career in science, in any discipline, it is important to network. I think people should attend meetings in the UK before they jet off to international ones. It is easier to meet people and establish collaborations at domestic meetings: people based in the UK are most likely to be important to your throughout your career. I also encourage them to attend in-house seminars and to hear people speak at first hand about their research.

What are your initial aims as President of the BSCB?

This is a good time for cell and developmental biology in the UK: apart from immunology, these

are the strongest domestic societies that hold their own meetings and it is important to maintain that tradition. The conferences are the most important thing the Society does. We can not view ourselves as a strong country scientifically, if we are always sending people abroad for conferences. One issue that we need to address is how to increase the popularity of the autumn meetings. In recent years, the BSCB autumn meetings have had fantastic scientific programmes and been praised by all those who attend, but the number of participants is falling. How can we reverse that?

Scientific societies are particularly important in universities where students need help with travel grants and encouragement to go to meetings. We need to ensure that students and post-docs in such universities know about the BSCB and its activities. This is where the Ambassador scheme can help.

By Joan Marsh

Biography

Clare Isacke is Professor in Molecular Cell Biology and Deputy Director of the Breakthrough Breast Cancer Research Centre, part of the Institute of Cancer Research in London. She read Biochemistry at the University of Oxford, then did a D Phil in the Zoology Department there with John Heath, studying growth factors in early embryonic development, using teratocarcinoma cells as a model system. Clare then did a post-doc at the Salk Institute in California, in the labs of Tony Hunter and Ian Trowbridge.

She returned to the UK in 1988 as a Wellcome Trust project grant holder in Colin Hopkins' lab at Imperial College London. She stayed at Imperial for over a decade, gradually rising to be Professor in Molecular Cell Biology. Her research concerned adhesion receptor trafficking and signalling, the roles of adhesion receptors in cell migration and the regulation of adhesion receptor activity.

Clare is now applying her knowledge of cell biology to breast cancer, investigating breast cancer invasion and metastasis, particularly tumour-stroma interactions and breast stem cells. She is also exploring new methods for early diagnosis and detection and collaborates extensively with colleagues in the Breast Unit at the Royal Marsden Hospital.

Defending the use of animals in research and testing

The use of animals in research has been in the news frequently over recent months, with animal rights activists delaying the construction of research facilities at Oxford University and forcing the Hall family to stop breeding guinea pigs for research. As cell biologists, you may or may not use animals in your own studies, but you should be aware of the arguments in favour and against, as cell biology is built on a long tradition of animal research.

RDS is the leading UK organisation that represents doctors and scientists in the debate concerning experiments on animals. It recently drew up a Declaration on animals in Medical Research that was signed by over 500 leading UK academic scientists and doctors and was widely publicised in the media. It is the only organisation which brings together the academic and commercial sectors to work on policy, representation and communications. RDS engages in dialogue with stakeholders, and interacts with legislators, regulators and government.

RDS has about 5000 members, both individuals and organisations. Members are entitled to advice, information and assistance on all aspects of animal research, such as dealing with administrative bodies or the media. All members receive regular information through publications – including the quarterly newsletter, *RDS News* – and meetings, and may sign up to the RDS Email News Service. RDS educational material, produced primarily for schools and colleges, is also available to members.

RDS would like to see a time when animal research that causes pain, suffering or lasting harm is no longer required, at least in many areas of research. However, society has unmet medical needs and there are gaps in our knowledge. RDS considers that current technical and scientific limitations mean that full replacement is unachievable in the foreseeable future.

The RDS was founded in 1908 by Dr Stephen Paget, at a time of intense public interest in medical research and animal welfare. It has an office in London with six staff and is overseen by a Council that currently comprises 11 members. Its comprehensive website contains useful information on animal welfare, the number of animals used in research, the types of animal and the research areas in which they are used. The number of animal experiments has halved over the last 30 years and is now roughly stable as the increasing use of genetically modified animals offsets reductions in the use of wild-type strains. The website lists some of the key medical benefits derived from animal research over the past century and also the benefits for animals themselves, mainly through the development of vaccines. It also has a recently introduced hot topics and policy section that addresses current issues.

Most of the activities of the RDS fall into four categories: communication, policy and lobbying, information and networking, and support for members. It publishes *RDS News*, which is essential reading for all those interested in animal research and animal rights issues; publishes leaflets and more extensive reports; runs an email news service; monitors both media and parliamentary coverage of relevant issues, as well as animal rights groups' publications; and provides supporting material to other organisations.

RDS has recently undertaken a strategy review and identified key priorities: maintaining political and Government support; maintaining a favourable policy and regulatory climate at all levels for animal research; maintaining public support (through direct communications, media work and institutional communications); and defending research against those who seek to abolish it.

The key policy and communications issues that RDS is addressing include animal rights extremism and antivivisection campaigning, Freedom of Information, and the regulatory burden. RDS has recently started a project to help the academic sector respond to animal rights extremism: for instance, by strengthening security without restricting research or communications programmes. We are also working with partner organisations to take the animal research message into schools and on the revision of European Directive 86/609 on animal experimentation.

RDS goals
RDS believes that research using animals should be well regulated, conducted humanely and only when there is no alternative. Not all medical research needs to use live animals – useful results are also obtained by using computers, studying cells and tissues, and from studies done on patients and human populations. RDS puts the research processes in context, to explain when animals need to be used.

RDS and the BSCB
The BSCB is affiliated to the RDS and pays an annual fee to support their activities.

Individual membership
Individuals who wish to join should check the website for details. Personal membership would ensure your own copy of *RDS News*, entitle you to vote at the AGM, to receive confidential advice, if required, and a variety of other benefits.

RDS website
www.rds-net.org.uk

Barbara Davies
Communications Director
RDS: Understanding Animal Research in Medicine
BDavies@rds-net.org.uk

MRC Training and Career Opportunities

At last year's Spring Meeting, Dr Shabih Syed, the MRC's Research Career Awards Programme Manager, gave a presentation during the Careers' lunch. For those who could not attend, the following is a summary of his presentation taken from his slides. The complete powerpoint presentation is available on the Society's website (www.bscb.org).

By Joan Marsh

MRC Fellowship awards are highly flexible: there is no age limit, they may be held as a part-time position and people are encouraged to apply for one on returning from a career break.

The New Investigator Award scheme is for people at the start of their independent career. They should have a PhD, D Phil or an MD and at least three years' post-qualification research experience; they should also be within three years of the start of their first established academic appointment (five years for clinicians) or in a senior post-doctoral position. If personal support is requested, then investigators are expected to spend at least 80% of their time on research, 50% in the case of clinicians who intend to divide their time between clinical work and research. Applicants must be able to show commitment to support from their host institution in the form of a letter detailing accommodation and resources, and evidence of the applicant's supervisory experience. The scheme now also requires institutional commitment in the form of an established post at the end for applicants who do not yet hold HEFCE funded posts, i.e. the majority of post-docs.

Pre- to Post-Doctoral Awards include Clinical Research Training Fellowships and special training fellowships (see below). These can be used for research training towards a PhD for clinical scientists or for post-doctoral research training for non-clinical scientists.

Intermediate Awards are to support post-doctoral experience to consolidate skills and the transition to an independent position. They comprise Clinician Scientist Fellowships for medical and dental graduates, nurses, midwives and other health profession researchers as well as Career Development Awards for non-clinical scientists.

Senior Awards, both Clinical and Non-Clinical, are for independent scientists and/or team leaders who have gained national or international recognition and achieved membership of peer review bodies. Both Intermediate and Senior awards support a personal salary, research support staff, research expenses, capital equipment and a travel allowance.

The MRC also awards **Strategic Fellowships** in areas where there is a need for a sustained effort to build research workforce capacity. By definition, these will vary with time. The present focus is on health services, public health, bioinformatics, neuroinformatics, computational biology and stem cells.

Applications for fellowships are sent out for peer review then short-listed candidates are invited to a panel interview. Factors taken into consideration are the standing and potential of the individual, the excellence of the centre, the suitability/merit of the project and ethical issues. Detailed questions depend on the type of award. After the interview, the panel members discuss the applicants and score them. The final ranking is then reviewed, including the strategic importance of the area for training.

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Book reviews

From DNA to Diversity: Molecular Genetics and the Evolution of Animal Design, 2nd ed.
Sean B Carroll, Jennifer K. Grenier, Scott D Weatherbee
Blackwell Publishing
December 2004
1-4051-1950-0

From DNA to Diversity: Molecular Genetics and the Evolution of Animal Design, 2nd ed.
Sean B. Carroll, Jennifer K. Grenier, Scott D. Weatherbee

Now in its second edition, *From DNA to Diversity: Molecular Genetics and the Evolution of Animal Design* has become a masterpiece that blends together developmental sciences, evolutionary biology and genetics, and skillfully presents a fascinating story. This captivating book, organised into eight chapters, commences by reminiscing about the significance of fossils as our primary window into the history of life, and underscores the wide range of information they can reveal about extinct species. Reflecting on the general features of body organization, this section also acquaints the reader with the modular architecture of organisms, a theme repeatedly encountered in subsequent chapters.

One of the cardinal ideas emerging from the text is the recent impact genetics in general, and gene regulation in particular, have made on our understanding of developmental processes. Examining the *Drosophila melanogaster* genetic toolkit for development, the first part of the book explores genes involved in specifying fields, compartments, individual cell types and body axes, and underscores the conservation of developmental genes and signalling pathways across species.

Several model organisms used to describe the genetic regulatory logic and the molecular integration of regulatory inputs facilitate the comprehension of fundamental concepts, such as the role of combinatorial control in ensuring gene expression specificity and diversity, or the importance of the modular organization of *cis*-regulatory elements in helping the dissociation of gene functions and in favouring the evolution of novel morphologies. Emphasising how the increasing number of sequences available affected the reconstruction of ancestral genomes, one of the chapters addresses the evolution of the genetic toolkit and, in an interesting case study, the metazoan *Hox* genes are used to exemplify the mechanisms underlying gene evolution and diversification. Using the *Hox* genes as an example, several case studies examine how evolutionary changes in genetic regulation have materialised in morphological diversity. Instructive discussions centre around topics such as genetic mechanisms responsible for repressing insect abdominal limbs, the evolution of insect wing number, evolutionary changes in *cis*-regulatory elements that shape wing formation and morphology, or the participation of *Ubx cis*-regulatory control regions in the evolutionary divergence in trichome patterning among different *Drosophila* species.

The evolution of morphological novelties, a fundamental topic covered by this book, constitutes a vivid reminder of how changes in genetic regulation can shape the development of novel structures. The authors explore the evolution of morphological novelties such as feathers, wings, spinnerets and butterfly eyespots, and highlight evolutionary processes that have led to the loss of morphological structures, such as the ascidian tail and snake legs, or to the appearance of new structures such as turtle shells.

A new and engaging chapter in this second edition addresses molecular mechanisms responsible for divergence among closely related species. Featuring the colour pattern of vertebrates as an example of phenotypic divergence, this section revisits the genetic basis of melanism and reveals how in some species (jaguar, rock pocket mouse) it is caused by *MC1R* mutations, in others (domestic cat) by *agouti* mutations, and yet in other species, such as the leopard, neither of these two genes is linked to melanism. At the same time, in a population of New Mexico rock pocket mice, *MC1R* mutations have not been linked to melanism, while in Kermode bears, the black allele is dominant and white bears carry a single *MC1R* amino acid replacement. This section discusses how, in the Southwestern USA, light-coloured rock pocket mice were found on light-coloured rocks, and melanic mice were found on dark lava formations, providing protection from predators, thus unveiling the adaptive function of the *MC1R* mutations. A case study on the genetic architecture of *Drosophila* pigmentation control illustrates another example in which, although one pathway is the most frequently used, other pathways can be exploited as well. One of the most fascinating sections, the final chapter, underscores the strength of regulatory evolution and examines the evolution of regulatory DNA elements, highlighting characteristics that render regulatory DNA the prevailing source of genetic diversity.

A strong focus on general concepts and a powerful emphasis on the detail come forth from the book, which is particularly rich in information. Carroll, Grenier and Weatherbee accompany the reader on

an interdisciplinary odyssey from structural motifs that underlie protein–protein and protein–DNA interactions, to the architecture of body parts, organs and axes. Journeys from the world of fossils throughout the animal kingdom are evocative of the words attributed to W. Winwood Reade: 'We live between two worlds; we soar in the atmosphere; we creep upon the soil; we have the aspirations of creators and the propensities of quadrupeds. There can be but one explanation of this fact. We are passing from the animal into a higher form, and the drama of this planet is in its second act.'

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Tissue Engineering – principles for the design of replacement organs and tissues
W. Mark Saltzman

This is a well-written monograph based on lecture notes for a course on tissue engineering to undergraduates in Engineering. The chapters are well-laid out and easy to follow.

The book is divided into convenient sections with Part 1 reviewing the history of tissue engineering (TE), outlining the possible indications for engineered tissues and organs and summarising the elements of cell–polymer interaction involved in TE. Part 2 deals with the fundamentals of cells as may be relevant to the undergraduate engineer developing an interest in TE. Part 3 deals with cell delivery and interactions with the matrix and with polymers, concluding with a section on 'real life' TE applications.

The chapters are well-referenced and there are a few exercises at the end of each chapter providing the reader with an opportunity to test recall of the factual content in that chapter.

Although well written, the approach is highly mathematical and reflects the target audience of engineers rather than biologists. Having said that, the sections on cell adhesion and extracellular matrix contain a good summary for the reader without the need for an in-depth knowledge of cell biology.

The final section on applications of TE is clearly written, but as is often the case in a rapidly changing field, the examples chosen are out of date, particularly with regards to the use of TE skin for burns patients, which has moved on apace, particularly in Sheffield.

I would recommend this book as a good introduction for someone interested in the maths of cell biology or someone with a background in maths or engineering looking to enter the field of tissue engineering.

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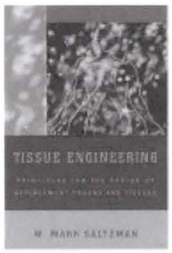

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The Nucleolus
Edited by Mark O.J. Olson

Recent years have witnessed an unprecedented expansion of genomics, proteomics and bioinformatics and, in this ambience, organelle proteomics has started to crystallize as an exciting and promising field. Proteomics has benefited our knowledge about the spliceosome, the nucleolus, mitochondria, chloroplasts, exosomes and phagosomes (1), and has provided information that only decades ago seemed unattainable. Only 121 proteins were known to localize to the nucleolus prior to 2002 (2), but two cardinal studies published during that same year have expanded the number of proteins known to localize to the nucleolar proteome to almost 400 (3, 4). Findings from this past decade have also placed the nucleolus at the convergence point of several diseases, of which the Treacher Collins syndrome, spinocerebellar ataxia, Werner syndrome, Bloom syndrome and Shwachman-Diamond syndrome are just a few.

These developments render *The Nucleolus* a fundamental and extremely timely resource. The book brings together internationally reputed contributors who, under the insightful editorship of Mark Olson, deliver and analyse the most recent findings relevant to an organelle that, although extensively studied, has continuously puzzled scientists and still proves to be full of mysteries and surprises.

A major goal set forth in *The Nucleolus* is to cover advances that during the past decade have furthered our understanding of this fascinating organelle. One of the important lessons emerging from the text is the fruitful collaborative contribution made by various disciplines (genetics, biochemistry, cell biology, molecular biology, structural biology) in an attempt to unravel nucleolar structure and function. Several fundamental concepts are presented throughout the book: the realization that the nucleolus, besides being a factory for ribosome assembly, performs additional unrelated tasks; the finding that instead of being a static

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organelle, it is a dynamic structure, in constant interaction with the surrounding nucleoplasm; the absence of nucleosomes in actively transcribed ribosomal DNA; or the likelihood that proteins involved in ribosome biogenesis have a second independent function, such as cell cycle control. While emphasising the giant stride represented by the recent availability of the ribosome structure at the atomic level, the text underscores the extent of additional work required to ensure a detailed understanding of the ribosome. At the same time, the book highlights questions that still await answers, such as the need for a better comprehension of nucleolar functions not related to ribosome assembly, or the urgency to comprehend similarities and differences between yeast and vertebrate ribosome biogenesis.

An interesting aspect that becomes apparent from the book and at the same time is a testimonial to the powerful interdisciplinary effort made to understand the nucleolus is the broad range of methods and techniques that have benefited nucleolar research. The text insightfully exemplifies the importance of various methodologies, ranging from those developed some time ago, such as psoralen crosslinking and restriction analysis used to investigate chromosome structure, to more recently developed techniques such as electron tomography and mass spectrometry, techniques that all have converged to unveil novel details about nucleolar structure and function.

Highlights of the book include a captivating analysis of the general organisation of ribosomal DNA-encoding genes and their evolutionary conservation across species, discussions on the latest developments in understanding vertebrate and yeast ribosomal DNA transcription, insights into ribosomal DNA replication, transcription and recombination, and updates on the proteomics of the nucleolus and on the non-traditional roles of the nucleolus. The text underscores the latest advances in the study of small nucleolar RNA–protein complexes (snoRNPs), the discovery of scaRNAs and guide RNAs, and the recent advances in understanding snoRNP assembly and trafficking. Throughout the text, the authors remind us of the countless ways genetical and biochemical yeast manipulations have helped our understanding of ribosome structure and function.

The Nucleolus will benefit students and professionals working in diverse basic science fields. Its 18 chapters will be a helpful resource for those who need an introduction into various concepts, as well as for those who already have background knowledge, but need to add additional layers of complexity to their expertise.

Chromosome Segregation

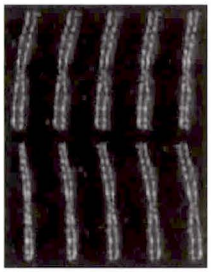
Kim Nasmyth and Mitsuhiro Yanagida

The accurate inheritance of chromosomes by each daughter cell, at every cell division, is literally a matter of life and death. A detailed understanding of this inherently beautiful, finely orchestrated process is of great importance for developmental biologists and oncologists alike.

This collection of articles, published after a recent meeting at the Royal Society in London, captures the zeitgeist of the chromosome segregation field as we head further into the 21st century. One strength of the volume is that it has brought together the latest research from leading lights in two traditionally somewhat disparate spheres – the bacterial and the eukaryotic chromosome segregation fields – and covers the commonalities found in the way organisms across evolution have worked out ways to package DNA and move it around the cell. It then explores new data on how eukaryotic cells achieve accurate chromosome segregation through the interplay between DNA and the cytoskeleton and how this might be regulated to prevent aneuploidy.

The opening chapter by Kim Nasmyth is a superb overview of the state of the cohesion nation, covering the genetics, biochemistry and cell biology of the molecules involved in holding sister chromatids together. It discusses in some length the proposed models for the establishment of cohesion, the possible mechanisms by which the cohesins actually hold chromosomes together, as well as the ways in which cohesin cleavage is achieved to bring about sister chromatid separation in anaphase.

In the chapter by Jeff Errington, the mechanisms of bacterial chromosome segregation are discussed eloquently - with particular emphasis on the molecules involved in the segregation of DNA into the prespore of the model organism *Bacillus subtilis*. On a similar theme, Thomas Leonard reviews in great detail the latest studies on the fascinating molecules, and the elegant mechanisms, that control the subcellular positioning and physical separation of bacterial chromosomes during the cell cycle. He describes the ParA/ParB (partitioning) and MinD/MinE (cell division) systems and concludes with a discussion of the role of the bacterial cytoskeleton in these processes.



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Kim Nasmyth and Mitsuhiro Yanagida
Phil. Trans. Royal Soc. B. Royal Society, March 2005

Further information on this publication may be found at:

http://www.pubs.royalsoc.ac.uk/phil_trans_bio_chromosome.shtml

The chapter by Tatsuya Hirano segues perfectly by discussing the structural maintenance of chromosome (SMC) proteins, their conservation from bacteria to humans and the mechanistic aspects of their functions in higher order DNA packaging and dynamics. A later chapter by Doug Koshland treats the reader to a further review of SMC function and models of chromosome organisation.

Switching gear somewhat, Yoshinori Watanabe discusses the latest news from the Shugoshin front. This recently discovered protein, with homologues in flies, plants and other eukaryotes including human cells, appears to be involved in protecting centromeric cohesin complexes from pathways that lead to cohesin removal during meiosis and mitosis. Shugoshin may also play a role in kinetochore–microtubule interactions. In a later chapter, focusing on the role of the *Drosophila* orthologue, MEI-S332, Terry Orr-Weaver evaluates the evidence for its role in meiotic and mitotic cohesion.

Aneuploidy, a situation where a cell has acquired an abnormal diploid chromosome number through errors in chromosome segregation, has pathological consequences when it occurs in meiotic cells (e.g. Down's Syndrome) and mitotic cells (e.g. tumorigenesis).

The excellent chapter by Ted Salmon considers the role of merotelic kinetochore attachments (i.e. where a kinetochore is attached to microtubules from opposite poles) in the generation of aneuploidy in mammalian tissue culture cells. It covers the evidence for a process by which the cell rectifies these deleterious connections before and during anaphase. It then discusses the components of the kinetochore that might contribute to kinetochore–microtubule attachment, plus-end stability and force generation.

Alison Pidoux and Robin Allshire cover the important discoveries, many from work on fission yeast, regarding the formation and function of heterochromatin at the centromere. They discuss the role of the histone H3 variant CENP-A found at the centromere core and the roles of histone modifications and chromodomain proteins in proper centromere function, sister chromatid cohesion and even kinetochore assembly.

Tomo Tanaka reviews our knowledge of the pathways that ensure chromosome biorientation takes place efficiently. Drawing mainly on data obtained using budding yeast, he explains the roles of tension and the Ipl1p/Aurora B protein kinase in the correction of erroneous kinetochore–microtubule connections.

Two chapters focus on the important role microtubule dynamics plays in the function of the mitotic spindle and ultimately in chromosome segregation. Kazu Kinoshita and colleagues review the contribution of XMAP215 and tau in inhibiting the microtubule destabilising activity of the Kinl kinesin, XKCM1 (MCAK/Kinesin-13). In a later article, Tim Mitchison effectively discusses the mechanisms underlying the poleward flux observed in *Xenopus* meiotic spindles with emphasis on the role of Eg5 kinesin, concluding with speculation on the force generation mechanisms at kinetochores in metaphase and anaphase.

Kohta Takahashi and colleagues reveal evidence for two distinct pathways of CENP-A loading onto centromeres in fission yeast. Mitushiro Yanagida, in his comprehensive overview of eukaryotic chromosome segregation, elegantly discusses the basic mechanisms, quality control pathways and mechanics of chromosome segregation.

The final two reviews cover aneuploidy and the pathways that the cell utilises to prevent it. Franziska Michor considers the inter-relationship between chromosomal instability (CIN), tumour suppressor genes and human cancer. Mathematical modelling has revealed the importance of mutations in CIN genes, acting as precursors to loss of tumour suppressors. Andrea Musacchio and colleagues give a great overview of their latest data on the assembly of the Mad2 component of the spindle assembly checkpoint – the surveillance pathway that monitors the attachment of chromosomes to spindle microtubules and acts as a quality control mechanism. In a superb piece of biochemical characterisation of Mad2 confomers, Musacchio's lab revealed a possible mechanism for Mad2 oligomerisation in the context of the spindle checkpoint complex.

Overall, this volume, albeit somewhat overpriced for a paperback, is well written and definitely worth a detailed read. It offers a blend of both hard data and interesting speculation and, while not comprehensive in its representation of the great and the good in the chromosome segregation field, it should be a valued addition to your bookshelf.

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Books for review

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Stem cells: nuclear reprogramming and therapeutic applications *Novartis Foundation symposium 265, Wiley*

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Signalling networks in cell shape and motility *Novartis Foundation symposium 269, Wiley*

Database Curation *Lesk, Wiley*

Domains in Integrins *Gullberg, Kluwer Academic/Plenum*

Microbial Diversity *Ogunseitan, Blackwell Science*

Stem cells: From bench to bedside *Bongso & Lee, World Scientific*

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Essential Developmental Biology 2nd edition *JMW Slack, Blackwell Publishing*

DNA Topology *Bates and Maxwell, Oxford Bioscience*

Fundamental Bacterial Genetics
Nancy Trun and Janine Trempy

The aim of this book is to introduce students to bacterial molecular genetics, from the basic concepts to the most up-to-date technology, using a format and language that is easy to understand. Indeed, the authors have succeeded in doing so – the book is well structured and clear.

The authors start by describing the bacterial cell and its DNA. In chapter 2, the chemistry, structure and function of the DNA molecule are explained. Then, from chapters 3 to 11, all the things that can happen to the DNA molecule, both inside and outside the bacterial cell, are covered. The book ends with chapters on gene expression and regulation, molecular tools and DNA cloning, and bioinformatics and proteomics, including coverage of functional genomics and microarrays.

The book focuses on one bacterial species only, *Escherichia coli*, but draws examples from other microbial systems at appropriate points. The inclusion of 'FYI boxes' (For Your Information) adds some key experiments that led to what we now know, plus biographies of key scientists and comparisons with other species.

At the end of each chapter, the authors have included the following: a summary of the key points, study questions, and suggestions for further reading. These summaries are concise and useful, and the study questions will be very helpful to students for revision purposes. The references (included both at chapter end and in a full reference list at the back of the book) could be a little more up to date, as there are few later than 1996.

The book also has it own dedicated website, with animations, study resources, web research questions and illustrations downloadable for PowerPoint files. Although this can be a useful resource for teachers and students looking for material for reports and presentations, it would have been more useful had the website included new information and references.

Overall, it is a well written textbook that will give students an essential introduction to the theory and practice of fundamental microbial genetics.

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Fundamental Bacterial Genetics
Nancy Trun and Janine Trempy
Blackwell Science
August 2003
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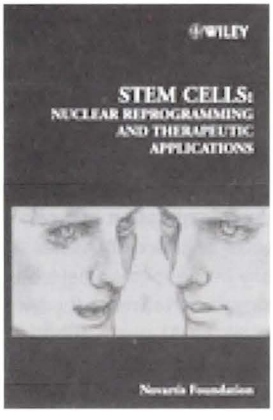

Stem Cells: Nuclear reprogramming and therapeutic applications

The Novartis Foundation organises internationally acclaimed meetings covering a variety of noteworthy topics. This book, *Stem Cells: Nuclear Reprogramming and Therapeutic Applications*, is the summary of one such symposium, featuring prominent papers presented by renowned scientists and documenting the following dialogue amongst their peers.

The first chapter attempts to answer a question that has no doubt left many suffering bouts of insomnia from caffeine-fuelled late nights deliberating how to define 'stemness'. The very mention of the question, 'What is a stem cell?' will cause nervous twitches in all those who have tried or are trying to answer it; however, the presented paper and ensuing discourse are highly intelligent and highly relevant. A slight problem is that those who aren't particularly involved in this area may not understand a large portion of the discussion.

Subsequent chapters consider topics covering adult stem cells, including bone marrow derived, neural and cardiac progenitors. Embryonic stem cells are also discussed at length, with particular attention paid to the factors that maintain stem cells in a pluripotent state or which drive them to create differentiated and lineage-committed cells *in vitro* and *in vivo*. Understanding stem cells at the molecular level is essential to understanding their behaviour in a physiological context. Nuclear reprogramming, defined here as the process by which a nucleus acquires developmental potential, is currently a focus of great interest in the scientific community and is covered very well in this book. It is relevant to stem cell research in general and also to research on the cloning of animals by nuclear transfer.

Important ethical issues raised by research on stem cells are highlighted in the book. It also reviews the regulatory regimes in different countries, which are likely to be influential in determining where future stem cell research is carried out. Potential clinical applications are also discussed and range from the production of cardiomyocytes to replace damaged heart tissue, myocardial regeneration, the production of insulin-producing cells for patients with diabetes, and the generation of neurons for the treatment of patients with Parkinson's disease or spinal cord injury.

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ELSO 2005
Dresden, September 2005

Thanks to financial help from a BSCB Honor Fell Travel Award, I attended the 5th ELSO conference. With six plenary sessions, 21 mini-symposia, seven sub-group meetings and 541 posters, there was plenty to see and hear over the three and a half days. Dresden proved to be an ideal city to host such a conference, with beautiful old and new buildings throughout its centre. The ELSO conference was held in a modern, glass building that was appropriately equipped with strong blinds, so we could still see people's movies, and with air conditioning, so the fantastic weather outside did not hinder the proceedings inside. Here, I report just some of my highlights from the meeting.

By Gillian Groeger

The proceedings began on Saturday afternoon, with various sub-groups' meetings. I attended one entitled 'Actin Dynamics and Membrane Trafficking'. **Yukiko Goda** (University College, London) reported the novel finding that synaptic vesicles are recycled and shared among neighbouring synapses, which adds a new dimension to actin/synapse relationships. **Margarita Chibalina** (University of Cambridge) demonstrated that the unusual myosin, Myosin VI, colocalises with clathrin-coated vesicles. Along with the signal transduction protein, Disabled2, and PIP2, Myosin VI is responsible for attaching these vesicles to actin filaments, but it remains unknown whether it is actively or passively involved in their transport.

The official opening featured the Klaus Tschira Lectures given by two distinguished scientists. Nobel Laureate **Peter Agre** (Duke University, USA) described the history of water channels, or aquaporins, and the role he played in their discovery and subsequent characterisation. One of his messages was that his breakthrough was partially due to serendipity: when run on a gel, aquaporins do not stain with the usual Coomassie blue, but are detected only by the less frequently used silver staining. Aquaporins are now known to play a key role in cell types involved in secretion and they are also found in lens and brain tissues. **Richard Klausner** (Seattle, USA) is the executive director of global health for the Bill and Melinda Gates Foundation. At present, the country where you are born determines to a large extent the quality of your life. The Gates believe this inequality should not exist and have given the foundation $30 billion dollars to perform research that will benefit the global population by answering the big questions in science. Vaccines in general, and against HIV in particular, are at the forefront of the foundation's present research drive. For example, they want to discover a way to keep vaccines stable and effective in the heat of tropical countries. It was an inspiring talk.

For the next three days, there were two plenary sessions in the morning, followed by a poster session and then several parallel minisyposia in the late afternoon. The highlights of the plenary sessions on the first day included **Phil Sharp**'s (Massachusetts Institute of Technology, Boston) overview of short RNAs in biology. It has been just 15 years since the discovery of double-stranded RNAs and today almost every cell biology lab has used, or thought of using, them to knock down expression of a particular gene. The full potential of short RNAs has yet to be realised, especially in the medical field, on which Sharp is now focusing. **Ira Mellman** (Ludwig Institute for Cancer Research, USA) spoke about dendritic cells and their role in the immune response. The finding that these cells contain low levels of lysosmal proteins was surprising, but he now believes that this is necessary to ensure that the cells can carry antigens from their initial location to lymph nodes without destroying them.

The first minisyposium I attended was on cell migration. **Margaret Frame** (Beatson Institute for Cancer Research, Glasgow) discussed the role of Calpain, a protease that localises to focal adhesions, in two- and three-dimensional cell migration. Her lab found that the Src/FAK/Calpain pathway was needed for migration in two dimensions (where cell movement is mainly mesenchymal), but not in three dimensions (where it is mainly amoeboid). **Walter Witke** (European Molecular Biology Laboratory, Monterotondo, Italy) showed that in the developing mouse the F-actin depolymerising factors, ADF and

Above: The Zwinger in Dresden

cofilin, have different functions in the brain, where cofilin is essential for neural crest migration, but the same in the skin, where they complement each other during formation of the epidermis.

Monday morning began with plenary sessions on development and on the cell biology of pathogens. **Kees Weijer** (University of Dundee) gave an overview of *Dictyostelium* with its varied life stages. The chemoattractant waves of cAMP propagated in these cells elicit huge morphogenetic changes. Kees has done similar work with the chick embryo, where FGF4 and FGF8 are important chemoattractant molecules during primitive streak formation. **Dominique Soldati** (University of Geneva, Switzerland) works on Apicomplexan parasites. These protozoans can bind E-cadherin only via Intermalin, but as E-cadherin is expressed only on the basal membrane of epithelial cells, the parasites cannot normally use this to gain entry to the cells. Soldati's lab have discovered that these parasites can infect only apoptosing cells or cells next to a recently apoptosed cell. In a normal gut epithelium, this would be only at the tips of the microvilli. She reasoned that this mechanism allows the parasite to live at low levels in a person and to continue to be infectious by its presence in cells that are shed regularly from the lining.

On Monday evening, I went to the minisymposium on cell adhesion. **Anne Eichmann** (College de France, Paris, France) investigates vasculogenesis and the role of cell markers, namely NRP-1 (arteries) and NRP-2 (veins). Her lab has determined that the haemodynamic characteristics of the blood flowing through vessels dictates the proteins expressed on cell surfaces and therefore the arterial/capillary/venous identity of those cells. **Katrin Lorenz** (Max Planck Institute of Biochemistry, Martinsried, Germany) spoke about integrin-linked kinase (ILK) and its role in skin and hair production. She has proven that ILK plays a key role in these processes, where it mediates β-1 integrin signals through FAK activation.

The final day opened with sessions on molecular medicine and molecules at work. **Kari Stefansson** (Reykjavik, Iceland) whose company, deCode, has access to the Icelandic genotype/phenotype/genealogy data, gave a very entertaining talk. These vast quantities of data are being used to get to grips with the genetics of some common diseases, for example, atherosclerosis. They have identified one protein that increases the risk of heart attack, namely FLAP, an enzyme involved in the regulation of the leukotriene pathway. deCode is now testing chemical inhibitors of FLAP to develop drugs to decrease the risk of heart attacks. Kari finished on a cautionary note because he believes that all genes have evolved for a reason and so confer a selective advantage. When the expression level of a gene changes, disease can occur, but if we attempt to correct the expression level too much, we may interfere with this evolutionary advantage. **Patrick Cramer** (The Gene Centre, Munich, Germany) gave an excellent talk, interspersed with several clever animations, on Pol II, the multi-protein machine for gene transcription. From crystallographic data, he has generated a model of Pol II and determined how it works to create mRNAs. Pol II has a central cleft where the DNA double helix is held open in a transcription bubble, allowing the mRNA nucleotides to bind. There are very specific entry and exit points to this cleft. Small non-coding RNAs can interfere with this cleft and prevent RNA initiation but not elongation.

In the minisymposium on the cell biology of neurons, **Peter Scheiffele** (Columbia University, USA) spoke about neuroligin-1 and neurexins and their roles in synapse differentiation. One of his exciting findings was that neurexins exist in early endosomes and so could locally change synapses. **Martin Schwab** (University of Zurich, Switzerland) addressed the question of how to overcome the neurite growth inhibitors produced in the CNS when spinal damage happens. By neutralising NogoA through a variety of means after partial spinal section, he found animals recover their mobility much faster and more fully.

Other conference events included commercial exhibitions and poster sessions. Standing by my poster, I met some fellow post-docs and PhD students, from whom I obtained a few ideas to try when I returned to the lab. There were also two sessions about careers, one on careers outside academia and the other dealing with various issues facing academics, which gave useful advice to young scientists like me. The conference concluded with some bioclips: short films about science, e.g. cell polarity or the role of histones. The website (www.bioclips.com) is open to all and has some movies that would add something different to undergraduate lectures and research talks. Overall, the 5th ELSO conference had something for everyone in the field of cell biology and I thoroughly enjoyed it.

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The **ELSO Early Career Award** was given to **Elena Conti** (European Molecular Biology Laboratory, Heidelberg, Germany) for her contributions to life sciences in the few years since she finished her PhD. She is a crystallographer who determines the structure of proteins involved in mRNA degradation, e.g. SMG-7 and UPF-1.

15th International Society of Developmental Biologists Congress
Sydney, September 2005

Playing the didgeridoo in the auditorium is usually frowned upon; not so at this meeting.

By Katherine Jeays-Ward

Around 1000 delegates attended this ISDB meeting in Sydney, apparently the largest number of attendees they've ever had. The opening plenary session was given by **Sydney Brenner** (Berkeley, CA) who encouraged us to submit our work to journals with very low impact. **Cliff Tabin** (Harvard, MA) then talked about the role of miRNAs in the control of hind vs forelimb identity. He outlined how an miRNA (mir196) may act in the hindlimb as a safeguard against leaky transcription of low levels of *Hox8b*, expression of which is normally linked with forelimb development.

The congress then got properly underway with concurrent sessions on Organogenesis, Germ Cell Formation and Migration, and Signal Transduction. In the Organogenesis session, **Richard Behringer** (University of Texas, TX) spoke on the genetic mechanisms of organ diversity between species, illustrated by comparisons of mouse and bat limb formation. Some of the differences can be accounted for purely by divergence in the *cis*-regulatory elements of the *Prx-1* gene, which shows about 70% sequence similarity between mouse and bat.

Below: Developmental biology in action.

In the Signal Transduction session, **Liz Robertson** (University of Oxford) discussed Nodal signalling pathways during early mouse development. Smad2/3 are the effectors of Nodal signalling, but Smad3 mutant mice show no defects in anteroposterior patterning, despite the role of Nodal in this process. The tissues of Smad2 mutant mice are highly disorganised from an early stage. Liz described various combinations of Smad2/3 homo- and heterozygous mutants, concluding that there is a dose-dependent requirement for these Smads during early development. She finished by demonstrating how conditional loss of Smad4 function affects formation of those tissues that require the highest levels of Nodal signal during development.

In a session entitled 'Polarity and Development', **Scott Fraser** (CIT Caltech, CA) outlined various approaches to imaging whole embryos, showed impressive images obtained by MRI of live specimens, and went on to describe cross-disciplinary work on the role of blood flow in cardiovascular development. He concluded that during endothelial development, blood velocity (and high shear stress levels) drives remodelling of the endothelium.

The second day started with plenary seminars given by **Janet Rossant** (Mount Sinai Hospital, Toronto, Canada), who spoke about stem cells and lineage development in the mouse, and **Olivier Pourquié** (Stowers Institute, Kansas City, MO). He described the segmental patterning of the vertebrate axis, in particular the somites, and the clock and wavefront model through which they are widely, although not universally, thought to form.

Despite my personal interest in the Neural Patterning session, which included a seminar by **Thomas Edlund** (Umea University, Sweden) on factors involved in early rostrocaudal patterning, the highlight of the second morning was the talk by

Above: One of perks of a conference in Sydney.

Marianne Bronner-Fraser (CIT, Caltech, CA) on regulatory events in neural crest formation. Although I know little about neural crest cells, I left the seminar with a clear, albeit basic, appreciation for the logical and solid work that she presented.

In the 'Patterning the Embryo' session, **Claudio Stern** (UCL, London) introduced us to coiled-coil proteins and chromatin remodelling complexes and how these are involved in regulating neural fate. He described a coiled-coil protein called ERNI (Early Response to Neural Induction) that is regulated by FGFs and which may delay induction of *Sox2* during gastrulation. **Patrick Tam** (Children's Medical Research Institute, NSW, Australia) discussed embryonic patterning and head morphogenesis in the mouse. He focused on the importance of tight control of endo- and mesodermal migration, and how the antagonistic activity of the anterior visceral endoderm, prechordal plate and foregut endoderm can modulate WNT and TGFβ signalling during craniofacial patterning.

My poster was presented on the second evening. The misfortune of being placed next to a very popular poster and associated access difficulty was outweighed by some of the interest shown in mine towards the end of the session, which was ended only by the expulsion of all the conference delegates from the conference centre shortly after 8pm.

The third day began with plenary talks by **Hiroshi Hamada** (Osaka University, Japan) and **Barry Dickson** (Institute of Molecular biotechnology, Austria). Hiroshi Hamada talked about left–right asymmetry in the mouse and how, through the use of extremely demanding technical manipulations, direction of flow can be affected by the degree of posterior tilt exhibited by cilia in the node. The unidirectionality of flow is necessary to break asymmetry in the embryo. He showed how a small break in symmetry in a restricted area may be converted to a robust asymmetry using a reaction–diffusion system of Nodal and Lefty. Barry Dickson spoke about sexual behaviour in female *Drosophila* that had been altered to exhibit elaborate courtship rituals usually found only in males. Surprisingly, alteration of a single gene was sufficient to achieve this behaviour in these flies – the aptly named *fruitless*.

Steve Wilson (UCL, London) gave an intriguing talk on using zebrafish to study the development of lateralised circuitry in the central nervous system. Usually, the habenular nuclei are different sizes as a result of Nodal signalling. Steve showed how in the zebrafish *ace* mutant, the habenulae lack obvious asymmetry, thereby implicating *fgf8* in the development of laterality. Normally, left-sided habenular axons project to the dorsal region of the interpeduncular nucleus (IPN), and right-sided axons project to the ventral IPN. In the absence of *fgf8*, habenular axons show unusual spiralling around the midline in a dorsoventrally restricted plane of the IPN, suggesting involvement of FGF8 in migration and/or delamination of axon projections.

The final day featured several excellent talks. **Brigid Hogan** (Duke, NC) discussed branching morphogenesis in the lung while **Malcolm Logan** (NIMR, London) described patterning in the hind- and forelimbs. He is interested in two aspects of limb development – initiation (what triggers outgrowth of limb buds) and limb-type specification (fore- vs. hindlimb). Tbx5 is expressed by forelimbs, and Tbx4 and Pitx1 are expressed by hindlimbs. Such an expression pattern would indicate a differential requirement for each gene for fore- or hindlimb development, but limb-restricted conditional knockout of Tbx4 and 5,combined with 'limb rescue assays', showed that Tbx4 expressed in the appropriate place could rescue Tbx5 knockout and allow a forelimb to develop. This demonstrated that Tbx4, despite being expressed exclusively in hindlimb, is able to drive forelimb development. Closer inspection of the

Tbx4/5 genes revealed that only the *cis*-regulatory elements differ, suggesting that although the genes arose through a gene duplication event, the two copies have since become uncoupled. Malcolm Logan used further limb rescue assays to find that Pitx1 could convert rescued forelimbs into hindlimbs in the Tbx4-expressing Tbx5 knockout limbs. He proposed a model in which limb type specification is initiated (through rostrocaudal hox codes) before initiation of limb outgrowth.

In the final plenary session, **Sir John Gurdon** (Gurdon Institute, Cambridge) gave a talk entitled 'From adult to egg: nuclear reprogramming and stem cell creation'. When transplanted into an egg, the nucleus of a determined or differentiated cell can revert from its committed state. Nuclei become progressively less able to do this as they approach terminal differentiation. As befits a closing lecture, visions of the future were presented; in this future, nuclear implantation using nuclei from fully differentiated adult cells would enable treatment of disease or degeneration with younger cells containing the genetic constitution of the target individual.

The opportunity to attend a meeting of such high calibre, with the advantage of such a good location, does not often arise. I would like to express my gratitude to the BSCB for the Honor Fell Travel Award, particularly as the meeting was focused on developmental rather than cell biology. I would also like to thank the Royal Society for their Travel Award. Together, these generous awards enabled me to attend this superb meeting.

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Meiotic Divisions and Checkpoints
Cargese, Corsica, March 2005

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This EMBO Workshop, held in spectacular surroundings, was attended by 82 people. During the five days, 33 talks were presented and 50 posters were displayed.

After a 20 minute trek from the town of Cargese through the Corsican scrubland, we reached the coastline where the Scientific Institute is situated. The meeting began with a historical perspective on the cell cycle and checkpoints given by **Tim Hunt** (Cancer Research UK). This was followed by the first session on prophase I arrest and pachytene-recombination checkpoints: **Anne Villeneuve** (Stanford University) gave an account of how cells ensure that chiasmata occur only between correctly paired homologues, **Andreas Hochwagen** (MIT) talked about meiotic DNA damage checkpoint function, and **Christer Hoog** (Karolinska Institutet) discussed the role of synaptonemal complexes.

The next major session was on meiosis progression. **Terry Orr-Weaver** (MIT) described a screen for Drosophila mutants that are defective in meiotic progression. **Olivier Haccard** talked about how either one of Mos or cyclin B is sufficient for meiotic maturation, and along similar lines **Angel Nebrada** (CNIO, Spain) described how RINGO regulates meiotic maturation. The following talks addressed translational control of meiosis as **Joel Richter** (University of Massachusetts) described symplekin and Gld2 as two novel factors required for cytoplasmic polyadenylation and **Claude Prigent** (University of Rennes) discussed the role of aurora-A in the regulation of maskin.

There was much discussion about the nature of CSF in the following session with **Peter Jackson** (Stanford University), **Thierry Lorca** (CNRS), **James Maller** (University of Colorado), **Marie-Helene Verlhac** and **Takeo Kishimoto** (Tokyo Institute of Technology) discussing the relative contributions of Emi1, Emi2, Polo-like kinase and the Mos pathway in CSF arrest. **Jim Ferrell** (Stanford University) described the importance of feedback loops and oscillators in the cell cycle.

In the last session, **Hiro Ohkura** (University of Edinburgh) described the results of a screen for spindle formation mutants in which mutants of the cyclin-dependent kinase regulators, Cks1 and Wee1, were found. **Bernard Maro** (CNRS) talked about how mouse oocytes establish asymmetrical distribution of developmental determinants. Finally, **Bill Earnshaw** (University of Edinburgh) talked about the chromosomal passenger borealin and the dependency of Shugoshin localisation on INCENP.

Two poster sessions were held in the open air, allowing people to present their data in a relaxed environment while enjoying the sunshine and sea breeze. My thanks go to the BSCB for the Honor Fell Travel Award which went towards the cost of attending this meeting.

Regenerate 2005
Atlanta, Georgia, June 2005

This regeneration and tissue engineering assembly was co-hosted by The Wake Forest Institute for Regenerative Medicine and Pittsburgh Tissue Engineering Initiative, with additional support provided by Georgia Tech/Emory Centre, Aderans Research Institute and Tissue Engineering Society International. We were all able to attend this meeting thanks to the BSCB Honor Fell Travel Award scheme.

By Emma Woods, Gemma Buckley and David Warde

A tiring eight-hour long-haul flight brought us from Manchester to Hartsfield International Airport, Atlanta. After a trek from one end of the airport to the other, we finally located our luggage and made our way to the Westin Peachtree Plaza in the heart of downtown Atlanta. The towering cylindrical hotel dominated the skyline and was to be both our lodgings for the next few days and also the host of the conference.

A day spent recovering from the journey and adjusting to the time difference allowed us to explore the city a little before the meeting began. Registration was stress-free and organised and we met with some other members of our group before heading to the first keynote introductory session. **Stephen Oesterle** MD, the senior vice president of the medical device giant, Medtronic, provided an interesting insight into the device industry and highlighted the companies' aims to integrate biologics into delivery tools. The focus was on the use of 'combination devices' to provide not only palliative function but also help to restore and cure.

The first day of talks was hosted as a Stem Cell Short Course with presentations covering embryonic, mesenchymal, haematopoietic and adult stem cell biology and their importance in tissue engineering applications. **Melissa Carpenter** and **Steve Stice** both highlighted the importance of investigating various stem cell isolation techniques and long-term culture methods. Their studies demonstrated that assessment of marker expression, long term proliferation, pluripotency, morphology, cytogenetic stability and epigenic status were all required in the evaluation of stem cells for regenerative therapies. Insight into the molecular mechanisms of murine stem cell self-renewal was provided by **Stephen Dalton**, whilst **Dennis McKearin** described some of the signalling pathways involved in *Drosophila* stem and stromal cell interactions. **Karen Hirschi** spoke of her research comparing adult bone marrow and muscle haematopoietic stem cells isolated from ROSA26 mice. She showed that both cell types formed distinct side populations and engrafted into the blood and endothelium of irradiated recipient animals and provided evidence for a vascular progenitor cell niche in adult muscle tissue. **Curt Freed** gave an overview of the treatment of Parkinson's disease using foetal substantia nigra dopaminergic neurons and showed clinical trial data which demonstrated the success of the treatment in a number of patients. The final discussion presented by **Alan Colman** of ES International, focused on the challenges faced in the progression of stem cell therapies fro the bench to the clinic, specifically showing some of the ground-breaking work carried out in his lab involving the treatment of diabetes and heart disease using stem cell strategies.

The Stem Cell Executive Forum that followed the talks provided an excellent opportunity for the speakers and delegates to join and formally discuss some of the issues highlighted throughout the day. This was followed in the evening by the official opening of the conference held in the main ballroom of the hotel, containing posters and industrial displays and a relaxed atmosphere in which to network with other attendees.

The second and third days allowed for four sessions to run concurrently, each beginning with a principal speaker followed by three other shorter talks. Day two's keynote speaker, **Charles Vacanti**, from Harvard Medical School described the work carried out by his group on the repair of the central nervous system. The 'spore-like' progenitor/ stem cells isolated from the CNS remained viable for more than one hour after the disruption of the spinal cord, whilst other cells die within minutes of injury. This work led to the investigation of these cells *in vitro* and demonstrated that they were

Above: Gemma and Emma in Atlanta Olympic Park

able to proliferate, form neurospheres and eventually mature, having the ability to form various cellular elements of central nervous system tissue. The *in vivo* study carried out on a paraplegic dog named Sparky showed promise, with a final video of him able to walk after transplantation of autologous neurospheres.

Anthony Atala was the principal speaker in the cell survival *in vivo* session and examined the contribution of cells and matrices to engineered tissues and organs. This covered cell sourcing, delivery vehicles, effects on wound healing and the contribution of transplanted cells to a regenerated organ. Other presentations in the biomimetics and delivery sessions contained data from other members of Atala's group and demonstrated their novel approach to the decellularisation of organs such as the liver to form a biocompatible scaffold on which to build a tissue engineered organ replacement. **Kurt Stenn** gave an extremely interesting seminar in a skin wound healing session detailing the bioengineering of the hair follicle in the mouse model. He showed results of a study in which cells isolated from the bulge region and dermal papilla can aggregate *in vivo* and form hair follicles that are able to cycle, contain a pigmented hair shaft and have follicle morphology.

The final keynote speaker was our own group leader, **Mark Ferguson**, who gave a dynamic talk following the progress of the anti-scarring drug, TGFβ3, from discovery to clinical trials through the establishment of his biotechnology company, Renovo.

Our group, from the UK Centre for Tissue Engineering based at Manchester University, focuses on the skin tissue engineering. We were all given the opportunity to give oral presentations during the meeting. The first was from **Gemma Buckley** who spoke about her work on the regenerative ability of the MRL/MpJ mouse ear and its similarities with that seen in amphibian limb regeneration. Her talk focused on the differences in revascularisation and reinnervation of the injured ear when compared to other mouse strains, with future work hoping to identify the molecular cues that switch from wound repair to regeneration. **Tony Metcalfe** continued the MRL story and highlighted the distinction between repair and regeneration, in particular progress towards scarless skin wound healing.

I presented on the third and final day of the meeting and, despite the nerves, all went well. My research examines the persistence of syngeneic and allogeneic dermal fibroblasts in the skin and has shown a distinct migration and survival pattern in both genetically matched and mismatched recipients. This forms a base line for examination of the persistence of genetically modified cells with an aim to incorporate these into a complete skin replacement to aid wound healing. The last talk from our group was from **David Warde** who presented his findings on the effects of hair follicle cycling on adipose tissue thickness and its subsequent effects on incisional and excisional wound healing. All of our talks were very well received by the audience with useful questions and areas for future discussion.

Regenerate 2005 was a successful gathering of international investigators from a wide variety of tissue engineering and stem cell disciplines. The organised structure gave a good mixture of formal presentations together with time to network informally at the evening poster sessions. The end of the meeting also saw the reappearance of the fine weather, allowing us to take advantage of the hotel's roof-top swimming pool before enjoying dinner at the revolving Sundial restaurant, on the 73rd floor!

We would like to thank the BSCB for their generosity and also the UK Centre for Tissue Engineering for additional expenses.

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Translation UK
Glasgow, July 2005

Thanks to BSCB Honor Fell travel awards, we were fortunate enough to be able to attend the Translation UK meeting in Glasgow hosted by the Biochemical society. The three day conference attracted around 150 scientists from across Europe and the USA. It was a satellite meeting to Bioscience 2005 that aimed to bring together researchers from all areas of translational control, from initiation to termination.

By Ian Powley, Laura Cobbold and Yi Wen Kong

Translation UK began where Bioscience 2005 ended, with **Richard Jackson** (University of Cambridge) giving the Jubilee lecture on 'Alternative mechanisms of initiating translation of mammalian mRNAs'. This was a very thorough overview of the translational field, concentrating mainly on internal initiation. The lecture emphasised the key discoveries in the field of translation over the years, many of which were made in Jackson's own lab.

The opening session on 'Ribosome structure and factor mechanism' began with a lecture from **John McCarthy** (University of Manchester) discussing biophysical studies of the eukaryotic translation initiation pathway. He described cryo-EM predictions of the yeast 43S complex and also his work on the effects of helicases on ribosome scanning. **Christian Spahn** (University of Berlin, Germany) presented cryo-EM structures of the IRESs (internal ribosome entry sites: a complex structural element in the 5′ UTR) of Cricket paralysis virus RNAs bound to ribosome particles. These are the first structures of IRESs bound to ribosomal subunits to be determined.

The first day ended with an evening buffet reception at the conference hall which coincided with the first of two poster sessions. These sessions gave all the participants a chance to discuss their work with each other on a more informal basis.

Friday morning began with a talk on the control of translation by **Alan Hinnebusch** (National Institutes of Health, USA). He discussed the factors required for the assembly of the 43S and 48S translation pre-initiation complexes using yeast as a model system. From our contingent, **Ian Powley** gave a talk on 'The identification and characterisation of mRNAs translated following DNA damage' and **Martin Bushell** described the translational control of gene expression during the induction of apoptosis. mRNA expression is up-regulated in both cases. **Jim Norman** gave an interesting talk on how the interaction of Paxillin with poly(A)-binding protein 1(PABP1) regulates cell migration via translational control of Raf-1 synthesis in which he showed that paxillin association is required for efficient nuclear export of PABP1.

The translational control and disease session took place on the Friday afternoon. **Valentina Camerini** (Pisa university, Italy) gave an insightful talk on the feline immunodeficiency virus and the various methods of translational control employed by this virus. It uses both cap-dependent and cap-independent initiation during gene expression. **Xavier Saelens** (University of Gent, Belgium) described how protein synthesis persists during necrotic cell death.

A social event took place on Friday night in Glasgow's vibrant city centre to allow the conference attendees a chance to relax for the evening. This event was a tremendous success, with a large turnout and a good time had by all!

The final day began with the focus on the control of translation by mRNA turnover. **Sarah Newbury** (University of Newcastle) discussed ribonucleases and their role in *Drosophila* development. She showed how mutational analysis of Pacman, a *Drosophila* homologue of the yeast exoribonuclease XRN1, has identified a potential role for this enzyme in controlling cell shape change. **Brian Collier** (MRC Human Genetics Unit, Edinburgh) gave a talk on the DAZL family of proteins, discussing the role of these PABP-binding proteins in regulating translation in germ cells.

The last session started with **Mike Kiledjian** (Rutgers University, USA) discussing the importance of the removal of the 5′ cap structure in the

control of mRNA turnover. **Allan Jacobson** (University of Massachusetts, USA) ended proceedings with a thought-provoking talk on nonsense-mediated mRNA decay and demonstrated how premature termination and normal termination are not equivalent biochemical events. He showed how nonsense-mediated decay appears to be triggered by a ribosome's failure to terminate adjacent to a properly 'configured' 3′ untranslated region in the mRNA.

The meeting finished with an informal lunch after which we had plenty of time to explore Glasgow. We spent the afternoon shopping in Buchanan Street and ended an enjoyable three days with a lab dinner and one last night out on the town.

Translation UK proved to be an interesting and entertaining meeting. We particularly enjoyed the lecture by Richard Jackson which showed how much progress has been made in the field in recent years. Christian Spahn's structures of IRESs bound to ribosomal subunits were extremely impressive. Overall, the whole conference proved how much is currently being discovered by labs around the world and also how much is still unknown in this ever-evolving area of science. It has hopefully led to new collaborations between labs and inspired new ideas, paving the way for future breakthroughs.

We would like to thank the BSCB and all the people at the conference for making it a wonderful experience.

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Weinstein Cardiovascular Development Conference Tucson, Arizona May 2005

Surrounded by the rattlesnake-laden desert and under the heat of the Arizonan sun, the Weinstein meeting for cardiovascular development promised to become a very tense and far too serious meeting. The atmosphere, however, proved to be more holiday-like than anticipated, thanks to the hospitable character of the hotel resort ("the soul of the southwest") and the friendliness and approachability of the conference attendees. And southern Arizona provided a fascinating background for this meeting: the cultural mix of Mexican and Native American influences reflected in the food, architecture and landscape.

By Stephan Lange

The annual Weinstein meeting was founded in 1994 by Dr. Constance Weinstein and focuses on the normal and abnormal development of the heart and vasculature and its relationship to human diseases. As an independent conference with no affiliations to medical, biomedical or biological societies or organisations, it retains its character as a rather informal gathering of interested scientists, despite the growing number of participants.

Most of the platform talks were selected from the submitted abstracts according to their scientific impact and general interest, giving less established and junior scientists the chance to present their work in front of a big audience.

Another feature of this conference is the comparatively low registration fee, which makes it attractive not only to junior scientists and PhD students but also to principal investigators (and their grant money). Although American scientists constituted more than three quarters of the participants, attendees from all over Europe as well as eastern Asia gave a more international flair to the conference.

Scientifically, the three day meeting offered a broad variety of topics and research areas with sessions ranging from the investigation of 'Gene–environmental interactions in cardiovascular defects' and 'Imaging the developing heart' to 'Early heart development'and 'Myocardium regulation, differentiation and structure'.

The keynote lecturer on the first day was **Christine E. Seidman** (Harvard Medical School and the Brigham and Women's Hospital) who

reviewed the impressive work from her group and others on early heart development and disease and its regulation by nuclear factors like Nkx2.5. This was undoubtedly one of the highlights of the conference. Transcription factors and their role in embryonic heart growth were key topics throughout the meeting. **Brian Black** (Cardiovascular Institute, UCSF), for example, described the use of a regulatory element from the *Mef2c* gene, which is responsive to transcription factors like isl-1 and delineates the fate of cells contributing to the anterior heart field.

The majority of the talks and posters dealt with the phenotypical description of heart defects in various genetic knockout- (or knockdown-) models, ranging from zebrafish to mouse. Although the results were impressive and the description of the various phenotypical alterations accurate and thorough, the observed defects were somewhat similar in nature with the molecular cause of the disease remaining elusive.

One of the participants summarised quite rightly that simply establishing a knockout-line and describing its phenotype (if any) is just one step in the struggle to understand the underlying molecular mechanisms or the involved signalling pathways while most of the work still lies ahead. Another problem, not only with regard to these genetic knockouts and knockdowns, but also for most of the presented data, is the fact that the investigations and experiments were done in animal model systems. Although this meeting demonstrated that a growing number of results are directly applicable to human diseases and their molecular origins, the gap between clinical observations and basic research remains huge.

One of the major topics addressed was stem cell technology. Quite refreshing was a critical introduction about the problems of stem cell research in the heart and stem cell-derived therapeutics by **David Sedmera** (Medical University of South Carolina). He demonstrated impressively in his talk that the homing and tissue-specific differentiation of free circulating multipotent cells (from a donor organism) into cardiomyocytes and coronary smooth muscle cells are rare events and that their potential for therapeutic use has to be investigated further.

The best methodological talks were by **Talat Mesud Yelbus** (Hannover Medical School, Germany) on the direct visualisation of cardiovascular development in chicken embryos and by **Mary E. Dickinson** (California Institute of Technology and UCSD) on the dynamic imaging of cardiovascular mechanics. The cultivation and recording of chicken embryos in shell-less cultures using a high-resolution time-lapse system spectacularly displayed vasculogenesis and embryonic heart development, as well as the impressive experimental design and image processing deployed by Yelbus and co-workers.

Above left: Blinded by the afternoon sun and waiting in front of the posters at 40°C in the shadow... (Picture courtesy of Elisabeth Ehler, who also suffered in the heat.)
Above right: The 'Skopopelli' was the logo of this year's Weinstein conference on Cardiovascular Development. According to the organizers it represents the Southwestern ambience and is a slightly (!) modernized version of ancient native American petroglyphs depicting the Kokopelli, a flute player and traveller that brings luck, fertility or trickery to the villages he visits.

Using high-speed confocal microscopy on genetically altered living zebrafish, Dickinson and co-workers were able to visualise heart contraction in three-dimensional models in great detail. With this beautiful and intriguing technique, they studied how contractile forces and the laminar flow of the circulation seem to be a prerequisite for the normal vascular remodelling of the embryonic heart.

Major social events were a visit to the Arizona desert museum with rattlesnakes already waiting in the car park for the careless visitor (or scientist), a tour on horseback (western style) around the hotel and a well organised barbecue under the night sky of the Arizonan desert that concluded the conference. All in all, the meeting was very interesting with some insights into cutting edge research, but the majority of talks focused too much on descriptive embryonic phenotypes of certain gene knockouts (or knockdowns).

Next year's Weinstein conference on Cardiovascular Development is going to take place in St. Petersburg, Florida in May. Pictures from the hotel resort promise that next year's motto "we meet at the beach" will lead to a record number of attendees. Information is available under: www.weinsteinmeeting.org.

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15th International *C. elegans* meeting University of California, Los Angeles, June 2005

The International C. elegans meeting is held every two years on the UCLA campus in Los Angeles and is a Mecca for worm biologists. From humble beginnings with Sydney Brenner at the LMB in Cambridge, the field has grown massively over the last 30 years with around 1800 attendees at this year's meeting.

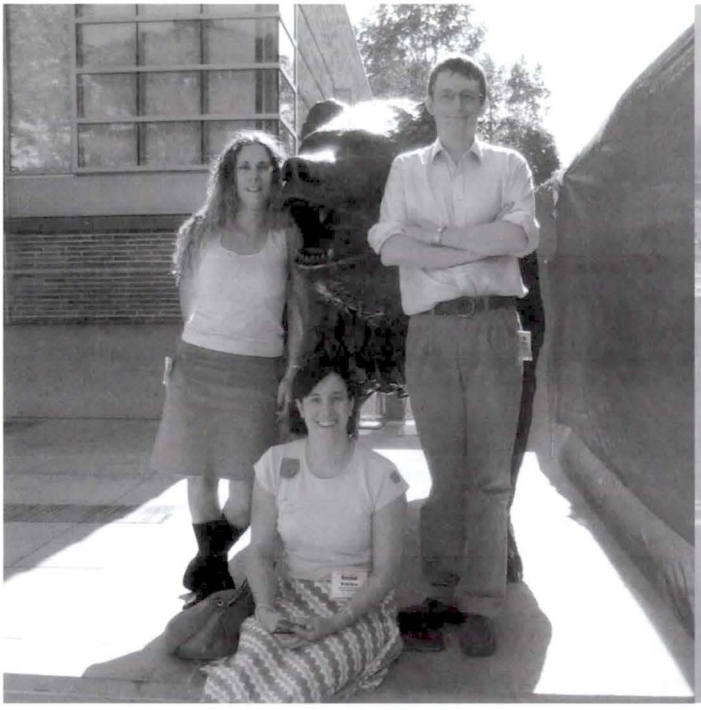
By Emma Hiley, Rachel McMullen and Paul Morrison

We arrived in LA early, giving us a bit of time to soak up the sun on Venice beach before setting off for the UCLA campus and a hectic schedule of talks, posters and workshops. The conference began with an evening plenary session on topics of general interest to the whole worm community. One of the most exciting developments in the field was presented by **Young-Ki Paik** (Yonsei Proteome Research Center, Korea). He described the isolation of daumone, the long sought chemical cue that causes the worm to enter an alternative 'dauer' developmental state. Although many groups have put years of research into the dauer pathway, daumone proved elusive. Following an incredibly persistent biochemical approach, Young-Ki Paik's group has finally isolated daumone and is in the process of making it available to the worm community.

The parallel sessions focus on specific areas of *C. elegans* research; necessary as worms are used to study such diverse subjects as aging, cell death, neurobiology, behaviour and evolution. We attended the session on neural development and synaptic function. Many of the talks addressed the roles of wnt signalling in the development of the worm nervous system. Much of this research makes use of the complete wiring diagram of the *C. elegans* nervous system which identifies all neurons and synaptic connections. By comparing the nervous systems of mutants with the wiring diagram, the speakers determined how wnts are involved throughout neuronal development, in the early cell divisions which specify neurons, as well as in the migration of cells and axon outgrowth. The second half of the session concentrated on synaptic function. Talks described the roles of tomosyn and the Ca^{2+} ATPase (mca-3) at synaptic release sites and how altering synaptic release could influence worm behaviour. Of particular interest was a talk by **Rajarshi Ghosh** (Albert Einstein College, New York) who described the behaviour of swimming worms. These animals undergo cycles of activity similar to sleeping and waking which can be regulated by neuronal function.

The poster sessions took place in the massive UCLA basketball stadium with around 1000 posters on display. Despite this large number, both Emma and Rachel received plenty of interest in their posters and we were both kept busy throughout the afternoon. The evening plenary session highlighted services available to worm users. This is one of the strengths of the worm field with two knockout consortia, a centralised strain service and many online resources all freely available. The talks covered recent changes and improvements and also described a new resource, Wormbook (www.wormbook.org), which is intended to become a complete online textbook for worm researchers.

The main events of the next two days for our lab were the parallel sessions on worm behaviour. Monday's session focused on describing the roles of signalling molecules at the synapse in regulating worm locomotion. Paul's talk seemed to go down well though the strict eight minute time slot didn't leave much time for discussion. **Kenneth Miller** (Medical Research Foundation, Oklahoma) described a pathway controlling the stimulation of worm movement involving the dense core vesicles present at the synapse as opposed to the synaptic vesicles studied by most labs. He proposed a new pathway controlling the release of neurotransmitter which effects release from both the synaptic vesicles and the dense core vesicles. The range of



talks gave a striking indication of the number and complexity of pathways controlling the movement of the worm. The second half of Monday's session featured talks from the **Bargmann** (Rockefeller University, New York) and **De Bono** (LMB, Cambridge) labs on the worm's ability to sense oxygen. Worms appear to use a temporal mechanism for detecting oxygen concentrations and some of the components involved in the oxygen sensing neurons have been identified. Some mutants show a difference in their preference for oxygen concentration, distinguishing between 8-12% and 5-8%. These talks also gave an insight into the clever mechanism developed by researchers to expose worms to oxygen gradients and record their movement to a preferred concentration.

The first talk on Tuesday by **Allyson McCormick** (University of Washington, Seattle) demonstrated how worms can be directly used for medical research. A model for epilepsy has been developed in which the worm body wall muscles are stimulated uncontrollably by the neurons, resulting in the worm having a fit-like episode. Researchers are using these mutants to try and identify signalling processes potentially involved in epilepsy. There were many talks on the association of temperature and feeding state in the worm. Worms grown at a specific temperature in the presence of food 'learn' to associate this temperature with food and will preferentially move to this temperature even in the absence of food. Conversely, worms grown at a specific temperature in the absence of food will avoid this temperature if exposed to a temperature gradient. Another interesting talk described the ability of the worm to 'learn' to avoid eating pathogenic bacteria. Worms were grown on either pathogenic and non-pathogenic bacteria or solely non-pathogenic bacteria and then allowed to choose which to eat. Worms previously exposed to the pathogen avoided it, whereas those not so exposed showed no preference. This may be an example of associative learning similar to taste aversion in many animals.

The keynote address was by **Robert Horvitz** (MIT, Cambridge). Horvitz, who along with Sydney Brenner and John Sulston won the Noble prize in 2002, gave a broad outline of his career, from beginning as a post-doc in Brenner's lab to his own discoveries about the genes and proteins involved in apoptosis. He spoke passionately about the importance of basic research and of communicating science to the general public to allow the importance of our work to be understood.

We found the meeting hugely enjoyable and inspiring and would like to take this opportunity to thank the BSCB for the Honor Fell awards which made it possible.

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Above left: Emma, Rachel and Paul by the UCLA mascot. Above right: The Nurrish lab on Venice Beach.

11th World Congress on Pain
Sydney, August 2005

Thanks to an Honor Fell Travel Award from the BSCB, I was able to attend the 11th World Congress on Pain in the beautiful city of Sydney. This triennial meeting of the International Association for the Study of Pain brings together basic scientists and clinicians from all disciplines in pain research and treatment to discuss and review current advances in the field. The seven day conference attracted over 12,000 delegates, presenting 1600 posters with 100 lectures and topical workshops.

By Anna Clark

The conference was kicked off by **Clifford Woolf** (Harvard Medical School) paying tribute to Pat Wall and Ron Melzack's Gate theory of pain (1965). This ground-breaking theory proposed the pain system to be a dynamic balance between excitation and inhibition, revolutionising thinking within the field. Clifford described how this theory had influenced his own research, presenting data regarding the apoptosis of GABAergic inhibitory neurons within the spinal cord following peripheral nerve injury and posing the interesting question of whether neuropathic pain conditions may benefit from neuroprotective treatments. **Rolfe-Detlef Treede** (Johannes Gutenberg University, Germany) discussed the concept of pain memory and central sensitisation in human patients. During the afternoon, I presented my poster entitled 'Release of Interleukin 1 from the rat isolated dorsal horn', receiving a large amount of interest and positive feedback from the other delegates (including from some scarily important people!).

Tuesday was the first of two days when I really got to grips with my area of interest – microglia cells and cytokine-induced pain. **Michael Salter** (University of Toronto) discussed the role of microglia cells and their expression of P2X4 receptors for ATP in rodent models of neuropathic pain. He presented new data demonstrating that a shift of the neuron choride membrane potential induced by ATP-stimulated microglia is prevented by blockade of the trkB receptor for the neurotrophin BDNF.

I then chose to attend the cytokine-induced pain workshop. **Michaela Kress** (Innsbruck University, Austria) presented evidence detailing the sensitisation of neuronal heat responses to the pro-inflammatory cytokines IL-1, and IL-6. **Tony Yaksh**, in collaboration with **Linda Sorkin** (both University of California, San Diego), presented evidence for TNF-dependent increases in p38 MAPK phosphorylation following nerve injury. **Claudia Sommer** (University of Würzburg, Germany) discussed studies on a range of clinical pain syndromes in which cytokine levels have been found to correlate directly with both inflammation and patient-reported pain.

In the afternoon's plenary lecture, **Steve Hunt** (University College London and the London Pain Consortium) reviewed much of his previous work describing central pain processing and the projection neurons that connect the spinal cord to the higher brain centres involved in nociception. He continued by sharing interesting results implicating a role for NK1-expressing spinal lamina I projection neurons in enhanced sensitivity in rodent models of inflammatory pain.

William Willis (University of Texas) began Wednesday's session with a discussion of spinal nociceptive pathways in visceral inflammation and pain. This was followed by an excellent lecture from **Howard Fields** (University of California, San Francisco) regarding the use of opioid analgesics for the treatment of a variety of clinical pain conditions. I then attended a workshop where **Nathalie Vergnolle** (University of Calgary, Canada), **Nigel Bunnett** (University of California, San Francisco) and **Stephen Vanner** (Queens University, Canada) discussed the role of serine proteases in pain transmission. The IASP general assembly met in the afternoon, allowing me to do some sight seeing!

Thursday started bright and early with **Gerald Gebhart** (University of Iowa) discussing visceral pain mechanisms. The morning workshop entitled 'Injury dependent plasticity at multiple levels of nociceptive transmission' dealt with injury-induced changes in both the peripheral and central nervous

systems. **Michael Salter** (University of Toronto) showed some very cool animation (produced by a Master's student in his laboratory) illustrating the complicated interaction between the NMDA receptor, the serine protease Src and the adaptor molecule ND2 in the central nervous system. **Clifford Woolf** discussed the inflammatory mediator bradykinin as both a peripheral and central sensitising agent. **Ke Ren** (University of Maryland) presented results suggesting BDNF involvement in the brain stem following induction of an inflammatory pain state. **Volker Neugebauer** (University of Texas) discussed the responses of the amygdala to noxious stimuli in a rodent model of arthritis.

In the 'Spinal sensitisation during nerve damage' workshop, **Michael Vasko** (Indiana University) and **Michael Ossipov** (University of Arizona) described sensitisation of CGRP release by prostaglandins, neurotrophins and dynorphin. **Tony Yaksh** introduced spinal microglial cells, specifically the correlation of p38 MAPK phosphorylation with pain behaviours following neuronal injury.

The last day began with a lecture by **Michael Gold** (University of Maryland) addressing changes in a range of neuronal ion channels during inflammatory and neuropathic pain. **Koichi Noguchi** (Hyogo College of Medicine, Japan) discussed signal transduction and gene transcription changes in the dorsal root ganglion after nerve injury. In relation to my area of interest, he proposed the MAPK family member ERK as a short-term regulator of capsaicin-induced hyperalgesia. The morning workshop was centred around my second passion, MAP kinases. **Ru-Rong Ji** (Harvard Medical School) demonstrated the induction of phospho-ERK in the spinal cord by C and A fibre stimulation, but not by innocuous A fibre stimulation, and suggested the influence of early gene transcription involving CREB.

Koichi Noguchi expanded on his plenary lecture by discussing a second member of the MAP kinase family, p38 MAPK. His data identified increases in p38 phosphorylation in large diameter dorsal root ganglion neurons after either noxious hot or cold stimuli. Interestingly, he also demonstrated that after nerve injury, phosphorylated ERK in damaged neurons far outnumbers p38, and that the majority of undamaged neurons express p38 preferentially to ERK. **Tony Yaksh** presented further data, this time demonstrating a p38-dependent upregulation of COX-2, resulting in prostaglandin release, in several rodent models of inflammatory pain.

Overall, I thoroughly enjoyed the whole week, learned a lot and met some very interesting people. And Sydney is a great city!

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The Protein Society Symposium
Boston, July/August 2005

By Michaela Smolle

Thanks to an Honor Fell Travel Award from the BSCB, I was able to attend the 19th Protein Society Symposium that took place from 30 July – 3 August, 2005. Travelling to Boston with Donna McGow from the same laboratory, I was very excited about the upcoming conference as well as my first visit to the United States. The symposium was held in the Boston Backbay area at the Marriott Hotel, Copley Place.

The conference provided the perfect platform to learn and to discuss the latest research in biochemistry. There were plenary sessions on systems biology and protein degradation, while mini-symposia covered many topics, including bioinformatics, protein engineering, protein function, interactions, molecular machines and proteomics. Overall, the program was intense (sessions started at 8 am), but plenty of coffee breaks and the two poster sessions allowed ample time for discussions with scientists from all around the world. They also offered me the opportunity to present my own research on the implications of protein–protein interactions for the architectural organisation and function of the human pyruvate dehydrogenase complex.

The opening plenary lecture was given by **Lucy Shapiro** from Stanford University on using a systems biology approach to study the bacterial cell cycle. In particular, she focused on the role of CtrA in *Caulobacter*, exemplified by its direct or indirect control of up to 150 different cell cycle regulatory genes, and the protein's own metabolic fate throughout the different cell cycle stages. This was followed by **Bonnie Bassler**'s (Princeton

University) presentation on inter-bacterial communication by the release and detection of signalling molecules – a process known as quorum sensing, which is responsible for phenomena such as bioluminescence or sporulation and effectively allows bacteria to behave as a multi-cellular organism.

Another plenary session was dedicated to talks on protein degradation via the ubiquitin system by **Adam Hershko** and **Alexander Varshavsky** who received the Stein and Moore Awards, respectively. Adam (Technion-Israel Institute of Technology) described in detail his work on the role of the ubiquitin protein degradation system with specific relevance to the cell-cycle, focusing on the anaphase promoting complex (APC) and p27, a G1 Cdk inhibitor. Alexander (California Institute of Technology) concentrated on the ubiquitin-dependent N-end rule pathway and its importance in protein degradation.

The second award session was more varied: **Matthias Mann** (University of Southern Denmark) who received the Anfinsen Award, described quantitative proteomics using labelling in cell culture; **Ronald Raines** (University of Wisconsin) won the Kaiser Award for his work on the production of synthetic collagen; **Roderick MacKinnon** (Rockefeller University) was awarded the Neurath Prize for his work on potassium channels; and the session closed with a talk by the recipient of the Irving Award, **Tom Muir** (Rockefeller University) on chemical probes for the investigation of protein function.

Three mini-symposia usually ran concurrently, forcing us to select the most appealing (or flit between different sessions). Personal highlights included a talk by **Andreas Mershin** (MIT, Boston) about his fascinating research on nanophotovoltaics and the attempt to build nanobatteries from spinach photosystem I and reaction centre. **Andy Finn** described the use of icosahedral assemblies, such as the cowpea mosaic virus or the hepatitis B coat protein, as a framework for the attachment of a variety of different organic and inorganic materials, including oligonucleotides, proteins, carbohydrates and metal complexes. Possible uses include the facilitation of crystallisation as well as therapeutic and diagnostic applications. In a bioinformatics session, **Themis Lazaridis** (City College of New York) talked about his work on modelling the interactions of proteins with the cell membrane by making the solvation parameters and dielectric screening dependent on the position within the membrane as well as taking the surface charge of phospholipid headgroups into account. **Terese Head-Gordon** (University of California, Berkley) compared the aggregation of non-disease related proteins, such as immunoglobulin-binding proteins L and G, with that of the Alzheimer's disease-related beta-amyloid protein. She explained how the inter-chain contacts necessary for aggregate formation can be predicted from protein folding studies.

In the session on protein–ligand interactions, **Laura Kiessling** (University of Wisconsin, Madison) gave insights into the control of multiprotein complex assembly and its importance in the elucidation and regulation of signalling pathways. This was followed by **Nancy Thornberry** (Merck Research Laboratories) who is investigating a dipeptidyl peptidase IV inhibitor as a treatment option for diabetes. **Virginia Cornish** (Columbia University, New York) showed how methotraxate and dihydrofolate reductase can be used instead of green fluorescent protein for selective labelling studies in living cells. In the protein misfolding session, **Ronald Wetzel** (University of Tennessee) and **Robert Tycko** (National Institutes of Health, Bethesda) presented their research on the kinetics and thermodynamics of amyloid fibril formation and on amyloid fibril structure using solid state NMR, respectively.

David Tirrell (California Institute of Technology) opened the protein engineering session with a description of his use of non-standard amino acids, referring in particular to the differences in activity and heat stability of wild-type and fluorinated chloramphenicol acetyltransferase. **Hagan Bayley** (University of Oxford) then presented single molecule experiments to observe non-covalent binding events in engineered protein pores. **Bob Sauer** (MIT, Boston) talked about his research on the energy dependence of protein unfolding and translocation by ClpX in a session on molecular machine function and assembly.

The closing session was broadly entitled 'Frontiers of protein science'. **Fred Cohen** (University of California, San Francisco) discussed the protein misfolding encountered in prion diseases and approaches that may prevent misfolding – such as the application of small molecules and dominant negative protein subunits. **David Baker** (University of Washington, Seattle) talked about high resolution protein structure prediction, its reliability and application to the analysis of genome sequence information. The symposium closed with **Frances Arnold**'s (California Institute of Technology) presentation on structure-based recombination. She used cytochrome P450 as an example of how proteins may be engineered to combine and/or create new functions.

Despite the full programme, our six days in Boston were not all science and plenty of time was available to mix with other people in the evenings and to explore some of Boston's attractions, including the three-mile "Freedom Trail", the Boston Tea Party and the Fine Arts Museum.

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FEBS/ESF Workshop on Integrated Approaches in Cytoskeleton Research Luxembourg, August 2005

I was fortunate to be awarded a BSCB Honor Fell travel award to attend the FEBS/ESF Advanced Workshop on Integrated Approaches in Cytoskeleton Research. My colleague, Clare Batchelor also attended, with funding from FEBS, and has helped write this report. The meeting was held in the beautifully renovated Neumünster Abbey in the Gründ area of Luxembourg City.

By Jennifer Higginson and Clare Batchelor

The workshop was organised by the European Cytoskeletal Forum www.weizmann.ac.il/eurocyto/home.html

The opening lecture on the Saturday evening was given by **Eric Karsenti** (EMBL, Heidelberg, Germany) on the self-organisation principles of mitotic spindle assembly. He discussed the role of molecular motors and chromosomes in organising the microtubules during mitosis and explained that the robustness of spindle assembly was due to the fact that these and other components would interact in a certain way that would always generate a dynamic regime which corresponds to what we call a mitotic spindle.

The first session on Sunday addressed the Structure and Assembly of Cytoskeletal Complexes. **Yanagida Toshio** (University of Osaka, Japan) began by describing the investigation of actin dynamics using single molecule FRET. His laboratory has found that actin exists in two major spontaneously switching conformational states, which are dependent upon myosin binding . This tells us that filamentous actin is not a rigid structure, but plays a positive role in cell motility. **Ueli Aebi** (University of Basel, Switzerland) changed direction slightly by focusing on intermediate filaments (IF). His group is approaching the tricky task of determining structural information about IF proteins using a 'divide and conquer' approach, which involves solving the structure of small protein fragments individually, then gathering this information together to describe IF structure, assembly and dynamics at the atomic level. Other speakers included **Heidi Rommelaere** (Gent University, Belgium) who gave an interesting talk on the analysis of mutations in the α-skeletal muscle actin gene, which give rise to congenital myopathies, and **Bernhard Wehrle-Haller** (Centre Médical Universitaire, Geneva, Switzerland) who described his work on the differential behaviour of integrin-dependent focal adhesion complexes in living cells and the mechanism by which they are formed.

The second session on 'Molecular Motors' began with a very entertaining talk from **Manfred Schliwa** (University of Munich, Germany), who described the mechanism of action of kinesin-1. Movement of the kinesin protein along microtubules is initiated by ATP hydrolysis, which then induces larger structural changes in the molecule. By generating mutations in kinesin-1, his lab has found that these changes are dependent upon key residues in the neck and hinge domain.

We then heard an interesting talk by **Mark Mooseker** (Yale University, USA) who discussed the phenotype of the Myo1a knockout mouse. He has shown that Myo1a is essential for normal development of the intestinal brush border in vertebrates. **Kristopher Clark** (Nijmegen Centre for Molecular Life Sciences, The Netherlands) presented evidence that TRPM7, a cation channel fused to an α-kinase, can interact directly with actin and myosin II and its activation regulates cell adhesion in mammalian cells through kinase-dependent and -independent pathways. Finally, **Sébastien Schaub** (Swiss Federal Institute of Technology, Switzerland) gave a fascinating presentation on the mechanism of cell migration using a variety of microscopy techniques in conjunction with computer tracking to study quantitively the movement of actin and myosin II in highly motile fish keratocytes.

Sunday afternoon was dedicated to Cytoskeletal Dynamics. **Alexander Bershadsky** (The Weizmann Institute, Israel) focused on the

diaphanous-related formins and described a new function for mDia in binding to the microtubule plus ends, believed to be a mechanism of linking actin filaments to the growing microtubule ends. **Alphée Michelot** (Grenoble, France) talked about formin 1 in *Arabidopsis*. This formin appears to be able to function both as a 'leaky capper' and as an Arp2/3 complex-like actin nucleator. **Tijs Ketelaar** (Wageningen University, The Netherlands) gave us a stimulating insight into plant root hairs and how these may be used to study cytoskeletal dynamics *in vivo*. This was followed by an interesting explanation by **Céline Revenu** (Institute Curie, Paris, France) of the many roles of villin, from severing, to capping, bundling and nucleation of actin filaments. **Gemma Bellett** (University of East Anglia) then changed the theme somewhat, to talk about non-centrosomal microtuble arrays. Her recent results advance the model of how apicobasal microtuble arrays are generated in differentiated, polarised epithelial cells.

Monday began with a special session on Live Cell Imaging and Emerging Technologies, which showed us new techniques for investigation of the cytoskeleton. The first talk from **Klemens Rottner** (German Research Centre for Biotechnology, Germany) addressed the conundrum of WASP vs. WAVE in the activation of the ARP2/3 complex, using techniques such as TIRF and epi-fluorescent timelapse microscopy. The specificity of ARP2/3 is brought about by differential subcellular positioning, possibly mediated by assembly into different protein complexes. **Rainer Pepperkok** (EMBL, Germany) explained how his group are using live cell imaging techniques together with mathematical modelling to investigate the mechanisms regulating the early secretory pathway through an interaction between specific vesicular coat complexes and microtubule motor complexes. Finally, **Julien Colombelli** (EMBL, Germany) gave a captivating presentation on the use of pulsed UV laser nanosurgery to quantify cytoskeletal dynamics *in vivo*.

After lunch, the session Nuclear Function of Cytoskeletal Proteins was opened by **Richard Treisman** (Cancer Research UK, London) who presented recent findings on how the cytoskeleton can influence the regulation of gene transcription. The transcription factor, SRF, is regulated by co-factors which shuttle continuously between the nucleus and the cytoplasm. Nuclear import is controlled by levels of G-actin and Rho GTPase signalling. **Roland Foisner** (Medical University of Vienna, Austria) described the emerging function of LAP2a, a lamina-associated polypeptide, in laminopathic diseases. Lap2a is involved in chromatin organisation during mitosis and is thought to control differentiation of adult stem cells when in a complex with lamins A/C, through an interaction with Rb.

Monday closed with a look at how model organisms can be used to study the cytoskeleton. **Angelika Noegel** (University of Cologne, Germany) described studies of CAP protein using *Dictyostelium*, demonstrating a role for CAP in endocytosis and vesicle transport. **Jürgen Wehland** (Braunschweig, Germany) then introduced us to bacterial pathogens and talked about how we could learn a great deal about actin dynamics by studying the actin-based motility of *Listeria*, *Shigella* and pathogenic *Escherichia coli*. **Raissa Elluere** (IBSM-CNRS, France) switched attention to yeast, in particular recent work on the role of Bud3 in the regulation of the septin network of dividing *Saccharomyces cerevisiae*. Finally, **Sawako Yamashiro** (Emory University, USA) introduced UNC-60B and UNC-87, homologues of ADF/Cofilin and calponin-like proteins, respectively, in *Caenorhabditis elegans*. Essentially, she showed that UNC-87 inhibited the F-actin severing activity of UNC-60B.

Mary Beckerle (University of Utah, USA) opened Tuesday's session on Integrated Cytoskeletal Circuits with her lab's recent findings on Zyxin. They have shown that during uniaxial cyclic stress, zyxin relocalises from the focal adhesions to the stress fibres, where it seems to recruit Ena/Vasp and so induce thickening of the stress fibres by actin polymerisation. **Guy Tanentzapf** (Gurdon Institute, Cambridge) then described the role of talin in *Drosophila* muscle. Talin appears to be essential for 'activation' of the integrin at muscle attachment sites but is also necessary for recruitment of other proteins to these sites. This suggests that talin has multiple functional interactions within muscle attachment sites. **Monique Arpin** (Institute Curie, Paris, France) gave an interesting description of the multiple roles of the ERM protein family in plasma membrane organisation and cellular signalling and **Chen Luxenburg** (Weizmann Institute, Israel) presented recent data on the role of cortactin and the Src tyrosine kinase in podosome formation.

Wednesday started with a session entitled Biophysics of the Cytoskeleton. **Cécile Sykes** (Institute Curie, Paris, France) began by describing a method for mimicking *Listeria* function using latex beads. Using this technique, they were able to measure the physical forces required to move the 'bacteria'. In addition, to try to understand the effects of actin polymerisation on the actin/myosin cortex, they used solid beads or oil droplets coated with an actin/myosin shell and demonstrated that the rigid bead caused cortex breakage, whereas the more flexible oil droplet allowed deformation of the cortex and propulsion of the bead by actin polymerisation. **Marileen Dogterom** (AMOLF, The Netherlands) then described recent data on force-generating

microtubule dynamics. Her *in vitro* assay also utilised beads, this time attached to a stiff microtubule-nucleating object. Movement of the bead, generated by the growth of the microtubule, could be measured in the presence and absence of various mictroubule-associated proteins to determine their effects on microtubule dynamics.

The final session on Cytoskeleton and Disease was opened by **Frans Ramaekers** (University of Maastricht, The Netherlands) who gave a very interesting description of using a cell compression device to understand the underlying mechanisms of laminopathies. Fibroblasts null for the lamin A/C gene have reduced mechanical stiffness and weaker nuclei than wild-type ones. Mutations in lamins result in total cellular weakness caused by a disrupted cytoskeleton. The next speaker, **John S. Condeelis** (Albert Einstein College of Medicine, USA), gave a fascinating presentation on the study of metastasis by generating an 'invasion signature' for invasive cancer cells using high-density microarray analysis to identify key genes that are up- or down-regulated in highly chemotactic cells.

The local organisers, **Evelyne Friederich** and **André Steinmetz**, did a wonderful job, choosing a well rounded scientific programme in a lovely venue and arranging an excellent wine-tasting excursion to the Moselle Valley. There were many interesting talks; however, we could not mention them all, instead we have chosen a good selection which we enjoyed. In addition, there were high quality posters which led to some very interesting discussions.

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7th European Conference of Endocrinology
Gothenburg, Sweden, July 2005

The conference took place in the very modern and spacious convention centre in Gothenburg, Sweden's second largest city. Throughout the city run broad avenues and the bottom of almost every building seems to have been converted to a shop. Especially difficult for the unexperienced pedestrian were the countless trams, which luckily didn't go very fast.

By Nele Schwarz

The submission of over 1100 abstracts and the registration of delegates from 68 countries promised to make this an interesting meeting, the purpose of which was the exchange of generally new research in the endocrine field on a European basis.

Of special interest was the session 'Immune–endocrine interactions'. **Clemens Kirschbaum** (Techninal University, Dresden, Germany) gave an interesting overview of his work on the adrenal axis and psychological stress. He is trying to identify the link between psychology and stress, which factors are involved and how and why people react differently to stressful situations. He was able to identify sex differences between men and women involving the HPA axis before and during stress. Women have higher cortisol levels and therefore a higher initial sensitivity to stress than men. The cortisol levels in women, however, decline after the stressful event, whereas the intially low cortisol levels in men increase after stress. Dr Kirschbaum proposed a signalling mechanism by which stress activates the translocation of NFκB into the nucleus where it causes an increase in transcription of inflammatory cytokines. This then leads to an increase in IκBα, a natural inhibitor of NFκB. This inhibitor is also directly activated by glucocorticoids, e.g. cortisol. Unfortunately, he did not speculate about the biological consequences of his findings; for example, whether the initially higher cortisol levels in women lead directly to higher levels of IκBα and therefore a lower level of proinflammatory cytokines before and during the first periods of stress, compared with men.

Another session I found highly interesting was 'Impact of endocrine disrupters on human health'. The first talk dealt with hormones and endocrine disrupters in food and water and was given by **Bernard Jegou** (University in Rennes, France). He defines endocrine disrupters as exogenous substances that cause adverse health effects in an

intact organism or its offspring. Endocrine disrupters typically perturb 'normal' signalling pathways by mimicking or blocking endocrine hormones in cells rather than causing damage directly as chemical substances do. Most hormones that occur in the environment are natural mammalian and plant hormones, but synthetic hormones as in the contraceptive pill and environmental contaminators, such as DDT, also play a role.

There is a significant increase in naturally occuring mammalian hormones found in water, because of an increase in farming and the number of cattle kept world wide. In the USA and Europe, more than 500 tons of steriods (androgens, oestrogens and gestagens) are released per year by cattle alone. Including pigs, sheep and chicken, this number rises to 700 tons. Usually these hormones are 100–10000 times less active than endogenous hormones, but the high amounts in the environment and also the mixture of different hormones can still cause disruptive effects in organisms.

The second talk in that session was given by **Werner Kloas** (Leibniz Institute of Freshwater Ecology, Berlin). He studies amphibians as models of effects of endocrine disrupters in water, especially their reproduction and the thyroid system, which is of major importance for metamorphosis in amphibians. Most studies involving endocrine disrupters have been carried out studying animals living in water, mainly fishes. These studies found that oestrogens and anti-androgenic compounds cause feminisation while androgens lead to masculinisation and anti-oestrogens cause neutralisation due to underdevelopment of the gonads. In amphibians, endocrine disrupters can affect the reproductive system, leading to abnormal sexual development as mentioned above, but also the thyroid system, leading to accelerated or retarded metamorphosis. Amphibians are a good model to study the disruptive effects of hormones, since hormonal effects can be detected easily and in some cases very early in the development of the organism. He then pointed out that the big variety of reproductive biology needs more comparative studies to investigate whether general endocrine principles do exist between amphibian orders, different classes of vertebrates and even other groups in the animal kingdom.

From the programme, the last day of the conference sounded the most related to my work, which is on G-protein coupled receptors. The first session started with **Anna Spada** (Institute of Endocrine Sciences, Milan) giving a talk on G-protein mutations. After a short overview, she focused on mutations in the α sub-unit of G stimulatory proteins. Most mutations in G-protein signalling have been identified in the receptor, but mutations in the α sub-unit, causing either a gain or loss of function, can lead to pathological phenotypes. For example, McCune-Albright syndrome is caused by an inactivating germ line mutation in the gene encoding the α sub-unit G stimulatory protein 1 (GNAS1), leading to osteodistrophy and pseudohypoparathyoidism. Receptor-activating mutations can increase cAMP concentrations and cause uncontrolled cell proliferation.

This session was followed by a symposium on G-protein coupled receptors – basic and clinical aspects. The most interesting talk was given by **Moritz Bünemann** (University of Würzburg, Germany) on Spatio-temporal aspects of GPCR-induced G protein activation. Currently, there are two models of G protein coupling. The older model is termed free collision coupling, where the G proteins are free to diffuse within the membrane and coupling occurs at random, leading to slow signalling, whereas the second model proposes a pre-coupled state in which the heterotrimeric G protein complex (α, β and γ sub-units) dissociates upon activation of the receptor by a ligand. The kinetics and coupling mechanisms in living cells are studied using fluoroscence resonance energy transfer (FRET) assays. Analysis of the FRET signal from interactions between the α2A-adrenergic receptor and labelled G$\beta\gamma$-subunits of Gi proteins suggested no significant pre-coupling between the receptor and G proteins.

When studying members of the G protein family in more detail, Dr Bünemann's group found that the subunits Gαi1, Gαi2, Gαi3 and Gαz do not fully dissociate upon activation of the receptor. They observed a rearrangement of the sub-units and found complete dissociation only for the highly homologous Gαo sub-unit. The difference in sub-unit behaviour upon receptor activation is unfortunately still not known, but might represent a novel mechanism for subtype selective cell signalling.

In general, I found the conference rather dissapointing. Even though it was advertised as covering a broad range of endocrinological aspects, the main emphasis was on clinical studies. All the 'meet the expert' sessions were purely clinical, discussing whether or not radioactive iodine should be given before the age of 18 and insulin pump therapy in children and adolescents. Also, I felt that this conference had a strong "bias" towards diabetes and obesity, two subjects which seem to be very popular in endocrinology at the moment. Nevertheless, I did learn some interesting things and would like to thank the BSCB very much for the opportunity to go to the conference, especially since Sweden is not known to be cheap!

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BSCB Autumn Meeting
Heriot Watt University 2–5 October 2005

An unseasonably sunny Scotland greeted more than 80 participants from the UK, Europe and the US., who gathered for the Society's autumn meeting on "Signalling and cytoskeletal dynamics during infection" in the Edinburgh Conference Centre at Heriot Watt University. The organiser, Michael Way (Cancer Research UK), had assembled an enticing programme of cutting-edge talks from leading experts studying cytoskeletal manipulation by bacteria, parasites and viruses.

By Richard D. Hayward

The meeting was sponsored by Science International AAS, PeproTech EC Ltd., Media Cybernetics U.K., Li-Cor Biosciences Ltd., Cancer Research UK, Company of Biologists, EMBO and The Royal Microscopical Society.

The plenary lecture on Sunday evening certainly lived up to this expectation. **Pascale Cossart** (Pasteur Institute, France) eloquently summarised two decades of work using genetics, post-genomics and cell biology to decipher how the food-borne bacterium *Listeria* manipulates the actin cytoskeleton of the host cell to force its own internalisation, actin-based motility and intercellular spread. Studying the subversive actions of the underlying virulence factors has not only enhanced understanding of listeriosis, but also contributed significantly to deciphering many fundamental cellular processes. Epitomising this, the most recent data from her laboratory demonstrate that by binding the host receptor E-cadherin, *Listeria* hijack the clathrin-dependent endocytic machinery to enter cells. These experiments also illuminated a novel cell–cell junction component (ARHGAP10) that controls the recruitment of α-catenin, a central linker between transmembrane receptors and the actin cytoskeleton.

Ari Helenius (Swiss Federal Institute of Technology, Switzerland) began the first session on Invasion by describing how many animal viruses, like adenovirus, influenza and SV40, differentially harness the cellular endocytic pathway to guide them through a complex entry and uncoating programme. Viruses can therefore be employed as tools to probe plasma membrane dynamics and membrane fusion and to define endocytic routes. To illustrate this, he showed how SV40 infection can be used to assess the specific dynamics, activation and assembly of cholesterol-rich caveolae. The obligate intracellular parasite *Toxoplasma gondii* also infects vertebrate cells, but by gliding, a phenotype that requires the collaborative action of secretory adhesins, molecular motors and factors involved in actin polymerisation. This gliding motility is powered by myosin A and requires actin filaments, but how the parasite controls actin polymerisation is unknown.

Dominique Soldati (University of Geneva, Switzerland) showed that apicomplexan genomes encode proteins homologous to eukaryotic actin regulatory proteins, in particular profilin- and formin-like proteins that contribute to this essential invasive process. **John Leong** (University of Massachusetts Medical School, USA) described how extracellular enterohaemorrhagic *E. coli* (EHEC) utilise a specialised 'type III' secretion system (TTSS) to deliver effector proteins into mammalian cells that reorganise the actin cytoskeleton into adhesion pedestals. One essential effector, Tir, inserts into the target plasma membrane and acts as a receptor for the bacterial surface protein intimin. He described exciting recent work in his laboratory showing that EHEC also translocates a second critical effector EspFU (also known as TccP) that mediates recruitment of the cellular actin assembly machinery to Tir. He presented the latest insights into the mechanism of EspFU and its co-operation with the cellular nucleation-promoting factor N-WASP, and reported apparent parallels between EHEC EspFU-dependent actin polymerisation and an ancestral auxiliary pathway employed by related enteropathogenic *E. coli*, also recently characterised by his group.

Freddy Frischknecht (University of Heidelberg, Germany) showed remarkable images of *Plasmodium* sporozoites within mosquito salivary glands, during injection, and inside the mammalian host. This *in vivo* imaging revealed unexpectedly that malarial sporozoites invade the lymphatic system

and interact with a surprisingly diverse repertoire of cell types. Although highly elastic *in vivo*, the crescent-like sporozoites move only in concentric circles *in vitro*, suggesting they might also provide a tractable experimental system with which to study cellular motility.

The dynamic organisation of the plasma membrane and its receptors remains an outstanding puzzle in cell biology. **Urs Greber** (University of Zurich, Switzerland), who chaired the session on 'Signalling at the plasma membrane and beyond', demonstrated how labelled adenovirus can be employed to monitor transmembrane receptor dynamics using total internal reflection fluorescence microscopy and rapid-rate imaging. Different motility modes could be classified and modelled, including confined motion due to receptor interaction, and both slow directional and fast processive movements of activated integrins. The bacterial enteropathogen *Salmonella* delivers a cocktail of effectors into target cells via a secretion system similar to that encoded by EHEC. These manipulate actin dynamics and force bacterial internalisation into intestinal epithelial cells.

Vassilis Koronakis (University of Cambridge) showed that effector delivery requires plasma membrane cholesterol, which binds to a conserved integral membrane TTSS translocon component. He also described how two *Salmonella* actin-binding proteins, SipC and SipA, co-operate to nucleate actin polymerisation independently of cellular components and stabilise the generated filaments by preventing their depolymerisation by host ADF/cofilin and gelsolin. New findings also provided insights into interplay between these *Salmonella* actin-binding proteins and other effectors that mimic cellular Rho GTPase nucleotide exchange factors and an inositol polyphosphatase.

In a related short talk, **Markus Schlumberger** (ETH Zurich, Institute of Microbiology, Switzerland) presented his recent work in Wolf-Dietrich Hardt's laboratory using fluorescent fusion proteins to monitor the delivery of *Salmonella* SipA in real-time, which was also awarded one of the poster prizes generously contributed by *Cellular Microbiology*.

Peter Cullen (University of Bristol) described sorting nexins, a large family of phox homology (PX) domain-containing proteins that regulate cargo sorting within the early endosomal network. In particular, he highlighted how modular sorting nexin-1 (SNX1) combines PX and a Bin/Amphiphysin/Rvs domain to associate with high curvature phosphatidylinositol-3-phosphate-rich early endosomal compartments, which also resemble *Salmonella*-containing vacuoles (SCVs). After dinner in the Scholar's Restaurant, the poster session was vivacious, promoting lively debate and interdisciplinary exchange of ideas, fuelled of course by the sponsored drinks.

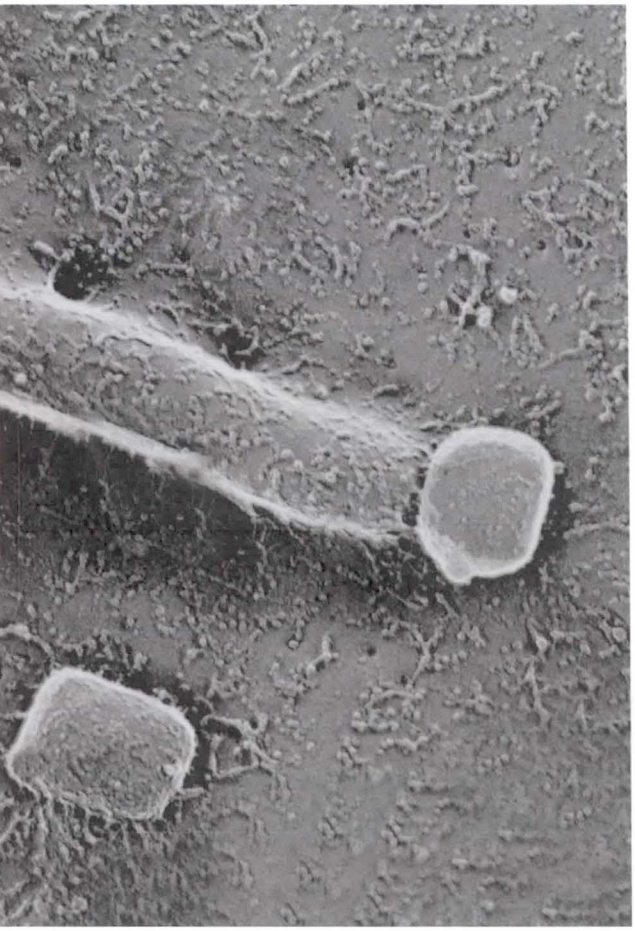
The Tuesday morning session 'Cytoskeleton and signalling during replication' began with **David Holden** (Imperial College London) describing the characterisation of a second TTSS in *Salmonella* using signature-tagged mutagenesis. This system controls bacterial replication and survival by delivering effector proteins across the vacuolar membrane which manipulate SCV biogenesis. Recent work in his laboratory shows that two effectors, SifA and SseJ, and microtubule motors coordinately influence SCV morphology, while SseG is required to localise SCVs in proximity to the Golgi, facilitating interactions between SCVs and the secretory pathway which promote pathogen replication.

Michael Way related how vaccinia virus is able to hijack the cytoskeleton of the cell at multiple stages of its lifecycle. *Vaccinia* utilise not only actin-based motility as do *Listeria*, but also microtubule-dependent movement and they can also induce cell motility and the formation of membrane extensions. He described exciting new data connected with the latter events, which reveal how the virus interferes with Rho GTPase regulation. **Kristen Hager** (University of Notre Dame, Indiana, USA) presented compelling evidence to support the hypothesis that *Toxoplasma gondii* uses γ-tubulin as a scaffold to remodel the host cytoskeleton to generate a protective intracellular niche that nevertheless permits selective nutrient delivery. Phagosome-associated actin might also fulfil such a role, by providing tracks to guide intracellular compartments like lysosomes to dock with phagosomes prior to their fusion.

Gareth Griffiths (EMBL Heidelberg, Germany) described with characteristic passion the evidence supporting this premise based on work with an *in vitro* system established in his laboratory, which uses latex bead phagosomes to monitor actin assembly on the phagosome membrane. He additionally presented recent findings supporting a role for pro-inflammatory signalling lipids in assembly.

In 'Getting to the cell periphery', **Greg Smith** (Northwestern University Medical School, Chicago,

Above: Looking down onto the intact surface of a cultured cell infected with vaccinia virus. Viral progeny on the exterior induce intracellular sub-membranous actin polymerisation, which creates membrane ridges behind the attached particles, allowing them to 'surf' across the cell surface to seek out a new target. Micrograph courtesy of John Heuser.



USA) showed how live-cell fluorescence microscopy of _-herpesviruses has revealed that anterograde and retrograde particle transport along microtubules in sensory axons is accompanied by changes in viral particle composition. **Tim Newsome** (Cancer Research UK), a postdoctoral fellow in Michael Way's laboratory, described how cellular tyrosine kinases regulate vaccinia virus transport. Intracellular vaccinia initially traverse the microtubule network to reach the plasma membrane by recruiting the kinesin motor complex. This interaction is regulated by Src-family kinases, which upon activation by the viral B5R protein, phosphorylate the viral protein A36R. This switch triggers kinesin dissociation and induces actin-dependent propulsion of cell-associated extracellular virus particles, assisting intercellular spread.

Matt Welch (University of California Berkeley, USA) described new model systems to investigate mechanisms of cellular actin polymerisation. He discussed how the bacterial pathogen *Rickettsia* is able to induce actin polymerisation by recruiting and activating the Arp2/3 complex using a bacterial nucleation promoting factor called RickA, and how baculoviruses induce actin polymerisation both in the infected cell cytosol and within the nucleus late in infection.

The morning after a night of intensive ceilidhing, the final session considered 'Exit at the plasma membrane'. **Daniel Kalman** (Emory University, Atlanta, USA) described work on Abl and Src family kinases involved in the pathogenesis of infectious microbes. He showed that motility and release of vaccinia virus and adhesion pedestal assembly by enteropathogenic *E. coli* depend on these kinases, and outlined recent work on kinase recruitment by **Bettina Bommarius** in his laboratory, which also appeared on her prize-winning poster. The prospects for applying kinase inhibitors like Gleevec as an alternative to conventional drugs were discussed.

Guy Tran Van Nhieu (Pasteur Institute, Paris) summarised how *Shigella* utilise TTSS-dependent effector delivery to trigger their internalisation by synergistically stimulating host Rho GTPases and Src tyrosine kinase. He described how ATP release through connexin channels enhances *Shigella* invasion and intercellular spread, and a fluorescence-based method to directly visualise translocated bacterial effectors within target cells.

Having donned our 3D glasses, we were guided through the fascinating ultrastructure of a poxvirus infected cell by **John Heuser** (St. Louis, USA), including a detailed examination of the membrane and cytoskeletal alterations that accompany membrane fusion, and the formation of the actin 'comet tails' that allow extracellular virions to 'surf' on the infected cell surface (see figure).

Quentin Sattentau (Oxford University) described the assembly of the 'virological synapse' by human immunodeficiency virus type-1, which requires viral envelope glycoprotein receptor engagement, associated adhesion molecules and the actin and microtubule cytoskeleton. These structures apparently allow communication between infected and uninfected CD4+ T cells, so might be central to cell-to-cell spread.

The relatively small size of this meeting fostered many productive discussions between the invited speakers, postdoctoral researchers and graduate students. Sincere thanks should go to Michael Way for organising such a scientifically productive and socially enjoyable meeting.

This report is merely intended to provide a flavour of the meeting. Owing to space constraints, it has not been possible to detail every presentation and poster. Apologies to those whose work has not been referred to directly.

Richard D. Hayward
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BSCB Annual Spring Meeting 2006
20–23 March, University of York

Monday 20 March

2:00	Registration
2:15-7.00 pm	BSCB/BSDB Committee Meetings (Tea/Coffee)
6.00-8.00	Dinner
8.30-9.30	**BSDB Plenary lecture: Cheryl Tickle** *Central Hall* Vertebrate limb development – roving from signal transduction to evolution

On the BSCB website...

Registration form
Abstract submission
Travel directions

www.bscb.org

Tuesday 21 March

7:30-8:25	Breakfast
8:25-9:25	**BSCB Plenary lecture: Ron McKay** *Central Hall*

Session I

BSCB: mES and mouse embryo germ layer specification

Central Hall

9.30-10:00	**Gordon Keller** (chair) Lineage specific differentiation of embryonic stem cells
10:00- 10:30	**Liz Robertson** Dose dependent nodal signals control germ layer formation in the early mouse embryo
10.30-11.00	Trade exhibition with tea/coffee and posters
11:00- 11:30	**Janet Rossant** Stem cells and lineage development in the early mouse embryo
11:30- 12:00	**Shinichi Nishikawa** New microarray database of intermediates generated in ES cell differentiation culture
12.00-2.00	Lunch, trade exhibition and posters: *Arts Centre Gallery* **Lunchtime Meeting** Getting a paper published *PL001*

BSDB: Imaging and temporal understanding of development

PX001

Richard Adams (chair) Keeping track of morphogenesis

Dan Kiehart Biophysical and genetic analysis of morphogenesis

Kat Hadjantonakis Seeing is believing: imaging mesoderm cells in action in ascidians and mice.
Scott Fraser Imaging the developmental mechanics of the vertebrate embryo

Session II

BSCB Out of the niche

PX001

2.00-2.30	**Austin Smith** (chair) Pluripotency and lineage restriction
Abstract Speaker	
2.45-3.00	Abstract Speaker
3.00-3.30	**Martin van Lohuizen** Polycomb repressors controlling stem cell fate: Implications for cancer and development
3.30-4.00	Trade exhibition with tea/coffee and posters
4.00-14.30	**Andreas Trumpp** c-Myc in stem cell self-renewal and differentiation mode
4.30-5.00	**Takashi Shinohara** Culture and genetic modification of male germline stem cells
5.00-6.00	**BSCB Hooke Medal lecture: David Owen** *Central Hall*
6.00-6.30	BSCB AGM Meeting *Central Hall*
6.00-8.00	Dinner *Galleria Restaurant*
8.00-10.00	Poster Session; Sponsored Bar

BSDB Developmental signals

Central Hall

Richard Harland (c2.30-2:45 Abstract Speaker

Abstract Speaker
Ottoline Leyser Hormone signalling and the control of branching

Andy McMahon Towards an understanding of the underpinnings of organ function: the mammalian kidney mode
David Strutt Frizzled-mediated co-ordination of cell polarity in *Drosophila*"

BSDB AGM Meeting *PX001*

Wednesday 22 March

7:30-8:45 Breakfast

Session III BSCB: Epithelial stem cells

Central Hall

9.00-9.30 **Fiona Watt** (chair) Culture and genetic modification of mouse male germline stem cells
9.30-9:45 Abstract Speaker
9.45-10.00 Abstract Speaker
10.00-10.30 **Barry Stripp** The airway stem cell hierarchy and its molecular regulation
10.30-11.00 Trade exhibition with tea/coffee and posters. *Arts Centre Gallery*
11.00-11:30 **Yann Barrandon** Stem cells of stratified epithelia
11.30-12.00 **Alan Clarke** The intestinal stem cell niche studied through conditional transgenesis
12.00-2.00 Lunch, trade exhibition and posters in Arts Centre Gallery
Lunch time meeting: Funding your research. *PL001*

BSDB: Developmental biology solving human disorders

PX001

Didier Stainier (chair) Endodermal organ development in zebrafish
Abstract speaker
Abstract speaker
Tanya Whitfield Zebrafish models of human deafness

David Tosh Transdifferentiation as a paradigm for understanding development and disease
Ethan Bier Title TBA

Session IV BSCB: HSCs

PX001

2.00-2.30 **Sten-Erik Jacobsen** (chair) Role of cytokines in regulation of haematopoietic stem cells and blood lineage development
2.30-2:45 Abstract Speaker
2:45-3:00 Abstract Speaker
3.00-3.30 **Ana Cumano** Haematopoietic cell development in the mouse embryo
3.30-4.00 Trade exhibition with tea/coffee and posters
4.00-4.30 **Roger Patient** Haematopoietic stem cell ontogeny in *Xenopus* and zebrafish
4.30-5.00 **Utpal Banerjee** Haematopietic development in *Drosophila*: origins, cell types, strategies and pathways
5.00-6.30 Poster session
6.30-7.30 **BSDB Medal Lecture - Waddington Medal** *Central Hall*
8.00-1.00am Conference Dinner and Disco/Salsa. *Merchant Adventurers Hall*

BSDB: HSPGs and development

Central Hall

Charles Emerson (chair) Self regulation of HSPG-mediated extracellular signalling
Abstract speaker
Abstract speaker
Scott Selleck From synapses to morphogen gradients: the varied (and interesting) lives of heparan sulphate proteoglycans

Isabel Guerrero Extracellular components as modulators of Hedgehog gradient formation in *Drosophila*
Jerry Turnbull Tuning heparan sulphate functions in mice and worms: sulphotransferases in neural cell migration and development

Thursday 23 March

7:30-8:45 Breakfast

Session V BSCB: Cancer stem cells

Central Hall

9.00-9.30 **Tariq Enver** (chair) Transcriptional programming in normal and leukaemic stem cells
9:30-9:45 Abstract Speaker
9:45-10:00 Abstract Speaker
10:00-10:30 **Dominique Bonnet** Prospective isolation of the most primitive adult murine mesenchmal stem cell subset with multipotent capacities *in vitro* and *in vivo*
10.30-11.00 Trade exhibition with tea/coffee and posters *Arts Centre Gallery*
11.00-11.30 **Brian Huntly** The cellular and molecular characterisation of leukaemia stem cells
11.30-12.00 **John Dick** Cancer stem cells: getting to the root of cancer

BSDB: Evolution and development

PX001

Peter Holland (chair) Homeobox gene evolution: new findings, new questions
Abstract speaker
Abstract speaker
Pat Simpson Evolution of the regulation of the achaete-scute genes and bristle patterns in *Diptera*

Nipam Patel The evolution of arthropod pattern formation: Insights from crustacean segmentation
Enrico Coen The genetic control of shape and form

Other forthcoming meetings

2006

Nervous System and Immune System: a struggle and a dialogue
30 January – 2 February, Portugal
www.ecsaude.uminho.pt/nervous/

Applications of Reverse Genetics of Viruses
3 February, Birkbeck College
www.euroscicon.com

Sepsis: New Insights, New Therapies
17 February, Clore Management Centre, Birkbeck College
www.novartisfound.org.uk

Comparative Immunology in the Post-genomic Era: mapping disease resistance/susceptibility genes
21 February, Birkbeck College
www.euroscicon.com

Visualising Transcription, Gene positioning and Reorganisation in the Nucleus
24 February, Birkbeck College
www.euroscicon.com

European Fission Yeast Meeting
15–19 March
www.wellcome.ac.uk

BSCB/BSDB Joint Spring Meeting
21–23 March, University of York
www.bscb.org

Integrated Biology of Crop Plants
29 March – 2 April
www.wellcome.ac.uk

Analysing the Phenotype and Function of Regulatory T cells
4 April, Birkbeck College
www.euroscicon.com

Weinstein Conference on Cardiovascular Development
11–13 May, St Petersburg, Florida
www.weinsteinmeeting.org

106th General Meeting of the American Society for Microbiology
21–25 May, Orlando, Florida
www.asm.org

The Culture of Science Editing: European Association of Science Editors
15–18 June, Krakow, Poland
www.ease.org.uk

Vascular Development
16 June, Clore Management Centre, Birkbeck College
www.novartisfound.org.uk

31st FEBS Congress
24–29 June, Istanbul, Turkey
www.febs2006.org

Tinkering – Mechanisms of Microevolution
14 July, Novartis Foundation, London
www.novartisfound.org.uk

Interactome Networks
30 August – 3 September
www.wellcome.ac.uk

Genome Perspectives on Host-Pathogen Interactions
6–10 September
www.wellcome.ac.uk

Acetaldehyde-related Pathology
8 September, Kings College London
www.novartisfound.org.uk

BSCB/The Royal Microscopical Society Autumn Meeting: Imaging and Trafficking
14–17 September, Royal Holloway College, London
Organisers: David Stephens and Rainer Duden
www.bscb.org

Genome Informatics
27 September – 1 October
www.wellcome.ac.uk

Mitochondria at the Heart of Life and Death
2 December, London
www.novartisfound.org.uk

2007

BSCB/BSDB/Genetic Society Joint Spring Meeting
29 March – 1 April, Heriot Watt University
Organisers: Sylvie Urbe and Angus Lamond
www.bscb.org

BSCB Autumn Meeting Abercrombie
9–12 September, St Catherine's College, Oxford
Organisers: Anne Ridley, Michelle Peckham and Peter Clark
www.bscb.org

Techniques in Molecular Biology
University of Hertfordshire

College Lane, Hatfield,
Herts AL10 9AB UK.
www.herts.ac.uk/stc

RNA Extraction And Analysis
A one-day laboratory/lecture course
29 June 2006
Contact: Dr Ralph Rapley

PCR Methods And Applications
A one-day laboratory/lecture course
30 June 2006
Contact: Dr Ralph Rapley

Introduction to Bioinformatics
A one-day practical/lecture course
4 July 2006
Contact: Dr Ralph Rapley

Immunology: Basic Terms and Techniques
A one-day laboratory/lecture course
6 July 2006
Contact: Mrs Vera Jones

Molecular Biology: Basic Terms and Techniques
A one-day laboratory/lecture course
7 July 2006
Contact: Dr Ralph Rapley

Proteins and Proteomics
A two-day laboratory course
4–5 September 2006
Contact: Dr Ralph Rapley

Nucleic Acids and Genomics
A three-day laboratory course
7–9 September 2006
Contact: Mrs Vera Jones

Details and application forms from:

Dr Ralph Rapley,
School of Life Sciences.
Tel: (01707) 284554; fax: 286137;
e-mail: R.Rapley@herts.ac.uk

Mrs Vera Jones,
Science Training Centre.
Tel:(01707) 284590; fax:286137;
e-mail: v.g.jones@herts.ac.uk

The British Society for Cell Biology

Financial Statements for the year ended 31 December 2004

Registered Charity number: 265816

Officers and Advisors

Executive Committee Members:

Dr. F. Watt (President)
Prof. M. Whitaker (Secretary)
Prof. M. Marsh (Treasurer)
Dr. K. Hodivala-Dilke (Meetings Secretary)
Dr. J. Pines (Membership Secretary)
Dr. J. Marsh (Newsletter Editor)
Dr. A. Ng (Website Co-ordinator)
Dr. V. Braga
Prof. G. Griffiths
Dr. M. Heck
Prof. A. Lamond
Prof. P. Luzio
Dr. S. Nurrish
Dr. R. Quinlan
Dr. J. Raff
Prof. L. Smythe
Dr. D. Stephens
Dr. M. Way
Dr. S. Urbe
Dr. S. Munro

Bankers:

HSBC Bank plc
Arlington Business Centre
Millshaw Park Lane
Leeds LS11 0PA

National Savings
Glasgow G58 1SB

Auditors:

Jacob Cavenagh & Skeet
Acorn House
2 Greenhill Crescent, Watford
Herts WD18 8AH

Contact Address:

c/o Prof. M Marsh
MRC LMCB
University College London
Gower Street
London, WC1E 6BT

Executive Committee's report for the year ended 31 December 2004

The Executive Committee (who are the trustees of the Society for the purposes of charity law) have pleasure in presenting their report and the audited accounts of the Society for the year ended 31 December 2004. These accounts have been prepared in accordance with the Charities Act 1993, the Statement of Recommended Practice 'Accounting & Reporting by Charities' (SORP 2000); and the constitution of the Society.

Officers and committee

Under the constitution of the Society the Officers of the Society are a President, a Secretary, a Treasurer, a Meetings Convenor, a Membership Secretary, a Newsletter Editor and a Website Co-ordinator. There is also an Executive Committee of the Society consisting of the Officers and twelve other elected members.

The Executive Committee is elected at the Annual General Meeting, with the Officers being elected by the Executive Committee and the President being nominated by the Executive Committee.

The Executive Committee prepares the Agenda for meetings of the Society, and between meetings acts as necessary on behalf of the Society; reporting on any such actions to the next meeting of the Society.

The individuals who served as officers and executive committee members during the year, and since the year-end, were as follows:

Dr. K. Ayscough (resigned 01/04/04)
Dr V Braga (appointed 01/04/04)
Prof. W. Earnshaw (resigned 01/04/04)
Prof. G. Griffiths
Dr M Heck (appointed 01/04/04)
Dr. K. Hodivala-Dilke
Prof. A. Lamond
Prof. P. Luzio
Dr. J. Marsh
Prof. M. Marsh
Dr. A. Ng
Dr. S. Nurrish
Dr. J. Pines
Dr. R. Quinlan
Dr. J. Raff
Prof. E. Smythe (appointed 01/04/04)
Dr D Stephens (appointed 01/04/04)
Dr. M. Way
Dr. F. Watt
Prof. M. J. Whitaker
Dr. S. Urbe (appointed 01/04/05)
Dr. S. Munro (appointed 01/04/05)

The executive committee members in office at the date of this report are detailed above.

Status & constitution

The Society is constituted under a constitution executed in 1965, and amended in 2002. The Society is a registered charity, number 265816.

Objects

The objects of the Society are to promote the advance of research in relation to all branches of cell biology and to encourage the interchange of information. The Society generally aims to fulfil these objects by organising and sponsoring two meetings each year on topics relevant to cell biology; issuing a twice yearly newsletter; and maintaining a website (www.bscb.org).

Review of Activities

At the beginning of April the Society held a Annual Spring Meeting at the University of Kent. On this occasion the meeting was solely a BSCB event and was not held jointly with the British Society for Developmental Biology [BSDB]. The meeting, titled 'Cell Structure and Dynamics' was very successful and attracted more than 300 delegates.

In September the Society held an Autumn Workshop on 'Cell cycle regulation of meiosis' at the International Centre for Life in Newcastle-upon-Tyne.

In response to an increase in the number of applications in 2004, the Society almost doubled its support of The Honor Fell Travel Award scheme. In total 93 awards were made, which included bursaries for one scientist from Eastern Europe and two undergraduate students to attend the Spring Meeting in Canterbury. The other 90 awards, which in total cost around £37,000, allowed graduate student and postdoctoral members of the society to attend national and international meetings.

Further details of the Society's activities throughout the year and meeting reports can be found in the half yearly magazine, available on the Society's website (www.bscb.org). The financial results of the Society are set out on page 41.

Reserves
The Executive Committee regularly reviews the reserves of the charity to ensure that sufficient liquid funds are available for the Society to meet its ongoing obligations. The reserves throughout the period have been adequate to fulfil this objective.

Investment Policy
The Executive Committee's policy at present is to invest in low-risk and reasonably liquid assets, so that funds are available to meet any unforeseen needs that arise as a consequence of meeting activities.

Risk assessment
The major risks to which the Society is exposed, as identified by the Executive Committee, have been reviewed in the year and systems are in place to mitigate those.

Executive Committee's Responsibilities
Charity law requires the Executive Committee to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the Society and of the surplus or deficit for that period. In preparing those financial statements, the Executive Committee have:
- selected suitable accounting policies and then applied them consistently;
- made judgements and estimates that are reasonable and prudent;
- prepared the financial statements on the going concern basis unless it is inappropriate to assume that the Charity will continue in existence.

The Executive Committee has overall responsibility for ensuring that the Society has an appropriate system of controls, financial and otherwise. It is also responsible for keeping proper accounting records which disclose with reasonable accuracy at any time the financial position of the Society. It is also responsible for safeguarding the assets of the Society and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Governance and internal control
The Executive Committee is also responsible for implementing systems of internal control which provides reasonable assurance that:
- the Society is operating efficiently and effectively;
- its assets are safeguarded against unauthorised use or disposition;
- proper records are maintained and financial information used within the charity or for publication is reliable;
- the Society complies with relevant laws and regulations.

The systems of internal control are designed to provide reasonable, but not absolute, assurance against material misstatement or loss. They include:
- delegation of authority and segregation of duties;
- identification and management of risks.

Report Of The Independent Auditors To The Executive Committee Of The British Society For Cell Biology
We have audited the financial statements of The British Society for Cell Biology for the year ended 31 December 2004 which comprise of the Statement of Financial Activities, the Balance Sheet and the related notes. These financial statements have been prepared under the historical cost convention and the accounting policies set out therein.

This report is made solely to the Society's Executive Committee, as a body, in accordance with section 44 of the Charities Act 1993. Our audit work has been undertaken so that we might state to the Executive Committee those matters we are required to state to it in an auditors' report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Society and the Society's Executive Committee as a body, for our audit work, for this report, or for the opinions we have formed.

Respective responsibilities of Executive Committee and auditors
The Executive Committee (who are the trustees of the Society for the purposes of charity law) are responsible for preparing the Executive Committee's Report and the financial statements in accordance with applicable law and United Kingdom Accounting Standards as set out in the Statement of Executive Committee's Responsibilities above.

We have been appointed auditors under section 43 of the Charities Act 1993 and report in accordance with regulations made under section 44 of that Act. Our responsibility is to audit the financial statements in accordance with relevant legal and regulatory requirements and United Kingdom Auditing Standards.

We report to you our opinion as to whether the financial statements give a true and fair view and are properly prepared in accordance with the Charities Act 1993. We also report to you if, in our opinion, the Executive Committee's Report is not consistent with the financial statements, if the Society has not kept proper accounting records, or if we have not received all the information and explanations we require for our audit.

We read other information contained in the Executive Committee's Report, and consider whether it is consistent with the audited financial statements. We consider the implications for our report if we become aware of any apparent misstatements or material inconsistencies with the financial statements. Our responsibilities do not extend to any other information.

Basis of opinion
We conducted our audit in accordance with United Kingdom Auditing Standards issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgements made by the Executive Committee in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Society's circumstances, consistently applied and adequately disclosed.

We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or other irregularity or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the financial statements.

Opinion
In our opinion the financial statements give a true and fair view of the state of the Society's affairs as at 31 December 2004 and of its incoming resources and application of resources, including it's income and expenditure, in the year then ended and have been properly prepared in accordance with the Charities Act 1993.

Jacob Cavenagh & Skeet
Chartered Accountants and Registered Auditor
Acorn House, 2 Greenhill Crescent
Watford, Herts WD18 8AH

Statement of financial activities for the year to 31 December 2004

	2004			2003
	Unrestricted	*Restricted*	*Total*	*Total*
	£	£	£	£
Incoming resources				
Donations, legacies & similar incoming resources[2]	25,000	20,000	5,000	41,204
Activities in furtherance of the charities objects				
Meetings	134,717	–	104,456	106,56
Subscriptions	25,348	–	25,348	23,573
Investment income	4,925	–	4,925	3,945
Other income	31	–	31	–
Total incoming resources	190,021	20,574	210,595	175,178
Resources expended				
Charitable expenditure				
Grants payable in furtherance of the charity's objects				
Honor Fell travel awards[2]	17,459	20,000	37,459	26,612
Costs of activities in furtherance of the charity's objects				
Costs of meetings	153,933	574	154,507	113,439
Newsletter costs	12,262	–	12,262	5,411
Website expenses	1,945	–	1,945	970
Management and administration[5]	11,308	–	11,308	7,165
Total resources expended	196,907	20,574	217,481	153,597
Net movement in funds for the year	(6,886)	–	(6,886)	21,581
Funds brought forward at 1 January	182,944	–	182,944	161,363
Funds carried forward at 31 December	176,058	–	176,058	182,944

Balance sheet as at 31 December 2004

		2004		2003
	£	£	£	£
Current assets				
Debtors:				
Other debtors		–		3,248
Prepayments and accrued income		2,916		8,307
Cash at bank and in hand:				
National Savings Investment Account		60,668		58,495
HSBC Bank Accounts		124,382		119,069
		187,966		189,119
Less: Creditors falling due within one year				
Income received in advance	1,000		–	
Creditors and accruals	10,908		6,175	
		11,908		6,175
Net Assets		176,058		182,944
Funds				
Unrestricted funds		176,058		182,944
		176,058		182,944

Notes to the accounts for the year ended 31 December 2004

1. Accounting Policies

a) Basis of accounting

The financial statements are prepared under the historical cost convention and in accordance with applicable Accounting Standards; the Statement of Recommended Practice 'Accounting and Reporting by Charities' (issued October 2000) and the Charities Act 1993.

The Society has taken advantage of the exemption in Financial Reporting Standard 1 from producing a cash flow statement, on the grounds that it would have been a small company had it been a company incorporated under companies' legislation.

b) Funds

General unrestricted funds represent the funds of the Society that are not subject to any restrictions regarding their use and are available for application on the general purposes of the Society.

Restricted funds are those subject to specific trusts, which may be declared by the donor or with their authority. The restricted funds of the Society are restricted income funds given for specific purposes which are expendable at the discretion of the Executive Committee in accordance with particular activities of the Society.

c) Incoming Resources

Donations and similar incoming resources are accounted for when receivable. Subscriptions and mailing list sales represent amounts receivable during the year. Meetings income is recognised in the period when the meeting takes place and investment income and bank interest are the amounts receivable for the year.

d) Resources Expended

Expenditure represents purchases and expenses incurred during the year including irrecoverable VAT. All expenditure is recognised on an accruals basis, with advance expenditure for meetings being deferred until the period when the meeting takes place. Transactions in foreign currency are translated at the rate ruling on the date of the transaction. Balances denominated in foreign currencies are retranslated at the year-end, with the gain or loss on retranslation going through the Statement of Financial Activities for the year. Management and administration comprises all the expenditure incurred in connection with the management and administration of the charity. Grants and awards are accounted for when paid over, or when awarded, if that award creates a binding obligation on the charity.

e) Joint arrangement

The share of income and expenditure from joint arrangements to put on meetings in the year is accounted for under the appropriate heading in the Statement of Financial Activities (see note 4).

2. Grants made

A grant of £45,000 was received from The Company of Biologists during the year. £20,000 of this was restricted for funding the Honor Fell Awards and £25,000 was unrestricted. Honor Fell travel awards represent grants made to members to enable them to travel to meetings of the Society. During the year grants totaling £37,459 were made to 93 individuals (2003: £26,612 to 68 individuals). No individual grants or travel awards exceeded £1,000 in the year.

3. Executive Committee members & Employees

No Executive Committee member or any person connected with them received, or is due to receive, any remuneration for the year directly or indirectly from the Society's funds. Twelve (2003: four) Executive Committee members received a total of £2,673 (2003: £1,364) in respect of reimbursed travel expenses during the year. The Society has no employees. Charity funds were used to purchase trustee indemnity insurance during the year (£919). Charity funds were used to purchase trustee indemnity insurance during the year (£798).

4. Joint arrangements

No joint arrangements were made for 2004 but during 2003 the Society entered into two joint arrangements: with the Society for Developmental Biology for the meeting in Warwick and with the British Association for Cell Research for the meeting in Oxford.

5. Management and Administration expenses

Management and administration expenses are analysed as follows:

	2002			2001
	Unrestricted	Restricted	Total	Total
	£	£	£	£
Secretarial	706	–	706	700
Executive Committee expenses	3,316	–	3,316	2,439
Subscriptions	2,292	–	2,292	509
Bank charges	678	–	678	464
Exchange losses	922	–	922	449
New Hooke Medals	838	–	838	–
Auditors' remuneration: Audit	1,275	–	1,275	1,250
Accountancy	1,281	–	1,281	1,354
	7,165	**–**	**7,165**	**11,485**

6. Restricted funds

	Balance b/f	Incoming resources	Resources expended	Balance c/f
	£	£	£	£
Honor Fell Fund	–	20,000	20,000	–
	–	**20,000**	**20,000**	**–**

The Honor Fell Fund relates to funds granted specifically to enable the making of grants to student delegates to cover the costs of travel to meetings of the Society.

Application to join the BSCB

Please complete and return along with a signed Direct Debit mandate to:
Margaret Clements, c/o The Company of Biologists Ltd., 140 Cowley Road, Cambridge CB4 0DL, UK

Name: ..... Mr/Ms/Mrs/Dr/Prof

Position: ..... Male/Female

Academic qualifications: .....

Email: .....

Telephone: .....

Fax: .....

Address: .....

.....

..... Postcode: .....

Research interests: .....

.....

Membership of other societies:

.....

BSCB Member	Proposer	Seconder
Name:	.....	.....
Membership Number:	.....	.....
Signature:	.....	.....

Applicants without proposers should enclose a brief CV

The society has a searchable database of its members on the BSCB web page. This list is not sold or distributed in any other way. Your details will be included only if you tick this box ☐

Applicant's signature: ..... Date: .....

British Society for Cell Biology

DIRECT Debit

Please complete parts 1, 2, 3, 4 and 6 to instruct your branch to make payments directly from your account. Then return the form to: British Society for Cell Biology, c/o Margaret Clements, The Company of Biologists Ltd., 140 Cowley Road, Cambridge CB4 0DL, UK

To The Manager, Bank/Building Society

.....

Address

.....

.....

..... Postcode .....

Originator's identification number | 9 | 4 | 1 | 4 | 5 | 1 |

FOR BSCB USE ONLY

This is not part of the instruction to your bank/building society

5. Originator's reference number (for office use only) **BRITSO** | | | | |

1. Please write the full postal address of your branch in the box above.

2. Name of account holder

.....

3. Account number | | | | | | | | |

4. Sort code | | | — | | | — | | |

Banks/Building Societies may refuse to accept instructions to pay direct debits from some types of account.

6. Instructions to the Bank or Building Society

Please pay the British Society for Cell Biology Direct Debits from the account detailed on this Instruction subject to the safeguards assured by the Direct Debit Guarantee.

Signature .....

Date .....

This guarantee should be detached and retained by the payee

The Direct Debit guarantee

- This guarantee is offered by all Banks and Building Societies that take part in the Direct Debit scheme. The efficiency and security of the scheme is monitored and protected by your own Bank or Building Society.
- If the amounts to be paid or the payment dates change, the BSCB will notify at least 14 days in advance of your account being debited or as otherwise agreed.
- If an error is made by the BSCB or by your Bank/Building Society, you are guaranteed a full and immediate refund from your branch of the amount paid.
- You can cancel a Direct Debit at any time, by writing to your Bank or Building Society. Please also send a copy of the letter to the BSCB.

Honor Fell Travel Awards

Jointly funded by the BSCB and the Company of Biologists

Honor Fell Travel awards are made to provide financial support for BSCB members, usually at the beginning of their research careers, to attend meetings. Applications are considered for any meeting relevant to cell biology. The amount of the award depends on the location of the meeting. Awards will be up to £250 for UK meetings (except for BSCB Spring or Autumn Meetings for which the registration and accommodation costs will be made, even in excess of £250), up to £300 for European meetings and up to £400 for meetings in the rest of the world. Awards are made throughout the year.

The following rules apply:

- Awards are not normally made to applicants over 35 years of age.
- Applicants must have been a BSCB member for at least a year or be in the first year of their PhD.
- No applicant will receive more than one award per year or three in toto.
- The applicant must contribute a poster or a talk on/at which they should acknowledge BSCB support.

No single lab will receive more than £1000 per year.

Applications should be sent to:
Jordan Raff, The Wellcome Trust/CR UK Gurdon Institute, Tennis Court Road, Cambridge CB2 1QN

All applications must contain the following:

- **the completed and signed application form (below)**
- **a copy of the abstract being presented**
- **proof of registration and travel costs**
- **a copy of the completed meeting registration form.**

First-year PhD students should send a copy of their BSCB membership application.

Application for an Honor Fell travel award

Full name and Mailing address:

.....

.....

.....

.....

.....

Email address: .....

Age: .....

BSCB Membership number: .....

❑ I have been a BSCB member for more than one year

The years of previous Honor Fell Travel Awards:.....

Degrees with dates: .....

.....

Present Position: .....

Number of Meetings attended last year:

.....

Meeting for which application is made (title, place and date):

.....

.....

.....

Expenses:

Travel: .....

Registration: .....

❑ I have included proof of registration and travel costs

Have you submitted any other applications for financial support?
YES/NO (delete as applicable)
If YES give details including, source and whether these monies are known to be forthcoming.

.....

.....

Supporting statement by Head of Laboratory:

This applicant requires these funds and is worthy of support. I recognise that in the event of non-attendance at the meeting, the applicant must return the monies to the BSCB and I accept the responsibility to reimburse BSCB if the applicant does not return the funds.

❑ My laboratory has not received more than £1000 in Honor Fell Travel Awards this calendar year.

Signature:.....

Name:.....

Applicant's
Signature: .....
Name: .....

Undergraduate bursaries to attend the BSCB Spring Meeting

Administered through the Honor Fell Travel Award Scheme
Jointly funded by the BSCB and the Company of Biologists

Undergraduate Bursaries are made to provide financial support for undergraduates currently studying cell biology or a related degree subject to attend the BSCB Spring Meeting. The award will cover the registration and accommodation costs of attendance. Travel costs are expected to be met by the University that the undergraduate attends.

The following rules apply:

- Awards are made to undergraduates in their final year of study.
- Applicants must be studying for a Cell Biology or related degree.
- Applications must be accompanied by a half page justification from the student **and** by a supporting statement from the supervisor of studies or course organiser.

Applications should be sent to: Jordan Raff, Wellcome/Cancer Research UK Institute, University of Cambridge, Tennis Court Road, Cambridge CB2 1QR.

All applications must contain:

- **the completed and signed application form (below)**
- **statements from both the student and course organiser.**

- The statement from the student should include details on why they wish to attend, what they hope to gain and also aspects of cell biology that to date they have found interesting.
- The statement from the course co-ordinator should indicate the course being undertaken by the student and reflect the calibre of the student, their enthusiasm for the subject and why they believe the student will benefit from the experience of attending the meeting.

Application for an undergraduate Honor Fell travel award

Full name and Work address
(write clearly – this will be used as a return label)

.....
.....
.....
.....
.....

E-mail address: .....
Age: .....
Institution attended: .....
Degree course: .....
.....

Main cell biological interests: .....
.....

Supporting statement by Head of Department or Course Co-ordinator: This applicant requires these funds and is worthy of support. The University/Department also agrees to pay the travel costs for the named undergraduate to attend the meeting.

Signature: .....
Name: .....

Applicant's
signature: .....
Name: .....

DEADLINE FOR APPLICATIONS: 31 January 2006

British Society for Cell Biology
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Schools Liaison Officer
David Archer
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Tel: 0118 962 2045

The BSCB newsletter is published twice a year in June and December.

Submission:
If you have an idea for an article please e-mail the editor a brief outline first. Appropriate colour images are welcomed for consideration for the front cover.

It is preferable to send all articles, reports and images by e-mail (though alternatives can be arranged after contacting the editor). Attachments for text are best received in Microsoft Word and images as 200-300 dpi JPEG/TIFF or Photoshop files. Hard copy images can also be sent.

Submission of articles and images should be made to
Dr Joan Marsh, John Wiley & Sons, International House, Ealing Broadway Centre, London W5 5DB. Tel: 020 8326 3846.
Fax: 020 8326 3802. e-mail: jmarsh@wiley.co.uk

Meetings:
Please note there is no charge to advertise a scientific or educational meeting. Please contact the editor with details of any meeting you wish to advertise.

Deadlines:
For the final version of articles and other materials and adverts is 1 April for publication in June and 1 October for publication in December.

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Regular member £35
Student, school teacher, retired member £15
Overseas members paying by bankers draft:
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If you are still paying by standing order, please cancel it and set-up direct debit. Those members who do not have a UK bank account should pay by bankers draft in pounds sterling payable to 'the British Society for Cell Biology'.

New members should complete an application form to join the BSCB (form on p28) and include it with their subscription dues. Send direct debit forms, bankers drafts and any membership application forms to Margaret Clements, Department of Zoology, Downing Street, Cambridge, CB2 3EJ.

Postmaster and General Inquiries
Send changes of address, amendments, and general queries to:
Margaret Clements, BSCB assistant, Department of Zoology, Cambridge University, Downing Street, Cambridge CB2 3EJ.
Tel: +44 (0)1223 336655 Fax: +44 (0)1223 353980,
E-mail: BSCB@zoo.cam.ac.uk
Invoices: send to: Professor Mark Marsh, Cell Biology Unit, MRC Laboratory for Molecular Cell Biology, University College London, Gower Street, London WC1E 6BT.

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For further information on commercial advertising contact:
Margaret Clements
c/o The Company of Biologists Ltd.
140 Cowley Road, Cambridge CB4 0DL, UK
Tel: +44 (0)1223 425525
Email: BSCB@biologists.com

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BSCB members are entitled to a 25% discount from the individual subscription rate to all journals published by the **Company of Biologists**, and other discounts from other publishers. To take advantage of this offer, quote your BSCB membership number when ordering your subscription.

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- *Journal of Cell Science:* paper only £172/$295; online only £45/$77; paper and online £215/$365
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The following journals from **John Wiley & Sons** have discounts of 25–65% (*https://secure.interscience.wiley.com/order_forms/bscb.html*)

Journal	BSCB rate	Standard rate
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Developmental Dynamics	$125	$165
Genesis	$60	$99
Journal of Cellular Biochemistry	$350	*
Journal of Morphology	$175	*
Microscopy Research and Technique	$295	$595

* No standard individual rate available; only available to institutions

NB: The price for the *Journal of Morphology* is now $175. If there are any members who have ordered the journal at the $150 rate, those orders will be honored.

Traffic discounted prices:
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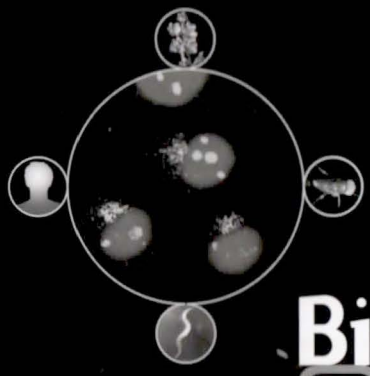

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